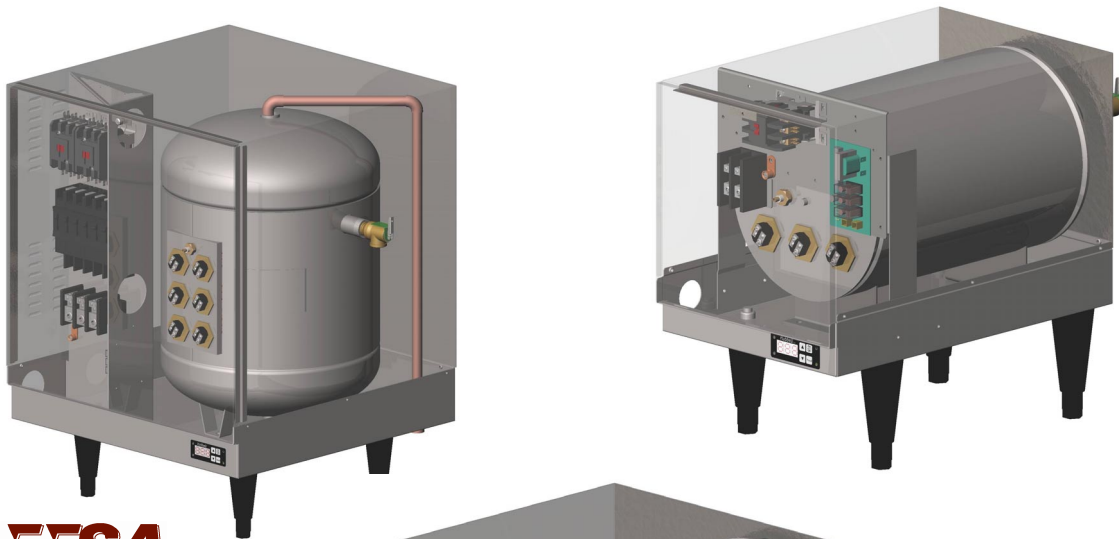


OPERATING AND MAINTENANCE MANUAL FOR ELECTRIC BOOSTER HEATER

Hubbell™ ELECTRIC HEATER COMPANY BASE MODEL “J”



ASME

ANSI/NSF5

2007 Edition Rev. A

**HUBBELL
ELECTRIC HEATER COMPANY
45 SEYMOUR STREET
P.O. BOX 288
STRATFORD, CT 06615**

PHONE: (203) 378-2659

FAX: (203) 378-3593

INTERNET: <http://www.hubbellheaters.com>

-- IMPORTANT --

Always reference the full model number and serial number when calling the factory.

WARNING / CAUTION

1. Tank is to be completely filled with water and all air is to be vented before energizing.
2. Due to the rigors of transportation, all connections should be checked for tightness before heater is placed in operation.
3. Safety relief valve must be installed in tapping provided.
4. The refractory material used in heating elements may absorb some moisture during transit, periods of storage, or when subjected to a humid environment. This moisture absorption results in a cold insulation resistance of less than twenty (20) megohms. If this heater has been subjected to the above condition, each heating element must be checked for insulation resistance before energizing. Contact the factory for a replacement element.
5. **KEEP AWAY FROM LIVE ELECTRICAL CIRCUITS.**
Do not perform any maintenance, make any adjustments, or replace any components inside the control panel with the high voltage power supply turned on. Under certain circumstances, dangerous potentials may exist even when the power supply is off. To avoid casualties, always turn the power supply safety switch to off, turn the charge or ground the circuit before performing any maintenance or adjustment procedure.
6. The unit is designed to operate at pressure not more than 150 psi.
7. Generalized instructions and procedures cannot anticipate all situations. For this reason, only qualified installers should perform the installations. A qualified installer is a person who has licensed training and a working knowledge of the applicable codes, tools, equipment, and methods necessary for safe installation of an electric resistance water heater. If questions regarding installation arise, check your local plumbing and electrical inspectors for proper procedures and codes. If you cannot obtain the required information, contact the company.
8. **Water Quality Requirements** – Recommended water hardness is 4 to 6 grains of hardness per gallon (GPG). Water hardness above 6 GPG should be treated by a water conditioner (water softener or in-line treatment). Water hardness below 4 GPG also requires treatment to reduce potential corrosion. Excessive GPG will result in higher operating and maintenance costs and will reduce product longevity. Chlorides must not exceed 50 parts per million (ppm). Excessive chlorides will result in metallic corrosion and will reduce product longevity. Water treatment has been shown to reduce costs associated with de-liming the booster as well as reducing metallic corrosion. Product failure caused by these conditions is not covered under warranty. See warranty for complete details.
9. This water heater is not intended for space heating applications.
10. The water heater is factory set at 185°F for booster water heating applications. This results in the possibility of a scalding water injury. A full thickness skin burn can occur in less than one second of exposure to water at this temperature.

TABLE OF CONTENTS

| SECTION | TITLE | PAGE # |
|----------------|--------------------------------------|---------------|
| I | GENERAL DESCRIPTION AND CONSTRUCTION | 4 |
| II | INSTALLATION AND START-UP | 8 |
| III | SCHEDULED MAINTENANCE AND OPERATION | 19 |
| IV | TROUBLESHOOTING | 21 |
| V | SERVICING & REPLACEMENT OF PARTS | 26 |
| VI | SERVICE PARTS LIST | 29 |
| VII | TORQUE VALUES | 30 |
| VIII | WARRANTY INFORMATION | 31 |

SECTION I - GENERAL DESCRIPTION AND CONSTRUCTION

GENERAL DESCRIPTION

This book describes a packaged electric booster heater that is typically used to provide 180°F sanitizing rinse water. The complete assembly consists of the storage tank, immersion electric heating element(s), electronic control module, safety relief valve, magnetic contactor(s), and any other required electrical operating control. Optional equipment may be supplied with your unit. Please consult the product packing list for details specific to your assembly. The unit is factory assembled, insulated, jacketed, wired, tested, and ready for electrical and plumbing service connections.

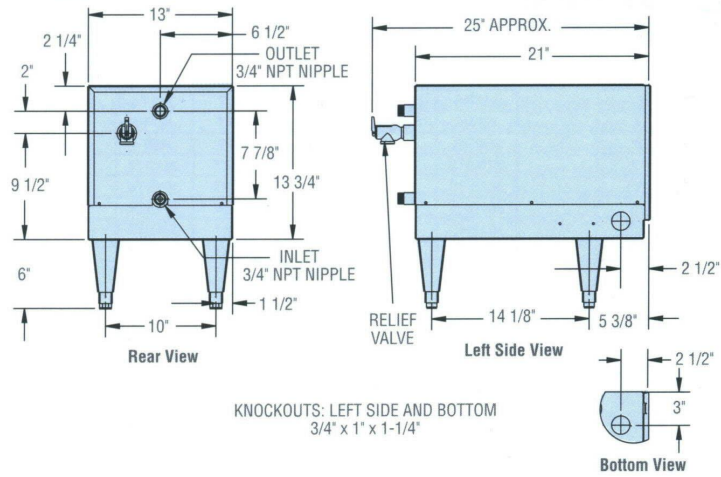
CAPACITY

| Model | Storage Capacity (gallons) | kW | 40° Rise (GPH) | 70° Rise (GPH) |
|--------|----------------------------|------|----------------|----------------|
| J61 | 6 | 1 | 10 | 5 |
| J61.5 | 6 | 1.5 | 15 | 8 |
| J62 | 6 | 2 | 20 | 11 |
| J63 | 6 | 3 | 30 | 17 |
| J64 | 6 | 4 | 41 | 23 |
| J65 | 6 | 5 | 51 | 29 |
| J66 | 6 | 6 | 62 | 35 |
| J67 | 6 | 7 | 72 | 41 |
| J69 | 6 | 9 | 92 | 53 |
| J610 | 6 | 10.5 | 108 | 62 |
| J612 | 6 | 12 | 123 | 70 |
| J613 | 6 | 13.5 | 138 | 79 |
| J615 | 6 | 15 | 154 | 88 |
| J618 | 6 | 18 | 185 | 105 |
| J624 | 6 | 24 | 246 | 141 |
| J627 | 6 | 27 | 277 | 158 |
| J630 | 6 | 30 | 308 | 176 |
| J636 | 6 | 36 | 369 | 211 |
| J639 | 6 | 39 | 400 | 228 |
| J640 | 6 | 40.5 | 415 | 237 |
| J645 | 6 | 45 | 461 | 264 |
| J654 | 6 | 54 | 554 | 316 |
| J658 | 6 | 58.5 | 600 | 343 |
| <hr/> | | | | |
| J161 | 16 | 1 | 10 | 5 |
| J161.5 | 16 | 1.5 | 15 | 8 |
| J162 | 16 | 2 | 20 | 11 |
| J163 | 16 | 3 | 30 | 17 |
| J164 | 16 | 4 | 41 | 23 |
| J165 | 16 | 5 | 51 | 29 |
| J166 | 16 | 6 | 62 | 35 |
| J167 | 16 | 7 | 72 | 41 |
| J169 | 16 | 9 | 92 | 53 |
| J1610 | 16 | 10.5 | 108 | 62 |
| J1612 | 16 | 12 | 123 | 70 |
| J1613 | 16 | 13.5 | 138 | 79 |
| J1615 | 16 | 15 | 154 | 88 |
| J1618 | 16 | 18 | 185 | 105 |
| J1624 | 16 | 24 | 246 | 141 |
| J1627 | 16 | 27 | 277 | 158 |
| J1630 | 16 | 30 | 308 | 176 |
| J1636 | 16 | 36 | 369 | 211 |
| J1639 | 16 | 39 | 400 | 228 |
| J1640 | 16 | 40.5 | 415 | 237 |
| J1645 | 16 | 45 | 461 | 264 |
| J1654 | 16 | 54 | 554 | 316 |
| J1658 | 16 | 58.5 | 600 | 343 |

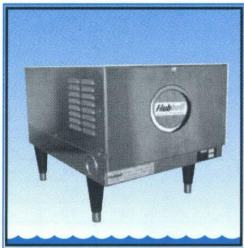
MODEL J6 - (4 TO 18 kW) DIMENSIONS



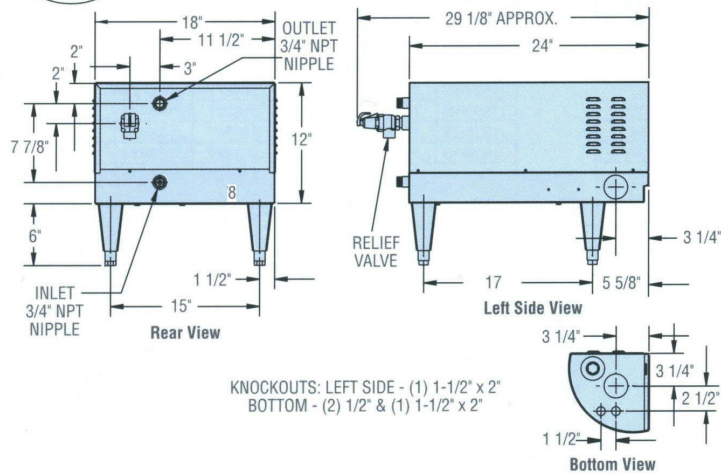
Shipping Weight: 95 lbs.



MODEL J6 - (24 TO 58 kW) DIMENSIONS



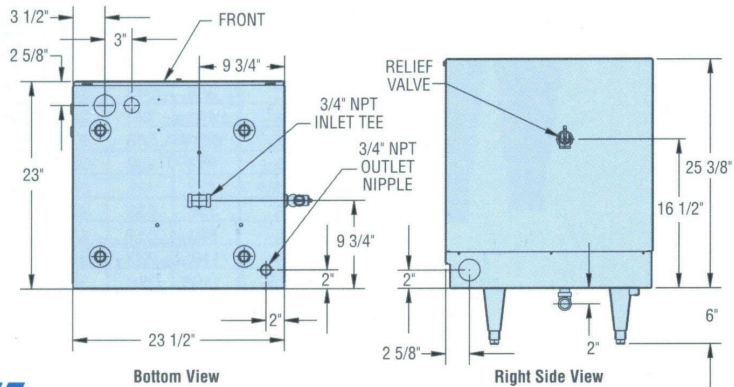
Shipping Weight: 110 lbs.



MODEL J16 - DIMENSIONS



Shipping Weight: 180 lbs.



KNOCKOUTS: LEFT SIDE - 1-1/2" x 2"
 BOTTOM - 1-1/2" x 2" & 3/4" x 1" x 1-1/4"

Hubbell™

CONSTRUCTION

TANK

The storage tank is designed, manufactured, and stamped in accordance with ASME section VIII Division 1. The tank is constructed of type 304L stainless steel for maximum tank longevity and fabricated by all welded construction and is designed for a maximum allowable working pressure of 150 psi (225 psi TP).

TANK CONNECTIONS

The heater is supplied with separate connections for the cold/warm inlet and the hot water outlet. Water entering the warm water inlet and leaving through the hot water outlet is evenly circulated by means of a diffuser within the tank. A 3/4-inch FNPT connection is provided for mounting a combination safety temperature and pressure relief valve. An overflow line should be utilized from the relief valve outlet to a floor drain. See drawing for locations and sizes.

HEATING ELEMENT

The water heater is supplied with an electric immersion heating element assembly(s), composed of copper sheathed elements that are fitted into a brass 1½-12UNF screw plug with 1-7/8" hex. Each assembly is threaded into the tank and sealed with an o-ring gasket. See drawing for voltage and power ratings.



MAGNETIC CONTACTOR

The definite purpose magnetic contactor(s) is a heavy-duty resistive load type. The contactor supplies power to the heating element(s) based on the resistive load (non-inductive) of the heater only when the relay on the control board is closed, thereby pulling in the contacts until the desired temperature is reached. At this point, the contacts will drop out, which in turn disconnects power from the elements. Units with two contactors will turn on and off in stages.



CONTROL BOARD AND DISPLAY

The control board supplies all the necessary function for heater operation. These include control temperature, hi-limit cut-out, low water detection, and leak detection.



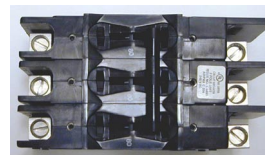
LOW VOLTAGE CONTROL TRANSFORMER

A control circuit transformer is supplied with all models rated greater than 240-volts. This component is used to step down the primary power supply (600, 480, 440, 415, or 380) to 208/240-volts for safety when working with control circuits.



