Installation and Operation Manual

Motorized Valves

for Steam and Hot Water Heating Systems

2-Way and 3-Way Motorized Valves

⚠ WARNING

All Heat-Timer controls and valves are strictly operating controls and valves; they should never be used as a primary limit or safety control. All equipment must have its own certified limit and safety controls required by local codes. The installer must verify proper operation and correct any safety problems prior to the installation of any Heat-Timer equipment.

HEAT-TIMER® CORPORATION

HT# 059103-00 B

Contents

Applications

Hot Water Heating Applications

The 3-Way floating Motorized Mixing Valves are used to regulate the temperature of the water in Hydronic heating applications. They are used with Outdoor Reset or Set Point hot water heating controls (used with Heat-Timer HWR Platinum, HWE-MOV, and MCF controls). Also, they benefit two temperature systems by reducing the water temperature in the secondary loop as in snow melt applications (used with Heat-Timer SMC and RSM controls). In addition, they are used to regulate the boiler return temperature by mixing the boiler supply with the cooler return to protect boilers from condensation (used with Heat-Timer MCF controls).

Steam Heating Applications

The 2-Way Floating Motorized Valves are used to modulate or turn on or off the steam to a building or process applications. They are used with Heat-Timer steam heating controls (MPC Platinum).

Steam to Hot Water Heating Applications

The 2-Way Floating Motorized Valves can also be used to regulate the amount of steam entering a steam-to-hot-water heat-exchanger. This configuration is designed to control the temperature of the water in hydronic heated buildings using a steam boiler. It is used with Outdoor Reset or Set Point hot water heating controls (used with Heat-Timer HWR Platinum, HWE-MOV, and MCF controls).

Installation:

Components

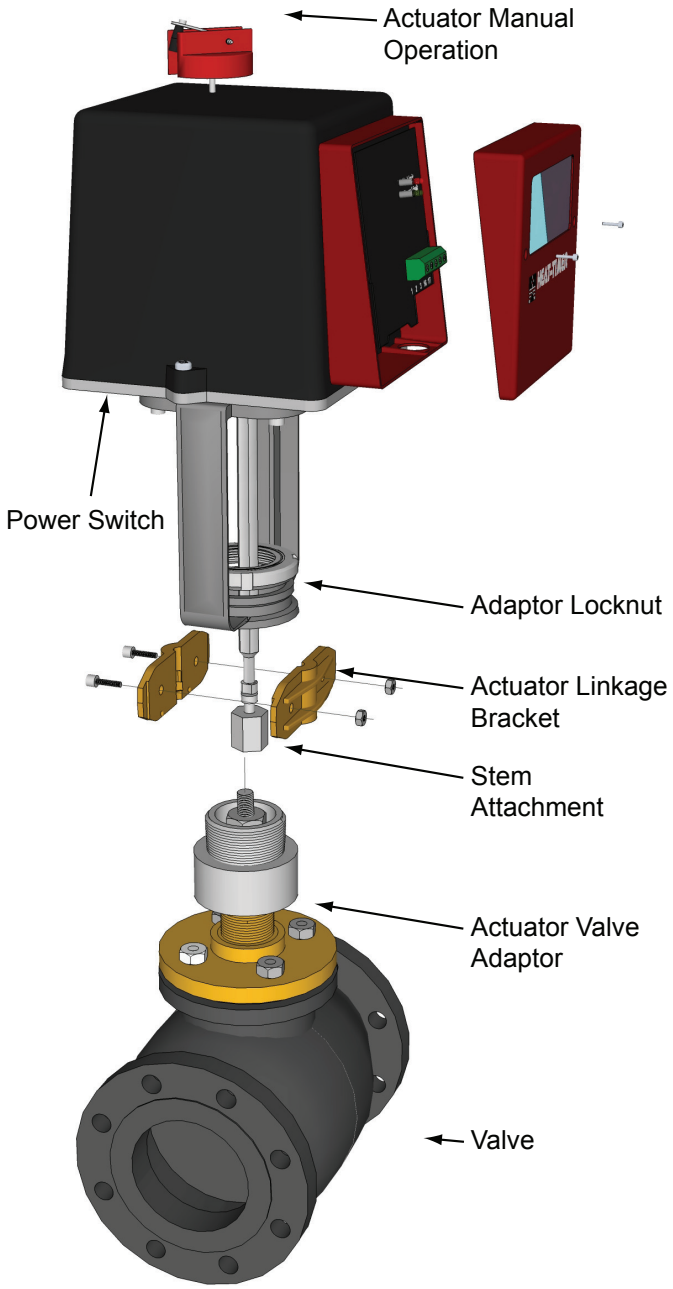
A Valve and actuator are usually shipped in different crates or boxes. The following components are shipped per the following packing lists:

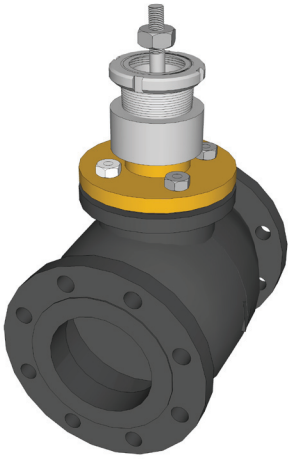
VALVE PACKAGE:

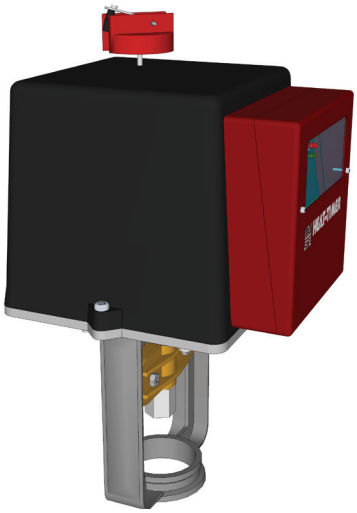
- Valve
- Actuator Valve Adaptor
- Adaptor Locknut

ACTUATOR PACKAGE:

- Actuator
- Actuator Linkage Bracket (with two hex screws and two nuts.
- Hex Wrench (#5)
- 24 VAC Transformer

