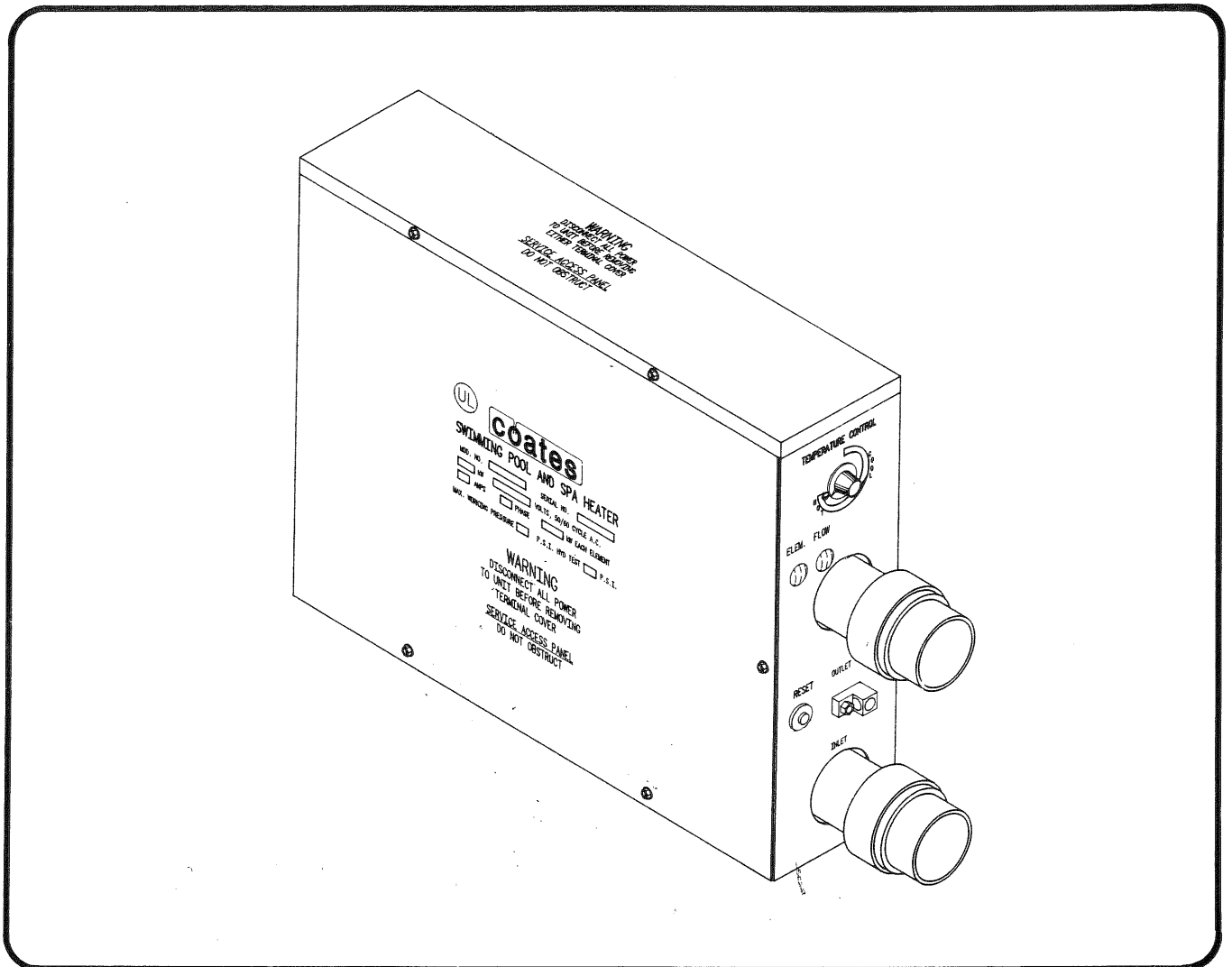




# SPA HEATER

**MODELS: 12406ST & 12411ST**  
installation, operation and maintenance



## 1.0 DESCRIPTION

Coates Spa Heaters are intended for use on spas or hot tubs having a forced water circulation system.