POWER CIRCUIT BREAKERS

When required by code, a magnetic power circuit breaker is supplied for circuit overload protection. The circuit breaker can be reset in the event of a current overload.



OUTER SHELL, INSULATION, AND SUPPORTS

The tank is encapsulated in high efficiency polyurethane foam insulation meeting the requirements for UL 94 HF-1 rating. The protective shell is constructed of type 304 brushed stainless steel. NSF approved adjustable plastic legs are provided for support.

DIAL TEMPERATURE AND PRESSURE GAUGE

A combination temperature (30°-240° F / 0°-120°C) and pressure (0–200 psi / 0-1400 kPa) gauge with 3-inch dial is supplied with the unit for in-line installation (shipped loose). The connection is ½” NPT with a 2” long sensing probe.



PRESSURE REDUCING VALVE

A bronze pressure reducing valve with built-in bypass is supplied with the unit. This valve is shipped separately for in-line installation. The ¾” NPT valve is adjustable from 25-psi to 75-psi. The inlet connection is supplied with a ¾” union by sweat connection. The outlet connection is ¾” female NPT.



OPTIONAL EQUIPMENT

Slide Brackets

Available for the J6 Model only, these brackets allow for mounting the booster heater under a counter. See slide bracket diagram on page 8 for details.

Shock Absorber

The optional shock absorber can be installed between the booster and the dishwasher to reduce the harmful pressures resulting from quick closing dishwasher solenoid valves.



Legs

In lieu of the standard black plastic legs, optional adjustable legs are available in stainless steel, die-cast nickel plated, and floor mount stainless steel. All optional legs are adjustable height type.



S/S Floor Mount

Nickel Plated

Stainless Steel

Security Package

For prison and other secure facilities a tamper resistant package is available. All external screws are spader type requiring a spader wrench for removal.

Alternate Voltage

Other voltages are available, including 380V, 440V, and 415V. Consult the factory for details.

Water Treatment System

The optional water treatment system provides superior mineral scale prevention and corrosion control by feeding a special blend of scale control compounds into the warm water stream before the booster. The in-line system includes a clear cartridge housing to allow an operator to view the cartridge and determine when it needs replacement without the need to open the system.



XBI Low Temperature Interlock

An optional in-line control board with separate manual setpoint (range: 165°F – 194°F) monitors the temperature of the water through the P65 probe and will trip a SPDT relay for customers' remote applications.

Remote Alarm Plug Adapter

An optional plug adapter is available to provide a remote fault alarm signal through the J4 connector on the control board. See page 11 for installation details.



SECTION II – INSTALLATION AND START-UP

WARNING / CAUTION

- DO NOT TURN ON THE ELECTRIC POWER SUPPLY to this equipment until heater is completely filled with water and all air has been released. *If the heater is NOT filled with water when the power is turned on, the heating elements will burn out.*
- For protection against excessive pressures and temperatures, local codes require the installation of a temperature-and-pressure (T&P) relief valve certified by a nationally recognized laboratory that maintains periodic inspection of production of listed equipment of materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff for Hot Water Supply Systems. ANSI Z21.22-1971. THE CUSTOMER IS RESPONSIBLE TO PROTECT PROPERTY AND PERSONNEL FROM HARM WHEN THE VALVE FUNCTIONS.
- All water heaters have a risk of leakage at some unpredictable time. IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE A CATCH PAN OR OTHER ADEQUATE MEANS, SO THAT THE RESULTANT FLOW OF WATER WILL NOT DAMAGE FURNISHINGS OR PROPERTY.
- Installation or service of this unit requires ability equal to that of a licensed tradesman in the field.
- The installation must conform to these instructions and any local authority having jurisdiction. Grounding and electrical wiring connected to the unit must also conform to the latest version of the National Electric Code NFPA-70.

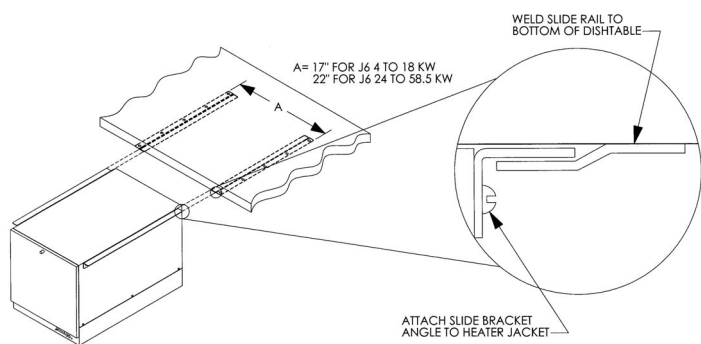
WATER HEATER PLACEMENT

NOTE: For most effective operation, install the booster heater as close as possible to the dishwasher. If the distance between the booster and the dishwasher exceeds NSF requirements, recirculation methods must be employed.

1. Place the heater on a solid, level foundation in a clean, dry location as near as possible to the dish washing machine.
2. The water heater should be protected from freezing and waterlines insulated to reduce energy and water waste.
3. Leave a minimum of 18" clearance for element withdrawal and control access.
4. Do not install in an area where flammable liquids or combustible vapors are present.

SLIDE BRACKETS FOR HANGING SUPPORT MOUNTING

1. Weld slide rails to bottom of dishtable. Spacing should be 17" for J6 models 4 to 18kW and 22" for J6 models 24 to 58.5kW. J16 models are not designed for use with slide brackets.
2. Attach slide bracket angles to heater with #8 sheet metal screws. It will be necessary to drill 1/8" holes into heater jacket for screw pilot holes.
3. Slide heater onto slide rails under dishtable.

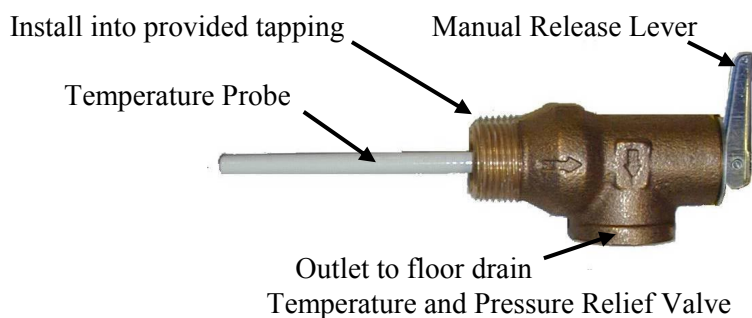


PIPING INSTALLATION – See Diagrams

NOTES:

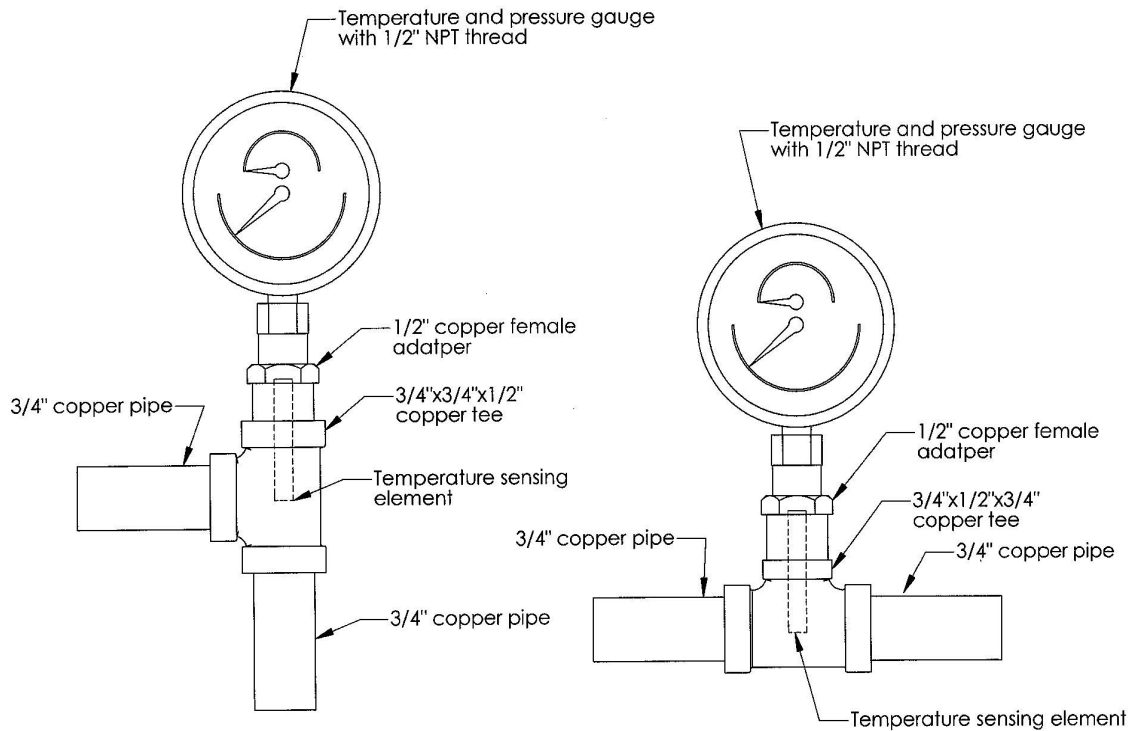
- Dielectric couplings should be used in connecting dissimilar metals to prevent electrolysis.
- No check valve may be installed in the supply line to the booster.

- All shut-off valves must be gate or ball valves – not globe valves.
 - To minimize heat loss and maximize efficiency, hot water piping should be insulated.
 - Teflon tape should be used on all NPT threaded pipe connections.
1. Connect the cold/warm water inlet and hot water outlet to the appropriate connections as shown; refer to the specifications for location and sizes.
 IMPORTANT – Be certain to connect the outlet piping to the final rinse and not to the wash tank.
 IMPORTANT (applies to J6 Models only) – Do not turn the entering warm water or exiting hot water nipples from their factory installed positions. The internal diffusers are aligned at the factory and turning the nipple will change the diffuser position and affect performance. Hubbell recommends that the inlet and outlet pipes are insulated to prevent excessive heat loss.
 IMPORTANT (applies to J6 Models only) – Do not apply heat directly to the entering warm water or exiting hot water nipples. If sweat connections are to be used, sweat tubing to the adapter before threading the adapter to the nipple on the heater. Any heat applied to the heater nipple will damage the internal plastic diffuser and affect performance.
 2. Install water pressure regulator and adjust to the pressure recommended by the dishwasher manufacturer. WHEN A STANDARD PRESSURE REGULATOR IS USED, (other than that purchased with the booster), it acts as a check valve and it is possible that thermal expansion will cause the relief valve to drip or occasionally blow off a small amount of water. To overcome this condition, it is recommended that a 3/8" by-pass arrangement with a horizontal check valve be installed around the pressure regulator. This will prevent annoyance caused by the relief valve dripping or blowing off. The pressure reducing valve is adjustable from 10 to 35 psi. The set screw located at the top of the diaphragm adjusts the pressure, turn clockwise to increase the pressure and counter-clockwise to decrease the pressure.
 3. Install in-line pressure and temperature gauge(s). **NOTE:** The temperature sensing element must be in the water stream.
 4. Install the combination temperature and pressure safety relief valve in the tapping provided. Note that this is required by law for safety considerations.



5. Install a relief valve overflow pipe to a nearby floor drain.
 NOTE: Relief valve discharge piping limitations:
 - a. Termination to be plain end (no threads)
 - b. Maximum 30-feet
 - c. Maximum four (4) elbows
 - d. No reduction in line size
 - e. No valve of any type to be installed between the relief valve and tank or in the drain line
 - f. Termination to be 6-inches above the drain
6. A shock absorber is recommended in the hot water outlet line to soften the water hammer caused by automatic dishwasher solenoid valves.

7. Install the dial temperature and pressure gauge in the outlet line. The temperature sensing element must be in the hot water stream and the gauge must be mounted upright.



FILLING THE HEATER

1. Open the valve to the cold water inlet and allow the heater and piping system to completely fill, as indicated by a steady flow of water through the dishwasher rinse nozzles.

NOTE: Flush the tank at full flow for 10 minutes prior to putting into service.

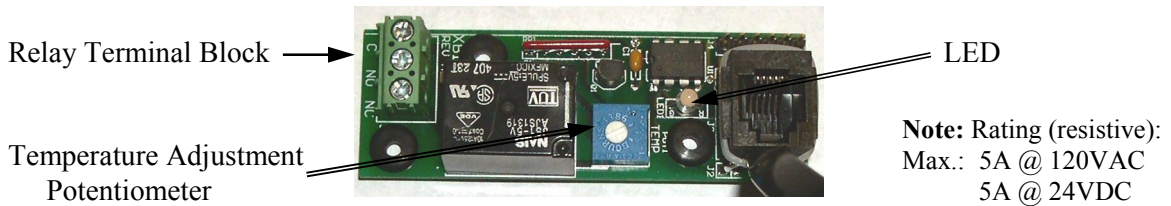
ELECTRICAL INSTALLATION

1. Enter the base through the factory punched KO's with properly sized feeder leads, See Wiring Chart. Single-phase installations require two (2) leads. All 3-phase heaters are intended for use with a 3-wire delta system plus ground. No neutral is required. For a 4-wire plus ground system, install 3 legs of power plus the ground and terminate the neutral leg.
2. Install these power leads into the box lugs on the power distribution block or magnetic contactor, as required.
3. All other electrical connections are made at the factory; therefore, no other electrical connections are necessary.
4. Connect incoming ground wire to ground lug supplied.
5. Check all connections, including factory connections, for tightness.