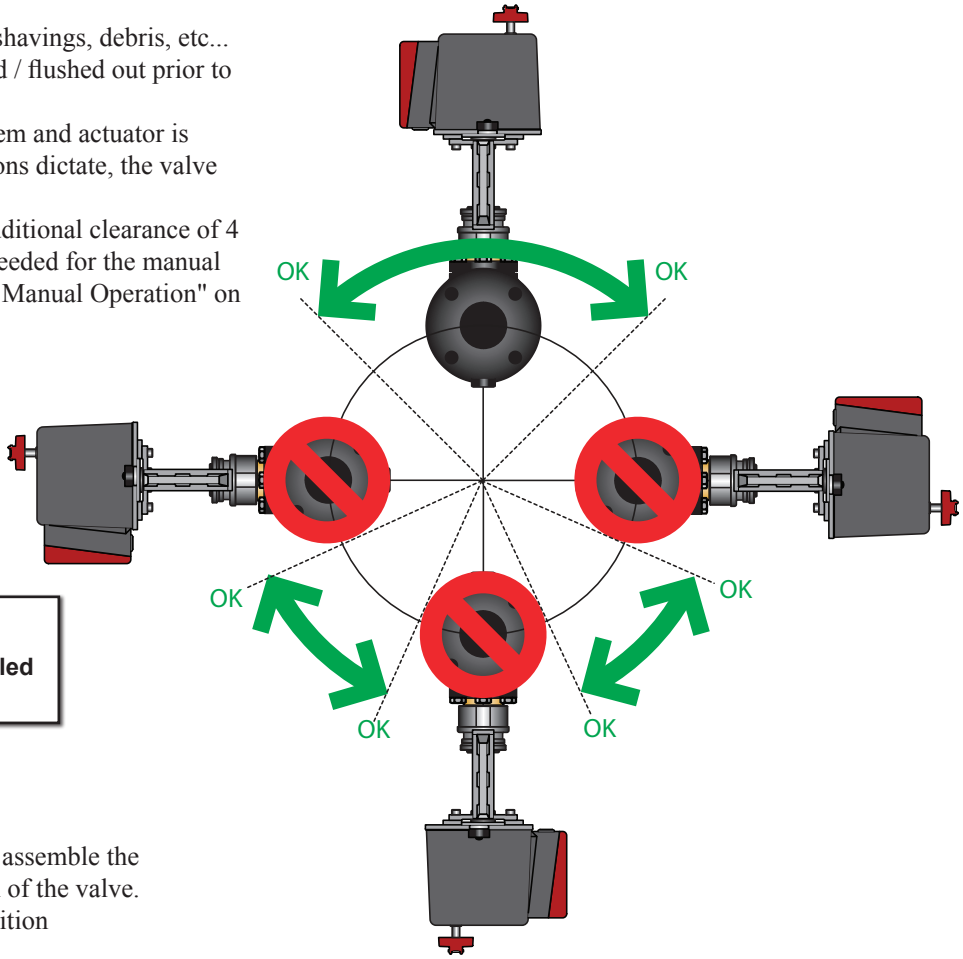






Mounting

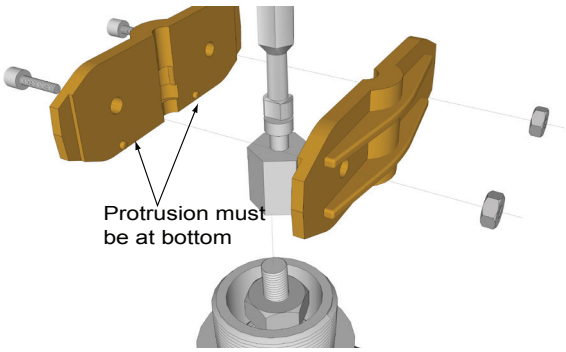
- To avoid valve problems, all dirt, metal shavings, debris, etc... located inside of piping must be removed / flushed out prior to installing the valve.
- The preferred installation of the valve stem and actuator is upright. However, where space restrictions dictate, the valve assembly can be mounted diagonally.
- The installation should account for an additional clearance of 4 to 6” above the actuator. This space is needed for the manual operation of the actuator. See "Actuator Manual Operation" on page 5

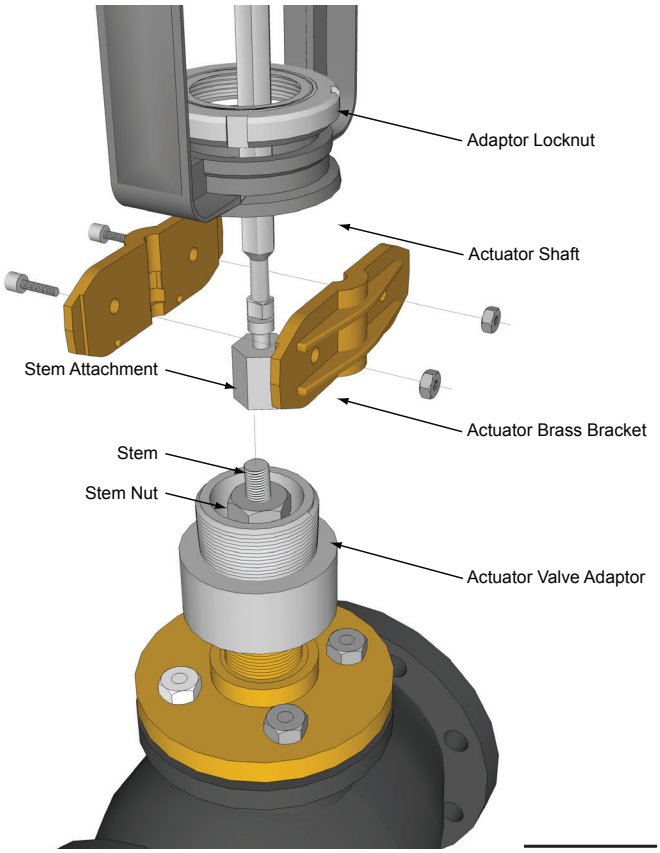


⚠ WARNING
Motorized Valves MUST NOT be installed upside down or horizontally

Valve Actuator Assembly

- For smaller valves, it is usually easier to assemble the valve and actuator before the installation of the valve.
- For larger valves, install the valve in position prior to installing the actuator.
- Thread and tighten the Actuator Valve Adaptor to the valve.
- Remove the Actuator Brass Brackets. This should release the Stem Attachment.
- Thread the Stem Attachment to the Valve Stem. Make sure that it is tightened against the Stem Nut.
- Mount the Actuator on top of the Valve.
- Thread the Adaptor Locknut to the Actuator Valve Adaptor. Make sure that the locknut’s beveled surface is facing the valve.
- Manually close or open the actuator to bring the Stem Attachment to meet the bottom of the Actuator Shaft. See "Actuator Manual Operation" on page 5
- Join the Stem Attachment and the Actuator Shaft using the Actuator Brass Bracket. Make sure the Actuator Brass Bracket internal shape fits and locks Stem Attachment and Actuator Shaft securely.
- For proper Actuator Brass Bracket operation, its protrusions must be at the bottom (closer to the valve).





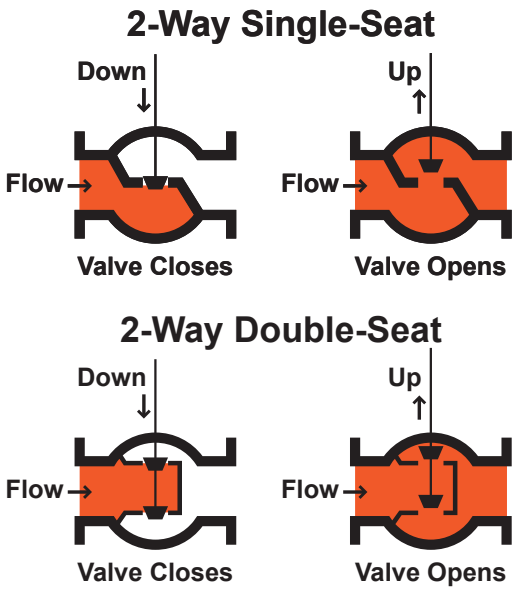
Flow Direction

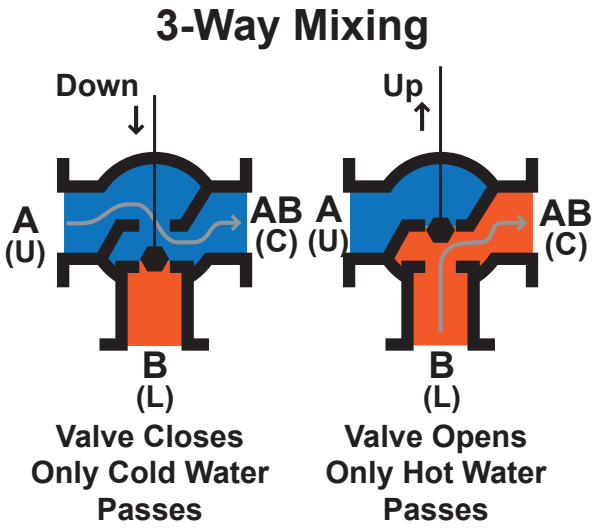
2-Way Valves:

Actuator Shaft moving Down will close the valve. Actuator Shaft moving Up will open the valve.

3-Way Valves:

Actuator Shaft moving Down will close the valve hot water Port **B**. Thus, more cold water will pass.
Actuator Shaft moving Up will close the valve cold water port **A**. Thus, more hot water will pass.

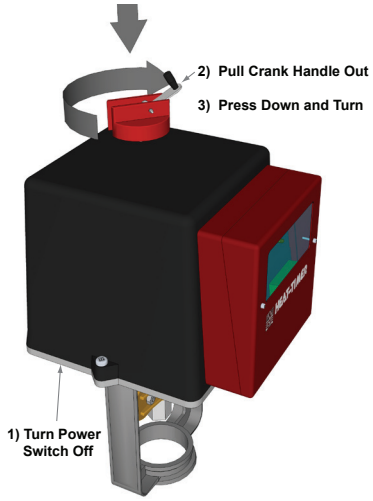




Actuator Manual Operation

The actuator red top handle is used to operate the valve manually in periods of no power or when servicing the equipment.

