

**INSTALLATION AND
OPERATION INSTRUCTIONS
P-K STANDARD FLOW 500 SERIES
WATER HEATER**

P-K SERIAL NO.

INSTALLATION
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RATING: GPH..... °F TO.....°F

STEAM LINE PRESSURE PSIG

**SERVICE ON THIS UNIT MUST BE PERFORMED
BY FULLY TRAINED AND QUALIFIED PERSONNEL**

**IMPROPER SERVICING OF THIS EQUIPMENT MAY CREATE A POTENTIAL HAZARD TO
EQUIPMENT AND OPERATORS.**

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Patterson-Kelley

Harsco

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PLEASE READ CAREFULLY, BEFORE INSTALLING THE P-K 500 STANDARD FLOW WATER HEATER

GENERAL INFORMATION

Upon receipt of shipment please inspect the unit for any damage. The P-K "500" Standard Flow was thoroughly inspected and factory tested prior to shipment, and any damage should be reported to the transportation company **immediately**. Please refer to the P-K Serial Number of the unit when contacting the local P-K Sales Representative.

P-K Standard Flow water heaters are produced as packaged units ready to connect to utilities, and also are available as non-packaged units.

A packaged "500" unit will normally include:

Insulated shell with self-contained tube bundle	Circulation Pump Condensate line strainer Steam Trap Shell thermometer Pressure relief valve Anticipator assembly*
Steam control valve**	
Steam Pressure Gauge	
Steam line strainer	

Since the Standard flow may be purchased without all of the above items, the complete list may not apply in all cases. This may be determined by referring to the purchase order.

In the standard flow arrangement hot water is drawn from the storage tank through the heat exchanger which introduces very little pressure drop at the outlet. A portion of this flow is picked up by the circulator and returned to the storage tank at a set rate.

The Anticipator control is located at the hot water outlet so that outgoing hot water and circulated water are both up to temperature.

Extraordinary peak demands can be handled with this arrangement without reflecting a corresponding peak steam demand.

** pneumatic or steam piloted

* patented

FLOW PATH SETS PERFORMANCE

In the standard flow arrangement, a fixed flow of water from the circulator pump passes through the heat exchanger at all times. During hot water demands, cold water enters the bottom of the storage tank. A portion of the cold water is picked up by the circulator and pumped through the heat exchanger at required recovery rate.

Steam consumption cannot exceed the flow required by the recovery rate. The combination of Control-Flo features directing and regulating the action of the Anticipator provides smooth control without overheating.

INSTALLATION INSTRUCTIONS

Position the unit so as to provide sufficient clearance in front to permit removal of tube bundle. See assembly drawing for required distance to remove bundle.

PLACEMENT

It is **very important** that the tube bundle be absolutely level. If the bundle tips toward the rear the condensate will collect in the "U" tubes; if the unit tips forward condensate will collect in the steam chamber. In either case, when such condensate is driven out by the steam pressure, water hammer and resulting tube damage could occur. The support skids of the unit may be used for leveling provided they have not been damaged in transit or handling. As a check, a level may be placed on the exposed cylindrical section of the tube bundle.

PLUMBING

Water Connections: Connect properly sized cold water service lines to the heater without check valves and provide suitable gate valve. The hot water outlet may be run "dead end" or through a circulation loop, depending on the type of installation. Include a gate valve in the water outlet. Any recirculation connections must be connected below the circulation pump on the unit. A suitable plugged tee is provided in the suction line of this pump. Refer to engineering drawing for exact location of recirculation connection.

The cold water service line to the unit must be connected to the cold water inlet as shown on the drawing.

BLOW OFF OR DRAIN

The blow off or drain should be connected to the heater as shown on the drawing without reduction in size. The piping should lead to a drain.

RELIEF VALVE

A properly sized relief valve is installed at top of tank. This valve should be piped to the drain without decreasing the pipe size or installing any valves. This valve should also be tested periodically to make certain it is functioning.

VACO-VALVE

When the tank is copper lined, a P-K Vaco-Valve is supplied to protect the copper lining from being damaged by vacuum. (Never fill the tank and drain a copper-lined unit without the vaco-valve being installed on the shell side in good operating condition.)

STEAM LINE

A properly sized steam line should be connected to the steam line strainer provided on the 500 Standard Flow.

If not provided as part of the factory package, a suitable drip trap must be connected just upstream of the control valve to prevent accumulation of condensate at the valve.

