MOTORIZED 3-WAY VALVE APPLICATION INSTRUCTIONS FOR LOW TEMPERATURE PROTECTION KIT 100171920 MODELS PB 502 - 2001 AND CF/CH 402 - 2072

⚠ WARNING

Electrical Shock Hazard-- For your safety, turn OFF electrical power supply before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

List of kit components

Model	Part Number	Component Description
PB/PF 502 - 2001 CH 402 - 2072	100208596	2-1/2" Motorized 3-Way Valve
	100173331	18 GA White Wire (5 ft.)
	100173335	18 GA Pink Wire (5 ft.)
	100173340	18 GA Yellow Wire (5 ft.)
	100161070	Instruction Sheet

CAUTION

Valve is intended for indoor use only.

Valve technical data

Power Supply: 22-26 VAC or 28-32 VDC

Max. Power Consumption: 6VA @ 26VAC at Full Load

Control Signals: 3 Wire 3 Point Floating

Torque: 50 in.lb. or 5.6 Nm at Rated Voltage

Rotation Time: 0-50 in.lb. / 20-30 Seconds Through 90˚

Actuator Ambient Temperature: 0˚F to +122˚F or -18˚C to +50˚C

Enclosure: Motor -UL recognized QMFZ Fire Rated 94 - 5 Gear Train - Die Cast Zinc with a Steel Base

Valve Body: Forged Brass ASTM B283

Ball and Stem: Nickel Plated Brass

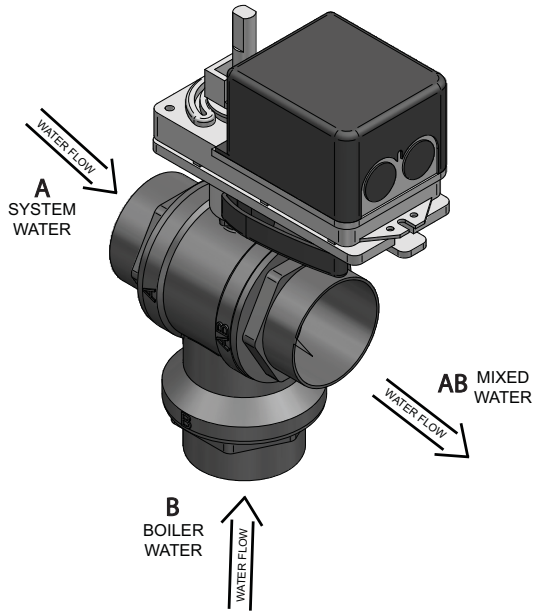
End Connections: 2-1/2" NPT Female

Max. Close-Off Pressure: 40 PSIG

CAUTION

Pump and motor unit are designed to be supported by the inline piping only. Do not support in any other manner. When placing pump between flanges, tighten flange bolts evenly and do not tighten excessively.

Figure 1 *2-1/2" Motorized 3-Way Valve*



NOTE: A-B-AB is noted on the valve to depict proper orientation. Arrows depict flow direction.

Wiring instructions

1. Locate the 18 GA white (100173331), pink (100173335), and yellow (100173340) wires provided in the kit. As indicated by Steps 2 through 5 below, route each wire from the connection board inside the motorized 3-way valve (100208596) to the connection board.

   For PB Models Only: The connection board is located inside the junction box on the back of the unit (FIG.'s 3A & B).

   For CF/CH Models: The connection board is located inside the control panel on the front of the unit (FIG. 4).

   NOTE: Lift the cover on the motorized 3-way valve to gain access to the connection board.

Figure 2 *2-1/2" Motorized 3-Way Valve Diagrams*

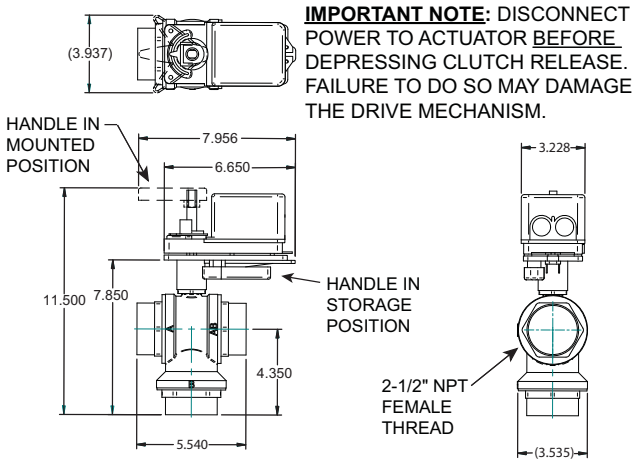


Figure 3A *Route wires to connection boards - Power-fin Models prior to serial #1707104971206*