The water flow through the heater should be at least 15 GPM but should not exceed 70 GPM. Higher flow may damage the heater.

## 2.0 INSTALLATION

### WARNING

Only qualified personnel, as defined by National Electrical Code Article 100, should install and maintain this equipment. Unauthorized alteration or improper maintenance of this unit may release the manufacturer from any warranty claims. The installation must be in accordance with the instructions in this manual and applicable local plumbing and electrical codes.

CHECK ELECTRICAL CONNECTIONS TO ALL COMPONENTS within the heater for tightness. These can become loose during shipment and handling.

## 2.1 PHYSICAL PLACEMENT

The Coates Spa Heater is suitable for indoor or outdoor installation. See Figure 1 for piping connections and figures 3A and 3B for electrical connections. The heater should be securely mounted to a smooth, flat surface. It may be conveniently located next to the filtration equipment. **Leave minimum clearance of 9 inches on the left, 12 inches on the back for service entrances and access.**

## 2.2 ELECTRICAL INSTALLATION

### CAUTION

The electrical installation must be in accordance with Article 680 of the National Electrical Code, and ANSI/NFPA 70.

The electrical supply power must be single phase, 2 wire, 240 VAC. The supply must be protected by a circuit breaker or a fused disconnect switch. An insulated ground conductor must be provided. See Figures 3A and 3B and Table 1 for supply wire and circuit sizing. A lug has been provided for attachment of the BONDING wire per the National Electric Code, 1996 Edition, Article 680-22, (a) (4). This lug is located between the inlet and outlet pipes of the heater.