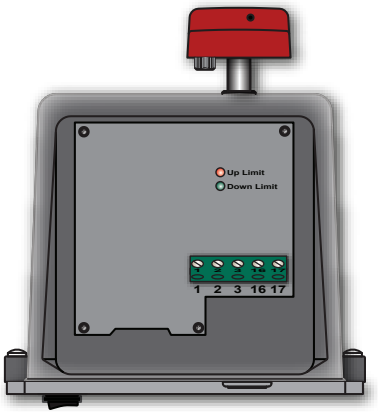
- First, make sure that the Power Switch is turned Off prior to operating the actuator manually.
- Pull the Crank Handle out and press it down to move the Actuator Shaft.
- Turn the Crank Handle clockwise to move the Actuator Shaft down. Turn the Crank Handle counter-clockwise to move the Actuator Shaft up.



Actuator LED

The actuator has two LEDs.

- A Green LED that lights when the actuator is moving its shaft downward. It is labeled Down Limit.
- A Red LED that lights when the actuator is moving its shaft upward. It is labeled Up Limit.

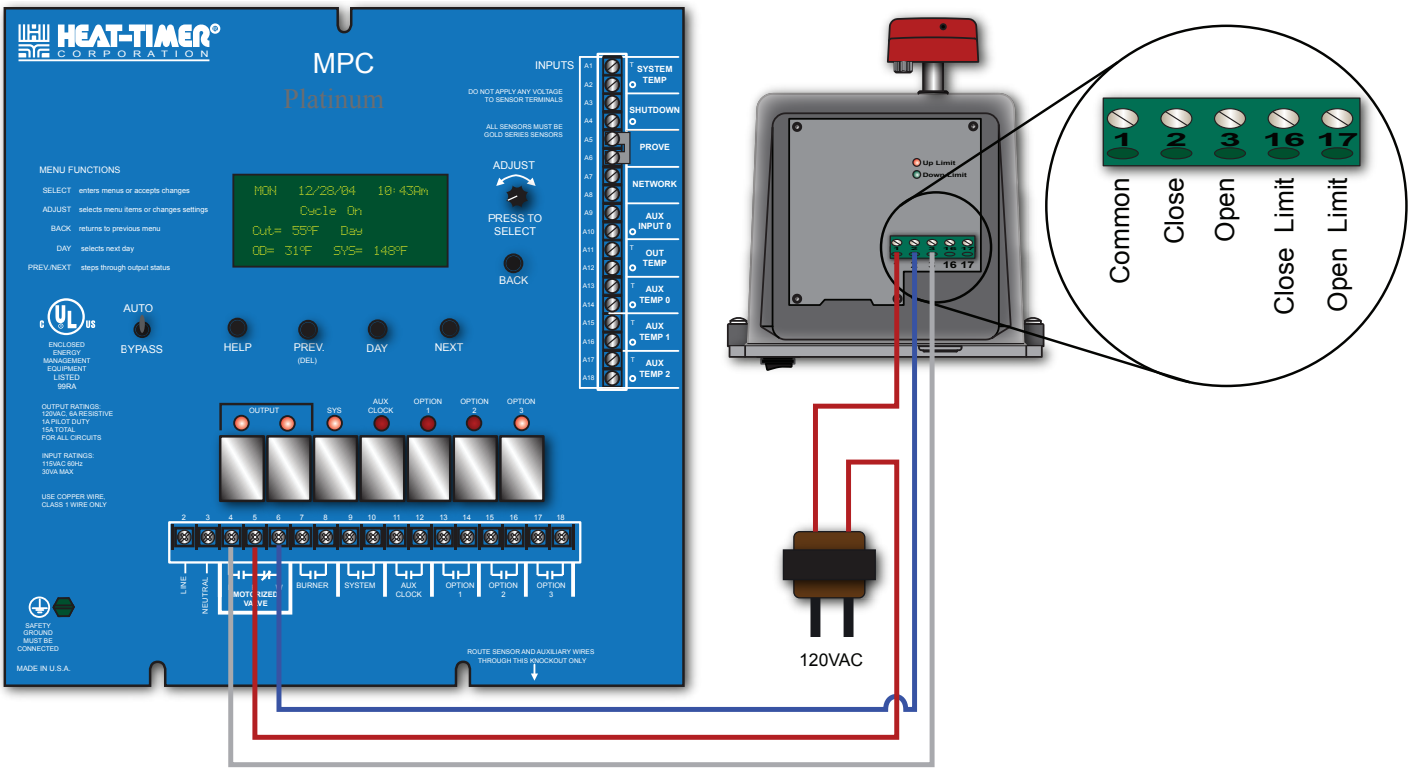


Wiring

- The Heat-Timer Motorized Valve can be used with virtually any floating motor controller. However, it is designed to work with Heat-Timer controls.
- The valve actuator uses a floating type signal (R. W. B.).
- The Actuator must be powered using the provided 24 VAC transformer. A single transformer can only power a single actuator.
- Remove the Red Actuator cover to reveal the wiring terminals.
- Select one of the wiring options based on the control used.
- After finalizing the wiring, reinstall the actuator Red cover.

Wiring the Actuator to the MPC Platinum Control

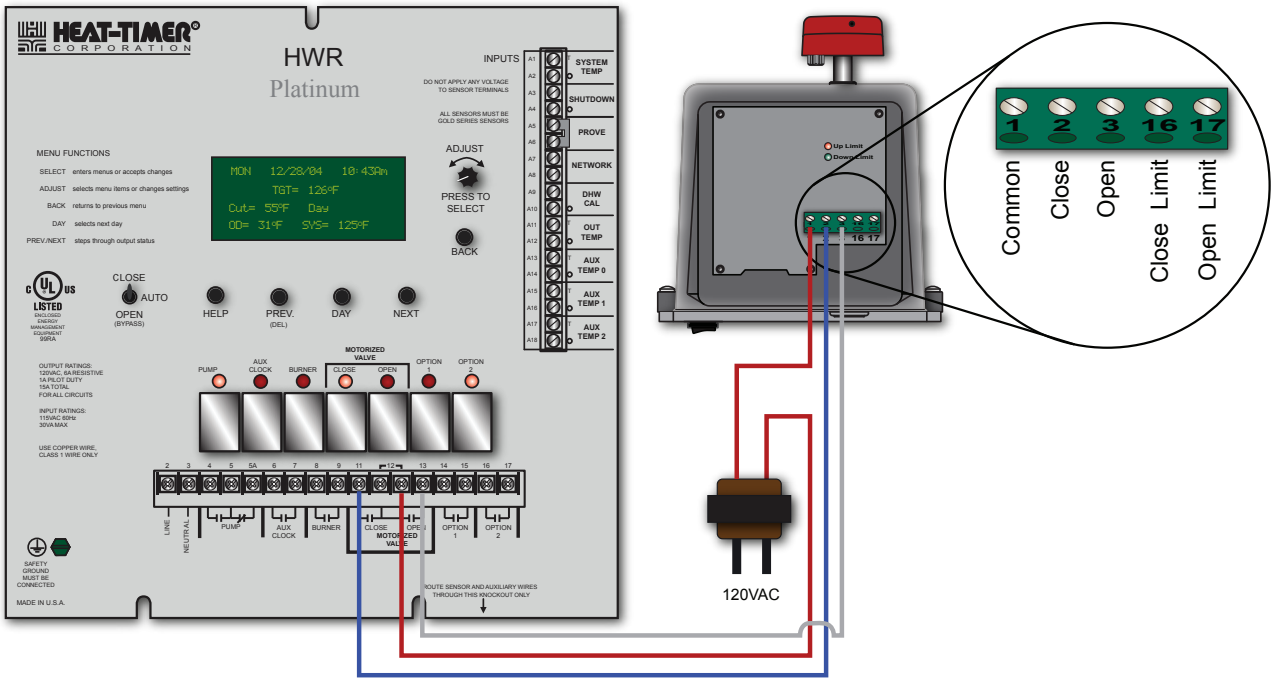
- Wire one of the 24VAC transformer outputs to the Actuator (1) Common terminal.
- Wire the second 24VAC transformer output to the MPC Platinum (5) Common output terminal.
- Connect the MPC Platinum (6) output terminal to the Actuator (2) Close terminal.
- Connect the MPC Platinum (4) output terminal to the Actuator (3) Open terminal.



