



OPERATING AND MAINTENANCE MANUAL

Hubbell Model JSK / JFR

1/18/24



-IMPORTANT-

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

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Table of Contents

NSF CRITERIA..... 4

SECTION I - GENERAL DESCRIPTION AND CONSTRUCTION..... 5

MODEL SPECIFICATIONS 5

SIZING INFORMATION..... 6

CONSTRUCTION 6

TANK..... 6

TANK CONNECTIONS..... 7

HEATING ELEMENT 7

MAGNETIC CONTACTOR 7

ELECTRONIC CONTROL BOARD, PROBE, AND DISPLAY 7

LOW VOLTAGE CONTROL TRANSFORMER..... 7

OUTER SHELL..... 7

OPTIONAL EQUIPMENT..... 7

SECTION II – INSTALLATION AND START-UP 8

WATER HEATER PLACEMENT 8

UNIT INSTALLATION 8

FILLING THE HEATER 9

ELECTRICAL INSTALLATION 9

START-UP 10

OPTIONAL FIELD CONVERSION FROM SINGLE TO THREE PHASE OR THREE TO SINGLE PHASE..... 10

FINAL CHECKS..... 10

JSK AND JFR WIRING CHARTS 11

SECTION III – SCHEDULED MAINTENANCE AND OPERATION 15

MAINTENANCE AND OPERATION 15

FREEZING..... 15

CONTROLLER OPERATION..... 15

RECOMMENDED CLEANING SCHEDULE..... 16

DAILY CLEANING 16

DRAINING HEATER FOR SERVICE PROTECTION..... 17

ANNUAL INSPECTION	17
SECTION IV – TROUBLESHOOTING	19
ERROR MESSAGES	19
CONTACTOR CARE.....	19
DISPLAY BUTTONS.....	19
MISCELLANEOUS	19
GENERAL TROUBLESHOOTING	20
CONTROL BOARD (T1250) / DISPLAY (TD1000) TROUBLESHOOTING.....	21
MAGNETIC CONTACTOR TROUBLESHOOTING.....	21
P65 PROBE TROUBLESHOOTING	22
SECTION V - SERVICING & REPLACEMENT OF PARTS	23
HEATING ELEMENT	23
MAGNETIC CONTACTOR	23
CONTROL BOARD	24
P65 SENSOR PROBE.....	24
P65 THERMOWELL	25
CONTROL THERMISTOR	26
SECTION VI – SERVICE PARTS LIST	27
SECTION VII – TORQUE VALUES	28
SECTION VIII – WARRANTY INFORMATION	29

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 the heater is placed in operation.
3. 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.
4. KEEP AWAY FROM LIVE ELECTRICAL CIRCUITS.
Do not perform any maintenance, make any adjustments, or replace any components inside the unit 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.
5. 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 with your local plumbing and electrical inspectors for proper procedures and codes. If you cannot obtain the required information, contact the company.
6. Water Quality Requirements – Recommended water hardness is 0 to 3 grains of hardness per gallon (GPG). Water hardness above 3 GPG should be treated by a water conditioner (water softener or in-line treatment). 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 heater as well as reducing metallic corrosion. Product failure caused by these conditions is not covered under the warranty. See warranty for complete details.
7. The water temperatures in the sink or holding vessel and drain water may reach temperatures above 190°F. 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.
8. The unit is not weatherproof and should be located indoors where the ambient air temperature is a minimum of 70°F (21°C).
9. The unit is not “jet-proof” construction. DO NOT use jet-clean spray to clean this unit.
10. DO NOT submerge or saturate with water. The unit is not waterproof. Do not operate if the unit has been submerged or saturated with water.
11. Install the unit with a minimum of 3 ½” of space from the bottom of the unit to all combustible surfaces to prevent combustion.
12. Discontinue use if the power cord is frayed or worn.
13. DO NOT use harsh chemicals such as bleach (or cleaners containing bleach), oven cleaners, or flammable cleaning solutions to clean this unit.
14. Make sure all operators have been instructed on the safe and proper use of the unit.
15. This unit is not intended for use by children or persons with reduced physical, sensory, or mental capabilities. Ensure proper supervision of children and keep them away from the unit.
16. DO NOT use extension pipes on the inlet and outlet connections on water heater units. Poor performance or unsafe conditions may occur.
17. This unit is intended for commercial use only – NOT for household use.

18. Do not use excessive force when tightening unions or nuts. Over-tightening and excessive force may cause leaks.
19. Use only delimers that are non-corrosive to aluminum, brass, and stainless steel. Damage to the unit caused by corrosive materials is not covered under warranty.

NSF CRITERIA

NSF Standard 4 has recently added performance requirements for food rethermalizing. The requirements mirror the requirements for food rethermalizing in the FDA Food Code. The basic requirement is that food reach a temperature of 165°F (74°C) in a time period of two hours or less.

Appliances that are manufactured for the purpose of rethermalizing food will need to meet these performance requirements in order to be listed to NSF Standard 4.

The JFR Series heating unit is specifically made for food rethermalizing; however, the heating unit is designed to be incorporated into a hot water bath rethermalizer. Hubbell does not supply the vessel that contains the water, nor the system which determines how food is placed and held in the vessel. The JFR unit attaches to the bottom of the vessel and supplies hot water to the vessel.

Hubbell does supply sizing recommendations to enable the appliance manufacturer to correctly size the JFR unit to the vessel. However, there are variables in the way that the vessel is manufactured that affect its ability to pass the NSF performance requirements. The JFR unit is listed with NSF for construction only. Due to the fact that the JFR is only a portion of a larger system, it is impossible to do performance testing until the JFR unit is incorporated onto the water vessel.

It is the responsibility of the vessel manufacturer to have the entire rethermalizing appliance tested and listed in accordance with NSF Standard 4. Simply hanging an NSF listed JFR unit on the appliance does not transfer NSF listing to the entire appliance.

SECTION I - GENERAL DESCRIPTION AND CONSTRUCTION

This manual describes a packaged Sink Sanitizing heater (Hubbell Model JSK) that is typically used to provide 180°F sanitizing rinse water and Food Rethermalizing/Bain Marie heater (Hubbell Model JFR) that is used to heat foods to temperatures of between 140°F and 190°F. The complete assembly is designed to directly mount under a sink or holding vessel and consists of the storage tank, immersion electric heating element(s), electronic control module, enclosure, 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, wired, tested, and ready for electrical and plumbing service connections.