OPTIONAL XB1 LOW TEMPERATURE INTERLOCK

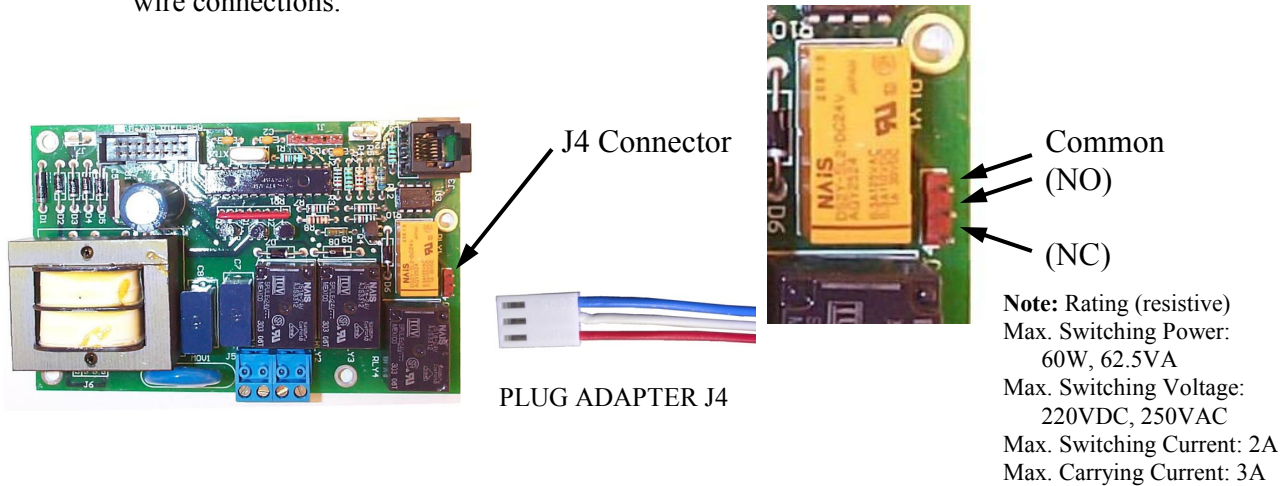
1. If desired, the XB1 can be used as an alarm relay or a temperature interlock at a setpoint other than the water temperature setpoint on the booster heater.
2. If the XB1 is not factory installed, mount the XB1 to the control panel, plug the P65 probe into the XB1, and plug the XB1 into the T1000 control board.
3. To set the XB1 setpoint, turn the potentiometer clockwise for a higher setpoint and counter-clockwise for a lower setpoint. The range is adjustable between 150°F and 180°F.

4. Make connections as required to the relay terminal block. When the temperature drops below the XB1 setpoint the relay is open between Normally Open (NO) and Common (C) and the LED will flash green. When the temperature is above the XB1 setpoint the relay is closed between NO and C and the LED will be solid green. Use NO and C for low temperature interlock or high temperature alarm. Use Normally Closed (NC) and C for low temperature alarm. A red LED indicates an error.



OPTIONAL REMOTE ALARM CONTACTS

1. If desired, the control board can be wired to a remote alarm to indicate a reset fault condition. These fault conditions include over-temperature, no probe, and low water (when the configuration is set to manual reset).
2. This alarm can be wired to the J4 connector on the control board as shown below. To facilitate this installation, an optional adapter, Hubbell P/N PLUG ADAPTER J4, can be purchased to provide wire connections.



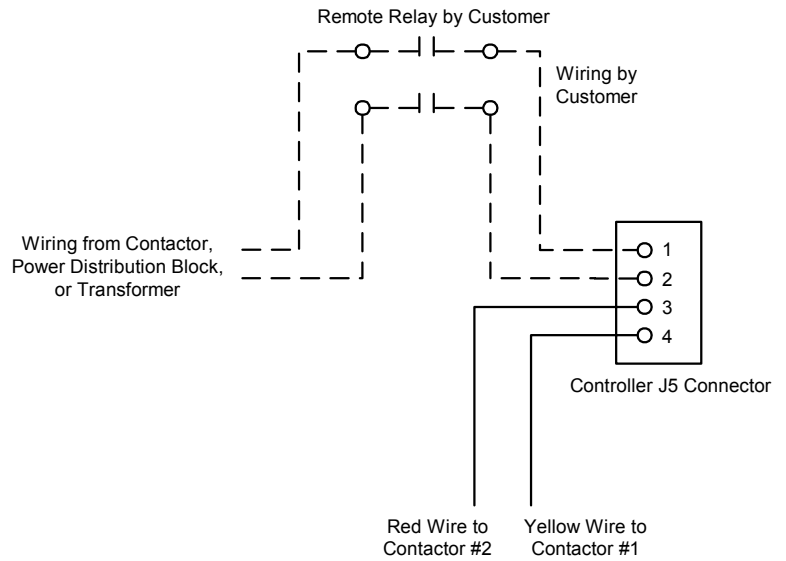
OPTIONAL FIELD CONVERSION FROM SINGLE TO THREE PHASE OR THREE TO SINGLE PHASE (6, 7, and 9 kW models in 208 and 240 volts only)

1. Find the appropriate diagram for the unit to be converted in the following chart titled “Wiring Chart”.
2. Re-wire the unit according to the diagram.
NOTE: The wire to be used for internal wiring must conform to SEW-2 or PTFE (200°C) and must match the wire size currently in use. Contact the factory for assistance, if required.
3. Contact the factory for correct labels. The factory will need the serial number for proper identification.

FOR REMOTE ON/OFF CONTROL

To remotely control the On / Off operation of the heater, it is recommended that a DPST switch or relay (by others) be used to break both power legs (white and black wires) connected to the top two terminals of the J5 connector on the control board. See diagram at right.

Use a NC (Normally Closed) relay to turn the booster ON when energizing the relay coil or to turn the booster OFF when de-energizing the relay coil.
Use a NO (Normally Open) relay to turn the booster OFF when energizing the relay coil or to turn the booster ON when de-energizing the relay coil.



FINAL CHECKS

1. Check all connections for tightness.
2. Ensure that all the above steps are completed.
3. Remove the protective outer plastic covering from the sheetmetal shell.
4. After the water is heated for the first time, monitor the water temperature as described in Section III, Quarterly Inspection.

Wiring Chart

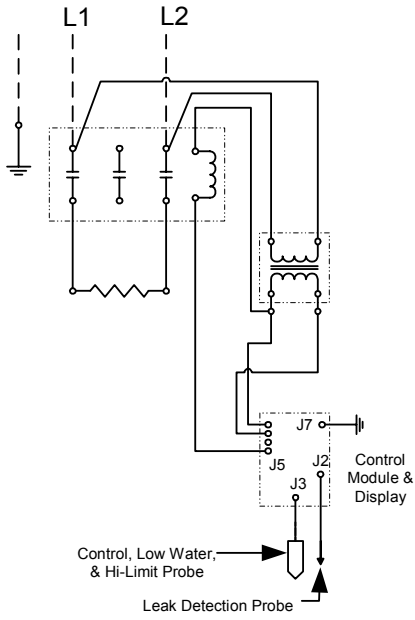
| kW | Volt | Ph | Unit Amp Draw | Branch Amp Draw | Phase-Phase Resistance (Ohms) | Min. Feed Breaker or Fuse Size | Internal Power Wire Size | Element Jumper Wire Size | Copper Power Feed Wire Size | Conduit Size | Diagram |
|------|------|----|---------------|-----------------|-------------------------------|--------------------------------|--------------------------|--------------------------|-----------------------------|--------------|---------|
| 4 | 208 | 1 | 19.2 | 19.2 | 10.8 | 25 | 12 | N/A | 10 | ½" | 1(NT) |
| | 240 | 1 | 16.7 | 16.7 | 14.4 | 25 | 12 | N/A | 12 | ½" | 1(NT) |
| | 480 | 1 | 8.3 | 8.3 | 57.6 | 15 | 12 | N/A | 14 | ½" | 1(WT) |
| 5 | 208 | 1 | 24.0 | 24.0 | 8.7 | 30 | 12 | N/A | 10 | ½" | 1(NT) |
| | 240 | 1 | 20.8 | 20.8 | 11.5 | 30 | 12 | N/A | 10 | ½" | 1(NT) |
| | 480 | 1 | 10.4 | 10.4 | 46.1 | 15 | 12 | N/A | 14 | ½" | 1(WT) |
| 6 | 208 | 1 | 28.8 | 28.8 | 7.2 | 40 | 12 | 12 | 8 | ½" | 4 |
| | 208 | 3 | 16.7 | 16.7 | 14.4 | 25 | 12 | 12 | 10 | ½" | 10(NT) |
| | 240 | 1 | 25.0 | 25.0 | 9.6 | 35 | 12 | 12 | 8 | ½" | 4 |
| | 240 | 3 | 14.4 | 14.4 | 19.2 | 20 | 12 | 12 | 12 | ½" | 10(NT) |
| | 480 | 3 | 7.2 | 7.2 | 76.8 | 10 | 12 | 12 | 14 | ½" | 10(WT) |
| | 600 | 3 | 6.0 | 6.0 | 114.8 | 10 | 12 | 12 | 14 | ½" | 14 |
| 7 | 208 | 1 | 32.5 | 32.5 | 6.4 | 45 | 12 | 12 | 8 | ½" | 4 |
| | 208 | 3 | 18.7 | 18.7 | 12.4 | 25 | 12 | 12 | 10 | ½" | 10(NT) |
| | 240 | 1 | 30.5 | 30.5 | 8.2 | 40 | 12 | 12 | 8 | ½" | 4 |
| | 240 | 3 | 17.6 | 17.6 | 16.5 | 25 | 12 | 12 | 10 | ½" | 10(NT) |
| | 480 | 3 | 8.4 | 8.4 | 65.8 | 15 | 12 | 12 | 14 | ½" | 10(WT) |
| | 600 | 3 | 6.8 | 6.8 | 102.0 | 10 | 12 | 12 | 14 | ½" | 14 |
| 9 | 208 | 1 | 43.3 | 43.3 | 4.8 | 55 | 10 | 12 | 6 | ¾" | 4 |
| | 208 | 3 | 25.0 | 25.0 | 9.6 | 35 | 10 | 12 | 8 | ½" | 10(NT) |
| | 240 | 1 | 37.5 | 37.5 | 6.4 | 50 | 10 | 12 | 8 | ½" | 4 |
| | 240 | 3 | 21.7 | 21.7 | 12.8 | 30 | 10 | 12 | 10 | ½" | 10(NT) |
| | 480 | 3 | 10.8 | 10.8 | 51.2 | 15 | 12 | 12 | 14 | ½" | 10(WT) |
| | 600 | 3 | 9.1 | 9.1 | 76.5 | 15 | 12 | 12 | 14 | ½" | 14 |
| 10.5 | 208 | 1 | 48.8 | 48.8 | 4.3 | 65 | 8 | 10 | 6 | ¾" | 4 |
| | 208 | 3 | 29.1 | 29.1 | 8.2 | 40 | 12 | 12 | 8 | ½" | 10(NT) |
| | 240 | 1 | 43.8 | 43.8 | 5.5 | 55 | 10 | 12 | 6 | ¾" | 4 |
| | 240 | 3 | 25.3 | 25.3 | 11.0 | 35 | 12 | 12 | 8 | ½" | 10(NT) |
| | 480 | 3 | 12.6 | 12.6 | 43.9 | 20 | 12 | 12 | 12 | ½" | 10(WT) |
| | 600 | 3 | 10.2 | 10.2 | 68.1 | 15 | 12 | 12 | 14 | ½" | 14 |
| 12 | 208 | 1 | 57.7 | 57.7 | 3.6 | 75 | 8 | 10 | 4 | 1" | 4 |
| | 208 | 3 | 33.3 | 33.3 | 7.2 | 45 | 12 | 12 | 8 | ½" | 10(NT) |
| | 240 | 1 | 50.0 | 50.0 | 4.8 | 65 | 8 | 10 | 6 | ¾" | 4 |
| | 240 | 3 | 28.9 | 28.9 | 9.6 | 40 | 12 | 12 | 8 | ½" | 10(NT) |
| | 480 | 3 | 14.4 | 14.4 | 38.4 | 20 | 12 | 12 | 12 | ½" | 10(WT) |
| | 600 | 3 | 11.3 | 11.3 | 61.2 | 15 | 12 | 12 | 14 | ½" | 14 |
| 13.5 | 208 | 1 | 64.9 | 64.9 | 3.2 | 85 | 8 | 10 | 4 | 1" | 4 |
| | 208 | 3 | 37.5 | 37.5 | 6.4 | 50 | 10 | 12 | 8 | ½" | 10(NT) |
| | 240 | 1 | 56.3 | 56.3 | 4.3 | 75 | 8 | 10 | 4 | 1" | 4 |
| | 240 | 3 | 32.5 | 32.5 | 8.5 | 45 | 12 | 12 | 8 | ½" | 10(NT) |
| | 480 | 3 | 16.2 | 16.2 | 34.1 | 25 | 12 | 12 | 12 | ½" | 10(WT) |
| | 600 | 3 | 13.6 | 13.6 | 51.0 | 20 | 12 | 12 | 12 | ½" | 14 |
| 15 | 208 | 1 | 72.1 | 72.1 | 2.9 | 95 | 6 | 8 | 3 | 1" | 4 (DB) |
| | 208 | 3 | 41.6 | 41.6 | 5.8 | 55 | 10 | 12 | 6 | ¾" | 10(NT) |
| | 240 | 1 | 62.5 | 62.5 | 3.8 | 80 | 8 | 10 | 4 | 1" | 4 |
| | 240 | 3 | 36.1 | 36.1 | 7.7 | 50 | 10 | 12 | 8 | ½" | 10(NT) |
| | 480 | 3 | 18.0 | 18.0 | 30.7 | 25 | 12 | 12 | 10 | ½" | 10(WT) |
| | 600 | 3 | 14.7 | 14.7 | 47.1 | 20 | 12 | 12 | 12 | ½" | 14 |
| 18 | 208 | 1 | 86.5 | 86.5 | 2.4 | 110 | 6 | 8 | 2 | 1" | 4 (DB) |
| | 208 | 3 | 50.0 | 50.0 | 4.8 | 65 | 8 | 10 | 6 | ¾" | 10(NT) |
| | 240 | 1 | 75.0 | 75.0 | 3.2 | 95 | 6 | 8 | 3 | 1" | 4 (DB) |
| | 240 | 3 | 43.3 | 43.3 | 6.4 | 55 | 10 | 12 | 6 | ¾" | 10(NT) |
| | 480 | 3 | 21.7 | 21.7 | 25.6 | 30 | 12 | 12 | 10 | ½" | 10(WT) |
| | 600 | 3 | 18.1 | 18.1 | 38.3 | 25 | 12 | 12 | 12 | ½" | 14 |

