

PEERLESS

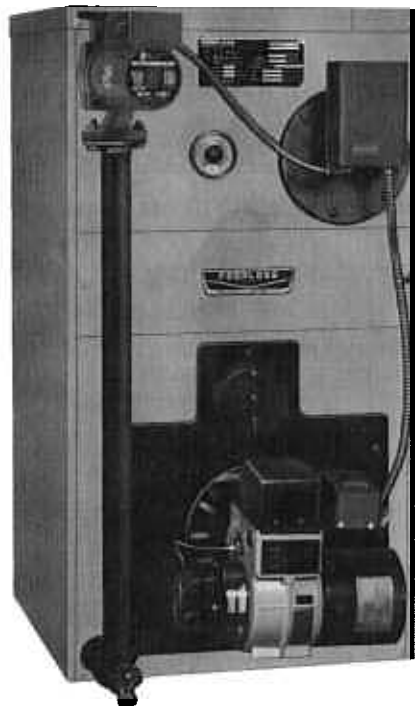


CAST IRON BOILERS

INSTALLATION INSTRUCTIONS

HANG THESE INSTRUCTIONS IN VICINITY OF BOILER

SERIES JO-TW AND JOT-TW OIL BOILERS



THE PEERLESS HEATER COMPANY

DIVISION OF PEERLESS INDUSTRIES INCORPORATED
BOYERTOWN, PENNSYLVANIA 19512 / PHONE (215) 367-2153

HEATING PRODUCTS SINCE 1908

INSTALLATION INSTRUCTIONS - - SERIES JO-TW and JOT-TW

Read carefully before beginning work. It will save time. Study the included drawings.

A shipping list is enclosed listing the items as packed at the factory. Check the sheet as you unpack the parts.

The equipment shall be installed in accordance with those installation regulations in force in the local area where the installation is to be made. These shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before installations are made.

A — ACCESSIBILITY CLEARANCES

- 1—To provide for reasonable conditions of accessibility, the following minimum clearances are recommended.
 - a. 24" between the side of the boiler and adjacent wall or other appliances, when access is required for servicing.
 - b. 30" between the front and rear of the boiler to an adjacent wall.

B — AIR FOR COMBUSTION AND VENTILATION

- 1—Be certain adequate facilities are available to provide air for satisfactory combustion and ventilation.
- 2—Appliances Located in Unconfined Spaces.
 - a. Installations in unconfined spaces with conventional construction and larger areas such as basements, the supply of air for combustion and ventilation can usually be considered adequate.
- 3—Appliance Located in Confined Spaces
 - a. If all air for combustion and ventilation is to come from within the building, two openings, one near the ceiling and one near the floor of the boiler room shall be provided with the minimum free area of each opening equal to 140 sq. in. per gallon of oil burned.
 - b. If all air for combustion and ventilation is to come from outside the building; two openings, one near the ceiling and one near the floor of the boiler room shall be provided with the minimum free area of each opening equal to 35 sq. in. per gallon of oil burned.

If ducts are used to convey the air, areas of 35 sq. in. per gallon of oil burned for vertical ducts or 70 sq. in. per gallon of oil burned for horizontal ducts are to be provided. Ducts shall have the same area as the free area of the openings to which they are connected.

C — SETTING BOILER BLOCK

- 1—The Series JO-TW and JOT-TW Boiler Sections are Factory Assembled with the Target Wall Shipped in Place. Provide a level foundation, located as close as possible to the center of the heating system and to the chimney.
- 2—Open flue collector carton. Remove flue collector (Item 9, Fig. 2) and high temperature rope. Lay rope (Item 8, Fig. 2) on top of boiler against bead provided.
- 3—Place flue collector on top of rope and attach to boiler with $\frac{1}{4}$ "-20 x $1\frac{3}{4}$ " studs with nuts through flue collector brackets into the tapped lugs provided in the top of the boiler end sections. Draw bolts down snugly.
- 4—**Caution:** This boiler is NOT APPROVED for use on combustible flooring.

D — JACKET ASSEMBLY

- 1—Attach the back jacket panel (19) to bosses on middle of back section with two $\frac{1}{4}$ " x $\frac{3}{8}$ " machine screws (20) provided. The back panel has two $\frac{5}{16}$ " dia. holes close to the center of the panel.
- 2—Attach both the left (21) and right (22) side panels to the back panel and secure with sheet metal screws. Be certain the offset flanges of the side panels are inserted into the offset clip attached to the back panel.
NOTE: ON SERIES JOT-TW BOILERS, THE OPTIONAL WATER HEATER (18) MUST BE INSTALLED BEFORE THE LEFT SIDE JACKET PANEL IS ATTACHED.
- 3—Remove combustion chamber plate (3). Remove observation door (4) from inside of combustion chamber plate. Place cerafelt liner on floor of boiler in front of target wall.
- 4—Place the lower front jacket panel (23) on the block and replace the combustion chamber cover plate (3). Attach the observation door (4).
- 5—Attach the left and right side panel to the lower front panel in the same manner as they are attached to the back panel. See No. 2 above.
- 6—Attach upper front panel (24). Be certain the offset flanges of the side panels slip into the offset clip on the front panel.
- 7—Attach the top panel. The top is made in two pieces (26 and 27). Join the two pieces together with sheet metal screws. Secure top panel to front, back and sides with sheet metal screws.
- 8—Attach the center front clean-out access panel (25). Secure with sheet metal screws.

9—Water Heater

a. Series JO-TW

Install Water Heater (13) when required, in large opening in front of boiler. See Figure 1 for suggested piping.

b. Series JOT-TW

Install Water Heater (18) when required, in large opening in back section. See Figure 1A for suggested piping.

Tankless Water Heater Ratings

Heater No.	*Capacity G.P.M.	
X-1020	5	For Use in Series JO-TW
CC-1020	5	For Use in Series JOT-TW

*Water heater ratings are based on intermittent demand — 40° F. to 140° F with 200° F Boiler Water Temperature.

When water heater is not employed, cover the heater opening with cover plate (12) or (16).

BE SURE RUBBER GASKET IS IN PLACE BETWEEN COVER PLATE OR WATER HEATER PLATE AND BOILER SECTION.

