

Peerless® Partner®

Indirect-Fired Water Heater



Installation, Operation & Maintenance Manual



Product Selection

1. The following guidelines apply to residential systems only. For commercial or institutional installations contact your local PB Heat, LLC representative.
2. Determine the quantity of domestic hot water required. Factors to consider:
 - a. Estimate typical peak hour demand. Determine the general time of day (morning, noon, evening) when the most hot water is used. Use chart below to determine potential maximum usage.

Estimate of Peak Domestic Hot Water Usage

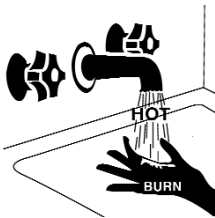
Use	Average Gallons of Hot Water per Usage	Times Used During One Hour	Gallons Used in One Hour
Shower	20	x _____	= _____
Bath	20	x _____	= _____
Shaving	2	x _____	= _____
Hands and Face Washing	4	x _____	= _____
Hair Shampoo	4	x _____	= _____
Hand Dish Washing	4	x _____	= _____
Automatic Dish Washing	14	x _____	= _____
Food Preparation	5	x _____	= _____
Wringer Clothes Washer	26	x _____	= _____
Automatic Clothes Washer	32	x _____	= _____

Total Peak Hour Demand = _____

- b. **Estimate unusual peak draw demand.** Whirlpool baths, hot tubs, and multiple head showers require large quantities of hot water in a short period of time. Contact fixture manufacturer for quantity of water required. Generally speaking, these circumstances can only be met with larger storage volumes.
- c. **Domestic Water Temperature.** Most residential usage will be satisfied with 119°F water, the temperature setting recommended by the Consumer Product Safety Commission. Some applications such as laundry and dishwashers may require a higher temperature.

Ratings can be improved by increasing Peerless® Partner® thermostat setting and using a mixing valve to temper the hot water to the proper temperature. When temperatures greater than 119°F are required, use a mixing valve at the outlet of the water heater or anti-scald fittings at point of use.

DANGER



Water temperatures over 125°F can cause severe burns instantly, or death from scalds.

Children, disabled, and elderly are at the highest risk of being scalded.

See instruction manual before setting temperature at water heater.

Feel water before bathing or showering.

Temperature limiting valves are available, see manual.

NOTICE

The Peerless Partner indirect-fired water heater is deemed to be used in a "commercial setting" if at any time the unit is operated at a temperature over 150°F. Refer to warranty for additional information.

d. **Boiler.** PP-80, PP-120, PP-80-DW, and PP-120-DW require full boiler output listed in Table 1. If boiler is a Category IV condensing boiler, such as Peerless® Pinnacle®, the above Peerless® Partner® models can be used with reduced boiler output. If boiler output is less than shown in Table 1 reduce first hour rating as shown in Table 2. Increase boiler size only if first hour rating does not meet estimated peak hour usage.

If a boiler with listed output is not needed for space heating, an alternative to a PP-80/120 would be a PP-40 or PP-60 piped in series with an unfired storage tank (i.e. electric water heater without heating elements energized).

If Peerless Partner is to be used with Peerless Boilers Series 63 or Series 64 steam boiler, refer to Series 63/64 Installation, Operation and Maintenance Manual for special installation and operation instructions. PB Heat, LLC cannot recommend the use of other steam boilers with Peerless Partner at this time. Other than Series 63 and Series 64 steam boilers, Peerless Partner should only be used with water boilers. Contact PB Heat, LLC for additional information.

e. **Domestic water priority.** First hour ratings may be less than published when boiler output is shared with space heating. Generally a consumer will notice a drop in domestic water temperature before a drop in space heating temperature. Giving domestic water production priority by directing entire boiler output to Peerless Partner will maximize domestic water output. However, prioritization controls could result in an unacceptable drop in space heating temperature when large quantities of domestic hot water are used, and a prioritization control malfunction could result in loss of space heating.

3. **Multiple Water Heaters.** Peak domestic water usage (first hour rating) or unusual peak draw may not be met with a single water heater. Multiple units can be installed as either a bank of tanks acting as a single unit, or as multiple individual units sized and located for specific draw situations.