| kW | Volt | Ph | Unit Amp Draw | Branch Amp Draw | Phase-Phase Resistance (Ohms) | Min. Feed Breaker or Fuse Size | Internal Power Wire Size | Element Jumper Wire Size | Copper Power Feed Wire Size | Conduit Size | Diagram |
|------|------|-----|---------------|-----------------|-------------------------------|--------------------------------|--------------------------|--------------------------|-----------------------------|--------------|---------|
| 24 | 208 | 1 | 115.4 | 38.5 | 1.8 | 145 | 10 | 12 | 1/0 | 1¼" | 3A |
| | 208 | 3 | 66.6 | 66.6 | 3.6 | 85 | 8 | 10 | 4 | 1" | 13(NT) |
| | 240 | 1 | 100.0 | 33.3 | 2.4 | 130 | 12 | 12 | 1 | 1¼" | 3A |
| | 240 | 3 | 57.7 | 57.7 | 4.8 | 75 | 8 | 10 | 4 | 1" | 13(NT) |
| | 480 | 3 | 28.9 | 28.9 | 19.2 | 40 | 12 | 12 | 8 | ½" | 13(WT) |
| | 600 | 3 | 22.6 | 22.6 | 30.6 | 30 | 12 | 12 | 10 | ½" | 15 |
| 27 | 208 | 1 | 130.0 | 43.3 | 1.6 | 165 | 10 | 12 | 2/0 | 1½" | 6A |
| | 208 | 3 | 74.9 | 37.5 | 3.2 | 95 | 10 | 12 | 3 | 1" | 12(NCB) |
| | 240 | 1 | 112.5 | 37.5 | 2.1 | 145 | 10 | 12 | 1/0 | 1¼" | 3A |
| | 240 | 3 | 65.0 | 65.0 | 4.3 | 85 | 8 | 10 | 4 | 1" | 13(NT) |
| | 480 | 3 | 32.5 | 32.5 | 17.1 | 45 | 12 | 12 | 8 | ½" | 13(WT) |
| | 600 | 3 | 27.2 | 27.2 | 25.5 | 35 | 12 | 12 | 8 | ½" | 15 |
| 30 | 208 | 1 | 144.2 | 48.1 | 1.4 | 185 | 8 | 10 | 3/0 | 1½" | 6A |
| | 208 | 3 | 83.3 | 41.6 | 2.9 | 105 | 10 | 12 | 2 | 1" | 12(NCB) |
| | 240 | 1 | 125.0 | 41.7 | 1.9 | 160 | 10 | 12 | 2/0 | 1½" | 6A |
| | 240 | 3 | 72.2 | 36.1 | 3.8 | 95 | 10 | 12 | 3 | 1" | 12(NCB) |
| | 480 | 3 | 36.1 | 36.1 | 15.4 | 50 | 10 | 12 | 8 | ½" | 13(WT) |
| | 600 | 3 | 29.4 | 29.4 | 23.6 | 40 | 12 | 12 | 8 | ½" | 15 |
| 36 | 208 | 1 | 173.1 | 57.7 | 1.2 | 220 | 8 | 10 | 4/0 | 2" | 6A |
| | 208 | 3 | 99.9 | 50.0 | 2.4 | 125 | 8 | 10 | 1 | 1¼" | 12(NCB) |
| | 240 | 1 | 150.0 | 50.0 | 1.6 | 190 | 8 | 10 | 3/0 | 1½" | 6A |
| | 240 | 3 | 86.6 | 43.3 | 3.2 | 110 | 10 | 12 | 2 | 1" | 12(NCB) |
| | 480 | 3 | 43.3 | 43.3 | 12.8 | 55 | 10 | 12 | 6 | ¾" | 13(WT) |
| | 600 | 3 | 36.2 | 36.2 | 19.1 | 50 | 10 | 12 | 8 | ½" | 15 |
| 39 | 208 | 1 | 187.5 | 62.5 | 1.1 | 235 | 8 | 10 | 250 | 2" | 6A |
| | 208 | 3 | 108.3 | 54.1 | 2.2 | 140 | 8 | 10 | 1/0 | 1¼" | 12(NCB) |
| | 240 | 1 | 162.5 | 54.2 | 1.5 | 205 | 8 | 10 | 4/0 | 1½" | 6A |
| | 240 | 3 | 93.8 | 46.9 | 3.0 | 120 | 10 | 12 | 1 | 1" | 12(NCB) |
| | 480 | 3 | 46.9 | 46.9 | 11.8 | 60 | 8 | 10 | 6 | ¾" | 13(WT) |
| | 600 | 3 | 36.2 | 36.2 | 19.1 | 50 | 10 | 12 | 8 | ¾" | 15 |
| 40.5 | 208 | 1 | 195.0 | 65.0 | 1.1 | 245 | 8 | 10 | 250 | 2" | 6A |
| | 208 | 3 | 112.6 | 56.3 | 2.1 | 145 | 8 | 10 | 1/0 | 1¼" | 12(NCB) |
| | 240 | 1 | 168.8 | 56.3 | 1.4 | 215 | 8 | 10 | 250 | 1½" | 6A |
| | 240 | 3 | 97.4 | 48.7 | 2.8 | 125 | 10 | 12 | 1 | 1" | 12(NCB) |
| | 480 | 3 | 48.7 | 48.7 | 11.4 | 65 | 8 | 10 | 4 | ¾" | 13(WT) |
| | 600 | 3 | 36.2 | 36.2 | 19.1 | 50 | 10 | 12 | 8 | ¾" | 15 |
| 45 | 208 | 3 | 119.1 | 59.5 | 1.9 | 150 | 8 | 10 | 2/0 | 1¼" | 12(NCB) |
| | 240 | 1 | 187.5 | 62.5 | 1.3 | 235 | 8 | 10 | 250 | 2" | 6A |
| | 240 | 3 | 108.3 | 54.1 | 2.6 | 140 | 8 | 10 | 1/0 | 1¼" | 12(NCB) |
| | 480 | 3 | 54.1 | 54.1 | 10.2 | 70 | 8 | 10 | 4 | ¾" | 13(WT) |
| | 600 | 3 | 42.2 | 42.2 | 16.4 | 55 | 10 | 12 | 6 | ¾" | 15 |
| | 54 | 208 | 3 | 149.9 | 74.9 | 1.6 | 190 | 6 | 8 | 3/0 | 1½" |
| 240 | | 3 | 129.9 | 65.0 | 2.1 | 165 | 8 | 10 | 2/0 | 1½" | 12 |
| 480 | | 3 | 65.0 | 65.0 | 8.5 | 85 | 8 | 10 | 4 | 1" | 13(WT) |
| 600 | | 3 | 54.3 | 54.3 | 12.8 | 70 | 8 | 10 | 4 | 1" | 15 |
| 58.5 | 208 | 3 | 159.9 | 79.9 | 1.5 | 200 | 6 | 8 | 4/0 | 1½" | 12 |
| | 240 | 3 | 140.7 | 70.4 | 2.0 | 180 | 6 | 8 | 2/0 | 1½" | 12 |
| | 480 | 3 | 70.4 | 35.2 | 7.9 | 90 | 12 | 12 | 3 | 1" | 12(WT) |
| | 600 | 3 | 54.3 | 54.3 | 12.8 | 70 | 8 | 10 | 4 | 1" | 15 |

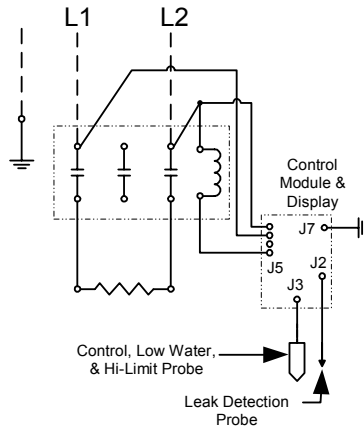
Notes:

1. Power feed wire sizing is based on using 75°C Cu THHN wire with feeder branch protection rated at 125%.
2. Internal wire sizing is based on using 200°C SEW-2 or PTFE wiring in a raceway with an ambient temperature up to 60°C.
3. For information on 380V, 415V, or 440V models reference the supplied drawing or contact the factory.
4. Normal phase-to-phase resistance tolerance is ±5%.
5. 480-volt and 600-volt phase-to-phase resistance values are shown with the transformer disconnected.
6. For 575V models, multiply the kW rating of the 600V model by a de-rating factor of 0.92 to get the actual rating for 575V.
7. For models manufactured prior to June 24, 2005, that utilize wiring diagrams 3, 5, 6, 7(NT), 7(WT), or 11 please contact the factory for wiring diagrams.

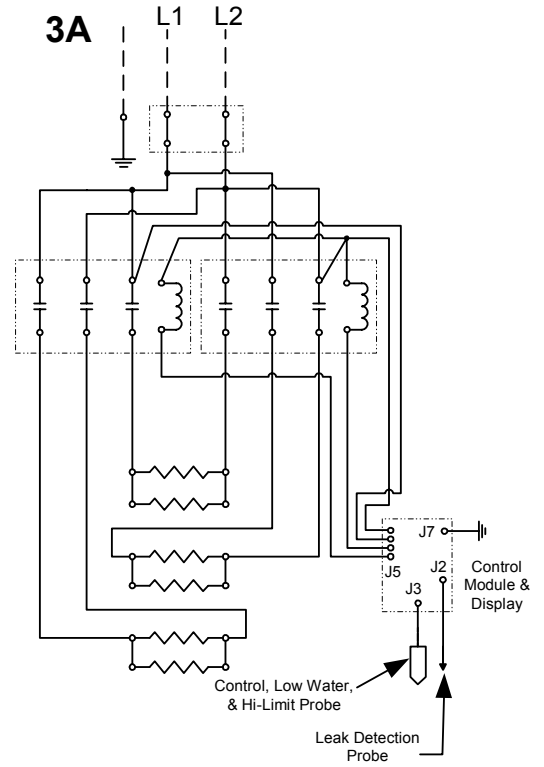
1(WT)



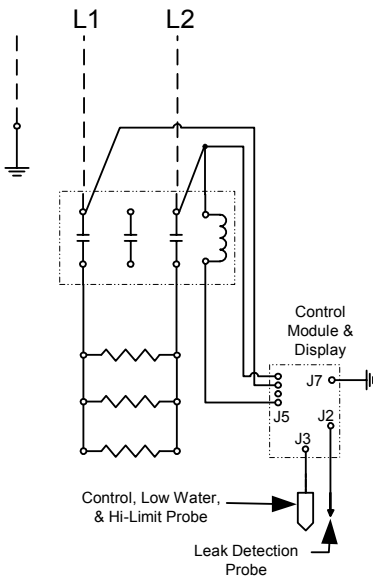
1(NT)



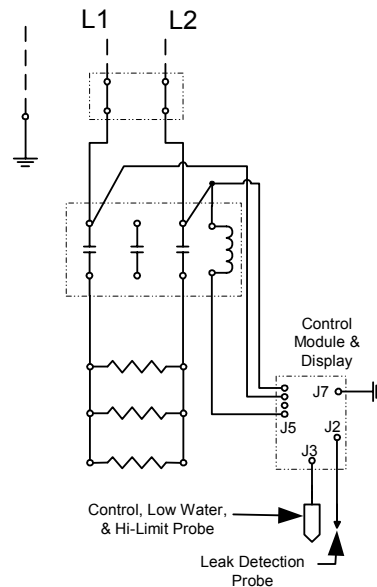
3A



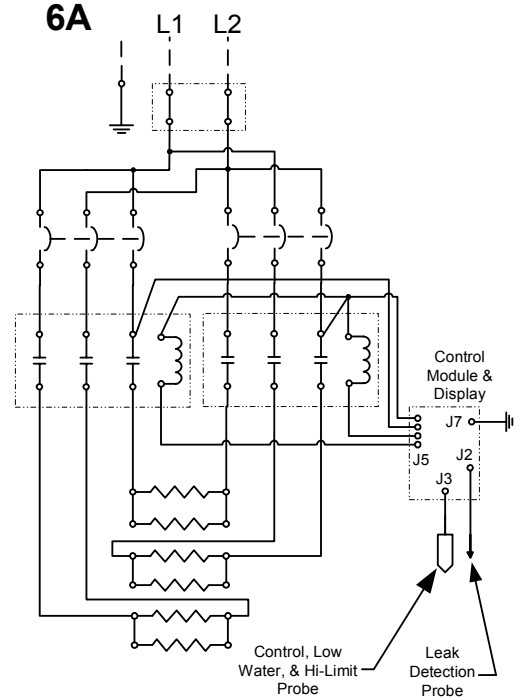
4



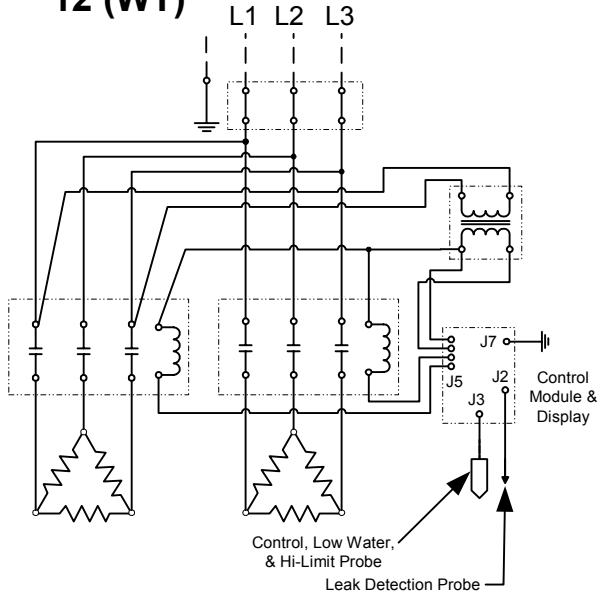
4 (DB)



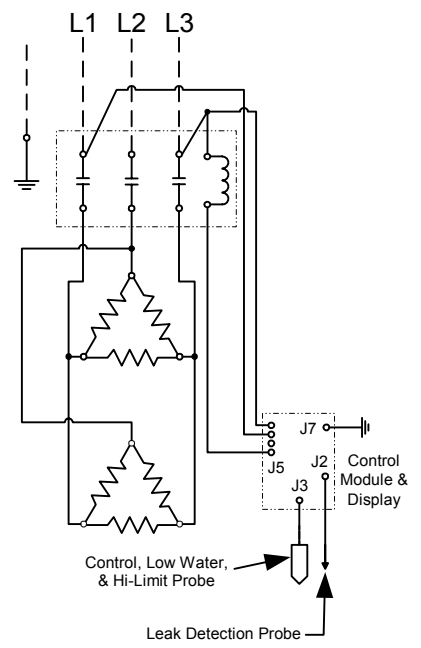
6A



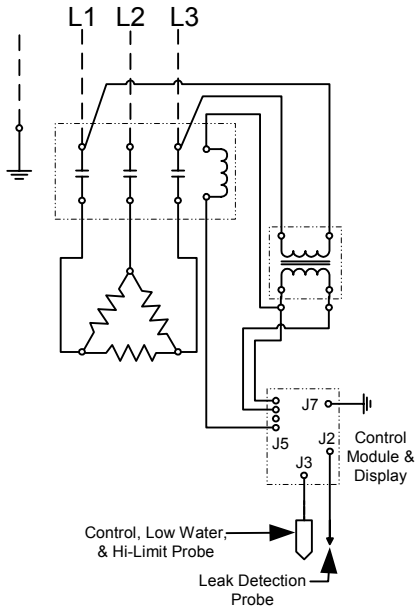
12 (WT)