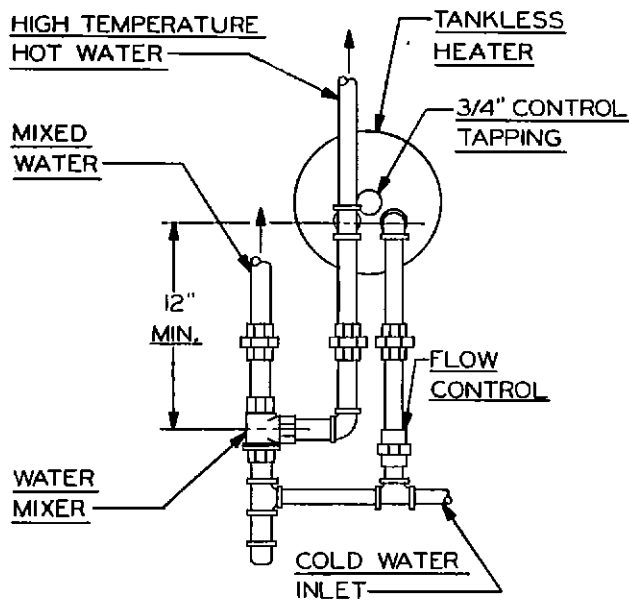


Figure 1

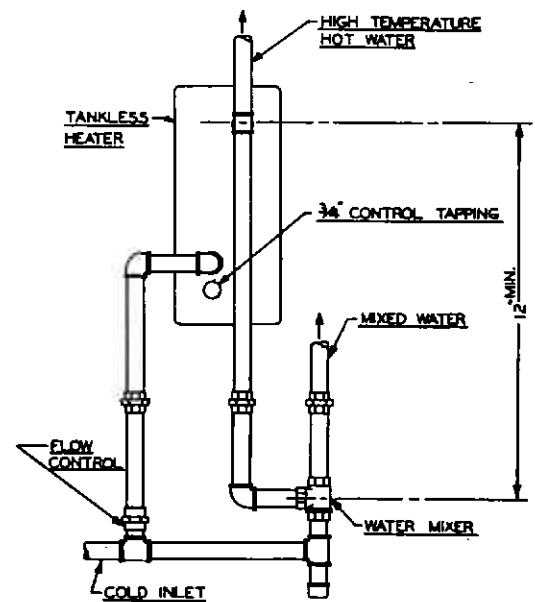


Figure 1A

Caution: Water mixing valve should always be installed in the hot water supply to prevent injury, see Figures 1 and 1A.

