

Honeywell

VBN Threaded Control Ball Valves and Actuators

INSTALLATION INSTRUCTIONS



APPLICATION

The VBN2 Two-Way and the VBN3 Three-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in closed loop heating, ventilating, and air conditioning (HVAC) systems to provide two-position or modulating functions. Not for use in open loop systems.

These valve assemblies can be ordered with or without factory-mounted actuators.

Application Notes

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.

Oversized valves can cause excessive cycling leading to premature actuator failure, and the seat and ball can be damaged because of the restricted opening.

Proper Use

VBN valves are intended for use in chilled water and hot water closed loop applications only, with a temperature range of 35 to 250°F, and pressures up to 360psig.

Water should be properly filtered, treated and conditioned for good operating performance, and according to 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.

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.

For effective C_v s for Honeywell control ball valves when used with pipe reducers, refer to the Product Data sheet form no. 62-2648.

Flow Characteristics

The VBN2 Two-Way Ball Valves have:

- equal percentage flow characteristic with characterized flow control insert.

The VBN3 Three-Way Ball Valves have:

- between ports A and AB: equal percentage flow characteristic.
- between ports B and AB: linear flow characteristic at approximately 80% of the nominal C_v rating.

Required Operating Torque

Both Honeywell fail in place and fail-safe low torque direct coupled actuators can be utilized with the VBN2 and VBN3 valves. VBN valves use a patented seat design that reduces the torque needed from the actuator.

Actuators with 27 lb-in torque, (for valves up to 1-1/4 in size), and 35 lb-in torque (for 1-1/2 in size and above) provide sufficient torque to operate the valve at rated close-off. (See Table 1.)



62-2025EFS-06

Table 1. Close-off, Differential Pressure Ratings.

Valve Type	Valve Size (in.)	Close-off Pressure Rating (psi)
2 way	1/2, 3/4	130
	1, 1-1/4, 1-1/2, 2, 2-1/2, 3	100
3 way	1/2, 3/4, 1	50
	1-1/4, 1-1/2, 2, 2-1/2	40

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.

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.

Mechanical Installation

IMPORTANT:

Hold valve with pipe wrench by hexagonal fitting ONLY. Do NOT handle the valve body with the pipe wrench; product damage may result.

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

Refer to actuator literature for actuator dimensions.

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, and flow arrow must point in the flow direction of the medium for proper operation.

NOTE: For three-way valve mounting, see Fig. 1 & 2.

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) Counter clockwise to increase A to AB flow.

NOTE: After valves have been installed in the piping, the installer can determine the ball orientation within the valve from the notches in the top of the valve stem. For two-way valves, the lengthwise direction of the notch indicates the flow through the ball (i.e. when the notch is parallel to the axis of the valve between A and B ports, the ball will allow flow through the valve). For three-way valves, the flow can be determined by the orientation of the "T" shaped notch in the valve stem, as shown in Fig. 2.

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. 4 and 5.)

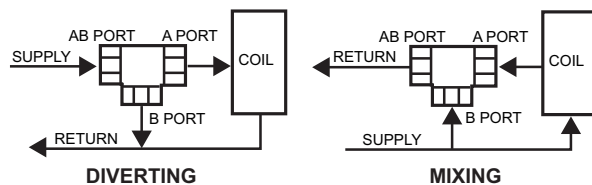
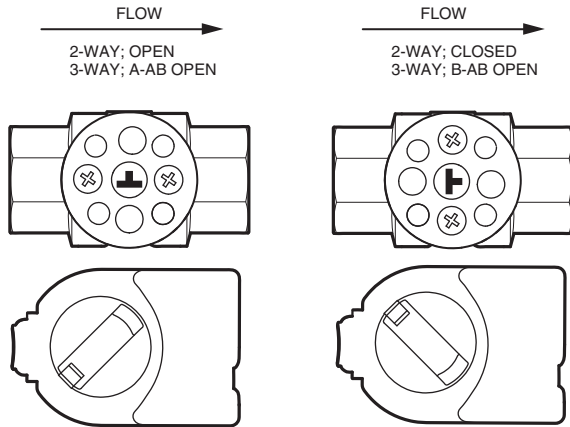


Fig. 1. Three-way ball valve flow orientation (not to scale).

