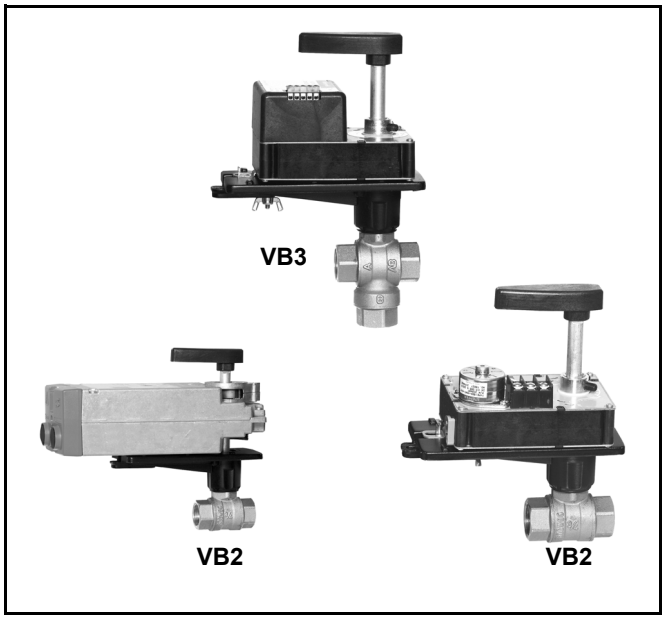
Honeywell

VB2, VB3
Ball Valve/Actuator Assemblies

PRODUCT DATA



APPLICATION

The VB2 Two-Way and the VB3 Three-Way Ball Valve Assemblies, with and without actuators, control hot and chilled water with glycol solutions up to 50% in heating, ventilating, and air conditioning (HVAC) systems for two-position or modulating functions.

These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return direct-coupled actuators (DCA).

FEATURES

All Models

- **Sizes from 1/2 in. to 2 in. with internal nominal pipe thread (NPT) connections.**
- **Equal Percentage flow characteristics.**
- **Field configurable for normally open or normally closed fail-safe position.**
- **Removable manual operating handle to control valve during installation or in an event of power failure.**
- **ANSI Class IV leakage specification (.01% of C_v).**
- **Choice of four actuation control schemes: Non-Spring Return Floating, Non-Spring Return Modulating, Spring Return 24V 2-Position, Spring Return Modulating/Floating.**
- **The bracket design allows the actuator to be mounted on the valve in any of four positions.**

VB2 (Two Way)

- **Wide C_v choices from 0.38 to 71.1.**
- **Valve ball and stem are either nickel plated brass or 316 stainless steel.**

VB3 (Three Way)

- **Wide C_v choices from 1.0 to 56.7.**
- **Valve installs in a "tee" pattern, no extra elbows or piping required.**
- **Valve ball and stem are nickel plated brass.**
- **Mixing and Diverting capabilities.**

SPECIFICATIONS

Models: See Table 2.

Dimensions: See Fig. 1 and 2.

Body Style: Two-way Ball Valve, full or reduced port using an insert. Internal NPT connections.

Body Size: 1/2 in. to 2 in. NPT.

Capacity: See Tables 1 and 3.

Body Pressure Rating (maximum):
360 psi (2482 kPa) at 250°F (121°C).

Controlled Medium:
Water or Glycol solutions up to 50%.
Not suitable for combustible gases.

63-2586-2

Medium Temperature Range:
-22 to +250°F (-30 to +121°C).

Maximum Differential Pressure: See Table 6.

Flow Characteristics:
2-Way: Equal Percentage.
3-Way: Port A to AB: Equal Percentage.
Port B to AB: Linear.

Materials:
Body: Forged Brass (ASTM B283).
Flow Optimizer: NORYL™.
Ball and Stem:
2-Way: Nickel Plated Brass or 316 Stainless Steel.
3-Way: Nickel Plated Brass.
Stem Seals: EPDM O-Rings.
Ball Seals: Reinforced Teflon Seals with EPDM O-Rings.

Approvals:
Valves: ANSI Class IV closeoff/leakage.
Actuators: See literature for the given actuator.

Accessories:
1118-34 Wing Nut for Actuator Retaining Clip.
1198-97 Screw for Handle.
1198-119 Screw for Actuator Retaining Clip.
9656-54 Handle.
9656-56 Actuator Retaining Clip for standard operation.
9656-184 Actuator Retaining Clip for fail-safe operation.

Table 1. Two-Way C_v Values.