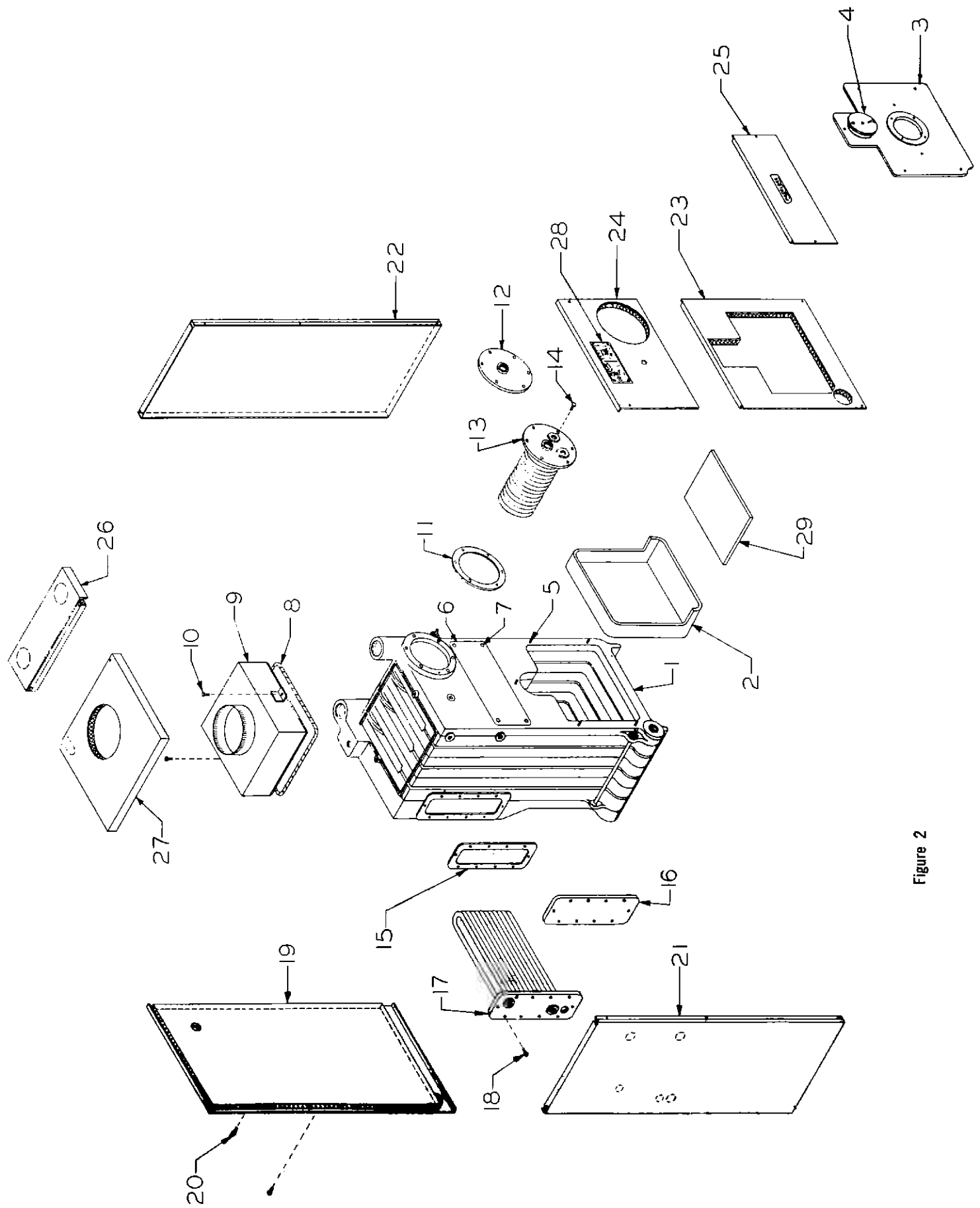


Figure 2

SERIES JO-TW and JOT-TW

Item No.	Description	Part No.	Model No.			
			JO-TW075 JO-TW100 JO-TW125	JO-TW150 JO-TW175	JO-TW200 JO-TW250	JO-TW275 JO-TW300
1	Block Assembly JO-TW	CC-1090	X			
	Block Assembly JO-TW	CC-1090-1		X		
	Block Assembly JO-TW	CC-1090-2			X	
	Block Assembly JO-TW	CC-1090-3				X
	Block Assembly JOT-TW	CC-1091	X			
	Block Assembly JOT-TW	CC-1091-1		X		
	Block Assembly JOT-TW	CC-1091-2			X	
	Block Assembly JOT-TW	CC-1091-3				X
2	Target Wall	CC-3025	X	X	X	X
3	Combustion Chamber Cover Plate	X-1060	X	X	X	X
4	Observation Door	X-1031	X	X	X	X
5	5/16"-18 x 2 1/4" Studs w/Nuts - 5 Required	X-1061	X	X	X	X
6	Clean Out Cover Plate	CC-1038	X	X	X	X
7	5/16"-18 x 1 1/4" Studs w/Nuts - 4 Required	X-1063	X	X	X	X
8	High Temp Rope 3/8" Dia. 48" Long		X			
	High Temp Rope 3/8" Dia. 56" Long			X		
	High Temp Rope 3/8" Dia. 64" Long				X	
	High Temp Rope 3/8" Dia. 72" Long					X
9	Flue Collector	CC-5010	X			
	Flue Collector	CC-5010-1		X		
	Flue Collector	CC-5010-2			X	
	Flue Collector	CC-5010-3				X
10	1/4"-20 x 1 3/4" Studs w/Nuts - 2 Required	X-5000	X	X	X	X
11	Rubber Gasket	X-1023	X	X	X	X
12	Cover Plate	X-1034	X	X	X	X
13	Tankless Coil (Optional Water Only)	X-1020	X	X	X	X
14	3/8"-16 x 3/4" Hex. Hd. Cap Screws - 6 Required		X	X	X	X
15	Rubber Gasket (JOT-TW Models)	CC-1018	X	X	X	X
16	Cover Plate (Optional JOT-TW Models)	CC-1037	X	X	X	X
17	Tankless Heater (Optional JOT-TW Models)	CC-1020	X	X	X	X
18	3/8"-16 x 3/4" Hex. Hd. Cap Screws - 12 Required		X	X	X	X
19	Back Jacket Panel	CC-6027	X	X	X	X
20	1/4"-20 x 3/8" Truss Hd. Machine Screws Cad. Plate - 2 Required		X	X	X	X

SERIES JO-TW and JOT-TW

Item No.	Description	Part No.	Model No.			
			JO-TW075 JO-TW100 JO-TW125	JO-TW150 JO-TW175	JO-TW200 JO-TW250	JO-TW275 JO-TW300
21	Left Side Jacket Panel	CC-6029	X			
	Left Side Jacket Panel	CC-6029-1		X		
	Left Side Jacket Panel	CC-6029-2			X	
	Left Side Jacket Panel	CC-6029-3				X
22	Right Side Jacket Panel	CC-6028	X			
	Right Side Jacket Panel	CC-6028-1		X		
	Right Side Jacket Panel	CC-6028-2			X	
	Right Side Jacket Panel	CC-6028-3				X
23	Lower Front Panel	CC-6026	X	X	X	X
24	Upper Front Panel	CC-6024	X	X	X	X
25	Clean-Out Access Panel	CC-6025	X	X	X	X
26	Right Top Jacket Panel	CC-6031	X			
	Right Top Jacket Panel	CC-6031-1		X		
	Right Top Jacket Panel	CC-6031-2			X	
	Right Top Jacket Panel	CC-6031-3				X
27	Left Top Jacket Panel	CC-6032	X			
	Left Top Jacket Panel	CC-6032-1		X		
	Left Top Jacket Panel	CC-6032-2			X	
	Left Top Jacket Panel	CC-6032-3				X
28	Rating Plate	9196	X	X	X	X
29	Base Liner	CC-3043	X			
	Base Liner	CC-3043-1		X		
	Base Liner	CC-3043-2			X	
	Base Liner	CC-3043-3				X

F — PIPING

DO NOT PIPE BOILER BEFORE JACKET IS INSTALLED.

- 1—See Figures 3 and 4 for suggested piping to the boiler.
- 2—Make up cold water supply connection to the boiler.
- 3—Install pressure gauge or therallimeter in tapping provided. See Figure 6.
- 4—Plug all open tappings in the boiler and fill with water. Apply approximately thirty (30) pounds pressure. Check to make certain that all joints and fittings are water tight.
- 5—After all joints and connections have been proven water tight, remove cold water supply and plugs from all tappings that are to be used. See Figure 6 for tapping locations.

NOTE: IF THIS BOILER AND DISTRIBUTING SYSTEM IS USED IN CONJUNCTION WITH A REFRIGERATION SYSTEM, THE CHILLED MEDIUM SHALL BE PIPED IN PARALLEL WITH THE BOILER AND THE PROPER VALVES APPLIED TO PREVENT THE CHILLED MEDIUM FROM ENTERING THE BOILER. WHEN THE BOILER IS CONNECTED TO HEATING COILS LOCATED IN AIR HANDLING UNITS WHERE THEY MAY BE EXPOSED TO REFRIGERATED AIR CIRCULATION, THE BOILER PIPING SYSTEM MUST BE EQUIPPED WITH FLOW CONTROL VALVES OR OTHER AUTOMATIC MEANS TO PREVENT GRAVITY CIRCULATION OF THE BOILER WATER DURING THE COOLING CYCLE.

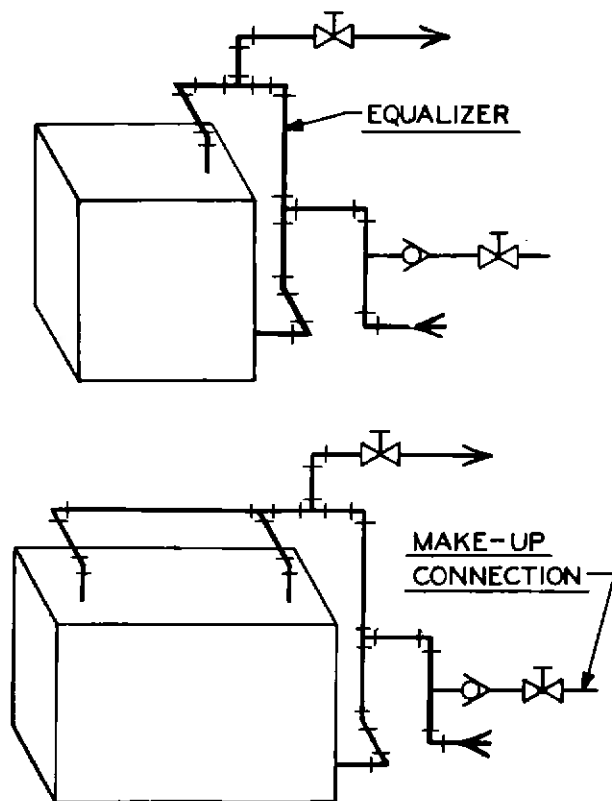


Figure 3

The supply and return connections should be sized to suit the system.