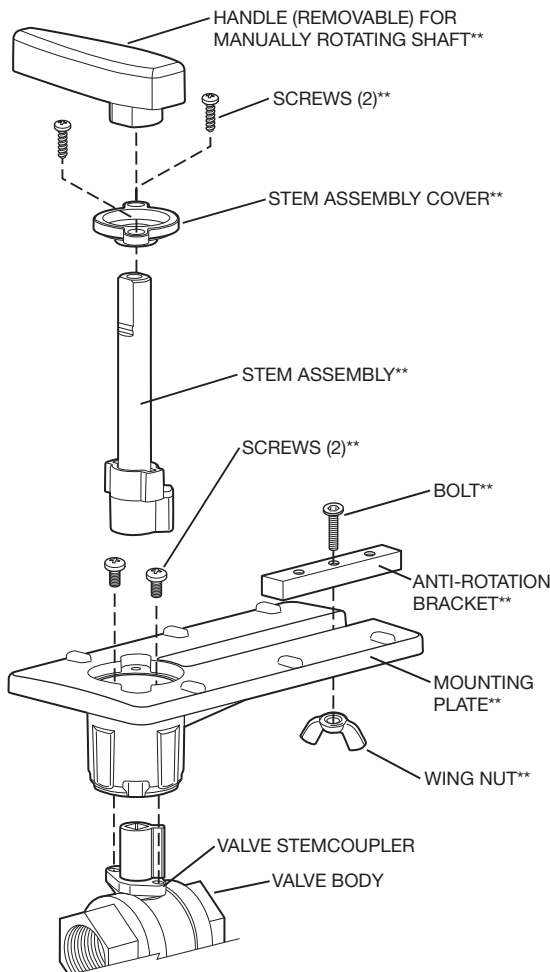


NOTES: **FOR 2-WAY VALVES** TO MOUNT ACTUATOR ON OPEN VALVE, TURN ACTUATOR FULLY COUNTER CLOCKWISE AS SHOWN. FOR 2-WAY VALVES TO MOUNT ACTUATOR ON CLOSED VALVE, TURN ACTUATOR FULLY CLOCKWISE AS SHOWN.

FOR 3-WAY VALVES TO MOUNT ACTUATOR ON A-AB VALVE, TURN ACTUATOR FULLY COUNTER CLOCKWISE AS SHOWN. FOR 3-WAY VALVES TO MOUNT ACTUATOR ON B-AB VALVE, TURN ACTUATOR FULLY CLOCKWISE AS SHOWN.

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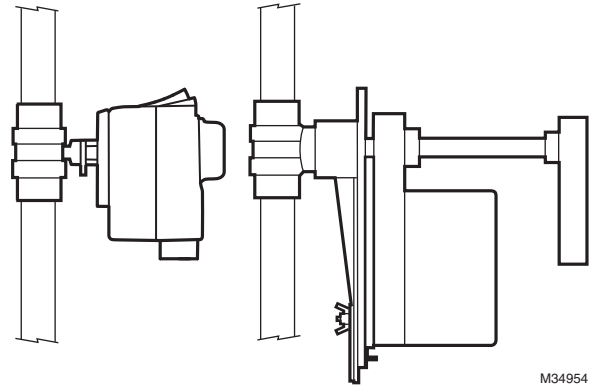
Fig. 2. Orientation of ball in valve.



**INCLUDED IN REPLACEMENT KIT (PART NO. 5112-11)

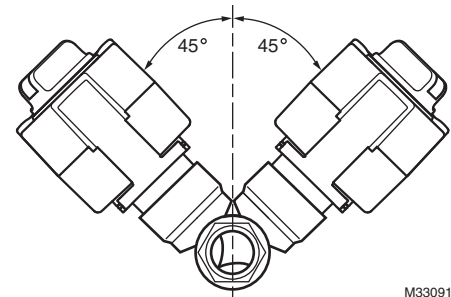
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Fig. 3. Valve assembly exploded view.



M34954

Fig. 4. Vertical valve installation.



M33091

Fig. 5. Acceptable valve angle from vertical.

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. 3 for valve exploded view.

Electrical Installation

1. If necessary, remove actuator wiring cover.
 - a. For 24Vac applications, use Class II transformer.
2. Wire actuator using Figures 6 through 29 for the application required.
3. Replace cover as applicable.

Wiring

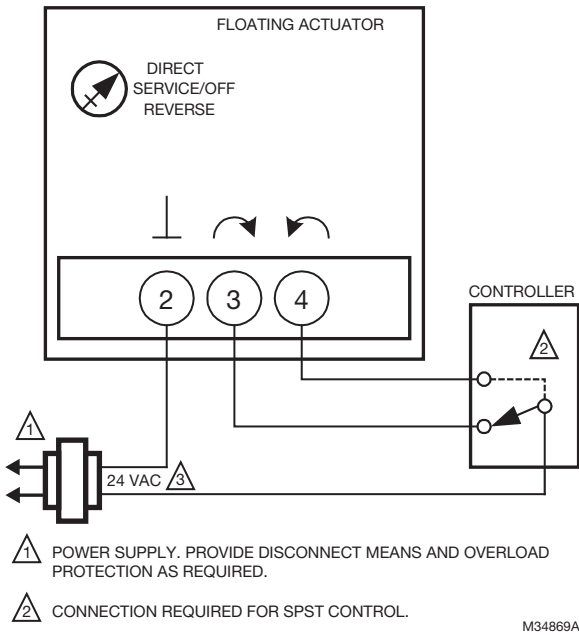


Fig. 6. MN6105 with On/Off SPDT Control.