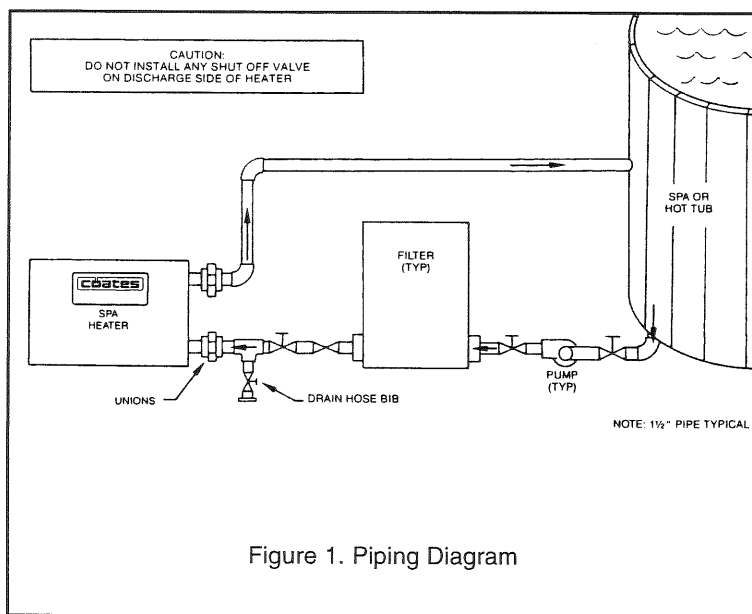


Figure 1. Piping Diagram

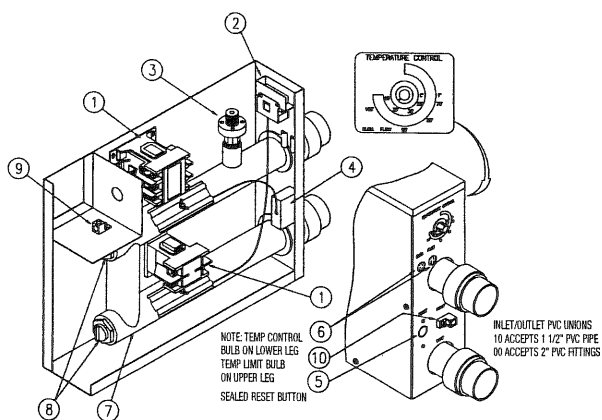
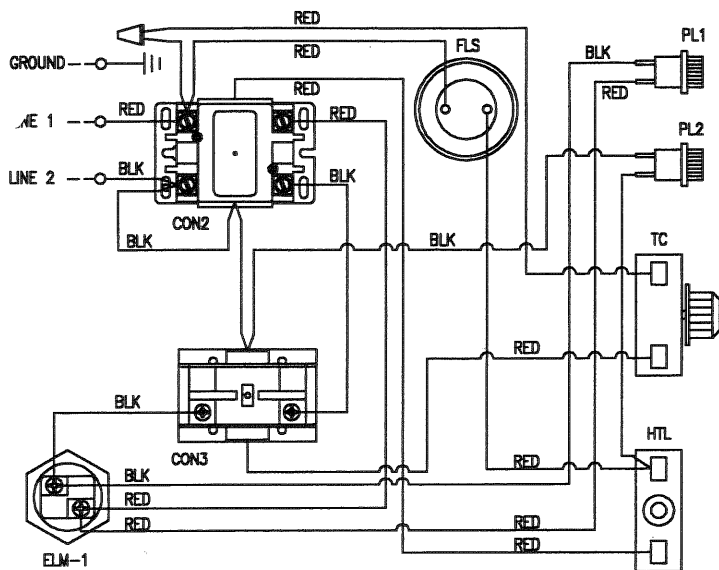


Figure 2. Coates Spa Heater Assembly

**POWER SUPPLY**

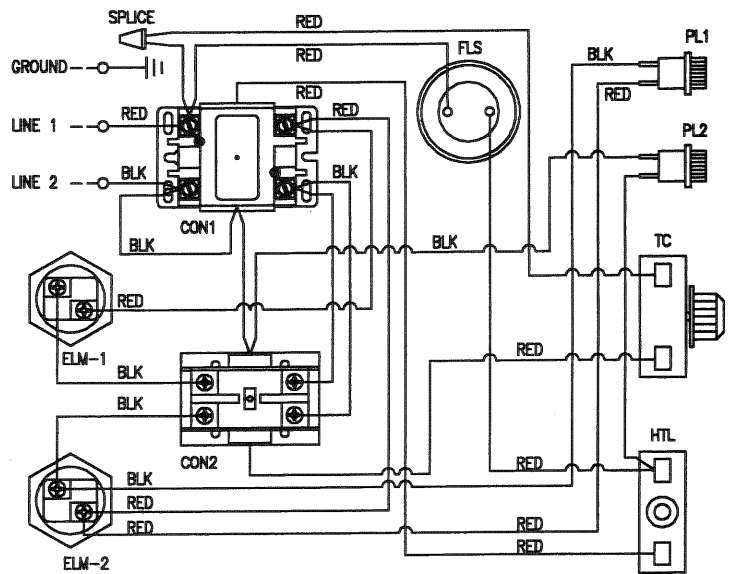
240VAC SINGLE PHASE



Model 12406ST  
Figure 3A. Wiring Diagram

**POWER SUPPLY**

240VAC SINGLE PHASE



Model 12411ST  
Figure 3B. Wiring Diagram

- HTL: HI-TEMP CUT OFF "MANUAL RESET"
- TC: TEMPERATURE CONTROL-THERMOSTAT
- ELM1-2: HEATING ELEMENT(S)
- CON1 CONTACTOR, 2-POLE 50AMP (RES)
- CON2 CONTACTOR, 2-POLE 35AMP (RES)
- CON3 CONTACTOR, 1-POLE 30AMP (RES)
- CB: CIRCUIT BREAKER (CUSTOMER SUPPLIED)
- PL1: PILOT LIGHT "ELEMENT"
- PL2: PILOT LIGHT "FLOW SWITCH"
- FLS: FLOW SWITCH
- PRS. SW. PRESSURE SWITCH (ALTERNATE)

- 1 INSULATED GROUND CONDUCTOR, COPPER. MUST BE THE SAME SIZE AS THE SUPPLY WIRING, BUT NOT LESS THAN #12 AWG.
- 2 FACTORY SPliced LEADS ARE PROVIDED FOR CONNECTION TO CUSTOMER SUPPLIED AUXILIARY CONTROLS. I.e. REMOTE THERMOSTAT. SEE YOUR DEALER FOR INSTALLATION INSTRUCTIONS.