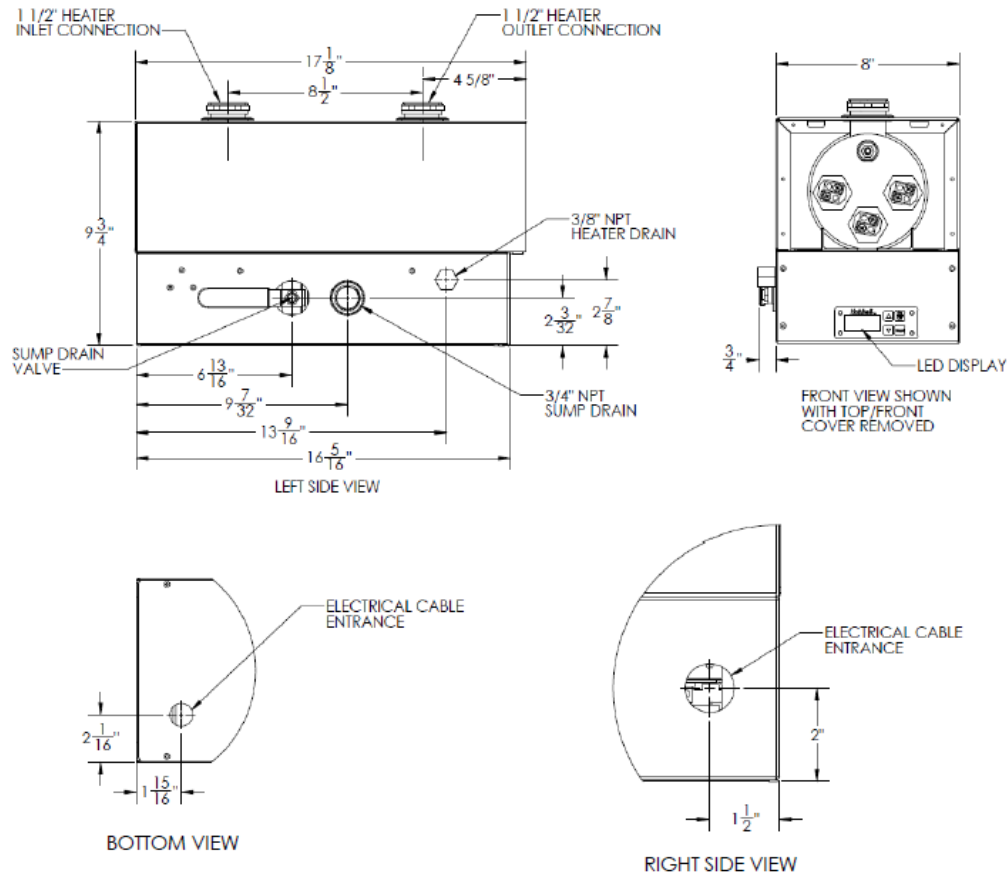
Note: This electric water heater has an efficiency rating of 98%, which is in compliance with national energy requirements.

MODEL SPECIFICATIONS

Model*	Watts	Volts	Amps	Phase		Model*	Watts	Volts	Amps	Phase
XXX-3RS	3000	208	14.4	1		XXX-3T	3000	240	7.2	3
XXX-4RS	4500	208	21.7	1		XXX-4T	4500	240	10.8	3
XXX-6RS	6000	208	28.9	1		XXX-6T	6000	240	14.4	3
XXX-9RS	9000	208	43.3	1		XXX-9T	9000	240	21.7	3
XXX-3S	3000	240	12.5	1		XXX-3T5	3000	440	3.9	3
XXX-4S	4500	240	18.8	1		XXX-4T5	4500	440	5.9	3
XXX-6S	6000	240	25.0	1		XXX-6T5	6000	440	7.9	3
XXX-9S	9000	240	37.5	1		XXX-9T5	9000	440	11.8	3
XXX-3S	3000	220	11.5	1		XXX-3T4	3000	480	3.6	3
XXX-4S	4500	220	17.2	1		XXX-4T4	4500	480	5.4	3
XXX-6S	6000	220	22.9	1		XXX-6T4	6000	480	7.2	3
XXX-9S	9000	220	34.4	1		XXX-9T4	9000	480	10.8	3
XXX-3S	3000	230	12.0	1		XXX-3T6	3000	600	3.0	3
XXX-4S	4500	230	18.0	1		XXX-4T6	4500	600	4.5	3
XXX-6S	6000	230	24.0	1		XXX-6T6	6000	600	6.0	3
XXX-9S	9000	230	35.9	1		XXX-9T6	9000	600	9.0	3
XXX-3W	3000	277	9.6	1		XXX-3T3	3000	380	4.3	3
XXX-4W	4500	277	14.4	1		XXX-4T3	4500	380	5.7	3
XXX-6W	6000	277	19.2	1		XXX-6T3	6000	380	8.6	3
XXX-9W	9000	277	28.9	1		XXX-9T3	9000	380	11.5	3
XXX-3T4S	3000	480	6.3	1		XXX-3T7	3000	415	4.7	3
XXX-4T4S	4500	480	9.4	1		XXX-4T7	4500	415	6.2	3
XXX-6T4S	6000	480	12.5	1		XXX-6T7	6000	415	9.4	3
XXX-9T4S	9000	480	18.8	1		XXX-9T7	9000	415	12.5	3
XXX-3R	3000	208	9.4	3		XXX-3T7	3000	400	4.5	3
XXX-4R	4500	208	12.5	3		XXX-4T7	4500	400	6.0	3
XXX-6R	6000	208	16.7	3		XXX-6T7	6000	400	9.0	3
XXX-9R	9000	208	25.0	3		XXX-9T7	9000	400	12.1	3

*XXX is JSK for the Sink Sanitation Unit and JFR for the Food Re-thermalizer/Bain Marie Unit

SIZING INFORMATION



- 1) For JSK models in a sink heater application use a minimum of 2000 watts per square foot of vessel top.
- 2) For JFR models in a food rethermalizer application use a minimum of 2000 watts per square foot of vessel top.
- 3) For JFR models in a Bain-Marie or steam table application use a minimum of 750 watts per square foot of vessel top.

NOTE: Use one heater for a Bain-Marie up to 6' long. Units over 6' require a minimum of two heaters.

CONSTRUCTION

TANK

Each tank is a single vessel constructed with two distinct chambers, a sediment collection chamber, and a heating chamber. Water, flowing directly from the sink or holding vessel by means of convection flow, enters the first, or sediment collection chamber. The unique design of this chamber causes sediment entrapped within the flowing water to separate from the water flow and to collect in the bottom of the chamber. The collected debris can then be easily flushed from the system when the sump drain valve is opened. The water then travels on to the second, or heating chamber where it is heated, flowing upward, and returning to the sink or holding vessel. The tank is fabricated of type 304 stainless steel all welded construction for maximum tank longevity and is designed for use at atmospheric pressure.

TANK CONNECTIONS

The heater is supplied with two standard 1 ½" sink connections intended to be connected to the bottom of a sanitation sink or holding vessel. See the drawing for locations and sizes.

HEATING ELEMENT

The water heater is supplied with an electric immersion heating element composed of corrosion resistant sheathed elements that are fitted into a 1" NPS brass screw plug. Each assembly is threaded into the tank and sealed with an O-ring gasket. See the drawing for voltage and power ratings.



MAGNETIC CONTACTOR

Load switching is done by a heavy-duty resistive (non-inductive) load type definite purpose magnetic contactor. The contactor supplies power to the heating element(s) 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 multiple contactors will turn on and off in stages. This contactor is rated for 200,000 cycles.



ELECTRONIC CONTROL BOARD, PROBE, AND DISPLAY

The control board supplies all the necessary functions 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, 380, or 277) to 208/240-volts for safety when working with control.



OUTER SHELL

The tank and all electrical and components are encapsulated in a protective shell constructed of type 304 brushed stainless steel.

OPTIONAL EQUIPMENT

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.

Cord and Plug and Receptacle

Some JFR units can be supplied with an electrical cord and plug installed and shipped with the mating receptacle. Plugs and receptacles can be supplied for the following applications only. 208V and 240V JFR units at 3kW supplied with a NEMA 6-20P and 208V and 240V JFR units at 4.5 kW supplied with a NEMA 6-30P.

Flush Hose Kit

The flush hose kit is available for JSK and JFR models and is used to power flush the unit to keep it working at peak efficiency. The kit consists of a drain stopper and a hose with adapter.

SECTION II – INSTALLATION AND START-UP

WARNING / CAUTION

- DO NOT TURN ON THE ELECTRIC POWER SUPPLY to this equipment until the 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.*
- 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 and waste piping and connections must comply with the International Plumbing Code 2003, International Code Council (ICC), or to the Uniform Plumbing Code 2003, International Association of Plumbing and Mechanical Officials (IAPMO).

WATER HEATER PLACEMENT

1. The water heater should be protected from freezing and waterlines insulated to reduce energy and water waste.
2. Leave a minimum of 12" clearance for element withdrawal and control access.
3. Do not install in an area where flammable liquids or combustible vapors are present.