Table 1: Peerless Partner Ratings

Model No.	First Hour Rating ¹ [gallons]		Minimum Boiler Output ² to Achieve First Hour Rating [Btu per hour]	Useable Hot Water [U.S. Gallons] ³	Heat Exchanger Surface Area [ft ²]
	140°F	115°F			
PP-30-LB	169	234	114,000	22	15
PP-40	212	292	141,000	28	20
PP-60	266	370	174,000	46	20
PP-80	330	440	212,000	64	34
PP-120	423	564	269,000	94	34
PP-40-DW	172	251	115,000	28	20
PP-60-DW	204	288	188,000	46	20
PP-80-DW	283	391	220,000	64	20
PP-120-DW	370	515	252,000	94	20

1. First hour rating based on heating water from 50°F to 140°/115°F with 180°F boiler water temperature. Gas- and oil-fired and electric water heater first hour ratings based on DOE test procedure using 90°F temperature rise (55°F to 145°F).

2. Net I=B=R Output, Water

3. Useable hot water based on recent completion of recovery period, but no additional boiler input after draw begins.

Table 2: First Hour Ratings for Reduced Boiler Output

Boiler Output [Btu per hour]	PP-30-LB		PP-40 ¹		PP-60 ¹		PP-80 ^{2,3}		PP-120 ^{2,3}	
	140°F	115°F	140°F	115°F	140°F	115°F	140°F	115°F	140°F	115°F
40,000	60	84	68	94	—	—	—	—	—	—
60,000	92	128	99	138	—	—	—	—	—	—
80,000	115	160	130	180	—	—	—	—	—	—
100,000	153	211	152	210	160	221	216	297	—	—
120,000	—	—	182	251	176	244	223	305	—	—
140,000	—	—	—	—	181	251	230	314	216	333
160,000	—	—	—	—	206	309	269	367	251	384
180,000	—	—	—	—	—	—	311	424	290	444
200,000	—	—	—	—	—	—	359	489	335	457
220,000	—	—	—	—	—	—	—	—	345	470
240,000	—	—	—	—	—	—	—	—	399	543
260,000	—	—	—	—	—	—	—	—	460	627

Boiler Output [Btu per hour]	PP-40-DW ¹		PP-60-DW ¹		PP-80-DW ^{2,3}		PP-120-DW ^{2,3}	
	140°F	115°F	140°F	115°F	140°F	115°F	140°F	115°F
40,000	57	78	66	91	130	179	136	186
60,000	85	117	100	139	147	203	155	215
80,000	115	158	133	181	160	222	168	233
100,000	143	197	156	215	178	243	185	255
120,000	—	—	166	227	192	265	199	272
140,000	—	—	171	236	210	289	226	308
160,000	—	—	189	261	224	309	251	347
180,000	—	—	200	272	243	335	276	380
200,000	—	—	—	—	265	366	301	409

- 180°F Boiler Water
- 200°F Boiler Water
- Due to condensation in boiler, reduced output not recommended for PP-80, PP-120, PP-80-DW, and PP-120-DW. Category IV condensing boilers, such as Peerless Pinnacle, can be used for reduced output.

Table 3: First Draw at 140°F^{1,2} (in Minutes)

Model No.	Domestic Water Flow Rate [gpm]											
	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
PP-40	16	14	12	10	9	8	7	6	5.5	5	4.2	3.7
PP-60	**	**	30	24	20	17	10.3	9.5	8.2	7.8	7.1	6.1
PP-80	**	**	**	**	**	**	14	13	12	11.1	10.5	8.5
PP-120	**	**	**	**	**	**	20	18	16	15	14	12.5
PP-40-DW	16	14	12	10	9	8	7	6	5.5	5	4.2	3.7
PP-60-DW	**	**	30	24	20	17	10.3	9.5	8.2	7.8	7.1	6.1
PP-80-DW	**	**	**	**	**	**	14	13	12	11.1	10.5	8.5
PP-120-DW	**	**	**	**	**	**	20	18	16	15	14	12.5

**Unlimited hot water available at specified flow rate.

- Based on cold start boiler with output listed in Table 1.
- For minutes of domestic water flow at 115°F, multiply by 1.56.

