BELIMO

Technical Documentation
Globe Valves

Effective September 2008

Belimo Project: Sonoma State University, Sonoma, California

Electronic Globe Valves

G2…(S), G3…(D) Series

G2…(S)	**Two-way Screwed** **Bronze or Stainless Trim**
G3…(D)	**Three-way Screwed** **Bronze Trim**

Three-way Valves available in Mixing or Diverting

½" to 2"

Service	**Chilled/hot water,** **60% glycol, steam (G2, G2S)**
C_v Range	**0.4-40** (Two-way) **2.2-41** (Three-way Mixing) **4.4-40** (Three-way Diverting)
Material	**Stainless steel stem,** **Bronze plug or** **Stainless plug**
Control	**On/Off, Floating, 2-10 VDC** **Multi-Function Technology®** **Spring Return or** **Non-Spring Return**

FEATURES

- Self-adjusting stroke
- Visual sliding stroke indicators
  – Position indicators adjusted automatically
- Assembly can be mounted with valve stem horizontal to the pipe
- Self locking valve coupling

BENEFITS

- Utilizes full control signal for maximum resolution
- Speeds installation and system check
- Piping flexibility
- Proper valve-actuator connection is ensured

Electronic Flanged Globe Valves

G6…(S), G7…(S) Series

G6…(S)	**Two-way Flanged Bronze or Stainless Trim**
G6…(S)-250	**Two-way Flanged ANSI 250 Bronze or Stainless Trim**
G7…(S)	**Three-way Flanged Bronze or Stainless Trim**
G7…(S)-250	**Three-way Flanged ANSI 250 Bronze or Stainless Trim**

Three-way Valves available in Mixing or Diverting

2½" to 6"

Service	**Chilled/hot water, 60% glycol, steam (G6, G6S)**
C_v Range	**65-344** (Two-way) **68-340** (Three-way Mixing) **68-248** (Three-way Diverting)
Material	**Stainless steel stem, Bronze plug or Stainless plug**
Control	**On/Off, Floating, 2-10 VDC** **Multi-Function Technology®** **Spring Return or Non-Spring Return**

FEATURES

- Complete flanged product range
- Mixing or diverting options
- Multi-Function Technology®
- ANSI 125/ANSI 250

BENEFITS

- Fits wide range of applications
- Piping flexibility
- Capable of any control signal
- Suitable for piping systems

Pressure Compensated Flanged Globe Valves

G6…C Series

G6…C	**Two-way Pressure Compensated**
G6…CS	**Two-way Pressure Compensated Stainless Steel Trim**
G6…LCS	**Two-way Pressure Compensated Stainless Steel Trim Linear Characteristic**
2½" to 6"	
Service	**Chilled/hot water, 60% glycol, steam**
C_V Range	**65 – 344**
Material	**Stainless steel stem, Bronze plug or Stainless plug**
Control	**On/Off, Floating** **Multi-Function Technology®** **Spring Return or Non-Spring Return**

FEATURES

- Balanced Plug Design
- Spring Return Solutions for up to 6" Valves
- Bronze or Stainless Trim

BENEFITS

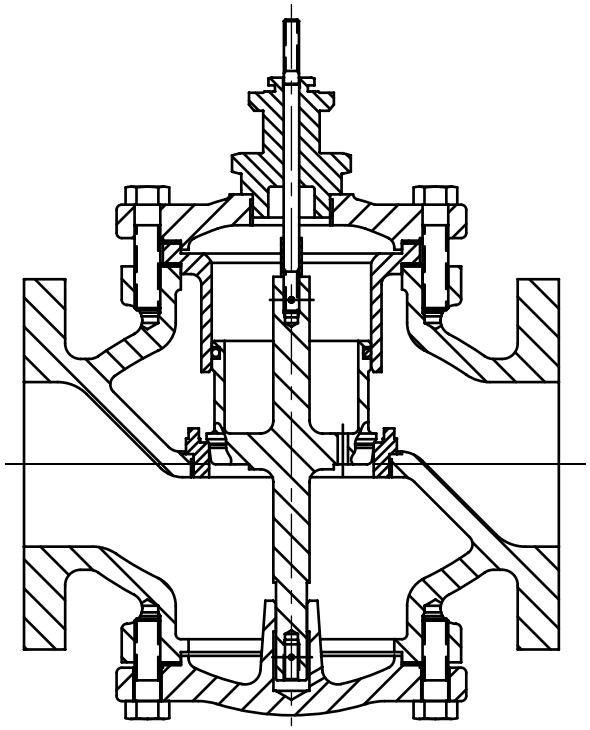
- Perfect for high close-off requirements
- Fail-safe on larger valves
- Covers wide range of operating temperatures

Belimo G6..C(S) Series Pressure Compensated Flanged Globe Valves

Better than Double Seated Solutions...

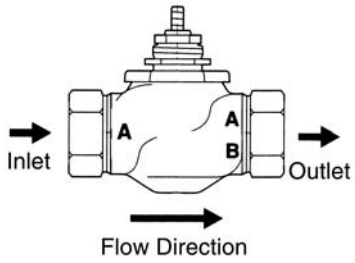
A TIGHTER SEAL

The Belimo Pressure Compensated Flanged Globe Valve utilizes a balance plug design that offers high close-off pressures similar to a double seated valve. However, the Belimo Pressure Compensated Valve does not have the drawbacks of a traditional double seated valve that require the user to accept a high bypass leakage. Belimo Pressure Compensated Flanged Globe Valves are rated with an ANSI Class III or and ANSI Class IV bypass leakage rate, which is consistent with standard flanged globe valves in the market today.



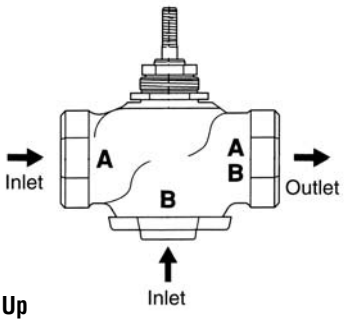
FLOW PATTERN

G2 2-way Valve



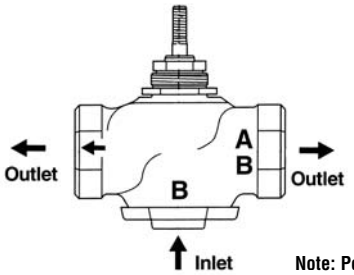
Stem Up
Open A to AB

G3 3-way Mixing Valve



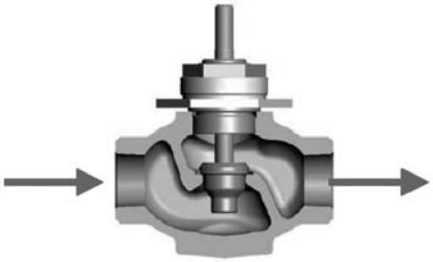
Stem Up
Open B to AB

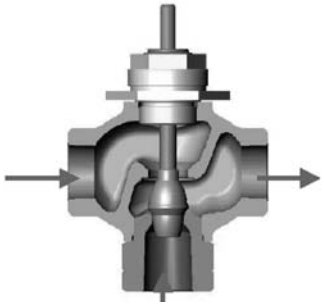
G3…D 3-way Diverting Valve

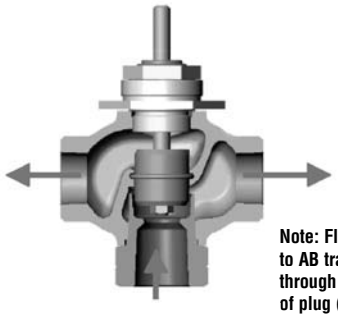


Stem Up
Open B to AB

Note: Ports are labeled B, AB, and ➡







All Valves Shown Stem Down

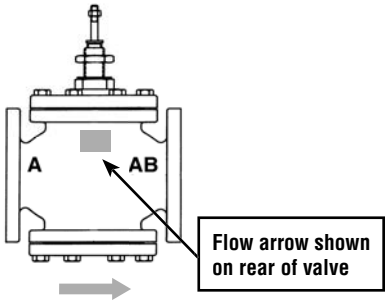
Note: Flow B to AB travels through center of plug (as shown).

DEFAULT SET-UP:

		SPRING ACTION	2-WAY VALVE	2-WAY VALVE	3-WAY MIXING VALVE	3-WAY MIXING VALVE
			DEFAULT	SPECIFY UPON ORDERING	DEFAULT	SPECIFY UPON ORDERING
NON-SPRING RETURN	**NV Series** NV(D)24-3 US NV(D)24-MFT US NVG24-MFT US	**NA**	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change reverse the switch S3.1.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change reverse the switch S3.1.	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change reverse the switch S3.1.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change reverse the switch S3.1.
SPRING RETURN	**NVF Series** NVFD24-3 US NVFD24-MFT US NVF24-MFT US	**Spring Up** **Stem Up**				
SPRING RETURN	**NVF-E Series** NVFD24-E US NVF24-MFT-E US	**Spring Down** **Stem Down**				
					3-WAY DIVERTING VALVE	
NON-SPRING RETURN	**NV Series** NV(D)24-3 US NV(D)24-MFT US NVG24-MFT US	**NA**				
SPRING RETURN	**NVF Series** NVFD24-3 US NVFD24-MFT US NVF24-MFT US	**Spring Up** **Stem Up**			**NC:** Closed B to ➡ will open upon increase in signal/power. Note: To change reverse the switch S3.1.	**NO:** Open B to ➡ will open upon increase in signal/power. Note: To change reverse the switch S3.1.
SPRING RETURN	**NVF-E Series** NVFD24-E US NVF24-MFT-E US NVF24-MFT-E US	**Spring Down** **Stem Down**				

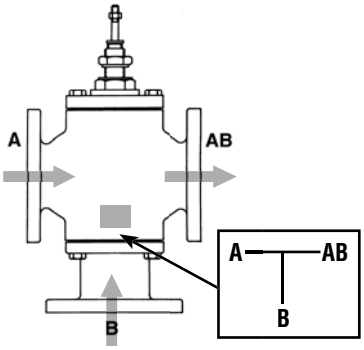
FLOW PATTERN

G6 2-way Valve



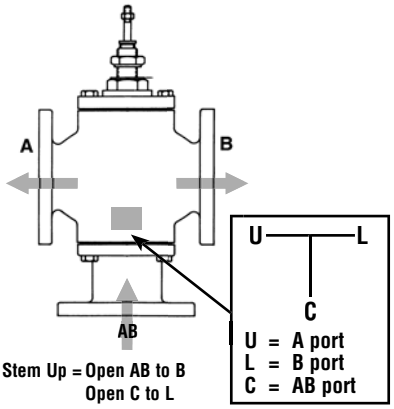
Stem Up = Open A to AB

G7 3-way Mixing Valve



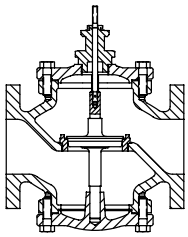
Stem Up = Open B to AB

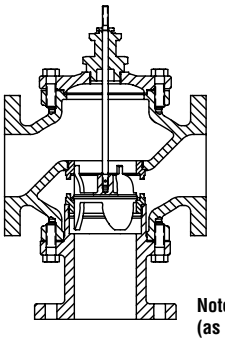
G7…D 3-way Diverting Valve



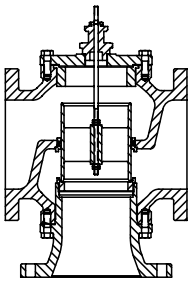
Stem Up = Open AB to B
Open C to L

Flow Pattern is marked on valve.





Note: Flow through ported plug (as shown Open A to AB).



Note: Flow AB to A travels through center of plug (as shown).

All Valves Shown Stem Down

DEFAULT SET-UP:

		2-WAY VALVE		3-WAY VALVE	
		DEFAULT	SPECIFY UPON ORDERING	**DEFAULT**	SPECIFY UPON ORDERING
NON-SPRING RETURN STAYS IN LAST POSITION	**GM Series**	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse CW/CCW switch.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse CW/CCW switch.	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse CW/CCW switch.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse CW/CCW switch.
	NV Series	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse S3.1 switch in actuator.		**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse S3.1 switch in actuator.	
	NVG Series	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse S3.1 switch in actuator.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse S3.1 switch in actuator.	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse S3.1 switch in actuator.	**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse S3.1 switch in actuator.
SPRING RETURN NOTE FAIL POSITION	**AF24 US**	**NO/FO** Valve: Open A to AB will drive closed. **Spring Action:** Will spring open A to AB upon power loss.	**NC/FC** Valve: Closed A to AB will drive open. **Spring Action:** Will spring closed A to AB upon power loss.	**NO/FO** Valve: Open A to AB will drive closed. **Spring Action:** Will spring open A to AB upon power loss.	**NC/FC** Valve: Closed A to AB will drive open. **Spring Action:** Will spring closed A to AB upon power loss.
	AF24-MFT US	**NC/FO** Valve: Closed A to AB will open upon increase in signal. Note: To change valve to A to AB open, reverse CW/CCW switch. **Spring Action:** Will spring open A to AB upon power loss.	**NO/FC or NC/FC** Valve: Can be open or closed, will drive closed or open A to AB (can be chosen with CW/CCW switch). **Spring Action:** Closed A to AB upon power loss.	**NC/FO** Valve: Closed A to AB will open upon increase in signal. Note: To change valve to A to AB open, reverse CW/CCW switch. **Spring Action:** Will spring open A to AB upon power loss.	**NO/FC or NC/FC** Valve: Can be open or closed, will drive closed or open A to AB (can be chosen with CW/CCW switch). **Spring Action:** Closed A to AB upon power loss.
			NO/FO Valve: Open A to AB **Spring Action:** Will spring open A to AB upon power loss. (**NO or NC** action can be chosen with CW/CCW switch).		**NO/FO** Valve: Open A to AB **Spring Action:** Will spring open A to AB upon power loss. (**NO or NC** action can be chosen with CW/CCW switch).
	NVF… and NVF…-E	**NC:** Closed A to AB, will open upon increase in signal/power. Note: To change valve to A to AB open, reverse S3.1 switch in actuator. Spring return direction is fixed by model. NVF… Spring Open, NVF…-E Spring Closed.		**NO:** Open A to AB, will close upon increase in signal/power. Note: To change valve to A to AB closed, reverse S3.1 switch in actuator. Spring return direction is fixed by model. NVF… Spring Open, NVF…-E Spring Closed.	

G2	14	S	NVD	24	-MFT	
Valve Type G2 = 2-way NPT G3 = 3-way NPT G6 = 2-way Flanged G7 = 3-way Flanged	**Valve Size** 12-50 = 1/2"–2" 65-150 = 2.5"–6" (Flanged)	**Trim Material** Blank = Bronze Trim S = Stainless Trim -250 = ANSI 250 Bronze Trim S-250 = ANSI 250 Stainless Trim C = Bronze Trim Pressure Compensated CS = Stainless Trim Pressure Compensated LCS = Stainless Trim Pressure Compensated D = Diverting Bronze Trim DS = Diverting Stainless Trim	**Actuator Type** Non-Spring Return NVD… NV… NVG… LM… NM… AM… GM… Spring Return NVFD… NVF… LF… NF… AF…	**Power Supply** 24 = 24 VAC/DC 120 = 120 VAC	**Control** Blank = On/Off -3(X1) = On/Off, Floating Point -SR = 2-10 VDC -MFT or MFTX1= Multi-Function Technology -MFT95 = 0-135 Ω	S = Built-in Auxiliary Switch

ORDERING EXAMPLE

1 Choose the valve actuator combination.

G214+NVD24-MFT US | **+NO** | **+Tagging (if needed)**

2 Specify preference or configuration.

3 **For MFT orders only - select programming code**

4 Does order require tagging?

Set-Up

Non-Spring Models
NO = Normally Open
NC = Normally Closed

Spring Return Models
NO/FO = Normally Open/Fail Open
NO/FC = Normally Open/Fail Closed

NC/FO = Normally Closed/Fail Open
NC/FC = Normally Closed/Fail Closed

Refers to valve ports A to AB.

V-10001 (N01)

V-10001 (N01)	2-10 VDC
V-10002 (N02)	0-10 VDC
V-10028 (N1E)	0-10 VDC
V-10063 (N1K)	0.5-4.5 VDC
V-10064 (N1L)	5.5-10 VDC
V-20002 (N1U)	0.02-5.00 sec. PWM
V-20003 (N1V)	0.10-25.5 sec. PWM
V-30001 (N24)	Floating Point

Tagging:
Valves may be tagged per customer specification.

Example:
AHU-1
FCU-2

5 Complete Ordering Example: G214+NVD24-MFT US+NO+N01

5 YEAR WARRANTY

Application

This valve is typically used in Air Handling Units on heating or cooling coils and Fan Coil Unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV Box reheat coils and bypass loops. This valve is suitable for use in a hydronic system with variable flow. This valve is driven by an actuator with on/off, floating control.

Stainless steel trim valves can be used for higher pressure steam applications.

	Valve Nominal Size		Type	Suitable Return Actuators							
C_v	Inches	DN [mm]	2-way NPT	Non-Spring				Spring			
0.4	½	15	G212(S)	LM Series			NV Series	LF Series		NVF Series	
1.3	½	15	G213(S)								
2.2	½	15	G214(S)								
4.4	½	15	G215(S)								
5.5	¾	20	G219(S)								
7.5	¾	20	G220(S)								
10	1	25	G224(S)		NM Series			NF Series			
14	1	25	G225(S)								
20	1¼	32	G232(S)								
28	1½	40	G240(S)		AM				AF		
40	2	50	G250(S)								

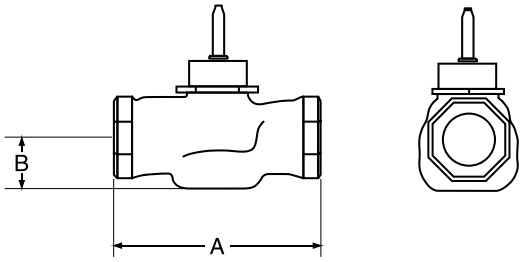
Technical Data

	G2	G2…S
Service	chilled or hot water, 60% glycol, steam	
Flow characteristic	equal percentage	linear
Action	stem up - open A to AB	
Sizes	½" to 2"	
End fitting	NPT female ends	
Materials		
Body	bronze	bronze
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	brass	stainless steel
Packing	spring loaded TFE	spring loaded TFE
Disc	composition (EPDM)	Teflon
ANSI class	ANSI 250 (up to 400 psi below 150°F)	
Leakage	ANSI class IV	
Max steam inlet		
NV actuators	15 psi (103kPa)	50 psi (345kPa)
Rotary actuators	35 psi (241kPa)	100 psi (689KPa)
Media temperature		
Water	20°F to 250°F (-7°C to 120°C)	20°F to 300°F (-7°C to 149°C)
Ambient temperature	32°F to 122°F (0°C to 50°C)	32°F to 122°F (0°C to 50°C)
Maximum ΔP*		
Water	35 psi (241kPa)	35 psi (241kPa)
Steam	15 psi (103kPa)	35 psi (241kPa)
Rangeability	G212(S) 5:1, G213(S) 15:1, G214(S) 25:1, G215(S) 40:1, G219(S) 50:1, G220(S) 60:1, G224(S) 60:1, All others 75:1	

*(50% or more open)

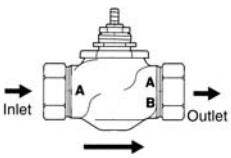
Dimensions

D031-2W

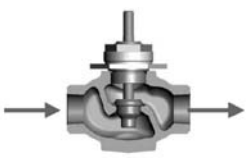


	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]
G232(S)	1¼	32	4.62" [117]	1.37" [35]
G240(S)	1½	40	5.37" [137]	1.50" [38]
G250(S)	2	50	6.12" [156]	1.56" [40]

G2…(S) 2-way Flow Patterns



Flow Direction



Stem Up - Open A to AB

G3…(D) 3-way Globe Valve, Bronze Trim

5 YEAR WARRANTY

Application

This valve is typically used in Air Handling Units on heating or cooling coils and Fan Coil Unit heating or cooling coils. Some other common applications include Unit Ventilators, VAV Box reheat coils and bypass loops. This valve is suitable for use in a hydronic system with constant or variable flow. This valve is driven by an actuator with on/off, floating control.

3-way valves are available with mixing or diverting flow patterns.

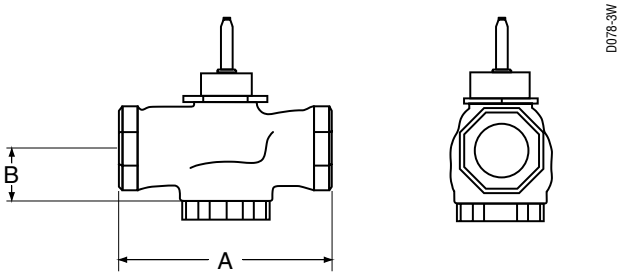
Valve Nominal Size			Type	Suitable Return Actuators							
C_v	Inches	DN [mm]	3-way NPT	Non-Spring				Spring			
2.2	½	15	G314	LM Series			NV Series	LF Series			NVF Series
4.4	½	15	G315(D)								
7.5	¾	20	G320(D)								
14	1	25	G325(D)		NM			NF	AF Series		
20	1¼	32	G332(D)								
28	1½	40	G340(D)		AM						
41	2	50	G350(D)								

Technical Data

	G3	G3…D
Service	chilled or hot water, 60% glycol	
Flow characteristic	linear - mixing only	diverting
Action	stem up - closed A to AB	stem up - open B to AB
Sizes	½" to 2"	
End fitting	NPT female ends	
Materials		
Body	bronze	
Seat	bronze	
Stem	stainless steel	
Plug	brass	
Packing	spring loaded TFE	
Disc	none	
ANSI class	ANSI 250 (up to 400 psi below 150°F)	
Leakage	ANSI Class III	
Media temperature		
Water	20°F to 250°F (-7°C to 120°C)	
Maximum ΔP*		
Water	35 psi (241kPa)	
Rangeability	500:1 (based on ANSI Class III leakage)	

*(50% or more open)

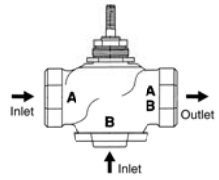
Dimensions



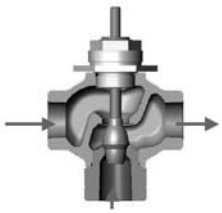
Valve Nominal Size			Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
G314	½"	15	3.06" [78]	1.37" [35]
G315(D)	½"	15	3.06" [78]	1.37" [35]
G320(D)	¾"	20	3.62" [92]	1.68" [43]
G325(D)	1"	25	4.62" [117]	1.56" [40]
G332(D)	1¼"	32	4.62" [117]	1.62" [41]
G340(D)	1½	40	5.37" [137]	1.62" [41]
G350(D)	2	50	6.12" [156]	1.87" [48]

G3…(D) 3-way Flow Patterns

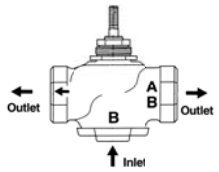
G3 3-way Mixing Valve



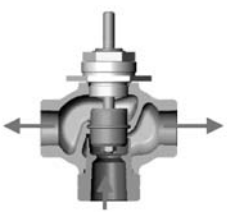
Stem Up- Open B to AB



G3…D 3-way Diverting Valve



Stem Up- Open B to AB



Note: Flow B to AB travels through center of plug (as shown).

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

Stainless steel trim valves can be used for higher pressure steam applications.

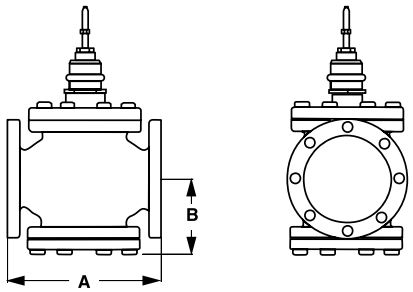
Valve Nominal Size		Type	Suitable Return Actuators			
C_v	Inches	2-way Flanged	Non-Spring		Spring	
65	2½	G665(S)	NVG	GM		AF
90	3	G680(S)				

Technical Data

	G6…	G6…S
Service	chilled or hot water, 60% glycol, steam	chilled or hot water, 60% glycol, steam
Flow characteristic	equal percentage	
Action	stem up - open A to AB	
Sizes	2½" to 3"	
End fitting	125 lb. flanged	
Materials		
Body	iron	iron
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	bronze	stainless steel
Packing	NLP (no lip packing)	TFE V-ring
ANSI class	ANSI 125	
Leakage	Class III	
Max inlet		
Steam	35 psi (241kPa)	50 psi (345kPa)- NV 100 psi (680kPa)- Rotary
Water	150 psi (1034kPa) @ 250°F	150 psi (1034kPa) @ 250°F
Media temperature		
Water	32°F to 300°F (0°C to 148°C)	20°F to 298°F - NV (-7°C to 148°C) 32°F to 350°F (0°C to 176°C)
Steam	32°F to 280°F (0°C to 138°C)	32°F to 338°F - Rotary (0°C to 170°C)
Maximum ΔP*		
Water	25 psi (172kPa)	50 psi (345kPa)
Steam	15 psi (103kPa)	50 psi (345kPa)
Rangeability	50:1	

*(50% or more open)

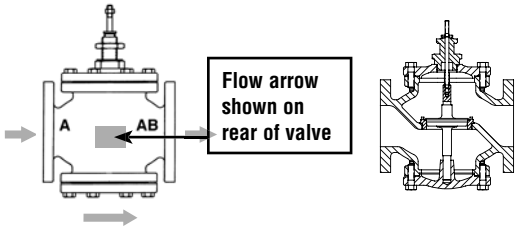
Dimensions



D166-2WF

Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B
G665(S)	2½"	[65]	9" [229]	4.750" [120]
G680(S)	3"	[80]	10" [254]	5.375" [137]

G6…(S) 2-way Flow Patterns



Flow Pattern is marked on valve. **Stem Up - Open A to AB**

G6…(S)-250 2-way ANSI 250 Flanged Globe Valve, Bronze or Stainless Steel Trim

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

Valves are designed for ANSI 250 piping systems. Stainless steel trim valves can be used for higher pressure steam applications.

	Valve Nominal Size	Type	Suitable Return Actuators			
C_v	Inches	2-way Flanged	Non-Spring		Spring	
65	2½	G665(S)-250	NVG	GM		AF
90	3	G680(S)-250				

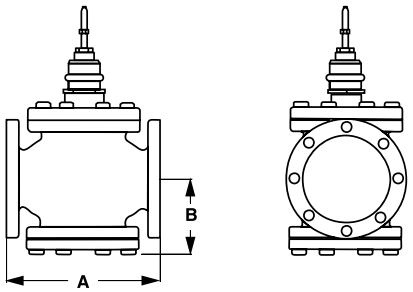
Technical Data

	G6…-250	G6…S-250
Service	chilled or hot water, 60% glycol, steam	chilled or hot water, 60% glycol, steam
Flow characteristic	equal percentage	
Action	stem up - open A to AB	
Sizes	2½" to 3"	
End fitting	250 lb. flanged	
Materials		
Body	iron	iron
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	bronze	stainless steel
Packing	NLP (no lip packing)	TFE V-ring
ANSI class	ANSI 250	
Leakage	Class III	
Max inlet		
Steam	35 psi (241kPa)	50 psi (345kPa)- NV 100 psi (680kPa)- Rotary
Water	250 psi (1724kPa) @ 300°F	250 psi (1724kPa) @ 350°F
Media temperature		
Water	32°F to 300°F (0°C to 148°C)	32°F to 350°F (0°C to 176°C)
Steam	32°F to 280°F (0°C to 138°C)	20°F to 298°F - NV (-7°C to 148°C) 32°F to 338°F - Rotary (0°C to 170°C)
Maximum ΔP*		
Water	25 psi (172kPa)	50 psi (340kPa)
Steam	15 psi (103kPa)	50 psi (340kPa)
Rangeability	50:1	

*(50% or more open)

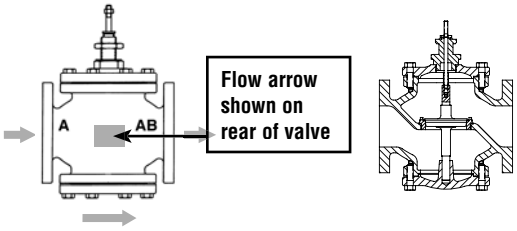
Dimensions

D166-2WF



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
G665(S)-250	2½"	[65]	9" [229]	4.75" [120]
G680(S)-250	3"	[80]	10" [254]	5.37" [137]

G6…(S)-250 2-way Flow Patterns



Flow Pattern is marked on valve. **Stem Up - Open A to AB**

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

Stainless steel trim valves can be used for higher pressure steam applications.

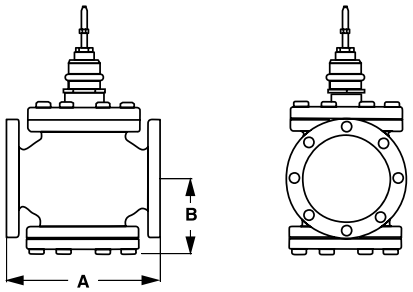
Valve Nominal Size	Type	Suitable Return Actuators			
C_v	Inches	2-way Flanged	Non-Spring		Spring	
65	2½	G665C(S)	NVG	NV	NF	AF Series
90	3	G680C(S)				
170	4	G6100C(S)		GM Series		
263	5	G6125C(S)				
344	6	G6150C(S)				
65	2½	G665LCS	NVG	NV	NF	
90	3	G680LCS				
170	4	G6100LCS		GM Series		
263	5	G6125LCS				
344	6	G6150LCS				

Technical Data

	G6…C	G6…CS	G6…LCS
Service	chilled or hot water, 60% glycol, steam	chilled or hot water, 60% glycol, steam	chilled or hot water, 60% glycol, steam
Flow characteristic	equal percentage		linear
Action	stem up - open A to AB		
Sizes	2½" to 6"		
End fitting	125 lb. flanged		
Materials			
Body	iron	iron	iron
Seat	bronze	stainless steel	stainless steel
Stem	316 stainless steel	316 stainless steel	316 stainless steel
Plug	bronze	316 stainless steel	316 stainless steel
Packing	NLP (no lip packing)	TFE V-ring	TFE V-ring
ANSI class	ANSI 125		
Leakage	Class III		
Max inlet			
Steam	35 psi (241kPa)	100 psi (680kPa)	100 psi (680kPa)
Water	150 psi (1034kPa) @ 250°F	150 psi (1034kPa) @ 250°F	150 psi (1034kPa) @ 250°F
Media temperature			
Water	32°F to 300°F (0°C to 148°C)	32°F to 350°F (0°C to 176°C)	32°F to 350°F (0°C to 176°C)
Steam	32°F to 280°F (0°C to 138°C)	32°F to 338°F (0°C to 170°C)	32°F to 338°F (0°C to 170°C)
Maximum ΔP*			
Water	25 psi (172kPa)	50 psi (340kPa)	50 psi (340kPa)
Steam	15 psi (103kPa)	50 psi (340kPa)	50 psi (340kPa)
Rangeability	50:1		

*(50% or more open)

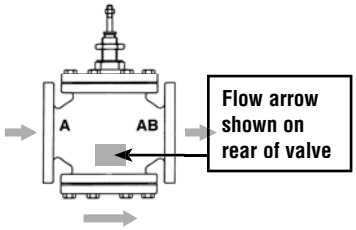
Dimensions



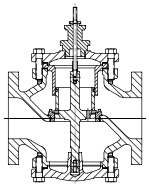
D166-2WF

Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B
G665C(S)	2½"	[65]	9" [229]	4.75" [120]
G680C(S)	3"	[80]	10" [254]	5.37" [137]
G6100C(S)	4"	[100]	13" [330]	6.37" [162]
G6125C(S)	5"	[125]	15.75" [400]	5.75" [146]
G6150C(S)	6"	[150]	17.75" [757]	6.50" [165]
G665LCS	2½"	[65]	9" [229]	4.75" [120]
G680LCS	3"	[80]	10" [254]	5.37" [137]
G6100LCS	4"	[100]	13" [330]	6.37" [162]
G6125LCS	5"	[125]	15.75" [400]	5.75" [146]
G6150LCS	6"	[150]	17.75" [757]	6.50" [165]

G6…C(S) 2-way Flow Patterns



Flow Pattern is marked on valve.



Stem Up - Open A to AB

G7…(S) 3-way Mixing Flanged Globe Valve, Bronze or Stainless Steel Trim

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

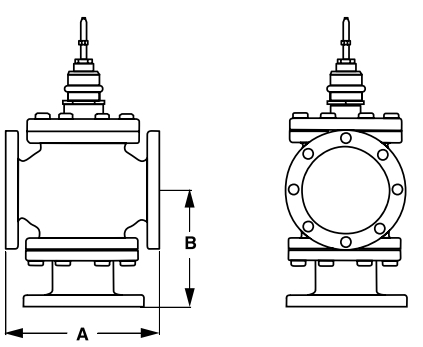
	Valve Nominal Size	Type	Suitable Return Actuators		
C_v	Inches	3-way Flanged	Non-Spring	Spring	
68	2½	G765(S)	AF	NVG	GM Series
85	3	G780(S)			
190	4	G7100(S)			
280	5	G7125(S)			
340	6	G7150(S)			

Technical Data

	G7	G7…S
Service	chilled or hot water, 60% glycol	chilled or hot water, 60% glycol
Flow characteristic	linear	
Action	stem up - open B to AB	
Sizes	2½" to 6"	
End fitting	125 lb. flanged	
Materials		
Body	iron	iron
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	bronze	stainless steel
Packing	NLP (no lip packing)	TFE V-ring
ANSI class	ANSI 125	
Leakage	Class III	
Max inlet		
Water	150 psi (1034kPa) @ 250°F	150 psi (1034kPa) @ 250°F
Media temperature		
Water	32°F to 300°F (0°C to 148°C)	32°F to 350°F (0°C to 176°C)
Maximum ΔP*		
Water	25 psi (172kPa)	50 psi (340kPa)
Rangeability	50:1	

*(50% or more open)

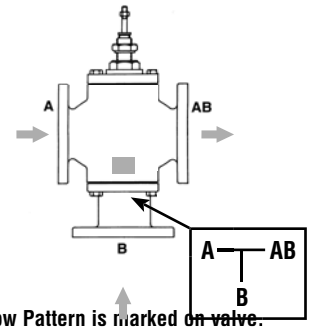
Dimensions



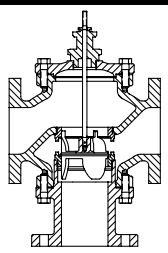
D169-G73W

	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
G765(S)	2½"	[65]	9" [229]	7.12" [181]
G780(S)	3"	[80]	10" [254]	8" [203]
G7100(S)	4"	[100]	13" [330]	9.87" [251]
G7125(S)	5"	[125]	15.75" [400]	9.25" [235]
G7150(S)	6"	[150]	17.75" [451]	9.87" [251]

G7…(S) 3-way Flow Patterns



Flow Pattern is marked on valve.



Stem Up = Open B to AB

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

Valves are designed for ANSI 250 piping systems.