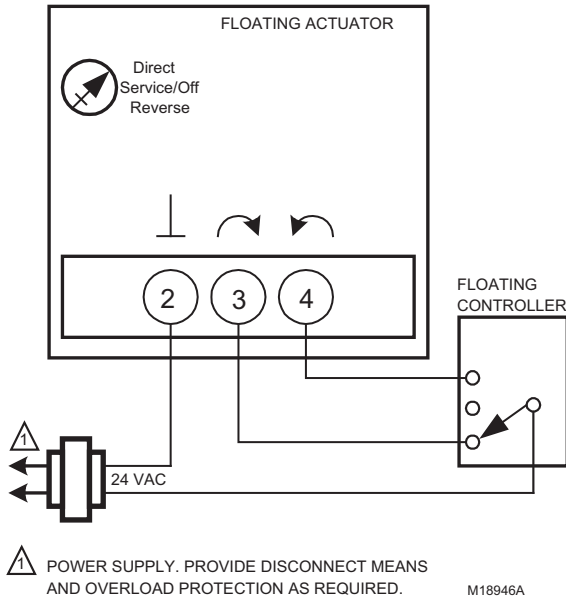


Fig. 7. MN6105 with Floating Control.

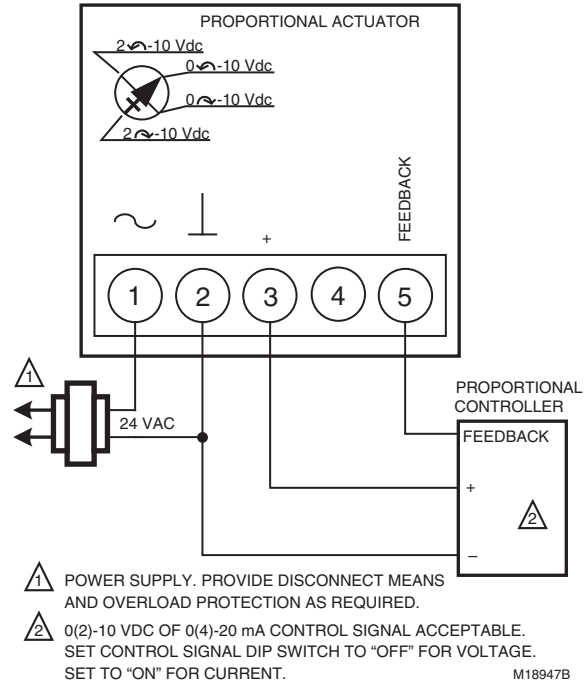


Fig. 8. MN7505 with 0(2)-10 Vdc Control.

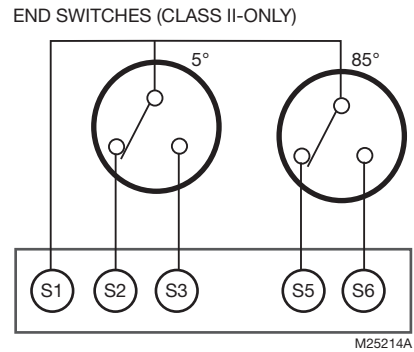


Fig. 9. Wiring for MN6105 and MN7505 models with aux./end switches.

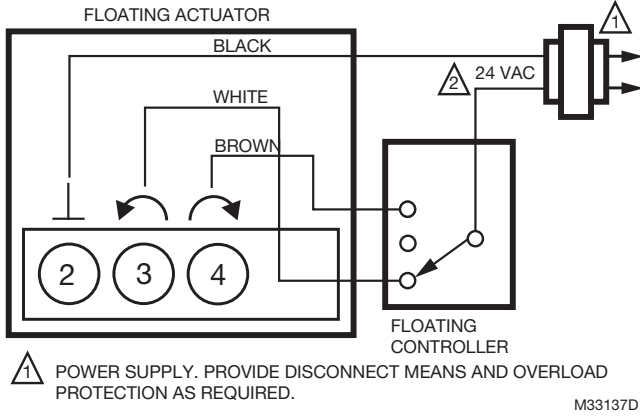


Fig. 10. MVN613 with Floating Control.