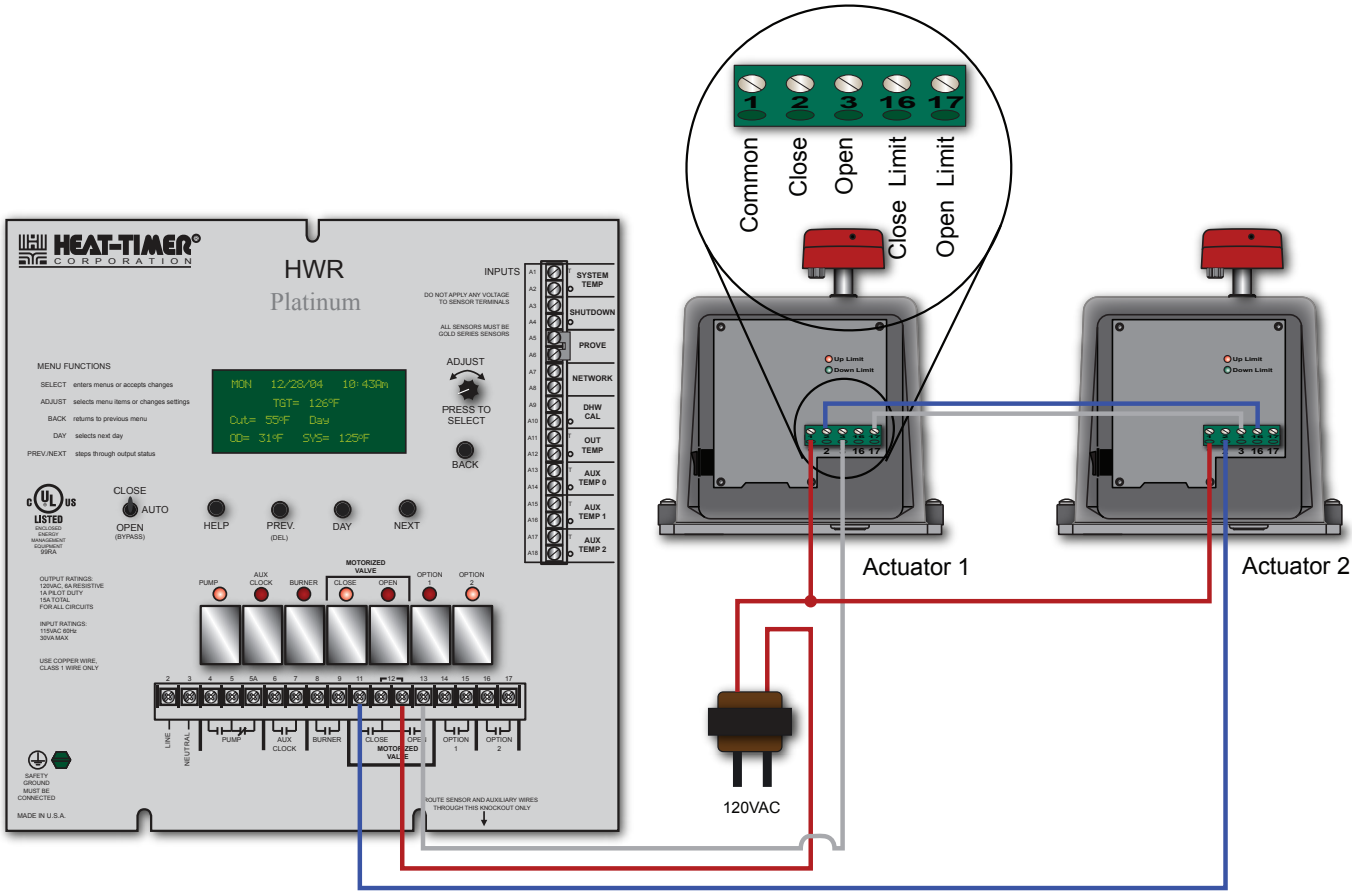
Wiring to the HWR Platinum Control

Single Actuator Wiring to HWR

- Wire one of the 24VAC transformer outputs to the Actuator terminal 1 (Common).
- Wire the second 24VAC transformer output to the HWR Platinum Common (12) output terminal.
- Connect the HWR Platinum Close (11) output terminal to the Actuator (2) Close terminal.
- Connect the HWR Platinum Open (13) output terminal to the Actuator (3) Open terminal.



