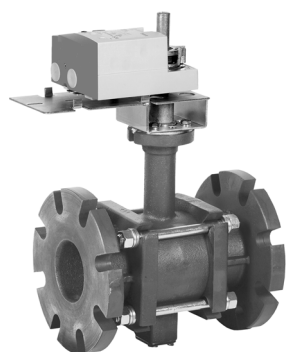
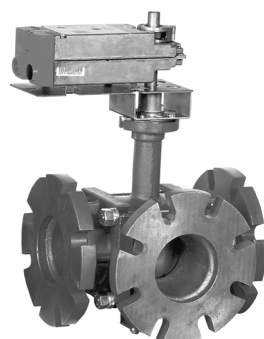


VBF2, VBF3 Control Ball Valves With Flanged Connections

PRODUCT DATA



VBF2



VBF3

APPLICATION

The VBF2 Two-Way and the VBF3 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 to provide 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 4 to 6 inch with ANSI Class 125 flanged connections.
- Equal percentage or linear flow characteristics.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 24V 2-Position, Spring Return Modulating/Floating.
- 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.
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Option of four actuator mounting positions on the valve.
- Wide range of C_v choices from 91 to 650.
- Valve ball and stem 316 stainless steel.

VBF2 (Two-way)

- **ANSI Class IV leakage specification (0.01% of C_v).**

VBF3 (Three-way)

- **Mixing or Diverting control and ANSI Class IV leakage specification (.01% of C_v) for all sizes except as noted below.**
- **VBF3 4 inch with 327 C_v , 5 inch with 400 C_v , and 6 inch with 650 C_v .**
 - Mixing control only.
 - Class IV (.01% of C_v) leakage A to AB.
 - Class III (.1% of C_v) leakage B to AB.
- **Globe valve A-B-AB flow pattern (side B port)**

Contents

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SPECIFICATIONS

Models: See Table 2.

Dimensions: See Fig. 1 and 2.

Body Style: Two-way ball valve, straight-through flow, full or reduced port using patented flow control insert.
Three-way ball valve, A-B-AB characterized flow, using laser-milled stainless steel control ball.
Combination ANSI 125/PN16 flanged connections.

Body Size: 4 to 6 inch.

Flow Capacity: See Table 1.

Body Pressure Rating (maximum):
240 psi (1655 kPa) at 250°F (121°C).

Controlled Medium: Water or Glycol solutions up to 50%.
Not suitable for combustible gases. For closed loop systems only. Not for use in open loop systems.

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

Maximum Differential Pressure: See Table 3.

Flow Characteristics:

Two-way: Equal Percentage.

Linear with full port.

Three-way: Port A to AB: Equal Percentage.

Port B to AB: Linear with 20% reduced flow capacity.

Mounting: Bolt holes conform to ANSI B16.1.

Materials:

Body: Cast Iron ASTM A395, 60-40-18

Ball and Stem: 316 Stainless Steel.

Stem Seals: EPDM O-Rings.

Ball Seals: Teflon™ Seals

Approvals/Standards:

Valves: ANSI close-off/leakage.

2-way - ANSI Class IV leakage

3-way - ANSI Class IV leakage (except as noted below)

3-way - A to AB; ANSI Class IV leakage.

B to AB; ANSI Class III leakage on 4 inch with 327 C_v, 5 inch with 400 C_v, and 6 inch with 650 C_v.

Actuators: Non-Spring Return, Floating or Modulating
UL/cUL.

UL873 Plenum Rating, File No. E4436; Guide No. XAPX.
CE

Spring Return 2-Position, 24 Vac or Floating/Modulating
UL/cUL

UL873 Plenum Rating, File No. E4436; Guide No. XAPX.
CE

C-TICK

Accessories:

See Fig. 13 and Table 4.

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Table 1. Flanged Valves C_v Values.

Pipe Size	C _v Designator									
	S	T	U	1	2	3	4	5	6	7
4 in.	91	118	152	197	254	327 ^a				
5 in.			144	185	240	309	400			
6 in.				208	268		346	441	577	650

^a For three-way valves only

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 Environmental and Combustion Controls Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
1985 Douglas Drive North
Golden Valley, Minnesota 55422-4386
3. <http://customer.honeywell.com> or <http://customer.honeywell.ca>

International Sales and Service Offices in all principal cities of the world. Manufacturing in Belgium, Canada, China, Czech Republic, Germany, Hungary, Italy, Mexico, Netherlands, United Kingdom, and United States.

Table 2. Model Selection.

Valve	Fitting	Body / Flow	Size	C _V	T / P	Trim	Enclosure	Actuator
VB = valve, ball								
F = Flanged								
2 = 2 way								
3 = 3 way								
			inch	S.I. metric				
			J	4	DN100			
			K	5	DN125			
			L	6	DN150			
			S					
			T					
			U					
			1					
			2					
			3					
			4					
			5					
			6					
			7					
					1 = ANSI Valve construction			
						S = Stainless Steel		
							O = no enclosure	
							R = NEMA 3R enclosure	
							X = no actuator	
							A = NSR, Floating	
							B = NSR, Modulating	
							C = SR, 2-Position, 24 Vac	
							D = SR, Floating/Modulating	

VB	F	2	A	B	1	S	O	A
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Application Notes

Required Operating Torque

Both Honeywell non-spring return and spring return direct coupled actuators can be utilized with the VBF2 and VBF3 valves. See Table 3, which lists the different torque actuator options. Larger torque actuators may be used, but there is no increase in close-off pressure rating.