STEAM CONTROL VALVE

The steam control valve used is covered by the bulletin enclosed in this manual. Refer to this bulletin for adjustment and maintenance.

CONDENSATE LINE

On packaged units both condensate strainer and trap are provided, making it necessary only to connect to an appropriate condensate drain. When the unit is not purchased with these items, both must be installed. A thermostatic type trap is used.

ANTICIPATOR

The Anticipator assembly permits a small amount of cold water to flow over the control bulb causing the steam valve to open when the water is drawn off.

Flow through the Anticipator is caused by a difference in pressure between incoming water and the water in storage. When no water is drawn, this pressure is balanced, hence no flow. Since the pressure difference is proportional to the varying flow rates by causing a sample of incoming cold water to enter a shroud that surrounds the temperature-sensing bulb.

A control valve in the sampling line adjusts proportion of sample flow to main flow, controlling the sensitivity of the Anticipator. It governs the relative response of the bulb to its two environments — tank storage temperature and incoming water temperature.

The Anticipator assembly is connected from the Anticipator inlet fitting to the Anticipator casting. It is provided with an adjustable control valve. Details of adjustment are described in Step 7 of Operation and Adjustment.

ELECTRICAL

Be sure the proper A. C. voltage is connected to the circulator pump as indicated on the tag attached to the "pigtails" on the motor, or refer to the drawing. All electric wiring and components meet requirements of NEMA, the National Electrical Code and CSA of Canada.

CIRCULATION PUMP

Make certain the unit is filled with water before starting circulation pump and the pump is properly lubricated, per pump bulletin included in this manual.

STEAM TRAP

The steam trap, unless otherwise specified, is a P-K "M" Type for main trap and "D" type for drip trap.

The traps are thermostatically operated and chosen for their dependability and ease in servicing.

To service the main trap, simply remove the six (6) bolts on the top cover. Lift off the cover, and remove defective cage unit. (New cage units may be purchased from The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.)

The "D" type or drip trap cage replacement is done by simply unscrewing the top cap and lifting the cage unit out and replacing it. (Order new cage unit from The Patterson-Kelley Co., Inc., East Stroudsburg, Pa.)

SERVICE TIPS

NOISY OR HAMMERING

1. Check the Steam Trap to be certain all condensate is being discharged.
2. Check the condensate lift. It must not exceed heater design without using a pump.
3. Check level of tube bundle. It must not pitch away from the condensate steam line.
4. Check strainer. Make certain it is not clogged.
5. Check the steam pressure. It is not to exceed design. (See drawing of specific heater.)

TEMPERATURE OVERRIDE

1. Leaking main steam valve. To check, disconnect steam pressure gauge line. If steam is apparent, assume steam valve leaking and proceed to repair.
2. Improperly calibrated temperature pilot. Recalibrate per valve data sheets.
3. Leaking capillary tubing. If after recalibration the override reoccurs and if the override becomes progressively high, suspect a leading capillary. Inspect and replace if necessary.
4. Incorrectly adjusted anticipator. Close the stop valve in the anticipator line and leave overnight. If conditions are corrected, open stop valve and re-adjust anticipator.
5. Defective or improperly calibrated thermometer. Check the discharge from the fixture closest to the heater with a known accurate thermometer.