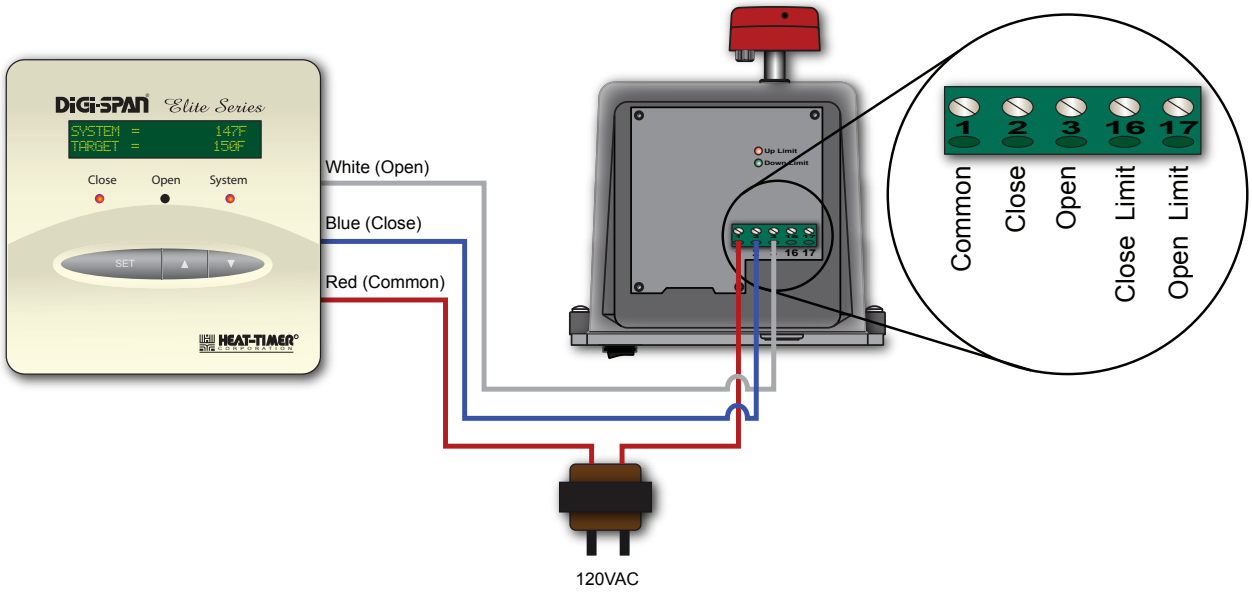
Two Actuator Wiring to HWR



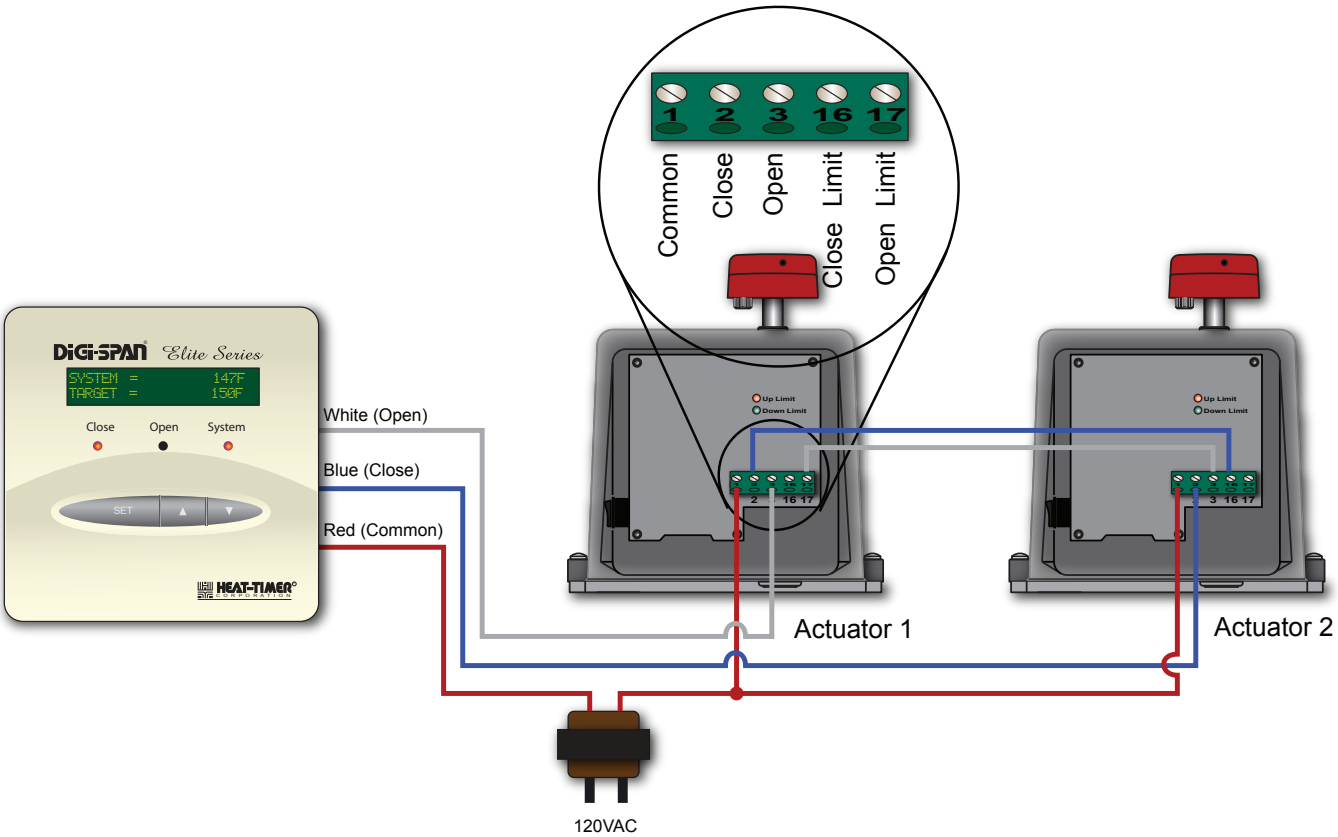
Wiring the Actuator to the HWE-MOV or MCF Elite Controls

Single Actuator Wiring to HWE-MOV or MCF

- Wire one of the 24VAC transformer outputs to the Actuator terminal 1 (Common).
- Wire the second 24VAC transformer output to the HWE-MOV or MCF Elite Red wire.
- Connect the HWE-MOV or MCF Elite Blue wire to the Actuator (2) Close terminal.
- Connect the HWE-MOV or MCF Elite White wire to the Actuator (3) Open terminal.