Pipe Size		C_v Designator A	B	C	D	E	F	G
1/2 in.	A	0.38	0.68	1.3	2.6	4.7	8	11.7[a]
3/4 in.	B	4.3	10.1	14.7[a]	28.6[a]			
1 in.	C	9.0	15.3	26.1				
1-1/4 in.	D	14.9	36.5					
1-1/2 in.	E	22.8	41.3					
2 in.	F	41.7	71.1					

[a] Denotes full port valve (with no insert). Recommend using a two-position actuator.

Table 2. Model Selection.

VB	Valve, Ball					
	2	Two-way type				
	3	Three-way type				
		A	1/2 in. NPT			
		B	3/4 in. NPT			
		C	1 in. NPT			
		D	1-1/4 in. NPT			
		E	1-1/2 in. NPT			
		F	2 in. NPT			
			A	C_v Designator See Table 1 for Two-way valves. See Table 3 for Three-way valves.		
			B			
			C			
			D			
			E			
			F			
			G			
				B	Nickel plated brass trim	
				S	Stainless Steel trim (two-way only)	
					A	Non-Spring Return, Floating actuator (ML6161B)
					B	Non-Spring Return, Modulating actuator (ML7161A)
					C	Spring Return, 24V, 2-position actuator (S0524-2POS)
					D	Spring Return, Modulating/ Floating actuator (S05010)
					X	No actuator

VB 2 A A B C

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
   1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Table 3. Three-Way C_V Values.

Pipe Size		C_V Designator			
		A	B	C	D
1/2 in.	A	1.0	2.4	4.3	8[a]
3/4 in.	B	2.4	3.8	12.6[a]	
1 in.	C	8.6	10[a]	22.3[a]	30.8[a]
1-1/4 in.	D	12.7	19.4[a]	34.1[a]	
1-1/2 in.	E	13.4	23.5	32[a]	
2 in.	F	23.9	38.2	56.7[a]	

[a] Denotes full port valve (with no insert). Recommend using a two-position actuator.

Application Notes

Effective C_V

When valves are mounted between pipe reducers, there is a decrease in actual valve capacity because the reducers create additional pressure losses in the system. This is especially true for ball valves because of their high capacity.

The C_V values in Tables 4 and 5 are a guideline. Use the Effective C_V, not the valve C_V by itself, to more accurately apply a control valve to the piping system. Multiply the C_V value by 0.865 to get the capacity in K_V, if metric units are required.

Table 4. Effective Cv's Using Pipe Reducers (Two-way).

Valve Size (in.)	Effective Cv									
	Pipe Size (NPT)									
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5
1/2	0.38	0.38	0.38	0.38						
	0.68	0.68	0.68	0.68						
	1.3	1.29	1.28	1.28						
	2.6	2.5	2.5	2.4						
	4.7	4.3	4.1	3.9						
	8	6.5	5.7	5.4						
	11.7	7.9	6.7	6.2						
3/4		4.3	4.3	4.2	4.2					
		10.1	9.6	9.1	8.8					
		14.7	7.1	6.5	6.2					
		28.6	21.1	17.1	15.4					
1			9	8.9	8.8	8.7	8.6	8.6		
			15.3	14.9	14.4	13.8	13.5	13.4		
			26.1	24.4	22.4	20.3	19.4	18.9		
1-1/4				14.9	14.8	14.5	14.3	14.2	14	
				36.5	35	31.5	29.6	28.6	27.6	
1-1/2					22.8	22.4	22	21.8	21.5	21.3
					41.3	39.2	37.2	36	34.7	34.1
2						41.7	41.2	40.6	39.7	39.2
						71.1	68.8	65.9	62.4	60.6

Table 5. Effective Cv's Using Pipe Reducers (Three-way).

Valve Size (in.)	Effective Cv								
	Pipe Size (NPT)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
1/2	1	1	1						
	2.4	2.3	2.3						
	4.3	4	3.8						
	8	7.9	5.7						
3/4		2.4	2.4	2.39	2.38				
		3.8	3.8	3.74	3.7				
		12.6	11.7	10.86	10.4				
1			8.6	8.5	8.4	8.3	8.2	8.2	
			10	9.9	9.7	9.6	9.5	9.4	
			22.3	21.2	19.9	18.4	17.7	17.3	
			30.8	28	25.2	22.3	21.1	20.5	
1-1/4				12.7	12.6	12.4	12.3	12.2	12.2
				19.4	19.2	18.5	18.1	17.9	17.6
				34.1	32.9	29.9	28.3	27.4	26.5
1-1/2					13.4	13.3	13.2	13.2	13.1
					23.5	23.1	22.7	22.4	22.1
					32	31	30	29.3	28.6
2						23.9	23.8	23.7	23.5
						38.2	37.8	37.3	36.6
						56.7	55.5	54	52

Required Torque

Both Honeywell non-spring return and spring return low-torque direct coupled actuators can be utilized with the VB2 and VB3 valves. A 35 lb-in. DCA provides sufficient torque to close the valve at rated closeoff. (See Table 6.)