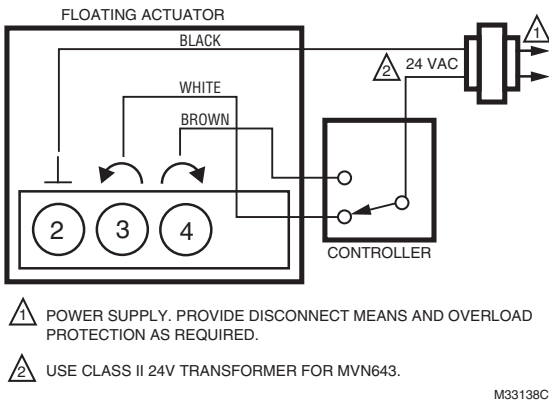


Fig. 11. MVN613 or MVN643 with Two Position SPDT Control.

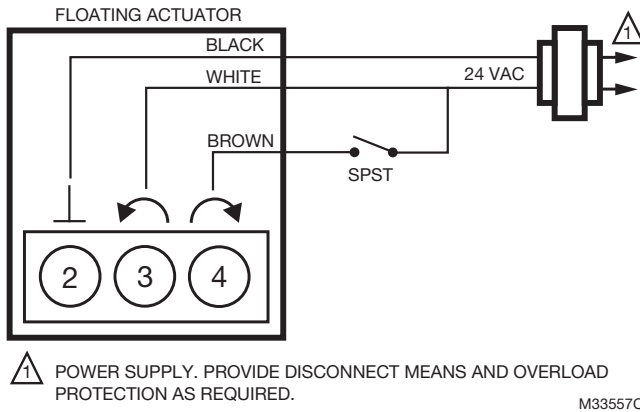


Fig. 12. MVN643 with Two Position SPST Control.

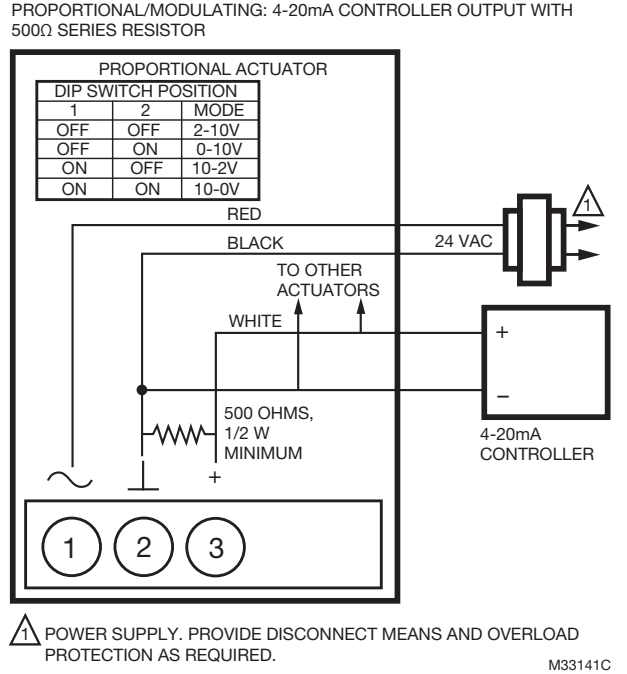


Fig. 13. MVN713 with 4-20mA Control.

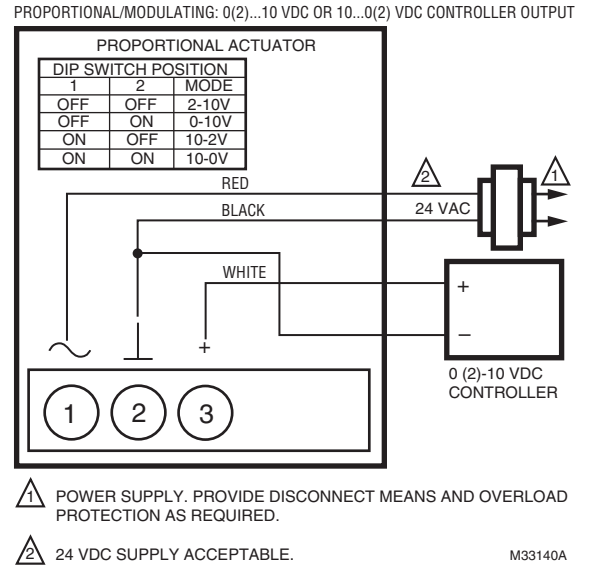


Fig. 14. MVN713 with 0(2)-10 Vdc Control.