Table 3. Close-off Pressure Ratings

Valve Size	Actuator Torque			
	88 in.-lb (10 Nm)	175 in.-lb (20 Nm)	175 in.-lb (20 Nm) 2-position	300 in.-lb (34 Nm)
	Close Off Pressure Rating (psid)			
4 in.	70	70	70	70
5 in.	70	70	70	70
6 in.			70	70

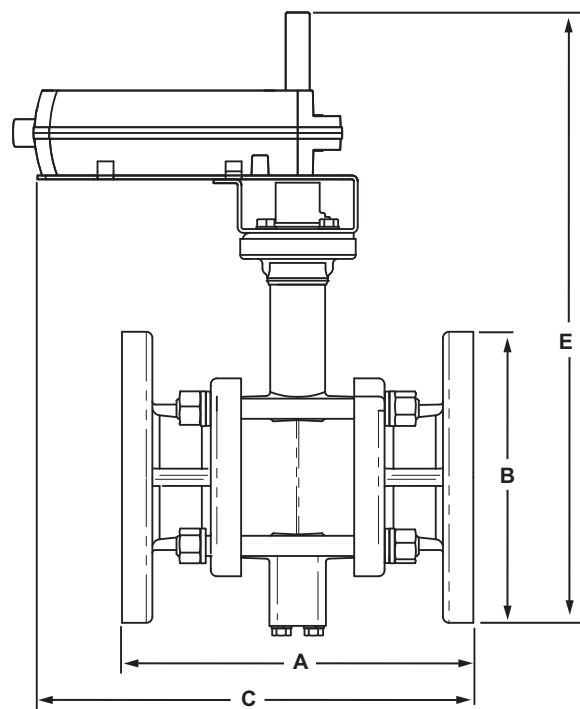
Flow Characteristics

VBF2 Two-Way Ball Valves have:

- an equal percentage flow characteristic.

VBF3 Three-Way Ball Valves have:

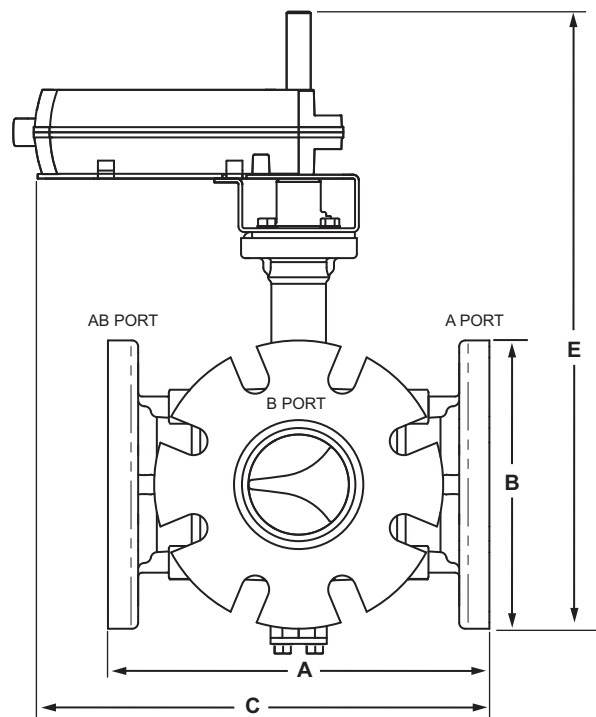
- between ports A and AB: an equal percentage flow characteristic.
- between ports B and AB: a linear flow characteristic.



Size (in.)	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D (depth) (not shown) in. (mm)	E in. (mm)	Wt. lb (kg)
4	VBF2J	11 (278)	9 (229)	13-1/4 (337)	9 (229)	18-3/4 (476)	65 (31)
5	VBF2K	12-3/8 (352)	10 (254)	14-1/4 (362)	10 (254)	19 (483)	75 (34)
6	VBF2L	13-7/8 (352)	11 (278)	15-1/8 (384)	11 (278)	19-7/8 (505)	90 (41)

M13732

Fig. 1. VBF2 dimensions in inches (millimeters).



Size (in.)	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D (depth) (not shown) in. (mm)	E in. (mm)	Wt. lb (kg)
4	VBF3J	11-7/8 (278)	9 (229)	14-1/8 (337)	10-3/8 (229)	18-1/2 (470)	75 (34)
5	VBF3K	13-7/8 (352)	10 (254)	15-1/8 (362)	12 (254)	19-3/8 (483)	90 (41)
6	VBF3L	15-7/8 (403)	11 (278)	16-1/8 (410)	13-3/8 (521)	20-1/2 (521)	105 (48)

M13733A

Fig. 2. VBF3 dimensions in inches (millimeters).

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

Safety

Honeywell assumes no responsibility for damages or injuries resulting from non-compliance with installation instructions or standard good practice when mounting, operating, or maintaining the valves, even if not explicitly mentioned in the installation instructions.



CAUTION

Equipment Damage Hazard.

Foreign particles like dirt and metal chips can damage the ball seals.

For trouble-free operation of the product, good installation practice must include initial system flushing, and chemical water treatment. Clean the lines upstream of particles larger than 1/16 inch diameter (welding slag, pipe scale, sand and other suspended particulate). Use of a 50 micron (or finer) system side stream filter is suggested. Remove all filters before flushing.

Do not use boiler additives, solder flux and wetted materials which are petroleum based or contain mineral oil, hydrocarbons, or ethylene glycol acetate. Compounds which can be used, with minimum 50% water dilution, are diethylene glycol, ethylene glycol, and propylene glycol (antifreeze solutions).

If installing these valves in an addition to, or retrofitting an existing building, do not assume that the fluid in the existing piping meets these criteria.

