Honeywell

VBF5011, VBF5013 Control Ball Valves With Flanged Connections

INSTALLATION INSTRUCTIONS

APPLICATION

The VBF5011 Two-Way and the VBF5013 Three-Way Control Ball Valve 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 valves can be used with Honeywell electronic actuators.

Application Notes

IMPORTANT

Valve sizing is important for correct system operation. Undersized valves do not have sufficient capacity at maximum load. Oversized valves do not have sufficient authority over the load in modulating applications. Oversized valves can cause excessive cycling and the seat and ball can be damaged because of the restricted opening.

Proper Use

These valves are only for use in cold, warm, and hot water systems. Not suitable for oil or combustible gases. For water application, they are designed for a medium temperature range from -22 to 250°F, at a maximum pressure of 360 psi for 2-1/2" & 3" valves and 240 psi for 4", 5", & 6" valves. The valves are to be operated with the appropriate Honeywell electronic actuators only. Water should be properly filtered, treated and conditioned according to local conditions and the recommendations of the boiler or chiller manufacturers. The installation of strainers and filters is recommended.

IMPORTANT

The presence of excessive iron oxide (red rust) in the system voids the valve warranty.

Required Torque

Honeywell electronic actuators can be utilized with the VBF5011 and VBF5013 valves. See Table 1, which lists the torque requirement for each valve size. See Table 2, which lists the close-off pressure rating for the valves with the different torque actuators. Larger torque actuators may be used, but there is no increase in close-off pressure rating.

Table 1. Torque Requirement

Type	Size	Torque Requirement (in-lbs)
2-way	2 1/2”	35
	3”	35
	4”	85
	5”	85
	6” *	140
3-way	2 1/2”	35
	3”	85
	4”	85
	5”	85
	6” *	140

*6" requires 140 in-lb actuator for flows up to 700 gpm. For flow rates greater than 700 gpm a 200 in-lb actuator is recommended.

Table 2. Close-off Pressure Rating

Valve Type	Valve Size	Actuator Type				
		35 lb-in (4 Nm)	88 lb-in (10 Nm)	175 lb-in (20 Nm)	175 lb-in (20 Nm) 2-position	300 lb-in (34 Nm)
		Close-off pressure rating (psi)				
2-way	2-1/2”, 3”	100				
3-way	2-1/2”	40				
3-way	3”		70	70	70	70
2-way, 3-way	4”		70	70	70	70
2-way, 3-way	5”		70	70	70	70
2-way, 3-way	6”				70	70

Flow Characteristics

VBF5011 Two-Way Control Ball Valves have:

- an equal percentage flow characteristic.

VBF5013 Three-Way Control Ball Valves have:

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

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

The valves are to be installed by skilled personnel and in strict accordance with the installation instructions and local regulations. 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. Observe all safety practices.

⚠ 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 20 mesh 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.

IMPORTANT:

1. *Hold valve with pipe wrench by hexagonal fitting ONLY. Do NOT handle the valve body with the pipe wrench; product damage may result.*
2. *Clean the lines upstream of particles larger than 1/16 in. diameter (welding slag, pipe scale and other contaminants).*
3. *Proceed with installation once the system specifics (expansion/contraction of the system and its medium as well as operating pressures) are within tolerances.*
4. *Eliminate air from system.*
5. *All the valves are marked to show proper direction.*
6. *Flow arrows must point in the direction of the flow for proper operation. If the valves are not installed in the correct orientation, improper flow or possible system damage could occur.*

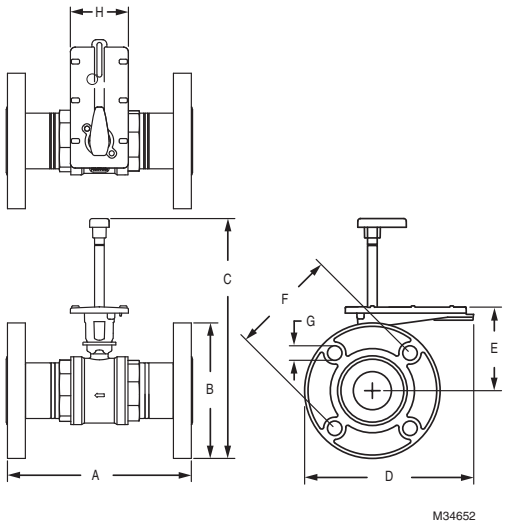


Fig. 1. 2-way 2-1/2" & 3" valve dimensions

Table 3. 2-way 2-1/2" & 3" valve dimensions

Size in.	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)
2-1/2	VBF5011A1734/U	9-1/2 (241)	7 (178)	12-3/8 (314)	8-3/4 (222)	4-5/16 (110)	5-1/2 (140)	3/4 (19)	3 (76)
3	VBF5011A1767/U	11 (279)	7-1/2 (191)	12-5/8 (321)	9 (229)		6 (152)		

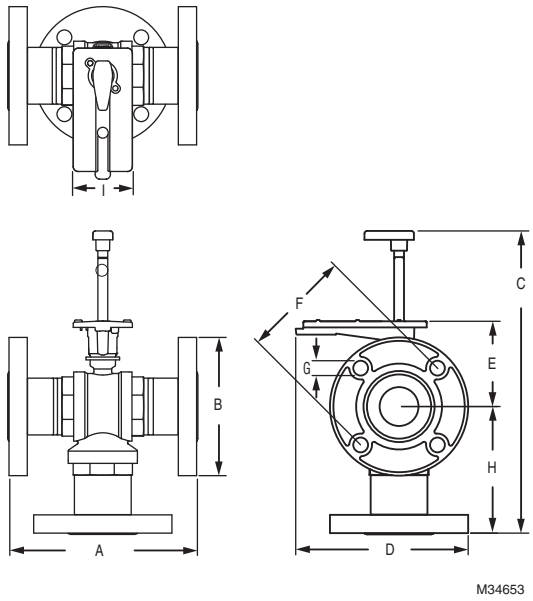


Fig. 2. 3-way 2-1/2" valve dimensions

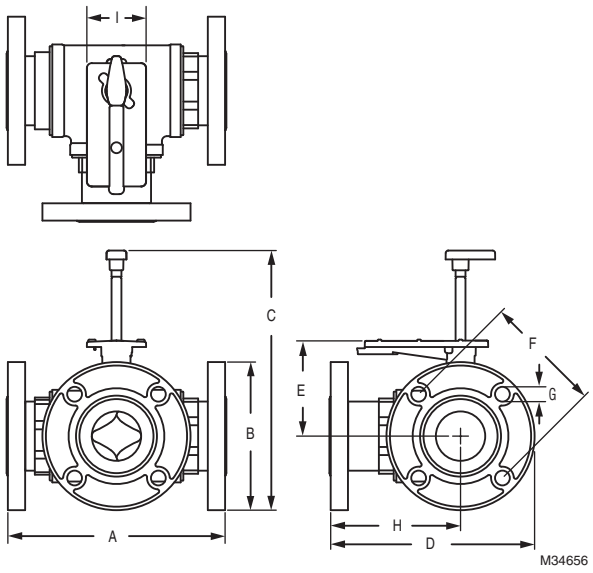


Fig. 3. 3-way 3" valve dimensions

Table 4. 3-way 2-1/2" & 3" valve dimensions

Size in.	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	I in. (mm)
2-1/2	VBF5013B1003/U	9-1/2 (241)	7 (178)	15-5/16 (389)	8-3/4 (222)	4-5/16 (110)	5-1/2 (140)	3/4 (19)	6-7/16 (164)	3 (76)
3	VBF5013B1011/U	11 (279)	7-1/2 (191)	13-1/8 (333)	10-5/16 (262)	4-13/16 (122)	6 (152)		6-5/8 (168)	