The supply should be out of the top of the back section and return to the bottom of the front section. There is a 3/4" tapping in the top of the back section for air elimination.

Boiler Model No.	Risers	Header	Equalizer
JO-TW075	1 - 2"	—	1 1/4"
JO-TW100	1 - 2"	—	1 1/4"
JO-TW125	1 - 2"	—	1 1/4"
JO-TW150	2 - 2"	2 1/2"	1 1/2"
JO-TW175	2 - 2"	2 1/2"	1 1/2"
JO-TW200	2 - 2"	3"	1 1/2"
JO-TW250	2 - 2"	3"	1 1/2"
JO-TW275	2 - 2"	3"	1 1/2"
JO-TW300	2 - 2"	3"	1 1/2"

The return from system should always enter equalizer through Hartford Loop, 2" to 4" below water line.

STEAM

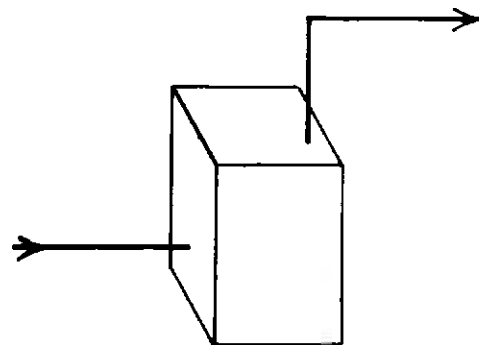


Figure 4

HOT WATER

6 — OIL BURNER INSTALLATION

- 1—The oil burner is supplied with a mounting flange fixed in position.
- 2—Mount the burner to the combustion chamber cover plate (3) Figure 2 with the four 5/16" studs and nuts provided.
BE SURE HI TEMP GASKET IS BETWEEN THE BURNER MOUNTING FLANGE AND THE COMBUSTION CHAMBER COVER PLATE.
- 3—Oil Burner Specifications.

For information pertinent to the oil burner such as nozzle sizing, fuel supply piping, adjusting or servicing refer to Figure 5 and the installation manual accompanying the burner. For nozzle sizing with pump pressures exceeding 100 PSI refer to chart on page 12. Beckett Burner with 140 PSI see page 7.

BECKETT BURNER WITH 100 PSI PUMP PRESSURE

Boiler Model No.	Burner Model No.	Burner Head	Static Plate	Nozzle** Size	Start-Up Settings	
					Air Shutter	Air Band
JO/JOT-TW075	AFG-F3*	F3	2 3/4"	.75 70° A	8.0	0
JO/JOT-TW100	AFG-F3	F3	2 3/4"	1.00 80° B	9.0	0
JO/JOT-TW125	AFG-F3	F3	2 3/4"	1.25 80° B	9.5	2
JO/JOT-TW150	AFG-F12	F12	2 3/4"	1.50 80° B	5.0	2
JO/JOT-TW175	AFG-F12	F12	2 3/4"	1.75 80° A	6.5	3
JO/JOT-TW200	AFG-F12	F12	2 3/4"	2.00 80° B	9.5	4
JO/JOT-TW250	AFG-F220	F220	2 3/4"	2.50 70° B	10.0	4
JO/JOT-TW275	SF-F220	F220	2 1/4"	2.75 70° B	3.0	0
JO/JOT-TW300	SF-F220	F220	2 1/4"	3.00 70° B	5.0	0

WAYNE BURNER WITH 100 PSI PUMP PRESSURE

Boiler Model No.	Burner Model No.	Air Cone I.D.	Nozzle** Size	Flame Lock	Start-Up Settings Off-Cycle Damp.	Air Shutter
JO/JOT-TW075	HS	2½" No Holes	.75 80° A	1	1.0	.50
JO/JOT-TW100	HS	2½" No Holes	1.00 80° B	1	1.2	1.50
JO/JOT-TW125	HS	2½" No Holes	1.25 80° B	1½	1.5	1.75
JO/JOT-TW150	HS	2½" 6 Holes	1.50 80° B	2½	2.0	2.25
JO/JOT-TW175	HS	2½" 6 Holes	1.75 80° B	2½	2.0	2.50
JO/JOT-TW200	HS	2½" 6 Holes	2.00 80° B	2½	2.0	3.50
JO/JOT-TW250	HS	2½" 6 Holes	2.50 80° B	3	2.0	5.00
JO/JOT-TW275	HS	3-5/16" Str. Bore	2.75 80° B	2½	2.0	4.00
JO/JOT-TW300	HS	3-5/16" Str. Bore	3.00 80° B	2½	2.0	4.50

CARLIN BURNER WITH 100 PSI PUMP PRESSURE

Boiler Model No.	Burner Model No.	Air Cone I.D.	Air Shutter	Nozzle** Size	Start-Up Settings Head Dim. "A"	Air Band
JO/JOT-TW075	99FRD/CRD	1051-7NH 2¼"	Blank	.75 60° A	1	25% open
JO/JOT-TW100	99FRD/CRD	1051-7NH 2¼"	Blank	1.00 70° B	2	35% open
JO/JOT-TW125	99FRD/CRD	1051-7NH 2¼"	Blank	1.25 70° B	2½	40% open
JO/JOT-TW150	99FRD/CRD	1051-7NH 2¼"	Blank	1.50 70° B	3	60% open
JO/JOT-TW175	99FRD/CRD	1051-7NH 2¼"	Blank	1.75 70° B	4	80% open
JO/JOT-TW200	99FRD/CRD	1051-7 2¼"	Open	2.00 70° B	4	100% open
JO/JOT-TW250	99FRD/CRD	1051-7 2¼"	Open	2.50 70° B	6	100% open
JO/JOT-TW275	102CRD	1251B-7 2½"	Open	2.75 60° B	7	100% open
JO/JOT-TW300	102CRD	1251B-7 2½"	Open	3.00 60° B	9	100% open

BECKETT BURNER WITH 140 PSI PUMP PRESSURE

Boiler Model No.	Burner Model No.	Burner Head	Static Plate	Nozzle** Size	Start-Up Settings Air Shutter	Air Band	Head Setting
JO/JOT-TW075	AFG-F3*	F3*	3½"	.65 80° A	6.0	2	N/A
JO/JOT-TW100	AFG-F3	F3	3½"	.85 80° A	6.0	1	N/A
JO/JOT-TW125	AFG-F3	F3	3½"	1.10 80° B	4.0	4	N/A
JO/JOT-TW150	AFG-F6	F6	2½"	1.25 80° A	10.0	1	N/A
JO/JOT-TW175	AFG-F6	F6	2½"	1.50 80° A	10.0	4	N/A
JO/JOT-TW200	AFG-MVI	M-V1-4	2½"	1.75 70° B	10.0	4.5	4
JO/JOT-TW250	AFG-MVI	M-V1-5	2½"	2.00 70° B	10.0	6	5
JO/JOT-TW275	SF-F220	F220	2½"	2.25 70° B	4.0	0	N/A
JO/JOT-TW300	SF-F220	F220	2½"	2.50 70° B	5.0	0	N/A

*Requires Low Firing Rate Baffle

**Recommend Delavan or equal

NOTE: Above air settings are start-up settings only — final adjustments are to be made with combustion test instruments Adjust burner for highest CO2 (Maximum 13%) while maintaining a smoke and -.01 to -.02 overfire draft.