OPERATION AND ADJUSTMENT

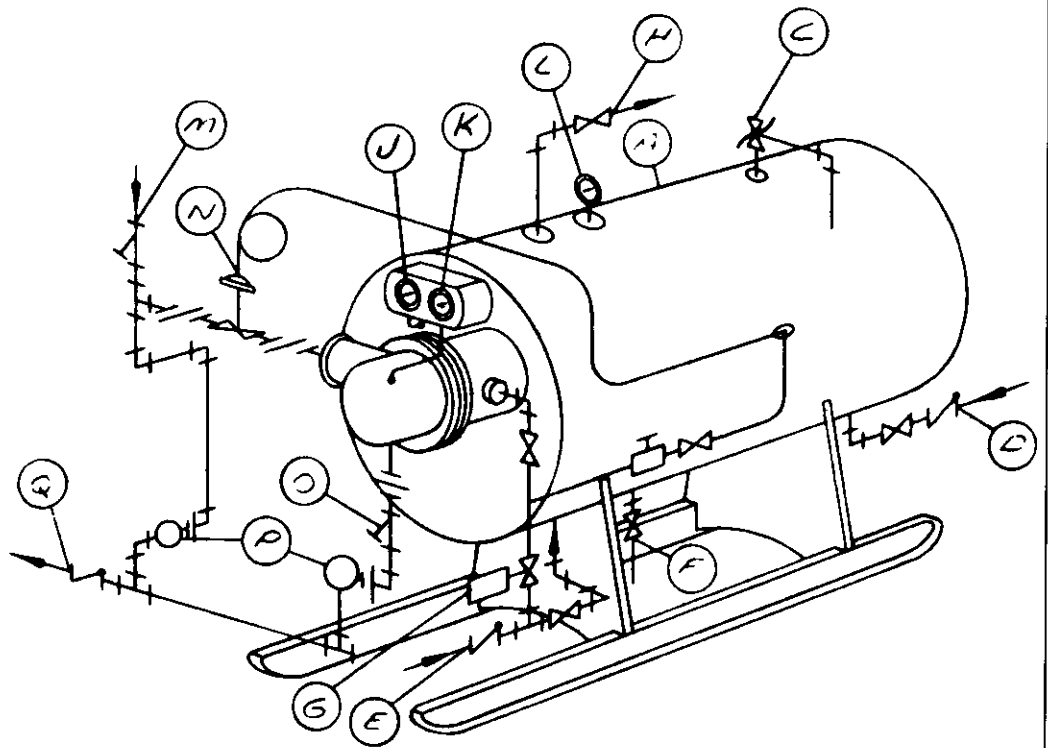
1. Turn on the water supply to the unit.
2. Trip relief valve to expel entrained air.
3. Turn on circulation pump (DO NOT OPERATE PUMP BEFORE WATER IS IN UNIT.)
4. Turn on steam slowly.
5. Operate unit at approximately $\frac{1}{2}$ rated capacity.
6. Adjust the steam control valve to obtain desired outlet temperature. This is the set-point. Please carefully read the manufacturer's instructions for adjusting the control valve.
7. To adjust the Anticipator, turn off all fixtures so no water can be drawn. No flow should exist in the anticipator connecting tube. Water should flow through the anticipator on any reasonably heavy draw. To obtain this condition, open the anticipator adjustment valve carefully until the circulator forces warm water into the anticipator tube. (Turn clockwise to open valve.) Next, throttle down the anticipator adjustment valve one full turn. (Turn counterclockwise to close.) See Isometric drawing for location of anticipator control valve.

Guarantee

We guarantee all materials and workmanship used in the construction of P-K Water Heaters to be first class in every respect. If any part proves defective within one year from date of shipment, a new part will be supplied without charge f.o.b. East Stroudsburg, Pennsylvania. We also guarantee each water heater to heat water at its rated capacity.

MX.	DESCRIPTION
A	INSULATION WITH ST'L. JACKET
C	RELIEF VALVE
	COLD WATER INLET
E	RECIRCULATION
F	BLOWDOWN VALVE
G	CIRCULATING PUMP
H	HOT WATER OUTLET
J	HOT WATER GAUGE
K	STEAM PRESS. GAUGE
L	TANK PRESS. GAUGE
M	STEAM INLET & STRAINER
N	STEAM CONTROL VALVE
O	STRAINER
P	STEAM TRAPS
Q	CONDENSATE OUTLET

P-K SERIES 500 STANDARD
CONTROL-FLO STORAGE
WATER HEATER
TYPICAL HOOK-UP USING
STEAM & STEAM
CONTROL VALVE



JR. A-52993

THE PATTERSON-KELLEY CO.

MR.	DESCRIPTION
A	INSULATION WITH STL. JACKET
B	RELIEF VALVE
C	COLD WATER INLET RECIRCULATION
E	BLOWDOWN VALVE
F	CIRCULATING PUMP
G	CONDENSATE OUTLET
H	STEAM TRAPS
J	STRAINER
K	STEAM PRESS. GAUGE
L	HOT WATER GAUGE
M	TANK PRESS. GAUGE
N	STEAM CONTROL VALVE
O	STEAM INLET & STRAINER
P	HOT WATER OUTLET

P-K SERIES 500 STANDARD
CONTROL-FLO STORAGE
WATER HEATER
TYPICAL HOOK-UP USING
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CONTROL VALVE