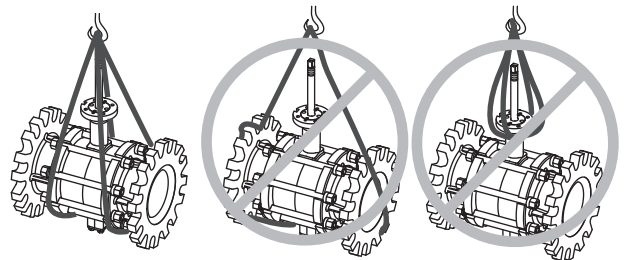
Valve Installation Location

Select a location where the valve and actuator will be accessible, once installed. Allow sufficient space for servicing the valve and actuator. Clearance for valve installation is dependent on actuator size and the valve pipe size. See Figures 1 and 2 for valve body dimensions. Refer to actuator literature for actuator dimensions.

1. Clean the lines upstream of the valve to remove particles larger than 1/16 inch diameter (welding slag, pipe scale and other contaminants). Upstream installation of a 20 mesh strainer is recommended.
2. Air should be eliminated from the system so the valves remain full of fluid during operation.
3. Straight sections of piping upstream and downstream of the valves are not necessary for proper operation. Reducing bushings or flanges may be attached directly to valves. Standard adapters are adequate for installation of flow control valves.
4. Proceed with installation once the system specifics (expansion/contraction of the system and its medium as well as operating pressures) are within tolerances.
5. Do not lift the valve by holding the stem.

Mounting Valve

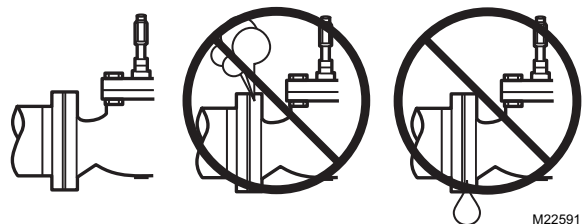
1. Before installing the valve, rotate the valve stem to make sure that the valve stem operates freely. Impaired stem operation can indicate that the stem was bent by rough handling. This condition can require replacing the valve.
2. Protect the stem from damage due to bending or scratching.
3. For horizontal piping, install the valve so the actuator is above the valve body. Install the valve in any position between vertical and horizontal. Do not install the valve with the stem below horizontal or upside down. For vertical piping, the actuator can be mounted in any orientation.
4. Hoist valve by its body only. Do not lift by stem, bonnet, flanges, or flange holes. (See Fig. 3 for proper hoisting method.)



M13752

Fig. 3. Proper hoisting of VBF Valves.

5. Mount the valve between aligned pipes. Mounting the valve on pipes that are not aligned causes leakage at the valve-to-pipe connection.



M22591

Fig. 4. Piping must prevent leakage.

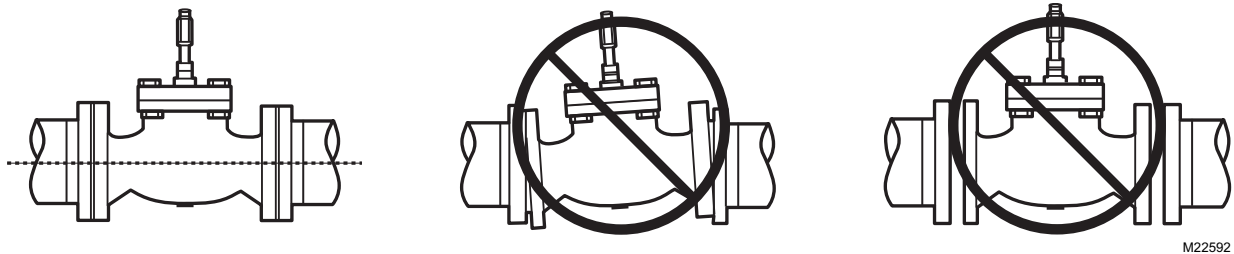


Fig. 5. Basic pipe orientation.

6. Iron valves are mechanically compatible with standard ANSI 150 lb flat-faced or raised-face steel flanges, or with 125 lb cast iron flanges.
7. Release system pressure and drain the valve pipe section so the medium (water or glycol solution) does not leak out of the valve body during installation.
8. Mount three-way valves as shown in Figure 9, according to whether they are to be used for mixing or diverting control. Note that 4 inch VBF3 valves with 327 C_V, 5 inch with 400 C_V, and 6 inch with 650 C_V must be used in mixing applications only.
9. Use a gasket material recommended for the medium to be handled (e.g., 1/16 inch thick ring type, filled asbestos gaskets). (Not supplied by Honeywell.)
10. Use mounting bolts long enough so the nuts can use the full length of the nut threads. Use four (4) 5/8 inch bolts to connect 4 inch valves to mating flanges in pipework; use six (6) 5/8 inch bolts for 5 and 6 inch valves.

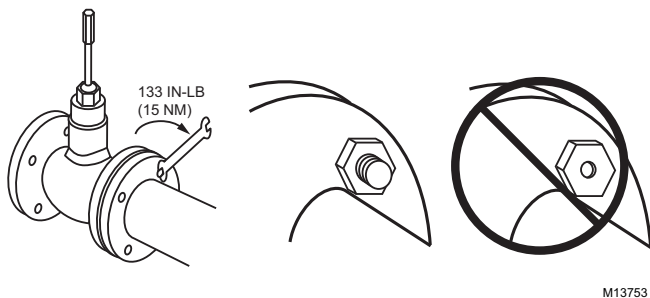


Fig. 6. Basic proper bolt length.