Figure 5

H — CONTROLS

1—Apply controls as follows:

a. Water Boilers:

Install the limit or operating control, theraltimeter and pressure relief valve. See Figure 6 for proper location.

b. Steam Boilers:

Install pressure limit control, pressure gauge, gauge glass trim and pop safety valve. See Figure 6. For application of low water cut-off see Figure 7, and control manufacturers instruction sheet shipped with the control.

Caution: Pipe the discharge of the pop safety valve or relief valve to prevent injury in the event of pressure relief. Suggest discharge to be piped to drain. Pipe full size of outlet.

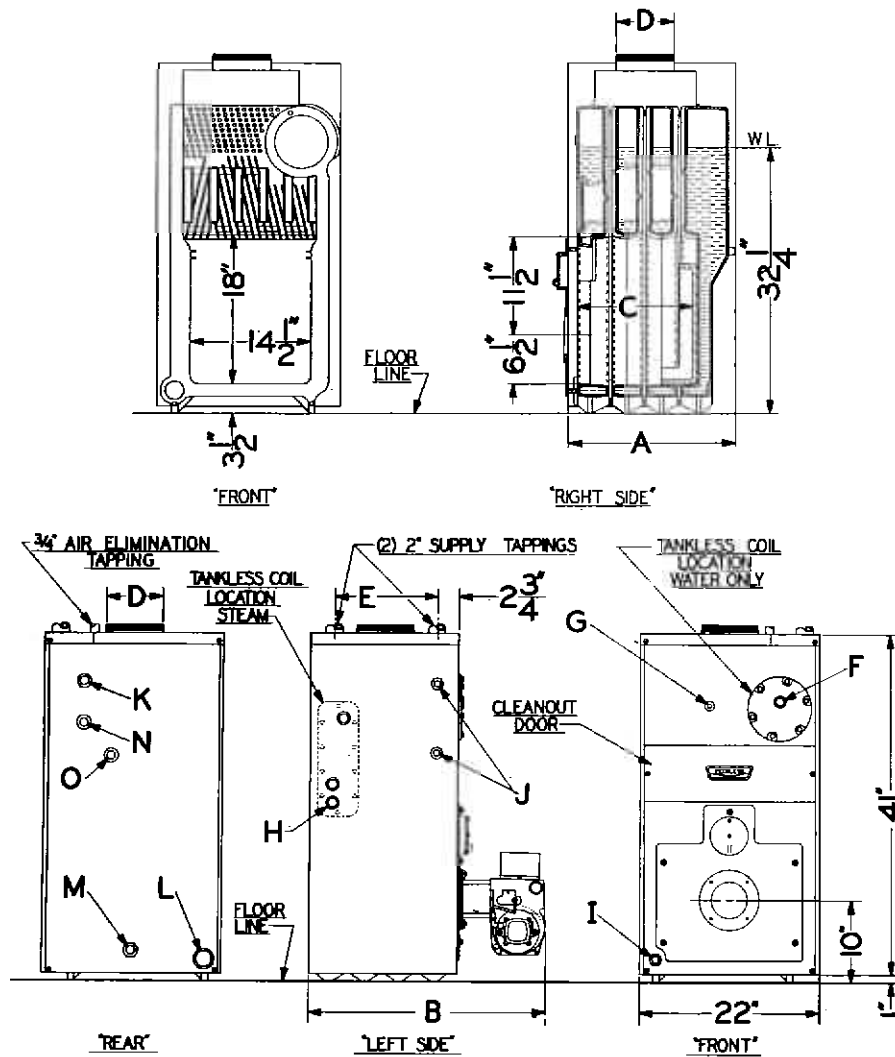


Figure 6

DIMENSIONS

Boiler Model No.	Length Flush Jacket A	Length Over All B	Length Fire Box C	Flue Outlet D	Center Supply Tappings E
JO/JOT-TW075 TW100 TW125	15 7/8"	26 7/8"	10"	6"	9"
JO/JOT-TW150 TW175	20"	31"	14-3/16"	7"	13 1/8"
JO/JOT-TW200 TW250	24 1/8"	35 1/8"	18 1/8"	8"	17 1/4"
JO/JOT-TW275 TW300	28 1/4"	39 1/4"	22-9/16"	9"	21 7/8"

TAPPING LOCATIONS

Location	Size N.P.T.	Steam	Hot Water
F	3/4"	Pressure Gauge	Operating & Limit Control
G	1/4"	Pressuretrol	Theralltometer
H	3/4"	Operating Control	
I	1 1/4"		Circulator
J	1/2"	Gauge Glass & Low Water Cut-Off	
K	3/4"	Safety Valve	Relief Valve
L	2"	Return	Optional Return
M	3/4"	Drain Cock	Drain Cock
N	3/4"		Optional High Limit
O	3/4"	Optional Secondary L.W.C.O. - Probe Type	