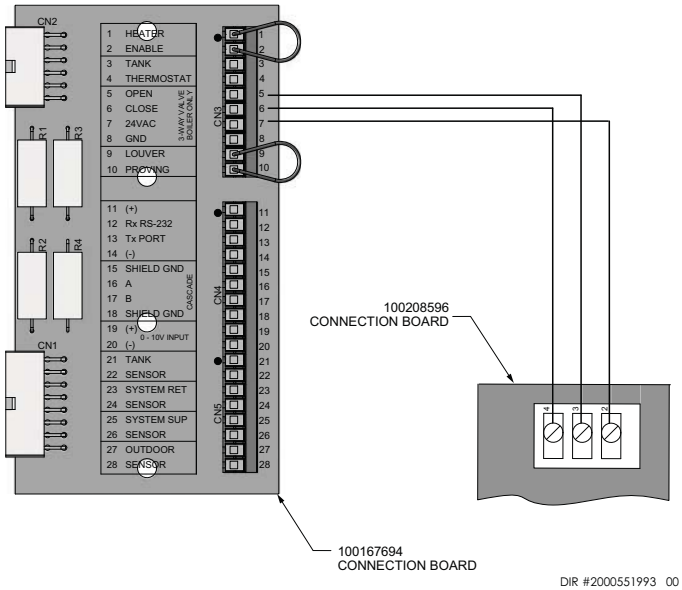


Figure 3B *Route wires to connection boards - Power-fin Models beginning serial #1707104971206*

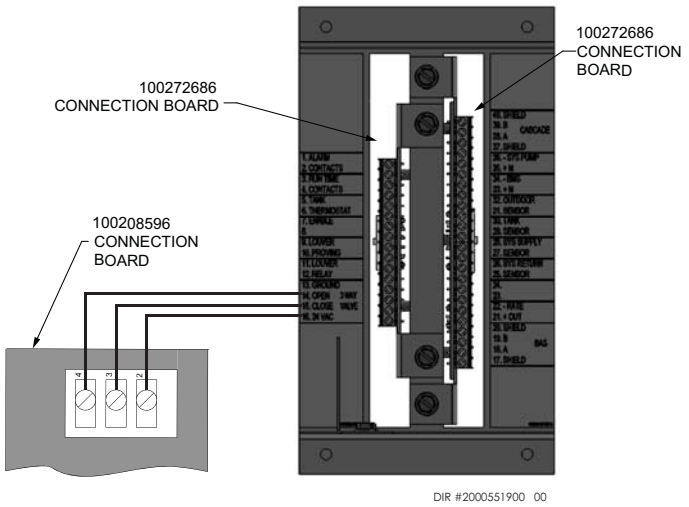
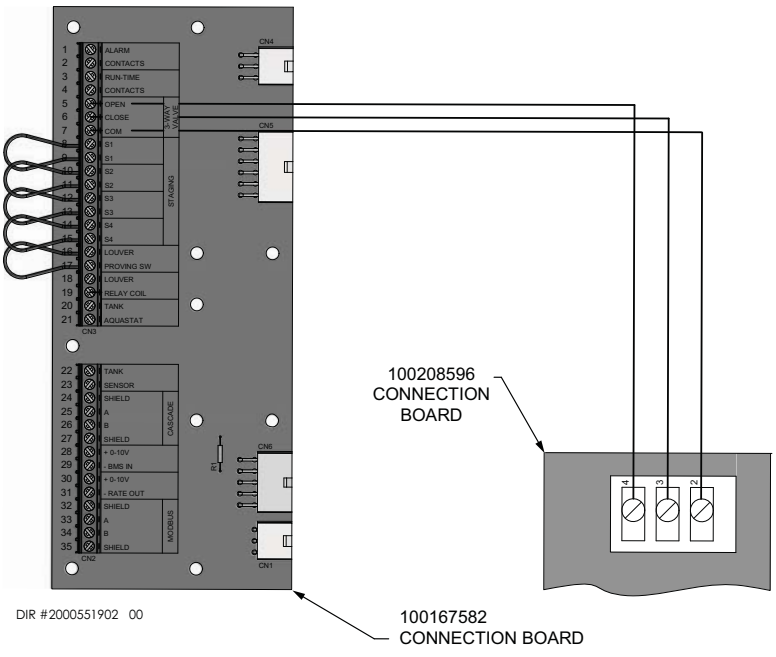