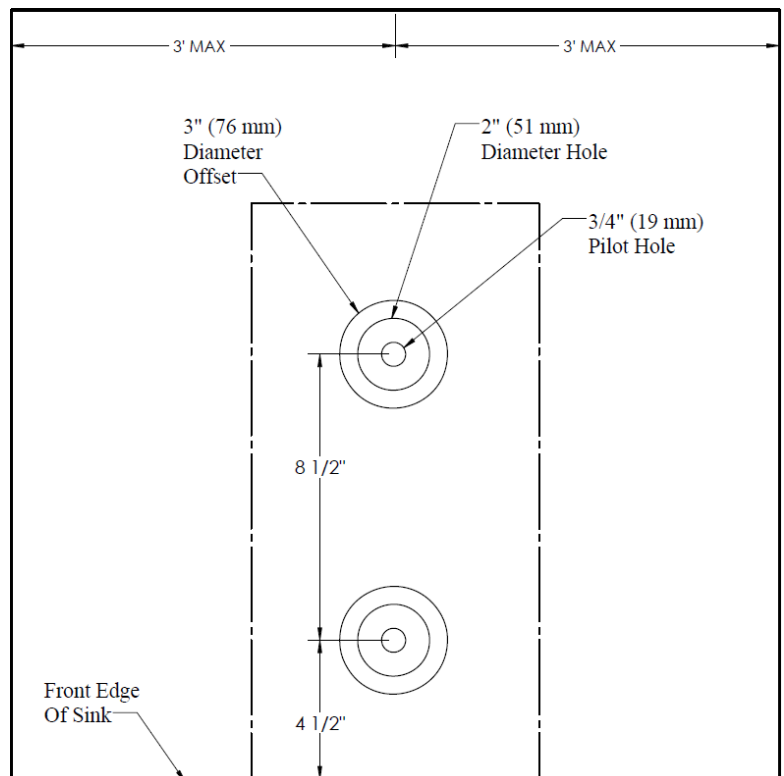
UNIT INSTALLATION

NOTE: JFR Models should be installed with a perforated water baffle (not supplied with unit) to distribute the heated water properly. The baffle should be $\frac{3}{4}$ " high with a divider wall between the inlet and outlet. The baffle should also have $\frac{3}{4}$ " holes around the periphery every 6".

NOTE: Front edge of unit should be flush with the front edge of the sink or holding vessel.

NOTE: JFR models should be situated with a maximum of 3' on either side of the sink or holding vessel.

1. Drill (1) $\frac{3}{4}$ " pilot hole $4\frac{1}{2}$ " from the front of the sink or holding vessel and (1) $\frac{3}{4}$ " pilot hole $8\frac{1}{2}$ " from the first pilot hole.
2. Cut (2) 2" diameter holes at the pilot holes using a knockout hole punch.
3. Make a 3" diameter offset, which is $\frac{1}{8}$ " deep, centered around the 2" diameter holes.
4. Unscrew the drain spud assembly from the welded pipe on the heater.
5. Unscrew the locknut from the drain spud assembly and slide off all of the washers except the rubber washer.



6. With only the rubber washer attached to the drain spud, slide the drain spud through the sink hole from above.

7. Secure the drain spud assembly to the sink or holding vessel.

a. From under the sink, slide the fiber washer onto the drain spud.

b. Screw the locknut

(flat side up), with plastic gasket between locknut and drain spud, onto the drain spud.

8. Repeat steps 4-7 for the other spud assembly.

9. Secure the unit to the sink or holding vessel. Two people may be required for this step.

a. Position the unit under the two spud assemblies.

NOTE: Make sure the washers are positioned properly inside the union nuts and are not crimped.

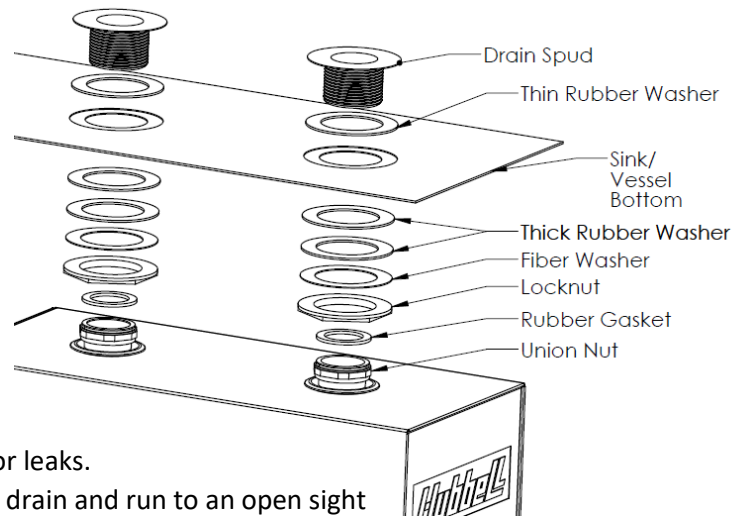
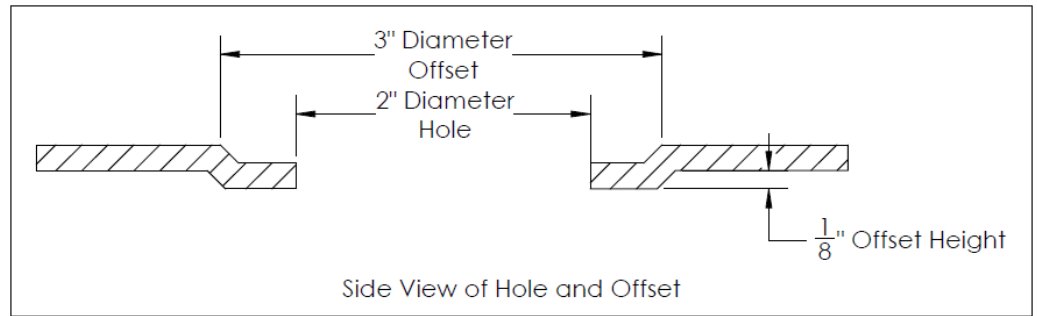
b. Screw the union nut to the threaded drain spud assembly.

10. Tighten the union nuts and locknuts securely.

11. Confirm sump drain valve handle is closed (vertical) position.

12. Fill the sink or holding vessel with water and check for leaks.

NOTE: A $\frac{3}{4}$ " hose or pipe may be connected to the sump drain and run to an open sight drain. The sump drain should not be permanently connected to the sanitary drain system. Check local plumbing code for drain installation.



FILLING THE HEATER

1. With the heater connected to bottom of the sink or holding vessel, fill the sink or holding vessel with warm water to normal operating level and allow the heater to completely fill with water.

ELECTRICAL INSTALLATION

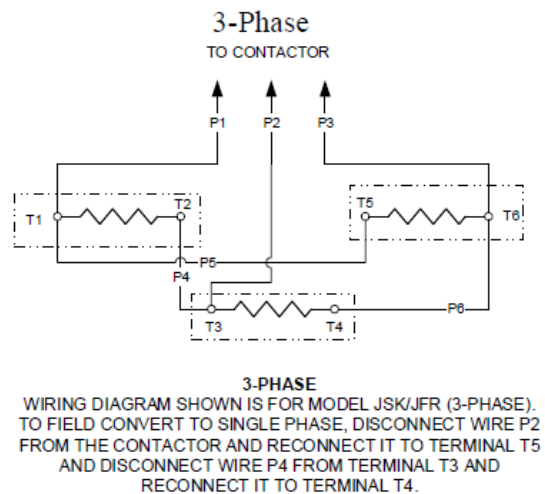
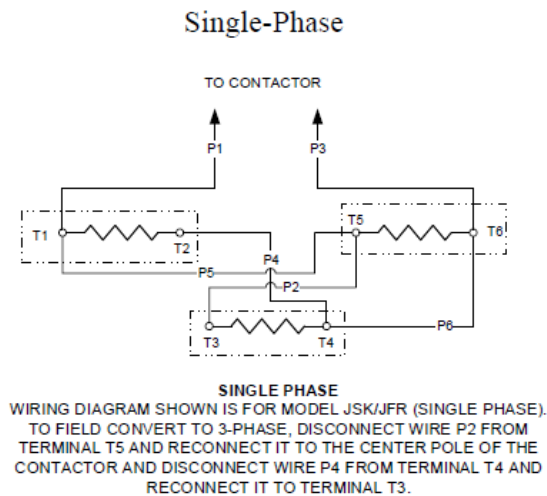
1. Enter the base through the factory cut KO's with properly sized feeder leads, See Wiring Charts. Single-phase installations require two (2) leads plus ground. All Hubbell 3-phase heaters are intended for use with a 3-wire delta system plus ground. No neutral is required. For a 4-wire plus ground system, 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.
3. Connect incoming ground wire to ground lug supplied.
4. Check for proper grounding.
5. All other electrical connections are made at the factory; therefore, no other electrical connections are necessary.
6. Check all connections, including factory connections, for tightness.
7. For cord connected units, wire receptacle as required and plug in unit.