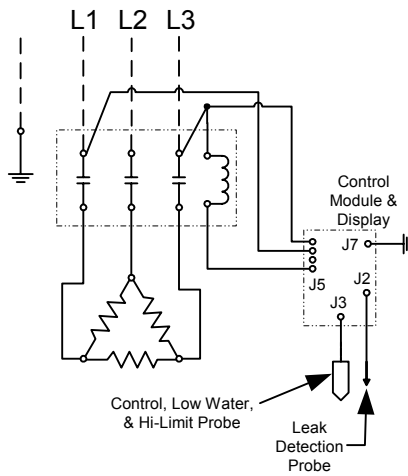
13 (NT)



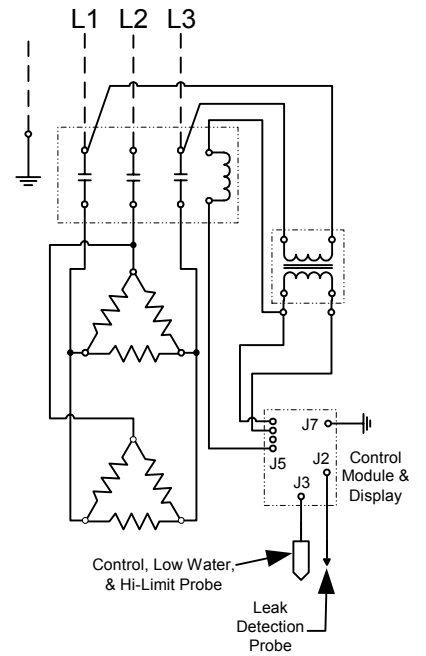
10(WT)



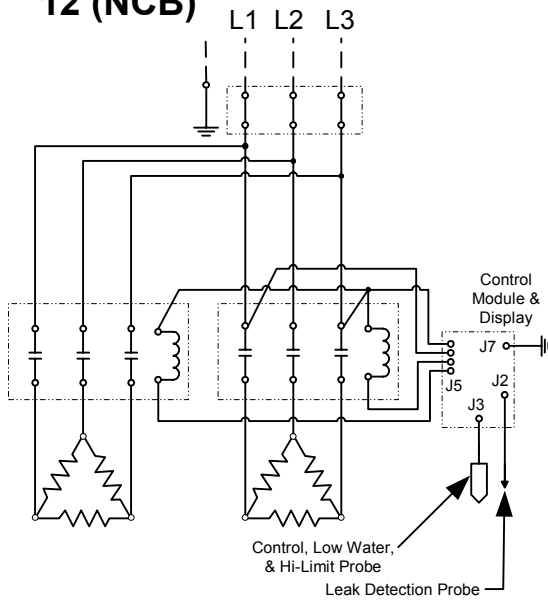
10(NT)



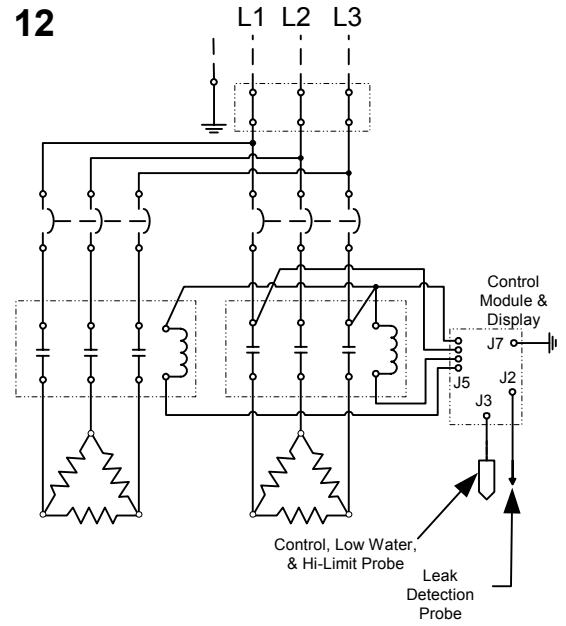
13(WT)



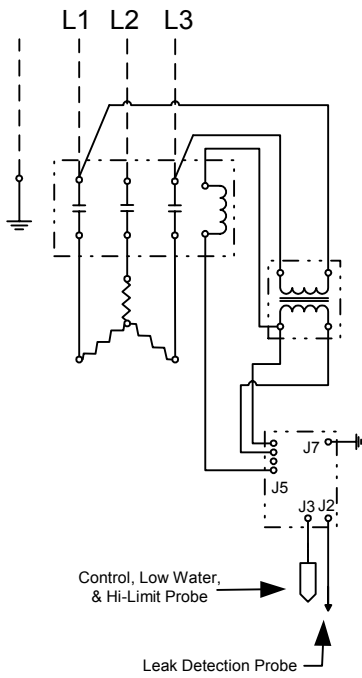
12 (NCB)



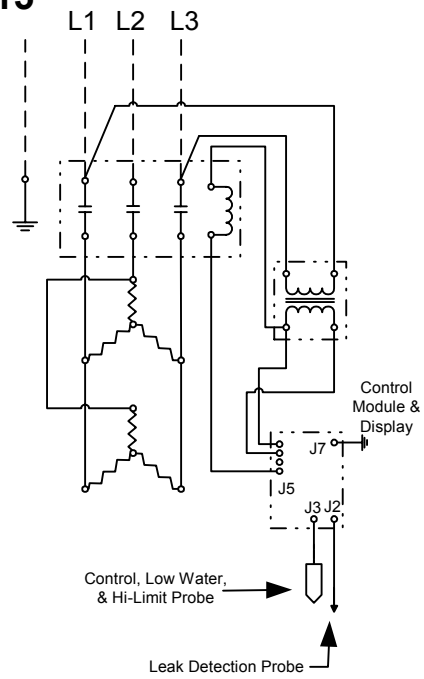
12



14

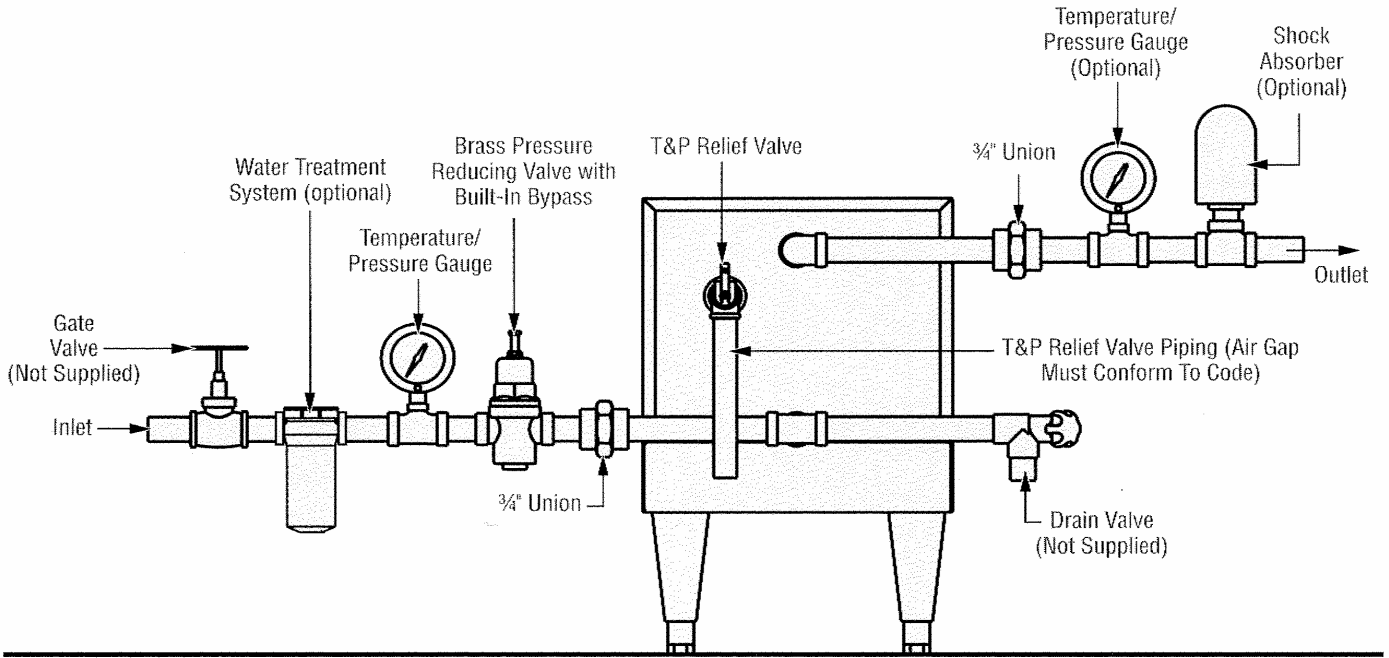


15

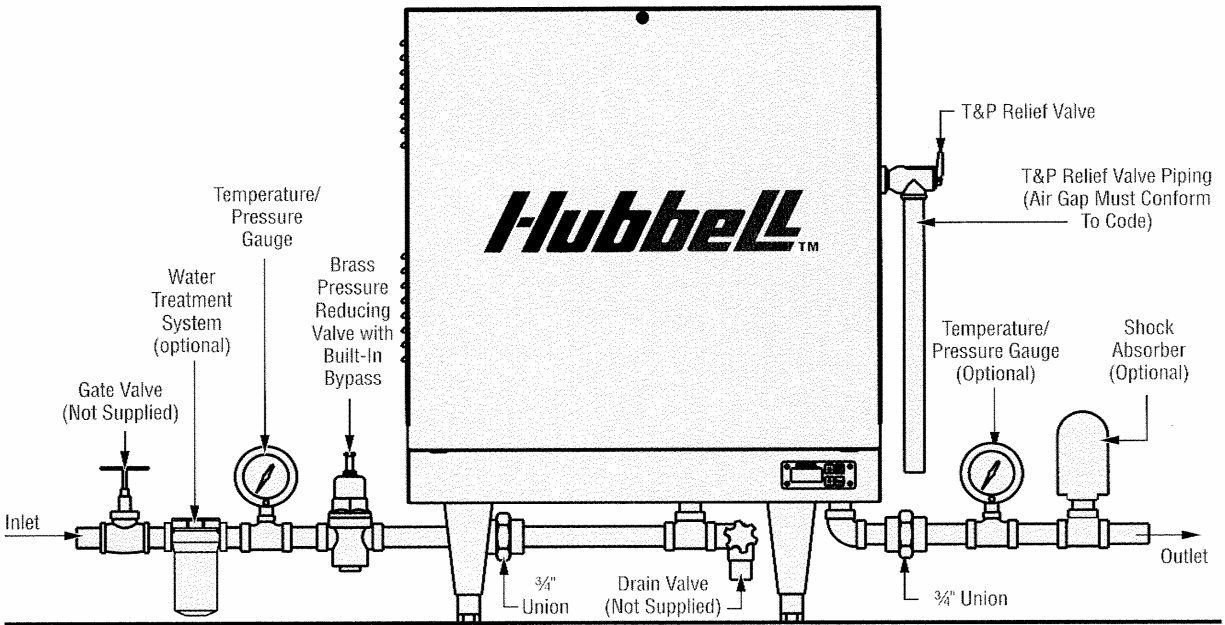


Note: Wiring diagrams 3, 5, 6, 7 (NT), 7 (WT), and 11 are obsolete.

J6 Plumbing Connections (Rear View)



J16 Plumbing Connections (Front View)



SECTION III - SCHEDULED MAINTENANCE AND OPERATION

WARNING / CAUTION

Before performing any maintenance procedure, make certain the power supply is turned OFF and cannot accidentally be turned on.

MAINTENANCE AND OPERATION

The water heater is automatic in its operation. It will maintain a full tank of water at the temperature setting of the controller. The water heater should not be turned on without first making sure that the tank is full of water and that all air has been released.

FREEZING

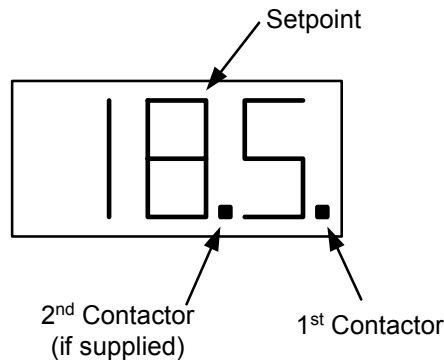
The tank should be fully drained in the event the electricity has been turned off and if there is danger of freezing.

CONTROLLER OPERATION

NOTE: All controller variables come preset from the factory to include a preset temperature of 185°F.

1. To turn unit on or off:
 - a. Press the ON/OFF button on the display module.
 - b. Note that the controller will resume its last mode of operation if power is disconnected.
2. To change setpoint temperature (the temperature is fully adjustable from 32° to 194°F (0°-90°C):
 - a. Press the UP and DOWN arrows simultaneously to enter setpoint change mode.
 - b. Press the UP or DOWN button to change the setpoint temperature.
 - c. Pressing and holding the UP or DOWN button will scroll through the setpoint temperature.
 - d. To leave setpoint change mode
 - i. Wait 5 seconds without pushing any buttons or press the UP and DOWN buttons simultaneously.
3. To view the number of operational hours (the number of hours when a contactor is pulled in) and software version:
 - a. Press the UP and DOWN arrows simultaneously to enter setpoint change mode.
 - b. Press the ON/OFF button.
 - c. Display will flash the software version (e.g. R14), HRS, followed by the hours in thousands of hours, followed by the hours.
 - i. Example: r14, HrS, 123, 456; indicates software version R1.4 and 123,456 hours.
 - d. To leave operational hours mode
 - i. Wait 5 seconds without pushing any buttons or press the UP and DOWN buttons simultaneously.
4. Configuration Menu. (NOTE: Configuration menu change should only be made by qualified personnel).
 - a. To enter the configuration menu, press and hold the UP, DOWN, and ON/OFF buttons simultaneously for 5 seconds.
 - b. To scroll through menu settings, press the ON/OFF button.
 - c. To make a change to a menu setting use either the UP or DOWN arrow.
 - d. Settings:
 - i. Relays – sets the number of magnetic contactors used in the heater.
 1. r ## , where ## is the number of magnetic contactors (01 or 02).