Table 6. Close-off, Differential Pressure Ratings.

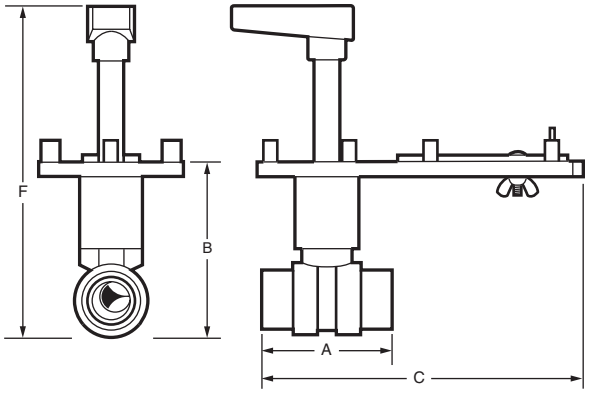
Valve Type	Valve Size (in NPT)	Pressure Rating (in psi)
2-Way	1/2	130
	3/4	
	1	100
	1-1/4	
	1-1/2	
	2	
3-Way	1/2	50
	3/4	
	1	
	1-1/4	40
	1-1/2	
	2	

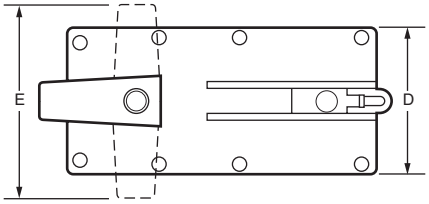
NOTE: Close-off pressures measured using a 35 lb-in. actuator.

Flow Characteristics

The VB2 Two-Way Ball Valves have:
— an equal percentage flow characteristic.

The VB3 Three-Way Ball Valves have:
— between ports A and AB: an equal percentage flow characteristic.
— between ports B and AB: a linear flow characteristic.





SIZE	MODEL NO.	A	B	C	D	E	F
1/2 in.	VB2A	2-3/8	3-7/16	6-3/8	3	4	8-1/8
		2-5/8	3-11/16	6-1/2			8-5/16
3/4 in.	VB2B	2-3/8	3-7/16	6-7/16	3	4	8-1/8
		2-5/8	3-11/16	6-1/2			8-5/16
1 in.	VB2C	2-3/4	3-11/16	6-9/16	3	4	8-5/16
		3-1/16	3-15/16	6-3/4			8-11/16
		4-1/4	4-7/16	7-3/8			8-7/8
1-1/4 in.	VB2D	3	3-15/16	6-11/16	3	4	8-11/16
		3-3/16	4-7/16	6-13/16			9-1/16
1-1/2 in.	VB2E	3-7/16	3-15/16	6-15/16	3	4	9-1/16
		3-11/16	5-3/16	7-1/16			8-7/8
2 in.	VB2F	4	5-3/16	7-3/16	3	4	8-7/8
		4-7/16	5-3/4	7-7/16			10-1/2

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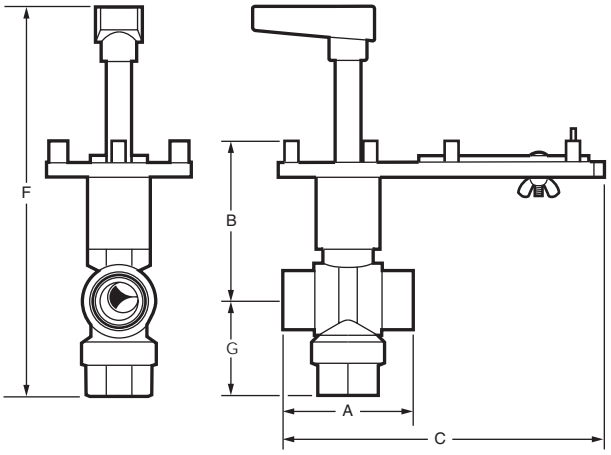
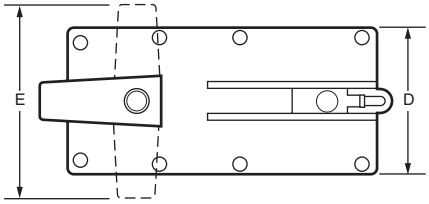
Fig. 1. VB2 dimensions in inches.