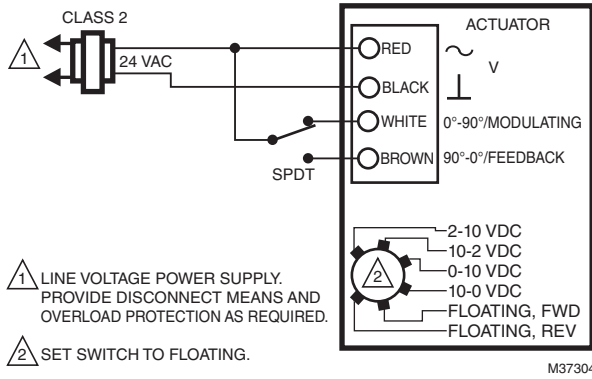


Fig. 15. MS7505 with Two Position SPDT Control.

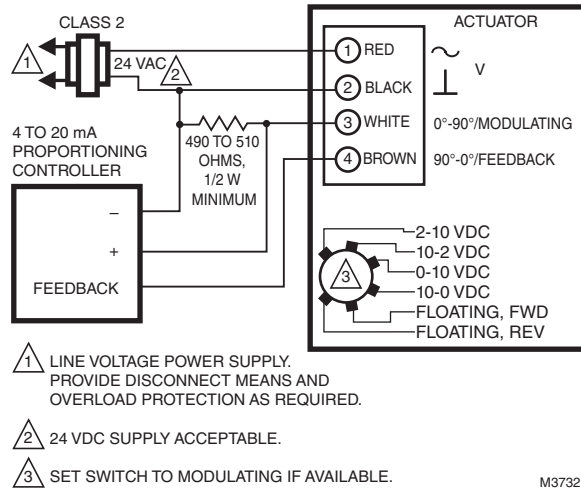


Fig. 18. MS7103 with 4-20 mA Control (MS7503 shown, ignore selection switch).

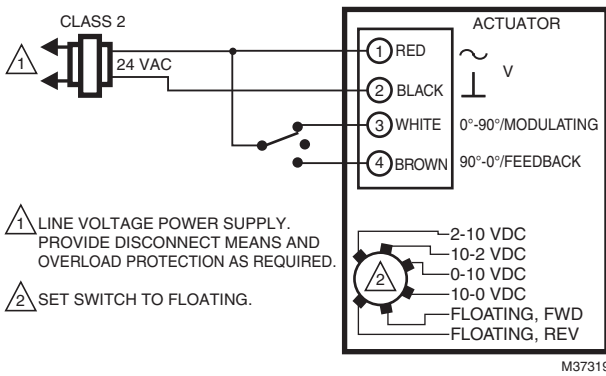


Fig. 16. MS7505 with Floating Control.

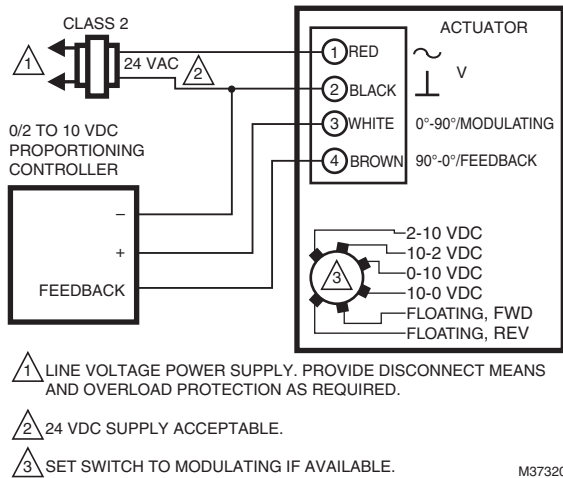


Fig. 17. MS7103 with 2-10 Vdc Control (MS7503 shown, ignore selection switch).

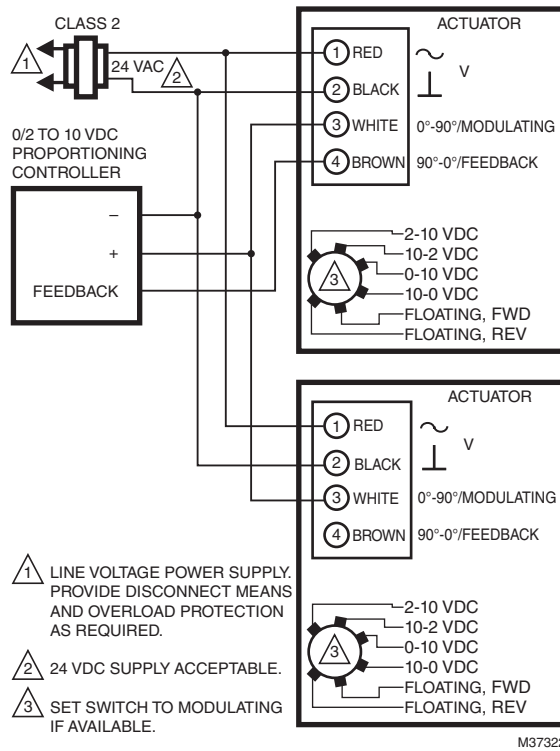
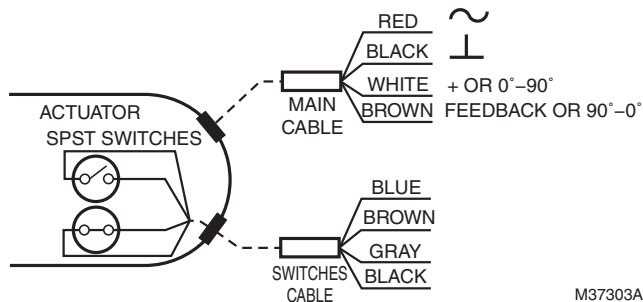
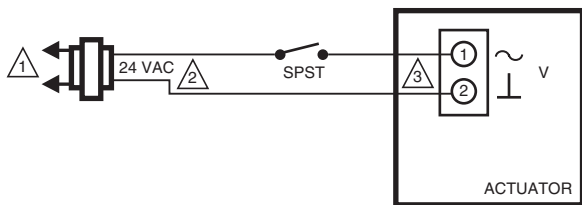