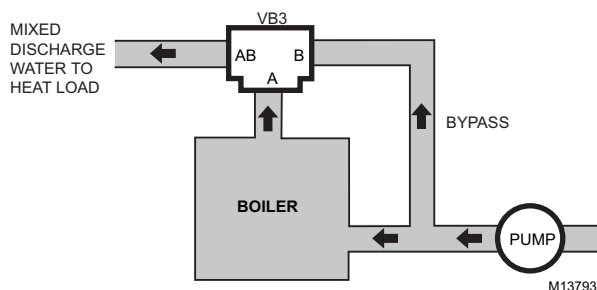


Fig. 7. Boiler bypass for reset control

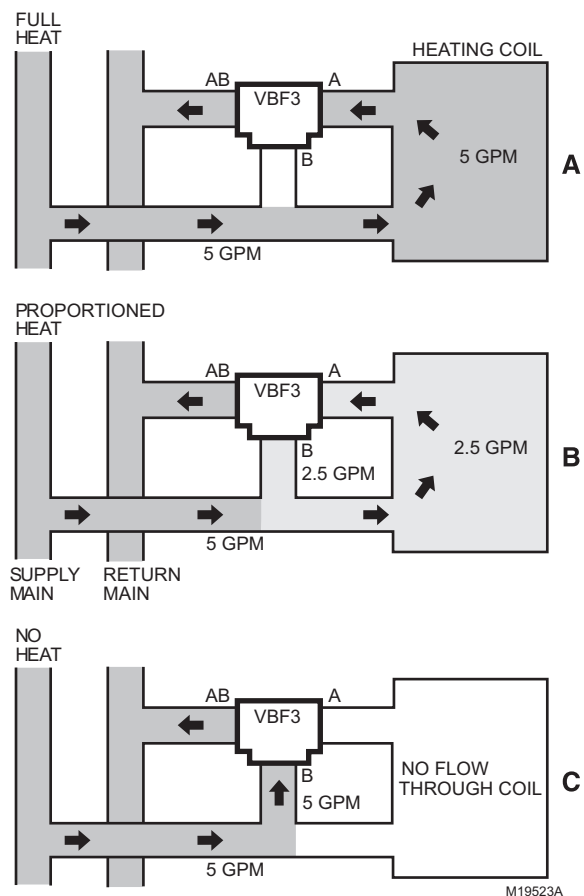


Fig. 8. Three-way mixing valve operation with coil bypass.

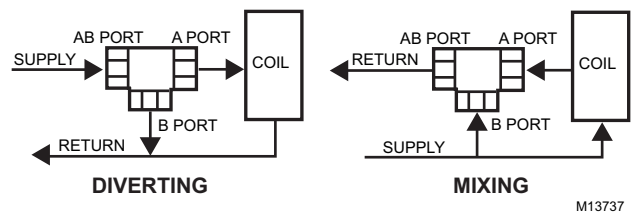
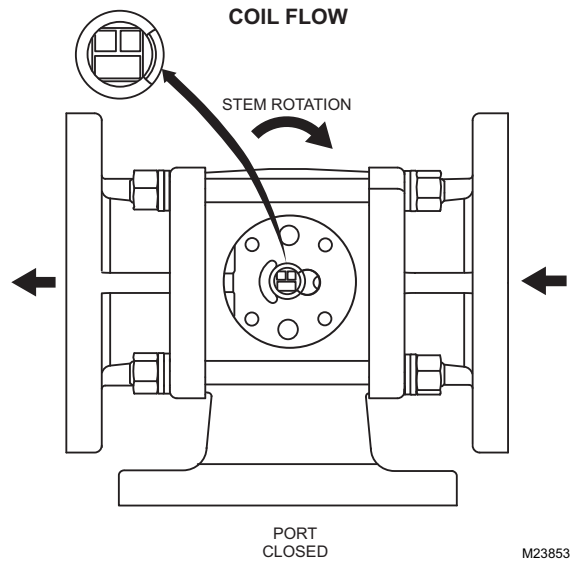
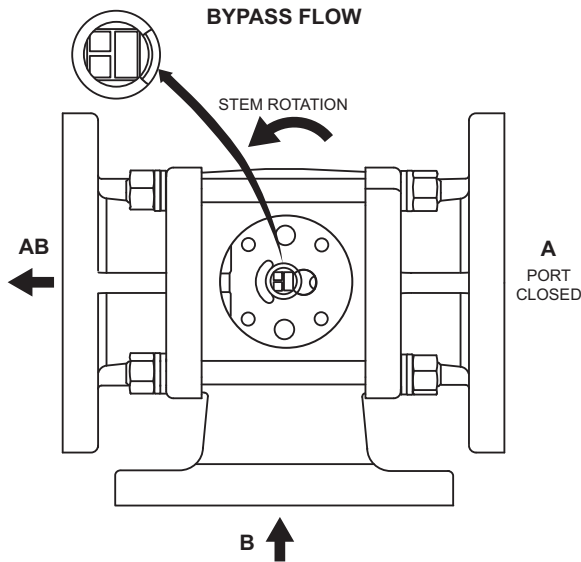


Fig. 9. Three-way ball valve flow orientation (not to scale).

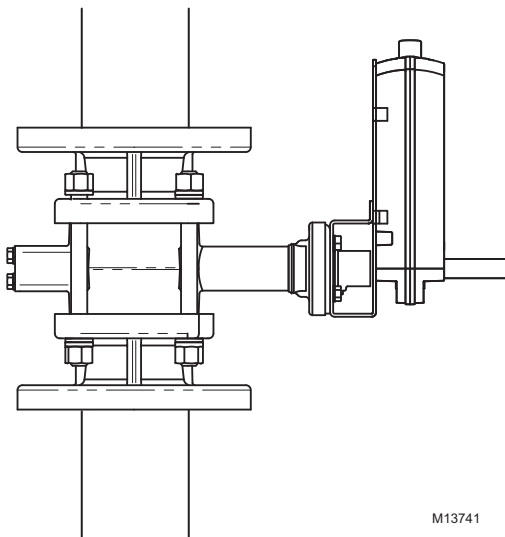
Stem rotation:

1. For two-way valves:
 - a. Rotate stem clockwise to open.
 - b. Rotate stem counter clockwise to close.
2. For three-way valves:
 - a. Rotate stem clockwise to increase A to AB flow.
 - b. Rotate stem counter clockwise to increase B to AB flow.