**McD & M #67PE-2
LOW WATER CUT-OFF**

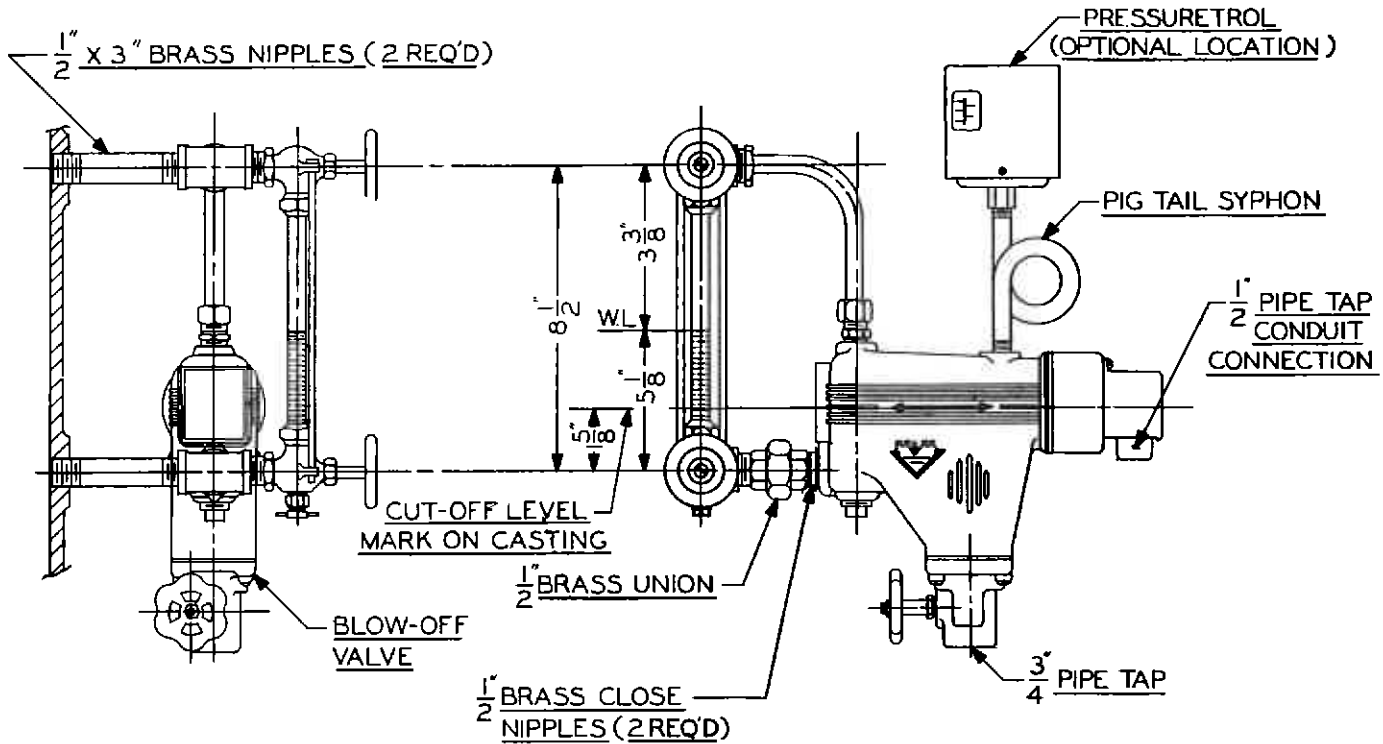


Figure 7

I — WIRING

- 1—All electrical wiring shall be done in accordance with the National Electrical Code and Local Requirements.
- 2—For recommended wiring, See Figures 8 thru 10.
- 3—For complete information on servicing and adjustment of controls, refer to the attached control specification sheets.

NOTE: Single Pole Switches including those of Safety Controls or Protective Devices shall not be wired in a grounded line.

J — CLEANING HEATING SURFACES

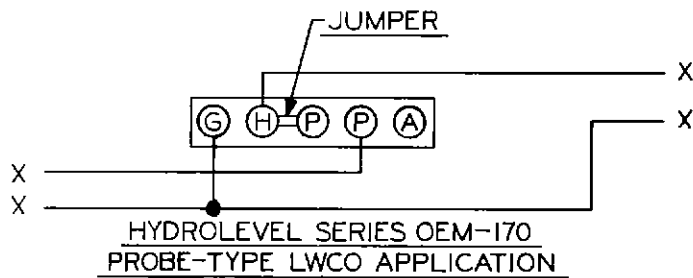
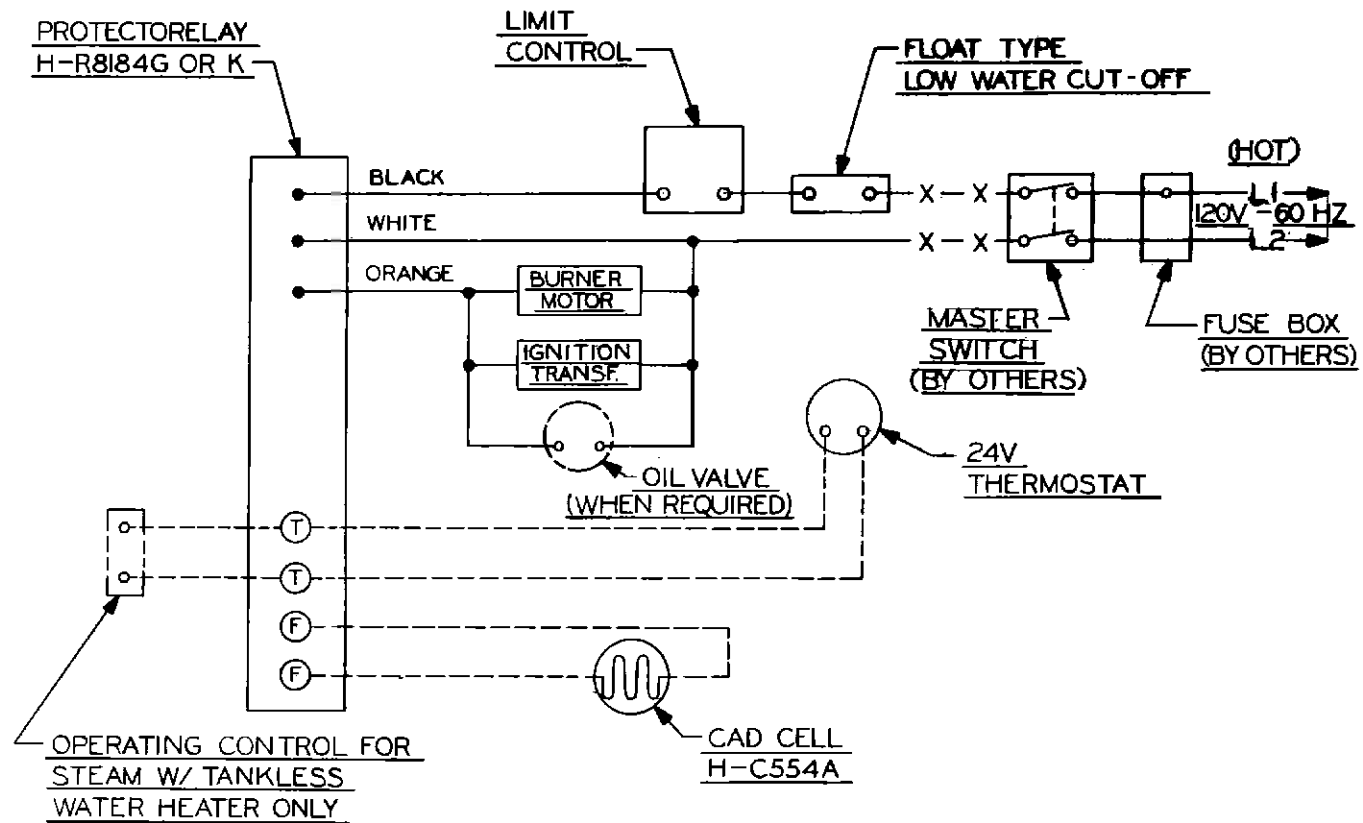
NOTE: BOILER IS TO BE CLEANED AT LEAST ONCE A YEAR. TO THOROUGHLY CLEAN THE BOILER IT MUST BE CLEANED BOTH FROM THE TOP AND FRONT.