Fig. 19. MS7103 with 2-10 Vdc Control using two actuators (MS7503 shown, ignore selection switch).



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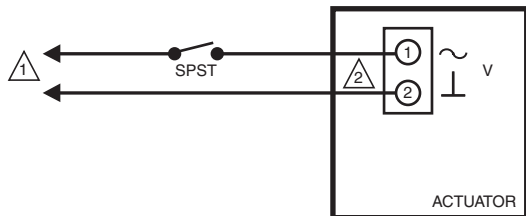
Fig. 20. Wiring for MS7103 and MS3103 Auxiliary Switches. Gray/Black = Normally Open. Closed in range 80 degrees to Fully Open. Blue/Brown = Normally Closed. Open in range 10 degrees to Fully Open.



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

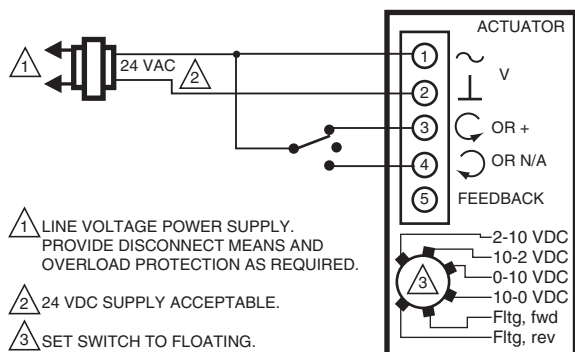
M34973



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

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Fig. 21. MS8105 with Two Position SPDT Control.



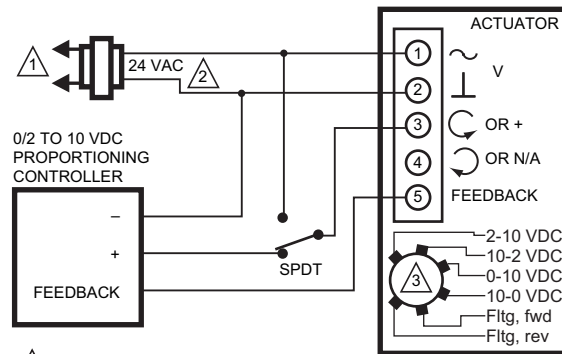
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO FLOATING.

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Fig. 22. MS7505 with Floating Control.



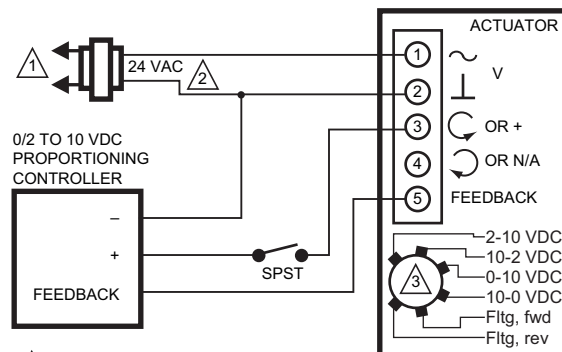
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19576A

Fig. 23. MS7505 with override to full open.



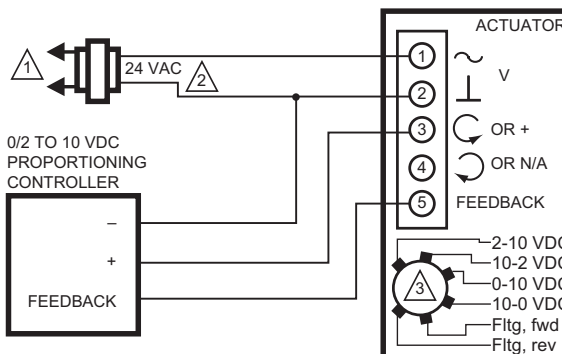
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19577A

Fig. 24. MS7505 with override to full closed.