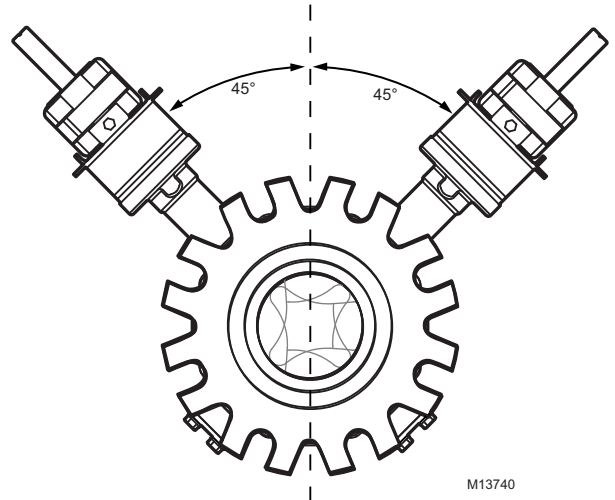
M23853

Fig. 10. Orientation of ball in valve



M13741

Fig. 11. Vertical Valve Installation



M13740

**Fig. 12. Acceptable valve angle from vertical
(when installed in horizontal piping)**

Mounting Actuator

For information on mounting, refer to the Product Data Sheet for the specific Honeywell actuator coupled to the valve. It is important to have the correct actuator available for the installation.

Checkout

For instructions for operating the valve actuator, see the specific actuator's Product Data Sheet. Operate the control system and check valve operation to determine that the valve stem positions the ball smoothly through its full stroke without binding.

Ensure that the actuator selected provides the force to position the valve ball. For electric spring-return actuators, the actuator provides normally closed or normally open operation on electric power or pressure failure, depending on the valve/actuator combination selected.

General

Spring return actuators return the valve to its normal position (open or closed, depending on the actuator and valve selected) in the event of a power failure. Non-spring return actuators hold the last commanded position.

Service Parts

See Figure 13 for diagram of replacement parts. The mounting plate for Honeywell direct coupled actuators is also available, 7981-200.

Table 4. Parts list for Flanged Valves

Two-way	4 in.	5 in.	6 in.
Seal	7981-910	7891-911	7981-912
Seal O-ring ¹	7981-914	7981-915	7981-916
Flange O-ring ¹	7978-65	7978-66	7978-68
Bottom Stem	7981-701	7981-701	7981-701

Three-way	4 in.	5 in.	6 in.
A and AB Port Seal	7981-911	7981-912	7981-913
Seal O-ring ²	7981-915	7981-916	7981-917
B Port Seal	7981-977	7981-978	7981-979
Flange O-ring ²	7978-66	7978-67	7978-69
Bottom Stem	7981-701	7981-701	7981-701

¹ For each 2 way valve, order two of each of these parts.
² For each 3 way valve, order two of each of these parts, but only one of the B port seals.

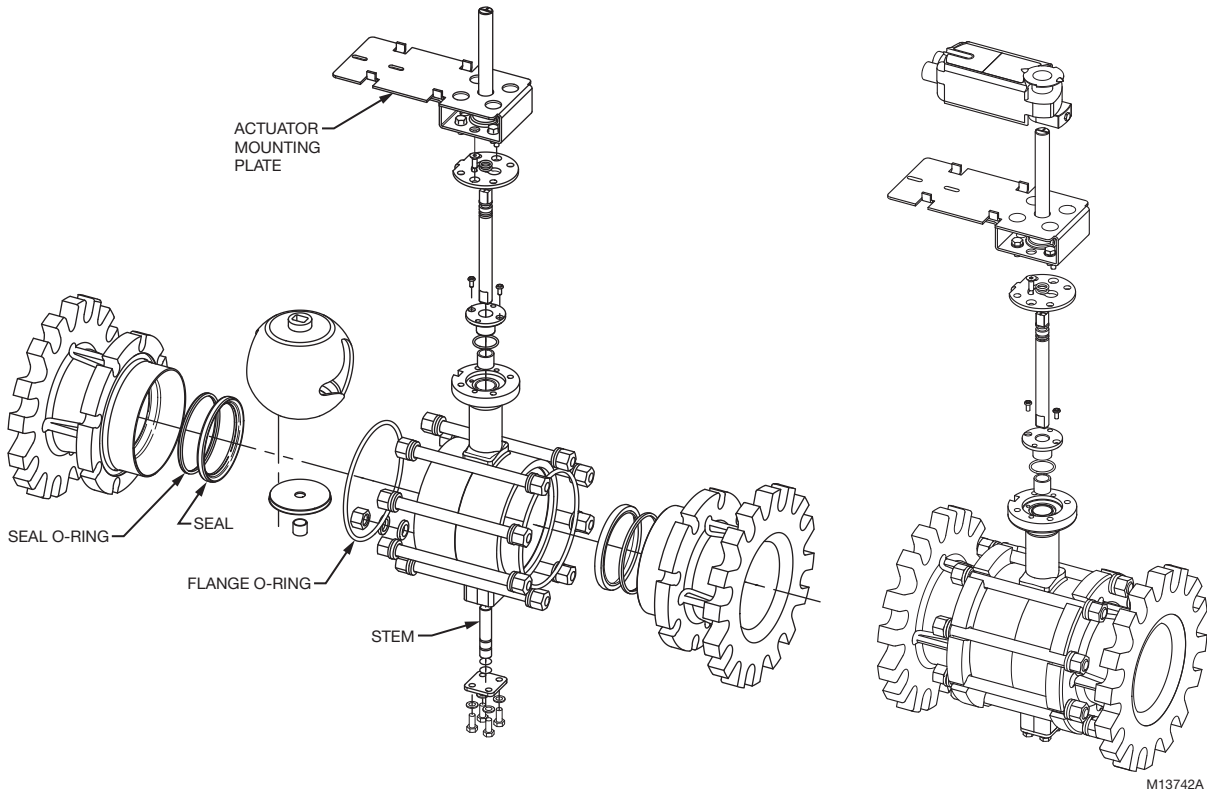


Fig. 13. Exploded view of flanged Ball Valve

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 four bolts and lock washers that hold the mounting plate to the valve stem housing and set them aside.
2. Rotate mounting plate around valve top to the desired position.