- ii. Low water detection – sets the low water detection on or off.
 - 1. L O n, for low water on. (Factory Default)
 - 2. L O F, for low water off.
- iii. Low water reset – sets the low water reset for either automatic or manual
 - 1. L A U, for low water automatic reset. (Factory Default)
 - 2. L A n, for low water manual reset.
- iv. Temperature units – sets the temperature units to either degrees Fahrenheit or Celsius.
 - 1. D E F, for degrees Fahrenheit. (Factory Default)
 - 2. D E C, for degrees Celsius.
- v. Differential – sets the number of degrees below setpoint that the heater will resume heating after it has achieved setpoint.
 - 1. d # #, where # # is the differential in degrees (1 to 20). (Factory set at 02)
- vi. Display – sets the display to either setpoint or actual temperature.
 - 1. d S S, for display setpoint temperature. (Factory Default)
 - 2. d S t, for display actual temperature.
- e. To leave the configuration menu, wait 5 seconds without pushing any buttons or press the UP and DOWN buttons simultaneously.
- 5. To reset any high-limit, no probe, or low water (when in manual reset mode) fault condition, press the RESET button.
- 6. Display
 - a. By default the display will show the setpoint of the booster heater.
 - b. The decimal points on the display, as shown below, indicate that the controller is calling for a contactor to pull in.



QUARTERLY INSPECTION

1. Monitor water temperature
 - a. Let water heater completely heat to a designated temperature setting.
 - b. After controller satisfies (that is, when the magnetic contactor actually clicks off), draw water from heater outlet and measure the temperature as close as possible to the heater.
 - c. Compare the water temperature of outlet water to the temperature setting of the display when it satisfies. Normal variation between the two points is approximately $\pm 5^{\circ}\text{F}$.
 - d. If these two readings do not coincide within acceptable tolerances and verification has been made of the accuracy of the temperature-reading gauge, replace the control board and/or the sensor probe.
2. Lift test lever on relief valve and let water run through valve for a period of approximately 10 seconds. This will help flush away any sediment that might build up in water passageways.
3. Inspect element for leakage as follows:

- a. Shut off power supply.
 - b. Remove front cover.
 - c. Visually inspect around heating element for evidence of leaks.
 - d. Rub around the heating element with a rag. Check for any evidence of moisture. If moisture is present or a water drip is observed, follow procedure outlined in Section V.
CAUTION: The area around the heating element may be hot.
4. Scale and mineral build-up on heating elements is a normal condition. It is recommended that the heating element be removed for examination and if scaled, should be cleaned. In an area of known hard or poor water conditions, the elements may need to be checked more frequently. This will improve the efficiency of the heater and increase the element life.
NOTE: Failure of the elements due to scale and mineral build-up is not covered under warranty. See warranty for complete details.
- a. Shut off power supply.
 - b. Drain the tank.
 - c. Remove front cover.
 - d. Disconnect the element wiring. It is recommended that one element at a time is removed to simplify re-wiring.
 - e. Unscrew element.
 - f. Lime scale removal
 - i. Place limed ends of the heating element in a de-limer solution, designed for potable water applications, and allow lime to dissolve. Do not allow de-limer to contact heating element terminals.
 - g. Other scale removal
 - i. Silicates, sulfates, and aluminates must be removed by scraping or other mechanical means. De-limers will not dissolve these types of scale.
 - h. Flush the cleaned ends of the elements with clean water.
 - i. Re-install element.
 - j. Re-attach element wires.
 - k. Continue until all heating elements are cleaned.
 - l. Fill the heater following the filling instructions provided in Section II and check around the elements for leaks.
 - m. Re-apply power.
5. Check for loose electrical connections. Tighten as necessary.

SECTION IV – TROUBLESHOOTING

ERROR MESSAGES

1. Err, No, Prb
 - a. This message will flash when the controller does not detect that the probe is connected to the control board. To clear this error reinsert the probe connector and press RESET.
2. Err, too, hot, ### (where ### is the actual temperature of the water.)
 - a. This message will display if the temperature of the water exceed the high limit temperature setpoint. To clear this error, wait until the temperature is below the operating setpoint and press RESET. Note that the unit will not reset until the indicated temperature is below 195°F. If this message continually occurs, follow the troubleshooting flow chart for continuous over-temperature condition.
3. Err, No, H2O
 - a. This message will display when the water level in the tank has dropped below the sensor probe. To clear this message, refill the tank. If the low water reset is set for automatic, the

error will clear. If the low water reset is set for manual, when the tank is full press RESET. Check the heater and the piping for leaks. Check for mineral buildup on the probe and clean as required. Check for continuity between the yellow wire and ground. See diagram 2 on the following page.

4. E r r , H 2 O , L E A
 - a. This message displays if the leak detection sensor determines there is water in the base of the heater shell. To clear this message, remove the water from the leak detection sensor. Check the unit and piping for leaks.
5. C C
 - a. This message displays if the display cable is installed into the control board backwards. To clear this message, remove and correctly install the display cable.
6. 2 5 5
 - a. This message indicates that the probe is likely out of calibration. To clear this message, it is recommended that the probe be removed and replaced.

CONTACTOR CARE

1. A chattering or humming from the contactor is due to dust or debris on the contact points that prevents the contactor from making proper contact. The debris can be removed by utilizing a can of antistatic cleaning and dusting spray (pressurized air) and spraying through the side of the contactor to remove the debris.

MISCELLANEOUS

1. If the display flashes when the unit is first turned on or turned on after maintenance, check that the J5 terminal on the controller is engaging all four pins on the board.
2. Note that before replacing the control board, display, or probe, it is recommended that the power supply to the booster heater be turned off at the main circuit breaker disconnect to the booster heater to reset and clear the electronic controller.

CAUTION: Do not use plumber's tape/Teflon tape/pipe dope when installing the probe. Tape will prevent the low water detection system from operating properly and will cause false low water errors. Lubricate O-ring prior to installation.

Tighten probe at the brass hex flats only. Use a 13/16" open ended socket or spark plug wrench. Do not apply pressure, twist, or turn the black wire or the stainless steel jam nut, as this will damage the probe.

TROUBLESHOOTING FLOW CHARTS

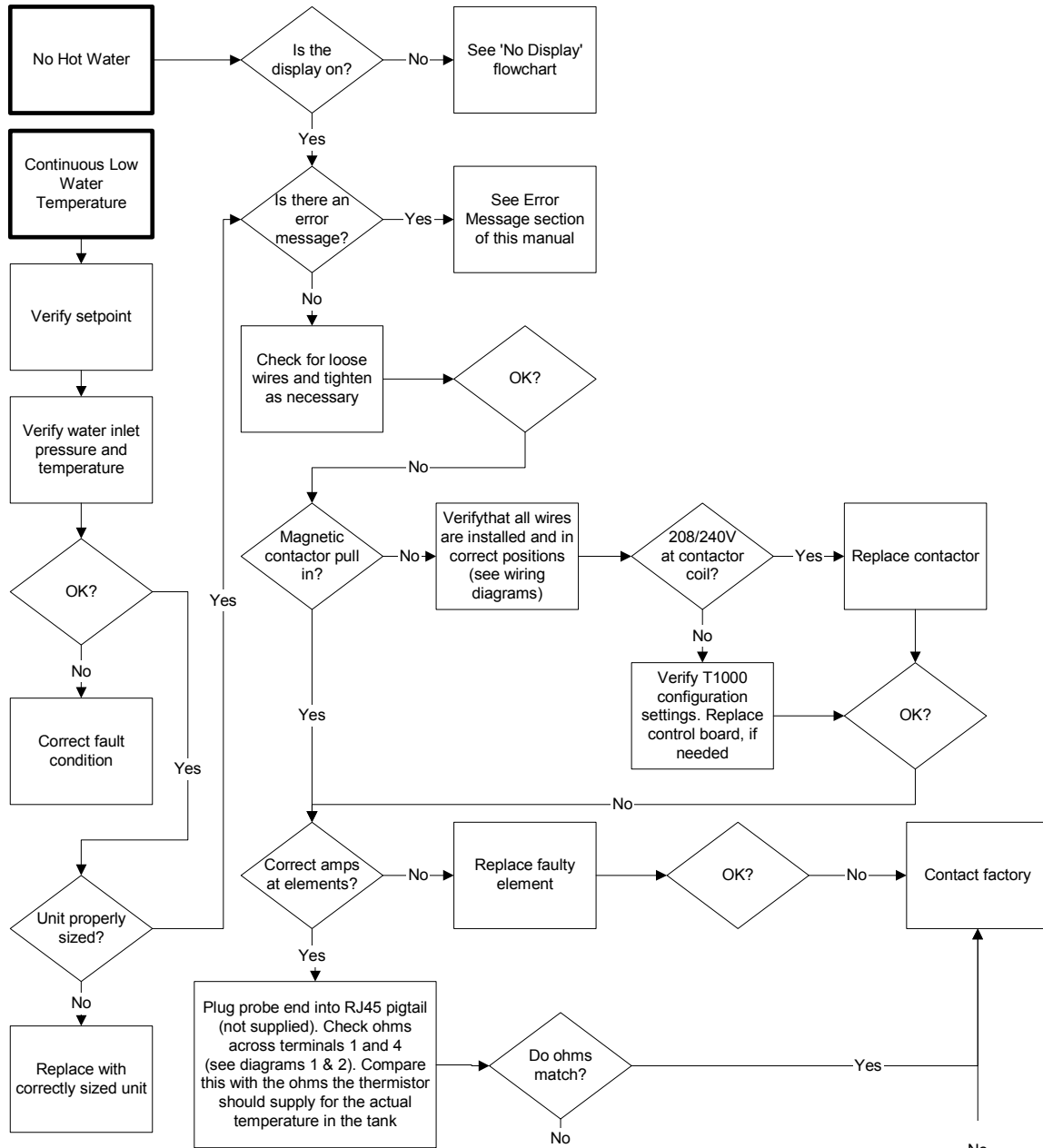
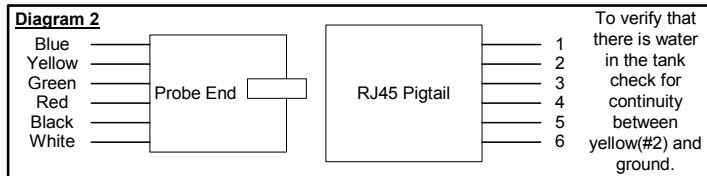
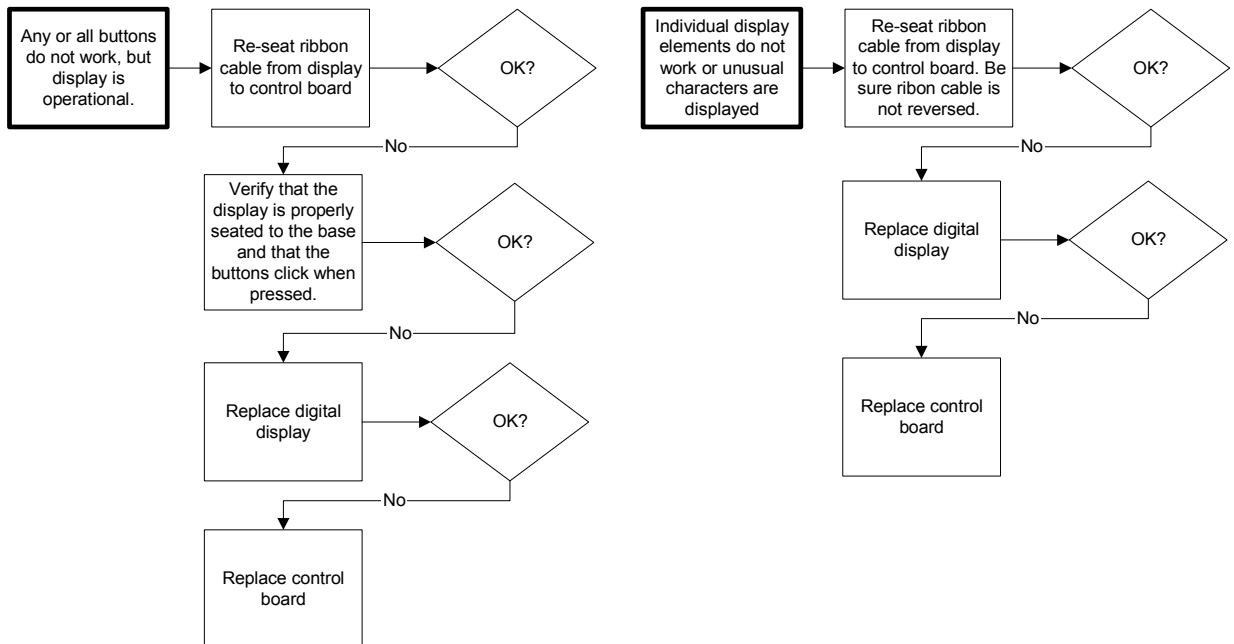
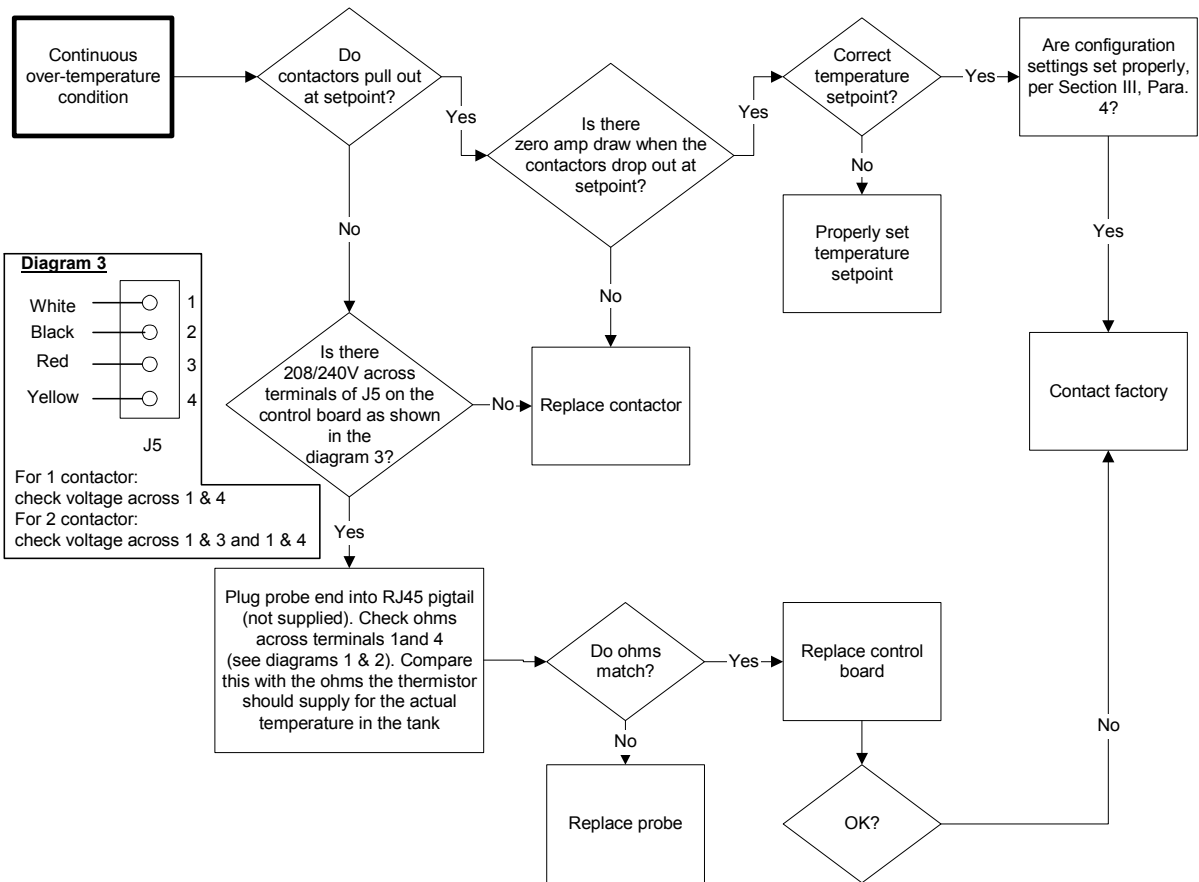
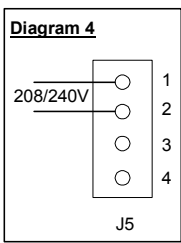
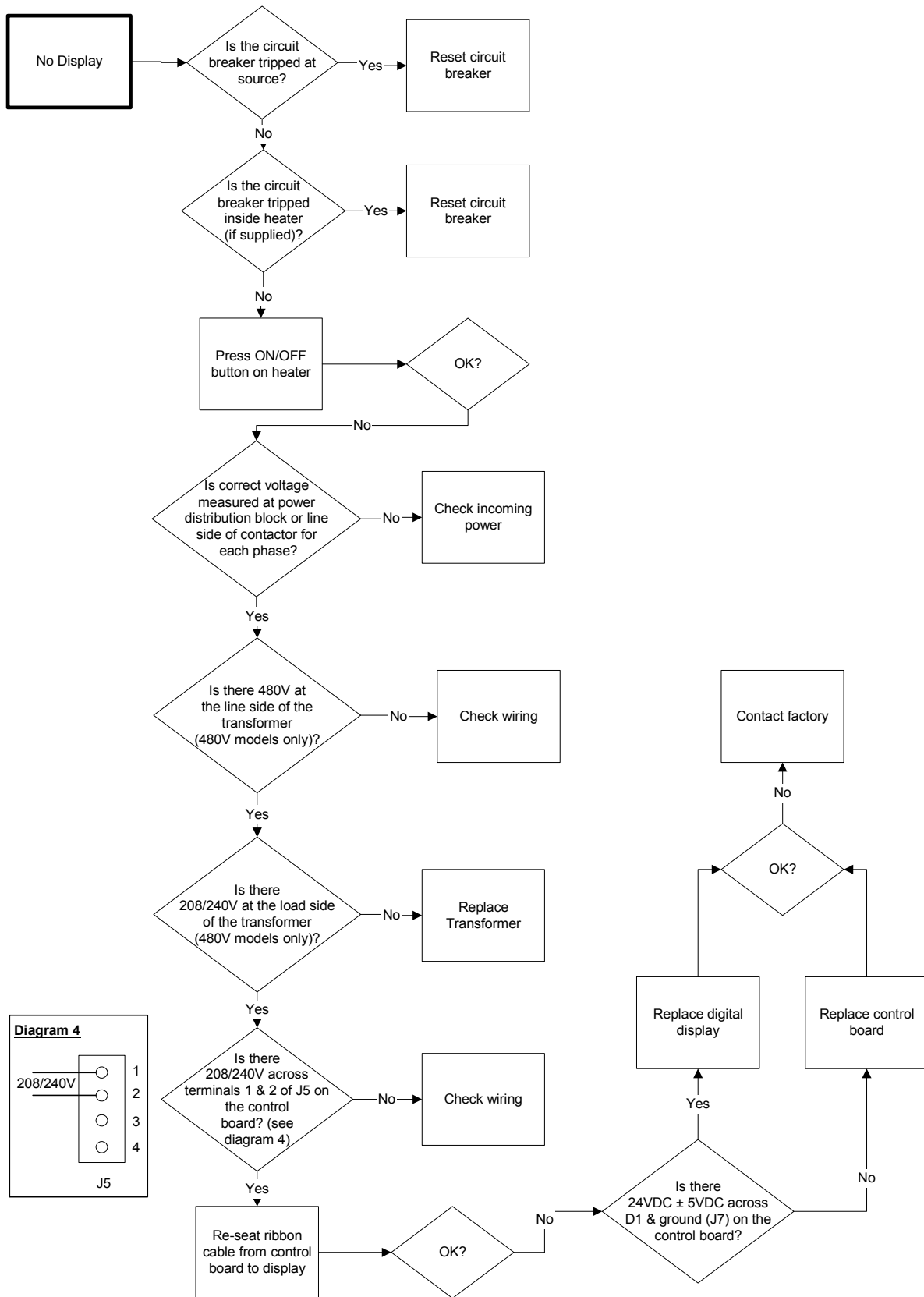