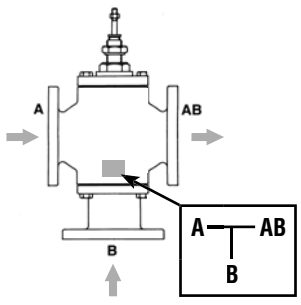
Valve Nominal Size		Type	Suitable Return Actuators		
C_v	Inches	3-way Flanged	Non-Spring	Spring	
68	2½	G765(S)-250	AF	NVG	GM Series
85	3	G780(S)-250			
190	4	G7100(S)-250			
280	5	G7125(S)-250			
340	6	G7150(S)-250			

Technical Data

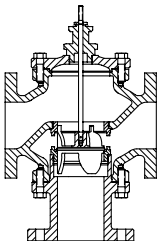
	G7…-250	G7…S-250
Service	chilled or hot water, 60% glycol	chilled or hot water, ethylene glycol, propylene glycol (<70°F)
Flow characteristic	linear	
Action	stem up - open A to AB	
Sizes	2½" to 6"	
End fitting	250 lb. flanged	
Materials		
Body	iron	iron
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	bronze	stainless steel
Packing	NLP (no lip packing)	TFE V-ring
ANSI class	ANSI 250	
Leakage	Class III	
Max inlet		
Water	250 psi (1724kPa) @ 300°F	250 psi (1724kPa) @ 350°F
Media temperature		
Water	32°F to 300°F (0°C to 148°C)	32°F to 350°F (0°C to 176°C)
Maximum ΔP*		
Water	25 psi (172kPa)	50 psi (340kPa)
Rangeability	50:1	

*(50% or more open)

G7…(S)-250 3-way Flow Patterns



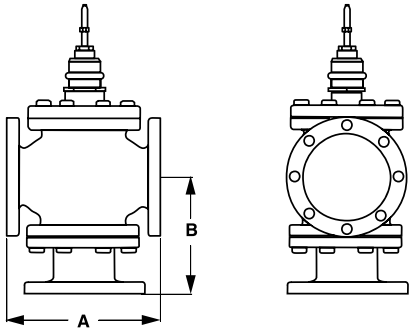
Flow Pattern is marked on valve.



Stem Up = Open B to AB

Dimensions

D169-G73W



Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B
G765(S)-250	2½"	[65]	9" [229]	7.12" [181]
G780(S)-250	3"	[80]	10" [254]	8" [203]
G7100(S)-250	4"	[100]	13" [330]	9.87" [251]
G7125(S)-250	5"	[125]	15.75" [400]	9.25" [235]
G7150(S)-250	6"	[150]	17.75" [451]	9.87" [251]

G7…D(S) 3-way Diverting Flanged Globe Valve, Bronze or Stainless Steel Trim

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

These valves are to be used in Diverting applications only.

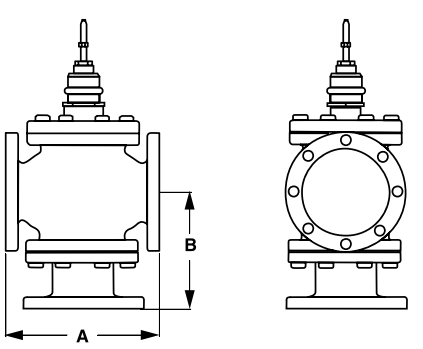
	Valve Nominal Size	Type	Suitable Return Actuators		
C_v	Inches	3-way Flanged	Non-Spring	Spring	
68	2½	G765D(S)	AF Series	NVG Series	GM Series
85	3	G780D(S)			
154	4	G7100D(S)			
195	5	G7125D(S)			
248	6	G7150D(S)			

Technical Data

	G7…D	G7…DS
Service	chilled or hot water, 60% glycol	chilled or hot water, 60% glycol
Flow characteristic	linear	
Action	stem up - open AB to B	
Sizes	2½" to 6"	
End fitting	125 lb. flanged	
Materials		
Body	iron	iron
Seat	bronze	stainless steel
Stem	stainless steel	stainless steel
Plug	bronze	stainless steel
Packing	NLP (no lip packing)	TFE V-ring
ANSI class	ANSI 125	
Leakage	ANSI Class III	
Max inlet Water	150 psi (1034kPa) @ 250°F	
Media temperature Water	32°F to 300°F (0°C to 148°C)	
Maximum ΔP* Water	25 psi (172kPa)	50 psi (340kPa)
Rangeability	30:1	

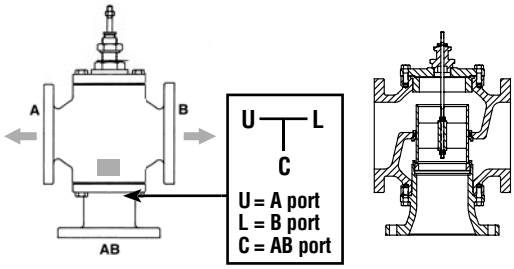
*(50% or more open)

Dimensions



	Valve Nominal Size		Dimensions (Inches [mm])	
Valve Body	Inches	DN [mm]	A	B
G765D(S)	2½"	[65]	9" [229]	7.12" [181]
G780D(S)	3"	[80]	10" [254]	8" [203]
G7100D(S)	4"	[100]	13" [330]	9.87" [251]
G7125D(S)	5"	[125]	15.75" [400]	9.25" [235]
G7150D(S)	6"	[150]	17.75" [451]	9.87" [251]

G7…D(S) 3-way Flow Patterns



Flow Pattern is marked on valve.

Stem Up = Open AB to B
Open C to L

Application

This valve is typically used in Large Air Handling Units on heating or cooling coils. This valve is suitable for use in a hydronic system with variable flow. This valve is designed with MFT functionality which facilitates the use of various control inputs.

Valves are designed for ANSI 250 piping systems.
These valves are to be used in Diverting applications only.

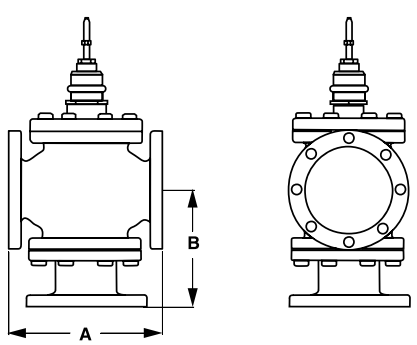
Valve Nominal Size		Type	Suitable Return Actuators		
C_v	Inches	3-way Flanged	Non-Spring	Spring	
68	2½	G765DS-250	AF Series	NVG Series	GM Series
85	3	G780DS-250			
190	4	G7100DS-250			
280	5	G7125DS-250			
340	6	G7150DS-250			

Technical Data

	G7…DS-250
Service	chilled or hot water, 60% glycol
Flow characteristic	linear
Action	stem up - open AB to B
Sizes	2½" to 6"
End fitting	250 lb. flanged
Materials	
Body	iron
Seat	stainless steel
Stem	stainless steel
Plug	stainless steel
Packing	TFE V-ring
ANSI class	ANSI 250
Leakage	ANSI Class III
Max inlet Water	250 psi (1724kPa) @ 350°F
Media temperature Water	32°F to 350°F (0°C to 176°C)
Maximum ΔP* Water	50 psi (340kPa)
Rangeability	50:1

*(50% or more open)

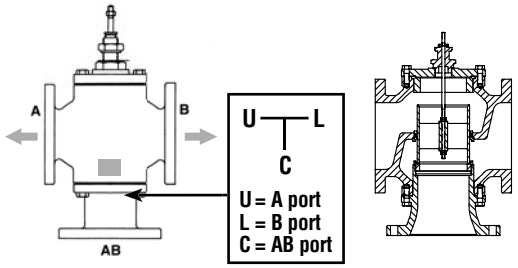
Dimensions



D169-G73W

Valve Body	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B
G765DS-250	2½"	[65]	9" [229]	7.15" [181]
G780DS-250	3"	[80]	10" [254]	8" [203]
G7100DS-250	4"	[100]	13" [330]	9.87" [251]
G7125DS-250	5"	[125]	15.75" [400]	9.25" [235]
G7150DS-250	6"	[150]	17.75" [451]	9.87" [251]

G7…DS-250 3-way Flow Patterns



Flow Pattern is marked on valve.

Stem Up = Open AB to B
Open C to L

Control Valve Product Range

Globe Valve Product Range
G2... G3.., 2-way and 3-way, NPT

	Valve Nominal Size		Type		Suitable Actuators					
					Non-Spring Return			Spring Return		
C_V	Inches	DN [mm]	2-way NPT	3-way NPT						
0.4	½	15	G212	–	LM Series		NV Series	LF Series		NVF Series
1.3	½	15	G213	–						
2.2	½	15	G214	–						
4.4	½	15	G215	–						
0.4	½	15	G212S	–						
1.3	½	15	G213S	–						
2.2	½	15	G214S	G314						
4.4	½	15	G215S	G315						
4.4	½	15	–	G315D						
5.5	¾	20	G219	–						
7.5	¾	20	G220	–						
5.5	¾	20	G219S	–						
7.5	¾	20	G220S	G320						
7.5	¾	20	–	G320D						
10	1	25	G224	–		NM Series		NF Series	AF Series	
14	1	25	G225	–						
10	1	25	G224S	–						
14	1	25	G225S	G325						
14	1	25	–	G325D						
20	1¼	32	G232	–		NM Series		NF Series	AF Series	
20	1¼	32	G232S	G332						
20	1¼	32	–	G332D						
28	1½	40	G240	–		AM Series			AF Series	
28	1½	40	G240S	G340						
28	1½	40	–	G340D						
40	2	50	G250	–					AF Series	
40	2	50	G250S	–						
41	2	50	–	G350						
41	2	50	–	G350D						

Applications
- Water-side control of air handling unit in ventilation and air-conditioning systems
- Water/Steam control in heating systems

Mode of Operation
The control valve is operated by an electronic actuator that responds to a standard voltage for on/off control, by a proportional VDC/4…20 mA, 3-point control system. The actuator will then move the plug of the valve to the position dictated by the control signal thus change the flow.

Product Features
Equal-percentage characteristic of flow for G2, linear characteristic for G3.

Actuator Specifications

Control type Multi-Function Technology (MFT)	On/Off, Floating Point, 2-10 VDC
Manual override	all models except LF, NF
Electrical connection	3 ft [1m] cable with ½" conduit fitting

Valve Specifications

Service	chilled or hot water, 60% glycol, steam (G2, G2S only)
Flow characteristic linear G3, G2S, G3D	A-port equal percentage G2,
Sizes	½" - 2"
Type of end fitting	½" - 2" NPT female ends
Materials	
Body	bronze
Stem	stainless steel
Seat	bronze stainless steel: G2..S
Plug	brass stainless steel: G2..S
Packing	spring loaded TFE: G2, G3 bronze trimmed
Disc	composition G2 Teflon® G2...S None G3
Pressure rating G2, G3..., ½"- 2"	250 psi
Media temp range	Refer to valve specification pages in this section
Maximum inlet pressure Steam	15 psi (103 kPa) G2 with NV 35 psi (241 kPa) G2 with rotary actuators 50 psi (345 kPa) G2...S with NV 100 psi (690 kPa) G2...S with rotary actuators
Maximum differential pressure (ΔP) Water Steam	 35 psi (241 kPa) 15 psi (103 kPa) G2 with NV 20 psi (138 kPa) G2 with rotary actuators 35 psi (241 kPa) G2...S

Globe Valve Product Range
G6... 2-way, Flanged Connection

	Valve Nominal Size	Type	Suitable Actuators			
			Non-Spring Return		Spring Return	
C_V	Inches	2-way Flanged				
65	2½	G665	NVG Series	GM Series		AF Series
90	3	G680				
65	2½	G665S				
90	3	G680S				
65	2½	G665-250				
90	3	G680-250				
65	2½	G665S-250				
90	3	G680S-250				
65	2½	G665C		NV24 Series	NF Series	
90	3	G680C				
65	2½	G665CS				
65	2½	G665LCS				
90	3	G680CS				
90	3	G680LCS				
170	4	G6100C		GM Series		
170	4	G6100CS				
170	4	G6100LCS				
263	5	G6125C				
263	5	G6125CS				
263	5	G6125LCS				
344	6	G6150C				
344	6	G6150CS				
344	6	G6150LCS				

The G...(C) (CS) (LCS) Series valve is a pressure compensated valve that allows high close-off ratings while utilizing standard actuation.

Applications
- Water-side control of air handling unit in ventilation and air-conditioning systems
- Water/Steam control in heating systems

Mode of Operation
The control valve is operated by an electronic actuator that responds to a standard voltage for on/off control, a proportional VDC/4…20 mA, or 3-point control system. The actuator will then move the plug of the valve to the position dictated by the control signal thus change the flow.

Product Features
Equal-percentage characteristic for G6. Linear characteristic for G6...LCS

Actuator Specifications

Control type	On/Off, Floating Point, 2-10 VDC Multi-Function Technology (MFT)
Manual override	all models
Electrical connection	3 ft [1m] cable with ½" conduit fitting

Valve Specifications

Service	chilled or hot water, 60% glycol, steam
Flow characteristic	
G6	A-port equal percentage
G6LCS	linear
Sizes	2½" - 6"
Type of end fitting	flanged
Materials	
Body	cast iron
Stem	stainless steel
Seats	bronze: G6 stainless steel: G6..S
Packing	bronze trimmed: NLP stainless trimmed: TFE V-ring
Pressure rating	
G6, 125# ANSI flange	125 psi
G6, 250# ANSI flange	250 psi
Media temp range	
Refer to valve specification pages in this section	
Maximum inlet pressure	
Water	150 psi (1034 kPa) G6, G6S 250 psi (1724 kPa) G6...250, G6S...250
Steam	35 psi (241 kPa) G6, G6...250 50 psi (345 kPa) G6S,G6S...250 (NV) 100 psi (690 kPa) G6S, G6S...250 (Rotary)
Maximum differential pressure (ΔP)	
Water	25 psi (172 kPa) G6, G6...250 50 psi (345 kPa) G6S, G6S...250
Steam	15 psi (103 kPa) G6, G6...250 50 psi (345 kPa) G6S, G6S...250

BELIMO

Globe Valve Product Range
G7..., 3-way, Flanged Connection

	Valve Nominal Size	Type	Suitable Actuators	
C_V	Inches	3-Way Flange	Spring Return	Non-Spring Return
68	2½	G765	AF Series	NVG Series / GM Series
85	3	G780		
68	2½	G765S		
85	3	G780S		
68	2½	G765-250		
85	3	G780-250		
68	2½	G765S-250		
85	3	G780S-250		
190	4	G7100		
280	5	G7125		
340	6	G7150		
190	4	G7100S		
280	5	G7125S		
340	6	G7150S		
190	4	G7100-250		
280	5	G7125-250		
340	6	G7150-250		
190	4	G7100S-250		
280	5	G7125S-250		
340	6	G7150S-250		
68	2½	G765D		NVG Series
85	3	G780D		
190	4	G7100D		
280	5	G7125D		
340	6	G7150D		
68	2½	G765DS		NVG Series
85	3	G780DS		
190	4	G7100DS		
280	5	G7125DS		
340	6	G7150DS		
68	2½	G765DS-250		NVG Series
85	3	G780DS-250		
190	4	G7100DS-250		
280	5	G7125DS-250		
340	6	G7150DS-250		

Applications
- Water-side control of air handling apparatus in ventilation and air-conditioning systems
- Water/Steam control in heating systems

Mode of Operation
The control valve is operated by an electronic actuator that responds to a standard voltage for on/off control, a proportional VDC/4…20 mA, or 3-point control system. The actuator will then move the plug of the valve to the position dictated by the control signal thus change the flow.

Product Features
Linear characteristic

Actuator Specifications

Control type	On/Off, Floating Point, 2-10 VDC Multi-Function Technology (MFT)
Manual override	all models
Electrical connection	3 ft [1m] cable with ½" conduit fitting

Valve Specifications

Service	chilled or hot water, 60% glycol
Flow characteristic	linear
Sizes	2½" - 6"
Type of end fitting	flanged
Materials	
Body	cast iron
Stem	stainless steel
Seats	bronze stainless steel: G7...S
Packing	bronze trimmed: NLP stainless trimmed: TFE V-ring
Pressure rating	
G7, 125# ANSI flange	125 psi
G7, 250# ANSI flange	250 psi
Media temp range	Refer to valve specification pages in this section
Maximum inlet pressure	
Water	150 psi (1034 kPa) G7, G7S 250 psi (1724 kPa) G7...250, G7S...250
Maximum differential pressure (ΔP)	
Water	25 psi (172 kPa) G7, G7...250 50 psi (345 kPa) G7S,G7S...250

5 YEAR WARRANTY

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

BRUSHLESS DC motor

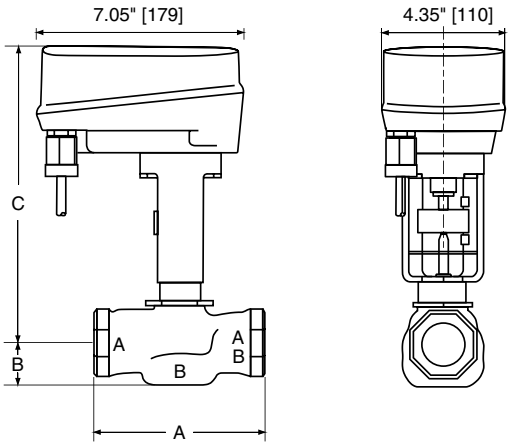
Models

NV24-3 US
NVD24-3 US

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Nominal Voltage Range	19.2...28.8 VAC, 21.6...28.8 VDC
Power consumption	3 W
Transformer sizing	5 VA (Class 2 power source)
Electrical connection	❑ 3 ft [1m] 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout stroke
Control	On/Off, Floating Point
Maximum stroke	¾" [20mm]
Force NV24-3 US NVD24-3 US	 225 lbf [1000 N] 90 lpf [400 N]
Position indication	stroke indicator on bracket
Manual override	3/16" hex, 5mm hex or phillips screwdriver
Running time	20mm/150 seconds, independent of load
Humidity	5 to 95% RH non-condensing
Ambient temperature	32°F to 122°F [0°C to 50°C]
Storage temperature	20°F to 250°F [-7°C to 120°C]
Housing	NEMA 2/IP54 with cable entry down
Housing material	UL94-5V (flammability rating)
Agency listings† EMC Mode of operation	CE, UL 60730-1, CSA C22.2 No. 139 certified CE acc. to 89/336/EEC Type 1 to UL 60730-1
Noise level	<52 dB(A)
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve
Assembly using UNV-001 Bracket

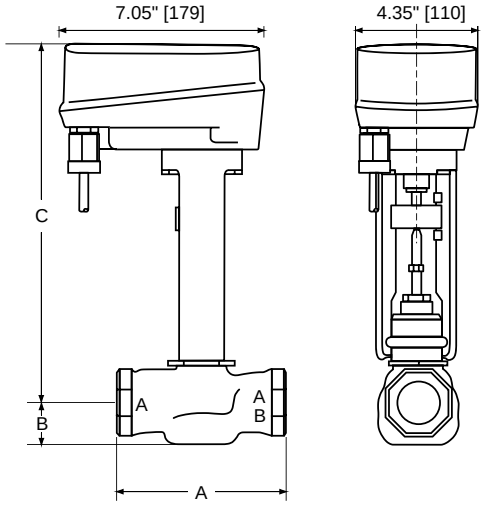
D031



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	10.43" [265]
G232(S)	1¼	32	4.62" [117]	1.37" [35]	10.43" [265]
G240(S)	1½	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	2	50	6.12" [156]	1.56" [40]	10.81" [275]

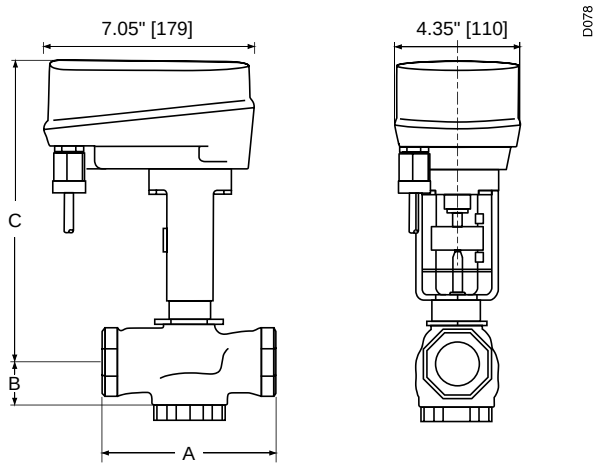
Dimensions with G2…S Series 2-Way Valve
Assembly using UNV-035 Bracket (Bracket is 1.563" longer than UNV-001)

D056



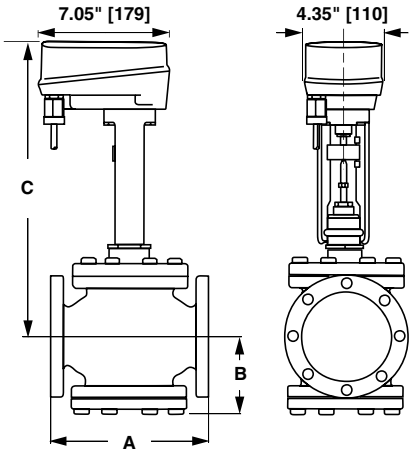
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	11.31" [287]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	11.31" [287]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	1¼	32	4.62" [117]	1.37" [35]	12.00" [305]
G240(S)	1½	40	5.37" [137]	1.50" [38]	12.06" [306]
G250(S)	2	50	6.12" [156]	1.56" [40]	12.37" [314]

Dimensions with G3…(D) Series 3-Way Valve



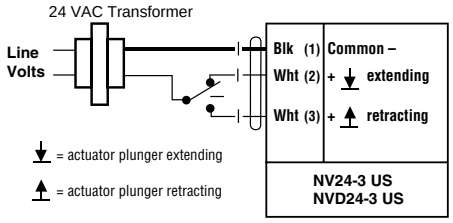
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G314	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G315(D)	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]
G325(D)	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	1¼"	32	4.62" [117]	1.62" [41]	10.06 [256]
G340(D)	1½	40	5.37" [137]	1.62" [41]	9.18" [234]
G350(D)	2	50	6.12" [156]	1.87" [48]	9.25" [235]

Dimensions with G6…C(S) Series 2-Way Valve with NV24-3 US



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G665C(S)	2½"	[65]	9.00" [229]	4.75" [120]	15.00" [381]
G680C(S)	3"	[80]	10.00" [254]	5.37" [137]	15.43" [392]
G665LCS	2½"	[65]	9.00" [229]	4.75" [120]	15.00" [381]
G680LCS	3"	[80]	10.00" [254]	5.37" [137]	15.43" [392]

Wiring Diagrams



On/Off or Floating Point control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

5 YEAR WARRANTY

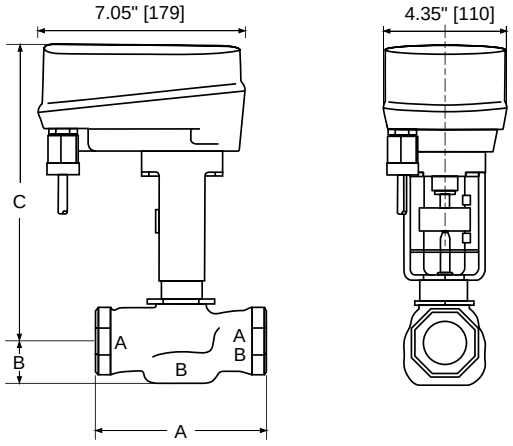
CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

NVD24-MFT US
NV24-MFT US
NVG24-MFT US

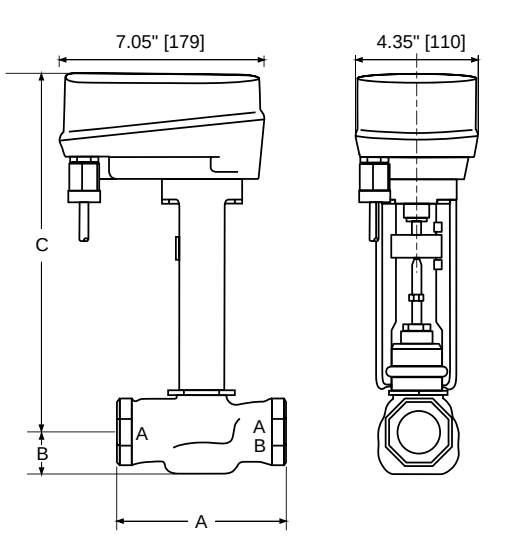
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
Nominal Voltage Range	19.2...28.8 VAC, 21.6...28.8 VDC
Power consumption	
NVD24-MFT US	3 W
NV24-MFT US	3 W
NVG24-MFT US	4 W
Transformer sizing	5 VA (Class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout stroke
Control	Multi-Function Technology
Control Signal Y	2 to 10 VDC (V-10001 default), PWM available
Operating range	2 to 10 VDC 4 to 20 mA (w/500 Ω, ¼ W resistor) ZG-R01
Input impedance	100k Ω for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, On/Off and Floating Point
Feedback output U	2 to 10 VDC, 0.5 mA max
Maximum stroke	¾" [20mm]
Force	
NVD24-3 US	90 lpf [400 N]
NV24-3 US	225 lbf [1000 N]
NVG24-MFT US	360 lbf [1600 N]
Position indication	stroke indicator on bracket
Manual override	3/16" hex, 5mm hex or phillips screwdriver
Running time	150 seconds, independent of load
Humidity	5 to 95% RH non-condensing
Ambient temperature	32°F to 122°F [0°C to 50°C]
Storage temperature	20°F to 250°F [-7°C to 120°C]
Housing	NEMA 2/IP54 with cable entry down
Housing material	UL94-5V (flammability rating)
Agency listings†	CE, UL 60730-1, CSA C22.2 No. 139 certified
EMC	CE acc. to 89/336/EEC
Software	Class A to UL 60730-1
Mode of operation	Type 1 to UL 60730-1
Noise level	<35 dB(A)
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve
Assembly using UNV-001 Bracket



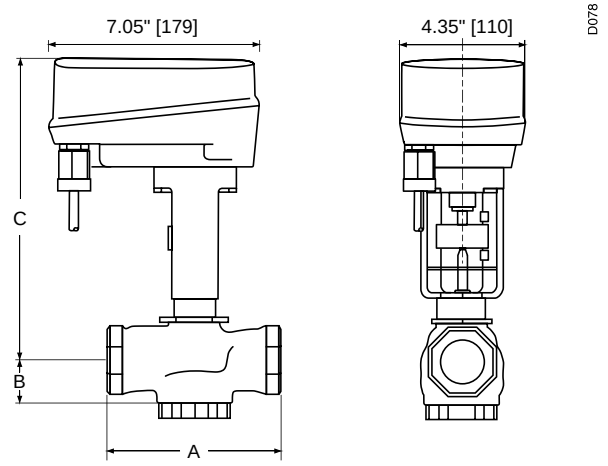
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	10.43" [265]
G232(S)	1¼	32	4.62" [117]	1.37" [35]	10.43" [265]
G240(S)	1½	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	2	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G2…S Series 2-Way Valve
Assembly using UNV-035 Bracket (Bracket is 1.563" longer than UNV-001)



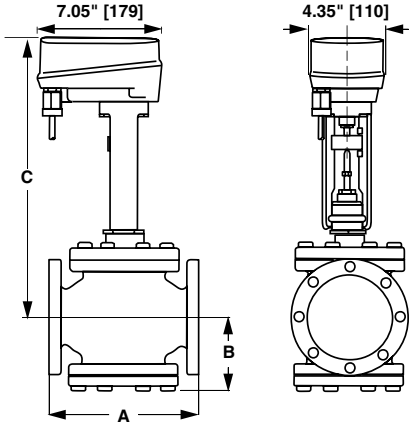
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	11.31" [287]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	11.31" [287]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	1¼	32	4.62" [117]	1.37" [35]	12.00" [305]
G240(S)	1½	40	5.37" [137]	1.50" [38]	12.06" [306]
G250(S)	2	50	6.12" [156]	1.56" [40]	12.37" [314]

Dimensions with G3…(D) Series 3-Way Valve



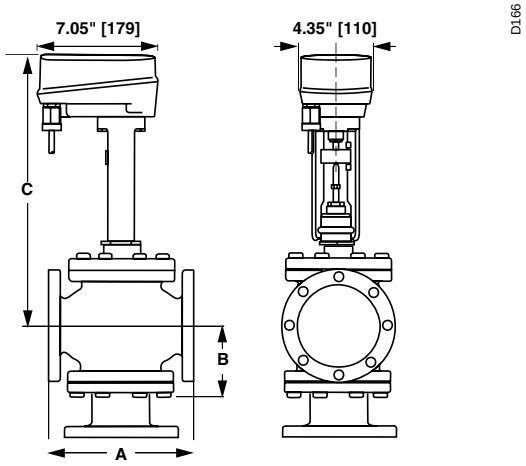
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G314	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G315(D)	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]
G325(D)	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	1¼"	32	4.62" [117]	1.62" [41]	10.06 [256]
G340(D)	1½	40	5.37" [137]	1.62" [41]	9.18" [234]
G350(D)	2	50	6.12" [156]	1.87" [48]	9.25" [235]

Dimensions with G6… Series 2-Way Valve with NVG24-MFT US



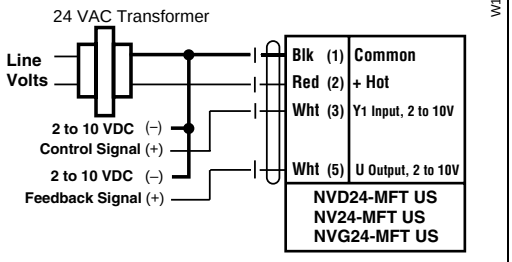
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G665(C)(S)(-250)	2½"	[65]	9.00" [229]	4.75" [120]	15.50" [394]
G680(C)(S)(-250)	3"	[80]	10.00" [254]	5.37" [137]	16.12" [410]
G665LCS(-250)	2½"	[65]	9.00" [229]	4.75" [120]	15.50" [394]
G680LCS(-250)	3"	[80]	10.00" [254]	5.37" [137]	16.12" [410]

Dimensions with G7… Series 3-Way Valve with NVG24-MFT US

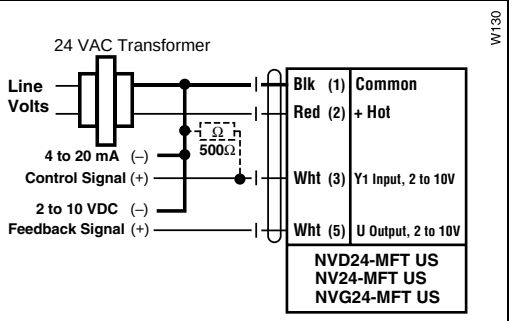


	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G765(S)(-250)	2½"	[65]	9.00" [229]	7.12" [181]	15.12" [384]
G780(S)(-250)	3"	[80]	10.00" [254]	8.00" [203]	15.93" [405]
G765D(S)(-250)	2½"	[65]	9.00" [229]	7.12" [181]	15.12" [384]
G780D(S)(-250)	3"	[80]	10.00" [254]	8.00" [203]	15.31" [405]
G7100D(S)(-250)	4"	[100]	13.00" [330]	9.87" [251]	16.07" [425]

Wiring Diagrams



2 to 10 VDC Control Signal



4 to 20 mA Control Signal

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

5 YEAR WARRANTY

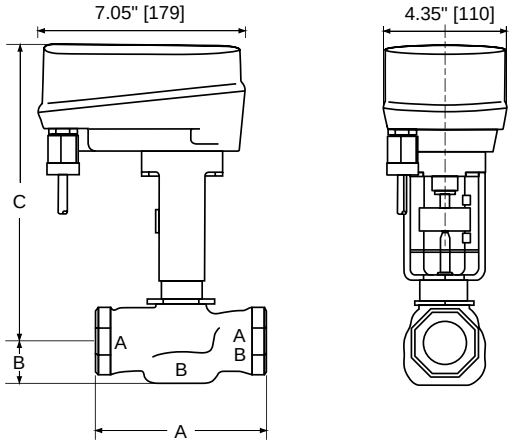
CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

NVF24 US	Spring Up
NVF24-E US	Spring Down
NVFD24 US	Spring Up
NVFD24-E US	Spring Down

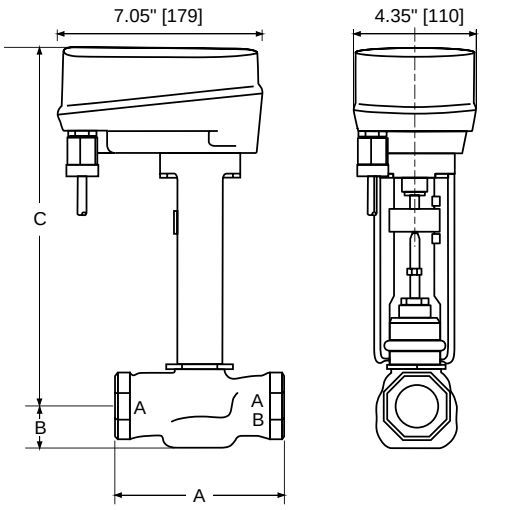
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
Nominal Voltage Range	19.2...28.8 VAC, 21.6...28.8 VDC
Power consumption	5.5 W
Transformer sizing	10 VA (Class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout stroke
Control Signal Y	On/Off
Operating range	2 to 10 VDC
Maximum stroke	¾" [20mm]
Plunger NVF...24 US NVF...24-E US	 spring up spring down
Force NVFD24(-E) US NVF24(-E) US	 90 lpf [400 N] 180 lpf [800 N]
Position indication	stroke indicator on bracket
Manual override	3/16" hex, 5mm hex or phillips screwdriver
Running time motor	150 seconds, independent of load
spring	30 seconds at ¾" [20mm] stroke
Humidity	5 to 95% RH non-condensing
Ambient temperature	32°F to 122°F [0°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54 with cable entry down
Housing material	UL94-5V (flammability rating)
Agency listings† EMC Software Mode of operation	CE, UL 60730-1, CSA C22.2 No. 139 certified CE acc. to 89/336/EEC Class A to UL 60730-1 Type 1 to UL 60730-1
Noise level	<35 dB(A)
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve
Assembly using UNV-001 Bracket



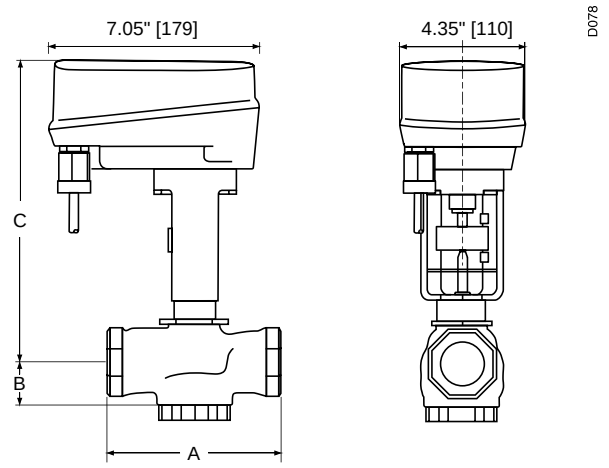
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	10.43" [265]
G232(S)	1¼"	32	4.62" [117]	1.37" [35]	10.43" [265]
G240(S)	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G2…S Series 2-Way Valve
Assembly using UNV-035 Bracket (Bracket is 1.563" longer than UNV-001)



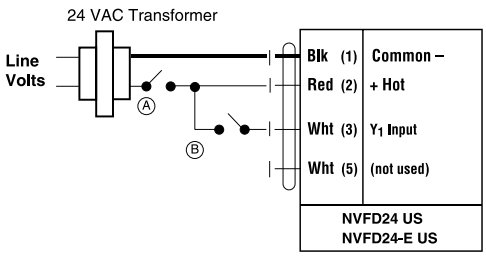
	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	½"	15	3.06" [78]	1.06" [27]	11.31" [287]
G219(S)-G220(S)	¾"	20	3.62" [92]	1.06" [27]	11.31" [287]
G224(S)-G225(S)	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	1¼"	32	4.62" [117]	1.37" [35]	12.00" [305]
G240(S)	1½"	40	5.37" [137]	1.50" [38]	12.06" [306]
G250(S)	2"	50	6.12" [156]	1.56" [40]	12.37" [314]

Dimensions with G3...(D) Series 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	Inches	DN [mm]	A	B	C
G314	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G315(D)	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]
G325(D)	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	1¼"	32	4.62" [117]	1.62" [41]	10.06 [256]
G340(D)	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G350(D)	2"	50	6.12" [156]	1.87" [48]	9.25" [235]

Wiring Diagrams



	Actuator		Control Switch Location	Correct LED Indication
	"Open" (Switch Selectable)	"Closed" (Switch Selectable)		
OFF/ON Drive "open" Spring "closed"	150 sec. (MFT selectable)	30 sec. Spring return	Ⓐ	Flashing Red
OFF/ON Drive "open" Drive "closed"	150 sec. (MFT selectable)	150 sec. (MFT selectable)	Ⓑ	Steady Green

If the switch location "A" is selected, the switch in location "B" is not required.
If the switch location "B" is selected, the switch in location "A" is not required.