Pre-Installation Considerations

- Read these instructions completely before starting installation.
- FOR YOUR SAFETY: Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance. Controls on this appliance could ignite vapors causing an explosion.
- Install in accordance with the requirements of the authority having jurisdiction. In the absence of such requirements, appliance must be wired in accordance with the *National Electrical Code, ANSI/NFPA 70*.

This product complies with 1990 N.S.P.C. provided: (1) the boiler water, including additives, is practically non-toxic, having a toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products, 5th edition; and (2) the boiler water pressure is limited to a maximum of 30 psig by an approved safety or safety relief valve.

4. Peerless Partner(s) may be located adjacent to boiler to reduce piping heat loss or central to points of use to reduce response time to fixtures.
 - a. Install indoors in an area not exposed to freezing temperatures. Do not install outdoors.
 - b. Position with adequate clearance for service and maintenance. Provide access to thermostat, temperature and pressure relief valve, and drain valve.
 - c. Protect surrounding area and lower floors from damage due to leakage from temperature and pressure relief valve, drain valve, boiler or domestic water piping, and tank. Locate water heater near a floor drain or in a drain pan suitable for the capacity of the water heater.
 - d. Install on level surface. Water heater must be kept in vertical position.
5. Suggested equipment list. See PIPING for additional information.
 - a. Water Heater Thermostat: Provided.
 - b. Temperature and Pressure Relief Valve: Provided.
 - c. Brass Drain Valve: 1 per water heater.
 - d. Brass Tee's: 2 per water heater.
 - e. Heat Exchanger to Boiler Piping: 1 inch nominal copper tubing and fittings. Circulator and flow control valve, or zone valve.

Piping

1. General

- a. All plumbing must be in accordance with the requirements of the authority having jurisdiction.
- b. Use both thread tape and pipe dope on all mechanical connections.
- c. Zone valve (if used) and circulator must be sized to provide minimum flow rate specified in Table 4. Use 1 inch nominal copper tubing between boiler and Peerless Partner heat exchanger. See Table 5 and Table 6 for sizing. Point of emphasis: using a zone valve without a full bore may cause high pressure drop which will adversely affect performance. Use extreme care when selecting zone valve.
All piping must be adequately supported. Allow for thermal expansion.
- d. High temperatures will damage plastic jacket. Use heat shield when soldering piping near tank.

Table 4: Flow Specifications

Model No.	Recommended Flow Rate	Heat Exchanger Pressure Drop	Domestic Water Connection Sizes
PP-30-LB	8 gpm	6.0 ft.	3/4 NPT
PP-40	10 gpm	7.9 ft.	3/4 NPT
PP-60	10 gpm	7.9 ft.	1 NPT
PP-80	12 gpm	9.1 ft.	1-1/2 NPT
PP-120	14 gpm	11.3 ft.	1-1/2 NPT
PP-40-DW	6 gpm	7.6 ft.	3/4 NPT
PP-60-DW	7 gpm	10.0 ft.	1 NPT
PP-80-DW	7 gpm	10.0 ft.	1-1/2 NPT
PP-120-DW	8 gpm	13.4 ft.	1-1/2 NPT

Table 5: Friction Loss per 100 Feet of Tubing [feet]

Tubing Type	Flow Rate [gpm]		
	6	7	10
Type K	3.6	4.8	9.3
Type L	3.1	4.1	8.1
Type M	2.7	3.6	7.0

Table 6: Friction Loss Allowance for Copper Fittings [feet of straight tubing]

Fitting	Wrought	Cast
90° Elbow	1	4
45° Elbow	1	2
Tee, Run	1/2	1/2
Tee, Branch	3	5
90° Bend	2	—
180° Bend	2	—
Gate Valve	—	1

2. Domestic Water

- a. **Cold Water In.** Install brass tee and drain valve (not provided). Install shutoff valve between water supply and cold water inlet for ease of service. See Figure 1.

For systems using a back flow preventer or no return valve, install a thermal expansion tank between cold water supply and valve to offset expansion/pressure increase as water is heated. See Figure 2.