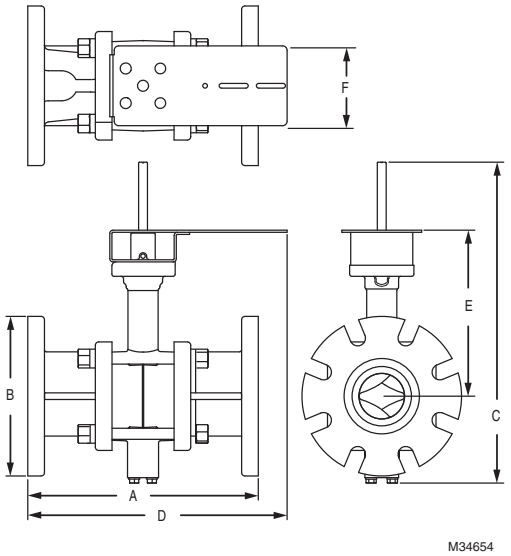


Fig. 4. 2-way 4", 5" & 6" valve dimensions

Table 5. 2-way 4", 5" & 6" valve dimensions

Size in.	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)
4	VBF5011A1858/U	13 (330)	9 (229)	18-1/8 (460)	14-5/8 (371)	9-3/8 (238)	4-1/2 (114)
5	VBF5011A1882/U	15 (381)	10 (254)	18-13/16 (478)	15-5/8 (397)	9-11/16 (246)	
6	VBF5011A1916/U	16-1/2 (419)	11 (279)	19-11/16 (500)	16 3/8 (416)	10-1/8 (257)	

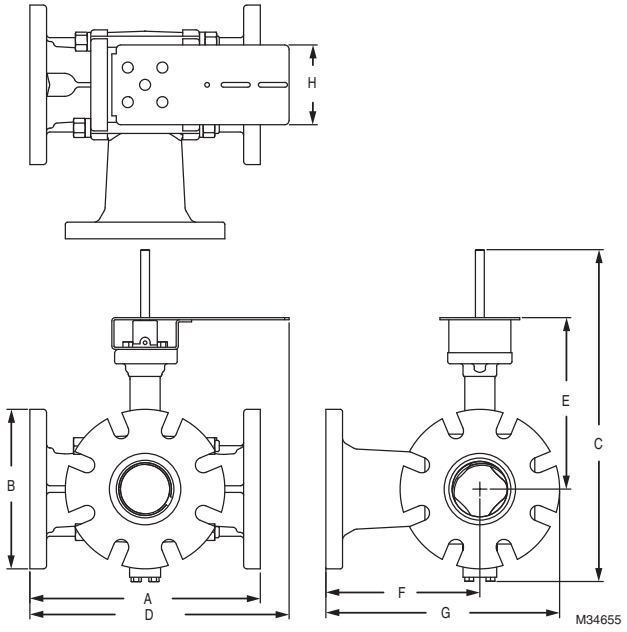


Fig. 5. 3-way 4", 5" & 6" valve dimensions

Table 6. 3-way 4", 5" & 6" valve dimensions

Size in.	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)
4	VBF5013B1029/U	13 (330)	9 (229)	1- 13/16 (478)	14-5/8 (371)	9-11/16 (246)	8-11/16 (221)	1- 3/16 (335)	4-1/2 (114)
5	VBF5013B1037/U	15 (381)	10 (254)	19-11/16 (500)	15-5/8 (397)	10-1/16 (256)	9-5/8 (244)	14-5/8 (371)	
6	VBF5013B1045/U	16-1/2 (419)	11 (279)	20-3/4 (527)	16-3/8 (416)	10-11/16 (271)	10-11/16 (271)	16-3/16 (411)	

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 5 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.

⚠ WARNING

Severe Burn Hazard.
Contact with hot liquid can lead to severe injury or cause death. Release system pressure and isolate or drain the valve pipe section so the medium (water or glycol solution) does not leak out of the valve body during installation (see Fig. 7).

⚠ CAUTION

Electrical Shock or Equipment Damage Hazard. Can shock individuals or short equipment circuitry.
Disconnect power supply to the actuator to prevent electrical shock and equipment damage, or remove and cap the air line to the actuator.

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. 6 for proper hoisting method.)