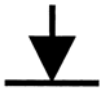
On/Off control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Spring Return Actuators Model Designation

NVF(D)24 US
retracting plunger (spring up)



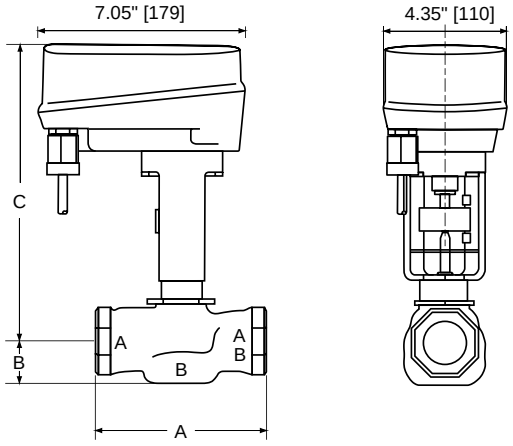
NVF(D)24-E US
extending plunger (spring down)

Models

NVF24-MFT US	Spring Up
NVF24-MFT-E US	Spring Down
NVFD24-MFT US	Spring Up
NVFD24-MFT-E US	Spring Down

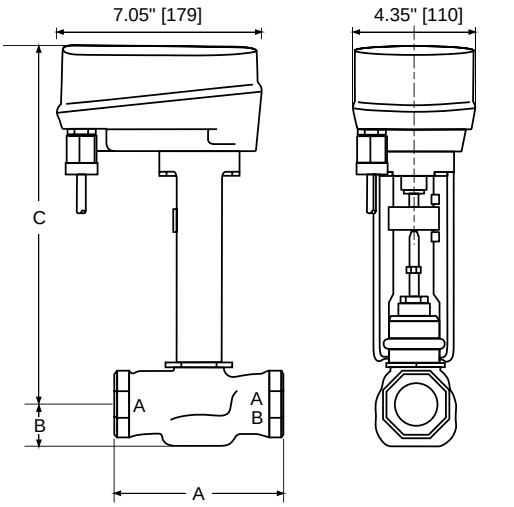
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz, 24 VDC ± 10%
Nominal Voltage Range	19.2...28.8 VAC, 21.6...28.8 VDC
Power consumption	5.5 W
Transformer sizing	10 VA (Class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout stroke
Control Signal Y	2 to 10 VDC (V-10001 default), PWM available
Operating range	2 to 10 VDC 4 to 20 mA (w/500 Ω, ¼ W resistor) ZG-R01
Input impedance	100k Ω for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 1500 Ω for PWM, On/Off and Floating Point
Operating range	2 to 10 VDC
Maximum stroke	¾" [20mm]
Plunger NVF...24-MFT US NVF...24-MFT-E US	 spring up spring down
Force NVFD24-MFT(-E) US NVF24-MFT(-E) US	 90 lpf [400 N] 180 lpf [800 N]
Position indication	stroke indicator on bracket
Manual override	3/16" hex, 5mm hex or phillips screwdriver
Running time motor	150 seconds, independent of load and stroke
spring	30 seconds at ¾" [20mm] stroke
Humidity	5 to 95% RH non-condensing
Ambient temperature	32°F to 122°F [0°C to 50°C]
Storage temperature	-40°F to 176°F [-40°C to 80°C]
Housing	NEMA 2/IP54 with cable entry down
Housing material	UL94-5V (flammability rating)
Agency listings† EMC Software Mode of operation	CE, UL 60730-1, CSA C22.2 No. 139 certified CE acc. to 89/336/EEC Class A to UL 60730-1 Type 1 to UL 60730-1
Noise level	<35 dB(A)
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve
Assembly using UNV-001 Bracket



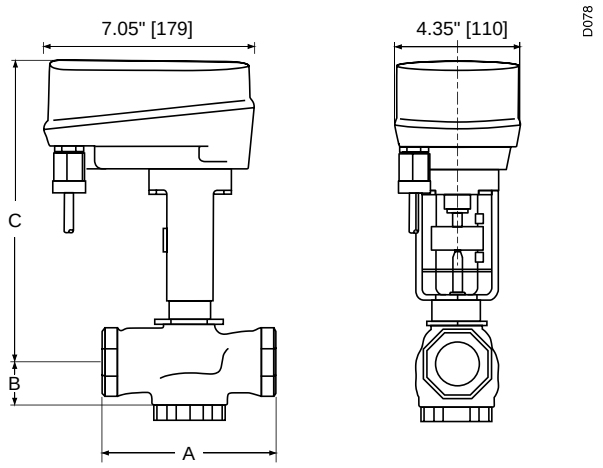
Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	207	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]
G224(S)-G225(S)	207	1"	25	4.62" [117]	1.12" [29]	10.43" [265]
G232(S)	130	1¼"	32	4.62" [117]	1.37" [35]	10.43" [265]
G240(S)	88	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	47	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G2…S Series 2-Way Valve
Assembly using UNV-035 Bracket (Bracket is 1.563" longer than UNV-001)



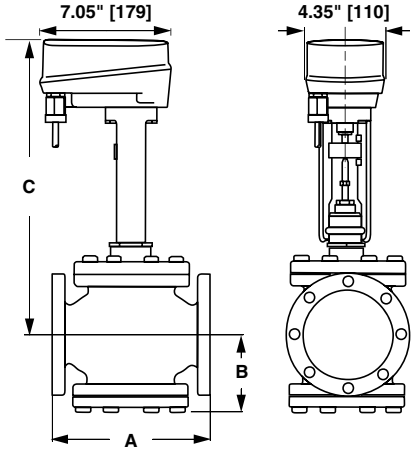
Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	11.31" [287]
G219(S)-G220(S)	207	¾"	20	3.62" [92]	1.06" [27]	11.31" [287]
G224(S)-G225(S)	207	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	130	1¼"	32	4.62" [117]	1.37" [35]	12.00" [305]
G240(S)	88	1½"	40	5.37" [137]	1.50" [38]	12.06" [306]
G250(S)	47	2"	50	6.12" [156]	1.56" [40]	12.37" [314]

Dimensions with G3...(D) Series 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]
G325(D)	207	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	130	1¼"	32	4.62" [117]	1.62" [41]	10.06 [256]
G340(D)	88	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G350(D)	47	2"	50	6.12" [156]	1.87" [48]	9.25" [235]

Dimensions with G6...C(S) Series 2-Way Valve with NVF24-MFT(-E) US

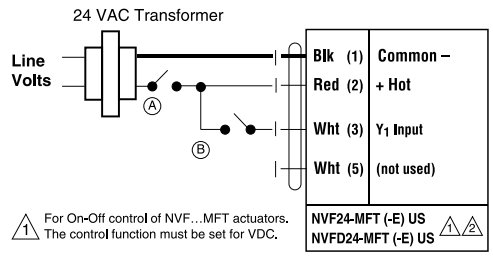


	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G665C(S)	150	2½"	[65]	9.00" [229]	4.75" [120]	15.00" [381]
G680C(S)	136	3"	[80]	10.00" [254]	5.37" [137]	15.43" [392]
G665LCS	150	2½"	[65]	9.00" [229]	4.75" [120]	15.00" [381]
G680LCS	136	3"	[80]	10.00" [254]	5.37" [137]	15.43" [392]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

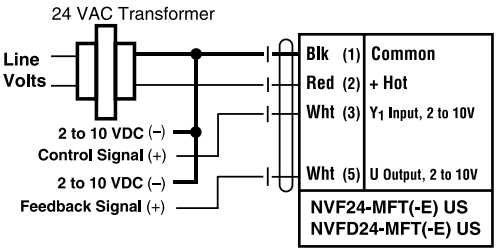
Wiring Diagrams



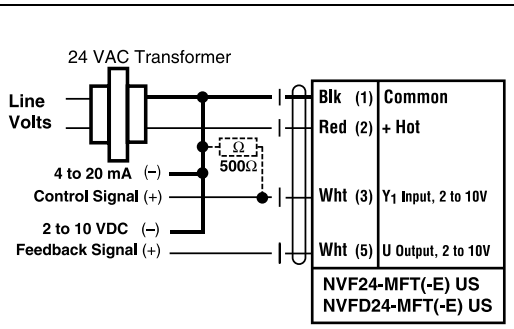
	Actuator		Control Switch Location	Correct LED Indication
	"Open" (Switch Selectable)	"Closed" (Switch Selectable)		
OFF/ON Drive "open" Spring "closed"	150 sec. (MFT selectable)	30 sec. Spring return	A	Flashing Red
OFF/ON Drive "open" Drive "closed"	150 sec. (MFT selectable)	150 sec. (MFT selectable)	B	Steady Green

If the switch location "A" is selected, the switch in location "B" is not required.
If the switch location "B" is selected, the switch in location "A" is not required.

On/Off control



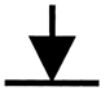
2 to 10 VDC



4 to 20 mA

Spring Return Actuators Model Designation

NVF(D)24-MFT US
retracting plunger (spring up)



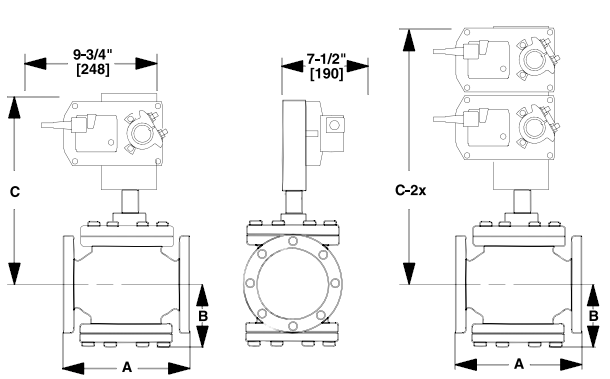
NVF(D)24-MFT-E US
extending plunger (spring down)

Models

GMB24-3X1
2xGMB24-3X1

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	4 W
	holding	2 W
Transformer sizing		6 VA (Class 2 power source)
Electrical connection		❑ 3 ft [1m] 18 GA plenum rated cable ½" conduit connector
Overload protection		electronic throughout stroke
Control		On/Off, Floating Point
Angle of rotation		95°
Direction of rotation		reversible with ↷/↶ switch
Position indication		reflective visual indicator (snap-on)
Running time		150 seconds, constant independent of load
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Housing		NEMA 2/IP54 with cable entry down
Housing material		UL94-5V (flammability rating)
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
Noise level		<45 dB(A)
Quality standard		ISO 9001

Dimensions with G6… Series 2-Way Valve with GMB24-3X1

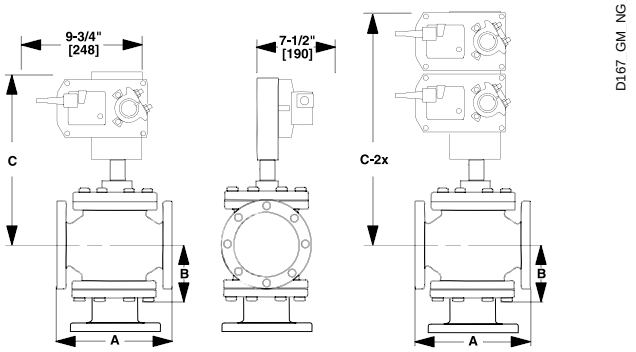


Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665(S)	116	108	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)	79	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)-250	116	108	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)-250	79	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665C(S)	150	150	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)	150	150	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G6100C(S)	150	150	4"	[100]	13.00" [330]	6.37" [162]	15.50" [394]
G6125C(S)	150	150	5"	[125]	15.75" [400]	5.75" [146]	16.12" [410]
G6150C(S)	150	150	6"	[150]	17.75" [757]	6.50" [165]	16.75" [425]
G665LCS	150	150	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	150	150	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G6100LCS	150	150	4"	[100]	13.00" [330]	6.37" [162]	15.50" [394]
G6125LCS	150	150	5"	[125]	15.75" [400]	5.75" [146]	16.12" [410]
G6150LCS	150	116	6"	[150]	17.75" [757]	6.50" [165]	16.75" [425]

Dimensions with G6… Series 2-Way Valve with 2x GMB24-3X1

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G665(S)	150	150	2½"	[65]	9.00" [229]	4.75" [120]	18.25" [464]
G680(S)	123	116	3"	[80]	10.00" [254]	5.37" [137]	19.18" [487]
G665(S)-250	170	171	2½"	[65]	9.00" [229]	4.75" [120]	18.25" [464]
G680(S)-250	123	116	3"	[80]	10.00" [254]	5.37" [137]	19.18" [487]

Dimensions with G7… Series 3-Way Valve with GMB24-3X1



Dimensions with G7… Series 3-Way Valve with GMB24-3X1

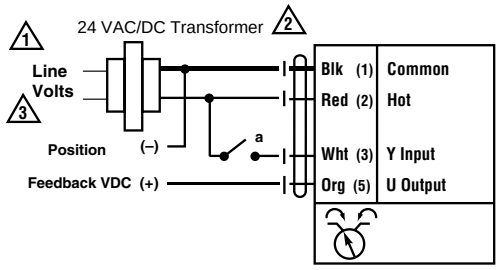
Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	114	106	2½"	[65]	9.00" [229]	7.12" [181]	13.87" [352]
G780(S)(-250)	78	72	3"	[80]	10.00" [254]	8.00" [203]	14.43" [367]
G7100(S)(-250)	19	14	4"	[100]	13.00" [330]	9.87" [251]	15.50" [394]
G765D(S)(-250)	100	-	2½"	[65]	9.00" [229]	7.12" [181]	13.87" [352]
G780D(S)(-250)	100	-	3"	[80]	10.00" [254]	8.00" [203]	14.43" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.00" [330]	9.87" [251]	15.50" [394]
G7125D(S)(-250)	100	-	5"	[125]	15.75" [400]	9.25" [235]	14.12" [359]
G7150D(S)(-250)	100	-	6"	[150]	17.75" [451]	9.87" [251]	15.12" [505]

Dimensions with G7… Series 3-Way Valve with 2x GMB24-3X1

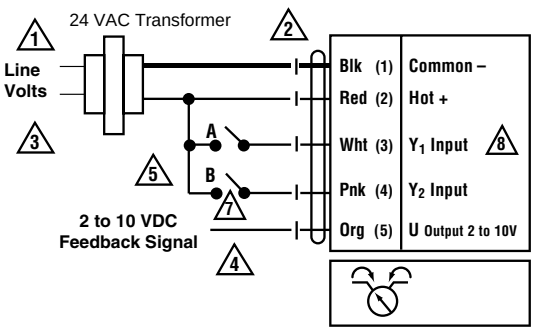
Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	150	150	2½"	[65]	9.00" [229]	7.12" [181]	18.62" [473]
G780(S)(-250)	122	116	3"	[80]	10.00" [254]	8.00" [203]	19.18" [487]
G7100(S)(-250)	32	27	4"	[100]	13.00" [330]	9.87" [251]	20.00" [508]
G7125(S)(-250)	19	15	5"	[125]	15.75" [400]	9.25" [235]	20.56" [522]
G7150(S)(-250)	13	10	6"	[150]	17.75" [451]	9.87" [251]	21.25" [540]
G765D(S)(-250)	100	-	2½"	[65]	9.00" [229]	7.12" [181]	18.62" [473]
G780D(S)(-250)	100	-	3"	[80]	10.00" [254]	8.00" [203]	19.18" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.00" [330]	9.87" [251]	20.00" [508]
G7125D(S)(-250)	100	-	5"	[125]	15.75" [400]	9.25" [235]	20.56" [522]
G7150D(S)(-250)	100	-	6"	[150]	17.75" [451]	9.87" [251]	21.25" [540]

Wiring Diagrams

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



On/Off control



Floating Point

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

MFT 5 YEAR WARRANTY

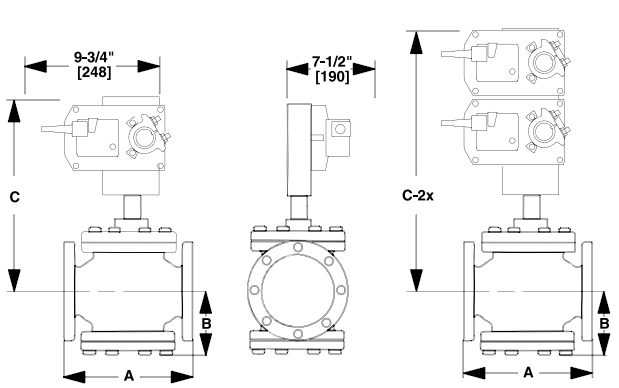
CE LISTED 94 DS TEMP.IND. & REG.EQUIP. c UL us BRUSHLESS DC motor

Models

GMX24-MFT
GMX24-MFT95X1
2*GMX24-MFTX1
2*GMX24-MFT95X1

Technical Data	
Control	MFT
Control signal	2 to 10 VDC, Floating Point, On/Off, PWM, 0-135 Ω (MFT95)
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	4.5 W
holding	3 W
Transformer sizing	7 VA (Class 2 power source)
Electrical connection	❑ 3 ft [1m] 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout stroke
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	2 to 10 VDC, 0.5 mA max VDC variable
Angle of rotation	95°
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Running time	150 seconds, constant independent of load
Humidity	5 to 95% RH non-condensing
Ambient temperature	-22°F to 122°F [-30°C to 50°C]
Housing	NEMA 2/IP54 with cable entry down
Housing material	UL94-5V (flammability rating)
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
Noise level	<45 dB(A)
Quality standard	ISO 9001

Dimensions with G6… Series 2-Way Valve with GMB24-MFTX1

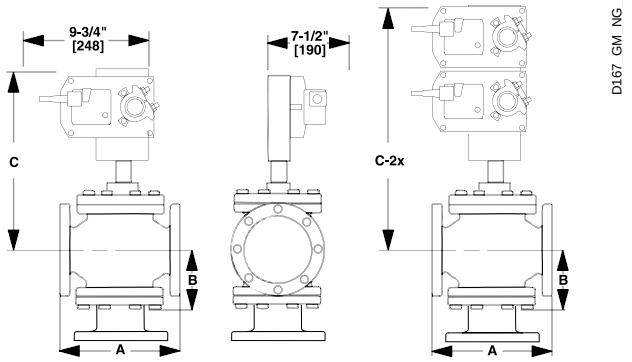


Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665(S)	116	108	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)	79	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)-250	116	108	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)-250	79	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665C(S)	150	150	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)	150	150	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G6100C(S)	150	150	4"	[100]	13.00" [330]	6.37" [162]	15.50" [394]
G6125C(S)	150	150	5"	[125]	15.75" [400]	5.75" [146]	16.12" [410]
G6150C(S)	150	150	6"	[150]	17.75" [757]	6.50" [165]	16.75" [425]
G665LCS	150	150	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	150	150	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G6100LCS	150	150	4"	[100]	13.00" [330]	6.37" [162]	15.50" [394]
G6125LCS	150	150	5"	[125]	15.75" [400]	5.75" [146]	16.12" [410]
G6150LCS	150	116	6"	[150]	17.75" [757]	6.50" [165]	16.75" [425]

Dimensions with G6… Series 2-Way Valve with 2x GMX24-MFTX1

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G665(S)	150	150	2½"	[65]	9.00" [229]	4.75" [120]	18.25" [464]
G680(S)	123	116	3"	[80]	10.00" [254]	5.37" [137]	19.18" [487]
G665(S)-250	170	171	2½"	[65]	9.00" [229]	4.75" [120]	18.25" [464]
G680(S)-250	123	116	3"	[80]	10.00" [254]	5.37" [137]	19.18" [487]

Dimensions with G7… Series 3-Way Valve with GMB24-MFTX1



Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	114	106	2½"	[65]	9.00" [229]	7.12" [181]	13.87" [352]
G780(S)(-250)	78	72	3"	[80]	10.00" [254]	8.00" [203]	14.43" [367]
G7100(S)(-250)	19	14	4"	[100]	13.00" [330]	9.87" [251]	15.50" [394]
G765D(S)(-250)	100	-	2½"	[65]	9.00" [229]	7.12" [181]	13.87" [352]
G780D(S)(-250)	100	-	3"	[80]	10.00" [254]	8.00" [203]	14.43" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.00" [330]	9.87" [251]	15.50" [394]
G7125D(S)(-250)	100	-	5"	[125]	15.75" [400]	9.25" [235]	14.12" [359]
G7150D(S)(-250)	100	-	6"	[150]	17.75" [451]	9.87" [251]	15.12" [505]

Dimensions with G7… Series -3 Way Valve with 2x GMB24-MFTX1

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	150	150	2½"	[65]	9.00" [229]	7.12" [181]	18.62" [473]
G780(S)(-250)	122	116	3"	[80]	10.00" [254]	8.00" [203]	19.18" [487]
G7100(S)(-250)	32	27	4"	[100]	13.00" [330]	9.87" [251]	20.00" [508]
G7125(S)(-250)	19	15	5"	[125]	15.75" [400]	9.25" [235]	20.56" [522]
G7150(S)(-250)	13	10	6"	[150]	17.75" [451]	9.87" [251]	21.25" [540]
G765D(S)(-250)	100	-	2½"	[65]	9.00" [229]	7.12" [181]	18.62" [473]
G780D(S)(-250)	100	-	3"	[80]	10.00" [254]	8.00" [203]	19.18" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.00" [330]	9.87" [251]	20.00" [508]
G7125D(S)(-250)	100	-	5"	[125]	15.75" [400]	9.25" [235]	20.56" [522]
G7150D(S)(-250)	100	-	6"	[150]	17.75" [451]	9.87" [251]	21.25" [540]

Wiring Diagrams

1 Provide overload protection and disconnect as required.

2 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.

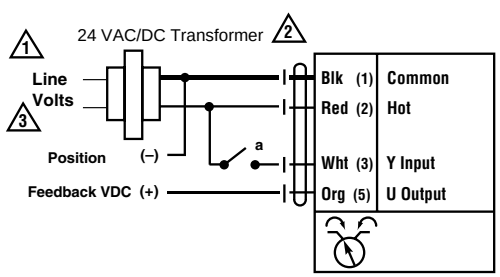
4 Position feedback cannot be used with Triac sink controller. The actuator internal common reference is not compatible.

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

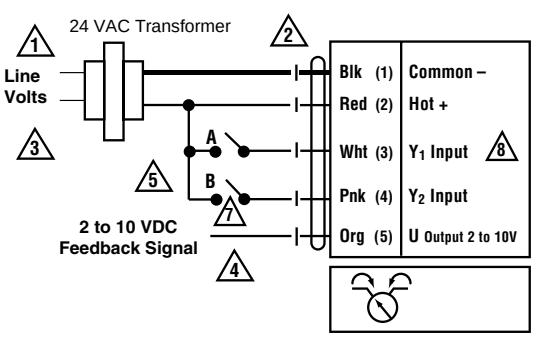
6 ZG-R01 may be used.

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

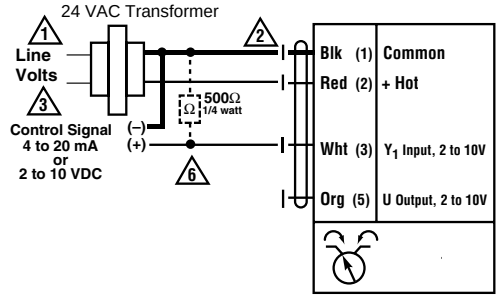
8 For triac sink the common connection from the actuator must be connected to the hot connection of the controller.



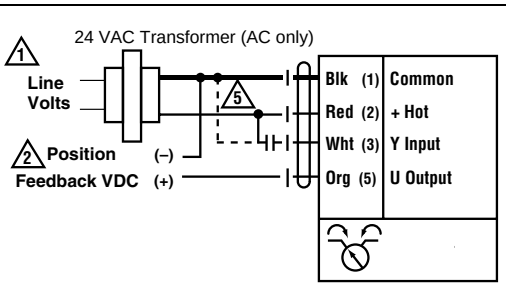
On/Off control



Floating Point



VDC/4-20 mA



PWM

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

INSTALLATION NOTES

21 Provide overload protection and disconnect as required.

22 Actuators and controller must have separate transformers.

23 Consult controller instruction data for more detailed information.

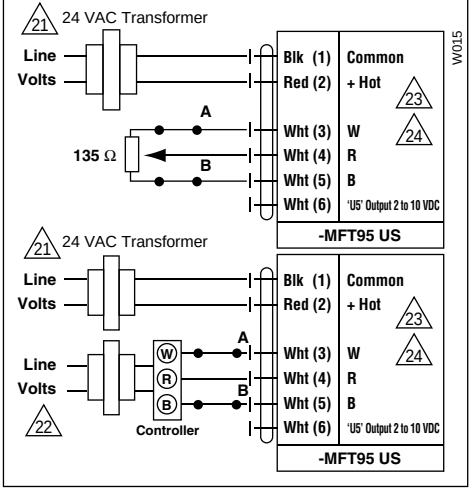
24 Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell® resistor kits may also be used.

25 To reverse control rotation, use the reversing switch.

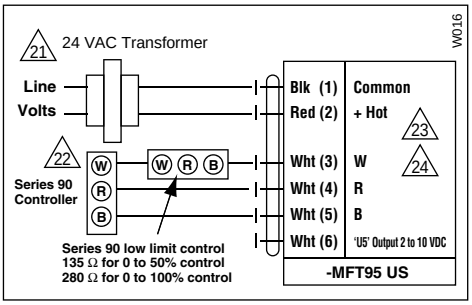
Override

Switch A	Switch B	Damper Position
		Damper Open
		Damper Closed

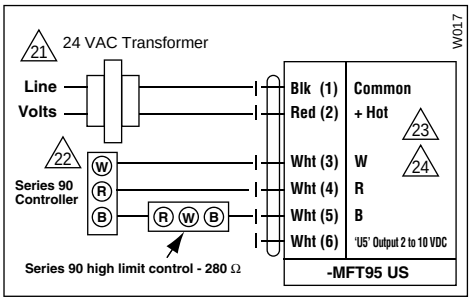
The direction of rotation switch is set so that the fail safe position and the position of the damper is closed with no signal at wire R.



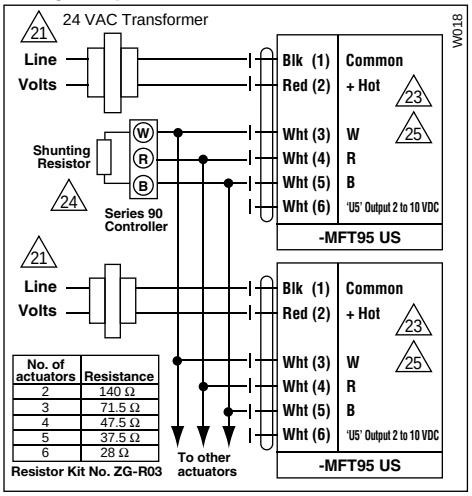
Low Limit Control



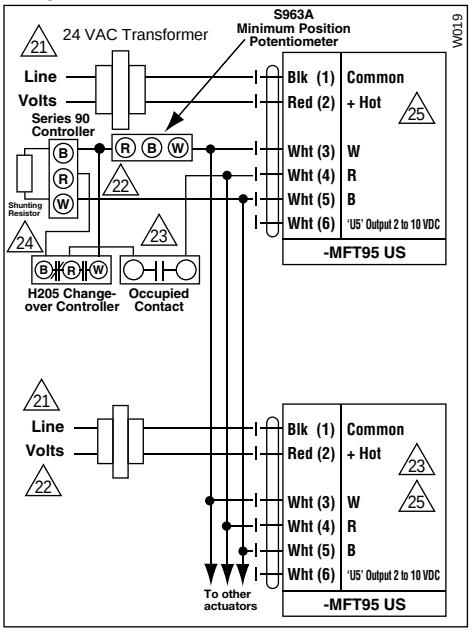
High Limit Control



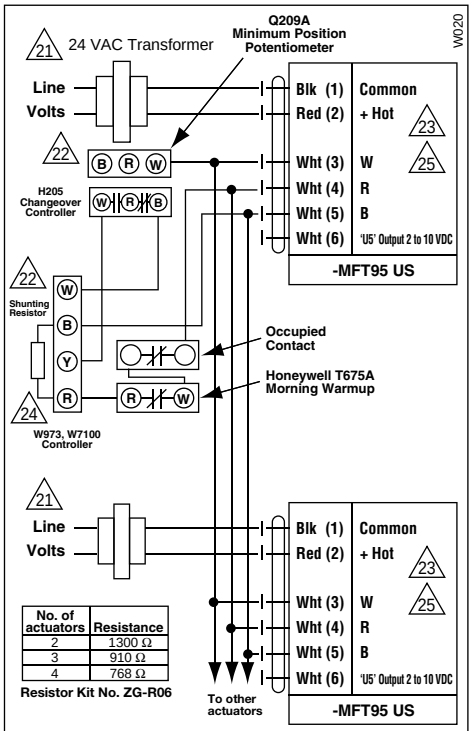
Wiring Multiple Actuators to a Series 90 Controller



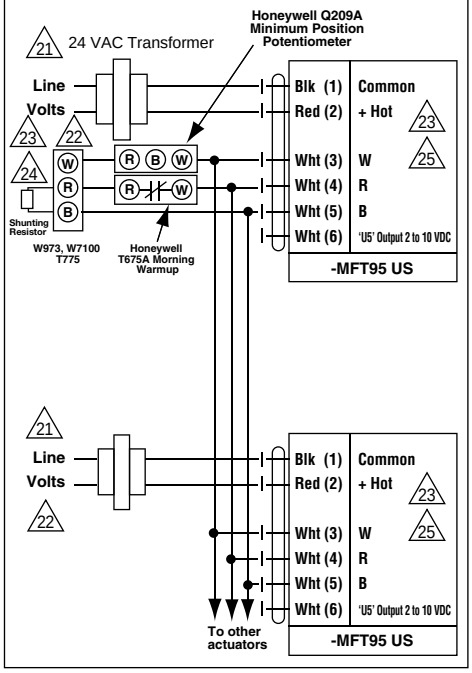
Wiring Multiple Actuators to a Series 90 Controller using a Minimum Position Potentiometer

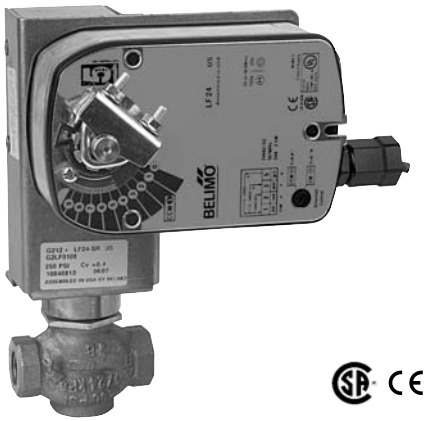


Typical wiring diagrams for multiple actuators used with the W973, W7100 and T775 controllers



Used with the W973 and W7100 controllers





Models

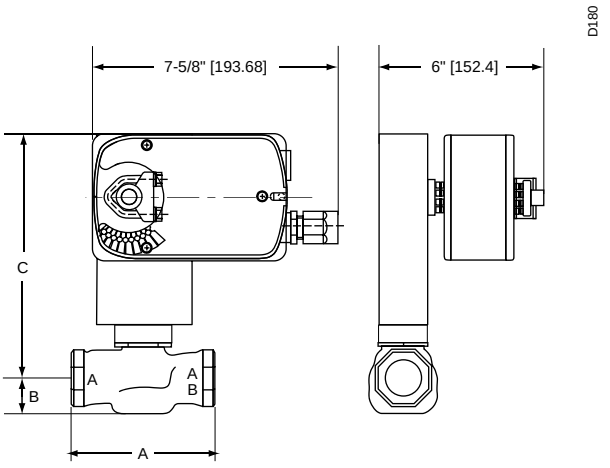
LF24 US
LF24-S US w/built-in Aux. Switch
LF120 US
LF120-S US w/built-in Aux. Switch

Technical Data		
Control		On/Off, Floating
Power supply		
LF24(-S) US		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
LF120(-S) US		120 VAC ± 10% 50/60 Hz
Power consumption		
LF24(-S) US	running	5 W
	holding	2.5 W
LF120(-S) US	running	5.5 W
	holding	3.5 W
Transformer sizing		
LF24(-S) US		7 VA, class 2 power source
LF120(-S) US		7.5 VA, class 2 power source
Electrical connection		3 ft, 18 GA appliance cable (-S models have 2 cables) ½" conduit connector
Electrical protection		120V actuators double insulated
Overload protection		electronic throughout rotation
Angle of rotation		95°
Spring return direction		reversible with CW/CCW mounting
Position indication		visual indicator 0° to 90°
Running time		<40 to 75 sec. (on-off)
	spring	<25 sec. @-4°F to 122°F [-20°C to 50°C] <60 sec. @-22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings†		UL 873, CSA C22.2 No. 24 certified, CE
Quality standard		ISO 9001
Noise level		max. 62 dB(A)

LF…-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

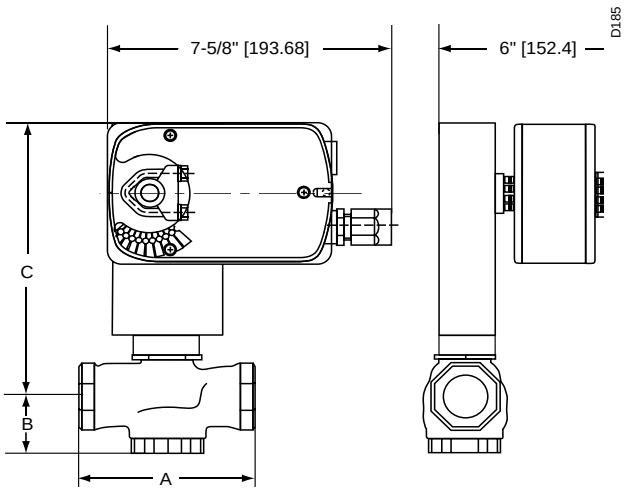
† Rated impulse voltage 800V (4kV for 120V model), Control pollution degree 3, Type of action 1.AA (1.AA.B for -S models)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	185	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

Wiring Diagrams

INSTALLATION NOTES

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

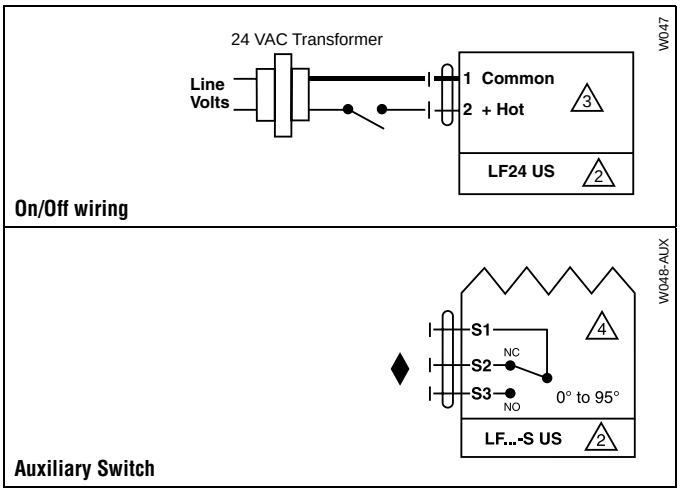
△3 Actuator may also be powered by 24 VDC.