Diagram 1
Thermistor Resistance vs Temperature
 (error ±3%)

| | |
|-------|----------|
| 70°F | = 11883Ω |
| 80°F | = 9299Ω |
| 90°F | = 7334Ω |
| 100°F | = 5828Ω |
| 110°F | = 4664Ω |
| 120°F | = 3758Ω |
| 130°F | = 3048Ω |
| 140°F | = 2488Ω |
| 150°F | = 2043Ω |
| 160°F | = 1687Ω |
| 170°F | = 1400Ω |
| 180°F | = 1169Ω |
| 190°F | = 980Ω |







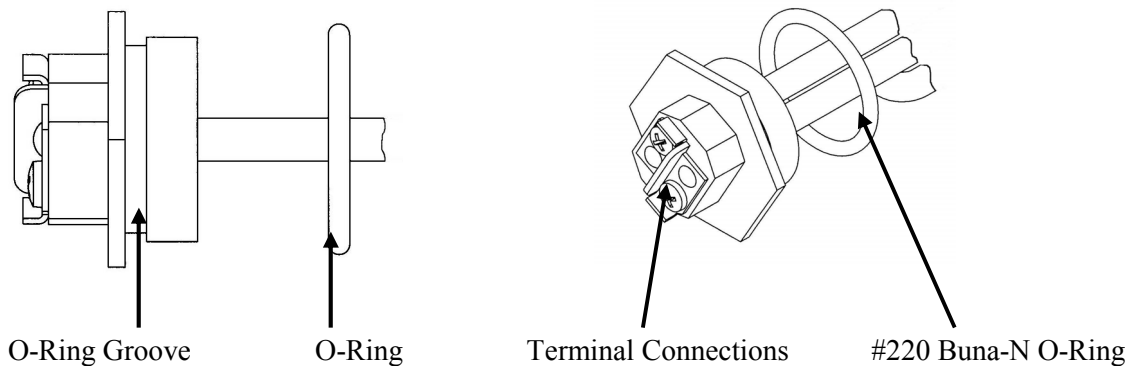
SECTION V - SERVICING & REPLACEMENT OF PARTS

WARNING / CAUTION

Before servicing or replacing any part, make sure to turn the power supply to the unit OFF.

HEATING ELEMENT

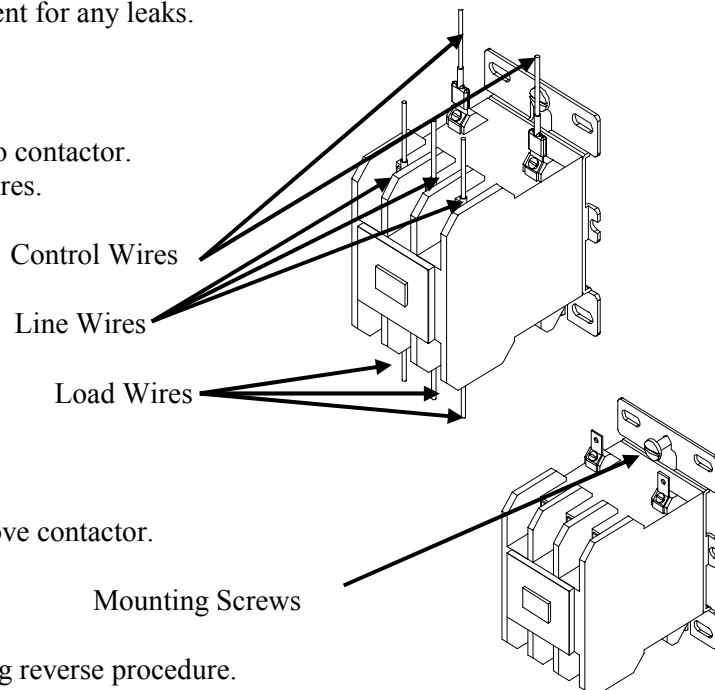
1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Lift manual release lever on relief valve to let air into system or break union on outgoing water line.
5. Drain water from tank.
6. Disconnect the wires from the heating element terminals.
7. Unscrew element with a 1-7/8" 6-point socket with no bevel.



8. Install new #220 Buna-N o-ring gasket and install new heating element. NOTE: Hubbell recommends lubricating the o-ring with Parker O-Lube prior to installation.
9. Rewire element according to the wiring diagram as shown in the Section II.
10. Fill tank and check around element for any leaks.

MAGNETIC CONTACTOR

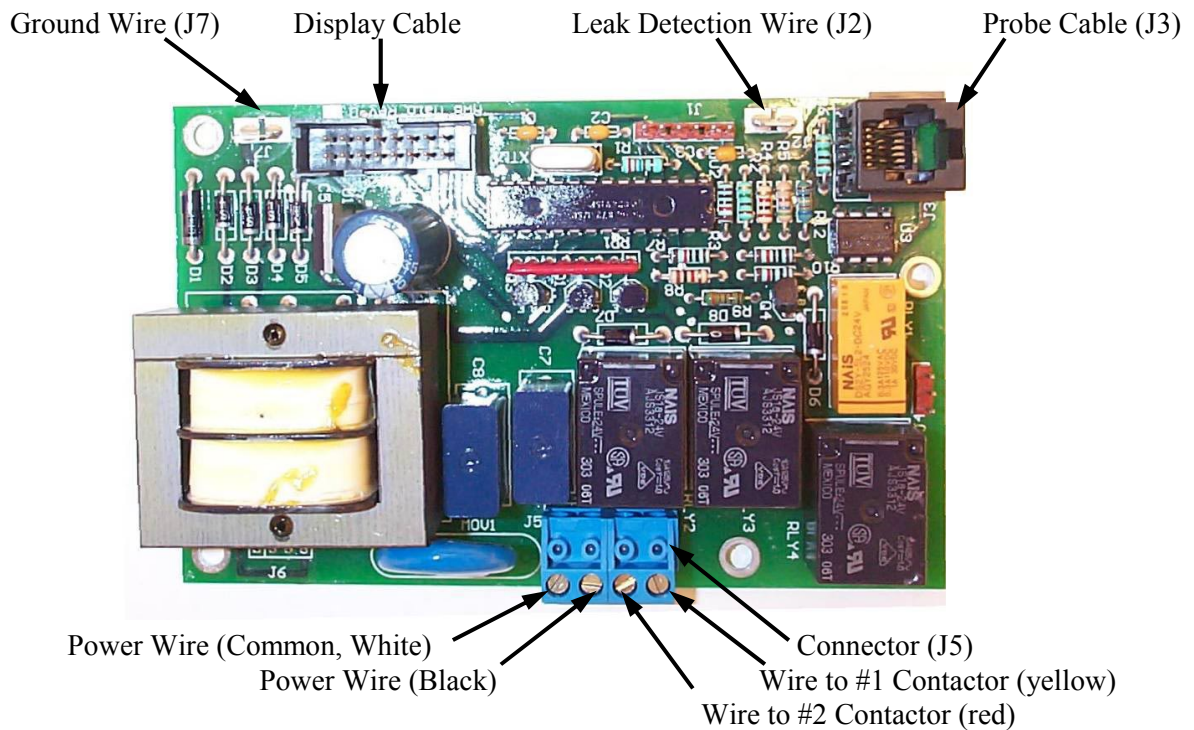
1. Disconnect power from unit.
2. Disconnect line and load wires to contactor.
3. Disconnect the control circuit wires.



4. Loosen holding screws and remove contactor.
5. Replace with new contactor using reverse procedure.

CONTROL BOARD

1. Disconnect power from unit.
2. Disconnect display cable, probe cable (J3), leak detection wire (J2), ground wire (J7), and terminal block (J5) from the control board. NOTE: The terminal block (J5) is removable from the control board. Grasp the terminal block on the ends and pull straight away from the board.