Figure 4 *Route wires to connection boards - Copper-Fin Models*



Pump sizing instructions

See Table 1 for the 100208596 pressure drop information at varying flows. Reference Tables 2 and 3 (depending on model) below for heat exchanger pressure drop information at varying flows.

The boiler pump must be sized based on the boiler, flow, and head loss of your specific application.

⚠ WARNING

Pump must be properly sized to overcome the head loss of: (1) the boiler heat exchanger as detailed in Tables 2 and 3; (2) the 100208596 valve as detailed in Table 1 and the equivalent feet of piping specific to each application.

Table 1 – *100208596 Pressure Drop*

2-1/2" 3-Way Valve	
Head Loss	**Flow**
3.9 Ft/hd	95 GPM
3.7 Ft/hd	90 GPM
2.8 Ft/hd	85 GPM
2.8 Ft/hd	80 GPM
2.5 Ft/hd	75 GPM
2.1 Ft/hd	70 GPM
1.6 Ft/hd	65 GPM
1.4 Ft/hd	60 GPM
1.2 Ft/hd	55 GPM
1.2 Ft/hd	50 GPM
0.7 Ft/hd	45 GPM
0.7 Ft/hd	40 GPM
0.5 Ft/hd	35 GPM
0.5 Ft/hd	30 GPM
0.2 Ft/hd	25 GPM
0.2 Ft/hd	20 GPM

Table 2 – *Heat Exchanger Pressure Drop for PB Models*

SYSTEM TEMPERATURE RISE CHART															
BTU/HR		**30°F ΔT**		**35°F ΔT**		**40°F ΔT**		**45°F ΔT**		**50°F ΔT**		**55°F ΔT**		**60°F ΔT**	
Input	Output	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd
500,000	435,000	29.0	0.9	24.9	0.7	21.8	0.5	19.3	0.4	17.4	0.3	15.8	0.2	14.5	0.1
750,000	652,500	43.5	2.1	37.3	1.8	32.6	1.3	29.0	1.0	26.1	0.8	23.7	0.7	21.8	0.6
1,000,000	870,000	58.0	4.8	49.7	3.3	43.5	2.4	38.7	2.0	34.8	1.6	31.6	1.2	29.0	1.1
1,300,000	1,131,000	75.4	9.8	64.7	6.9	56.6	4.6	50.3	3.6	45.3	2.9	41.1	2.2	37.7	1.9
1,500,000	1,275,000	87.9	9.8	75.3	7.7	65.9	6.3	58.6	5.2	52.9	4.2	47.9	3.3	43.9	2.7
1,700,000	1,445,000	99.6*	14.1	85.4	10.2	74.7	7.9	66.4	6.5	59.8	5.3	54.3	4.6	49.8	3.9
2,000,000	1,700,000	117.2*	20.2	100.4*	14.9	87.9	11.9	78.1	9.2	70.3	7.2	63.9	6.4	58.6	5.2

* The Asterisk indicates flow rates that exceed the Maximum Allowable Flow Rate of the Heat Exchanger and must not be used.

Cupro-Nickel heat exchanger required at flows above 75 GPM on Models 502 - 1302 and above 90 GPM on Models 1501 - 2001.