Two Actuator Wiring to HWE-MOV or MCF

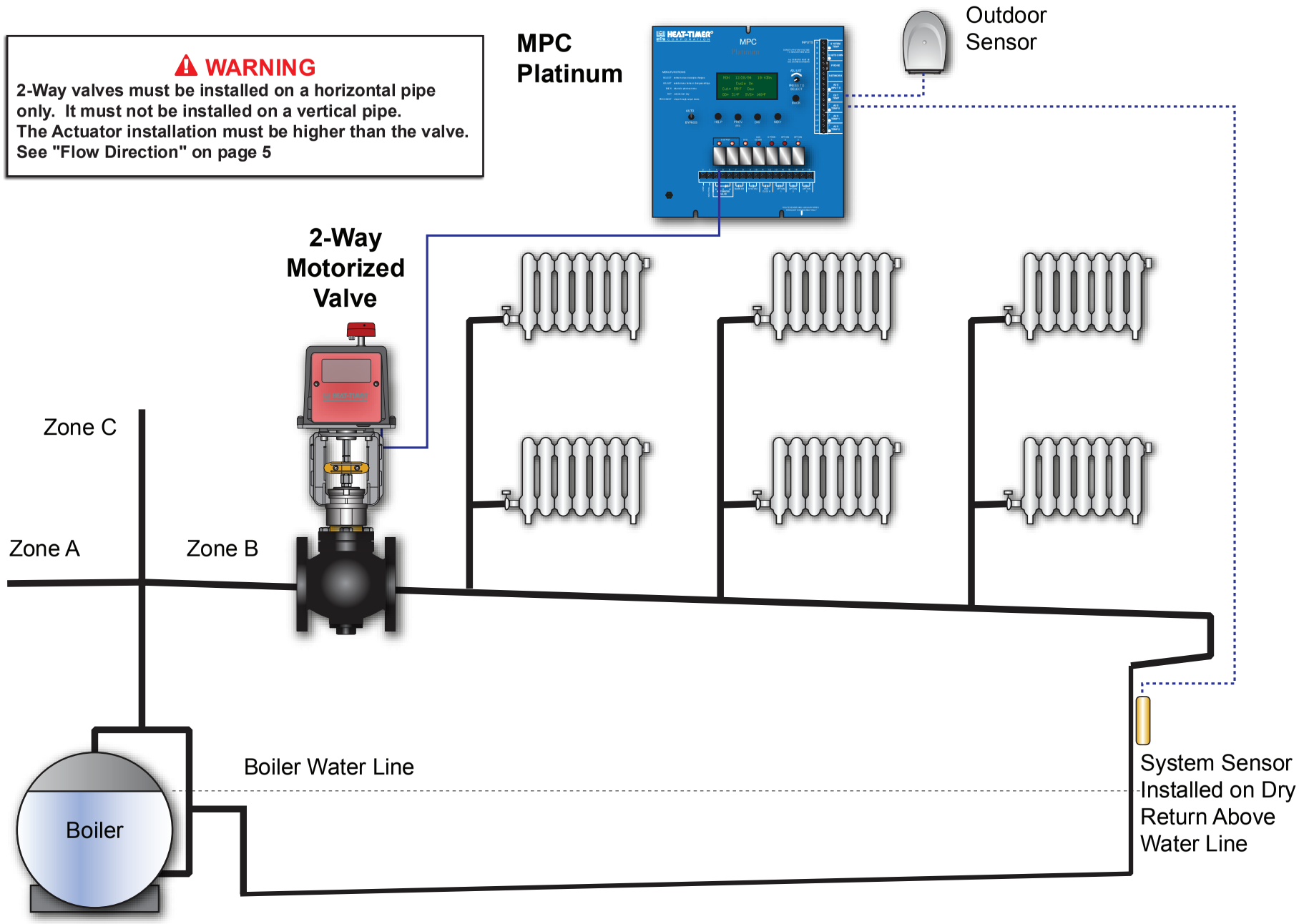


Piping Diagrams

Piping 2-Way Motorized Valve in One-Pipe Steam Heating Application

⚠ WARNING

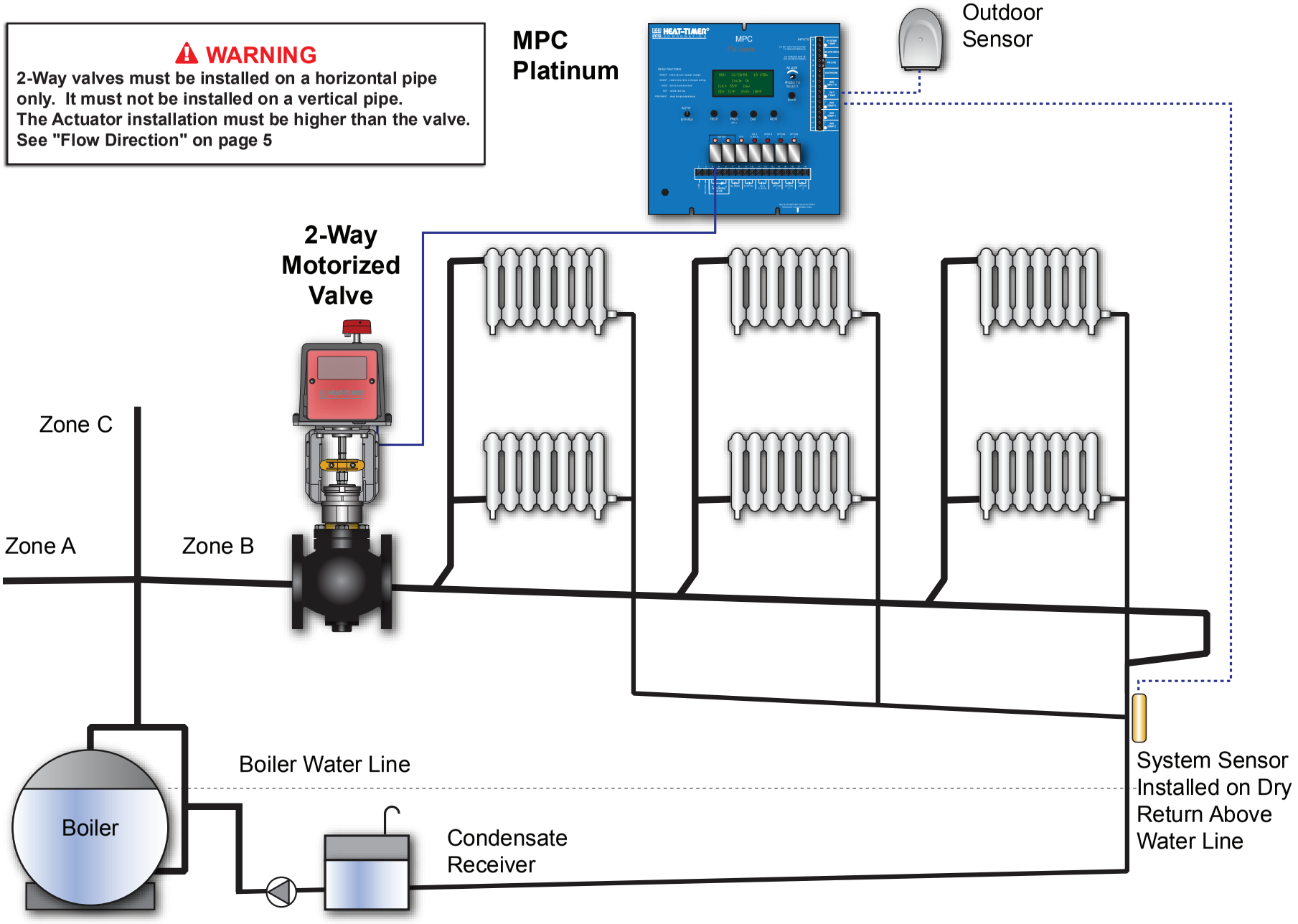
2-Way valves must be installed on a horizontal pipe only. It must not be installed on a vertical pipe.
The Actuator installation must be higher than the valve.
See "Flow Direction" on page 5



Piping 2-Way Motorized Valve in Two-Pipe Steam Heating Application

⚠ WARNING

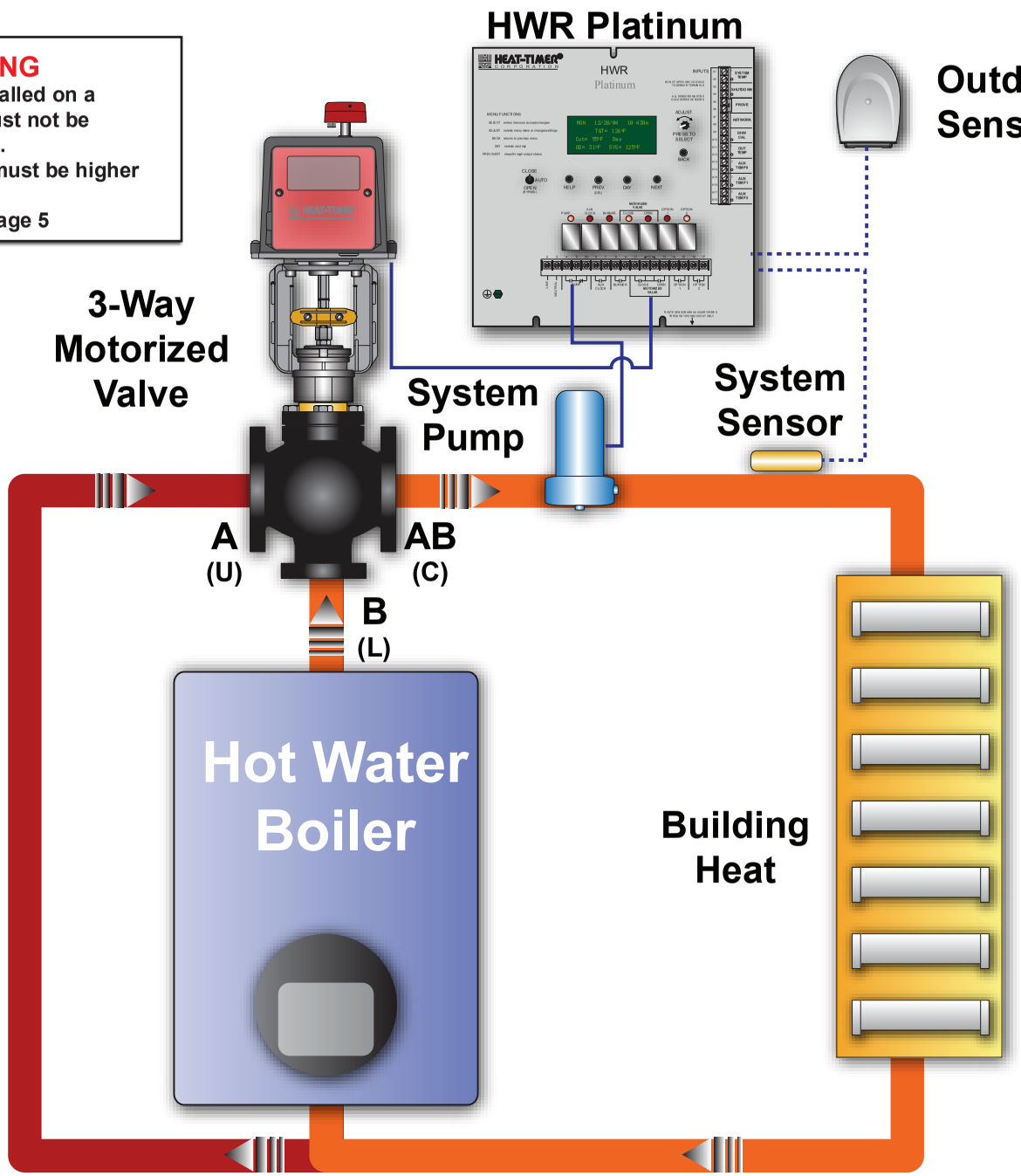
2-Way valves must be installed on a horizontal pipe only. It must not be installed on a vertical pipe.
The Actuator installation must be higher than the valve.
See "Flow Direction" on page 5