△4 For end position indication, interlock control, fan startup, etc., LF24-S US and LF120-S US incorporates a built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

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.

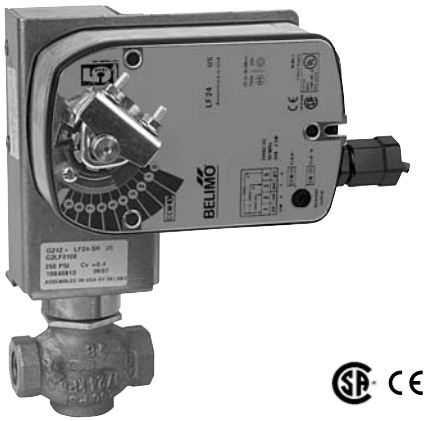


On/Off wiring

Auxiliary Switch

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.



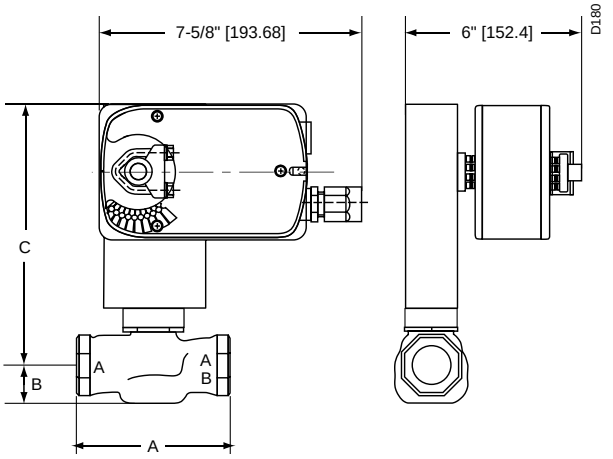
Models

LF24-3 US
LF24-3-S US w/built-in Aux. Switch

Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	2.5 W
	holding	1W
Transformer sizing		5 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cables (-S model has 2 cables) ½" conduit connector
Overload protection		electronic throughout 0° to 95° rotation
Input Impedance		1000 Ω (0.6w) control inputs
Angle of rotation		95°
Torque		35 in-lb [Nm]
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator 0° to 90°
Running time	motor	150 sec. constant independent of load
	spring	<25 sec. @ -4°F to 122°F [-20°C to 50°C] <60 sec. @ -22°F [-30°C]
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 type 2/IP54
Housing material		zinc coated metal
Agency listings		UL 873 listed, CSA C22.2 No. 24 certified, CE
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Servicing		maintenance free
Quality standard		ISO 9001

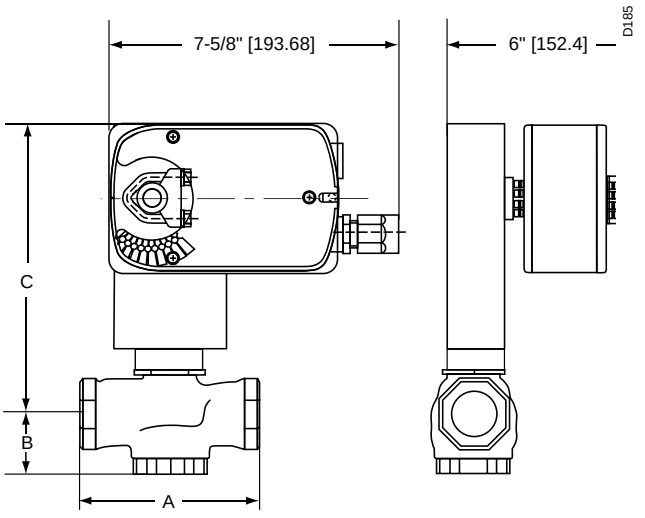
LF24-3-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	185	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

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 The common connection from the actuator must be connected to the Hot connection of the controller.

5 The actuator Hot must be connected to the control board common.

6 For end position indication, interlock control, fan startup, etc., LF24-3-S US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

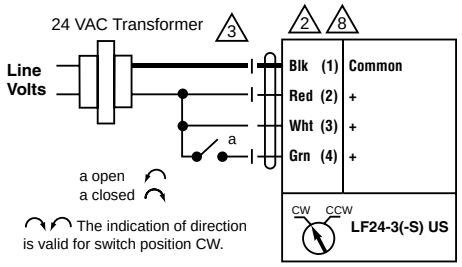
8 Actuators with plenum rated cable do not have numbers on wires; use color coded instead. Actuators with appliance rated cable use numbers.

APPLICATION NOTES

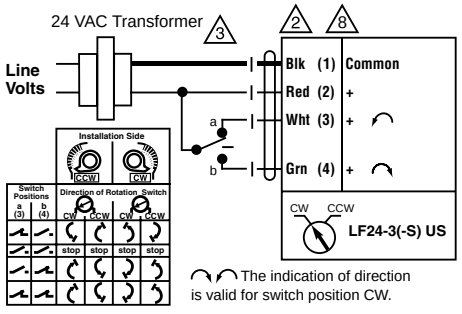
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*

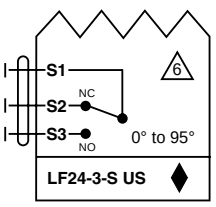
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



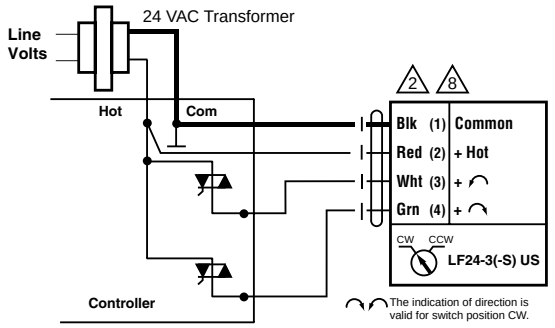
On/Off control



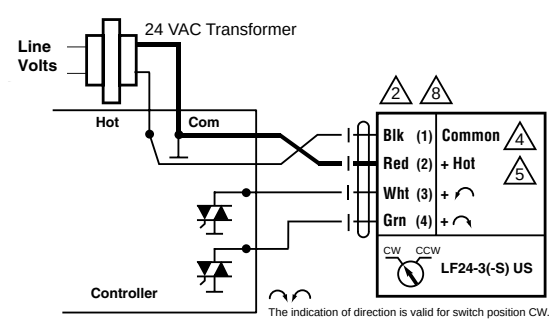
Floating Point control



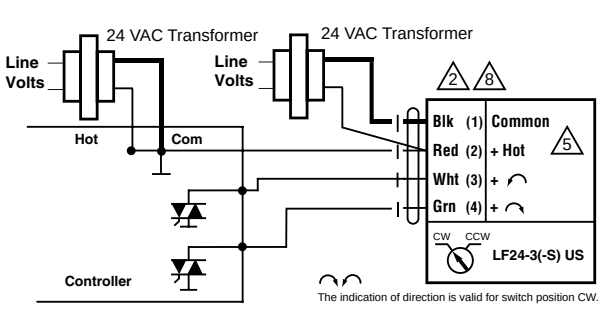
Auxiliary switch



Triac source



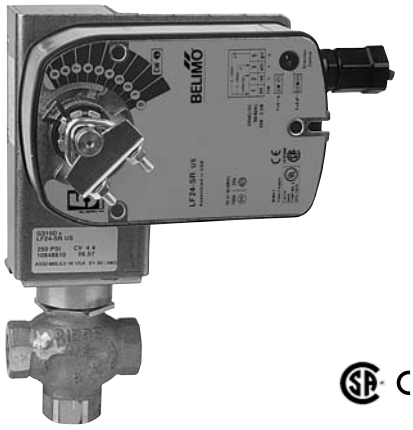
Triac sink



Triac sink with separate transformers

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

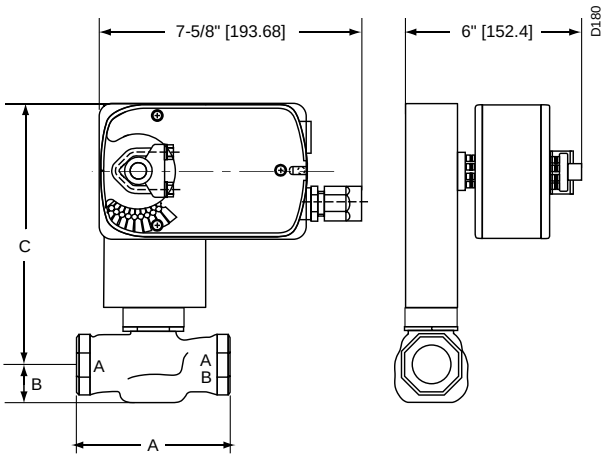


Models

LF24-SR US
LF24-SR-S US w/built-in Aux. Switch

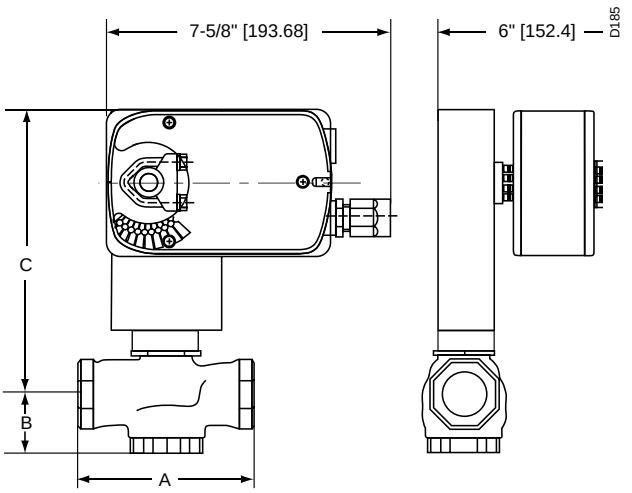
Technical Data		
Control		Proportional
Control signal		2 to 10 VDC 4 to 20 mA (with 500 Ω resistor)
Power consumption	running	2.5 W
	holding	1 W
Transformer sizing		5 VA, class 2 power
Electrical connection		3 ft, 18 GA appliance cables (-S model has 2 cables) ½" conduit connector
Overload protection		electronic throughout 0° to 95° rotation
Input impedance		100k Ω
Feedback output		2 to 10 VDC
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator
Running time	motor	<40 to 75 sec. (on-off) 150 sec. independent of load (proportional)
	spring	<25 sec. @ -4°F to 122°F [-20°C to 50°C] <60 sec. @ -22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings		UL 873, CSA C22.2 No. 24 certified, CE
Quality standard		ISO 9001
Noise level		max. 62 dB(A)
LF24-SR-S US		
Auxiliary switch		1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	185	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

Wiring Diagrams

INSTALLATION NOTES

△2 ***CAUTION** Equipment damage!*
Actuators may be connected in parallel. Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500 Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

△3 Actuators may also be powered by 24 VDC.

△4 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.

△5 Only connect common to neg. (–) leg of control circuits.

△6 For end position indication, interlock control, fan startup, etc., LF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @ 250 VAC, UL listed, adjustable 0° to 95°.

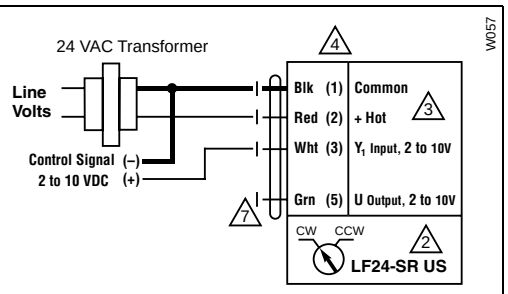
△7 The LF24-SR-S US wire 5 is white.

APPLICATION NOTES

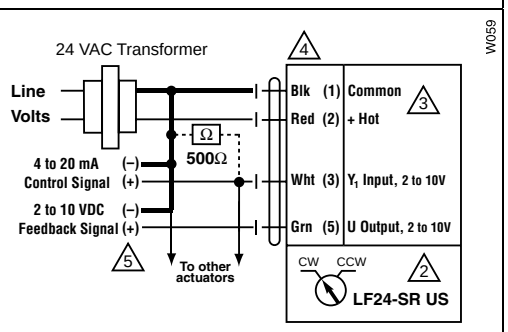
♦ The ZG-R01 500 Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC, up to 2 actuators may be connected in parallel.

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

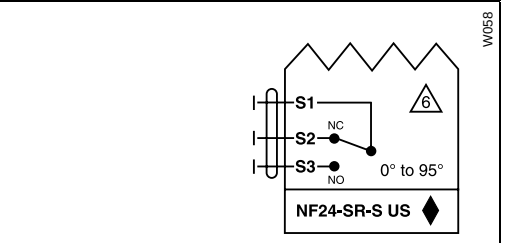
⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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



2 to 10 VDC control



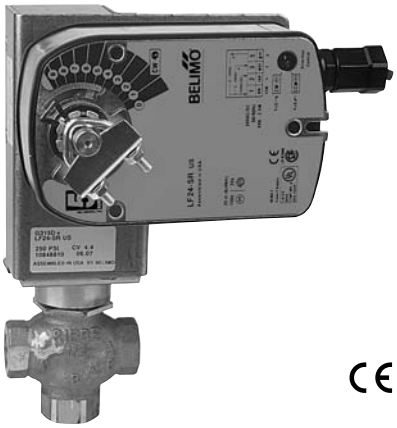
4 to 20 mA control



Auxiliary switch

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.



MFT

5 YEAR WARRANTY

CE LISTED 94 D5 TEMP.IND. & REG. EQUIP. c UL us

BRUSHLESS DC. motor

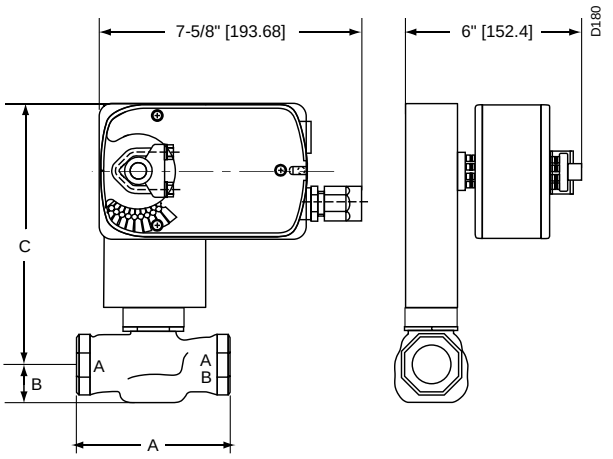
Models

LF24-MFT US
LF24-MFT-S US w/built-in Aux. Switch

Technical Data		
Control		MFT
Control signal		2 to 10 VDC
Power consumption	running	2.5 W
	holding	1 W
Transformer sizing		5 VA (class 2 power source)
Electrical connection (-S models have 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cable
Overload protection		electronic throughout 0° to 95° rotation
Feedback output		2 to 10 VDC, 0.5 mA max
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20mA 750 Ω for PWM 500 Ω for on/off and floating point
Angle of rotation		95°
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator
Running time	motor	150 sec. independent of load (proportional, default)
	spring	<25 sec. @-4°F to 122°F [-20°C to 50°C] <60 sec. @-22°F [-30°C]
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2
Agency listings		cULus according to UL 873 and CAN/CSA C22.2 No. 24-93
Noise level (max)	running	<30 db(A)
	spring return	62 dB(A)
Quality standard		ISO 9001

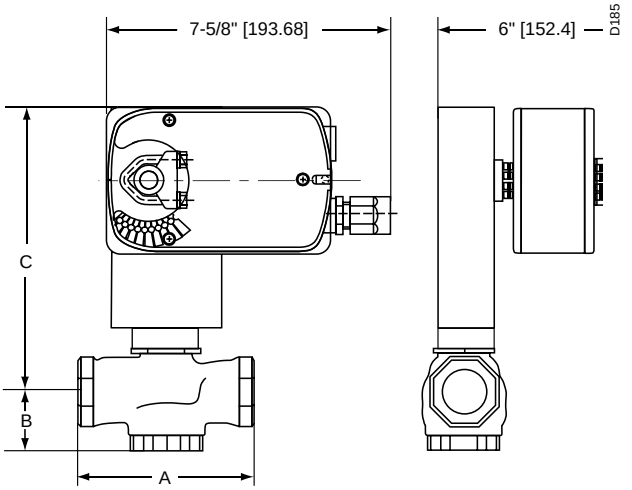
LF24-MFT-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	185	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

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.

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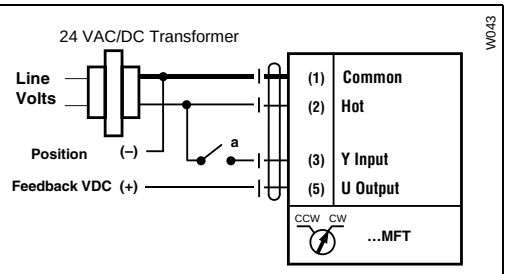
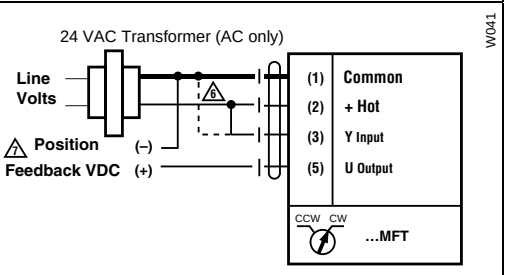
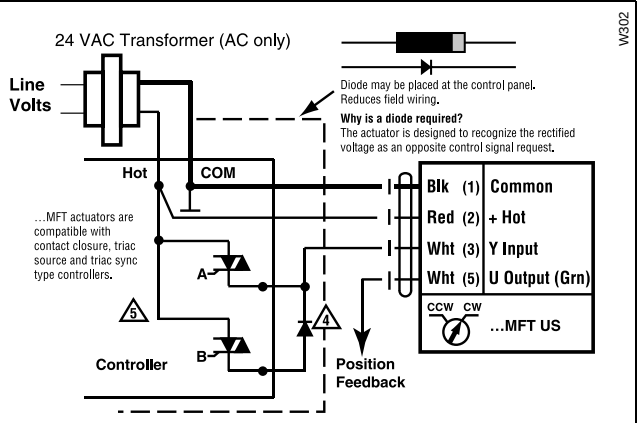


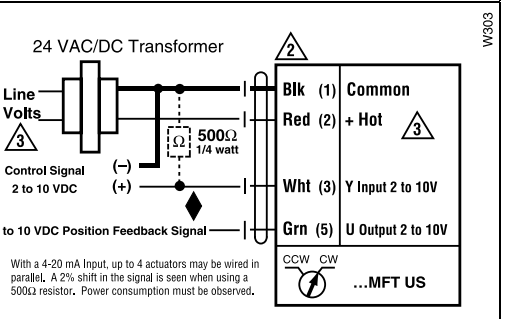
On/Off control



PWM, triac source and sink



Floating Point control



Proportional 2 to 10 or 4 to 20 mA control signal

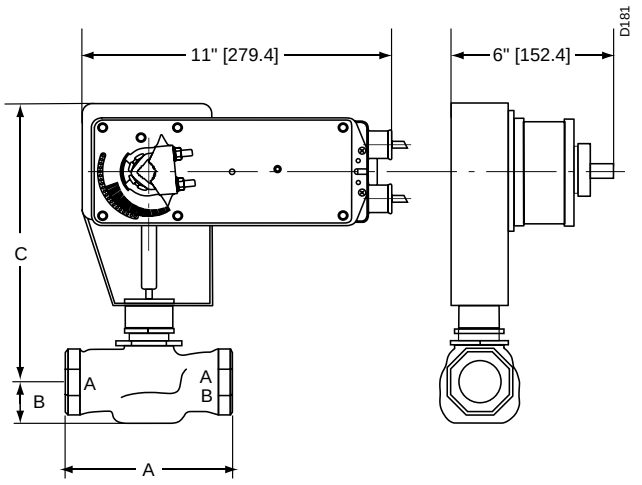
Models

NF24 US
NF24-S US w/built-in Aux. Switch
NF120 US
NF120-S US w/built-in Aux. Switch

Technical Data		
Control		On/Off
Power consumption		
NF24(-S) US	running	5 W
	holding	2.6 W
NF120(-S) US	running	6 W
	holding	3.5 W
Transformer sizing		10 VA, class 2 power
Electrical connection (-S model has 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cables
Electrical protection		120 V actuators double insulated
Overload protection		electronic throughout 0° to 95° rotation
Angle of rotation		95°
Position indication		visual indicator
Running time	control	<75 sec.
	spring	<60 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)

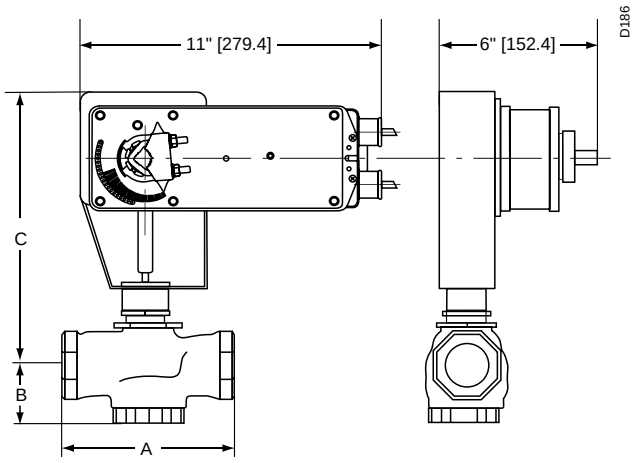
NF...-S US	
Auxiliary switch	1 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, adjustable 5° to 85°

Dimensions with G2... Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G224(S)-G225(S)	168	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	105	1¼"	32	4.62" [117]	1.37" [35]	12.00" [305]

Dimensions with G3...(D) Series 3-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G325(D)	168	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	105	1¼"	32	4.62" [117]	1.62" [41]	10.06" [256]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

2 ***CAUTION** Equipment damage!*
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., NF24-S US incorporates a built-in auxiliary switch: 1 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, adjustable 5° to 85°.

APPLICATION NOTES

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

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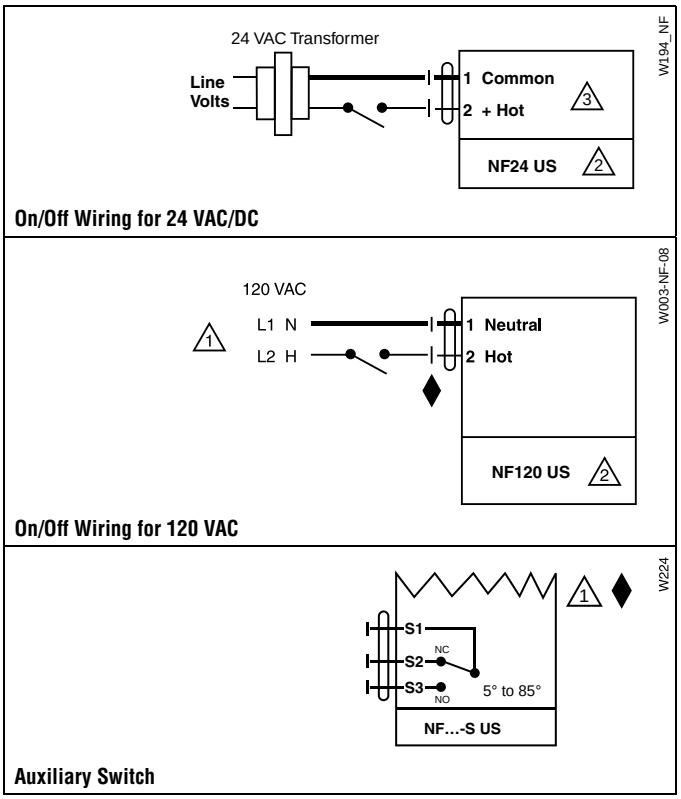
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow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



On/Off Wiring for 24 VAC/DC

On/Off Wiring for 120 VAC

Auxiliary Switch

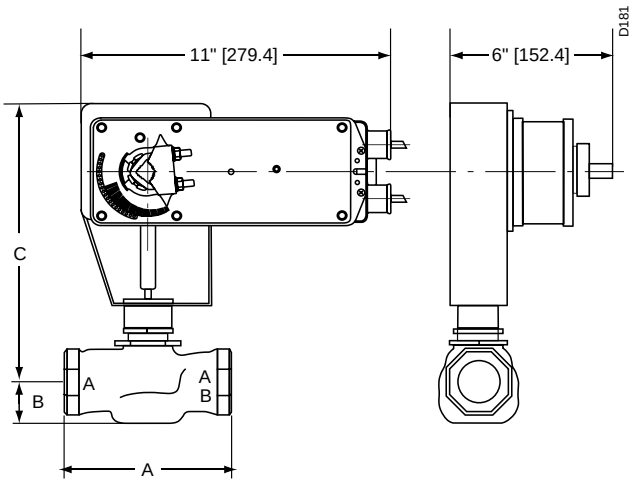
Models

NF24-SR US
NF24-SR-S US w/built-in Aux. Switch

Technical Data		
Control		Proportional
Control signal		2 to 10 VDC 4 to 20 mA (with 500 Ω resistor)
Power consumption	running	3 W
	holding	1 W
Transformer sizing		6 VA, class 2 power
Electrical connection (-S model has 2 cables)		½" conduit connector 3 ft [1m], 18 GA appliance cables
Overload protection		electronic throughout 0° to 95° rotation
Operating range Y		2 to 10 VDC, 4 to 10 mA
Input impedance		100 kΩ (0.1 mA), 500 Ω
Feedback output U		2 to 10 VDC (max. 0.5 mA) for 95°
Angle of rotation		95°, adjustable 30° to 95° with accessory
Torque		60 in-lb [7 Nm] constant torque
Direction of rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ switch
Position indication		visual indicator, 0° to 95° (0° is spring return position)
Running time	motor	150 seconds independent of load
	spring	<60 seconds
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
Quality standard		ISO 9001
Noise level		max. 45 dB(A)

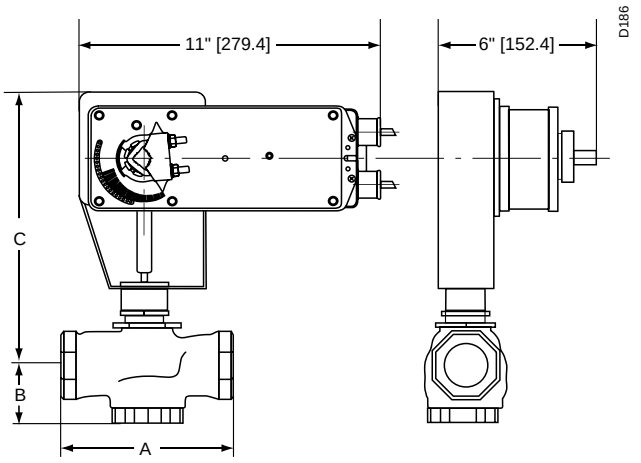
NF24-SR-S US	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G224(S)-G225(S)	168	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	105	1¼"	32	4.62" [117]	1.37" [35]	12.00" [305]

Dimensions with G3…(D) Series 3-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G325(D)	168	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	105	1¼"	32	4.62" [117]	1.62" [41]	10.06" [256]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

6 For end position indication, interlock control, fan startup, etc., NF24-SR-S US incorporates one built-in auxiliary switch: 1 x SPDT, 3A (0.5A) @250 VAC, UL listed, adjustable 0° to 95°.

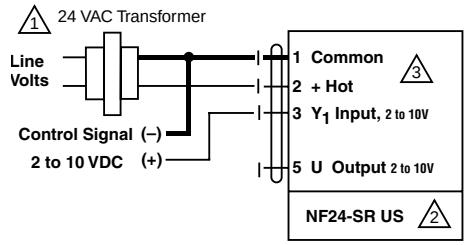
APPLICATION NOTES

♦ 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.

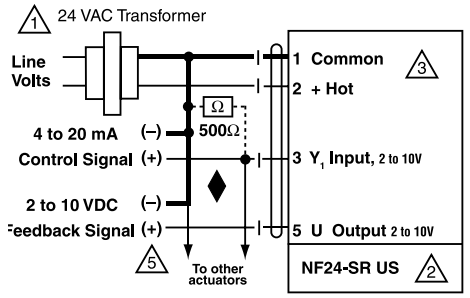
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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

W068



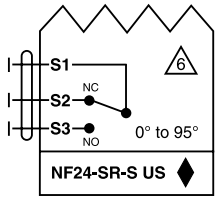
2 to 10 VDC control

W069



4 to 20 mA control

W058-NF-08



Auxiliary switch

Piping

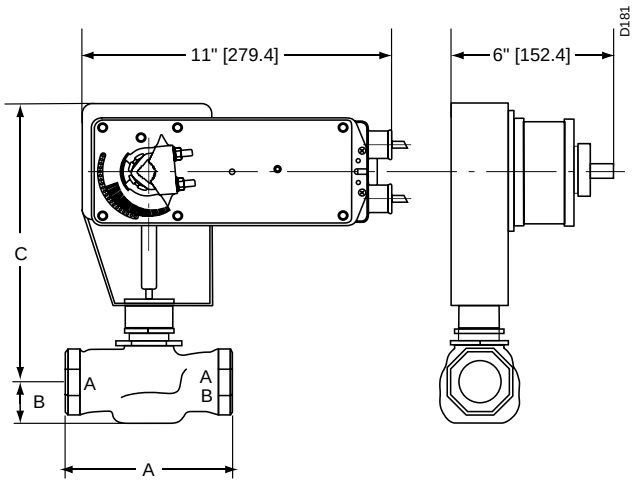
The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Models

NF24-MFT US

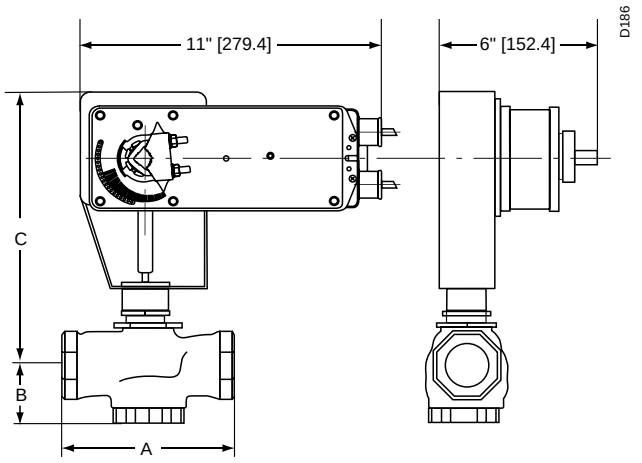
Technical Data		
Control		MFT
Control signal		2 to 10 VDC, (4 to 20 mA with 500 Ω resistor)
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	6 W
	holding	1.8 W
Transformer sizing		10 VA, class 2 power
Electrical connection		½" conduit connector 3 ft [1m], 18 GA appliance cable
Overload protection		electronic throughout rotation
Input impedance		100 kΩ for 2 to 10 VDC (0.1 mA) 500 Ω for 4 to 20 mA 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 ↷/↶ switch
Position indication		visual indicator, 0° to 95°
Running time	control	150 sec. constant
	spring	<60 sec.
Ambient temperature		-22° F to 122° F [-30° C to 50° C]
Housing		NEMA 2 / IP54
Agency listings		UL 873 listed, CSA C22.2 No. 24 certified, CE
Noise level		less than 45 dB(A)

Dimensions with G2… Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G224(S)-G225(S)	168	1"	25	4.62" [117]	1.12" [29]	12.00" [305]
G232(S)	105	1¼"	32	4.62" [117]	1.37" [35]	12.00" [305]

Dimensions with G3…(D) Series 3-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G325(D)	168	1"	25	4.62" [117]	1.56" [40]	9.81" [249]
G332(D)	105	1¼"	32	4.62" [117]	1.62" [41]	10.06" [256]

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.

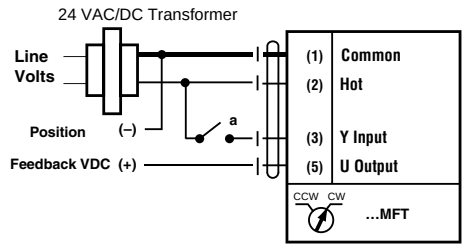
7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

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.