Table 3 – *Heat Exchanger Pressure Drop for CF/CH Models*

SYSTEM TEMPERATURE RISE CHART															
BTU/HR		**30°F ΔT**		**35°F ΔT**		**40°F ΔT**		**45°F ΔT**		**50°F ΔT**		**55°F ΔT**		**60°F ΔT**	
Input	Output	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd	GPM	Ft/hd
399,999	339,999	23	1.1	19	0.7	--	--	--	--	--	--	--	--	--	--
500,000	425,000	28	1.6	24	1.2	21	0.7	19	0.7	--	--	--	--	--	--
650,000	552,500	37	3.0	31	2.2	28	1.6	24	1.2	22	0.9	20	0.7	18	0.6
750,000	637,500	42	4.1	36	2.8	32	2.3	28	1.6	25	1.3	23	1.1	21	0.7
990,000	841,500	55	2.6	48	2.3	42	1.5	37	1.4	33	1.0	30	0.9	28	0.9
1,260,000	1,071,000	71	4.4	61	3.6	53	2.7	48	2.3	42	1.7	39	1.5	35	1.2
1,440,000	1,224,000	81	6.3	70	5.0	61	3.8	54	2.7	48	2.3	44	2.0	40	1.8
1,800,000	1,530,000	102*	11.8	87	9.0	76	6.6	68	5.6	61	4.4	55	2.6	50	3.0
2,070,000	1,759,500	--	--	100*	10.1	87	9.0	78	7.6	70	6.2	64	5.4	58	4.6

* The Asterisk indicates flow rates that exceed the Maximum Allowable Flow Rate of the Heat Exchanger and must not be used.

*Cupro-Nickel Heat Exchanger Required at Flows Above 55 GPM on Models 402 - 752 and above 90 GPM on Models 992 - 2072.

Typical piping applications:

Installation instructions

1. Install the motorized 3-way valve in the piping as shown in FIG's. 5 thru 8, depending on model.
2. Unit(s) high limit must be set at max.
3. Inlet and outlet connections to the boiler are shown for reference only. Actual connections may vary from those represented here. Consult the Installation and Service Manual for actual locations.
4. Unit(s) pump should operate only during firing periods.

Figure 5 *Primary/Secondary Piping of a Single Boiler - 2-1/2" Motorized 3-Way Valve - Powerfin models*