- 3 THE "ST" MODEL SPA HEATER IS AVAILABLE WITH EITHER A FLOW SWITCH, PN 23000102 OR A PRESSURE SWITCH, PN 22007210. CONFIRM WHICH DEVICE YOUR HEATER IS EQUIPPED WITH BEFORE ORDERING REPLACEMENT PARTS.

**TABLE 1**

MODEL NO.	HEATER KW/VOLT RATING	WIRING DIAG. FIG. NO.	NO. & KW. OF HEAT. ELEMENTS	HEATER CURRENT RATING	RECOM. CIRCUIT RATING	RECOMMENDED SUPPLY WIRING
						COPPER @ 60° C
12406 ST	5.5@240 VAC	2-A	1@5.5 KW	23 AMPS	30 AMPS	#10 AWG
12411 ST	11@240 VAC	2-B	2@5.5 KW	46 AMPS	60 AMPS	#4 AWG

**TABLE 2**

ITEM	PART NO.	DESCRIPTION	QTY
1	21000100	CONTACTOR, 2P, 50AMP, 240VAC MOD 12411ST	1
1	21000650	CONTACTOR, 2P, 35AMP, 240VAC MOD 12406/11ST	1
1	21000660	CONTACTOR, 1P, 30AMP, 240 VAC MOD 12406ST	1
2	22002001	TEMPERATURE CONTROL	1
3	22007210	PRESSURE SWITCH, 1-5 PSI	1
4	22003820	HIGH TEMPERATURE LIMIT, MANUAL RESET	1
6	29034620	PILOT LIGHTS for ELEMENT and FLOW	2
7	62002605	VESSEL ASSEMBLY, STAINLESS STEEL	1
8	20005061	HEATING ELEMENT, 5.5 KW, 240 VOLT	*
9	29020025	GROUND LUG, LA-2	1
10	29020025	BONDING LUG, LA-2	1

◇ BUSHING NOT SHOWN

\* SEE TABLE 1 FOR ELEMENT QUANTITY

When ordering spare parts from your dealer, provide the model number and serial number of your heater.



### 3.0 HEATER CONTROLS

The heater has a temperature controller adjustable from 60°F to 104°F, one manual reset type high temperature limit thermostat set at 122°F and a flow switch to prevent operation of heater without water flow.

#### 3.1 CAUTIONS AND WARNINGS

1. Be sure to check all cautions and warnings in this manual and as displayed on the heater labels before operating or performing any maintenance on these heaters.
2. Do not remove the heater cover while electrical power is applied to the heater. Power must be interrupted at the heater supply circuit breaker or disconnect switch.
3. The MIN. setting on the temperature control dial is an OFF position. The heater will not operate at this setting regardless of water temperature.

#### 3.2 STARTING THE HEATER

##### CAUTION

Do not operate heater without water.

1. ensure that heater case is properly grounded, and bonded.
2. Fill the system with water and start the circulating pump.
3. Turn on electrical power at the heater supply circuit breaker.
4. Set the temperature control to medium water temperature control to medium water temperature and increase gradually to desired operating temperature. DO NOT EXCEED 104°F MAXIMUM.

#### 3.3 PRESSURE SWITCH ADJUSTMENT

The pressure switch will provide proper operation for many installations. The factory setting of the pressure switch may need to be adjusted if the heater is installed well above or below the level of the spa.

**POWER SUPPLY TO THE HEATER MUST BE OFF WHEN ADJUSTMENTS ARE MADE.**

Verify correct operation of switch by:

1. If pump has two speeds, set at low speed.
2. Energize pump and then energize heater. If flow light turns on, the pressure switch is closing.
3. Turn pump off while watching flow light. The light should turn off within 5 seconds, if it does not, restart pump immediately.

If the light turns on and off with the pump, no further adjustment is necessary.

If the switch is closed (light on) with the **pump off** turn the thumb knob clockwise (increase pressure) until the switch opens.

If the switch is open (light off) with the **pump on**, turn the thumb knob counter-clockwise (decrease pressure) until the switch closes.