SIZE	MODEL NO.	A	B	C	D	E	F	G
1/2 in.	VB3A	2-5/8	3-1/8	6-1/2	3	4	9	2
3/4 in.	VB3B	2-5/8	3-1/8	6-1/2	3	4	9	2
1 in.	VB3C	2-3/4	3-1/8	6-9/16	3	4	9	2-1/16
		3	3-1/4	6-3/4			9-1/2	2-7/16
		4-1/4	3-1/2	7-3/8			10-1/2	3-1/8
1-1/4 in.	VB3D	3	3-1/4	6-3/4	3	4	9-1/2	2-3/8
		3-3/16	3-1/2	6-13/16			9-15/16	2-5/8
1-1/2 in.	VB3E	3-7/16	3-1/2	6-15/16	3	4	10-1/16	2-3/4
		3-11/16	4	7-1/16			10-13/16	3
2 in.	VB3F	4	4	7-3/16	3	4	11	3-1/8
		4-7/16	4-5/16	7-7/16			11-3/4	3-5/8

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Fig. 2. VB3 dimensions in inches.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings given in instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

Preparation

⚠ CAUTION

Equipment Damage Hazard.
Foreign particles like dirt and metal chips can damage the ball seals.
Clean upstream lines prior to installation.

⚠ CAUTION

Equipment Damage Hazard.
Improper chemicals can damage the valve.
Use neither aerosol products nor petroleum-based lubricants.

1. Clean the lines upstream of particles larger than 1/16 in. diameter (welding slag, pipe scale and other contaminants).
2. Proceed with installation once the system specifics (expansion/contraction of the system and its medium as well as operating pressures) are within tolerances.
3. Eliminate air from system.
4. Two-way valves are marked to show flow direction.

IMPORTANT

Flow arrows must point in the direction of the flow for proper operation.

NOTE: For three-way valve mounting, see Fig. 3 through 5.

5. Stem rotation:
   a. For two-way valves:
      (1) Clockwise to close.
      (2) Counterclockwise to open.
   b. For three-way valves:
      (1) Clockwise to increase B to AB flow.
      (2) Counterclockwise to increase A to AB flow.
6. Valve must be mounted with the actuator/bracket above the valve body. Do not install the valve with the stem below horizontal or upside down. (See Fig. 6 and 7.)

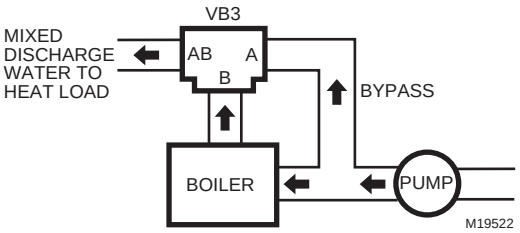


Fig. 3. Boiler bypass for reset control.

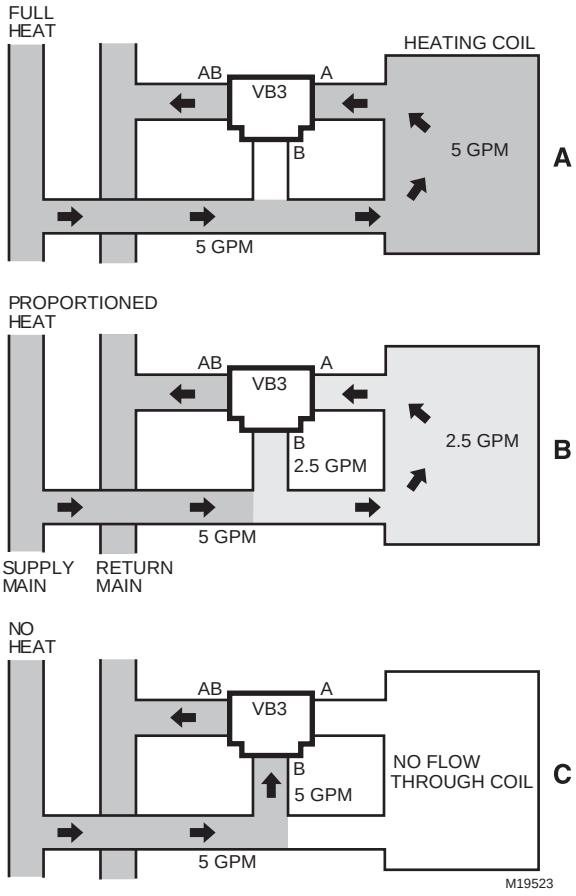


Fig. 4. Three-way mixing valve operation with coil bypass.