Piping 3-Way Motorized Valve in Hot Water Heating Application

⚠ WARNING

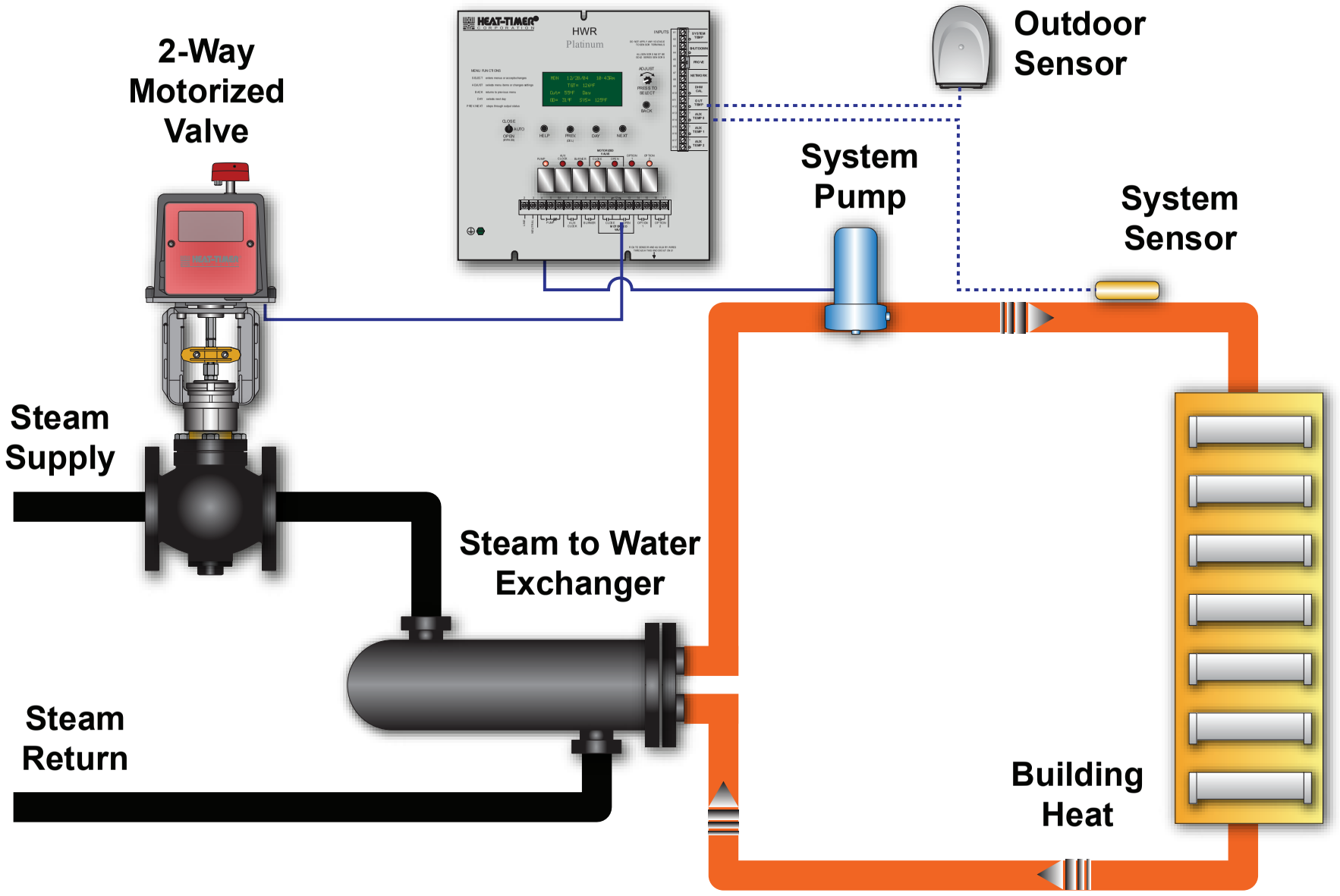
3-Way valves must be installed on a horizontal pipe only. It must not be installed on a vertical pipe.
The Actuator installation must be higher than the valve.
See "Flow Direction" on page 5



Piping 2-Way Motorized Valve in Steam to Hot Water Heating Application

⚠ WARNING

2-Way valves must be installed on a horizontal pipe only. It must not be installed on a vertical pipe.
The Actuator installation must be higher than the valve.
See "Flow Direction" on page 5



Valves Sizing

Motorized Valves should be sized by C_V ratings (the capacity factor or flow coefficient). This is defined as the number of gallons of water at 60°F which pass through a device with a one pound per square inch pressure differential.

2-Way Steam Valve Sizing

The selection of a steam valve in a zoning situation should be based on minimizing the drop across a two-way valve. In the case of heat exchangers the objective is to allow maximum capacity flow as specified by the heat exchanger and/or pump capacity. This formula is used:

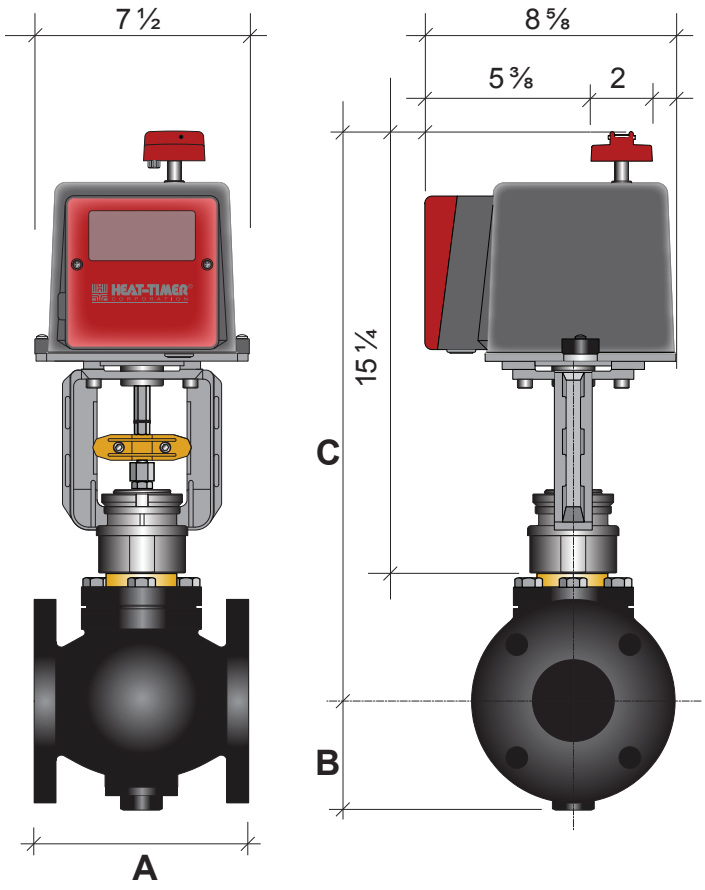
$$C_V = \frac{\text{Lb/hr.}}{2.1\sqrt{(P_1-P_2) \times (P_1+P_2)}}$$

Take this example in which the object is to calculate the C_V which will pass 5,000 lb/hr of saturated steam when the inlet pressure is 7 PSIG and a 2 PSIG pressure drop is desired. Remember to use absolute pressures.

$P_1 = 14.7 + 7.0 = 21.7$

$P_2 = P_1 - \Delta P = 19.7$

$$C_V = \frac{5{,}000}{2.1\sqrt{(21.7-19.7) \times (21.7+19.7)}} = 262$$



2-Way Single-Seat Motorized Valve

Valve Size	Catalog Number	Flow Coefficient C_V	Dimensions			Mount	Body	Trim	Est Shipping Weight	Medium Temp Range °F
			A	B	C					
1 ½"	928051-50-VM	24	5 ¾	3 ¼	19"	NPT	Bronze	S. Steel	31	32 to 300
2"	928052-00-VM	40	6 ½"	3 ⅝ "	19 ¼"	NPT	Bronze	S. Steel	35	32 to 300
2 ½"	928252-50-VM	65	9"	4 ¾"	20 ¾"	Flanged	Iron	Bronze	71	32 to 300
3"	928253-00-VM	90	10"	5 ⅜"	21 ⅝"	Flanged	Iron	Bronze	88	32 to 300
4"	928254-00-VM	170	13"	6 ⅜"	22 ⅝"	Flanged	Iron	Bronze	135	32 to 300
5"	928255-00-VM	280	15 ¾"	5 ¾"	23 ¼"	Flanged	Iron	Bronze	150	32 to 300
6"	928256-00-VM	360	17 ¾"	6 ½"	23 ⅞"	Flanged	Iron	Bronze	191	32 to 300