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M34976

Fig. 25. MS7505 with 0(2)-10 Vdc Controllers.

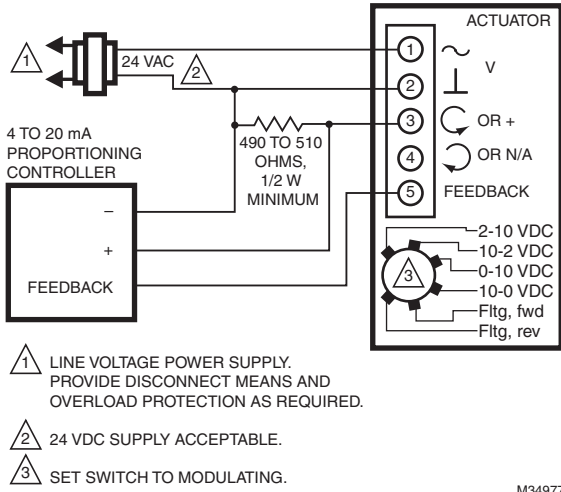


Fig. 26. MS7505 with 4-20mA Controllers.

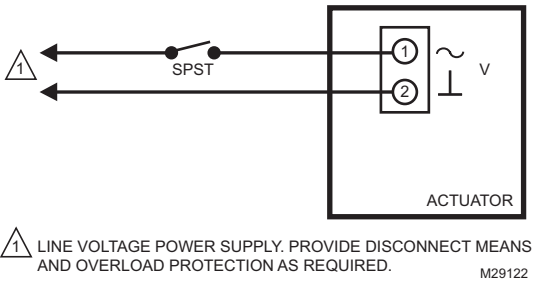


Fig. 27. MS4105 with 120 Vac Two Position SPDT control.

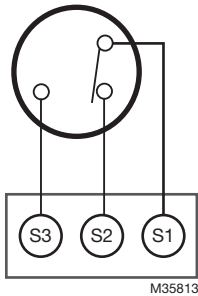


Fig. 28. Wiring for MS4105, MS7505, and MS8105 models with aux./end switches.

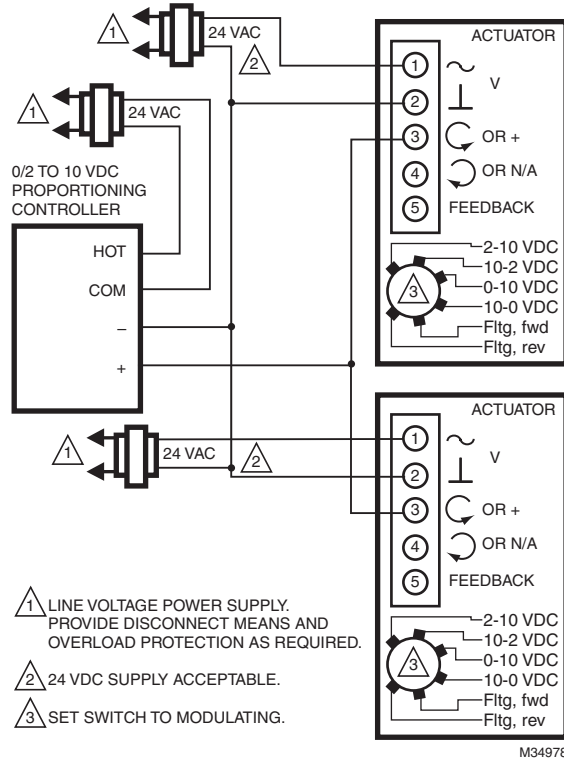


Fig. 29. MS7505 with 0(2)-10 Vdc controller operating multiple actuators.

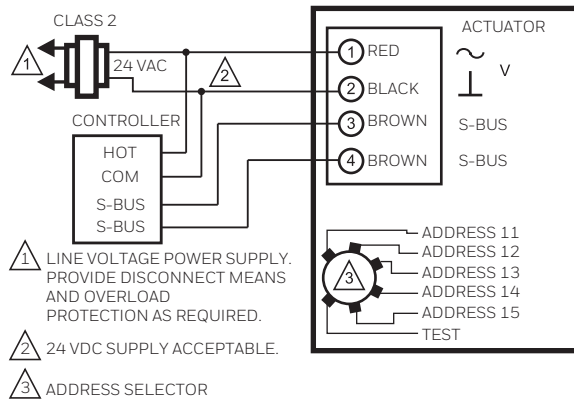


Fig. 30. MS3103 with Sylk Bus control.