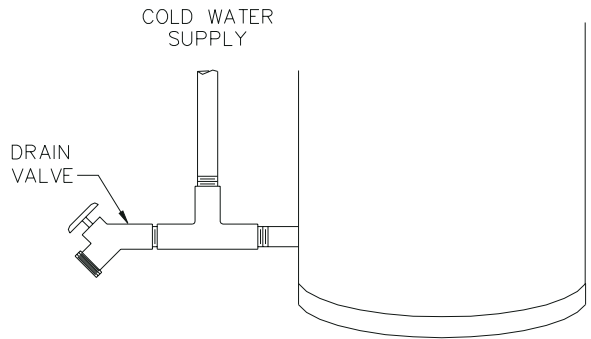


Figure 1: Water Inlet

- b. **Standard Domestic Hot Water Out.** Install brass tee and temperature and pressure relief valve. Do not place any valves between the temperature and pressure relief valve and the tank. See Figure 3.

Run temperature and pressure relief valve discharge piping to a suitable place to avoid damage to building or injury to occupants. Do not install reducing fittings or other restrictions. Discharge piping must allow complete drainage of both the temperature and pressure relief valve and piping.

A heat trap will improve energy efficiency by reducing piping heat loss.

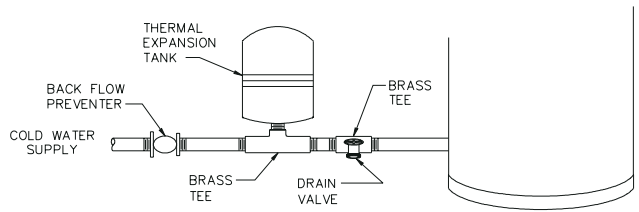


Figure 2: Thermal Expansion Tank

- c. **Domestic Hot Water Out with Mixing Valve.** See Figure 4.

- 3. **Boiler.** Install Peerless Partner as a separate space heating zone. Place boiler circulator(s) in boiler supply piping.

For boiler with tankless heater, disconnect domestic water piping and limit control (where used). Plug limit tapping. Do not plug domestic water tappings.

- 4. **Multiple Water Heaters** installed as single unit. Install boiler water piping and domestic piping in parallel reverse return configuration. See Figure 5.
- 5. **Peerless Partner with unfired storage tank.** See Figure 6.

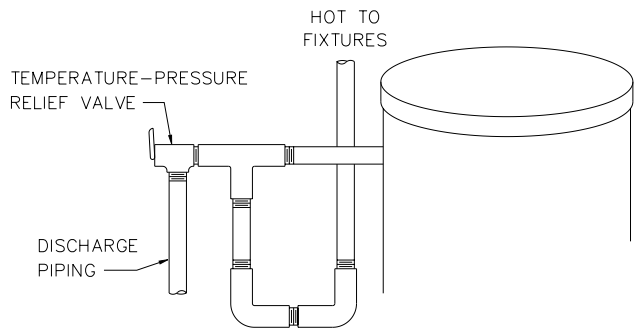


Figure 3: Hot Water Outlet

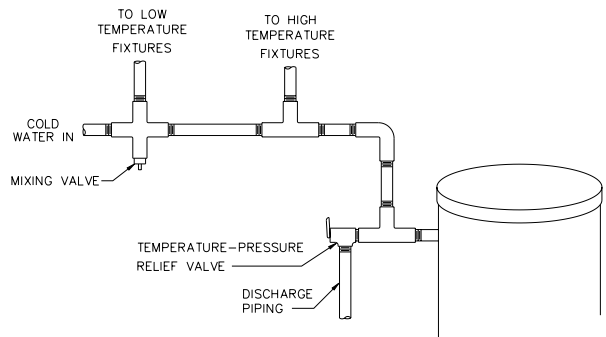
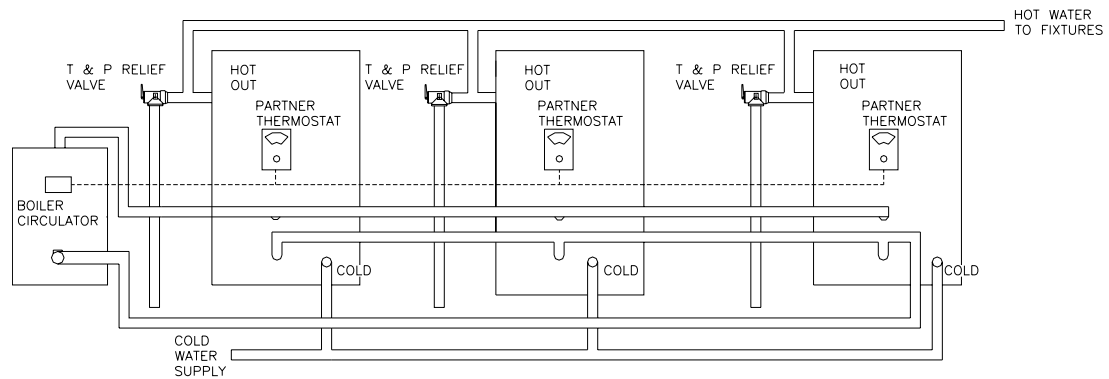