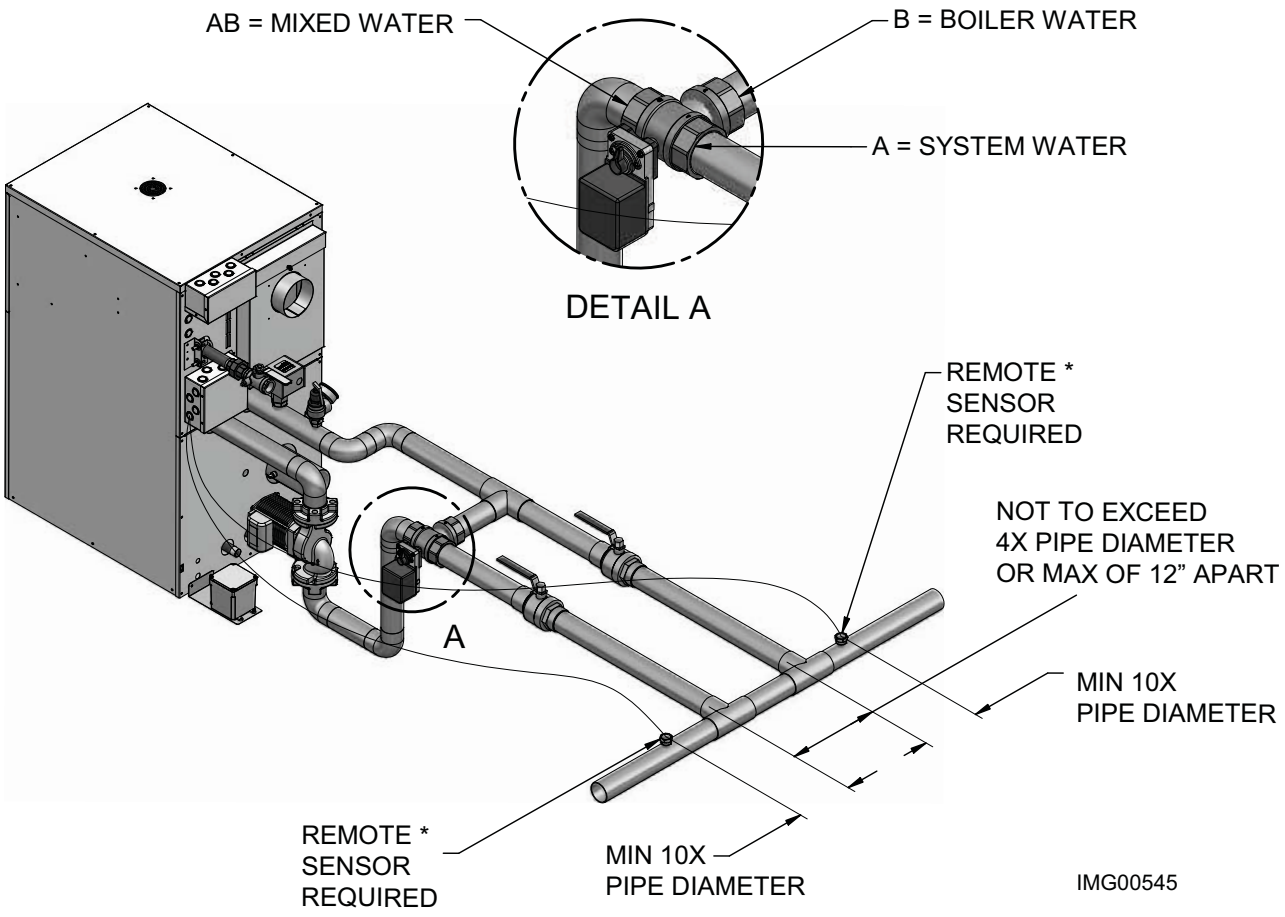


Figure 6 *Primary/Secondary Piping of Multiple Boilers - 2-1/2" Motorized 3-Way Valve for each appliance - Power-fin models*

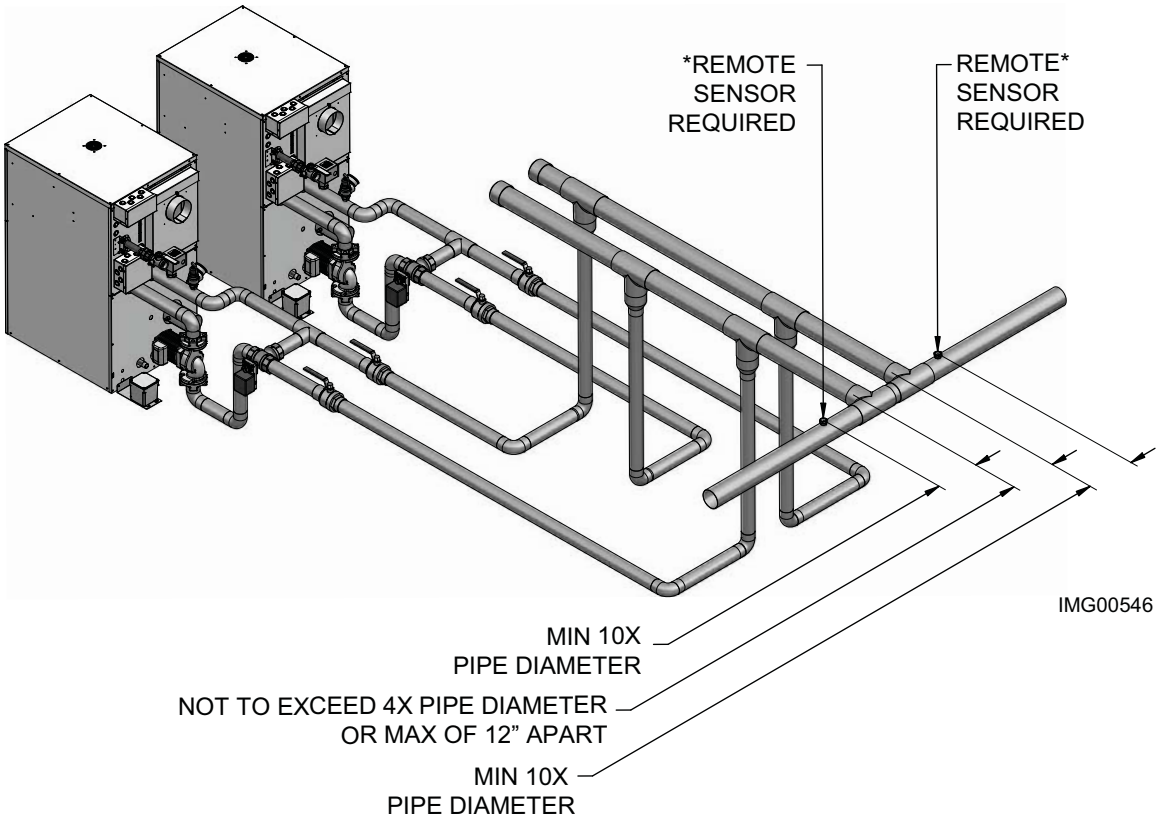


Figure 7 *Primary/Secondary Piping of a Single Boiler - 2-1/2" Motorized 3-Way Valve - Copper-Fin models*