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 and Syk-enabled spring return actuators:
To change spring return direction: remove, flip over, and replace actuator on the bracket.
 - b. For floating control actuators: Reverse two control signal wires (CW/CCW).
 - c. For modulating spring return control actuators:
 - (1) MS7505 actuators reposition control signal selection switch; MS7103 actuators 2-10 Vdc only (reversal not possible), or
 - (2) To change spring return direction: remove, flip over, and replace actuator on the bracket.
 - d. For modulating actuators without spring return, reposition reverse/direct acting selector switch.
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 Fig. 31.
 - (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 labelling.
 - (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 using maximum 120 lb-in torque.

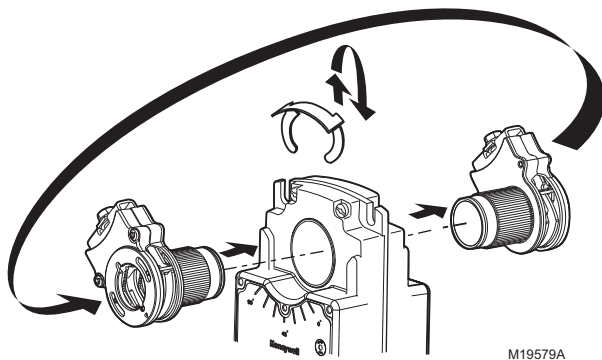


Fig. 31. Mounting shaft coupling to actuator opposite side.

Service and Repair

The valve stem can be replaced in-line, if necessary. See Fig. 32.

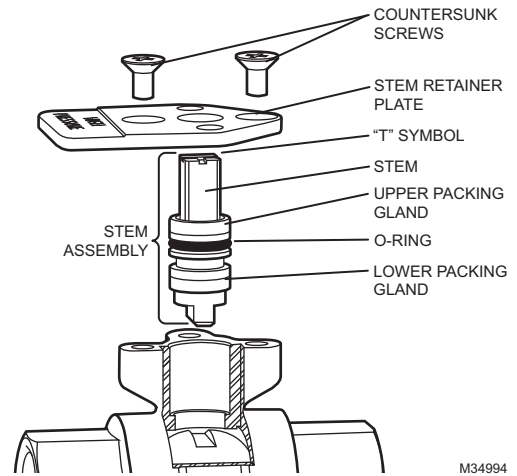


Fig. 32. Replacing the valve stem in-line.

Valve Stem Replacement



WARNING

Scratching the inside of the valve neck may cause a leak when re-assembled.

1. Close isolation valves on both supply and return sides of the Honeywell control valve. (If there are no isolation valves, turn off the circulation pump). Valve body must be de-pressurized.
2. Relieve excess pressure from isolated portion by opening an air vent or drain valve.
3. Remove the actuator. Ensure that the valve is closed. The T symbol on the stem should be oriented like it is in the right-side drawing in Fig. 33 below.
4. Remove the 2 screws securing the adapter plate. Discard these screws.
5. Remove the stem, making sure the lower packing gland is removed, and discard.
6. Cover new stem with supplied protective grease.
7. Insert the new stem. Be sure to align the key on the bottom of the stem with the slot in the ball, and the T symbol of the new stem is aligned exactly as the old one, like the right-side drawing in Fig. 33 below.
8. Replace the adapter plate.
9. Tighten the two new, supplied, screws to 16.5 lb in (+-10%) to attach the adapter plate to the valve body.
10. Open the isolation valves.
11. Once mechanical and electrical installations are complete, cycle the actuator to verify operation, and that the direction of rotation matches the control signal. If the actuator is a fail-safe model, make sure that the valve is in the correct position when there is no power applied.

VBN THREADED CONTROL BALL VALVES AND ACTUATORS

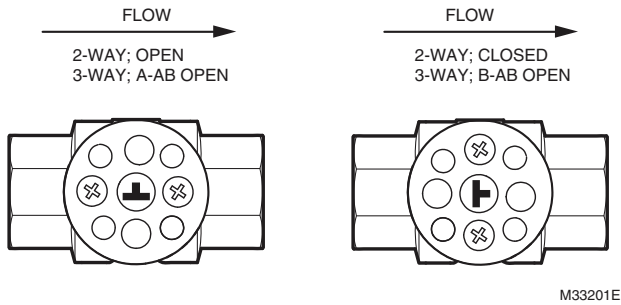


Fig. 33.

When the valve is in the position on the left (A to AB open) the actuator has turned the stem counter clockwise.

When the valve is in the position on the right, the actuator has turned it clockwise.

(For 3-Way valves, the flow direction in the picture is for mixing application.)

Correct stem replacement assemblies are found in the Tradeline catalog.

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62-2025EFS-06 M.S. Rev. 12-19
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