START-UP

1. Check that the fused disconnect switch or circuit breaker is on, or if equipped with power cord and plug make sure the unit is plugged into a properly grounded receptacle of the correct voltage, size, and plug configuration.
2. Make sure that the drain cap is securely tightened to the heating chamber drain.
3. Close the sump drain by moving the drain handle toward the front of the unit until it stops in the vertical position.
4. Fill the sink or holding vessel with hot tap water to the normal operating level.
5. Press the Power ON/OFF button to turn the unit ON.
6. On JFR models, set the water temperature control to the desired temperature.
7. Wait until the water reaches the desired temperature.

OPTIONAL FIELD CONVERSION FROM SINGLE TO THREE PHASE OR THREE TO SINGLE PHASE (JSK and JFR models in 6 and 9 kW at 208, 240, and 480 volts only)

1. Re-wire the unit to desired configuration as indicated below.
NOTE: The wire to be used for internal wiring must conform to THHN (90°C) and must match the wire size currently in use. Contact the factory for assistance, if required.
2. Contact the factory for the correct labels. The factory will need the serial number for proper identification.



FINAL CHECKS

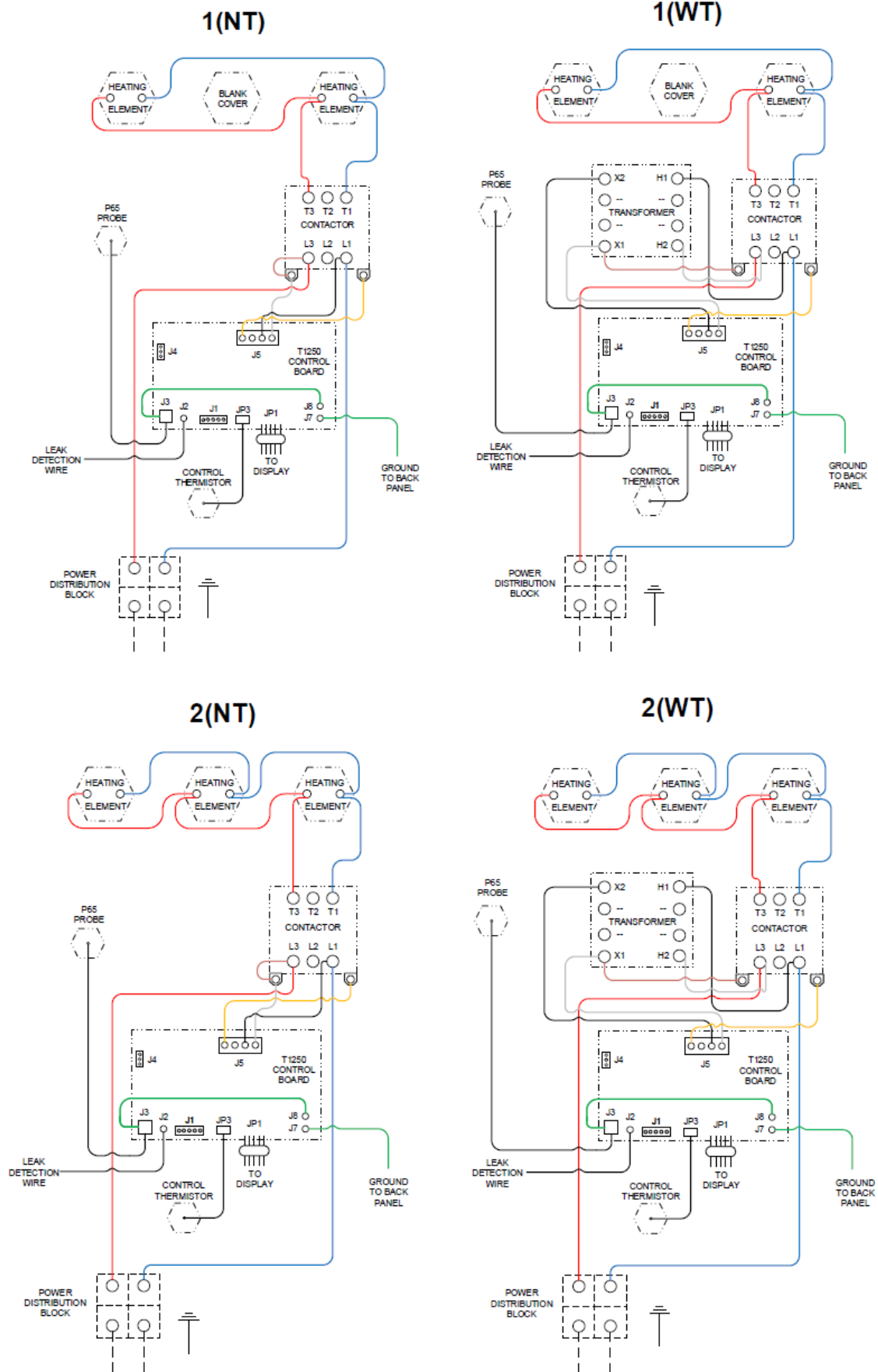
1. Check all connections for tightness.
2. Ensure that all the above steps are completed.
3. Remove the protective outer plastic covering from the sheet metal shell.
3. After the water is heated for the first time, monitor the water temperature as described in Section III, Annual Inspection.