NOTE: There are four positions possible (increments of 90 degrees from each other) for the mounting plate position

3. Once the mounting plate is in the desired position, re-insert the bolts through the lock washers and into the four bolt holes in the valve stem housing.
4. Tighten bolts to the valve body securing the mounting plate.

See Fig. 14 for valve exploded view.

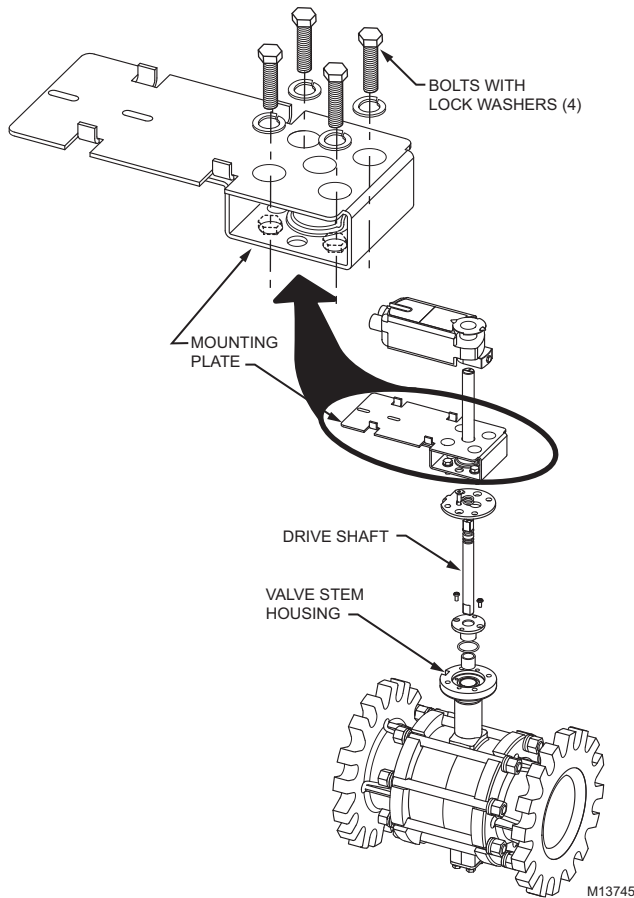


Fig. 14. Mounting Plate Adjustment Bolts

Electrical Installation

1. If necessary, remove actuator wiring cover.
2. Wire actuator using Figures 15 through 23 for the application required.
3. Replace cover.

The following wiring instructions are provided as a convenience to the installing contractor. For more detailed information about these actuators, refer to the Product Data sheets for the corresponding Honeywell actuator as follows:

Literature #	Actuator Model and Literature Type
63-2632	MN6110, MN7510 (Product Data)
63-2588	MN6134, MN7234 (Product Data)
63-2607	MS7510, MS7520, MS8110, MS8120 (Product Data)

Wiring

VALVES WITH NON-SPRING RETURN ACTUATORS (MN6110A, MN6134A, MN7234A, MN7510A)