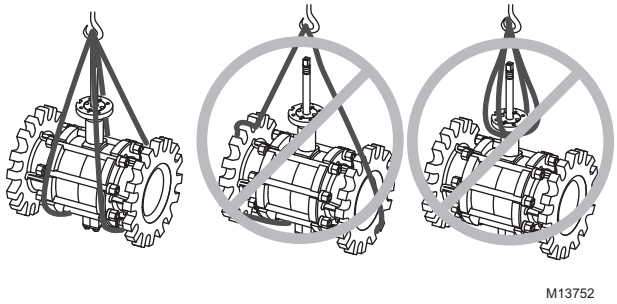


Fig. 6. Proper hoisting of VBF Valves

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

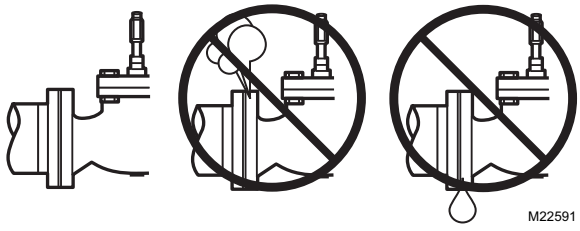


Fig. 7. Piping must prevent leakage

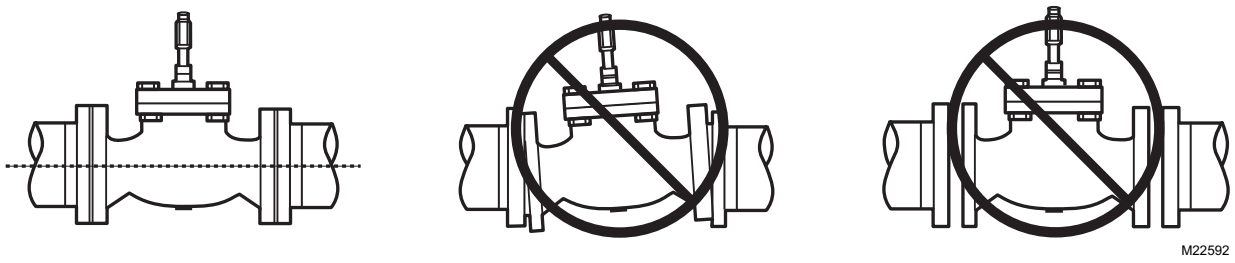


Fig. 8. Basic pipe orientation

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 Fig. 13, according to whether they are to be used for mixing or diverting control.
9. Use a gasket material recommended for the medium to be handled.
10. Use mounting bolts long enough so the nuts can use the full length of the nut threads. Use four bolts to connect 2-1/2" & 3" valves and use eight bolts to connect 4", 5", & 6" valves. Use bolts 1/8" smaller than the diameter of the bolt hole to allow clearance for installing.

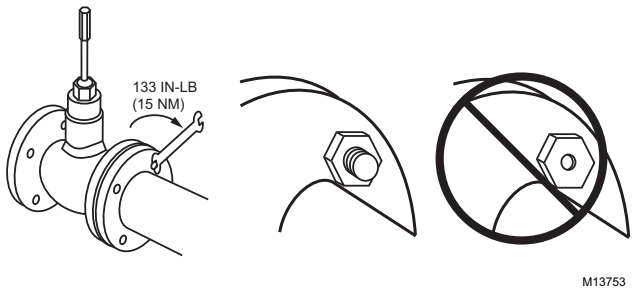


Fig. 9. Basic proper bolt length

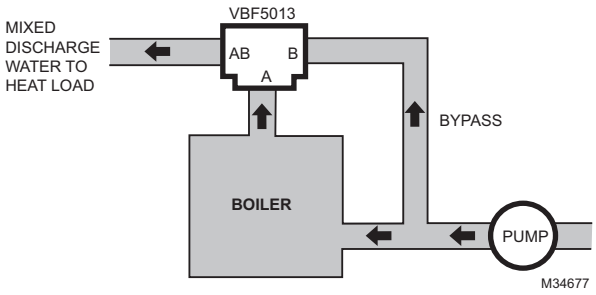


Fig. 10. Boiler bypass for reset control

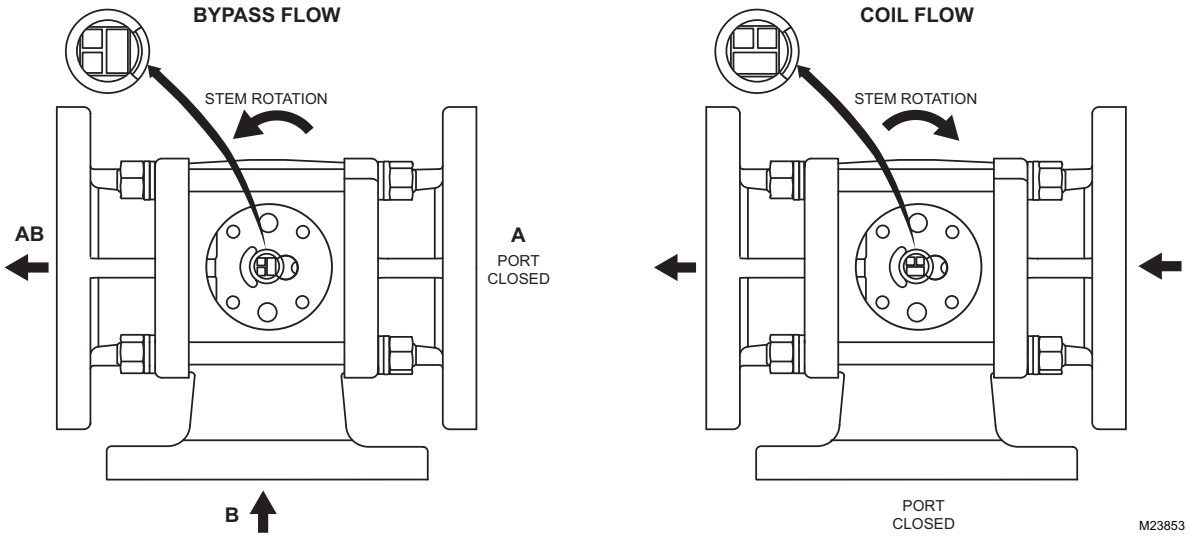


Fig. 11. Stem Rotation

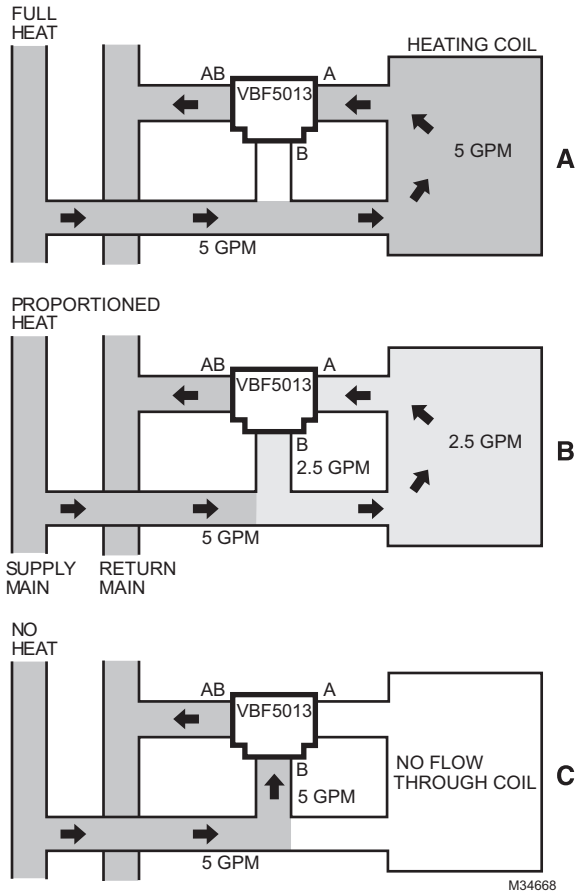


Fig. 12. Three-way mixing valve operation with coil bypass

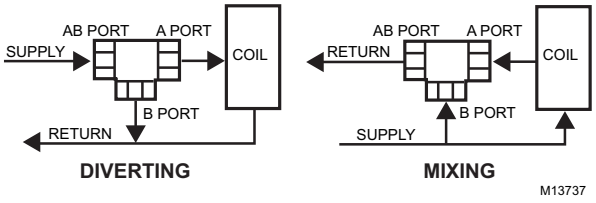


Fig. 13. Three-way control ball valve flow orientation (not to scale)

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.