TO CLEAN:

- 1—Turn off all electrical power to boiler before beginning cleaning operation.
- 2—Remove the flue pipe, left side jacket top panel and flue collector.
- 3—Remove center front jacket panel (Item 5, Figure 2).
- 4—Remove clean out cover plate from boiler (Item 6, Figure 2).
- 5—Brush the vertical surfaces from the top first. Then brush the tubes horizontally through the opening in the front. If unit is extremely dirty, brushing up from the combustion chamber area also may be necessary.
- 6—Remove any scale or soot from the fire box by means of vacuum cleaning or any other available means.

NOTE: THE OIL BURNER MUST BE REMOVED TO FACILITATE THIS OPERATION.

- 7—Replace the flue collector and jacket top panel.
- 8—Replace clean-out cover plate and center front jacket panel.



————— LINE VOLTAGE

----- LOW VOLTAGE

STEAM
With or Without
Tankless Water Heater and
GRAVITY HOT WATER

Figure 8

NOTE - ALL WIRING MUST COMPLY WITH APPLICABLE CODES, ORDINANCES, AND REGULATIONS.

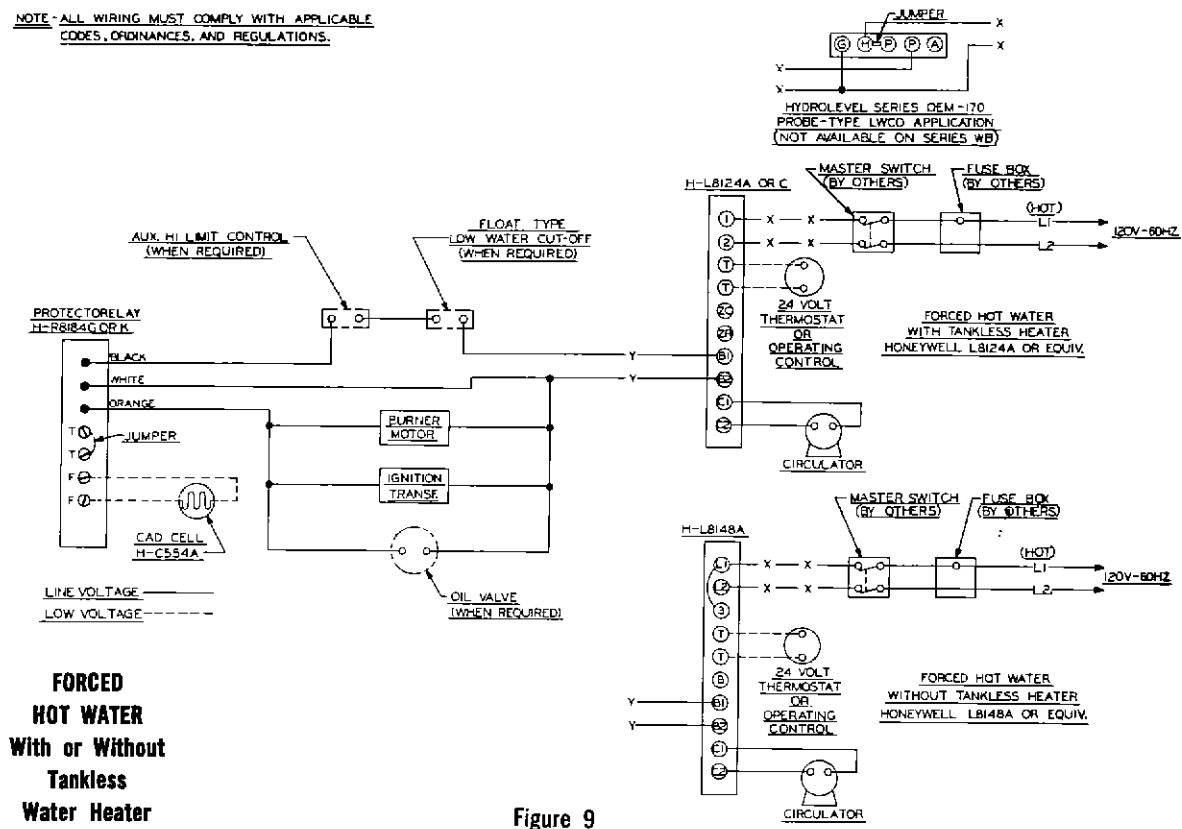
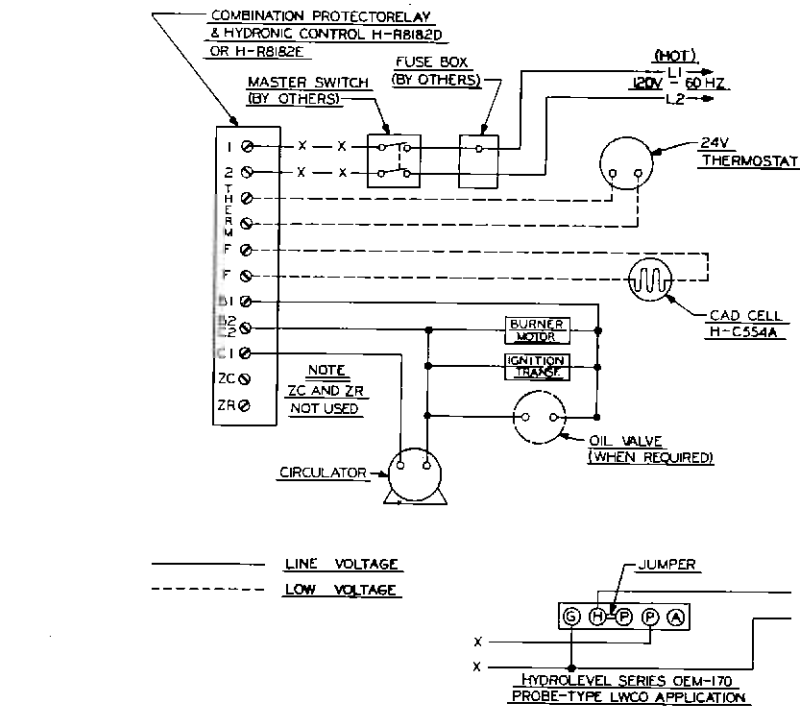