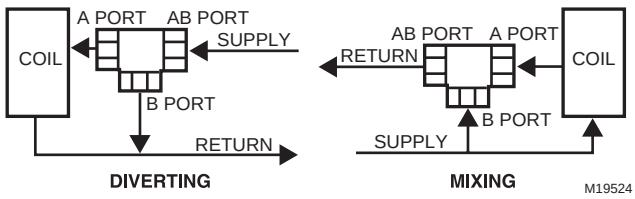


Fig. 5. Three-way ball valve flow orientation (not to scale).

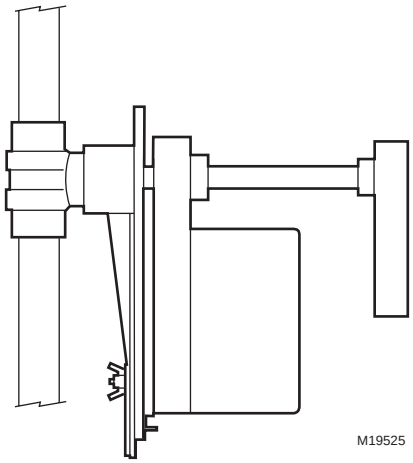


Fig. 6. Vertical valve installation.

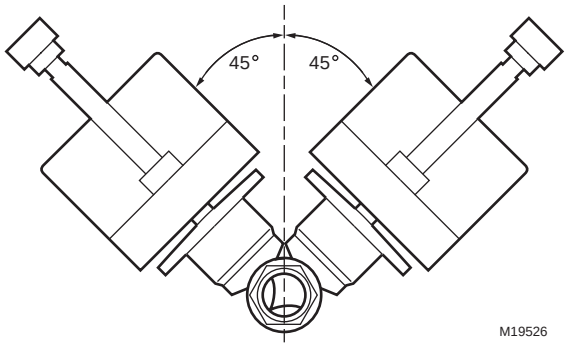
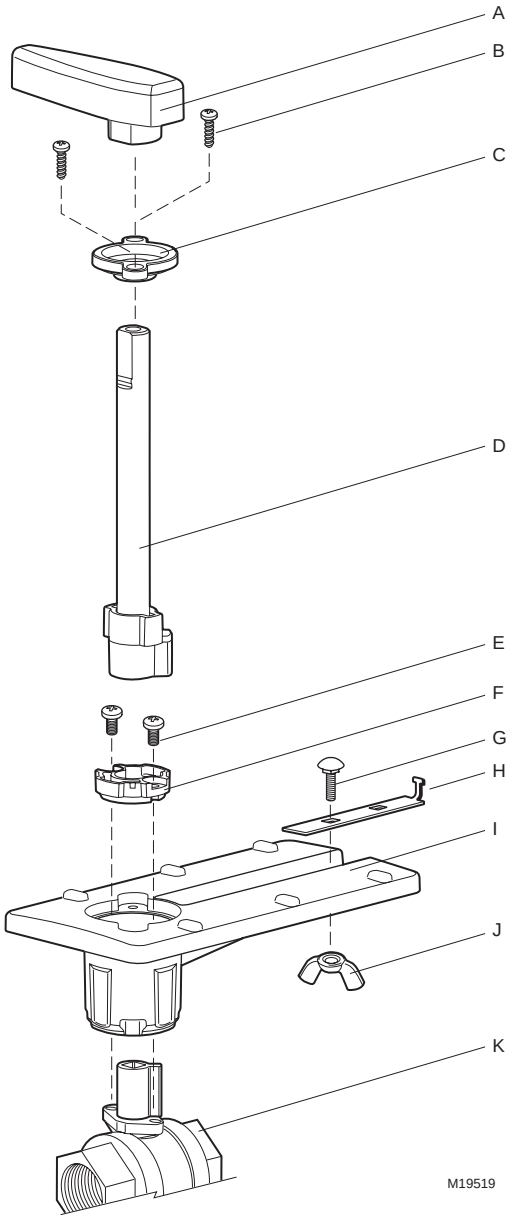


Fig. 7. Acceptable valve angle from vertical.