Figure 4: Mixing Valve



NOTE: ALL PIPING IN PARALLEL

Figure 5: Installation of Multiple Water Heaters as Single Unit

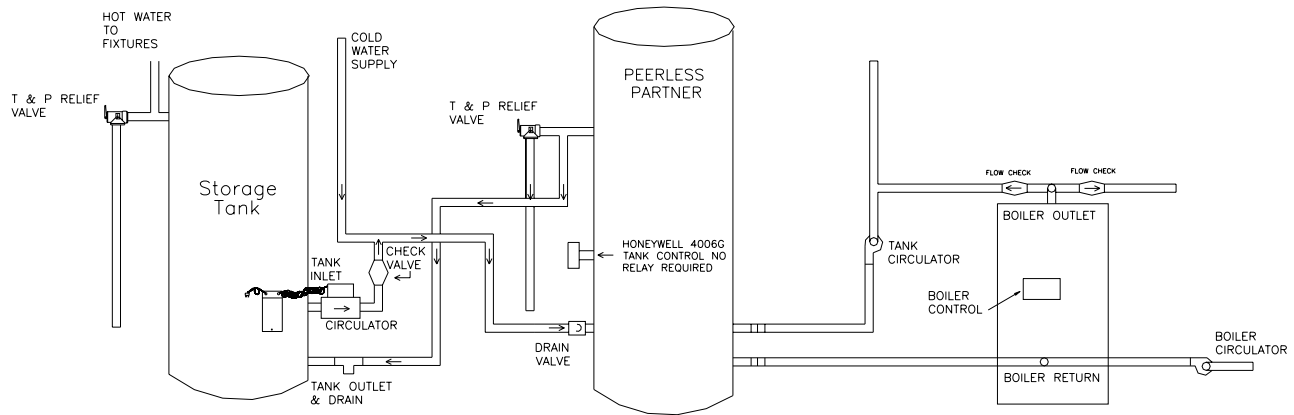


Figure 6: Unfired Storage Tank

Electrical

1. The Peerless Partner must be electrically grounded in accordance with local codes. In the absence of local codes follow the *National Electrical Code, ANSI/NFPA 70*.
2. Install thermostat provided with Peerless Partner. Insert bulb into immersion well. Secure to well by tightening screws on case.
3. Wire Peerless Partner thermostat to boiler. Provide disconnect switch between thermostat and control system to allow for vacation shutdown and/or service shutdown.

Zoning with zone valves assumes end switch is isolated – zone valve actuator powered by separate transformer. Do not use boiler transformer to operate zone valves.

 - a. MI/MIH. For zoning with zone valves or three-way valve, connect zone valve end switch to limit terminals T and TV. For zoning with circulators, refer to Figure 7.
 - b. DE/PSC/PDE. Provide zone control as shown in boiler's installation instructions.
 - c. WBV/EC/SC. Water less tankless heater. See Figure 8.