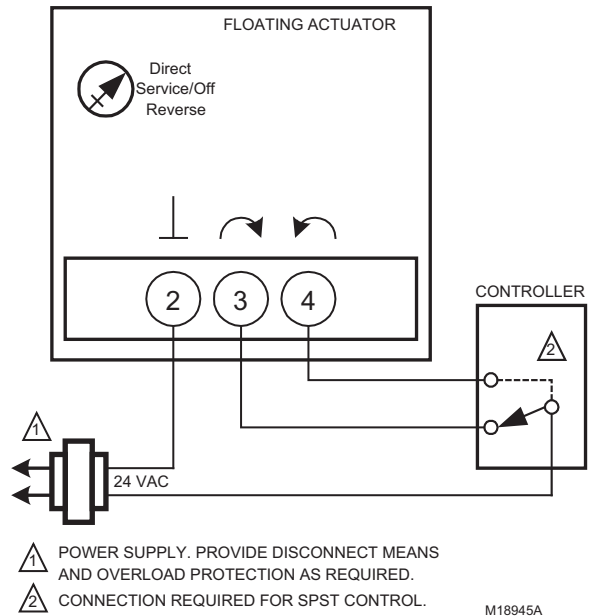


Fig. 15. Wiring for On/Off Control

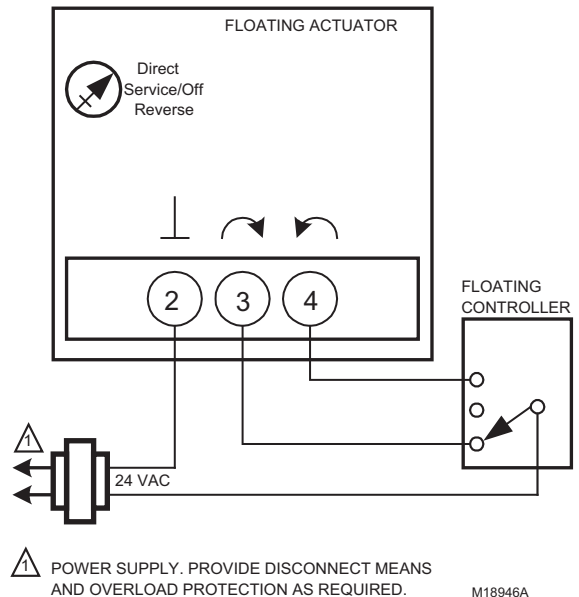
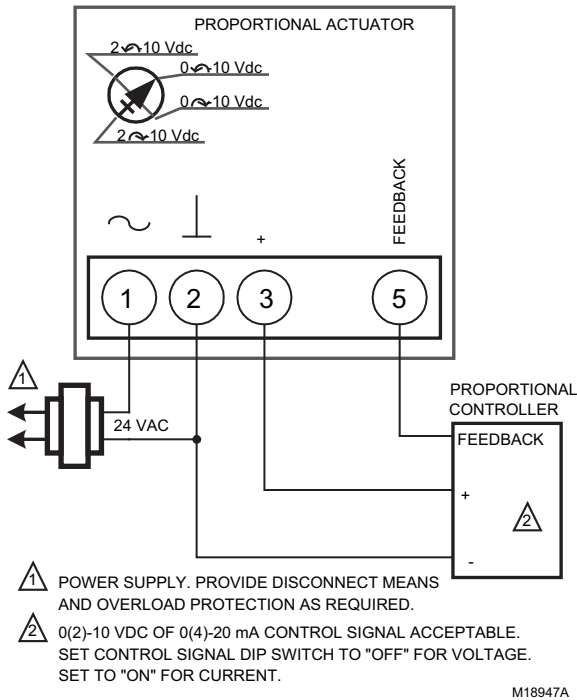
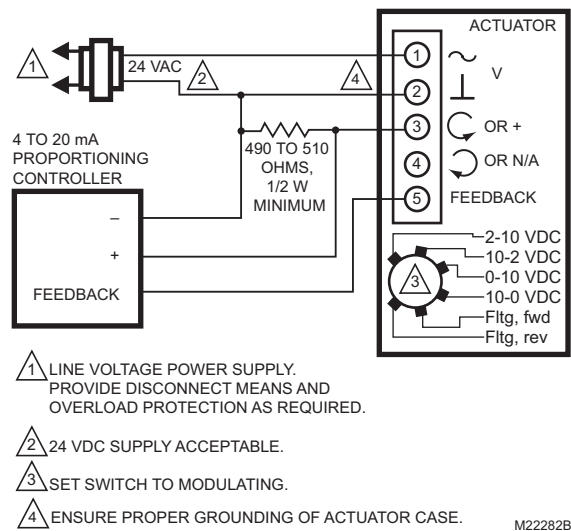
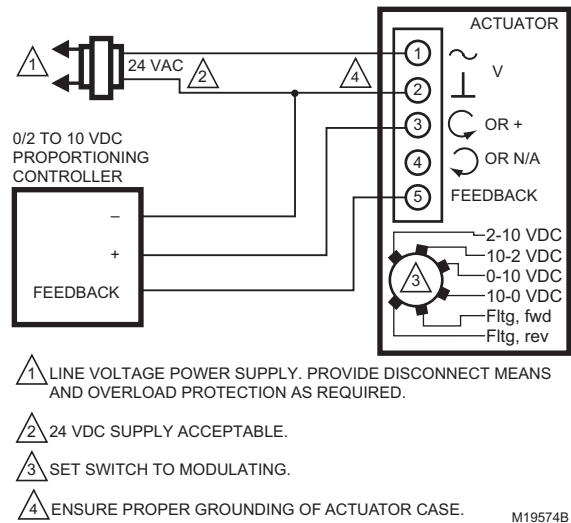
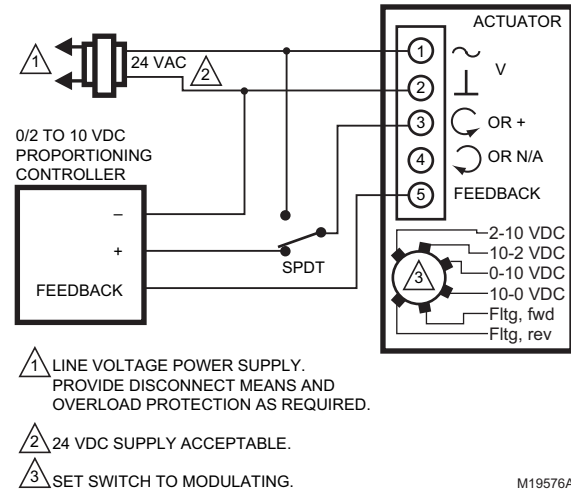
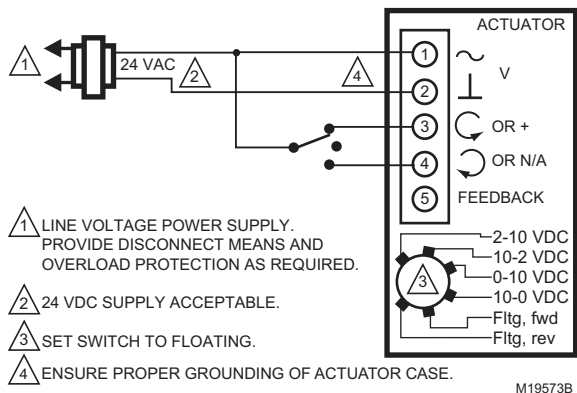
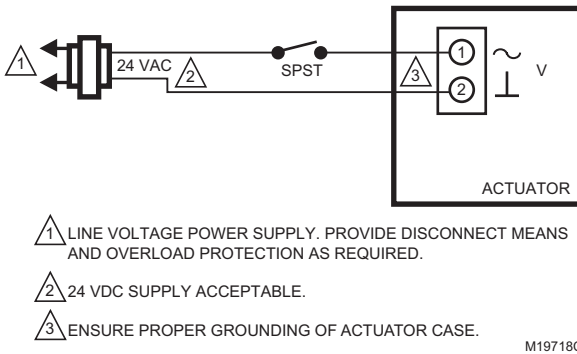