Part	Description
A	Handle (removable) for manually rotating shaft
B	Screws (2)
C	Stem assembly cover
D	Stem assembly
E	Screws (2)
F	Hold-down ring (to attach mounting plate to valve)
G	Bolt
H	Anti-rotation bracket
I	Mounting plate
J	Wing nut
K	Valve body

Fig. 8. Valve assembly exploded view.

Mechanical Installation

The valves are tapped in NPT and should be sealed with an approved pipe sealant. Torque should not exceed 75 ft-lb.

See Fig. 1 and 2 for valve dimensions. Refer to actuator literature for actuator dimensions.

Mounting Plate Adjustment

The Actuator Mounting Plate can be rotated to a different position for installation in confined spaces. This is accomplished as follows:

1. Remove the handle from the shaft and set it aside.
2. Remove the two screws that hold the stem assembly to the mounting plate and set them aside.
3. Remove and set aside the stem assembly.
4. Remove and set aside the two screws that attach the mounting plate to the valve.
5. Remove and set aside hold-down ring from mounting plate.
6. Rotate mounting plate around valve top to the desired position.

   NOTE: Take note of the screw hole positions on the valve. They limit the mounting plate positions.

7. Lower ring down to valve body and engage it in the new position relative to the mounting plate.
8. Tighten screws to valve body securing the mounting plate.
9. Reattach the stem assembly to the mounting plate.
10. If desired, replace the handle on the shaft.

NOTE: See Fig. 8 for valve exploded view.

Electrical Installation

1. If necessary, remove actuator wiring cover.
2. Wire the actuator according to the appropriate diagram.
3. If applicable, position reverse/direct acting switch for desired operation.
4. Replace cover.

OPERATION AND CHECKOUT

Once both the mechanical and electrical installations are complete:

1. Cycle the actuator to verify that the direction of rotation suits the control sequence.
2. If the rotation direction is incorrect:
   a. For 2-position control actuators: Remount actuator on the bracket.
   b. For floating control actuators: Reverse two control signal wires (CW/CCW).
   c. For analog control actuators either:
      (1) Reposition reverse/direct acting switch, or
      (2) Remount actuator on the bracket.
3. If the control scheme requires fail-safe operation, ensure that, upon removal of power, the fail position coincides with the control sequence.
4. If the fail-safe position is incorrect, adjust the actuator to fail in the correct position. (See actuator instructions for details.)

For detailed actuator information, see Honeywell forms:
— 63-2209 ML6161,ML7161 Product Data Sheet
— 63-2607 S05,S10,S20 Series Actuator Product Data Sheet

TYPICAL SPECIFICATIONS

Ball Valve

Valve housing shall consist of forged brass rated at no less than 360 psi at 250°F. Standard valve ball shall consist of chemically nickel-plated brass. Manufacturer shall be able to provide optional 316 stainless steel ball and stem for two-way valves. Valve shall have a blow-out proof stem with two EPDM O-rings with minimum 600 psi rating. Manufacturer shall be able to provide glass-filled polymer ball insert to make flow control equal percentage. Valves shall be Honeywell. Two-way valves shall have EPDM O-rings behind ball seals to allow for a minimum close-off pressure of 100 psi with actuator which provides 35 lb-in. torque for 1/2 in. to 2 in. sizes. Valve shall be available with a minimum of 25 unique C_V values. Valve shall be available with fixed end internal sweat or union end connections. Three-way valves shall be installed in "tee" configuration with actuator perpendicular to shaft. Valve shall not require elbows of any kind. Three-way valves shall have EPDM O-rings behind ball seals to allow for a minimum close-off pressure of 40 psi with an actuator that provides 35 lb-in. torque for 1/2 in. to 2 in. sizes. Three-way valves must be available in both mixing and diverting configurations.

Valve Actuator

Control valve actuator shall accept analog modulating [(0)2-10 Vdc], floating (tri-state), or two-position signal as indicated in the control sequence. Actuators shall be by Honeywell. Actuator shall provide minimum torque required for full valve shutoff position. Wiring terminals shall be provided for installation to control signal and power wiring.

Accessories

Identification tags shall be available for all valves; tags shall be indelibly marked with C_V, model number, and tag location.

Honeywell

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