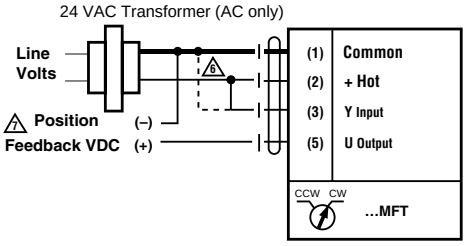
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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

W043



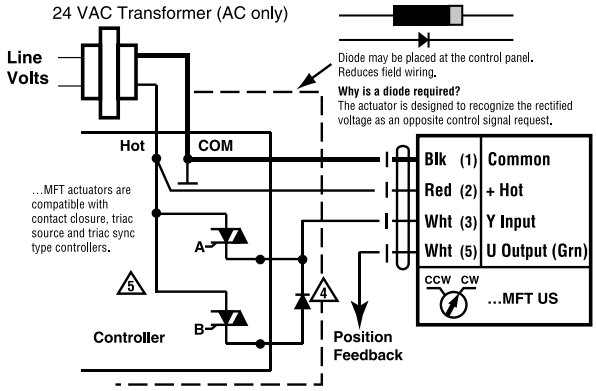
On/Off control

W041



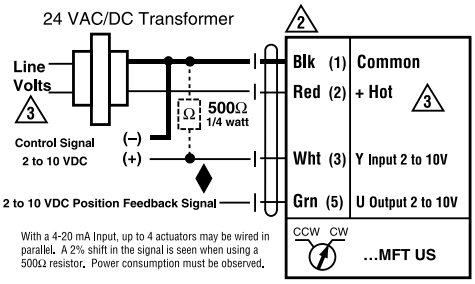
PWM, triac source and sink

W302

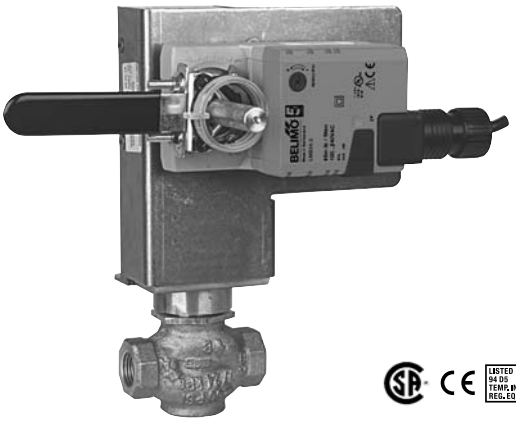


Floating Point control

W303



Propotional 2 to 10 or 4 to 20 mA control signal



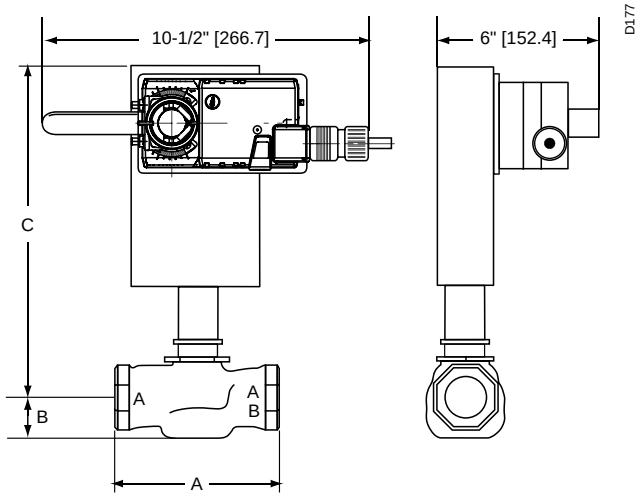
Models

LMB24-3X1
LMB24-3-S w/built-in Aux. Switch

Technical Data	
Control	On/Off, Floating Point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	1.5 W
holding	0.2 W
Transformer sizing	3 VA (class 2 power source)
Electrical connection LM24-3 LMB24-3-S	½" conduit connector 3 ft, 18 GA plenum rated cables 3 ft, 18 GA appliance cables
Overload protection	electronic throughout 0° to 95° rotation
Input Impedance	600 Ω
Angle of rotation	95°
Torque	45 in-lb [5 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<35 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

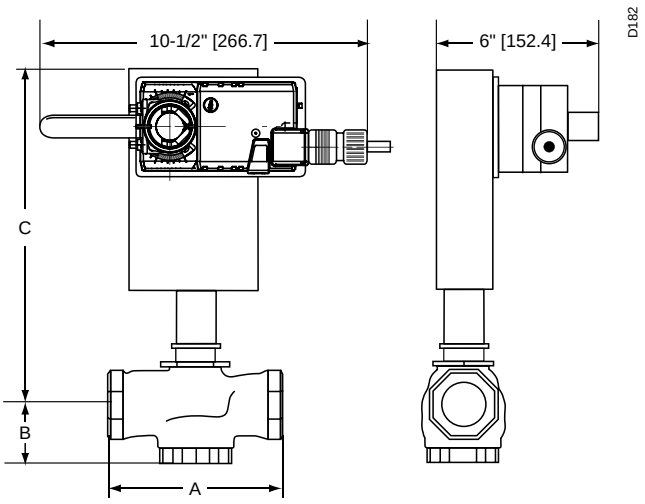
LMB24-3-S	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	250	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

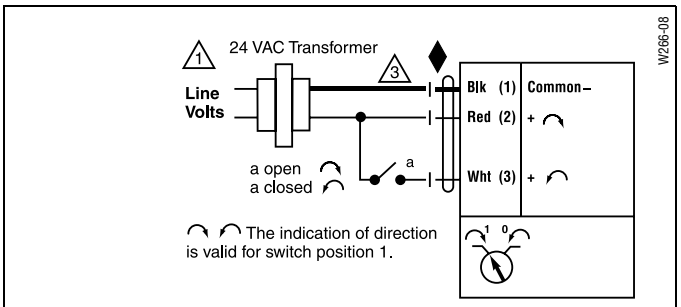
3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

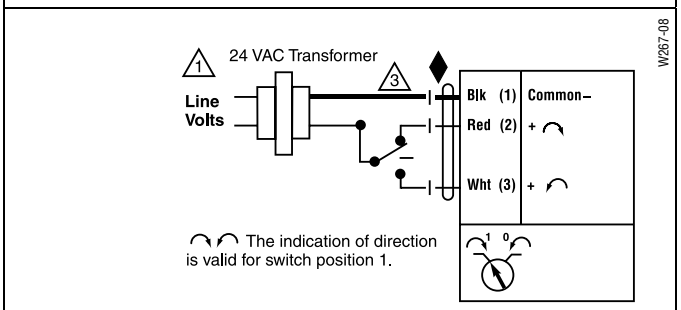
Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***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.



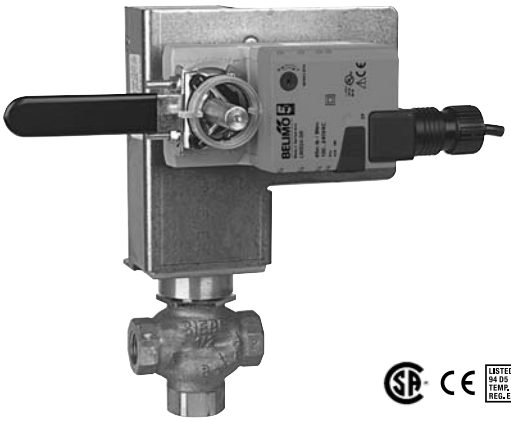
On/Off control



Floating Point or On/Off control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

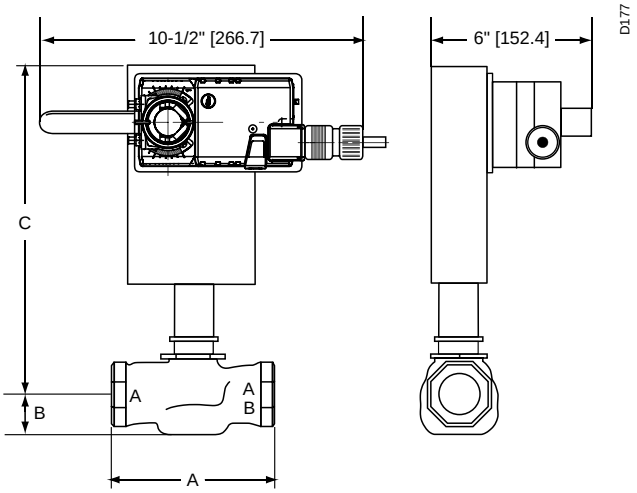


Models

LMB24-SRX1 w/built-in Aux. Switch

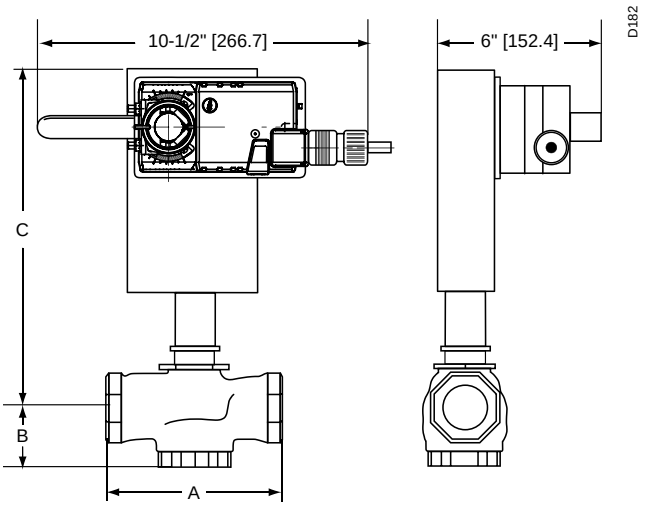
Technical Data	
Control	Proportional
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	1.5 W
holding	0.4 W
Transformer sizing	3 VA (class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input Impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	max 95° , adjustable with mechanical stop
Torque	45 in-lb [5 Nm]
Direction of rotation	reversible with ↷/↶ switch ↶ =CCW with decreasing control signal (10-2V) ↷ =CW with decreasing control signal (10-2V)
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<35 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	250	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

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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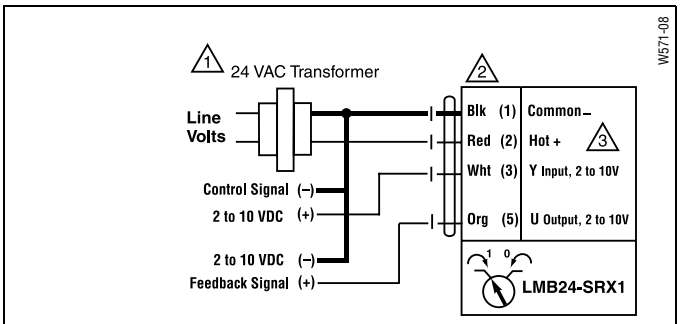
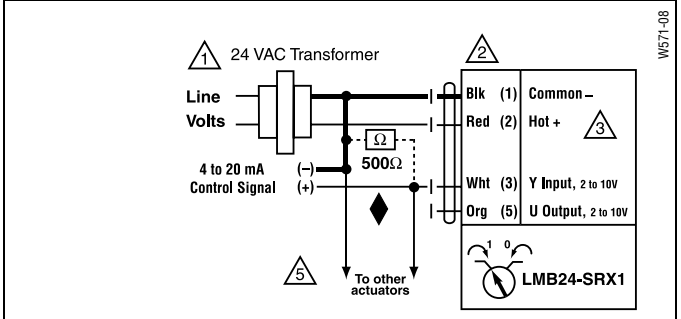


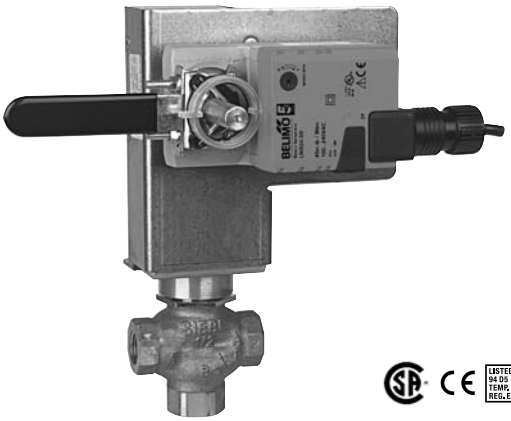
2 to 10 VDC control



4 to 20 mA control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

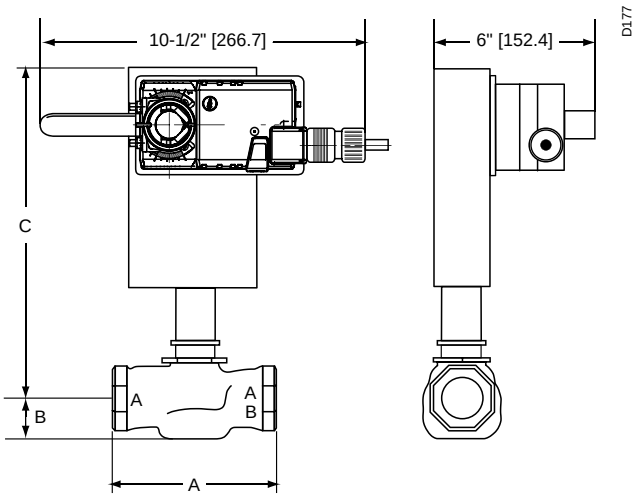


Models

LMB24-MFTX1
LMX24-MFTX1

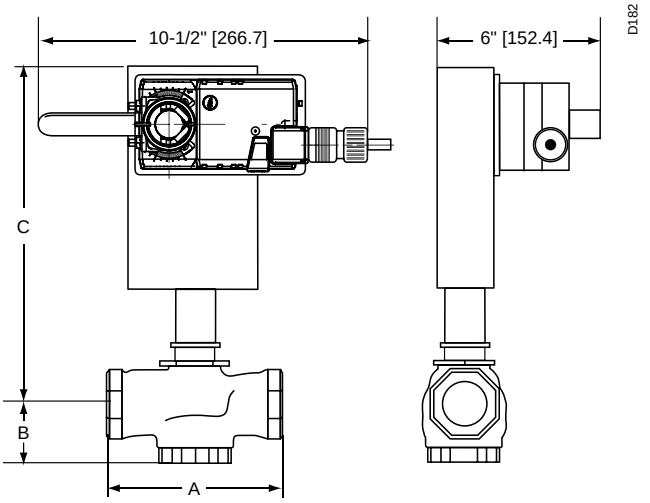
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	2 W (1.2 W)
Transformer sizing	3.5 VA (class 2 power source)
Electrical connection	3 ft, 10 ft, 16ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA (default) Variable (VDC, PWM, Floating Point, On/Off)
Input Impedance	100 kΩ (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	max 95°, adjustable with mechanical stop electronically variable
Torque	45 in-lb [5 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time default variable	150 seconds 35 to 150 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 type 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
Noise level	<35 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G212(S)-G215(S)	250	½"	15	3.06" [78]	1.06" [27]	9.75" [248]
G219(S)-G220(S)	250	¾"	20	3.62" [92]	1.06" [27]	9.75" [248]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G314(D)-G315(D)	250	½"	15	3.06" [78]	1.37" [35]	9.75" [248]
G320(D)	250	¾"	20	3.62" [92]	1.68" [43]	9.75" [248]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

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.

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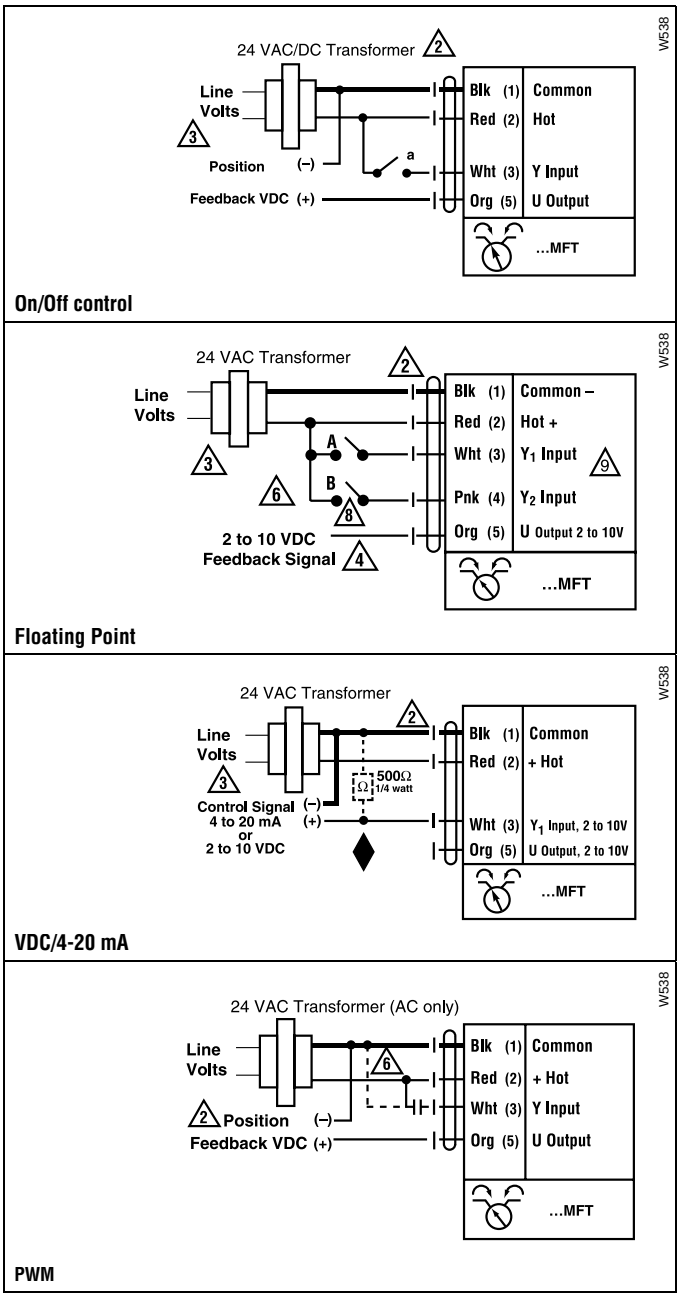
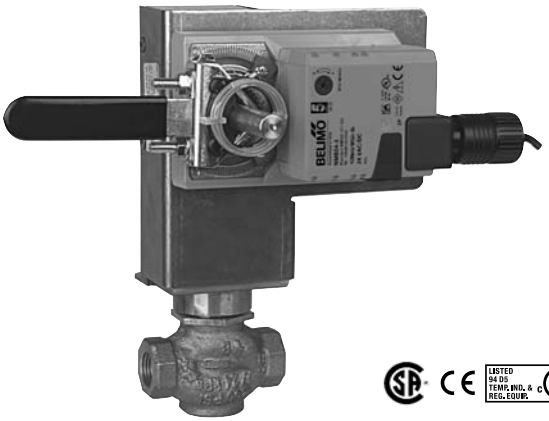
Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.



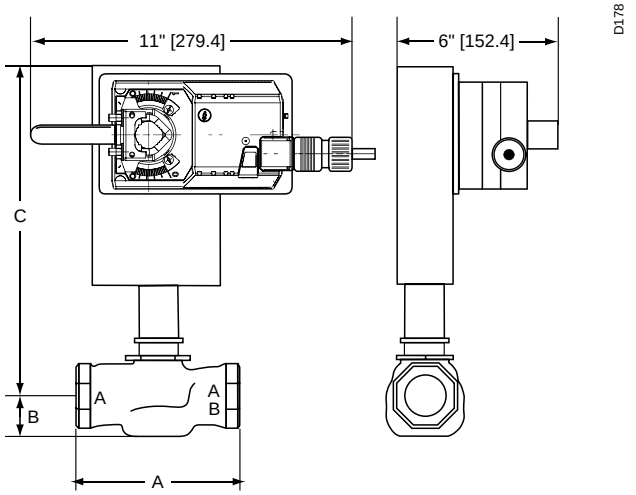


Models

NMB24-3X1

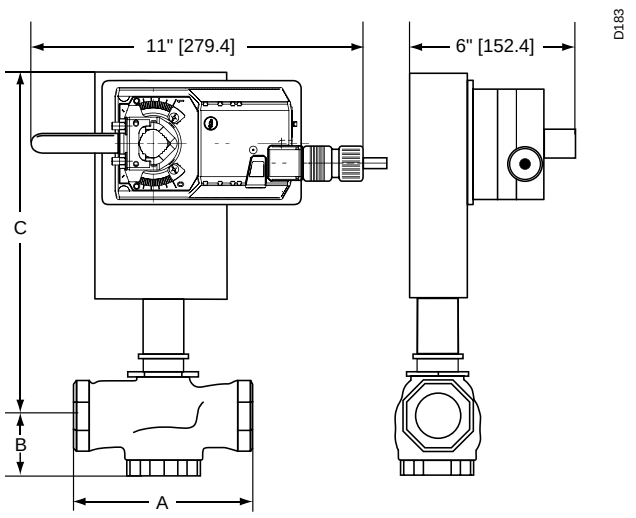
Technical Data	
Control	On/Off, Floating Point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.0 W
holding	0.2 W
Transformer sizing	4 VA (class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Input Impedance	600 Ω
Angle of rotation	max 95°, adjustable with mechanical stop
Torque	90 in-lb [10 Nm]
Direction of rotation	reversible with ↷/↶ switch ↶ =CCW with decreasing control signal (10-2V) ↷ =CW with decreasing control signal (10-2V)
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G224(S)-G225(S)	250	1"	25	4.62" [117]	1.12" [29]	8.00" [203]
G232(S)	158	1¼	32	4.62" [117]	1.37" [35]	8.25" [210]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G325	168	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G325D	250	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G332	105	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]
G332D	250	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

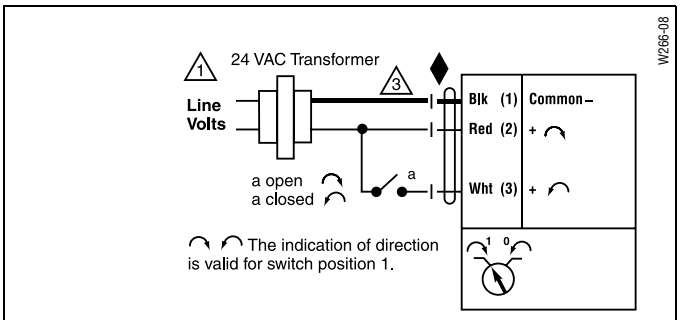
3 Actuators may also be powered by 24 VDC.

APPLICATION NOTES

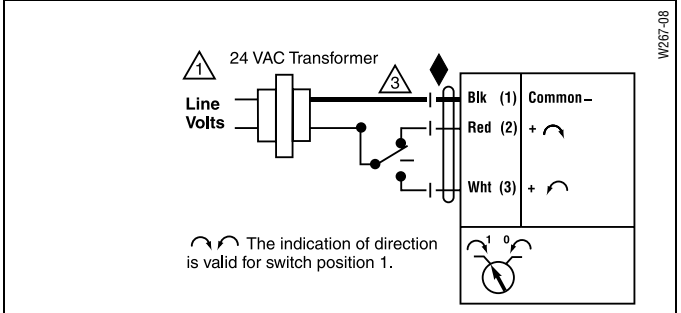
Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

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.



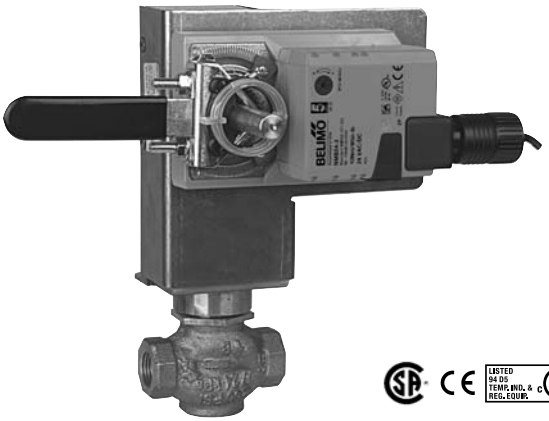
On/Off control



Floating Point or On/Off control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

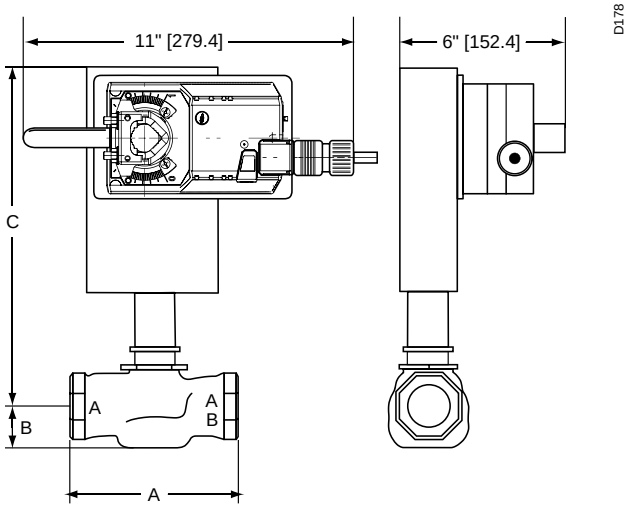


Models

NMB24-SRX1 w/built-in Aux. Switch

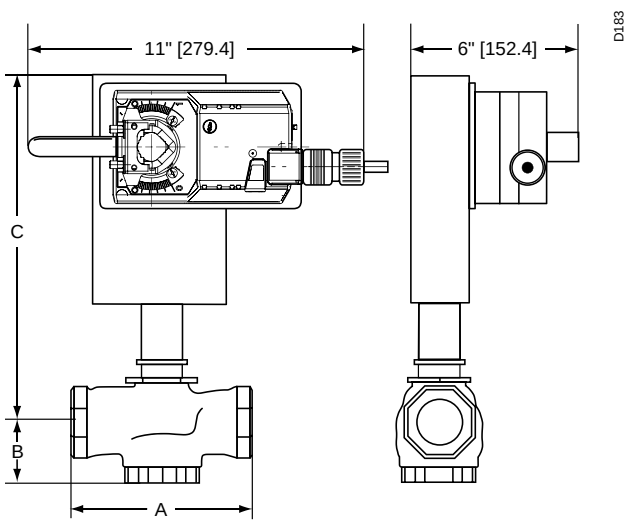
Technical Data	
Control	Proportional
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.5 W
holding	0.4 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	3 ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input Impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	max 95°, adjustable with mechanical stop
Torque	90 in-lb [10 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G224(S)-G225(S)	250	1"	25	4.62" [117]	1.12" [29]	8.00" [203]
G232(S)	158	1¼"	32	4.62" [117]	1.37" [35]	8.25" [210]

Dimensions with G3…(D) Series 3-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G325	168	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G325D	250	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G332	105	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]
G332D	250	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

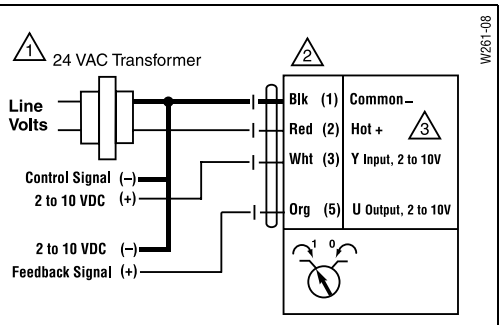
3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

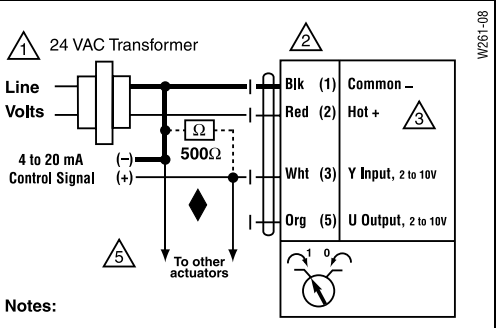
APPLICATION NOTES

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.



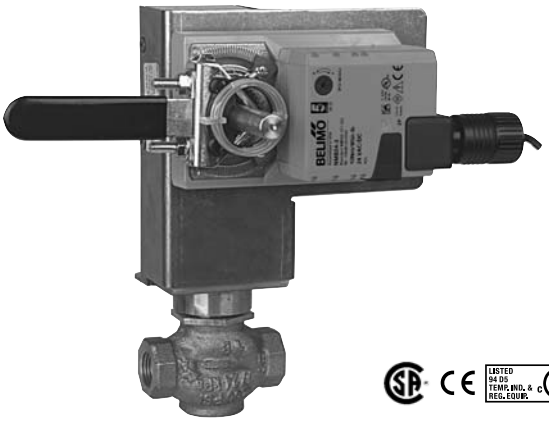
2 to 10 VDC control



4 to 20 mA control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.



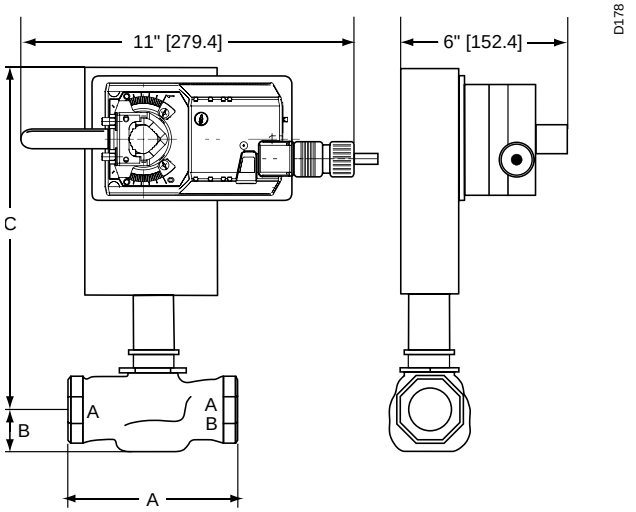
Models

NMX24-MFTX1

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	3.5 W (1.25 W)
Transformer sizing	5.5 VA (class 2 power source)
Electrical connection	3 ft, 10ft, 16ft, 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	100 kΩ (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	max 95°, adjustable with mechanical stop electronically variable
Torque	90 in-lb [10 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time default variable	150 seconds 45 to 170 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 type 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
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

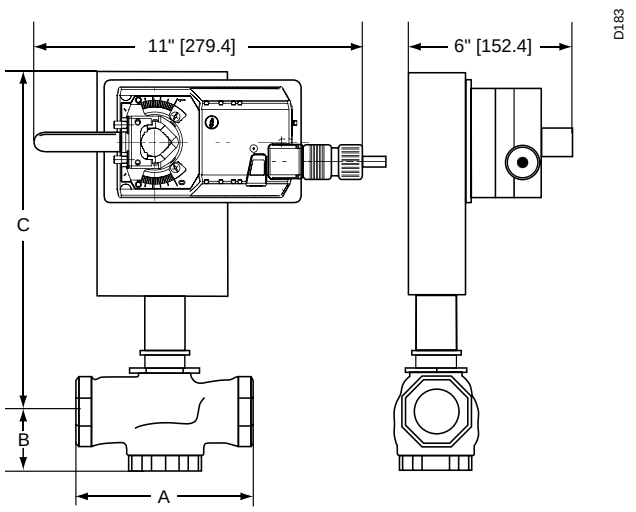
-

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G224(S)-G225(S)	250	1"	25	4.62" [117]	1.12" [29]	8.00" [203]
G232(S)	158	1¼	32	4.62" [117]	1.37" [35]	8.25" [210]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G325	168	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G325D	250	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G332	105	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]
G332D	250	1¼"	32	4.62" [117]	1.62" [41]	8.25" [210]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

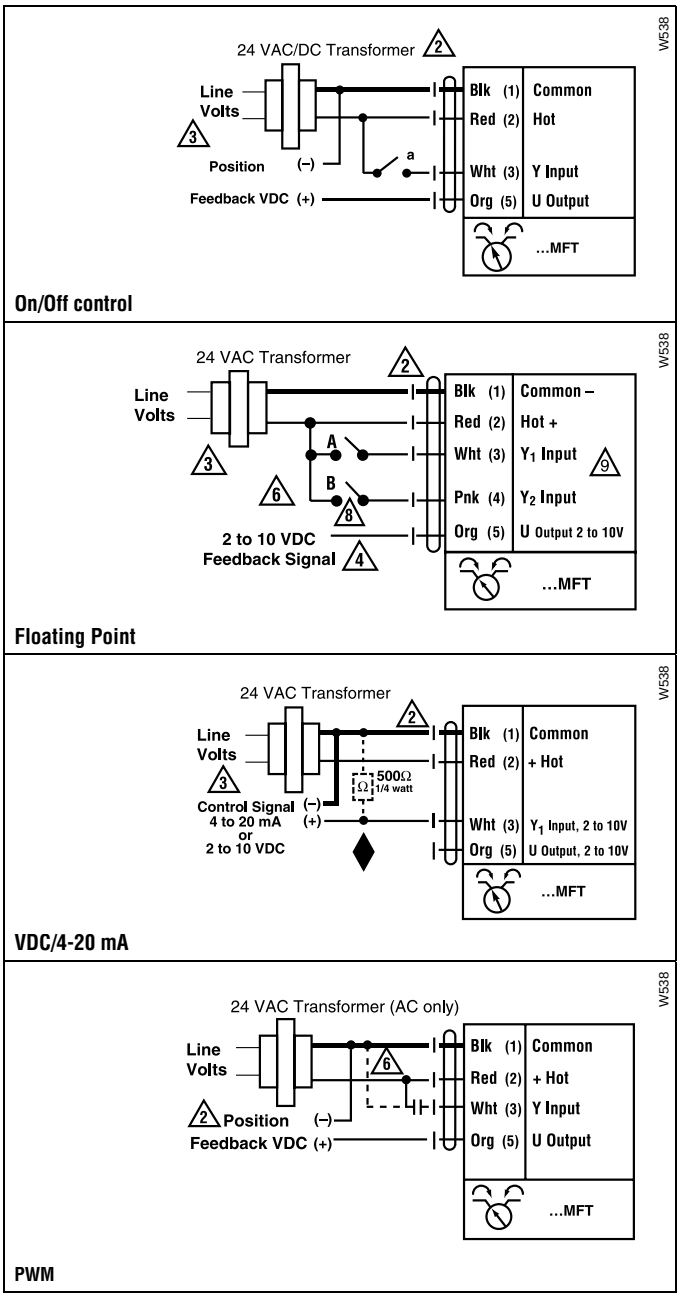
APPLICATION NOTES

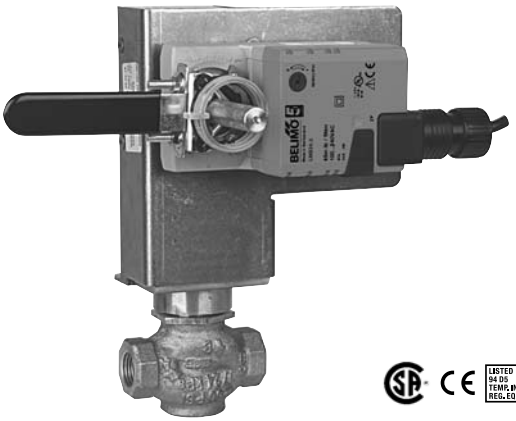
◆ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***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.

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.