Fig. 16. Wiring for Floating Control



**VALVES WITH SPRING RETURN ACTUATORS
(MS7510A, MS7520A, MS8110A, MS8120A)**



**Fig. 21. Wiring for Proportioning Controllers
(Modulating mode setting)**

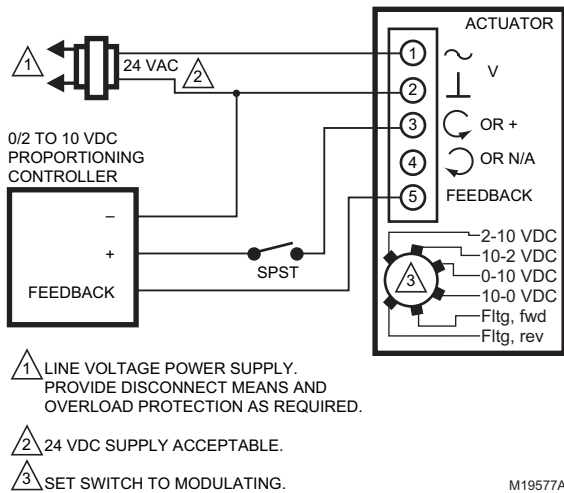


Fig. 22. Override to full closed (Modulating mode setting)

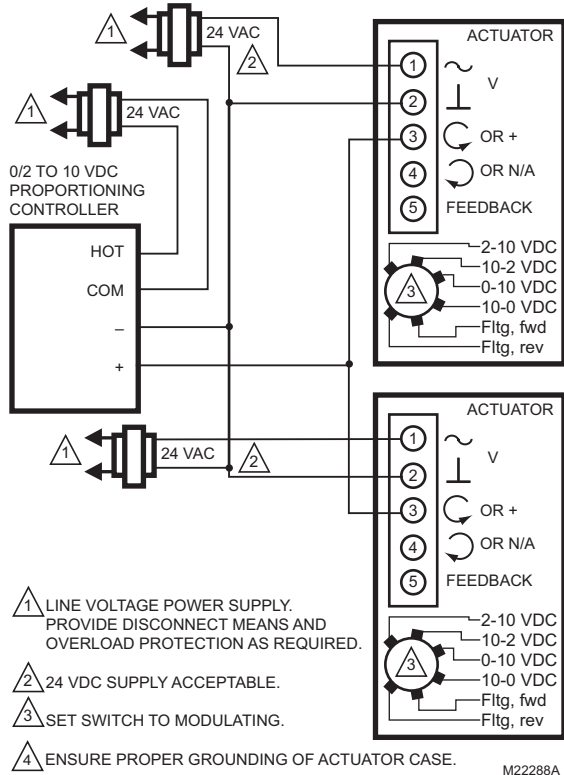


Fig. 23. Wiring for Proportioning controllers operating multiple actuators (Modulating mode setting)

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, remove and reinstall the actuator in the opposite orientation as follows:
 - a. Loosen the shaft coupling bolt using a 10 mm wrench.
 - b. Loosen all other mounting bolts connecting the actuator to the mounting bracket, and set aside.
 - c. Remove the actuator from the valve shaft.
 - d. Move the actuator coupling to the opposite side of the actuator, as displayed in Figure 24.

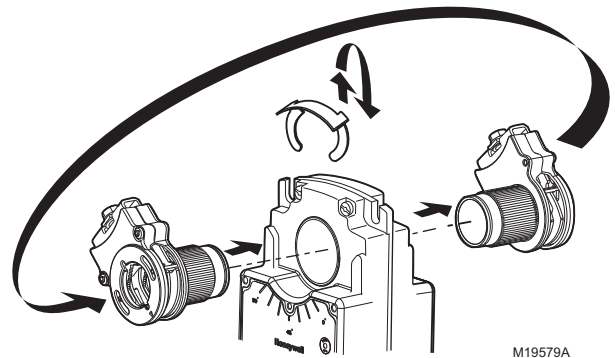


Fig. 24. Mounting shaft coupling to actuator opposite side.

- a. Remove the retainer clip from the shaft coupling and set it aside for later use.
- b. Remove shaft coupling from one side of the actuator.
- c. Replace the shaft coupling on the opposite side of the actuator, aligning it based on the stroke labelling.
- d. Replace the retainer clip on the shaft coupling using the groove of the coupling.
- e. Reconnect the actuator to the valve mounting bracket by replacing the screws previously removed (step b)
- f. Tighten the shaft coupling bolt using a 10 mm wrench.

For detailed actuator information, see Honeywell literature:

- 63 2632—MN6110, MN7510 Product Data
- 63-2588—MN6134, MN7234 Product Data
- 63-2607—MS7510, MS7520, MS8110, MS8120 Product Data

TYPICAL SPECIFICATIONS

Actuated Ball Valve

Valve housing shall consist of cast iron, rated at no less than 240 psi at 250°F. Valve housing shall have ANSI Class 125 flanges. Valve ball shall consist of stainless steel with parabolic ports to make flow control equal percentage. Valve shall have a blow-out proof stem with two EPDM O-Rings. Valve shall have EPDM O-Rings behind ball seals to allow for a close-off pressure of 70 psi with 88 in.-lbs of torque for 4 and 5 inch valves. Six inch valves shall require actuators with 140 in.-lbs of torque for flow rates under 700 gpm. Valve shall be available with a minimum of 5 unique C_v values for each size. 3-Way Valve: Bypass C_v shall be 80% of Through C_v .

Valve Actuator

Control valve actuator shall accept analog modulating 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 location.

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