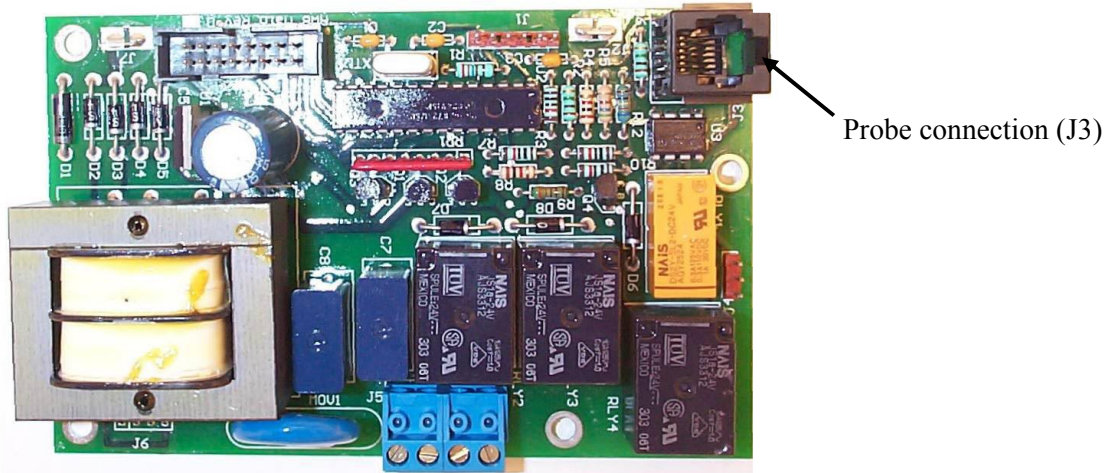
3. Remove four (4) screws securing control board to panel.
4. Remove and replace control board.
5. Reconnect wires disconnected in step 2. NOTE: When reconnecting the ribbon cable be sure to have the key on the cable align with the slot in the connector.
6. Connect power to unit.

RELIEF VALVE

1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Lift manual release lever on relief valve to let air into system or break union on outgoing water line.
5. Drain water from tank.
6. Disconnect overflow piping.
7. Unscrew relief valve, remove assembly and replace with new one.
8. Connect overflow piping.
9. Turn on incoming water supply and check for leaks.
10. Connect power to unit.

SENSOR PROBE

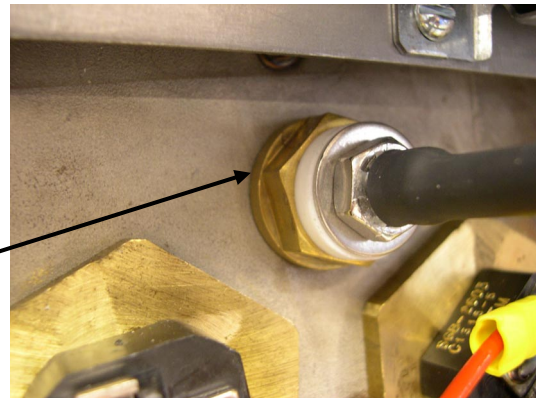
1. Disconnect power from unit.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Lift manual release lever on relief valve to let air into system or break union on outgoing water line.
5. Drain water from tank.
6. Disconnect probe wire from control board. (See picture)



7. Remove probe from tank using a 13/16" slotted socket or 13/16" spark plug wrench to accommodate the probe cable.
NOTE: Care should be taken not to pull or put excessive force on the cable to probe connection.

8. Install new #115 Buna-N o-ring gasket and install new probe. **NOTE:** Hubbell recommends lubricating the o-ring with Parker O-Lube prior to installation. **WARNING:** Do not remove the jam nut. To replace the probe, remove the entire probe assembly from the tank.

Probe



9. Reconnect probe wire to control board.
10. Refill tank.
11. Check for leaks. Retighten as required.
12. Note that to resume operation the controller will need to be reset by pressing the 'RESET' button on the display.

CAUTION: Do not use plumber's tape/Teflon tape/pipe dope when installing the probe. Tape will prevent the low water detection system from operating properly and will cause false low water errors. Lubricate O-ring prior to installation.

Tighten probe at the brass hex flats only. Use a 13/16" open ended socket or spark plug wrench. Do not apply pressure, twist, or turn the black wire or the stainless steel jam nut, as this will damage the probe.

SECTION VI – SERVICE PARTS LIST

| Category | Description | Volts | Ohms | Hubbell P/N | |
|---|--|-----------------------------|-------|-----------------------|----------------|
| Accessories | Bronze Pressure Reducing Valve | | | 36C-304-01T | |
| | Plastic Legs (Price each, 4 Req'd.) | | | AP61-4003-C | |
| | Nickel Plated Legs (Price each, 4 Req'd.) | | | AE61-4002-C | |
| | Stainless steel adjustable legs (Price each) | | | A50-5048-C | |
| | Floor Mount Legs S/S (Price each, 4 Req'd.) | | | A50-9939-C | |
| | Temp. and Pressure Gauge | | | T405 | |
| | Relief Valve (4-27 kw) | | | 100XL .75 150LB | |
| | Relief Valve (30-58 kw) | | | 40XL .75 150LB | |
| | Slide Brackets (J6 models only, 2 per set) | | | J6 SLIDE BRACKET | |
| | Water Treatment System (blended phosp.) | | | HBW-CLEAR | |
| | Replacement cartridge for water treatment | | | RSC-10 | |
| | Circuit Breakers | 60 amp | | | CB 60 AMP |
| 70 amp | | | | CB 70 AMP | |
| 80 amp | | | | CB 80 AMP | |
| 90 amp | | | | CB 90 AMP | |
| 100 amp | | | | CB 100 AMP | |
| Contactors | 20 Amp Resistive, 15 Amp Inductive, 208/240 VAC Coil | | | C25DNF315B | |
| | 40 Amp Resistive, 30 Amp Inductive, 208/240 VAC Coil | | | C25DNF330B | |
| | 50 Amp Resistive, 40 Amp Inductive, 208/240 VAC Coil | | | C25DNF340B | |
| | 65 Amp Resistive, 50 Amp Inductive, 208/240 VAC Coil | | | C25DNF350B | |
| | 75 Amp Resistive, 60 Amp Inductive, 208/240 VAC Coil | | | C25FNF360B | |
| | 90 Amp Resistive, 75 Amp Inductive, 208/240 VAC Coil | | | C25FNF375B | |
| Elements (Note: Each element is supplied with an O-Ring) | 2000 Watts | 208 | 21.6 | C1315-2 | |
| | 4000 Watts | 208 | 10.8 | C1315-3 | |
| | 5000 Watts | 208 | 8.7 | C1315-4 | |
| | 6000 Watts | 208 | 7.2 | C1315-5 | |
| | 6500 Watts | 208 | 6.7 | C2315-6 | |
| | 7150 Watts | 208 | 6.1 | C2315-7 | |
| | 9000 Watts | 208 | 4.8 | C2315-9 | |
| | 9600 Watts | 208 | 4.5 | C2315-10 | |
| | 2000 Watts | 240 | 28.8 | C1315-11 | |
| | 3000 Watts | 240 | 19.2 | C1315-12 | |
| | 3500 Watts | 240 | 16.5 | C1315-13 | |
| | 4000 Watts | 240 | 14.4 | C1315-14 | |
| | 4500 Watts | 240 | 12.8 | C1315-15 | |
| | 5000 Watts | 240 | 11.5 | C1315-16 | |
| | 6000 Watts | 240 | 9.6 | C1315-17 | |
| | 6500 Watts | 240 | 8.9 | C1315-18 | |
| | 6750 Watts | 240 | 8.5 | C1315-34 | |
| | 7500 Watts | 240 | 7.7 | C2315-19 | |
| | 9000 Watts | 240 | 6.4 | C2315-20 | |
| | 9750 Watts | 240 | 5.9 | C2315-21 | |
| | 2000 Watts | 480 | 115.2 | C1315-22 | |
| | 2333 Watts | 480 | 98.8 | C1315-23 | |
| | 3000 Watts | 480 | 76.8 | C1315-24 | |
| | 3500 Watts | 480 | 65.8 | C1315-25 | |
| | 4000 Watts | 480 | 57.6 | C1315-26 | |
| | 4500 Watts | 480 | 51.2 | C1315-27 | |
| | 5000 Watts | 480 | 46.1 | C1315-28 | |
| | 6000 Watts | 480 | 38.4 | C1315-29 | |
| | 6500 Watts | 480 | 35.4 | C1315-30 | |
| | 7500 Watts | 480 | 30.7 | C1315-31 | |
| | 9000 Watts | 480 | 25.6 | C1315-32 | |
| | 9750 Watts | 480 | 23.6 | C1315-33 | |
| | 6750 Watts | 480 | 34.1 | C1315-35 | |
| | | Extra O Ring, (#220 Buna-N) | | | O RING J MODEL |
| | Misc. Electrical | Control Board | | | T1000 |
| Digital Display Module (includes overlay) | | | | TD1000 | |
| J16 Ribbon Cable Extension | | | | RIBBON CABLE J16 | |
| Display Overlay | | | | OVERLAY J MODEL | |
| Probe (includes #115 Buna-N O-Ring) | | | | P65 | |
| Transformer 480-208V | | | | 8050-3299-3 | |
| Transformer 600-195V | | | | 8050-3350-3 | |
| Transformer 380-185V | | | | 8050-3351-3 | |
| Power Distribution Block 175 amp 2 pole | | | | 16220-2 | |
| Power Distribution Block 175 amp 3 pole | | | | 16220-3 | |
| Power Distribution Block 310 amp 3 pole | | | | 16023-3 | |
| Diffuser Assembly with Nipple | | | | J6 DIFFUSER | |
| RJ45 Pigtail for P65 Probe Testing | | | | P65-RJ45 TESTER | |
| Remote Alarm Plug Adapter | | | | PLUG ADAPTER J4 | |
| Wire #18 200C (black,white,red,yellow) Tefzel 750 | | | | WIRE #18 200C "COLOR" | |
| Wire #12 200C (blue or red) Tefzel 750 | | | | WIRE #12 200C "COLOR" | |
| Wire #10 200C (blue or red) Tefzel 750 | | | | WIRE #10 200C "COLOR" | |
| Wire #8 200C (blue or red) Tefzel 750 | | | | WIRE #8 200C "COLOR" | |
| Wire #6 200C (black) Tefzel 750 | | | | WIRE #6 200C BLACK | |

SECTION VII – TORQUE VALUES

| Part | P/N | Wire Size | Torque (in•lbs) | Torque (ft•lbs) | |
|----------------------------------|--|-----------|-----------------|-----------------|-------|
| Element to Tank | All | N/A | 600 | 50 | |
| Wire to Element | All | All | 15 | 1.25 | |
| Probe to Tank | All | N/A | 300 | 25 | |
| Wire to Ground Lug | KA8C | All | 25 | 2.08 | |
| | KA4C | All | 45 | 3.75 | |
| Wire to Circuit Breaker | All | #14-#10 | 35 | 2.92 | |
| | | #8 | 40 | 3.33 | |
| | | #6-#4 | 45 | 3.75 | |
| Transformer | All | All | 15 | 1.25 | |
| Wire to Control Board | All | All | 3.5 | 0.29 | |
| Wire to Contactor | C25DNF315B C25DNF330B C25DNF340B C25DNF350B | #14-#12 | 15 | 1.25 | |
| | | #10 | 25 | 2.08 | |
| | | #8 | 40 | 3.33 | |
| | | #6-#4 | 45 | 3.75 | |
| | C25FNF360B C25FNF375B | #14-#10 | 40 | 3.33 | |
| | | #8 | 45 | 3.75 | |
| | | #6-#4 | 50 | 4.17 | |
| Wire to Power Distribution Block | 16023-3 16023-2 | Line | All | 275 | 22.92 |
| | | Load | #14-#10 | 20 | 1.67 |
| | | | #8 | 25 | 2.08 |
| | | | #6-#4 | 35 | 2.92 |
| | 63133 63132 | Line | #14-#8 | 50 | 4.17 |
| | | | #6-2/0 | 120 | 10 |
| | | Load | #14-#10 | 20 | 1.67 |
| | | | #8 | 25 | 2.08 |
| #6-#4 | 35 | 2.92 | | | |
| Control Board to Panel | All | N/A | 10 | 0.83 | |
| Display to Base | All | N/A | 10 | 0.83 | |
| All Other Components to Panel | All | N/A | 20 | 1.67 | |

SECTION VIII – WARRANTY INFORMATION

LIMITED WARRANTY

1. PRODUCT WARRANTY. Hubbell warrants the booster heater it manufactures and its components (the "Product") to be free from defects in materials and workmanship, under normal use and service for the period of time identified below beginning from the date of installation, provided that the product is installed within three (3) months of date of shipment from Hubbell and when the Product is installed and maintained in accordance with Hubbell's written instructions (see operators manual for details). Owner must establish the Product's purchase date by means satisfactory to Hubbell in its sole discretion.

TANK and COMPONENTS: One (1) year parts and labor

TANK ONLY: Ten (10) years Non Pro-Rated

REPLACEMENT PARTS: Thirty (30) days parts only, no labor, from date of purchase

SUCH WARRANTIES DO NOT COVER:

- Product failure (including but not limited to the tank and/or heating elements) caused by liming, sediment buildup, chemical corrosion, chlorine corrosion, or freezing.
- Product misuse, tampering or misapplication, accidental damage, improper installation or the application of improper voltage.
- Costs incurred for shipping, delivery, handling, and/or administrative charges.
- For the tank warranty after the first year, all labor, shipping, installation costs, and components (other than the tank) are the responsibility of the owner.
- With respect to labor warranty within the first year, overtime, holiday, weekend or any other non-standard labor rate.
- Excessive and unreasonable labor rates and/or travel expenses as determined by Hubbell in its sole discretion.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR PATENT OR OTHER INTELLECTUAL PROPERTY RIGHT INFRINGEMENT.

2. LIMITATION OF REMEDIES AND DAMAGES. Hubbell's liability and Buyer's exclusive remedy hereunder will be limited solely, at Hubbell's option, to repair or replacement by a Hubbell authorized service agency (other than where Buyer is located outside of the United States or Canada, in which case Hubbell's liability and Buyer's exclusive remedy hereunder will be limited solely to replacement of part under warranty) with respect to any claim made within the applicable warranty period referred to above. Without limiting the generality of the foregoing, all warranty items shall be returned by Buyer, at its sole expense, to the nearest Hubbell-authorized service agency or to the Hubbell factory (45 Seymour Street Stratford, CT 06615) for replacement or repair. Hubbell reserves the right to accept or reject any such claim in whole or in part. Hubbell will not accept the return of any product without prior written approval from Hubbell, and all such approved returns shall be made at Buyer's sole expense. HUBBELL WILL NOT BE LIABLE, UNDER ANY CIRCUMSTANCES, FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR COSTS OR LOST PROFITS RESULTING FROM THE USE OR INABILITY TO USE THE PRODUCTS OR FROM THE USE OF OR INABILITY TO USE THE PRODUCTS OR FROM THE PRODUCTS BEING INCORPORATED IN OR BECOMING A COMPONENT OF ANY OTHER PRODUCT OR GOODS.