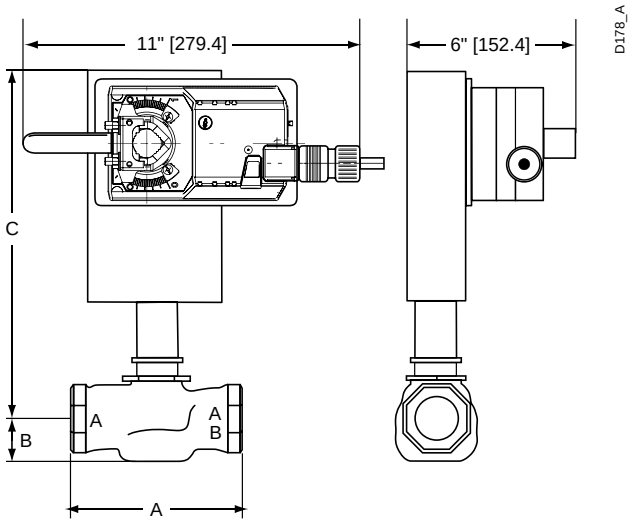
Models

AMB24-3X1
AMB24-3-S w/built-in Aux. Switch

Technical Data	
Control	On/Off, Floating Point
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.5 W
holding	0.2 W
Transformer sizing	5.5 VA (class 2 power source)
Electrical connection AMB24-3 AMB24-3-S	½" conduit connector 3 ft, 18 GA plenum rated cable 3 ft, 18 GA appliance cable
Overload protection	electronic throughout 0° to 95° rotation
Input Impedance	600 Ω
Angle of rotation	max 95°, adjustable with mechanical stop
Torque	180 in-lb [20 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

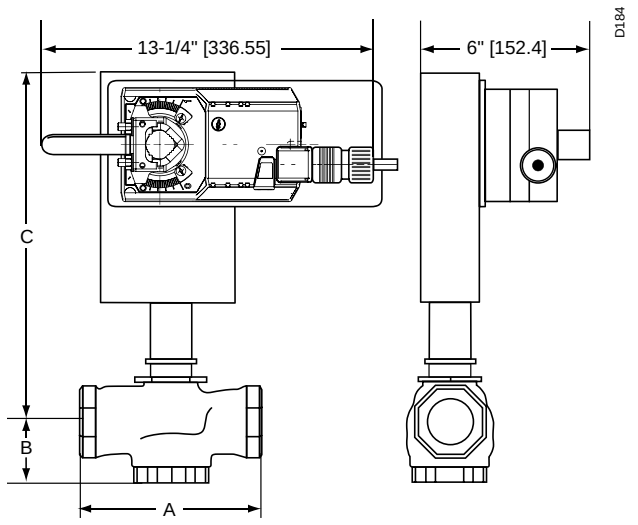
AMB24-3-S	
Auxiliary switch	1 x SPDT, 6A (1.5A) @ 250 VAC, UL Listed, adjustable 0° to 95° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G240(S)	230	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	127	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G340	169	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G350	93	2"	50	6.12" [156]	1.87" [48]	9.25" [235]
G350D	250	2"	50	6.12" [156]	1.87" [48]	9.25" [235]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

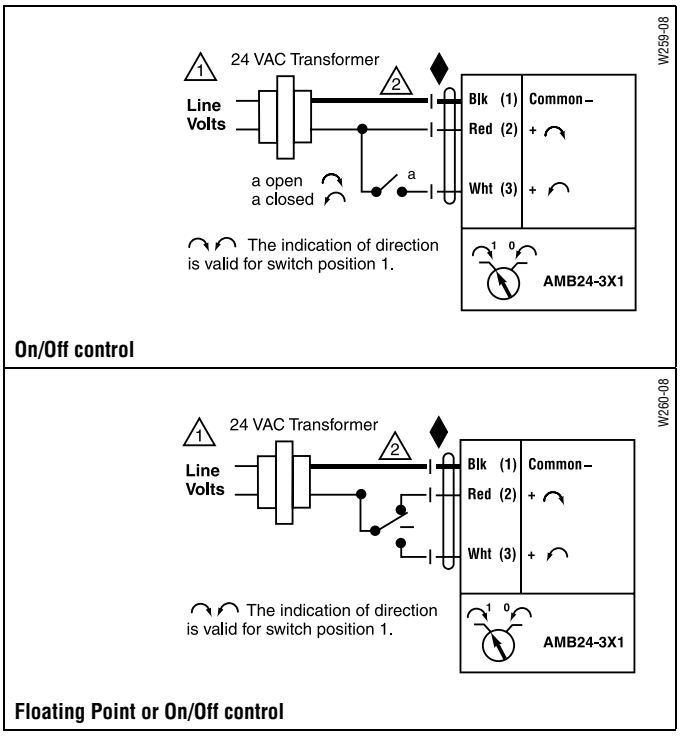
3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

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.

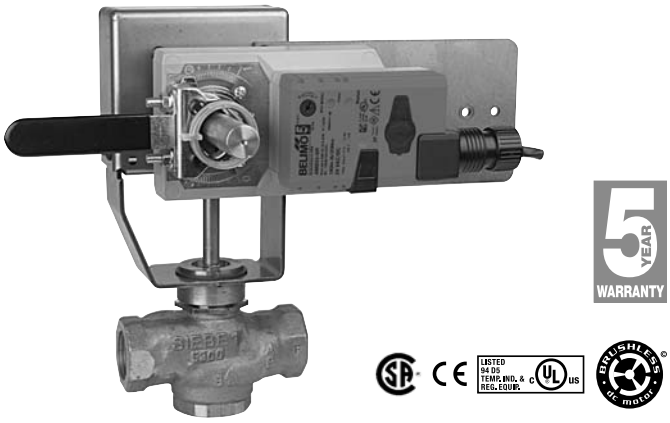


On/Off control

Floating Point or On/Off control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

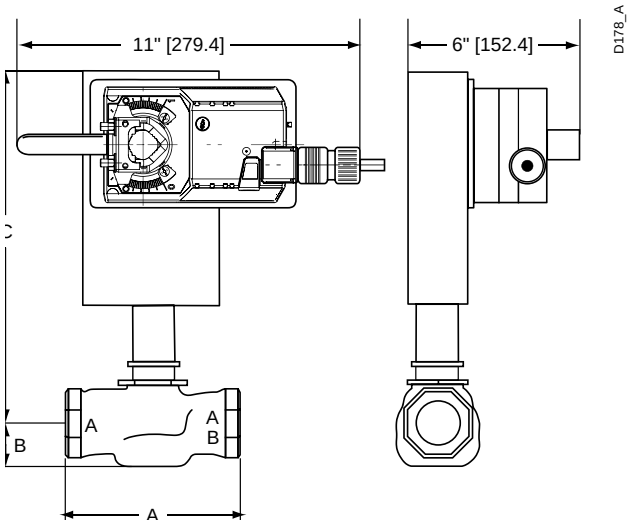


Models

AMB24-SRX1 w/built-in Aux. Switch

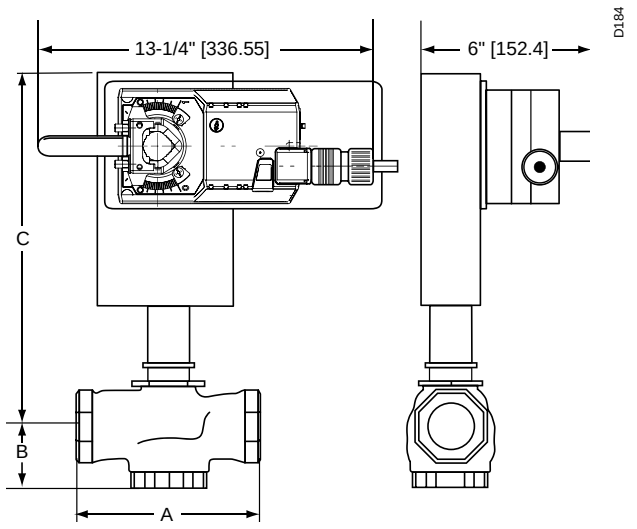
Technical Data	
Control	Proportional
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption running	2.5 W
holding	0.4 W
Transformer sizing	5 VA (class 2 power source)
Electrical connection	3 ft, 18 GA appliance cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA
Input Impedance	100 kΩ (0.1 mA), 500 Ω
Angle of rotation	max 95°, adjustable with mechanical stop
Torque	180 in-lb [20 Nm]
Direction of rotation	reversible with ↷/↶ switch ↶ =CCW with decreasing control signal (10-2V) ↷ =CW with decreasing control signal (10-2V)
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time	95 seconds, constant independent of load
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 type 2/IP54
Housing material	UL94-5VA
Agency listings	cULus acc. to UL 60730-1/-2-14, CAN/CSA C22.2 No. 24 certified, CE acc. to 73/23/EEC
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G240(S)	230	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	127	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G340	169	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G350	93	2"	50	6.12" [156]	1.87" [48]	9.25" [235]
G350D	250	2"	50	6.12" [156]	1.87" [48]	9.25" [235]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

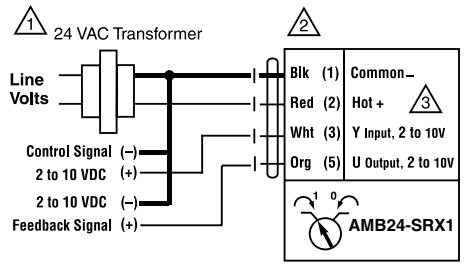
5 Only connect common to neg. (–) leg of control circuits.

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.

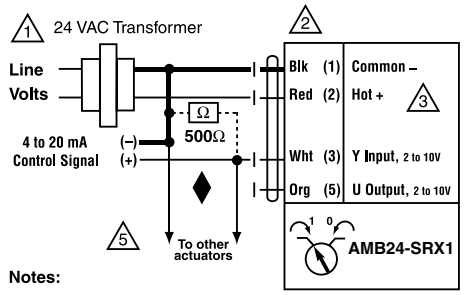
⚠ ***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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

W257-08



2 to 10 VDC control

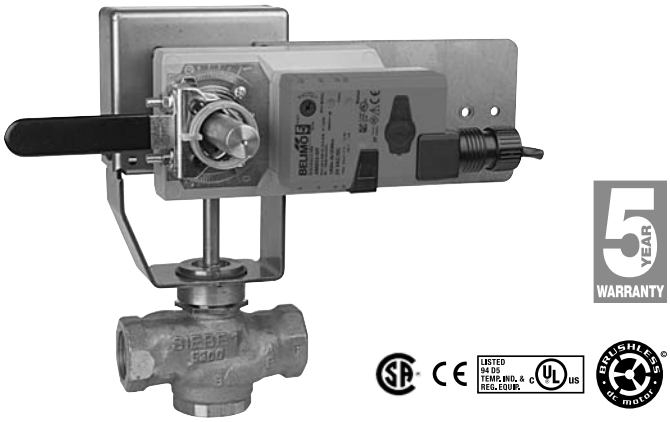
W257-08



4 to 20 mA control

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

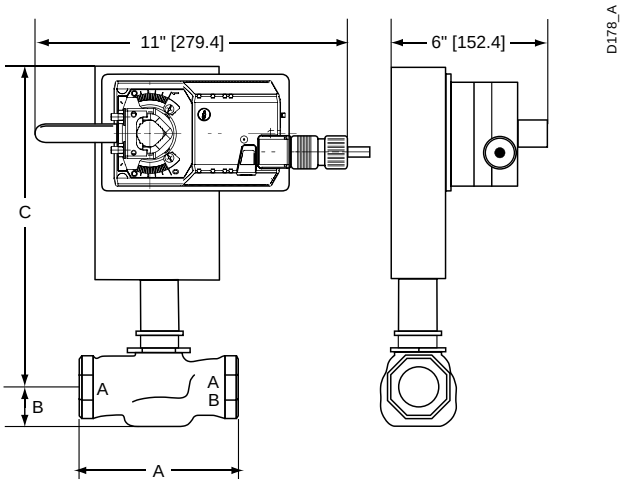


Models

AMX24-MFT95X1
AMX24-MFTX1

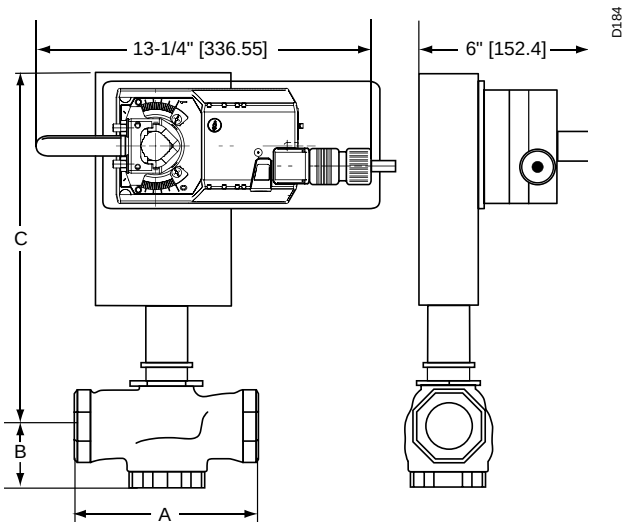
Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	4 W (1.25 W)
Transformer sizing	6 VA (class 2 power source)
Electrical connection	3 ft, 10ft, 16ft, 18 GA plenum rated cable ½" conduit connector
Overload protection	electronic throughout 0° to 95° rotation
Operating range Y	2 to 10 VDC, 4 to 20 mA (default) Variable (VDC, PWM, Floating Point, On/Off)
Input Impedance	100 kΩ (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	max 95°, adjustable with mechanical stop electronically variable
Torque	180 in-lb [20 Nm]
Direction of rotation	reversible with ↷/↶ switch
Position indication	reflective visual indicator (snap-on)
Manual override	external push button
Running time default variable	150 seconds 90 to 350 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 type 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
Noise level	<45 db(A)
Servicing	maintenance free
Quality standard	ISO 9001

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G240(S)	230	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	127	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3…(D) Series 3-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G340	169	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	9.18" [234]
G350	93	2"	50	6.12" [156]	1.87" [48]	9.25" [235]
G350D	250	2"	50	6.12" [156]	1.87" [48]	9.25" [235]

Wiring Diagrams

INSTALLATION NOTES

1 Provide overload protection and disconnect as required.

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

3 Actuators may also be powered by 24 VDC.

5 Only connect common to neg. (–) leg of control circuits.

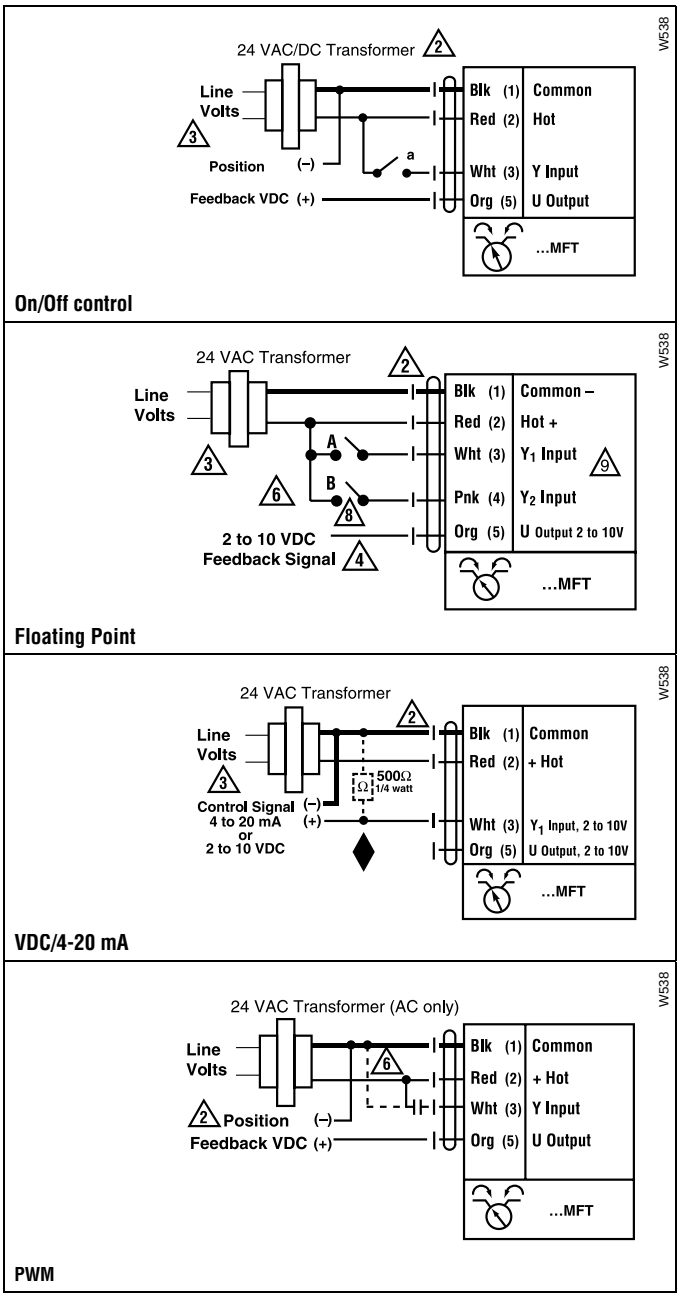
APPLICATION NOTES

♦ 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!*
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.

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.



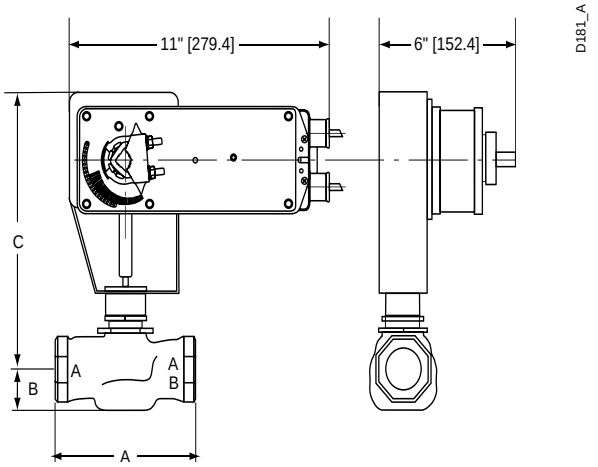
Models

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

Technical Data		
Control		On/Off
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	5 W
	holding	1.5 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		auxiliary switches are double insulated
Overload protection		electronic throughout 0° to 95° rotation
Angle of rotation		95°
Position indication		visual indicator, 0° to 95°
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)

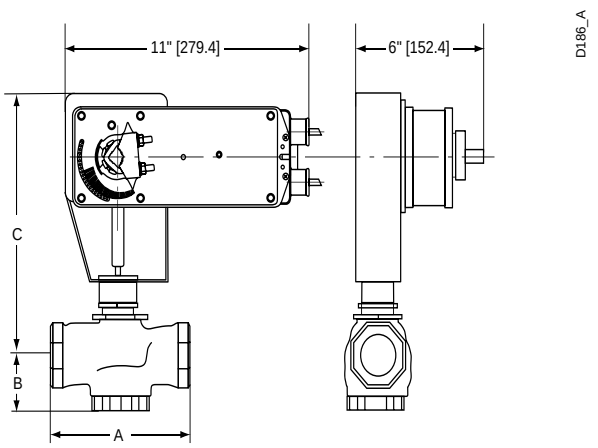
AF…-S US	
Auxiliary switches	2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85° (double insulated)

Dimensions with G2… Series 2-Way Valve



		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G240(S)	169	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	93	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3… Series 3-Way Valve

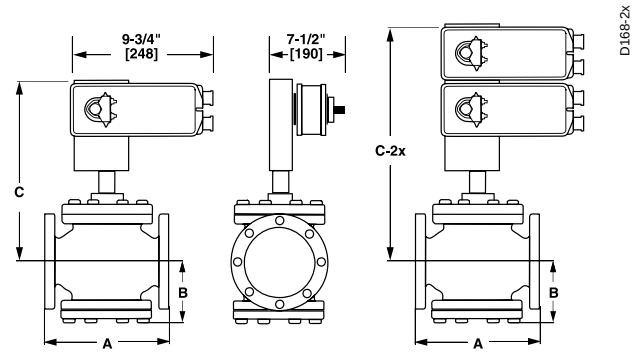


		Valve Nominal Size		Dimensions (Inches [mm])		
Valve Body	COP	Inches	DN [mm]	A	B	C
G340	169	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G350	93	2"	50	6.12" [156]	1.87" [48]	10.81" [275]
G350D	250	2"	50	6.12" [156]	1.87" [48]	10.81" [275]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Dimensions with G6… Series 2-Way Valve

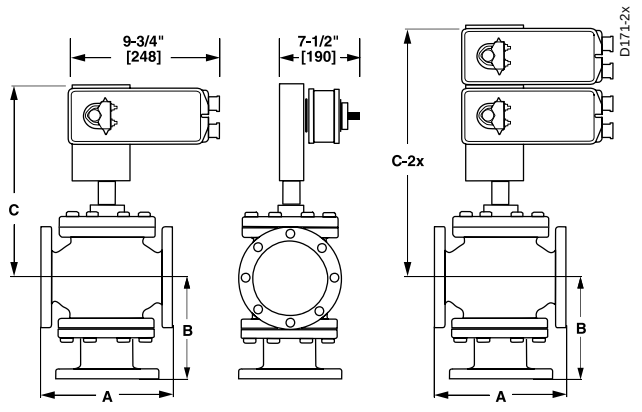


Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inch-es	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665C(S)(-250)	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)(-250)	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)(-250)	36	28	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)(-250)	24	17	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665LCS	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]

Dimensions with G6… Series 2-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G6100C(S)	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125C(S)	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150C(S)	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]
G6100LCS	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125LCS	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150LCS	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]

Dimensions with G7… Series 3-Way Valve



Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	35	27	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780(S)(-250)	23	16	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	15.500" [394]

Dimensions with G7… Series 3-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	58	50	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780(S)(-250)	39	39	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	20.250" [514]
G7125D(S)(-250)	100	-	5"	[125]	15.750" [400]	9.250" [235]	18.875" [480]
G7150D(S)(-250)	100	-	6"	[150]	17.750" [451]	9.875" [251]	19.875" [505]

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.

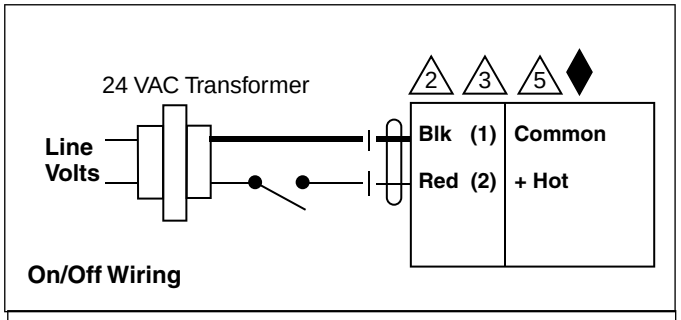
5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

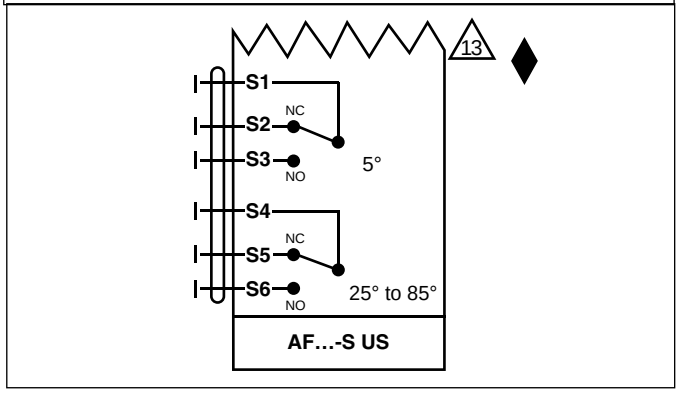
APPLICATION NOTES

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

WARNING *Live Electrical Components!*

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





Auxiliary Switch Wiring for AF… -S US

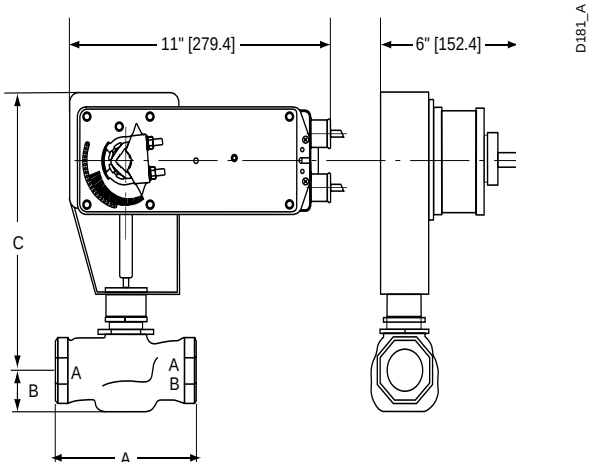
Models

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

Technical Data		
Control		On/Off
Power consumption	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)

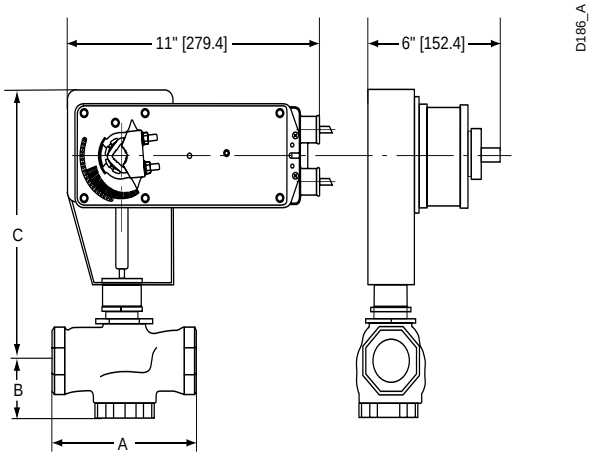
AF…-S US	
Auxiliary switches	2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85° (double insulated)

Dimensions with G2… Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G224(S)-G225(S)	250	1"	25	4.62" [117]	1.12" [29]	8.00" [203]
G232(S)	158	1¼	32	4.62" [117]	1.37" [35]	8.25" [210]
G240(S)	169	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	93	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3… Series 3-Way Valve

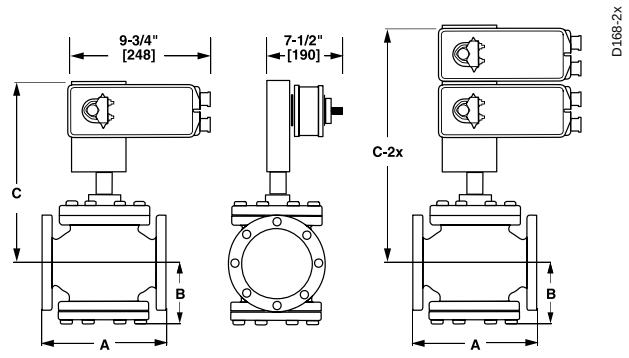


Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G325	168	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G325D	250	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G340	169	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G350	93	2"	50	6.12" [156]	1.87" [48]	10.81" [275]
G350D	250	2"	50	6.12" [156]	1.87" [48]	10.81" [275]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Dimensions with G6… Series 2-Way Valve



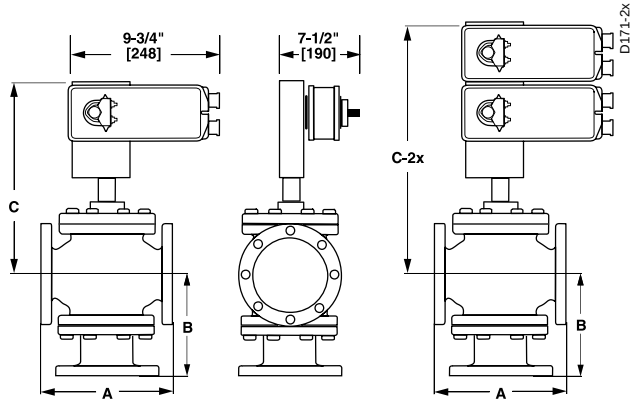
Dimensions with G6… Series 2-Way Valve with AF120(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665C(S)(-250)	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)(-250)	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)(-250)	36	28	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)(-250)	24	17	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665LCS	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]

Dimensions with G6… Series 2-Way Valve with 2x AF120(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G6100C(S)	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125C(S)	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150C(S)	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]
G6100LCS	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125LCS	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150LCS	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]

Dimensions with G7… Series 3-Way Valve



Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	35	27	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780(S)(-250)	23	16	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	15.500" [394]

Dimensions with G7… Series 3-Way Valve with 2x AF120(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	58	50	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780(S)(-250)	39	39	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	20.250" [514]
G7125D(S)(-250)	100	-	5"	[125]	15.750" [400]	9.250" [235]	18.875" [480]
G7150D(S)(-250)	100	-	6"	[150]	17.750" [451]	9.875" [251]	19.875" [505]

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.

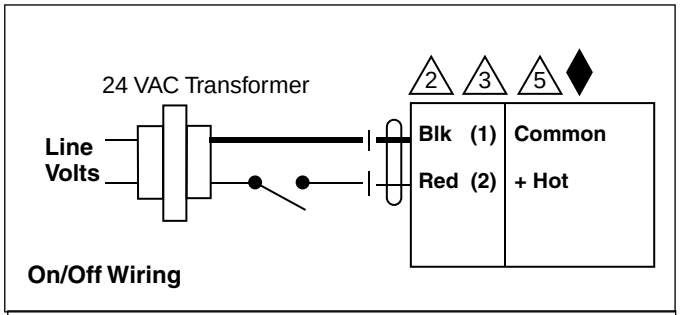
5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

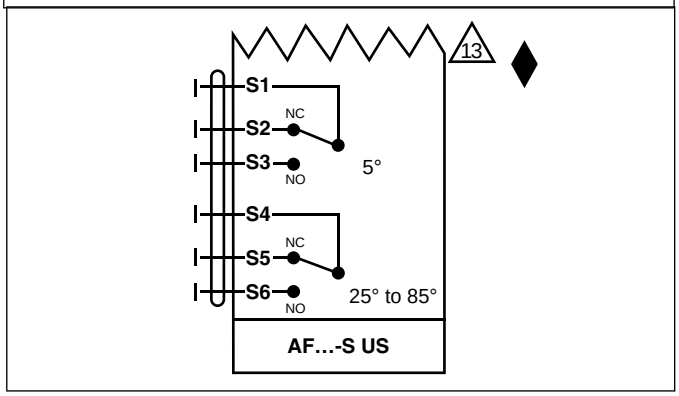
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

WARNING *Live Electrical Components!*

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



On/Off Wiring



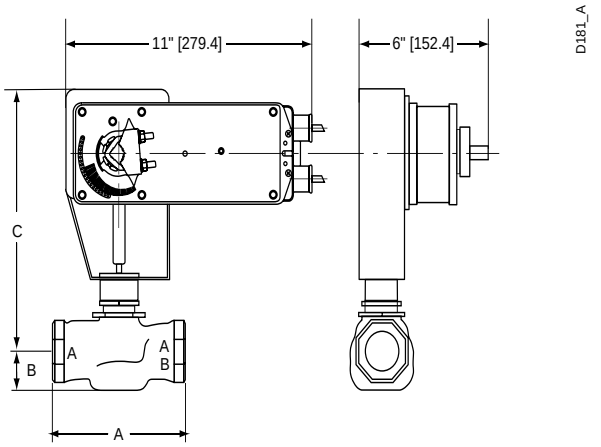
Auxiliary Switch Wiring for AF… -S US

Models

AF24-SR US

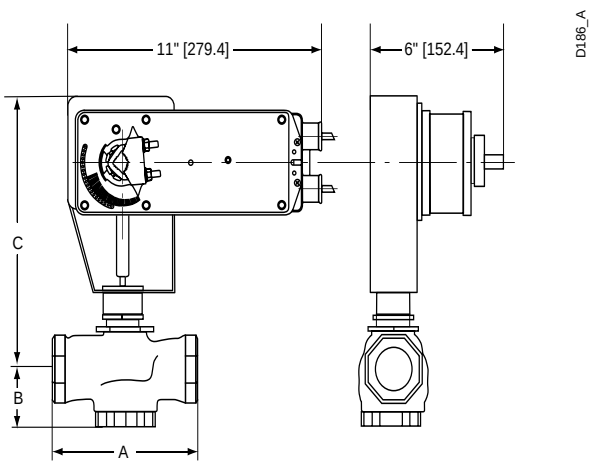
Technical Data		
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Feedback output		2 to 10 VDC, 0.5 mA max
Control		Proportional
Power consumption	running	6 W
	holding	2 W
Transformer sizing		10 VA, class 2 power
Electrical connection		3 ft, 18 GA appliance cable ½" conduit connector
Overload protection		electronic throughout 0° to 95° rotation
Angle of rotation		95°
Direction of Rotation	spring	reversible with CW/CCW mounting
	motor	reversible with built-in ↷/↶ 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)

Dimensions with G2… Series 2-Way Valve



	Valve Nominal Size		Dimensions (Inches [mm])			
Valve Body	COP	Inches	DN [mm]	A	B	C
G240(S)	169	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	93	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3… Series 3-Way Valve

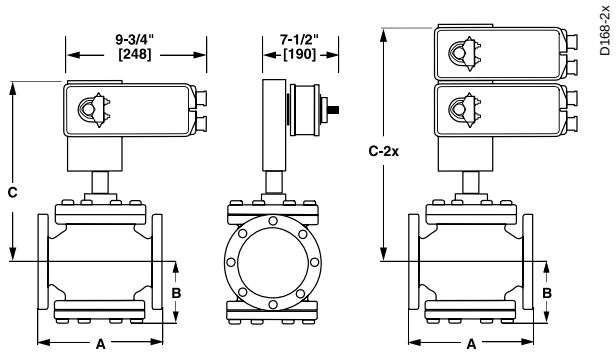


	Valve Nominal Size		Dimensions (Inches [mm])			
Valve Body	COP	Inches	DN [mm]	A	B	C
G340	169	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G350	93	2"	50	6.12" [156]	1.87" [48]	10.81" [275]
G350D	250	2"	50	6.12" [156]	1.87" [48]	10.81" [275]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Dimensions with G6… Series 2-Way Valve



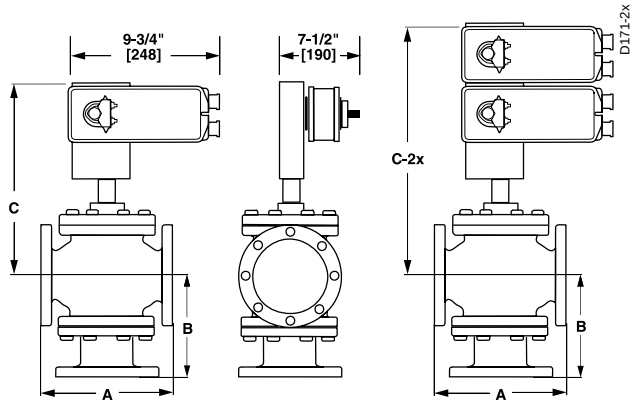
Dimensions with G6… Series 2-Way Valve with AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665C(S)(-250)	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)(-250)	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)(-250)	36	28	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)(-250)	24	17	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665LCS	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]

Dimensions with G6… Series 2-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G6100C(S)	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125C(S)	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150C(S)	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]
G6100LCS	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125LCS	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150LCS	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]

Dimensions with G7… Series 3-Way Valve



Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	35	27	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780(S)(-250)	23	16	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	15.500" [394]

Dimensions with G7… Series 3-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	58	50	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780(S)(-250)	39	39	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	20.250" [514]
G7125D(S)(-250)	100	-	5"	[125]	15.750" [400]	9.250" [235]	18.875" [480]
G7150D(S)(-250)	100	-	6"	[150]	17.750" [451]	9.875" [251]	19.875" [505]

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.

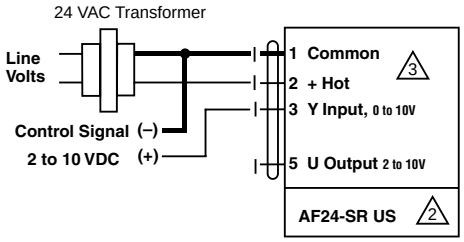
5 Actuators with plenum rated cable do not have numbers on wires; use color codes instead. Actuators with appliance cables are numbered.