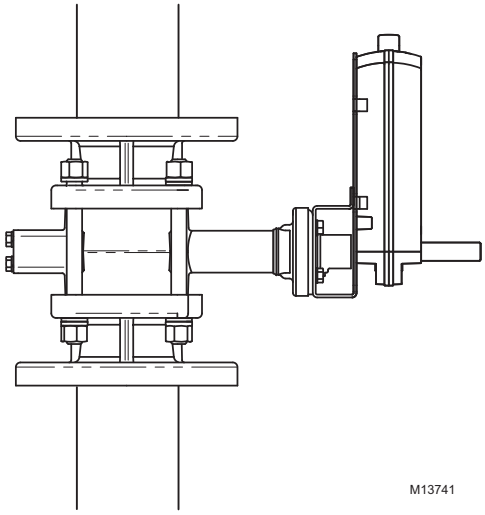


Fig. 14. Vertical Valve Installation

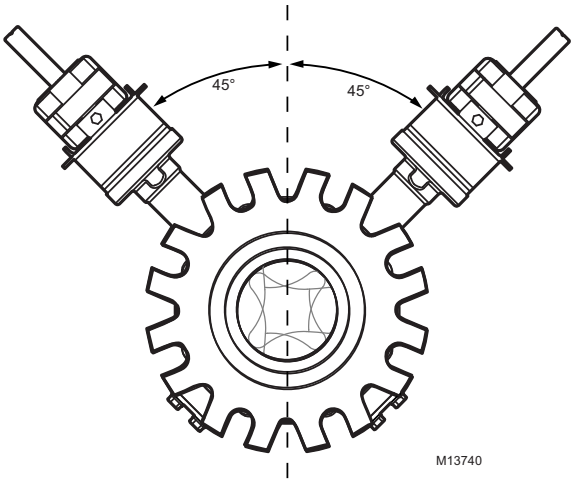


Fig. 15. Acceptable valve angle from vertical (when installed in horizontal piping)

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.Check valve body and connections for leaks. After installing linkage and actuator, check the operation according to installation information provided with these controls. Operate the system through one complete cycle to be sure the valve controls properly.

Ensure that the actuator selected provides the force to position the valve ball. For 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

For 2-1/2" & 3", see Fig. 16 for exploded view.

For 4", 5", & 6", see Table 7 and Fig. 17 for diagram of replacement parts.

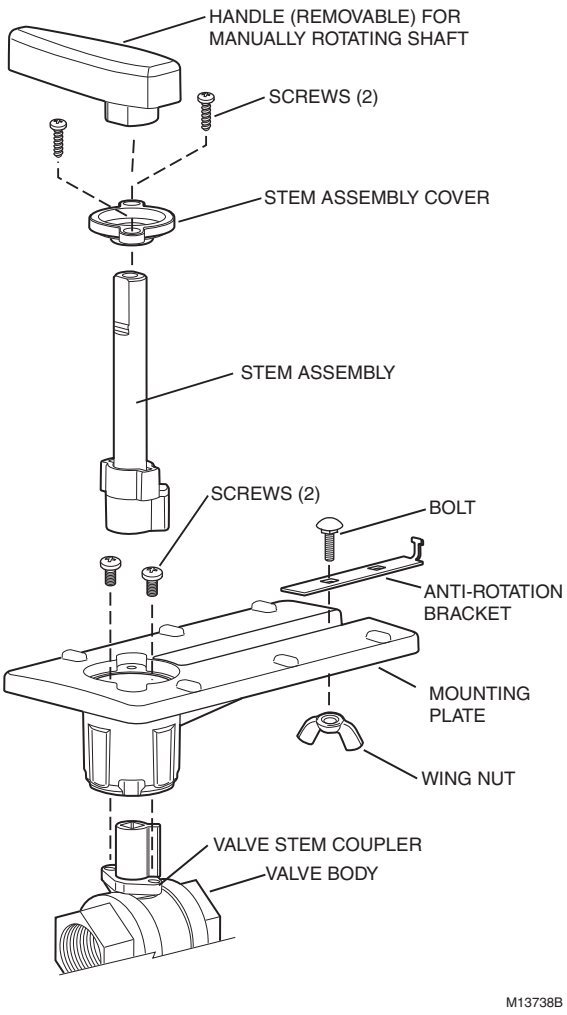


Fig. 16. Valve assembly, exploded view

Table 7. Parts list for Flanged Valves

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

Three-way	4 in.	5 in.	6 in.
Seal	7981-911	7981-912	7981-913
Seal O-ring	7981-915	7981-916	7981-917
Flange O-ring	7978-66	7978-67	7978-69
Bottom Stem	7981-701	7981-701	7981-701

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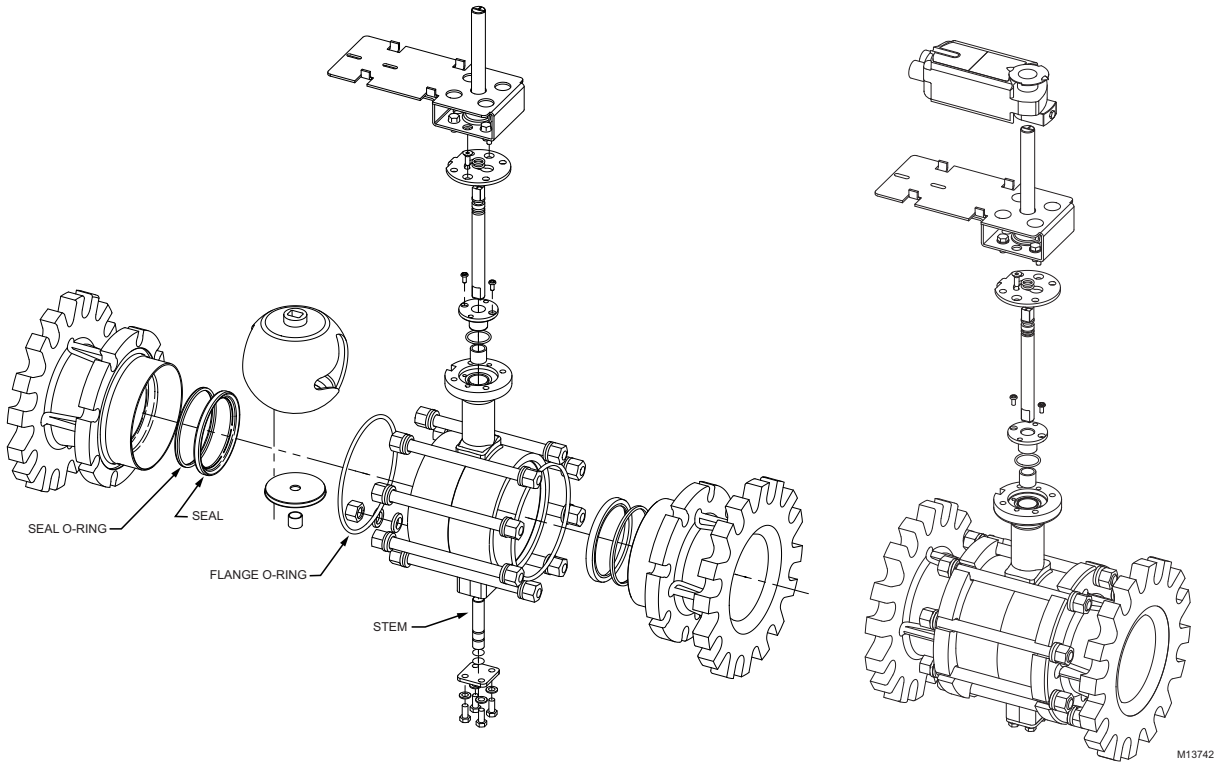