2-Way Double-Seat Motorized Valve

Valve Size	Catalog Number	Flow Coefficient C_V	Dimensions			Mount	Body	Trim	Est Shipping Weight	Medium Temp Range °F
			A	B	C					
2 ½"	928052-50-VM	70	7 ¾"	4 ⅛"	20 ⅜"	Flanged	Iron	Bronze	71	32 to 300
3"	928053-00-VM	100	9"	4 ⅜"	20 ⅝"	Flanged	Iron	Bronze	88	32 to 300
4"	928054-00-VM	200	11 ⅜""	5"	22 ⅛"	Flanged	Iron	Bronze	135	32 to 300
5"	928055-00-VM	260	12"	6 ⅞"	23 ⅛"	Flanged	Iron	Bronze	150	32 to 300
6"	928056-00-VM	350	14 ⅛	7 ⅝"	24"	Flanged	Iron	Bronze	191	32 to 300
8"	928058-00-VM	680	16 ¼"	8 ⅞"	25 ⅛"	Flanged	Iron	Bronze	306	32 to 350
10"	928060-00-VM	960	20"	9 ⅞"	25 ⅞"	Flanged	Iron	Bronze	451	32 to 350

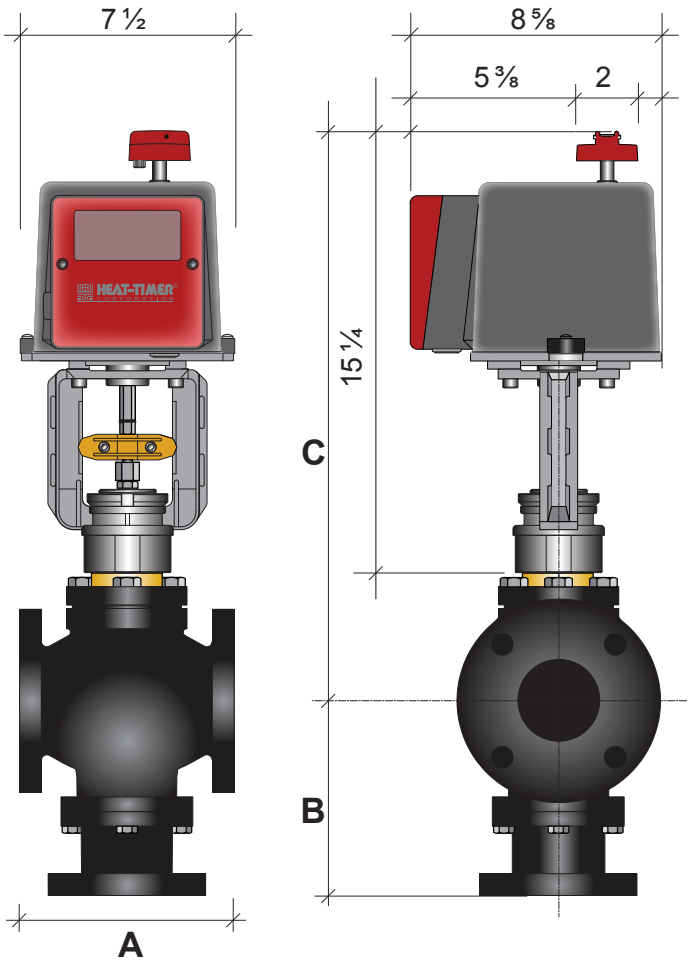
3-Way Water Valve Sizing

The selection of a Hot Water Valve should be based on a C_V rating approximately 10% greater than the calculated requirement to maintain control at the maximum flow rate. The following formula is used to calculate the required C_V rating is:

$$C_V = \frac{G.P.M.}{\sqrt{\Delta P}}$$

The objective is to minimize the pressure drop across the valve. Take this example in which the objective is to calculate the C_V which will pass 200GPM of water while limiting the pressure drop to 3 PSIG. These calculations must use absolute pressures.

$$C_V = \frac{200}{\sqrt{3}} = 115$$



3-Way Mixing

Valve Size	Catalog Number	Flow Coefficient CV	Dimensions			Mount	Body	Trim	Est Shipping Weight	Medium Temp Range °F
			A	B	C					
1”	928301-00-VM	11.6	4 ¼”	2 ¾”	18 ⅜'	NPT	Bronze	S. Steel	25	32 to 300
1 ½”	928301-50-VM	29	5 ¾”	3 ⅞”	19	NPT	Bronze	S. Steel	32	32 to 300
2”	928302-00-VM	46.3	6 ½”	4”	19 ½”	NPT	Bronze	S. Steel	36	32 to 300
2 ½”	928302-50-VM	69	9”	7 ⅛”	20 ¾"	Flanged	Iron	Bronze	80	32 to 350
3”	928303-00-VM	86	10”	8”	21 ⅝"	Flanged	Iron	Bronze	99	32 to 350
4”	928304-00-VM	156	13”	9 ⅞”	22 ⅝"	Flanged	Iron	Bronze	155	32 to 350
5”	928305-00-VM	270	15 ¾	9 ¼”	21 ½"	Flanged	Iron	Bronze	173	32 to 350
6”	928306-00-VM	347	17 ¾	9 ⅞”	22 ¼'	Flanged	Iron	Bronze	218	32 to 350
8”	928308-00-VM♦	450	16 ¼	11 ½”	25 ⅞"	Flanged	Iron	Bronze	331	32 to 350

♦ Actuator used may look different from image.

Troubleshooting

2-Way Actuator-Valve Installations:

Loud banging noise.

- Make sure that the valve is installed on a horizontal pipe. See "Piping 2-Way Motorized Valve in One-Pipe Steam Heating Application" on page 9
- Make sure that no condensate will drain back against the valve when closed. This will cause the steam to flash the condensate causing the banging when the valve opens.

3-Way Actuator-Valve

Water is getting hotter when the valve closes.

- Make sure to use the proper valve ports. See "Flow Direction" on page 5

Difficult to control water temperature.

- If the pump was installed before any of the hot or cold input ports, the control will not be able to regulate the temperature of the mix. In addition, the pump may fail or damage the valve when the valve is either fully open or fully close. The pump must be installed after the valve discharge port. See "Piping 3-Way Motorized Valve in Hot Water Heating Application" on page 11

Valve does not close.

- If the pump was installed before the hot input port, the actuator might not have the force to close the valve against the pump flow. The pump must be installed after the valve discharge port. See "Piping 3-Way Motorized Valve in Hot Water Heating Application" on page 11

Actuator Specifications

Actuator Input Signal:	24VAC Floating
Power Consumption:	10VA
Operating temperature	Ambient 15°F to 120°F
Manual Override:	Manual Crank Handle
Construction:	Aluminum Bracket and Housing
Locations:	NEMA Type 2 / IP54 Indoor Only
Clearance:	Minimum of 4- 6” above the actuator for manual operation
Mounting:	Vertical above center line of valve

2-Way Valve Specifications

Body:	(1 ½” -2” Valves) ANSI B16.15 Bronze 250lb. Threaded (NPT)
	(2 ½” - 10” Valves) ANSI B16.1 Iron 125lb. Flange
Trim:	(1 ½” -2” Valves) 316 Stainless Steel
	(2 ½” - 10” Valves) Bronze
Packing:	Long-Life Multi-Stack, EPDM Lip Packing for temperatures up to 350°F
Seat Closure:	(1 ½” - 2” Valves) Single-Seat ANSI Class IV and Class VI shut-off
	(2 ½” - 6” Valves) Single-Seat ANSI Class IV shut-off
	(8” - 10” Valves) Double-Seat ANSI Class IV shut-off
Temperature:	(1 ½” -2” Valves) +32ºF to 400ºF
	(2 ½” - 10” Valves) +32ºF to 350ºF

3-Way Valve Specifications

Body:	(1” -2” Valves) ANSI B16.15 Bronze 250lb. Threaded (NPT)
	(2 ½” - 8” Valves) ANSI B16.1 Iron 125lb. Flange
Trim:	(1” -2” Valves) 316 Stainless Steel
	(2 ½” - 8” Valves) Bronze
Packing:	Long-Life Multi-Stack, EPDM Lip Packing for temperatures up to 350°F
Seat Closure:	(1” - 8” Valves) ANSI Class IV shut-off
Temperature:	(1 ½” -2” Valves) +32ºF to 400ºF
	(2 ½” - 8” Valves) +32ºF to 350ºF

HT# 059103-00 B

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