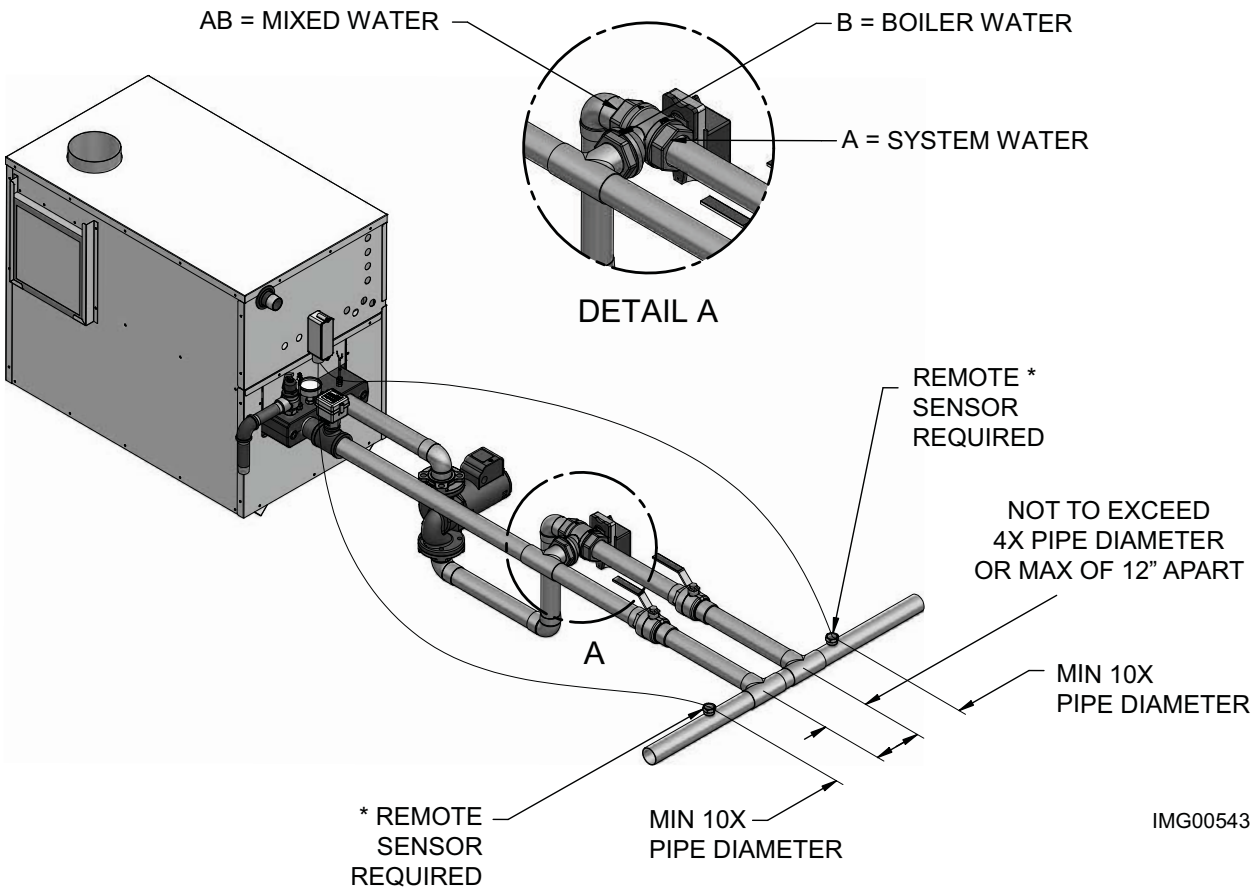
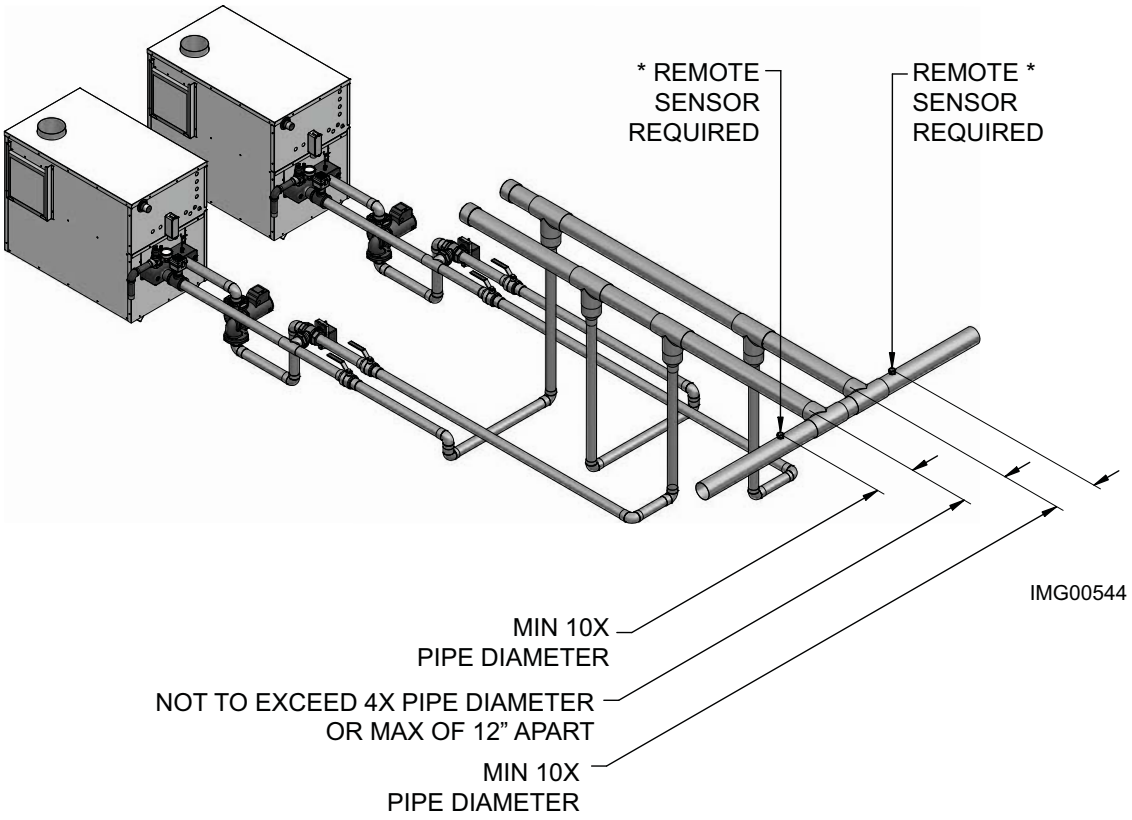


Figure 8 *Primary/Secondary Piping of Multiple Boilers - 2-1/2" Motorized 3-Way Valve for each appliance - Copper-Fin models*



Startup instructions

1. When there is no call for the heat, the valve will remain at its default position of 0˚ where it will be closed to bypass (the running time through the 90˚ going from closed to bypass to fully open is 20-30 seconds).
2. Observe the unit when there is a call for heat.
3. Check to see that the valve slowly opens to the bypass water, blending with the return water to bring the inlet temperature to the boiler up to 140˚F.
4. Monitor the valve to make sure it maintains a constant temperature and does not make dramatic jumps.
5. As the return water heats up to 140˚F or above, the valve will close to the bypass.

Notes

Revision Notes: *Revision A (ECO C01815) initial release.*

Revision B (ECO C02223) reflects the revision of FIG. 5.
Revision C (ECO C06696) reflects the update of the wiring diagram in Figure 3 on page 2.
Revision D (ECO C11123) reflects the addition of CF/CH Models and Table 3 on page 3.
Revision E (PCP# 3000005238 / CN# 500005983) reflects the removal of the blue wire.
Revision F (PCP# 3000021627 / CN# 500011855) reflects an update to add the new PF.

11/17 - Printed in U.S.A.