Fig. 17. Exploded View of Flanged Ball Valve

Mounting Plate Adjustment

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

For 2-1/2" and 3":

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. 16 for valve exploded view.

For 4", 5", and 6":

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. 18 for location of mounting bolts.

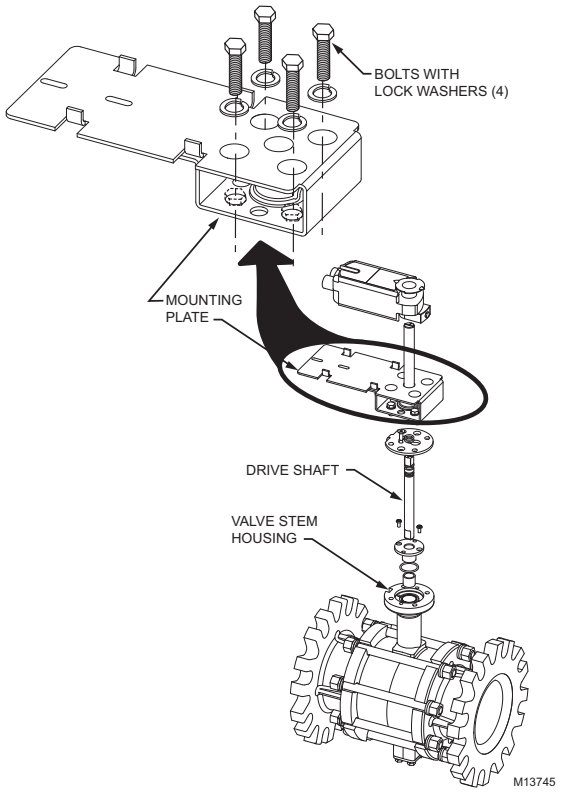


Fig. 18. Mounting Plate Adjustment Bolts

Electrical Installation

Pipe Size		
2-1/2" & 3"	**4" & 5"**	**6"**
MN6105A1011	MN6110A1003	MN6134A1003
MN7505A2001	MN7510A2001	MN7234A2008
MS8105A1030	MS8110A1008	MS8120A1007
MS7505A2030	MS7510A2008	MS7520A2007*

* 2-position only

1. If necessary, remove actuator wiring cover.
2. Wire actuator using Figures 28 through 37 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 MN6105, MN6110, MN7505, MN7510 Floating Actuator (Product Data)
63-2588 MN6120, MN6134 (Product Data)
63-2587 MN7220, MN7234 (Product Data)
63-2607 MS7510, MS7520, MS8110, MS8120 (Product Data)
63-2633 MN6105, MN7505 Modulating Actuator (Product Data)

The 2-1/2" and 3" valves will be shipped with 2 anti-rotation clips. Please use narrow clip for MN6105 and MN7505 actuators and use wide clip for MS8105 and MS7505.

The 4" and 5" valves will be shipped with 2 sets of anti-rotation components. Please use short bolt for MN6110 and MN7510 actuators and use long bolt for MS8110 and MS7510.

The 6" valves will be shipped with 2 sets of anti-rotation components. Please use short bolt for MN6134 and MN7234 actuators and use long bolt for MS8120 and MS7520.

Wiring

VALVES WITH NON-SPRING RETURN ACTUATORS (MN6105, MN7505)