APPLICATION NOTES

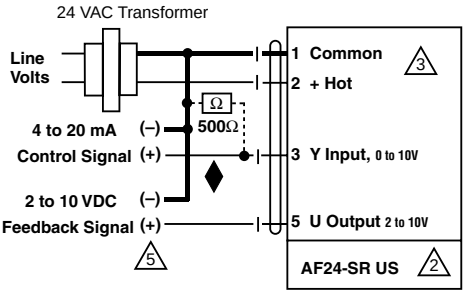
♦ Meets cULus or UL and CSA requirements without the need of an electrical ground connection.

***WARNING** Live Electrical Components!*

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



Proportional 2 to 10 VDC control signal



Proportional 4 to 20 mA control signal

MFT 5 YEAR WARRANTY

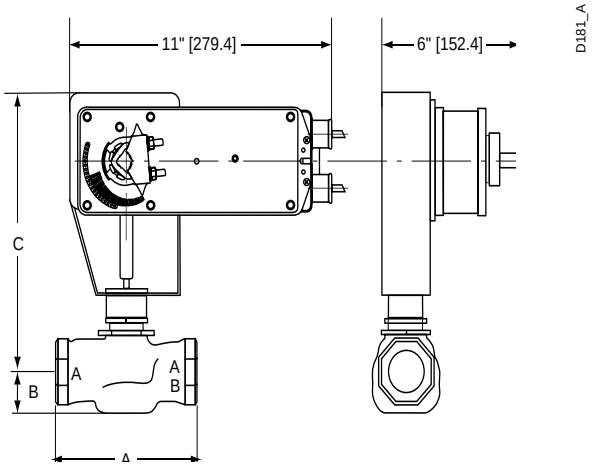
Models

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

Technical Data		
Control		MFT
Control signal		2 to 10 VDC, Floating Point, On/Off, PWM, 0-135 Ω (MFT
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 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) ½" 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 ↷/↶ 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)

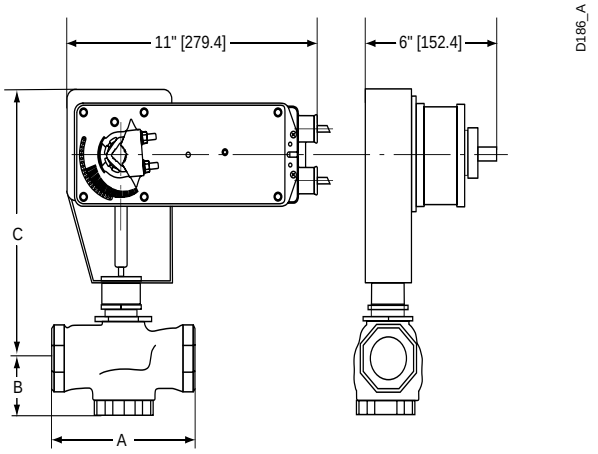
AF24-MFT-S US	
Auxiliary switches	2 x SPDT, 7A (2.5A) @ 250 VAC, UL listed, one switch is fixed at +5°, one is adjustable 25° to 85° (double insulated)

Dimensions with G2… Series 2-Way Valve



Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G224(S)-G225(S)	250	1"	25	4.62" [117]	1.12" [29]	8.00" [203]
G232(S)	158	1¼	32	4.62" [117]	1.37" [35]	8.25" [210]
G240(S)	169	1½"	40	5.37" [137]	1.50" [38]	10.50" [267]
G250(S)	93	2"	50	6.12" [156]	1.56" [40]	10.81" [275]

Dimensions with G3… Series 3-Way Valve

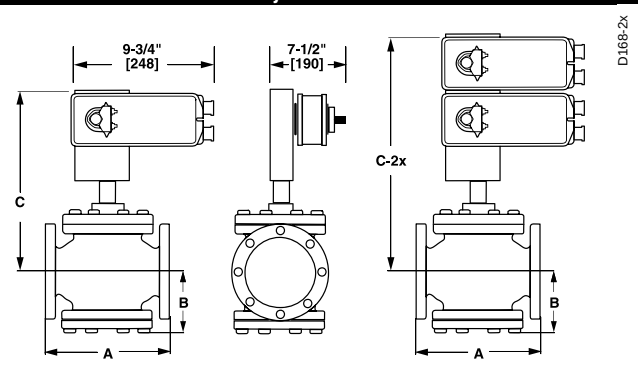


Valve Body	COP	Valve Nominal Size Inches	DN [mm]	Dimensions (Inches [mm]) A	B	C
G325	168	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G325D	250	1"	25	4.62" [117]	1.56" [40]	8.00" [203]
G340	169	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G340D	250	1½"	40	5.37" [137]	1.62" [41]	10.50" [267]
G350	93	2"	50	6.12" [156]	1.87" [48]	10.81" [275]
G350D	250	2"	50	6.12" [156]	1.87" [48]	10.81" [275]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

Dimensions with G6… Series 2-Way Valve

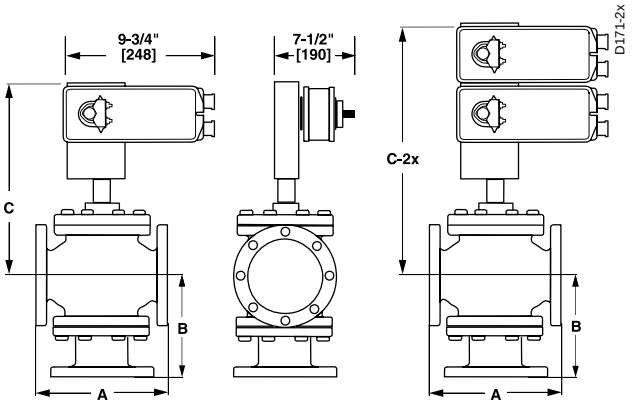


Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G665C(S)(-250)	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680C(S)(-250)	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665(S)(-250)	36	28	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680(S)(-250)	24	17	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]
G665LCS	150	115	2½"	[65]	9.00" [229]	4.75" [120]	13.50" [343]
G680LCS	136	72	3"	[80]	10.00" [254]	5.37" [137]	13.93" [355]

Dimensions with G6… Series 2-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G6100C(S)	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125C(S)	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150C(S)	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]
G6100LCS	132	67	4"	[100]	13.00" [330]	6.37" [162]	20.25" [514]
G6125LCS	87	21	5"	[125]	15.75" [400]	5.75" [146]	20.87" [530]
G6150LCS	50	-	6"	[150]	17.75" [757]	6.50" [165]	21.50" [546]

Dimensions with G7… Series 3-Way Valve



Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C
G765(S)(-250)	35	27	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780(S)(-250)	23	16	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	13.875" [352]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	14.438" [367]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	15.500" [394]

Dimensions with G7… Series 3-Way Valve with 2x AF24(-S) US

Valve Body	COP ANSI III	COP ANSI IV	Valve Nominal Size Inches	Valve Nominal Size DN [mm]	Dimensions (Inches [mm]) A	B	C-2x
G765(S)(-250)	58	50	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780(S)(-250)	39	39	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G765D(S)(-250)	100	-	2½"	[65]	9.000" [229]	7.125" [181]	18.625" [473]
G780D(S)(-250)	100	-	3"	[80]	10.000" [254]	8.000" [203]	19.188" [487]
G7100D(S)(-250)	100	-	4"	[100]	13.000" [330]	9.875" [251]	20.250" [514]
G7125D(S)(-250)	100	-	5"	[125]	15.750" [400]	9.250" [235]	18.875" [480]
G7150D(S)(-250)	100	-	6"	[150]	17.750" [451]	9.875" [251]	19.875" [505]

Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

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.

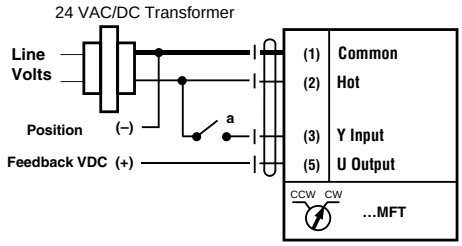
7 Position feedback cannot be used with Triac sink controller. The actuators internal common reference is not compatible.

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.

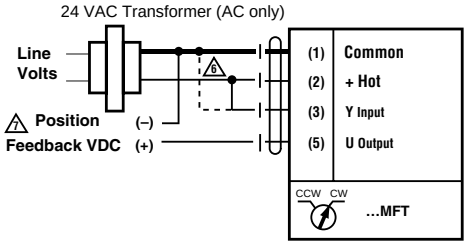
***WARNING** Live Electrical Components!*
During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components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

W043



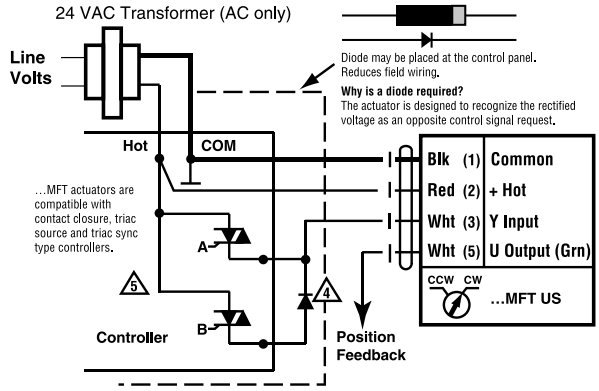
On/Off control

W041



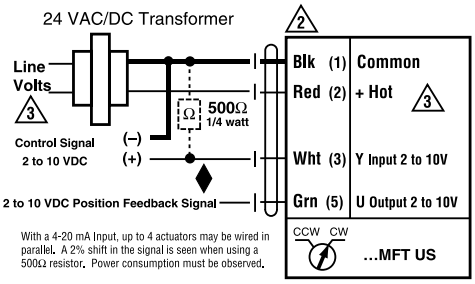
PWM, triac source and sink

W302



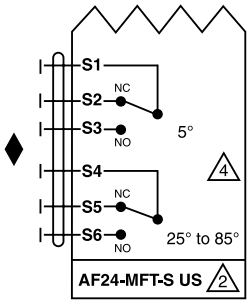
Floating Point control

W303



Propotional 2 to 10 or 4 to 20 mA control signal

W195-AUXMFT



Auxiliary Switches

INSTALLATION NOTES

21 Provide overload protection and disconnect as required.

22 Actuators and controller must have separate transformers.

23 Consult controller instruction data for more detailed information.

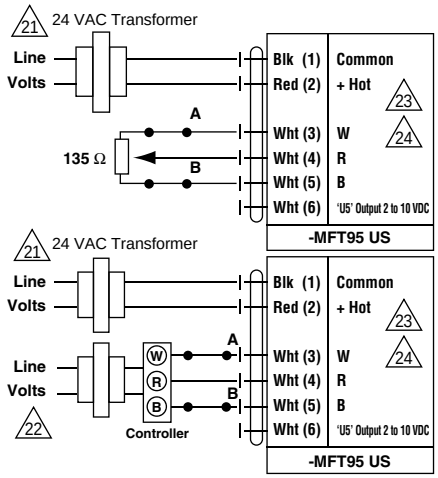
24 Resistor value depends on the type of controller and the number of actuators. No resistor is used for one actuator. Honeywell® resistor kits may also be used.

25 To reverse control rotation, use the reversing switch.

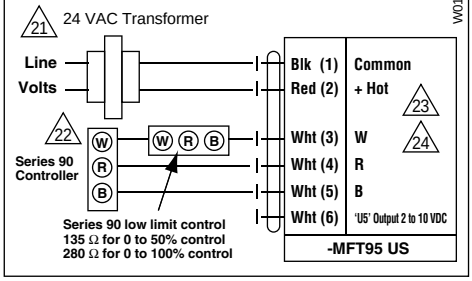
Override

Switch A	Switch B	Damper Position
		Damper Open
		Damper Closed

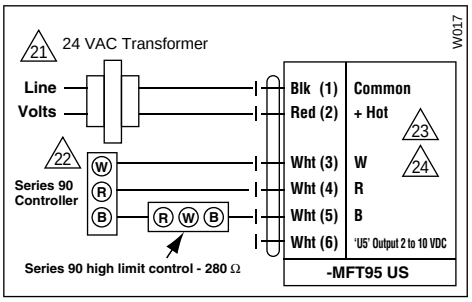
The direction of rotation switch is set so that the fail safe position and the position of the damper is closed with no signal at wire R.



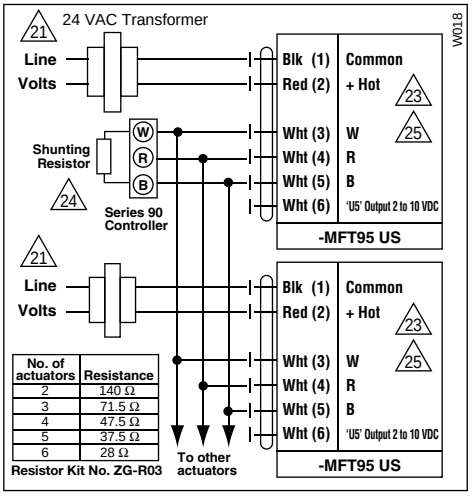
Low Limit Control



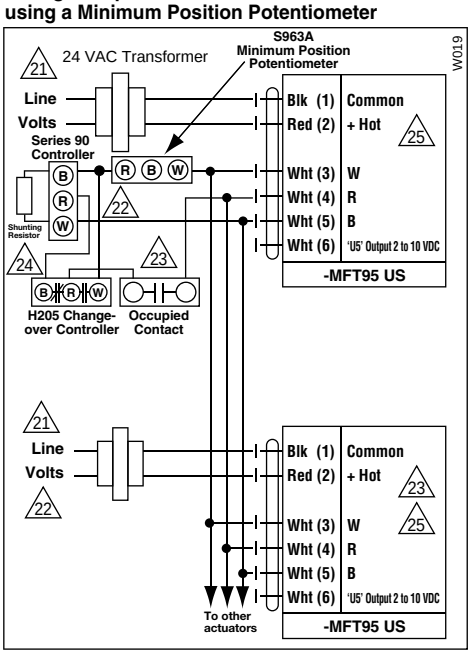
High Limit Control



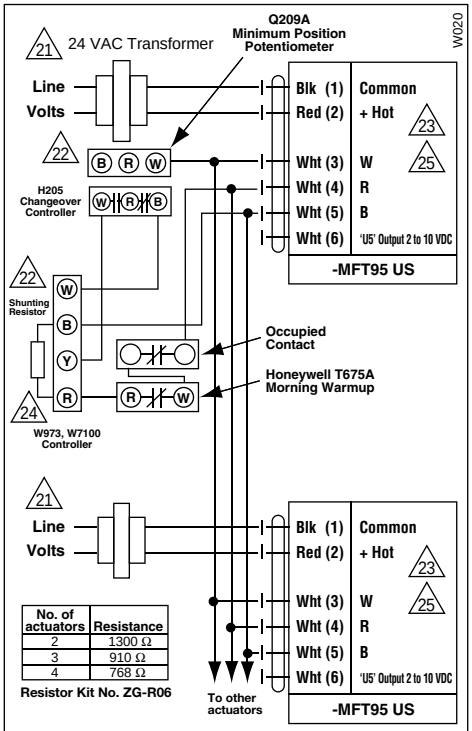
Wiring Multiple Actuators to a Series 90 Controller



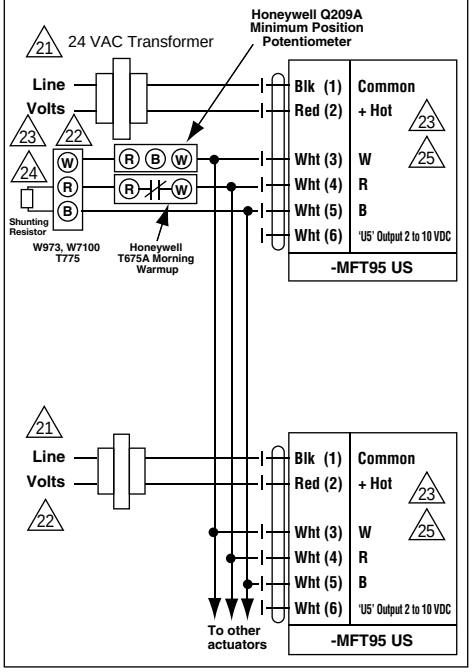
Wiring Multiple Actuators to a Series 90 Controller using a Minimum Position Potentiometer

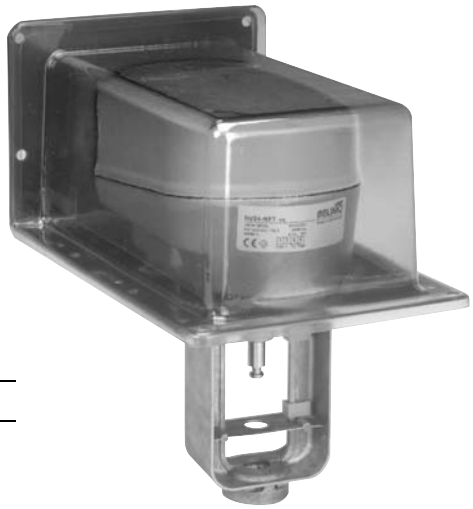


Typical wiring diagrams for multiple actuators used with the W973, W7100 and T775 controllers



Used with the W973 and W7100 controllers





ZS-NV-10

Weather Shields G2/G3

		NV	LM	NM	LF	AF	GM	AVAILABLE
ZS-NV-10	NV Series	●						●
ZS-SPGV-20	Single AF series on Flanged Globe Valve					●		●
ZS-SPGV-60	LF Series on Flanged Globe Valve			●	●			●
ZS-SPGV-70	LM Series on Flanged Globe Valve		●	●				
ZS-SPGV-80	NM Series on Flanged Globe Valve			●				

NSV-BAT

Accessories

		NV	AF	GM	AVAILABLE
NSV-24 US	Battery backup module	●		●	●
NSV-BAT	12VDC 1.2 AH battery (2 required)	●		●	●

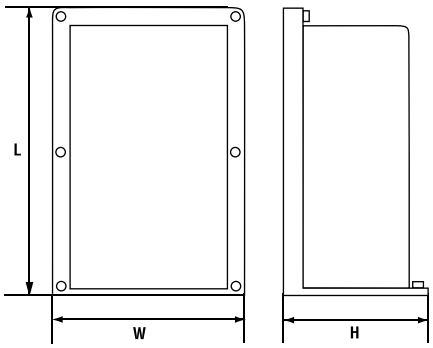
Note: Each NSV-24 US requires 2 NSV-BAT.

Weather Shield for NV Series Actuator with G2/G3, G6, G7 and G6C Globe Valves

Application

The ZS-NV-10... weather shield provides moderate protection for valves which are mounted outdoors. This product is not designed as a water tight enclosure. The smoke tinted housing offers easy mounting over the NV Series actuator while allowing easy viewing of the actuator in operation.

Specifications	
Cover	PETG with UV resistant smoke tint
Plate	Galvaneal w/black powder coat
Gasket	PVC Closed Cell Foam
Perimeter Gasket	Open Cell Foam
Screws	Stainless Steel
Fasteners	Nylatch type
Temperature limitations	-22˚F to 122˚F [-30˚C to 50˚C]



Dimensions (Inches [mm])

Part Number	L	W	H
ZS-NV-10	9.80" [250]	6.50" [165]	4.90" [125]

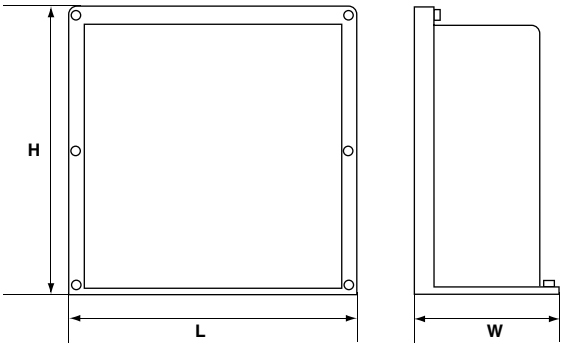
Part Number	For Actuator
ZS-NV-10	All NV Series

Weather Shield for G6/G7 Globe Valves

Application

The ZS-SPGV Weather shields provide moderate protection for valves which are mounted outdoors. This product is not designed as a water tight enclosure. The ZS-SPGV are used with G6/G7 series valves.

Specifications	
Cover	Poly Vinyl Chloride (PVC)
Perimeter Gasket	BUNA
Screws	Brass
Temperature limitations	-22°F to 122°F (-30°C to 50°C)



Dimensions (Inches [mm])

Part Number	For Actuator	L	W	H
ZS-SPGV-10	Dual AF series on Flanged Globe Valve	12" [305]	4" [102]	12" [305]
ZS-SPGV-20	Single AF series on Flanged Globe Valve	12" [305]	4" [102]	12" [305]
ZS-SPGV-40	Single GM series on Flanged Globe Valve	12" [305]	4" [102]	12" [305]
ZS-SPGV-50	Dual GM series on Flanged Globe Valve	12" [305]	4" [102]	12" [305]

Battery Back-up Module NSV24

Application

Several Belimo damper actuators can be used either with 24 VAC or 24 VDC.

In case of a power failure, the NSV24 battery back-up unit switches the damper actuator from its main AC power supply over to the 24 VDC battery to drive the actuators to their safety position.

For easy maintenance, the battery back-up system is placed in the control panel, not in the actuator. Several actuators may be powered by one back-up module. The batteries are separate from the NSV24.

Operation

The NSV24 is connected to the same 24 VAC power source as the damper actuators. It also charges the 24 V (2-12 volt batteries) storage battery. Its charge current is limited to 150 mA maximum, and the maximum charge voltage is temperature compensated.

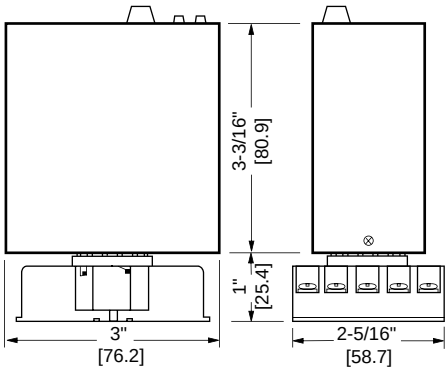
In case of a power failure, the NSV24 switches immediately over to the battery power source, and according to the control function, the actuators will move to their safety position. After 250 seconds, the batteries are disconnected from the actuators to prolong battery life. Because of this, a safe battery back-up can be provided for several short-term failures. The main power source operation is indicated by a green LED, and the battery power source by a red LED.

Technical Data	
Power supply	24 VAC ± 20% 50/60 Hz
Fusing	4A slow blow fuse
Power consumption	Min. 5W (without actuator load)
Transformer	8 VA
Batteries	24 V Nominal 1.2 Ah (2-12 volt lead-acid batteries; batteries not supplied with module)
Maintenance	The batteries should be checked annually (approximate life is 6 years)
Charging circuit	Charge current max. 150 mA Charge voltage 24-27 V, temperature compensated
Battery back-up operation	24 V nominal 1.2 Ah, max. 60 W auto shut off after 250 seconds
Indication LED	Green - Main power source operation (battery will be charged) Red - Battery back-up operation
Mounting	Mounted in the control panel with an 11 terminal plug-in base (not supplied with module)
Ambient temperature	14°F to 122°F [-10°C . . . 50°C]

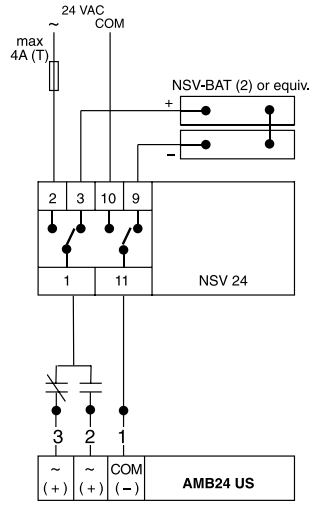
Connectable Actuator Models	Maximum per module
GMB24-3X1	20
GMX24-3	15
GMX24-MFTX1	15
GMB24-SR	15
AMB24-3	30
AMX24-MFT	30
AMB24-SR	30
NMB24-3	30
NMX24-MFT	30
NMB24-SR	30
LMB24-3	30
LMX24-MFT	30
LMB24-SR	30

Accessories	
NSV-BAT	12 VDC 1.2 Ah battery (2 required)

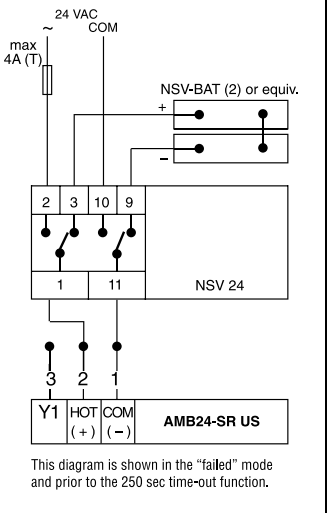
Dimensions (Inches [mm])



Wiring Diagram



Note: Fail-safe direction must have normally closed contact.



This diagram is shown in the "failed" mode and prior to the 250 sec time-out function.

Set-Up of NV24-3 US Actuators during Installation

General

Beneath the cover of the actuator are the terminals for the cable connection and the S1 switch. The floating point signal is processed in the microprocessor and conveyed to the motor. Supply voltage is created by the rectifier. The stroke direction can be reversed with the switch S1.2 (On/Off is indicated on switch). This defines if the valve closes with the plunger up or down. The direction of the plunger can also be inverted by exchanging the wires Y1 and Y2.

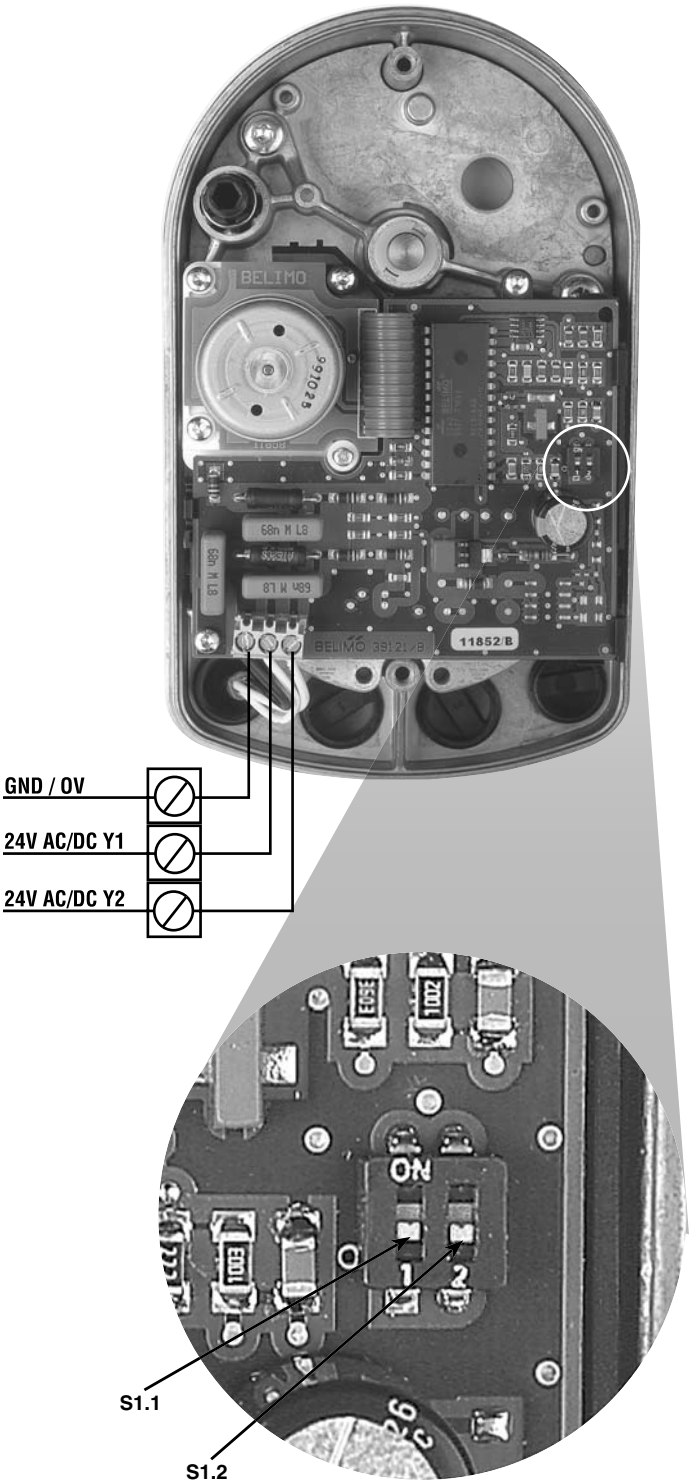
Note: Switch S1.2 must be set based on the valve closing point.

Functional description

Use Switches S1.1 and S1.2 to set the run time and select the valve closing point.

S1.1	**Actuating time**	
	Off position	50s/.25" [7.5s/mm] (Default)
	On position	Deactivated not used
S1.2	**Selecting the closing point**	Valve closing point is with the closing point actuator plunger extended or retracted
	Off position	Valve closing point is with the actuator plunger retracted
	On position	Valve closing point is with the actuator plunger extended

Note: NV24-3 US and NVD24-3 US do not contain test or adaptation functional switches. Adaptation is not necessary for the NV24-3 US and NVD24-3 US actuators.



Set-Up of NV Series MFT Actuators during Installation

General

Beneath the cover of the actuator are the terminals for the cable connection, the S1 and S2 buttons, S3 switch, and the LED status display H1. The setting signal is processed in the microprocessor, and conveyed to the motor via drivers. By setting the slide switch S3 or pressing the buttons S1 and S2, the actuator can easily be configured on site to the requirements, if there are changes from the factory settings.

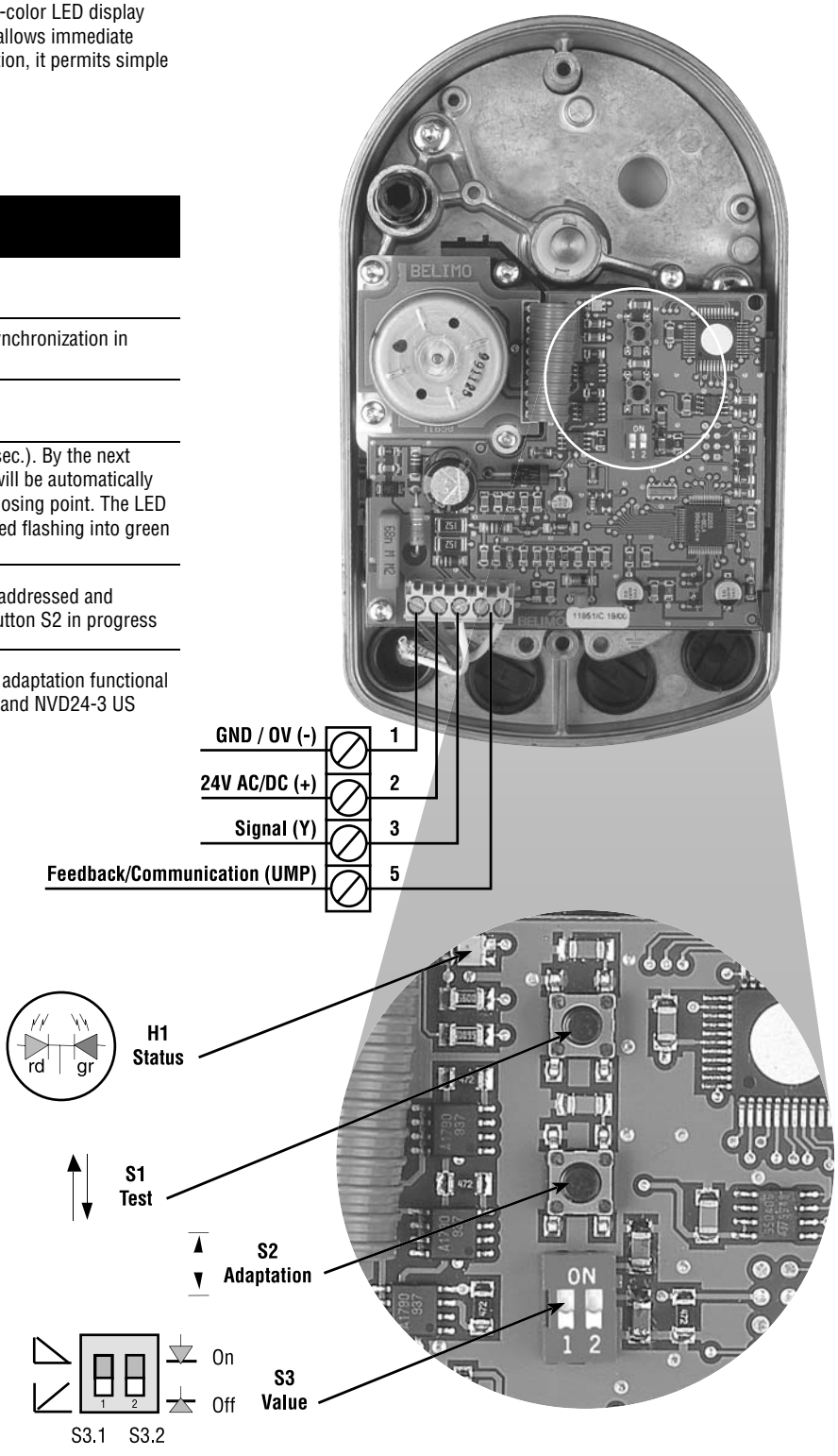
The NV and NVF actuators are maintenance-free. The two-color LED display is located beneath the cover of the actuator. This display allows immediate recognition of the functional state of the actuator. In addition, it permits simple set-up if the factory settings need to be changed.

MFT and Spring Return Actuators
Operation of Switches/LED

LED operating display H1	
Green steady light	Actuator working properly
Green flashing light	Test run or adaptation with synchronization in progress
Red steady light	Fault; repeat adaptation
Red flashing light	After power interruption (>2 sec.). By the next closing movement the valve will be automatically synchronized in the chosen closing point. The LED indicator will change from a red flashing into green steady light.
Alternating red/green light	Master control system being addressed and operation of the adaptation button S2 in progress

Note: NV24-3 US and NVD24-3 US do not contain test or adaptation functional switches. Adaptation is not necessary for the NV24-3 US and NVD24-3 US actuators.

NV…MFT US
NVF…MFT US
NVF…US



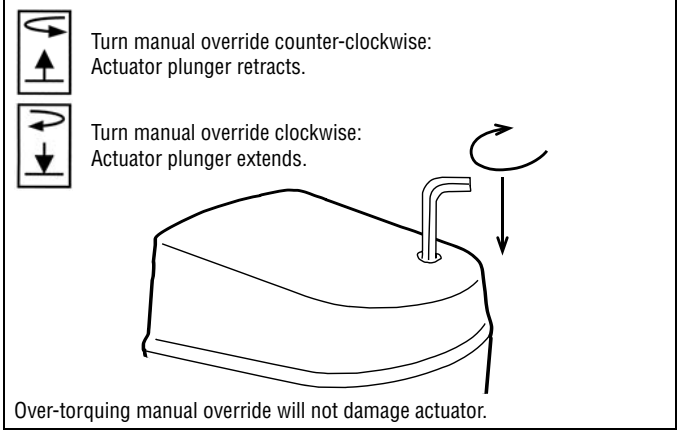
Manual Override

NV…US Non-Spring Return

The valve coupling can be adjusted by inserting a 3/16" or 5 mm hex in the housing cover **(Figure 3)**.