JSK AND JFR WIRING CHARTS

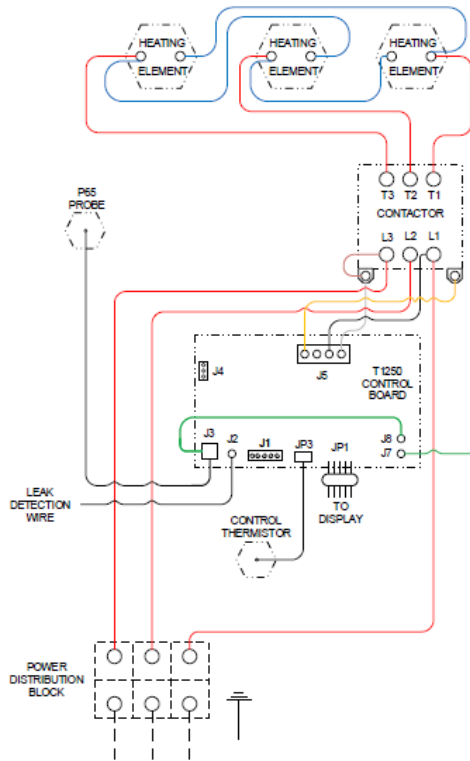
kW	Volts	Ph	Unit Amp Draw	Phase-Phase Resistance (Ohms)	Min. Feed Breaker or Fuse Size	Internal Power Wire Size	Copper Power Feed Wire Size	Conduit Size	Wiring Diagram
3	208	1	14.4	14.4	20	12	12	¾"	1(NT)
	208	3	9.4	28.8	15	12	14	¾"	3(NT)
	220	1	11.5	19.1	15	12	14	¾"	1(NT)
	230	1	12.0	19.2	20	12	14	¾"	1(NT)
	240	1	12.5	19.2	20	12	12	¾"	1(NT)
	240	3	7.2	38.4	15	12	14	¾"	3(NT)
	277	1	9.6	28.9	15	12	14	¾"	1(WT)
	380	3	4.3	96.3	15	12	14	¾"	3(WT)
	400	3	4.5	106.7	15	12	14	¾"	3(WT)
	415	3	4.7	114.8	15	12	14	¾"	3(WT)
	440	3	3.9	129.1	15	12	14	¾"	3(WT)
	480	1	6.3	76.2	15	12	14	¾"	1(WT)
4.5	480	3	3.6	153.6	15	12	14	¾"	3(WT)
	600	3	3.0	240.0	15	12	14	¾"	4
	208	1	21.7	9.6	30	10	10	¾"	2(NT)
	208	3	12.5	19.2	20	12	12	¾"	3(NT)
	220	1	17.2	12.8	30	12	10	¾"	2(NT)
	230	1	18.0	12.8	30	12	10	¾"	2(NT)
	240	1	18.8	12.8	30	12	10	¾"	2(NT)
	240	3	10.8	25.6	15	12	14	¾"	3(NT)
	277	1	14.4	19.2	20	12	12	¾"	2(WT)
	380	3	5.7	64.2	15	12	14	¾"	3(WT)
	400	3	6.0	71.1	15	12	14	¾"	3(WT)
	415	3	6.2	76.5	15	12	14	¾"	3(WT)
6	440	3	5.9	86.0	15	12	14	¾"	3(WT)
	480	1	9.4	51.1	15	12	14	¾"	2(WT)
	480	3	5.4	102.4	15	12	14	¾"	3(WT)
	600	3	4.5	160.0	15	12	14	¾"	4
	208	1	28.9	7.2	40	10	8	¾"	5(NT)
	208	3	16.7	14.4	30	12	10	¾"	3(NT)
	220	1	22.9	9.6	30	10	10	¾"	1(NT)
	230	1	24.0	9.6	40	10	10	¾"	1(NT)
	240	1	25.0	9.6	40	10	8	¾"	5(NT)
	240	3	14.4	19.2	20	12	12	¾"	3(NT)
	277	1	19.2	14.4	30	12	10	¾"	1(WT)
	380	3	8.6	48.1	15	12	14	¾"	3(WT)
9	400	3	9.0	53.3	15	12	14	¾"	3(WT)
	415	3	9.4	57.4	15	12	14	¾"	3(WT)
	440	3	7.9	64.5	15	12	14	¾"	3(WT)
	480	1	12.5	38.4	20	12	12	¾"	5(WT)
	480	3	5.4	76.8	15	12	14	¾"	3(WT)
	600	3	6.0	120.0	15	12	14	¾"	4
	208	1	43.3	4.8	60	8	4	¾"	5(NT)
	208	3	25.0	9.6	40	10	8	¾"	3(NT)
	220	1	34.4	6.4	50	8	6	¾"	2(NT)
	230	1	35.9	6.4	50	8	6	¾"	2(NT)
	240	1	37.5	6.4	50	8	6	¾"	5(NT)
	240	3	21.7	12.8	30	10	10	¾"	3(NT)
9	277	1	28.9	9.6	40	10	8	¾"	2(WT)
	380	3	11.5	32.1	15	12	14	¾"	3(WT)
	400	3	12.1	35.6	20	12	12	¾"	3(WT)
	415	3	12.5	38.3	20	12	12	¾"	3(WT)
	440	3	11.8	43.0	15	12	14	¾"	3(WT)
	480	1	18.8	26.7	30	12	10	¾"	5(WT)
	480	3	10.8	51.2	15	12	14	¾"	3(WT)
	600	3	9.0	80.0	15	12	14	¾"	4

JSK and JFR Wiring Chart Notes:

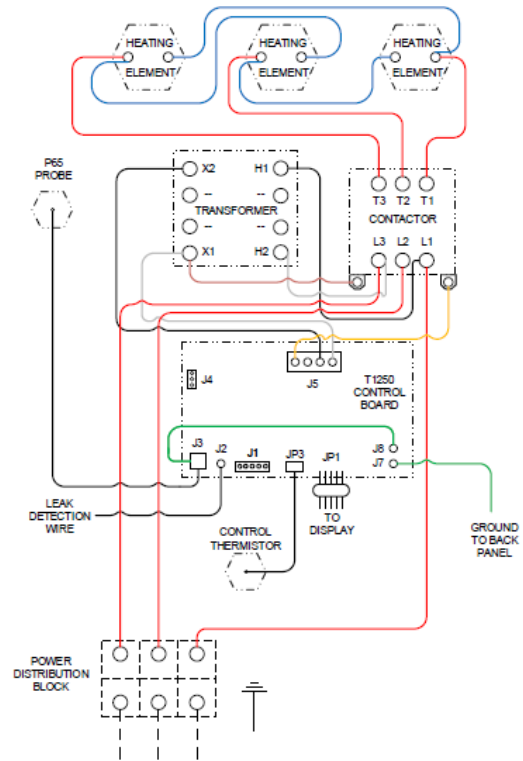
1. Power feed wire sizing is based on using 75°C Cu THHN wire with feeder branch protection rated at 125%.
2. Internal wire sizing is based on using 90°C Cu THHN wiring in a raceway with an ambient temperature up to 60°C.
3. For information on 277V, 415V, or 440V models reference the supplied drawing or contact the factory.
4. Normal phase-to-phase resistance tolerance is ±5%.
5. 380, 480, and 600-volt phase-to-phase resistance values are shown with the transformer disconnected.



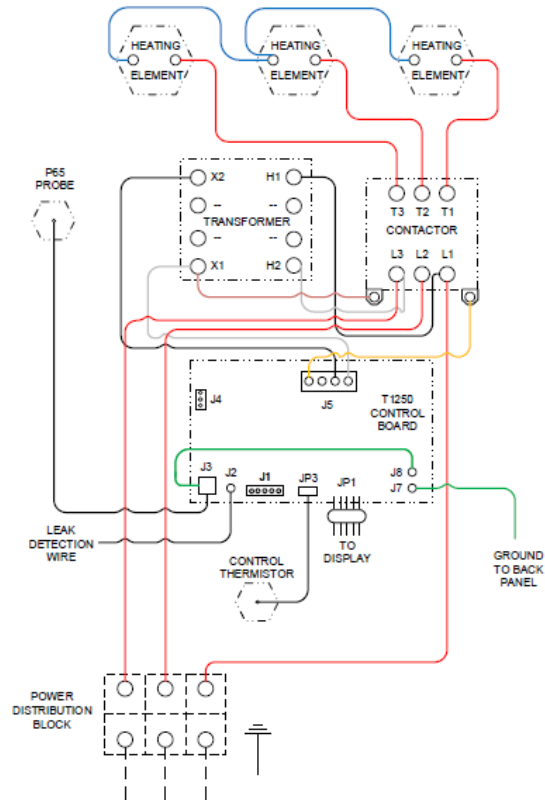
3(NT)