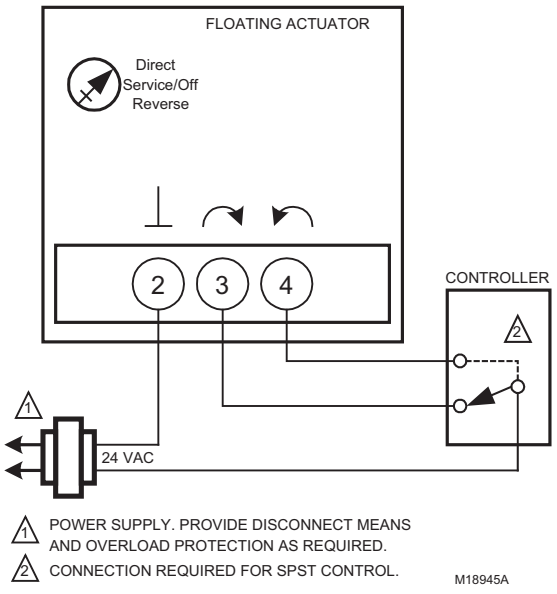


Fig. 19. Wiring for On/Off Control

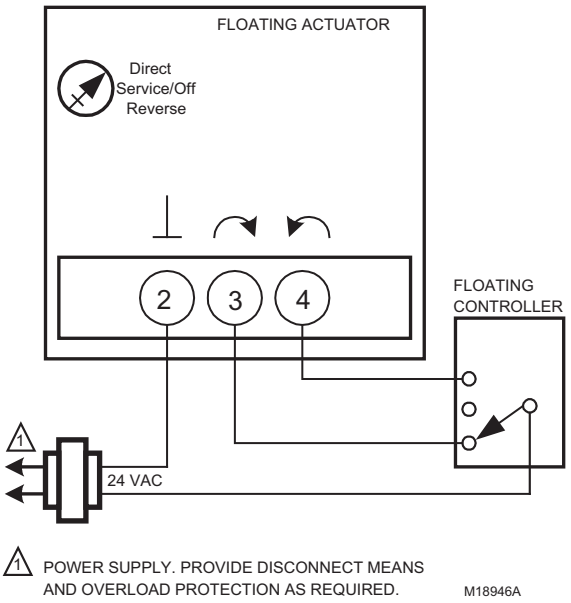


Fig. 20. Wiring for Floating Control

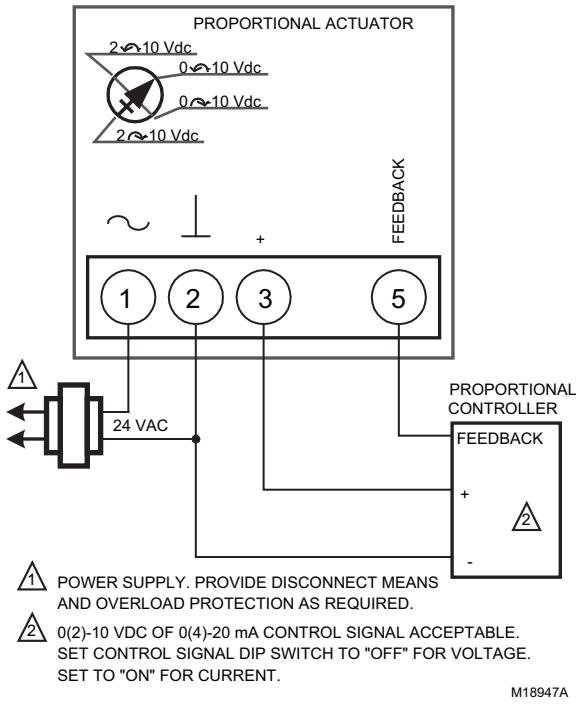


Fig. 21. Wiring for Modulating Control

VALVES WITH SPRING RETURN ACTUATORS (MS7505, MS8105)

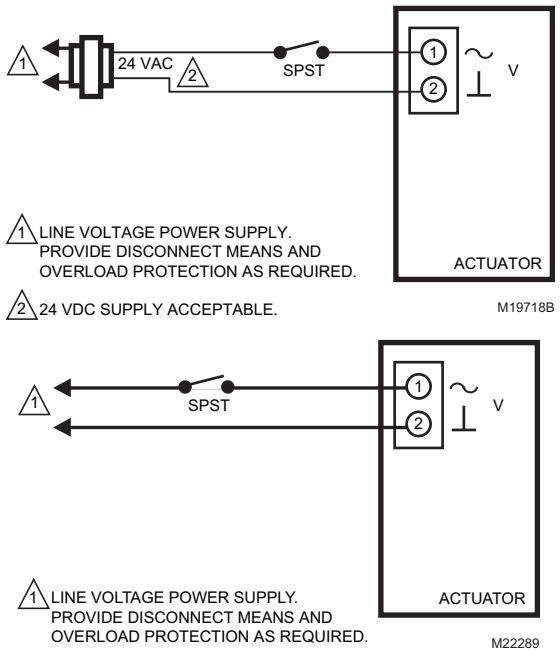


Fig. 22. Wiring for On/Off Control

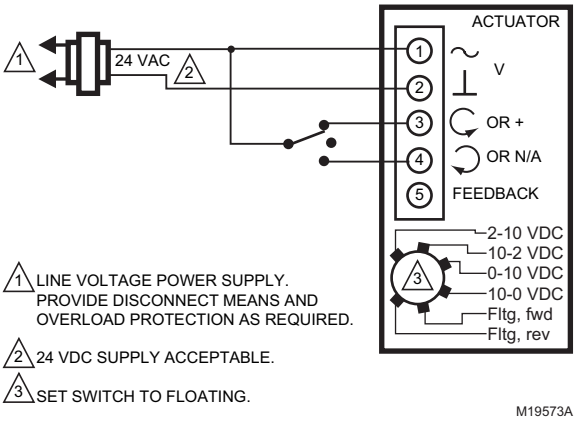


Fig. 23. Wiring for Floating Control (Floating mode setting)

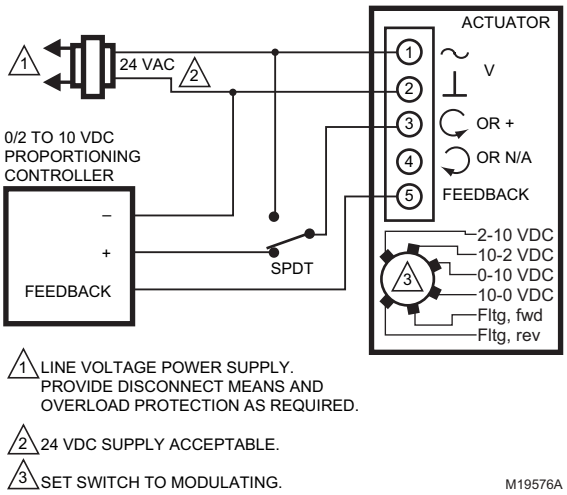


Fig. 24. Override to full open (Modulating mode setting)

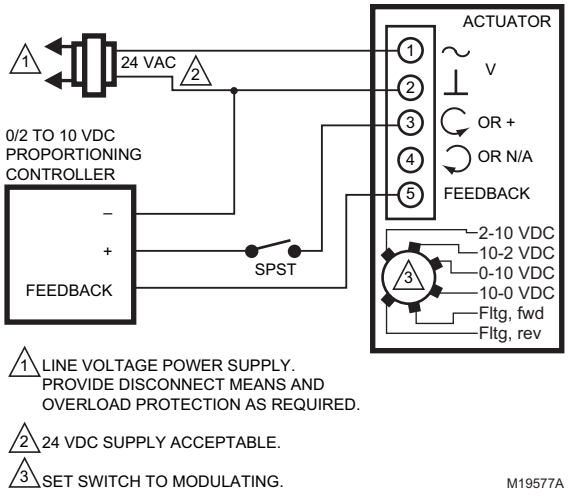
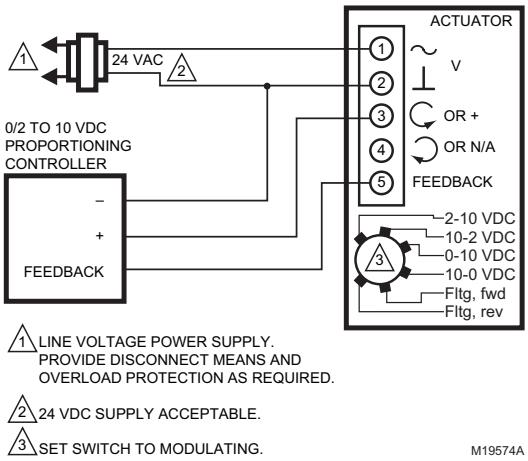


Fig. 25. Override to full closed (Modulating mode setting)



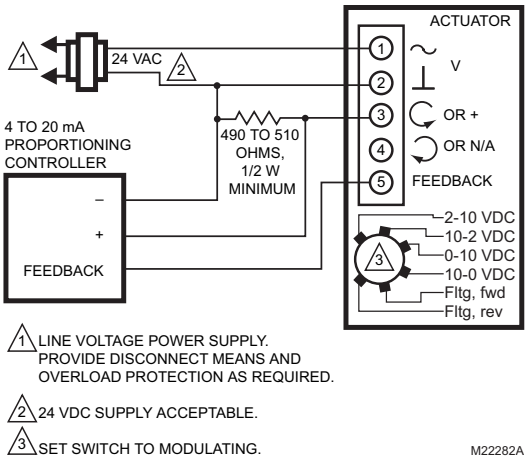


Fig. 26. Wiring for Proportioning Controllers (Modulating mode setting)