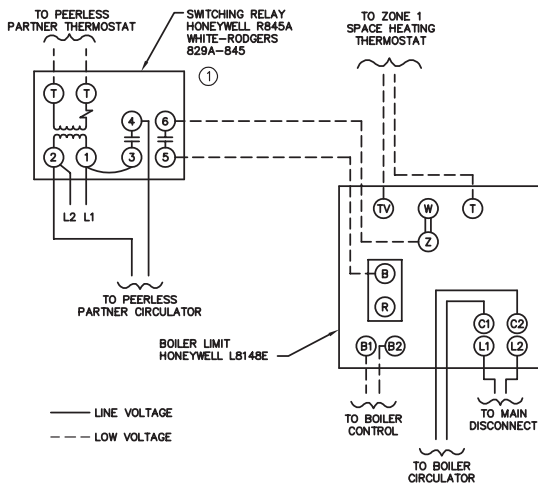


Figure 7: Wiring Diagram – MI/MIH

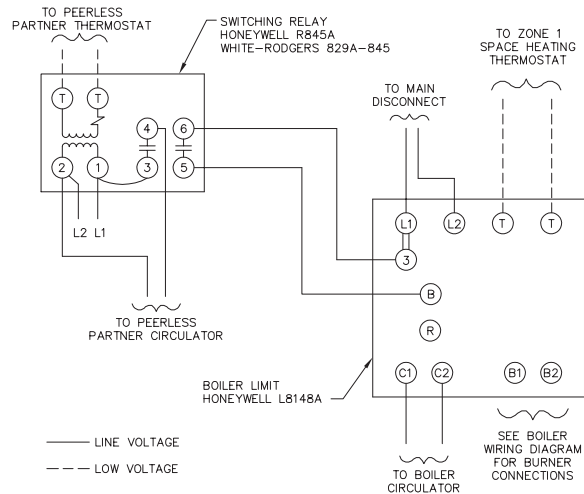


Figure 8: Wiring Diagram – WBV, EC and SC less Tankless

Start-up

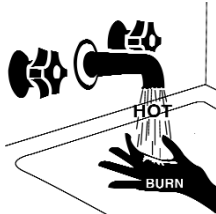
1. General

- Open hot water faucet when filling or draining Peerless Partner.
- The Peerless Partner thermostat has three markings: Warm (120°F), Normal (140°F), and Hot (160°F). The thermostat is adjusted to its lowest temperature position when shipped from the factory.

2. Fill tank and domestic water piping.

- Adjust Peerless Partner thermostat** to 119°F, or in accordance with authority having jurisdiction. Adjust mixing valve (if used) to desired temperature.

⚠ DANGER



Water temperatures over 125°F can cause severe burns instantly, or death from scalds.

Children, disabled, and elderly are at the highest risk of being scalded.

See instruction manual before setting temperature at water heater.

Feel water before bathing or showering.

Temperature limiting valves are available, see manual.

- Follow manufacturer's instructions to start-up boiler.** Set boiler limit at least 20°F above Peerless Partner thermostat setting. For boiler limit with low limit, set temperature to lowest setting. For boiler limits with adjustable differential, set differential to 10-15°F range.
- Operate boiler until Peerless Partner thermostat satisfied.** Measure domestic water temperature at hot water faucet. See Paragraph 3 above.
- Draw hot water** and allow Peerless Partner to operate through several recovery cycles to verify proper operation.

Maintenance

- 1. General Housekeeping (continuous).** Keep area clear of gasoline or other flammable vapors or liquids. Controls on this appliance could ignite vapors causing an explosion.
- 2. Clean Inside of Tank (monthly).**
 - a. Mark temperature setting on Peerless Partner thermostat. Set thermostat to lowest setting.
 - b. Close cold water inlet shutoff valve. Open a hot water faucet.
 - c. Open drain valve. Allow water to flow until free of sediment. Close drain valve.
 - d. Open cold water inlet shutoff valve. Close hot water faucet after flow established.
 - e. Set Peerless Partner thermostat to operating set point.
- 3. Check temperature and pressure relief valve.** Follow manufacturer's instructions.
- 4. Maintain boiler per manufacturer's instructions.**

Troubleshooting

1. No Hot Water

- a. *No power to boiler and control system.*
 - * Check fuse or circuit breaker.
 - * Check disconnect switch.
 - * Check wiring.
- b. *Zone Valve is not open.*
 - * Check wiring.
 - * Repair or replace zone valve.
- c. *Circulator is not operating.*
 - * Check wiring.
 - * Check circulator switching relay.
 - * Repair or replace circulator.
- d. *Peerless Partner thermostat not calling for heat.*
 - * Check wiring.
 - * Replace thermostat.
- e. *Hot water from boiler not getting to Peerless Partner.*
 - * Air trapped in boiler piping, preventing water circulation. Purge piping.
 - * Check boiler for proper operation.
 - * Check wiring.