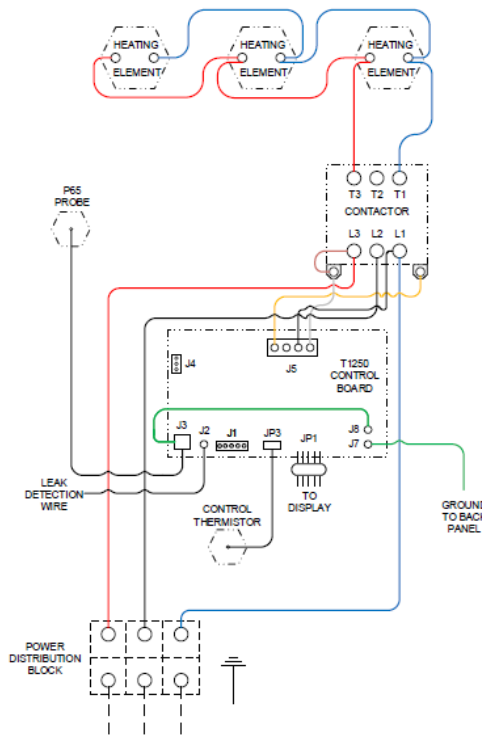
3(WT)



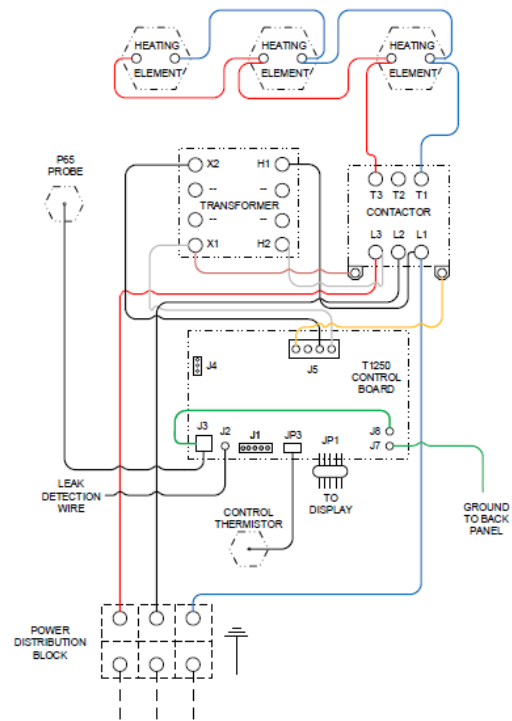
4



5(NT)



5(WT)



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: r 14, H r S, l2 3, 4 5 6; 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. With the controller turned OFF, 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).

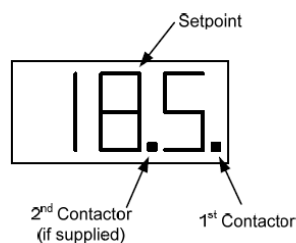
- ii. Low water detection – sets the low water detection on or off.
 - 1. L O n , for low water on. (Factory Default)
 - 2. L O F , for low water off.
- iii. Low water reset – sets the low water reset for either automatic or manual.
 - 1. L A U , for low water automatic reset. (Factory Default)
 - 2. 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.
- vii. Heater Interlock – sets the heater interlock mode to on or off. (Only available with r23 or later software).
 - 1. H o F , to disable the 24-volt interlock feature. (Factory Default)
 - 2. H o n , to enable the 24-volt interlock feature.

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 heater.
- b. The decimal points on the display, as shown below, indicate that the controller is calling for a contactor to pull in. If three or more contactors are installed, the Third decimal point is used for all remaining contactors.



RECOMMENDED CLEANING SCHEDULE

- On a daily basis.
- Whenever food accumulates in the tank.
- Whenever a non-food spill occurs.
- Whenever the unit is to be stored or shipped, especially in freezing temperatures.

DAILY CLEANING

1. Make sure the power supply is turned OFF and allow the unit and water to cool down.
2. Connect a drain hose to the sump drain and make sure the other end is in a bucket or open sight drain following the local plumbing codes.
3. Place a rubber stopper on the inlet strainer connection.
4. Turn the handle of the sump drain valve to the horizontal position to allow water to flow to the drain hose.

5. Attach the flush hose with the adapter that is connected to a fresh water supply and place the adapter in the outlet strainer connection. Flush until the sump drain is clear.
6. Close the sump drain valve by moving the handle into the vertical position.
7. Remove the rubber stop from the inlet strainer connection and place it in the outlet connection and place the flush hose and adapter in the inlet strainer connection.
8. Place a bucket under the heating chamber drain and remove the pipe cap.
9. Flush the unit with water until the heat compartment is clear.
10. Turn the water supply OFF and allow the unit to finish draining.
11. Place the pipe cap back on the heating chamber drain and tighten.
12. Remove the flush hose and rubber stop from the inlet and outlet connections.

DRAINING HEATER FOR SERVICE PROTECTION

Use the following procedure when shutting down the unit for long periods of time.

1. Press the Power ON/OFF button to turn the unit OFF.
2. Perform the entire cleaning procedure in this section.
3. Turn off the electrical power supply to the heater.
4. Make sure the water has been completely drained from the unit and the sink or holding vessel.

ANNUAL INSPECTION

1. Monitor water temperature
 - a. Let the water heater completely heat to a designated temperature setting.
 - b. After controller satisfies (that is, when the magnetic contactor actually clicks off), measure the temperature of the water in the sanitizing sink or holding vessel.
 - 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 device, replace the control board and/or the sensor probe.
2. Inspect element for leakage as follows:
 - a. Shut off the 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.

3. 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 the power supply.
- b. Drain the tank.
- c. Remove upper front cover.
- d. Disconnect the element wiring. It is recommended that one element at a time is removed to simplify rewiring.
- 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 with new O-ring.
 - 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.
4. 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 P65 probe or control thermistor 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 exceeds 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.

4. **Err, H2O, LEA**

- 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. **CC**

- 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. **255**

- 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.

7. **H L d**

- a. This message indicates that the 24-volt interlock feature is enabled, there is no 24-volt signal present, and the Heater is in standby mode. If it is not the intention to operate the heater with the 24-volt interlock feature, this feature should be disabled as shown in the controller operation section. (Only available with r23 or later software).

CONTACTOR CARE

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.

DISPLAY BUTTONS

If the display randomly changes or does not respond when the buttons are pressed, loosen the four (4) screws holding the display to the base, reseal the display in the center of the opening, leaving the screws loose.

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 heater be turned off at the main circuit breaker disconnect to the heater to reset and clear the electronic controller.

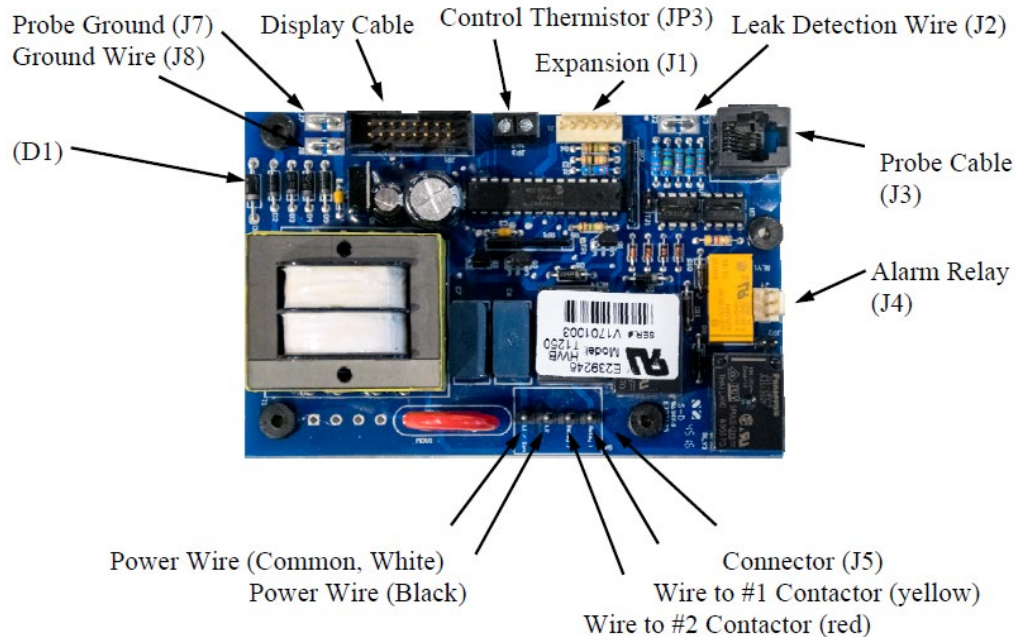
CAUTION: Do not use plumber's tape/Teflon tape/pipe dope when installing the probe. Tape will prevent the low water detection system from operating properly and will cause false low water errors. Lubricate O-ring prior to installation.