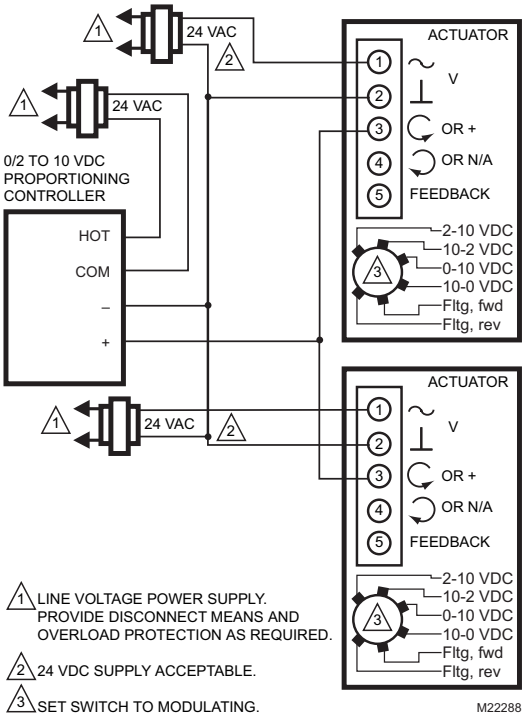


Fig. 27. Wiring for Proportioning controllers operating multiple actuators (Modulating mode setting)

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

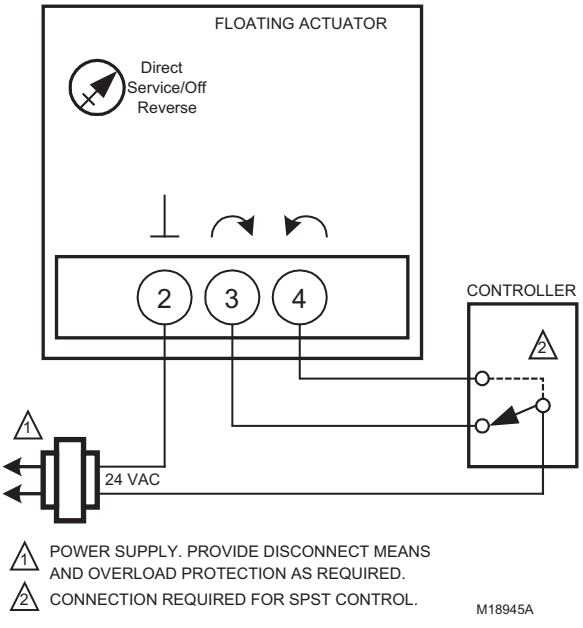


Fig. 28. Wiring for On/Off Control

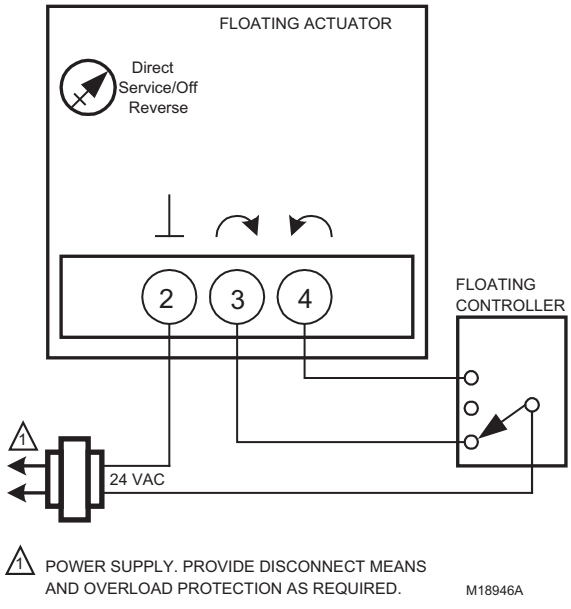


Fig. 29. Wiring for Floating Control

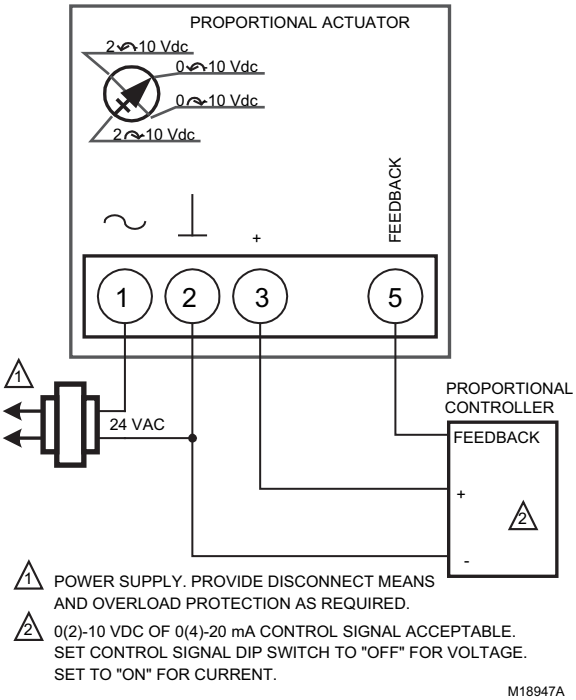


Fig. 30. Wiring for Modulating Control

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

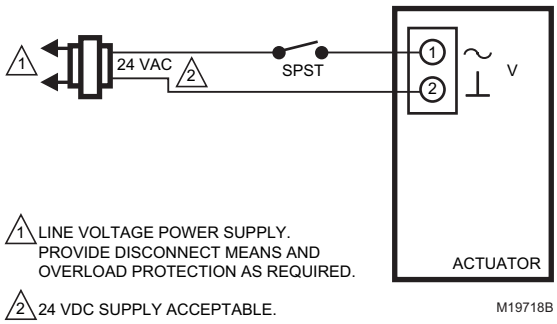


Fig. 31. Wiring for On/Off Control

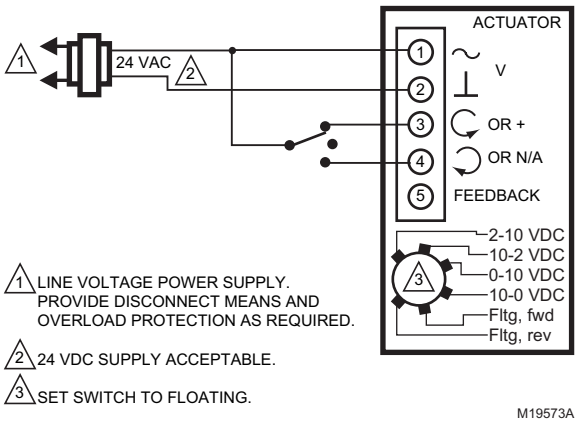


Fig. 32. Wiring for Floating Control (Floating mode setting)