Figure 9



**FORCED
HOT WATER
COMBINATION PROTECTORELAY
With or Without
Tankless
Water Heater**

Figure 10



SERIES JO-TW AND JOT-TW RATINGS

(1) Boiler Model No.	(2) Heating Capacity BTU/Hr.		(3) Net I-B-R Ratings			(4) I-B-R Firing Rate G.P.H.	Chimney		Minimum Draft Required in Stack
	Water	Steam	BTU/Hr. Steam	Steam Sq. Ft.	BTU/Hr. Water		Size Inches	Height Feet	
JO/JOT-TW075	a 92,000	a 91,000	68,000	283	80,000	.75	8 x 8	20	.04"
JO/JOT-TW100	a 121,000	a 119,000	89,000	371	105,000	1.00	8 x 8	20	.05"
JO/JOT-TW125	a 148,000	a 147,000	110,000	458	129,000	1.25	8 x 8	20	.06"
JO/JOT-TW150	a 180,000	a 179,000	134,000	558	157,000	1.50	8 x 8	20	.04"
JO/JOT-TW175	a 209,000	a 206,000	155,000	646	182,000	1.75	8 x 8	20	.05"
JO/JOT-TW200	a 241,000	a 237,000	178,000	742	209,000	2.00	8 x 8	20	.04"
JO/JOT-TW250	b 282,000	a 282,000	212,000	883	245,000	2.50	8 x 12	20	.05"
JO/JOT-TW275	b 310,000	a 310,000	233,000	971	270,000	2.75	8 x 12	20	.04"
JO/JOT-TW300	b 338,000	a 338,000	254,000	1058	294,000	3.00	8 x 12	20	.05"

(1) Boiler Model No. may have the following suffix letters.

- W—Water
- S—Steam
- U—Boiler-burner unit (Unassembled)
- P—Packaged
- C—Circulator
- T—Tankless Coil

(2a) Heating Capacity BTU/Hr. based on D.O.E. testing procedure at 13.0% CO₂, and —.02" water column draft in firebox.

(2b) Heating Capacity BTU/Hr. based on 12.3% CO₂, and —.02" water column draft in firebox.

(3) Net I-B-R Ratings based on the Testing and Rating Standard for Cast Iron and Steel Heating Boilers of The Hydronics Institute.

The Net I-B-R Ratings shown include allowance for normal piping and pick-up load.

The water ratings are based on a piping and pick-up allowance factor of 1.15, steam ratings are based on allowance of 1.33.

The Peerless Heater Company should be consulted before selecting a boiler for gravity hot water installations and installations having unusual piping and pick-up requirements, such as exposed piping, night shut-down, etc.

(4) Firing rate is based on a fuel oil with a heating value of 140,000 BTU per gallon. Burner input based on maximum altitude of 2,000 ft. — for other altitudes consult factory.

ADVERSE FUEL CONDITIONS

If an adverse fuel condition such as cold oil exists, it may be necessary to increase the pump pressure to the nozzle. Cold oil is much harder to atomize at 100 psi as compared to room temperature oil. To the right is a chart giving flow rates of standard nozzle sizes at 120 psi and 140 psi pump pressure.

NOTE: If it was necessary to increase the pump pressure above the standard 100 psi, to eliminate any confusion for the next routine servicing a tag must be placed on the burner indicating pump pressure and nozzle size used.

Nozzle Rating At 100 PSI	Approx. Nozzle Rates GPH 120 PSI	140 PSI
.50	.55	.59
.65	.71	.77
.75	.82	.89
.85	.93	1.00
.90	.99	1.07
1.00	1.10	1.18
1.10	1.21	1.30
1.20	1.31	1.41
1.25	1.37	1.48
1.35	1.48	1.60
1.50	1.64	1.78
1.65	1.81	1.95
1.75	1.92	2.07
2.00	2.19	2.37
2.25	2.47	2.66
2.50	2.74	2.96
2.75	3.00	3.24

Background information - Draft Requirements

The sizing of your boiler that is a function of heating requirements as well as heat loss will not be discussed at this time - draft requirements will be.

Modern boilers, with high efficiency, have a design pressure drop that is substantially higher than those which old boilers had. This situation is created by the need to increase efficiency by transferring more heat from the combusted gases to the medium. Smaller flueways, as well as the addition of bars pins and fins to the cast iron sections, have been designed into modern boilers to 'scrub' the combusted gases and transfer as much heat as possible; rather than have it escape up the chimney. However, there is a price to pay for this efficiency. It is a pressure, or draft loss, in the boiler.

This draft loss must be taken into account when installing an oil boiler into a new or old chimney. New chimneys are less likely to have poor draft. However, they must have sufficient draft to support combustion. A -.06 is desirable and preferred. Older, unlined chimneys may require a replacement liner to have them perform well enough to support combustion.

An example follows:

	<u>Old installation</u>	<u>New installation</u>	<u>Comments</u>
Chimney Draft	-.04"	-.04"	No change, but older chimneys (especially unlined ones) have leaks which reduce draft.
Boiler Design Pressure Drop	+.01"	+.04"	Required for mandated efficiency increases.
Draft over fire	-.03"	0.00"	The old installation would have had a higher temperature in the chimney [as high as 800 degrees vs. 400 degrees F], which would increase the draft.

The above readings are 'cold' readings [before the boiler and chimney are heated up].
A -.01" to -.02" minimum draft over fire is required for a good installation where no oil fumes would be present. *The draft would vent them up the chimney.*

The above discussion which concerns draft in the chimney and draft loss in the boiler, is incomplete without discussing the effect of draft on the burner. Very simply, increasing the fuel usage [higher gallonage] on a unit which has multiple firing rates, requires more air for combustion and a higher draft loss in the boiler. As an example, increasing the firing rate 1/4 gallon will increase the draft loss in the unit by approximately +.01". *The actual burner used on a particular boiler also effects the draft and smoke conditions.. The use of a burner supplied by The Peerless Heater Co. would assure you of a quality, trouble free installation.*