If the hex is turned clockwise, the coupling moves down; counterclockwise turning moves it up. The manual override is protected against overload. The coupling remains in the manual position as long as the actuator is not connected to the nominal voltage. With the nominal voltage applied to the actuator, the coupling follows the positioning signal.

Figure 3



Over-torquing manual override will not damage actuator.

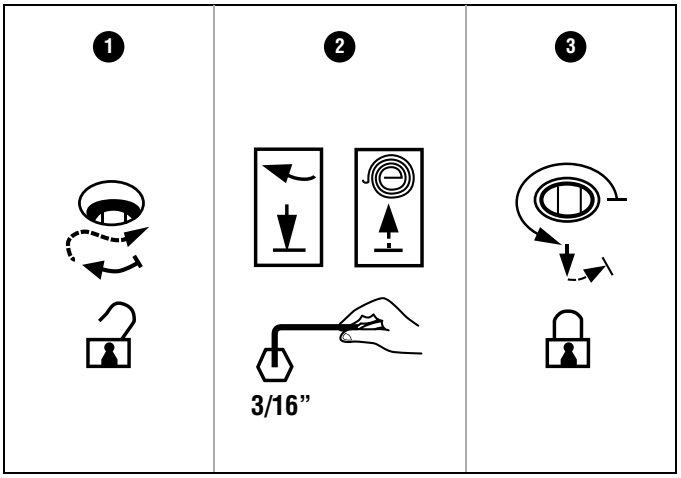
NVF…US Spring Return

The valve coupling can be adjusted by inserting a 3/16" or 5 mm hex in the housing cover **(Figure 3)**.

The spring return function in the actuator is pre-tensioned when delivered. The manual operating mechanism is overload-proof. The plunger will remain at the manual setting until the power supply to the actuator is turned on or, the next time the power supply is interrupted, it moves to whichever end position has been selected.

NOTE:
1. Do not override the NVF while power is applied to the actuator.
2. If the actuator is overridden while power is applied, remove cover and perform manual adaptation function by pressing S2 button.
3. **When overriding the actuator turn the hex 3/4 turn and then press down to lock after the desired position is found. This prevents the gear from over-tightening into an end-position which would prevent the override mechanism from unlocking automatically during power up. If the manual override does not unlock automatically during power-up you must unlock the actuator manually with the hex.**
4. Use the NV… MFT US in only closed control loops.

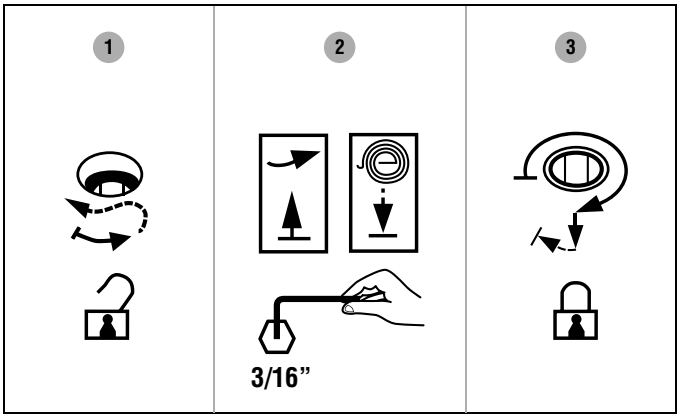
NVF…US Retracting, Spring Up



1. **Disengaging manual operation**
   Turn the hex clockwise 45° until resistance is encountered. Then lift the key approx. 1/4" [7 mm] until the black socket for the key is level with the top of the housing cover. The spring mechanism will now rotate the key counter-clockwise and the plunger will retract.
2. **Manual operation**
   Turning the hex clockwise causes the plunger to extend to the required position.
3. **Locking manual operation**
   Turn the hex 3/4 turn counter-clockwise and then press it down into the cover of the housing (the black socket will move inwards approx. 1/4" [7 mm]). Slight counter-clockwise rotation of the key will then lock the manual operating mechanism in position.

   Note: Do not trigger the spring mechanism and turn the manual operating mechanism clockwise to the "spring-up" end position at the same time.

NVF…-E US Extending, Spring Down



1. **Disengaging manual operation**
   Turn the hex counter-clockwise 45° until resistance is encountered. Then lift the key approx. 1/4" [7 mm] until the black socket for the key is level with the top of the housing cover. The spring mechanism will now rotate the key clockwise, the plunger will extend.
2. **Manual operation**
   Turning the hex counter-clockwise causes the plunger to retract to the required position.
3. **Locking manual operation**
   Turn the hex back clockwise 3/4 turn and then press it down into the cover of the housing (the black socket will move inwards approx. 1/4" [7 mm]). Slight clockwise rotation of the key will then lock the manual operating mechanism in position.

Functional description NV24-MFT US, NVF… US

The S1 button makes it simple to check the wiring and overall functioning of the actuator. The first time voltage is applied, the stroke is adapted automatically. Independently of this, an adaptation can be repeated as necessary by pressing button S2. Actuator will not do an adaptation after each power loss.

S1	**Test**	The valve performs full stroke at minimum running time and checks the adapted stroke.
S2	**Adaptation**	The stroke effected (between the two mechanical end-stops of the valve) is acquired as 100% stroke and stored in the microprocessor. The control signal and running time are then matched to this 100% stroke.

EXAMPLES

S3.1	**OFF**	At 2 Volts, the valve is closed.
S3.2	**OFF**	The valve closing point is STEM UP CLOSED.

Result of Input Signal and Feedback Signal: The valve will be closed at 2 Volts and will open as the actuator drives down. The control signal will read 2 Volts at the closed point and 10 Volts at the fully open point. The feedback will read 2 Volts at the closed point and 10 Volts at the fully open point.

S3.1	**ON**	At 2 Volts, the valve is open.
S3.2	**OFF**	The valve closing point is STEM UP CLOSED.

Result of Input Signal and Feedback Signal: The valve will be fully open at 2 Volts and will close as the actuator retracts. The control signal will read 10 Volts at the closed point and 2 Volts at the fully open point. The feedback will read 2 Volts at the closed point and 10 Volts at the fully open point.

S3.1	**OFF**	At 2 Volts, the valve is closed.
S3.2	**ON**	The valve closing point is STEM DOWN CLOSED.

Result of Input Signal and Feedback Signal: The valve will be closed at 2 Volts and will open as the actuator retracts. The control signal will read 2 Volts at the closed point and 10 Volts at the fully open point. The feedback will read 2 Volts at the closed point and 10 Volts at the fully open point.

S3.1	**ON**	At 2 Volts, the valve is open.
S3.2	**ON**	The valve closing point is STEM DOWN CLOSED.

Result of Input Signal and Feedback Signal: The valve will be open at 2 Volts and will close as the actuator drives down. The control signal will read 10 Volts at the closed point and 2 Volts at the fully open point. The feedback will read 2 Volts at the closed point and 10 Volts at the fully open point.

Set-Up of S3 switches

Note: It is very important to set Switches S3.1 and S3.2 to ensure proper valve operation.

1. Determine if the valve body is STEM UP CLOSED or STEM UP OPEN. In other words, when is the valve closed from Ports A to AB– when the stem is up or down?

   If the valve is STEM UP OPEN – set Switch S3.2 to the ON position

   If the valve is STEM UP CLOSED – set Switch S3.2 to the OFF position

   By setting this switch, the actuator will be able to recognize its closing point during the ADAPTATION process.

2. Determine if you would like to valve to be Reverse or Direct Acting.

   Direct Acting: if the valve should be CLOSED at minimum control signal – set Switch 3.1 to the OFF position.

   Using this setting, the valve will be CLOSED at minimum control signal and will OPEN as the control signal increases. EX: Closed at 0 Volt signal and Open at 10 Volt signal.

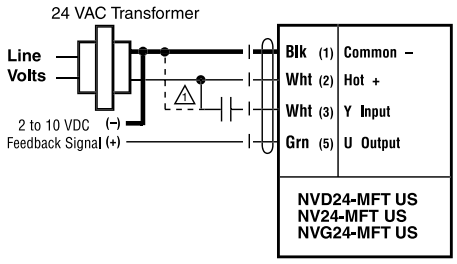
   Reverse Acting: if the valve should be OPEN at 2 Volts (or minimum control signal) – set Switch 3.1 to the ON position.

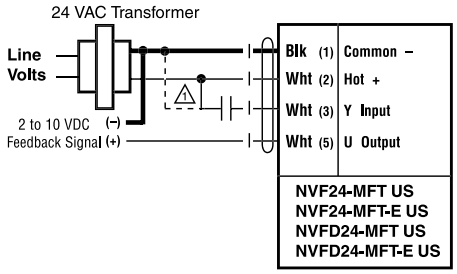
   Using this setting, the valve will be OPEN at minimum control signal and will CLOSE as the control signal increases. EX: Closed at 10 Volt signal and Open at 2 Volt signal.

NOTE: The Feedback signal (Wire 5) of the NV Series actuator will follow the closing point of the valve- not the input control signal. In other words, the feedback will always read 2 Volts when the valve is closed regardless if the input control signal is set for Reverse or Direct Acting.

S3	**Setting the direction of stroke and selecting the closing point.**	
	The stroke direction can be adjusted to be reverse or direct acting. Under the factory setting, the stroke increases as the setting signal increases. Depending upon the type of valve (NO/NC), the closing point (stroke = 0%) can be chosen with the valve stem retracted or extended.	
S3.1	**Direction of stroke**	The direction of stroke is inverted in relation to the control signal.
	Off position	Control signal = 0% corresponding to 0% stroke
	On position	Control signal = 100% corresponding to 0% stroke
S3.2	**Selecting the closing point**	This is the closing point of the valve. This closing point is dependent on the valve body- not the actuator. This setting must be correct for proper operation of the actuator.
	Off position	Valve is stem up closed (Flow from A to AB).
	On position	Valve is stem down closed (Flow from A to AB).

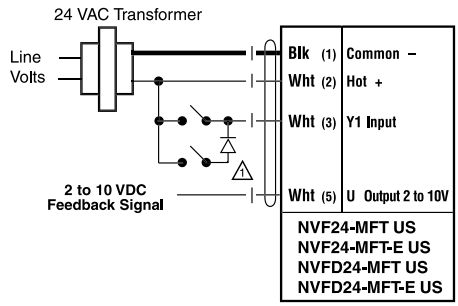
Additional Wiring Configurations for NV.../NVF... Series Actuators





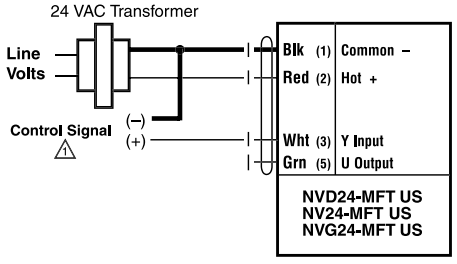
1 Control signal may be pulsed from either the Hot or Common 24 VAC line.

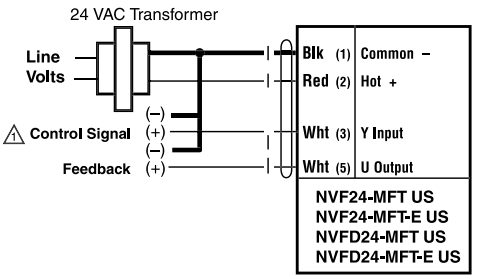
Pulse width modulation (PWM) control wiring		
Range Available:	**20 ms to 50 sec.**	
Typical:	**0.59 to 2.93**	**V-20001**
	0.02 to 5.00	**V-20002**
	0.10 to 25.5	**V-20003**
	Custom configurations available	



1 Requires IN4004 or IN4007diode

Floating point control: P-30… configurations		
Range Available:	**20 ms to 50 sec.**	
Typical:	**0.59 to 2.93**	**V-20001**
	0.02 to 5.00	**V-20002**
	0.10 to 25.5	**V-20003**
	Custom configurations available	





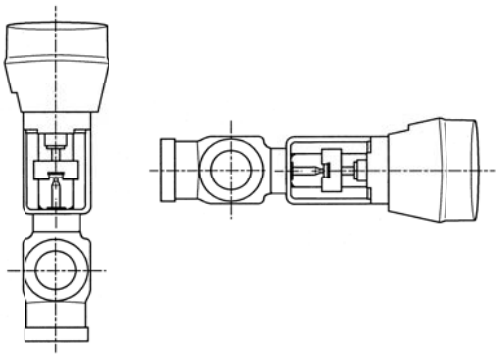
1 The start point and end point can be adjusted to sequence multiple actuators from one control signal.

Start point and stop adjustable wiring		
Range Available:	**Start 0.5 to 30 VDC**	
	Stop 2.5 to 32 VDC	
Typical:	**2 - 10 VDC**	**V-10001**
	0 - 10 VDC	**V-10002**
	4 - 7 VDC	**V-10004**
	6 - 9 VDC	**V-10005**
	Custom configurations available	

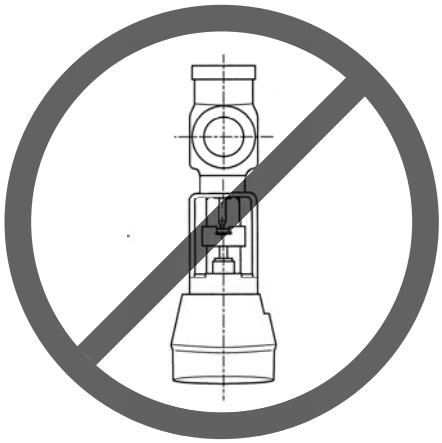
Piping

The valve should be mounted in a weather-protected area in a location that is within the ambient limits of the actuator. Allow sufficient room for valve with actuator and for service. Allow 6" for cover removal and 12" for complete actuator removal. The assembly can be mounted with the actuator vertical or horizontal in relation to the pipe. The actuators should never be mounted underneath the valve, as condensation can build up and result in a failure of the actuators. Do not reverse flow direction.

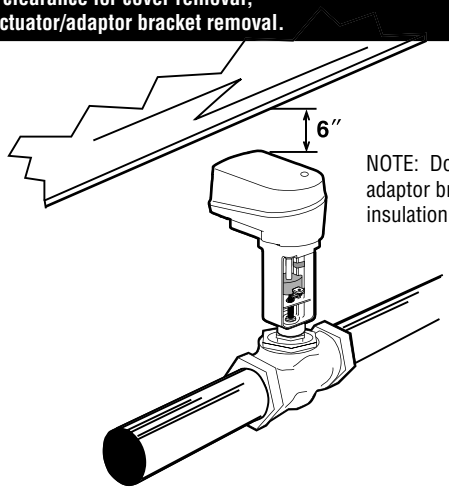
Assembly can be mounted horizontally or vertically.



DO NOT INSTALL WITH ACTUATOR BELOW PIPE.



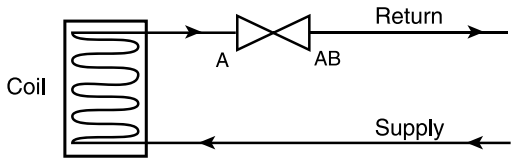
Allow 6" clearance for cover removal, 12" for actuator/adaptor bracket removal.



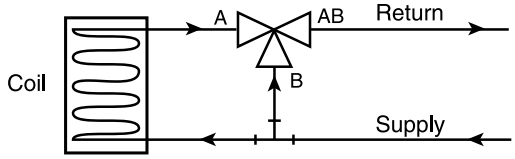
NOTE: Do not cover adaptor bracket with insulation material.

Piping Diagrams

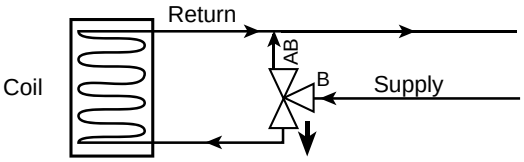
2-way Valve Piping Diagram
(1 Input, 1 Output)



3-way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



Three-Way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



NVG...

GM...

AF...

	Model	Description	Valve Size	Notes
NON-SPRING RETURN	GMB24-3X1	On/Off, Floating Point	2-1/2" to 6"	
NON-SPRING RETURN	GMB24-MFTX1 NVG24-MFT US	2-10 VDC (default)	2-1/2" to 6" 2-1/2" to 3"	Specify 2-10 VDC, PWM range or custom control range, when ordering. (See V-codes and P-codes)
SPRING RETURN	AF24 US	On/Off	2-1/2" to 4" - 2-way Valves 2-1/2" to 6" - 3-way Valves	
SPRING RETURN	AF24-MFT US	2-10 VDC (default)	2-1/2" to 4" - 2-way Valves 2-1/2" to 6" - 3-way Valves	Specify 2-10 VDC,PWM range or custom control range, when ordering. (See V-codes and P-codes)

Note: GM and AF series actuators can be mounted in tandem to increase close-off.
Note: NVG actuators are direct coupled.

MULTI-FUNCTION TECHNOLOGY

PROGRAMMING CODES					Control Input	Running Time	Built-in Feedback	List Price
NV DESCRIPTION	V-10001	N01	P-10001	A01	2-10 VDC	150	2-10 VDC	No Charge
	V-10002	N02	P-10002	A02	0-10 VDC	150	0-10 VDC	No Charge
	V-10028	N1E	P-10028	A28	0-10 VDC	100	0-10 VDC	No Charge
	V-10063	N1K	P-10063	A63	0.5-4.5 VDC	150	0.5-4.5 VDC	No Charge
	V-10064	N1L	P-10064	A64	5.5-10 VDC	150	5.5-10 VDC	No Charge
	V-20002	N1U	P-20002	W02	0.02-5.00 seconds PWM	150	2-10 VDC	No Charge
	V-20003	N1V	P-20003	W03	0.10-25.5 seconds PWM	150	2-10 VDC	No Charge
	V-30001	N24	P-30001	F01	Floating Point	150	2-10 VDC	No Charge
	V-40002	N29	P-40002	J02	On/Off	150	2-10 VDC	No Charge

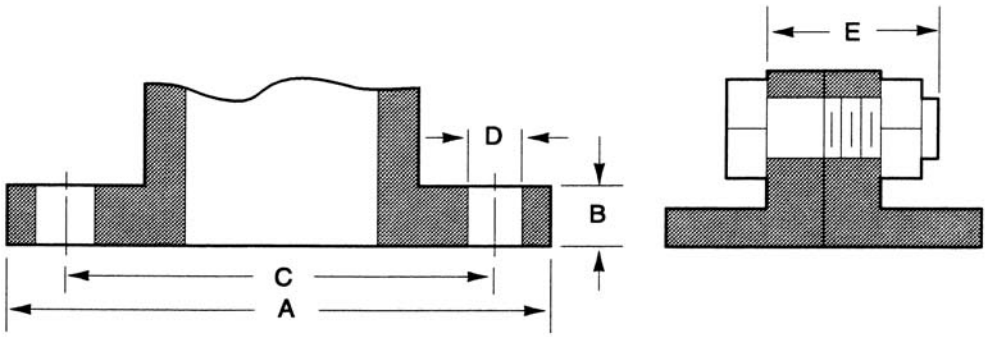
GM DESCRIPTION

Note: V-codes used for NV…Series actuator. All other MFT actuators use P-codes. Most popular configurations available at no additional cost.

ANSI 125

Flange Detail for American Standard 125 lb. Cast Iron Pipe Flanges

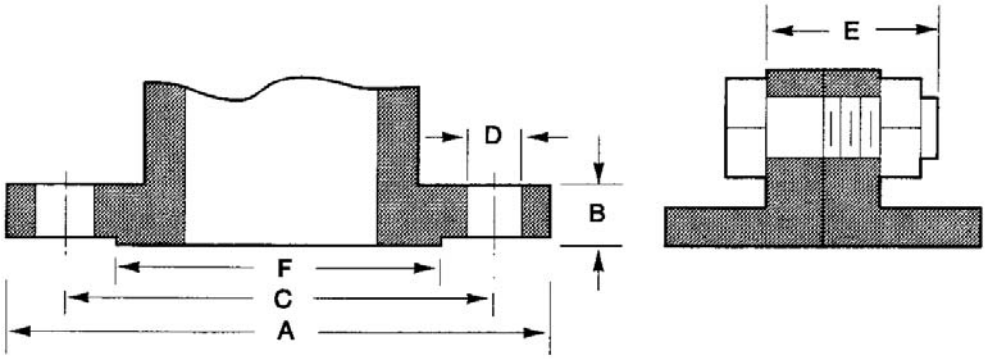
	FLANGES		DRILLING		BOLTING		
Nominal Pipe Size	A Flange Diameter	B Flange Thickness	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	E Length of Machine Bolts
2-1/2"	7"	11/16"	5-1/2"	3/4"	4	5/8"	2-1/2"
3"	7-1/2"	3/4"	6"	3/4"	4	5/8"	2-1/2"
4"	9"	15/16"	7-1/2"	3/4"	8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



ANSI 250

Flange Detail for American Standard 250 lb. Cast Iron Pipe Flanges

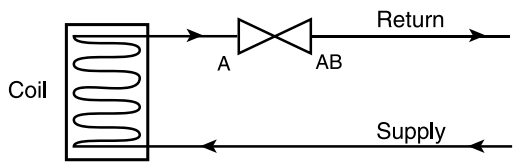
	FLANGES			DRILLING		BOLTING		
Nominal Pipe Size	A Flange Diameter	B Flange Thickness	F Diameter of Raised Face	C Diameter of Bolt Circle	D Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	E Length of Machine Bolts
2-1/2"	7-1/2"	1"	4-15/16"	5-7/8"	7/8"	8	3/4"	3-1/2"
3"	8-1/4"	1-1/8"	5-11/16"	6-5/8"	7/8"	8	3/4"	3-1/2"
4"	10"	1-1/4"	6-15/16"	7-7/8"	7/8"	8	3/4"	4"
5"	11"	1-3/8"	8-5/16"	9-1/4"	7/8"	8	3/4"	4"
6"	12-1/2"	1-7/16"	9-11/16	10-5/8"	7/8"	12	3/4"	4"



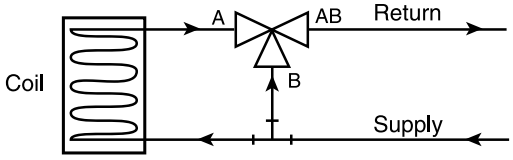
Piping

Piping Diagrams

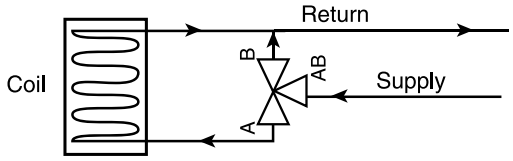
2-way Valve Piping Diagram
(1 Input, 1 Output)



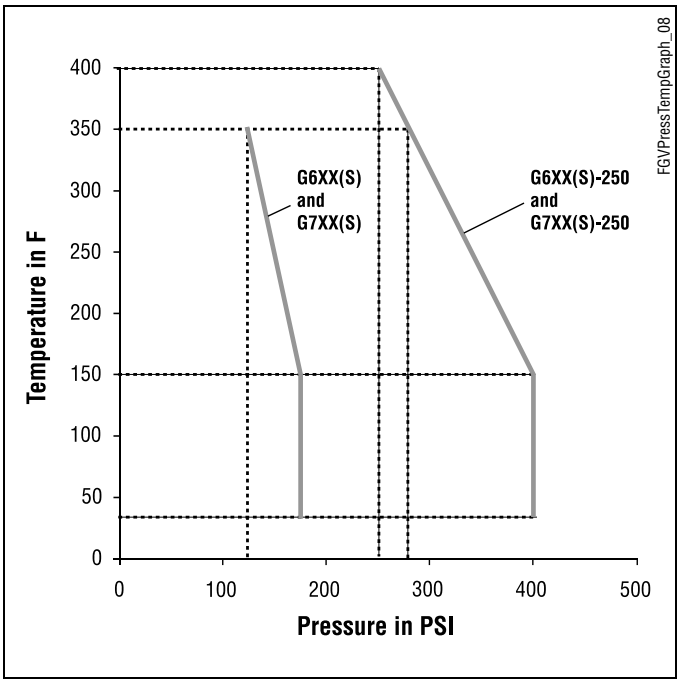
3-way Mixing Valve Piping Diagram
(2 Inputs, 1 Output)



3-way Diverting Valve Piping Diagram
(1 Input, 2 Outputs)



Maximum Temperature and Pressure Ratings for Flanged Globe Valve Bodies



Custom MFT Configuration Order Form

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

BELIMO

#1 Select an Actuator

(use one sheet for each unique actuator/configuration)

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

(-S=Auxiliary Switch)

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

Email _____

FIELD LABELING: LBL-MFT

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

#2 Create a Custom Configuration

❶ Angle of rotation setting

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

☐ **Activated** — The following settings ❷ - ❺ 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.

❷ Control Types

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

❸ Feedback Signals U_5

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

☐ **Position Feedback U** DC 0...10 V

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

❹ 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**

❺ Override control and electronic angle of rotation limiting

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

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

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

Section 230900 – INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 – GENERAL

The following addition should be made to 1.2.B.

1.2 SUMMARY

B. Related Sections include the following:
   3. Division 23 Section "Hydronic Piping" for requirements for piping packages for control valves.

The following replaces the noted specification sections, except as noted.

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
   7. Power Requirements (Spring Return): 24 [120] [230] V ac, maximum 10 VA at 24-V ac or 8 W at 24-V dc.
   8. 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.
   9. Temperature Rating: -22 to +122ºF **-30 to +50ºC [-58 to +122ºF -50 to +50ºC]**
   10. Housing: Minimum requirement NEMA type 2 (4/4X) / IP54 (IP67) 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.

B. Electronic Valve Actuators:
   1. Manufactured, brand labeled or distributed by BELIMO.
   2. Size for torque required for valve close off at 150 percent of total system (head) pressure for two-way valves; and 100 percent of pressure differential across the valve or 100 percent of total system (pump) head differential pressure for three-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-V ac or 8 W at 24-V dc.
   8. Maximum 1 VA at 24-V ac or 1 W at 24-V dc.
   9. Temperature Rating: -22 to +122ºF **-30 to +50ºC [-58 to +122ºF -50 to +50ºC]**.
   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: 24V-ac/dc.
   5. Temperature Rating: -22 to +122ºF **-30 to +50ºC**.
   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 2.16.I Butterfly Valves – Resilient Seat and 2.16.J Butterfly Valves – High Performance.)*
   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.H – 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. Power Requirements: 24VAC [120VAC] [230VAC] 1 pH.
   7. Auxiliary Switches: 2 SPDT rated 3A at 250 VAC.
   8. Temperature Rating: -22 to +150ºF **-30 to +65ºC.**
   9. Housing: Minimum requirement NEMA type 4X/ IP67 with an industrial quality coating. Actuator shall have an internal heater to prevent condensation within the housing. A visual indication beacon shall indicate position status of the device.
   10. Agency Listing: ISO, CE, CSA
   11. Actuator shall have an internal heater to prevent condensation within the housing.
   12. 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. 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. 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 with an operating pressure differential range of 5 to 50 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 for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are NOT acceptable. **[Actuators for 3-wire floating (tri-state) on ½" – 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'-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.
10. All pressure independent control valves for individual coil control shall be provided as part of a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a combination strainer/shut-off valve/drain [shut-off valve] with a P/T port. The return side of the coil shall contain a union fitting with a P/T port, pressure independent control valve, an isolation valve with P/T port and manual air vent. Shut-off valves as an integrated part of the pressure independent control valve are prohibited. **[A [12"] [24"] flexible hose set shall be provided for each coil supply and return connection for all ½", ¾" and 1" pipe packages.]**

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 and adjusted for the pressure independent valve assembly (valve and actuator combination) for field conditions using the pressure independent control valve manufacturer's documented procedure 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, female NPT 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, female NPT 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. Two-Way Modulating: [3 psig] 5 psig or twice the load pressure drop, whichever is more.
   c. Three-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.
5. All characterized control valves for individual coil control shall be provided as part of a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a combination strainer/shut-off valve/drain [shut-off valve] with a P/T port. The return side of the coil shall contain a union fitting with a P/T port, characterized control valve, a flow limiter with P/T port, manual air vent and shut-off valve. Shut-off valves as an integrated part of the characterized control valve are prohibited. **[For 3-way installations, supply an isolation valve with P/T port for field installation in the bypass of the circuit.] [A [12"] [24"] flexible hose set shall be provided for each coil supply and return connection for all ½", ¾" and 1" pipe packages.]**

F. Steam system characterized control valves shall have the following characteristics:
1. NPS 1 and Smaller: Nickel-plated forged brass body rated at no less than 600 psi, stainless steel ball and blowout proof stem, female NPT end fittings, with a dual EPDM O-ring packing design, fiberglass reinforced PTFE Teflon seats, and a PTFE Teflon flow characterizing disc.
2. Sizing: 15PSIG or less inlet steam pressure.
   a. Two-Position: Line size or sized using 10% of inlet gauge pressure.
   b. Modulating: Pressure drop shall be 80% of inlet gauge pressure.
3. Close-Off Pressure Rating: 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.
5. Flow Characteristics: Equal percentage characteristics.

G. 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 2-1/2 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. Two-Way Modulating: [3 psig] 5 psig or twice the load pressure drop, whichever is more.
   c. Three-Way Modulating: Twice the load pressure drop, but not more than [3 psig] 5 psig.
4. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-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 percent of total system head pressure for two-way valves and 150 percent of the design pressure differential across the three-way valves.
6. Two- and three-way globe valves shall be used only if characterized control valves do not fit the sizing criteria or application.

H. 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 2-1/2 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 percent of operating (inlet) pressure.

I. 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 more. Size for the design flow with the disc in a 60-degree-open-position with the design velocity less than 12 feet per second.
4. Close-Off Pressure Rating: NPS 2-12" 200 psi bubble tight shut-off. NPS 14 and larger, 150 psi bubble tight shut-off.

J. Butterfly Valves – High Performance:

1. Valve body shall be full lugged carbon steel ANSI Class 150 [300] body with a 316 stainless steel disc without a nylon coating, RTFE seat, and be ANSI Class 150300 flange standards. Blowout-proof shaft shall be 17-4ph stainless steel and shall be supported at four locations by glass-backed TFE bushings. Valve packing shall be Chevron TFE and shall include fully adjustable packing flange and separable packing gland. Valve body shall have long stem design to allow for 2" insulation (minimum). Valve face-to-face dimensions shall comply with API 609 and MSS-SP-68. Valve assembly shall be completely assembled and tested, ready for installation.
2. 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 more. Size for the design flow with the disc in a 60-degree-open-position with the design velocity less than 32 feet per second.
3. Flow Characteristics: Modified equal percentage, unidirectional.
4. Close-Off Pressure Rating: 150 [285] psi bubble tight shut-off.
5. Media Temperature Range: ANSI Class 150 [300] limitations.
6. Max Differential Pressure: 285 psi @ 100 deg F for ANSI 150 (725 psi @ 100 deg F for ANSI 300).

K. 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 percent of total system head pressure for two-way valves and 125 percent of the design pressure differential across the three-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.
6. All zone valves for individual coil control shall be provided as part of a pipe package supplied by the valve manufacturer. The supply side of the coil shall contain a combination strainer/shut-off valve/drain [shut-off valve] with a P/T port. The return side of the coil shall contain a union fitting with a P/T port, zone valve, a flow limiter with P/T port, manual air vent and shut-off valve. Shut-off valves as an integrated part of the zone valve are prohibited. **[A [12"] [24"] flexible hose set shall be provided for each coil supply and return connection for all ½", ¾" and 1" pipe packages.]**

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 with one actuator per damper section. Mechanically paralleled or 'piggybacked' actuators are not permitted.
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: 0.23A (running) and 0.09A (holding) at 24V-ac or 27 VA (running) and 10 VA (holding) at 120V-ac.
6. Actuator timing shall meet 15 sec [75 sec] [local codes].
7. Temperature Rating: Actuator shall have a UL555S listing by the damper manufacturer for 350ºF [250ºF].
8. **[Proportional Smoke Damper Actuators shall meet all requirements specified above and shall modulate 0-100% open in response to a 2-10vdc or 4-20mA control signal. A 2-10vdc feedback output shall provide a 2-10vdc signal for position indication.**
   a. Power Requirements (Proportional): Maximum (running) 12 VA at 24-V ac or 8 W at 24-V dc. Maximum (holding) 5VA at 24-V ac or 3 W at 24-V dc.
   b. A manual override winder and locking mechanism shall be provided for override operation of the actuator on a loss of power.]
9. **[Balancing Smoke Damper Actuators shall meet all requirements specified above and shall include an integral adjustable maximum opening potentiometer for airflow adjustment.**
   a. Power Requirements (Balancing): Maximum (running) 9.5 VA at 24-V ac or 6 W at 24-V dc. Maximum (holding) 5VA at 24-V ac or 3 W at 24-V dc.
   b. A manual override winder and locking mechanism shall be provided for override operation of the actuator on a loss of power to the actuator.]

The following replaces item 2.8.K.1

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

2.9 COMBINATION FIRE AND SMOKE DAMPERS

Replace with the following:

O. 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: 0.23A (running) and 0.09A (holding) at 24V-ac or 27 VA (running) and 10 VA (holding) at 120V-ac.

6. Actuator timing shall meet 15 sec [75 sec] [local codes].
7. Temperature Rating: Actuator shall have a UL555S listing by the damper manufacturer for 350ºF [250ºF].
8. **[Proportional Combination Fire and Smoke Damper Actuators shall meet all requirements specified above and shall modulate 0-100% open in response to a 2-10vdc or 4-20mA control signal. A 2-10vdc feedback output shall provide a 2-10vdc signal for position indication.**
   a. **Power Requirements (Proportional): Maximum (running) 12 VA at 24-V ac or 8 W at 24-V dc. Maximum (holding) 5VA at 24-V ac or 3 W at 24-V dc.**
   b. **A manual override winder and locking mechanism shall be provided for override operation of the actuator on a loss of power.]**
9. **[Balancing Combination Fire and Smoke Damper Actuators shall meet all requirements specified above and shall include an integral adjustable maximum opening potentiometer for airflow adjustment.**
   a. **Power Requirements (Balancing): Maximum (running) 9.5 VA at 24-V ac or 6 W at 24-V dc. Maximum (holding) 5VA at 24-V ac or 3 W at 24-V dc.**
   b. **A manual override winder and locking mechanism shall be provided for override operation of the actuator on a loss of power to the actuator.]**

The following replaces item 2.9.Q.1

1. Auxiliary switches for [**signaling**] [**fan control**] [**or**] [**position indication**].
2. Housing: Steel housing, aluminum is unacceptable.
3. Agency Listing: ISO 9001, UL873, or UL60730.
4. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.

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, Nailor, Pottorff, Prefco, Ruskin and Safe-Air.

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.

Belimo Platinum Distributors

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

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