GENERAL TROUBLESHOOTING

Symptom	Probable Cause	Corrective Action
Heater does not heat at all.	Main supply circuit breaker tripped.	Check and/or reset the circuit breaker.
	Heater circuit breaker tripped.	If unit is supplied with a circuit breaker, check and/or reset the circuit breaker.
	Heater in high limit.	If a high limit error occurs, allow water to cool and press the reset button. If error continues see symptom "Temperature and pressure relief valve opens and/or high limit temperature error occurs".
	Low water error.	Verify that the heater is full of water. If error is still present, see the "P65 Probe Troubleshooting" section.
	Magnetic contactor does not energize.	See the "Magnetic Contactor Troubleshooting" section.
	No power to control board (T1250) or display (TD1000) not lit.	Reseat the display (TD1000) ribbon cable in the control board (T1250) connector. If the display is still not lit, see the "Control Board (T1250) / Display (TD1000) Troubleshooting" section.
	Element Failure	Disconnect the wires from each element and verify that the resistance (ohms) value for each element is correct. Replace elements as required.
	Incorrect Configuration Settings	Verify and correct configuration settings as required.
Water at the sink or holding vessel is not the proper temperature.	Heater may be undersized.	The heater must be properly sized for the incoming water and rinse requirements of the sink or holding vessel. If required, replace with a properly sized unit.
	Temperature setpoint too low.	Adjust the temperature setpoint.
	Incorrect voltage.	Voltage available at the heater must be correct for unit. Verify voltage on all phases matches nameplate on the heater.
	One or more elements are not energizing.	Verify that each element is drawing the correct amperage. Replace elements as required.

CONTROL BOARD (T1250) / DISPLAY (TD1000) TROUBLESHOOTING

1. Verify proper power supply voltage between each phase (L1 to L2, L2 to L3, and L1 to L3). The power supply voltage should match the voltage listed on the nameplate. If voltage is incorrect, check main supply wiring or replace the unit with a proper heater.
2. Check for 208/240VAC between pin 1 (white wire) and pin 2 (black wire) of the J5 connector on the T1250 control board. If no voltage is present, skip to step 4.
3. If 240VAC is present, check for 24VDC between D1 and ground. If 24VDC is present replace the display (TD1000). If 24VDC is not present replace the control board (T1250).



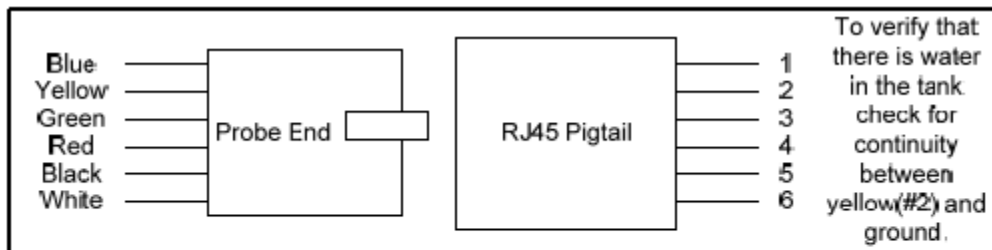
4. If a transformer is installed, verify proper power supply voltage to the primary side of the transformer and verify approximately 240VAC on the secondary side of the transformer. If voltage is present on the primary side but not on the secondary side, replace the transformer.
5. If circuit breakers are installed, verify that the circuit breaker is ON. Verify proper power supply voltage between each phase (L1 to L2, L2 to L3, and L1 to L3) to the line side of each circuit breaker and to the load side of each circuit breaker. If voltage is present on the line side but not on the load side, replace the circuit breaker.
6. Verify that the heater is wired according to the proper wiring schematic for the unit. Correct as required. If the unit still does not operate, contact the factory.

MAGNETIC CONTACTOR TROUBLESHOOTING

1. With the unit ON and calling for heat, check for lit decimal points on the display. If the unit has a single contactor, the first decimal to the right of the display should be lit. If two decimals are lit, verify that the configuration is set for one contactor. If the unit has two contactors, verify that two decimals are lit. If only one decimal is lit, verify that the configuration is set for two contactors. If no decimals are lit, continue to the 'P65 Probe Troubleshooting' section.
2. With the unit ON and calling for heat and one decimal lit, check for 240VAC between pin 1 (white wire) and pin 4 (yellow wire) of the J5 connector on the T1250 control board. If no voltage is present, replace the control board (T1250). If voltage is present, check for voltage across the contactor coil. If voltage is present at the contactor coil, replace the magnetic contactor. If no voltage is present, verify that the heater is wired according to the proper wiring schematic for the unit.

P65 PROBE TROUBLESHOOTING

1. Unplug and reseal the P65 probe wire in the jack on the T1250 control board. Note that the error message "Err, No, P r b" will be displayed and the reset button must be pressed to clear the message.
2. If problem persists, Replace the P65 probe.
3. If the problem is with temperature control or high limit "Err Too Hot":
 - a. Change the configuration to 'd S t' to display the actual water temperature.
 - b. Check the temperature of the water with a thermometer and compare that with the temperature on the display. If the two temperatures coincide +/- 5°F, replace the T1250 control board. If the two temperatures do not coincide, replace the P65 probe.
4. If the problem is with low water, "Err NO H2O":
 - a. Verify that the unit is filled with water.
 - b. Check to be sure all ground connections are secure.
 - c. If problem persists, Replace the P65 probe.



Thermistor Resistance vs. Temperature	
Water Temperature	Resistance (±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

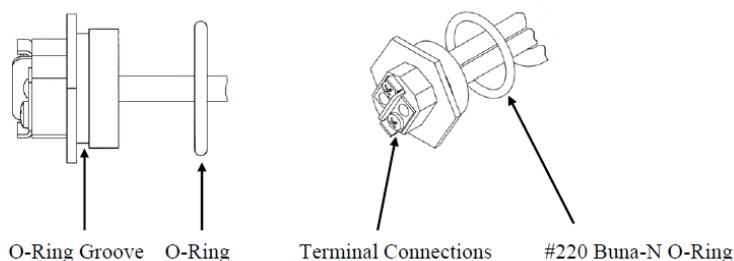
SECTION V - SERVICING & REPLACEMENT OF PARTS

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 Section II.
10. Fill the tank and check around element for any leaks.

MAGNETIC CONTACTOR

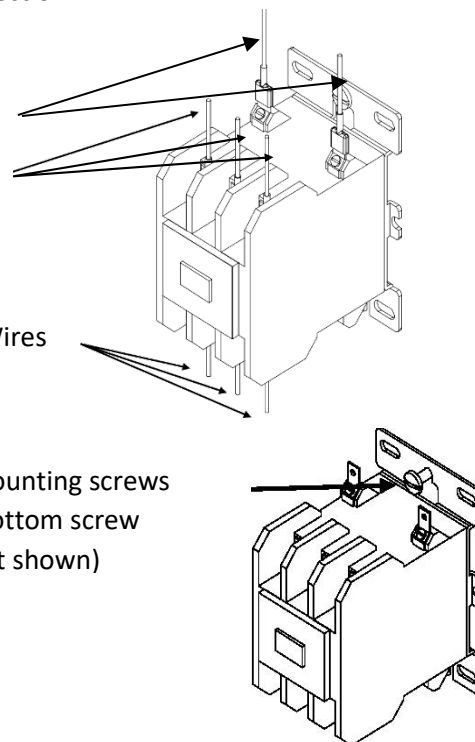
1. Disconnect power from unit.
2. Disconnect line and load wires to contactor.
3. Disconnect the control circuit wires.
4. Loosen holding screws and remove contactor.
5. Replace with new contactor using reverse procedure.