2. Inadequate Hot Water

- a. *Check operation of Peerless Partner.*
 - i. Obtain container with known volume (in gallons) and stopwatch.
 - ii. Open hot water faucet until boiler starts recovery period. Close faucet.
 - iii. Allow boiler to operate until water heater fully recovers. Set thermostat disconnect switch to OFF position.
 - iv. Open hot water faucet until water is hot. Begin filling container. Use stopwatch to measure time to fill container.

$$\text{Flow Rate (gpm)} = \frac{\text{Container Volume (gallons)}}{\text{Time to Fill Container (seconds)}} \times 60 \frac{\text{seconds}}{\text{minute}}$$

- v. Water temperature will remain constant within $\pm 5^{\circ}\text{F}$ until storage is exhausted. Continue to fill container until temperature drops 10°F .
- vi. Compare total volume of water collected to Usable Hot Water in Table 1. If within 5 gallons the Peerless Partner is operating properly. Check PRODUCT SELECTION for proper model usage.
- vii. Compare calculated flow rate with first draw usage available per Table 3. If actual flow rate is greater than first draw usage available, consider use of flow restricting fixtures or mixing valve.

b. *Inadequate boiler water flow. Check circulator sizing per PIPING.*

c. *Boiler is undersized.*

3. Slow Recovery.

See 2(b)(c) above. Approximate cold start recovery period (* use Minimum Boiler Output from Table 1 or Boiler Rated Output, whichever is smaller):

$$\text{Recovery Time [Minutes]} = \frac{\text{Tank Capacity [gallons]} \times \text{Temperature Rise } [^{\circ}\text{F}] \times 8.33 \frac{\text{Btu}}{(\text{gallons})(^{\circ}\text{F})}}{\text{Boiler Output } \frac{\text{Btu}}{\text{hr}} *} \times 60 \frac{\text{minutes}}{\text{hr}}$$

Example No.1: A Peerless Partner PP-40 with a Peerless MI-03 gas boiler (DOE Heating Capacity of 58 Mbh). The desired water temperature is 115°F . Cold water temperature is 55°F .

$$\text{Recovery time} = \frac{(37 \text{ gallons}) \times (115^{\circ}\text{F} - 55^{\circ}\text{F}) \times 8.33 \frac{\text{Btu}}{(\text{gallons})(^{\circ}\text{F})}}{58,000 \frac{\text{Btu}}{\text{hr}}} \times 60 \frac{\text{minutes}}{\text{hr}} = 19.1 \text{ minutes}$$

Example No. 2: A Peerless Partner PP-120 with a Peerless LC-04 (Gross I=B=R Output of 547 Mbh). The desired water temperature is 150°F . Cold water temperature is 50°F .

$$\text{Recovery time} = \frac{(119 \text{ gallons}) \times (150^{\circ}\text{F} - 50^{\circ}\text{F}) \times 8.33 \frac{\text{Btu}}{(\text{gallons})(^{\circ}\text{F})}}{300,000 \frac{\text{Btu}}{\text{hr}}} \times 60 \frac{\text{minutes}}{\text{hr}} = 19.8 \text{ minutes}$$

4. Water Temperature Too Hot

a. *Peerless Partner thermostat set too high. Adjust to lower setting.*

b. *System piping and/or controls.*

* Peerless Partner thermostat continues to call for heat after reaching setpoint. Replace thermostat.

* Check system piping and flow control valve. Verify space heating call for heat does not cause flow through Peerless Partner heat exchanger.

c. *Mixing Valve (if used). Verify proper operation per manufacturer's instructions.*

5. Leaking Temperature and Pressure Relief Valve

a. *Water expands when heated.*

* Install thermal expansion tank on cold water inlet.