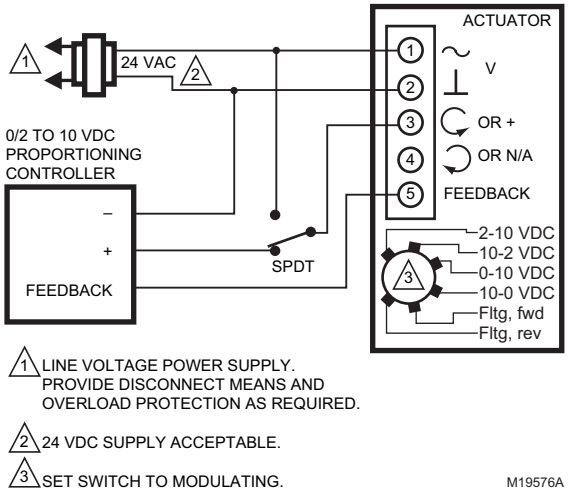


Fig. 33. Override to full open (Modulating mode setting)

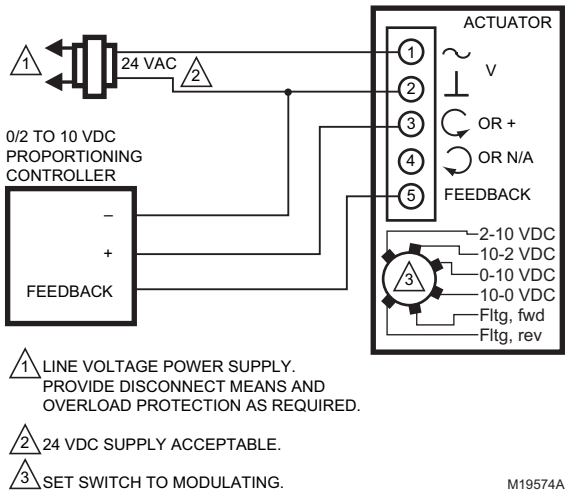


Fig. 34. Wiring for Proportioning Controllers (Modulating mode setting)

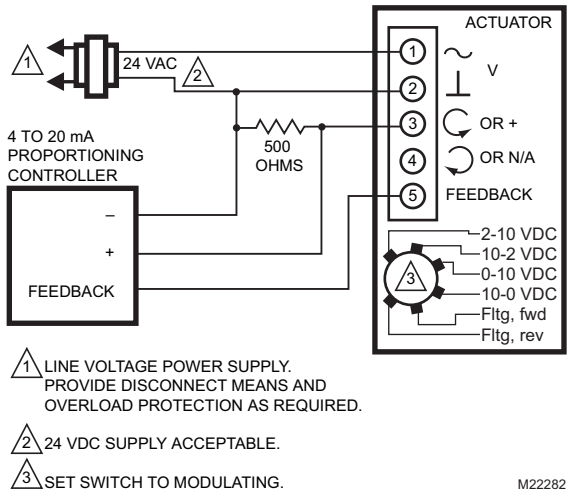


Fig. 35. Wiring for Proportioning Controllers (Modulating mode setting)

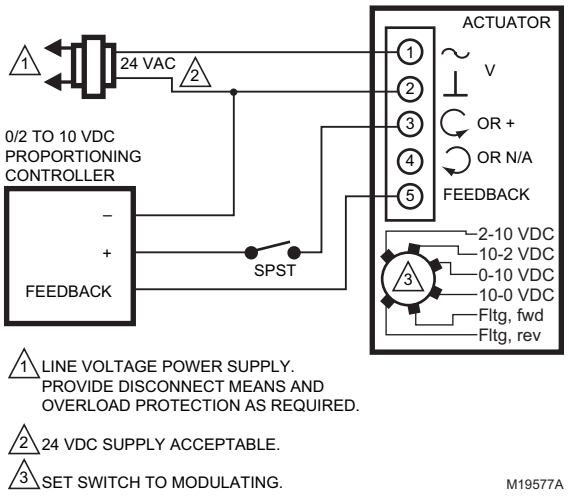


Fig. 36. Override to full closed (Modulating mode setting)

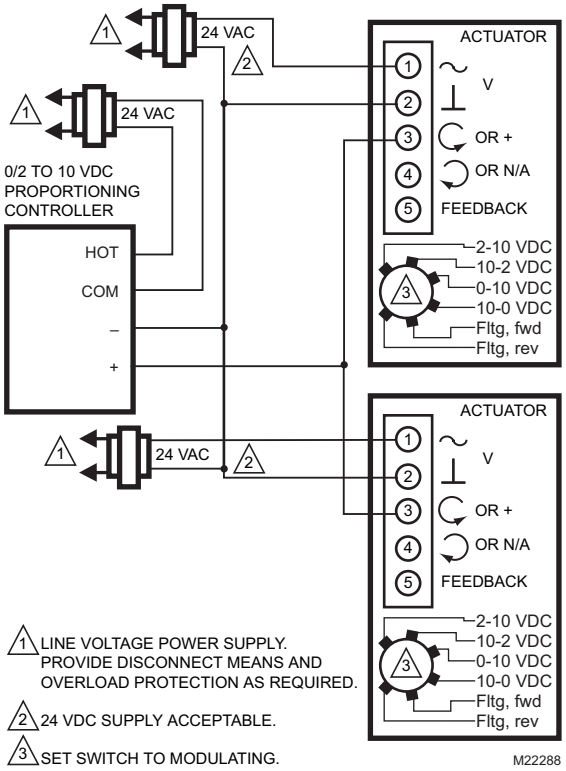


Fig. 37. Wiring for Proportioning controllers operating multiple actuators (Modulating mode setting)

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 38.

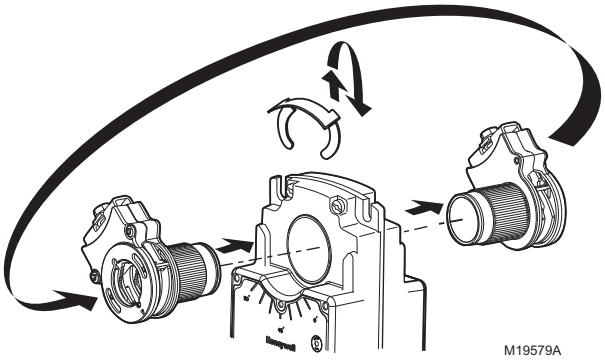


Fig. 38. Mounting shaft coupling to actuator opposite side

   (1) Remove the retainer clip from the shaft coupling and set it aside for later use.
   (2) Remove shaft coupling from one side of the actuator.
   (3) Replace the shaft coupling on the opposite side of the actuator, aligning it based on the stroke labeling.
   (4) 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.

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62-2035—02 M.S. Rev. 10-20
Printed in United States