Control Wires

Line Wires

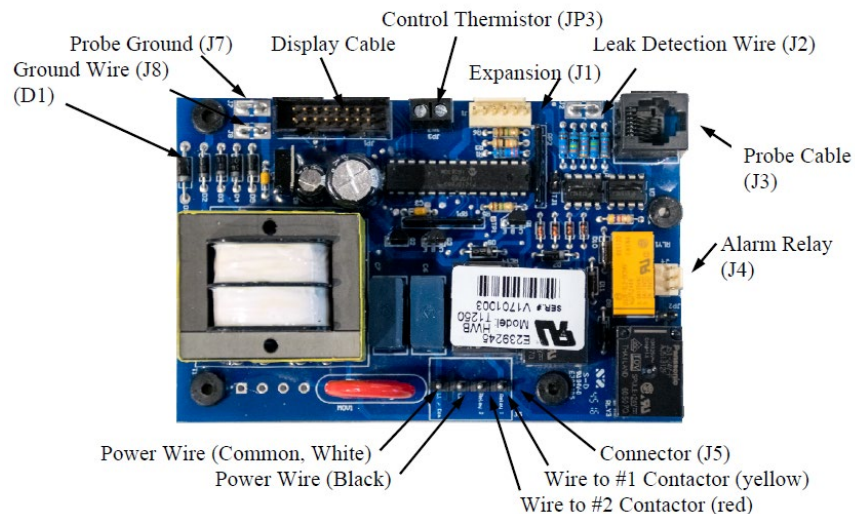
Load Wires

Mounting screws
(bottom screw
not shown)



CONTROL BOARD

1. Disconnect power from unit.
2. Disconnect display cable, probe cable (J3) and probe ground (J7), leak detection wire (J2), ground wire (J8), control thermistor (JP3) and terminal block (J5) from the control board. **NOTE:** The terminal block (J5) is removable by grasping the terminal block on the ends and pulling straight away from the board.

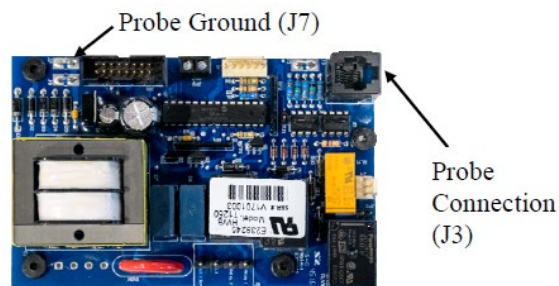


Note: Probe connector J3 comes filled with a dielectric gel that should remain in the connector.

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.

P65 SENSOR PROBE

1. Disconnect power from the unit.
2. Unplug the P65 probe connector from J3 and the probe ground from J7 on the T1250 control board.



3. Twist the cord and shrink-wrap end of the P65 probe (or cut the shrink-wrap with a sharp knife) to loosen the P65 sensor assembly from the P65 thermowell.
4. Remove the old P65 sensor assembly by pulling on the cord coming out of the P65 thermowell.

Note: It is unnecessary to unscrew the thermowell from the vessel to replace the P65.



5. Insert the new P65 sensor assembly into the P65 thermowell. Be sure to insert the sensor until the shrink-wrap cap engages the threads on the end of the thermowell.

Note: The new sensor and cord assembly is push-fit onto the end of the thermowell threads. Do not twist the new sensor and cord assembly into the thermowell. The thermal conductive heat transfer paste inside the thermowell is sufficient for replacement sensors. Adding additional paste is not required.

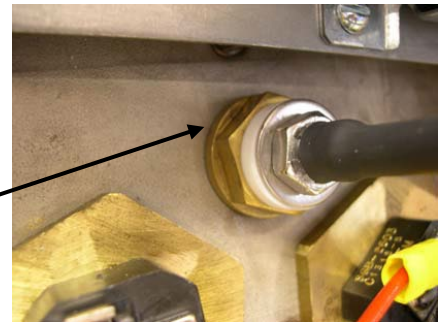
6. Plug P65 probe connector into the T1250 control board.
7. Turn on the power to the unit. If the display shows “ E r r, N o, P r b ”, press the reset button.

P65 THERMOWELL

1. Follow steps 1-4 for removing the P65 Sensor Probe above.
2. Shut off incoming water supply.
3. Attach hose to drain connection.
4. Drain water from tank.
5. Remove the thermowell from tank using a 13/16” socket.
6. Install new #115 Buna-N O-ring gasket and install new thermowell. **NOTE:** Hubbell recommends lubricating the O-ring with Parker O-Lube prior to installation.

WARNING: Do not remove the jam nut.

Thermowell



7. Reinstall or install a replacement P65 sensor probe in accordance with steps 5 and 6 above.
8. Refill tank.
9. Check for leaks. Retighten as required.
10. Turn on the power to the unit.
11. 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 P65 Thermowell. 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.

CONTROL THERMISTOR

1. Disconnect power from unit.
2. Unscrew the set screws from JP3 on the T1250 Control Board.
3. Unscrew the Control Thermistor from the vent elbow.
4. Screw in the new Control Thermistor into the vent elbow.
5. Place wire ends into the JP3 connection and tighten the set screws.

SECTION VI – SERVICE PARTS LIST

Category	Description	Volts	Ohms	Hubbell P/N
Accessories	Flush Hose Kit			
	Cord and Plug with Receptacle			
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
Elements	750 Watts	120	19.2	C1315-750A
	1000 Watts	120	14.4	C1315-1000A
	2000 Watts	208	21.6	C1315-2000RS
	1000 Watts	240	57.6	C1315-1000S
	1500 Watts	240	38.4	C1315-1500S
	2000 Watts	240	28.8	C1315-2000S
	1000 Watts	480	230.4	C1375-1000T4
	1500 Watts	480	153.6	C1375-1500T4
	2000 Watts	480	115.2	C1375-2000T4
	3000 Watts	480	76.8	C1375-3000T4
	1000 Watts	440	193.6	C1375-1000T5
	1500 Watts	440	129.1	C1375-1500T5
	2000 Watts	440	96.8	C1375-2000T5
	3000 Watts	440	64.5	C1375-3000T5
	3000 Watts	415	57.4	C1375-3000T7
Misc. Electrical	Control Board			T1250
	Digital Display Module			TD1000
	Display Overlay			OVERLAY J MODEL
	Probe Sensor			P65
	Probe Thermowell			P65 WELL
	Control Thermistor			JSK THERMISTOR
	Transformer 277/240-208V, 40VA			J14946
	Transformer 480/440-208V, 50VA			B050-3299-3
	Transformer 600/575-195V, 50VA			B050-3350-3
	Transformer 380/415-185V, 50VA			B050-3351-3
	Power Distribution Block, 85 Amps, 600 VAC			PDB85-1X1-1
	Power Distribution End Block			PDB END BLOCK
Vessel	JSK/ JFR Vessel			JSK TANK
Enclosure	JSK/ JFR Enclosure			D-1237

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	KA4C	All	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	#12	15	1.25
		#10	25	2.08
		#8	40	3.33
Wire to Power Distribution Block	All	All	35	11.67
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 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). The 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: Five (5) 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.
- Temperature or other controller setting adjustments, pressure reducing valve adjustments, resets, and plumbing leaks.
- 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.

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