* Reduce Peerless Partner thermostat setting.

b. *Water temperature too high. See Paragraph 4 above.*

c. *Water pressure is too high. Install pressure reducing valve on cold water inlet.*

d. *Valve seat has deteriorated or has sediment build-up. Replace temperature and pressure relief valve.*

Dimensions

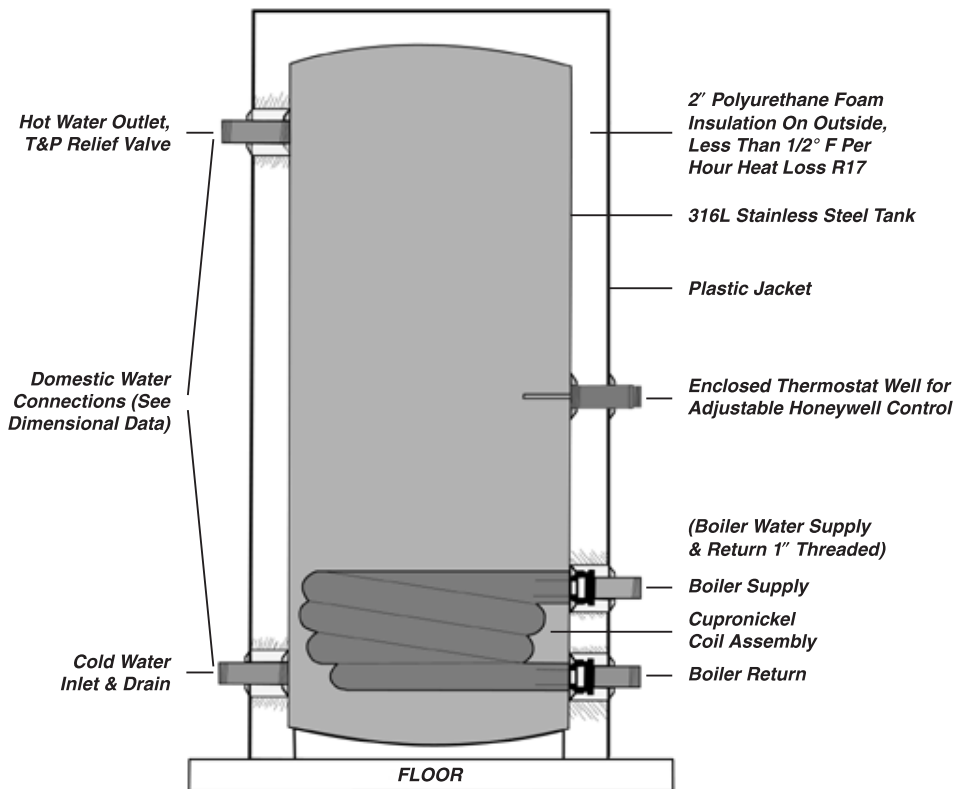


Figure 9: Cutaway View

Table 7: Dimensions and Specifications

Model No.	Dimensions [inches]						Pressures [psig]		Tank Capacity [U.S. Gallons]
	Diameter	Height	Floor to 'Boiler In'	Floor to 'Boiler Out'	Floor to 'Cold - Drain'	Floor to 'Hot - T&P'	Test	Working	
PP-30-LB	23¼	28½	9	4½	4½	22	300	150	30
PP-40	19¼	52½	9	4½	4½	46	300	150	37
PP-60	23¼	52½	9	4½	4½	46	300	150	57
PP-80	23¼	72	29	5½	5½	64	300	150	77
PP-120	27	73½	30¼	7¼	7¼	66	300	150	119
PP-40-DW	19¼	52½	9	4½	4½	46	300	150	37
PP-60-DW	23¼	52½	9	4½	4½	46	300	150	57
PP-80-DW	23¼	72	29	5½	5½	64	300	150	77
PP-120-DW	27	73½	30¼	7¼	7¼	66	300	150	119

Repair Parts

Thermostat: Honeywell L4080B1295 (Operating range = 120°F to 160°F, 15° fixed differential)

Temperature and Pressure Relief Valve: PP-40: Watts 100XL-8 (100 Mbh, 8" element)

PP-60/80/120: Watts 40XL-8 (200 Mbh, 8" element)

Peerless® Partner®

Indirect-Fired Water Heater

Installation, Operation & Maintenance Manual

TO THE INSTALLER:

This manual is the property of the owner and must be affixed near the water heater for future reference.

TO THE OWNER:

This water heater should be inspected annually by a Qualified Service Agency.



PB HEAT, LLC

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PeerlessBoilers.com