#### 3.4 STOPPING THE HEATER

1. Turn off electrical power at the heater supply circuit breaker before stopping the circulating pump.

#### 4.0 MAINTENANCE

1. Keep the heater clean.
2. If high temperature causes limit thermostat to cut off the electrical power, disconnect power at disconnect switch and determine the cause before resetting thermostat. **A water temperature drop is required to allow resetting of the manual reset high limit.**
3. If leaks develop in the heater or connecting piping, shut down the heater and repair defective connections.
4. If heating elements are removed for replacement, use only Coates elements, see Table 2.

**WARNING:**  
Only qualified personnel should attempt maintenance on this equipment. (N.E.C. Article 100)

## HEATER TROUBLE SHOOTING GUIDE

### CAUTION

This heater incorporates 240 volt electrical circuits.  
Do not open the case unless unit is disconnected from electrical power.  
Use only manufacturer's parts, or U.L. listing and warranty may be void.

PROBLEM	INDICATOR	POSSIBLE CAUSES	ACTION
No Heat	No lights on.	No power to heater	Check circuit breaker(s) "on".
		No water flow, pump off.	Check that pump is running and providing sufficient flow.
		Low water flow, pump running	Check & clean filter, check for plugged pump impeller.
		High Temperature "RESET" tripped	Push to RESET high limit control.
		Pressure switch out of adjustment.	Consult this <b>Manual Section 3.3</b> for adjustment instructions.
	Flow light on. Elem. light off	Temperature control inoperative or set too low.	Adjust control higher or replace control as required.
Flow and Elem. lights on.	Heating element(s) inoperative.	Check heater with amp-meter. Replace element(s) as required.	
Insufficient Heat	Flow and Elem. lights on.	Heater too small for Spa.	Check heater sizing requirement of Spa.
		One element inoperative on 11kW heater	Replace element.
High Limit RESET Trips	No lights on	Temperature control failed, water overheats in Spa	Replace temperature control.
		Pressure switch not turning off heater when pump/flow stops.	Adjust pressure switch per this <b>Manual Section 3.3</b> , or replace switch.
		High temperature limit switch has failed.	Replace High Limit control.
		Heater subject to high ambient temperature.	Cool equipment room or shade heater from sun.

When flow light is on, rotate temperature control ② thru full range, element pilot light ⑥ should come on indicating element(s) ⑧ is energized. If Spa does not heat when pilot light is on, replace element(s) ⑧.

Elements ⑧ can be checked with an Ohm meter. Each element ⑧ should read approximately 10.5 Ohms.

Ambient temperatures above 120°F will cause the High Temperature Limit ④ to trip prematurely.

#### PROTECTING YOUR COATES HEATER WITH PROPER WATER CHEMISTRY

Proper water balance is important to extending the life of your Coates Heater. While pH control is critical, the control of calcium hardness will protect against scaling and also help prevent corrosion.

	ACID						ALKALINE								
DAMAGE TO HEATER	CORROSIVE WATER						IDEAL RANGE	ALKALINE WATER						DAMAGE TO HEATER	
	0	1	2	3	4	5		6	7	7.2-7.8	8	9	10		11

The correct levels of sanitizer, pH, total alkalinity and calcium hardness will vary some depending on the type of pool (plaster, vinyl or fiberglass) and the chemical content of the fill water. **Water that is not maintained in balance can void your warranty.**

# USE INSTRUCTIONS

## IMPORTANT SAFETY INSTRUCTIONS

When using this electrical equipment, basic safety precautions should always be followed, including the following.

### 1. READ AND FOLLOW ALL INSTRUCTIONS.

#### 2. To reduce the risk of injury:

- A. The water in a pool or spa should never exceed 104°F(40°C). A water temperature in excess of 104°F is considered unsafe for all persons. Lower water temperatures are recommended for extended use (exceeding 10-15 minutes) and for young children. SEE "STARTING THE HEATER" IN THE OPERATIONS & MAINTENANCE MANUAL FOR INSTRUCTIONS ON HOW TO ADJUST THE TEMPERATURE CONTROL.
- B. Since excessive water temperatures have a high potential for causing fetal damage during early months of pregnancy, pregnant or possibly pregnant women should limit pool or spa water temperatures to 100°F(38°C).
- C. Before entering a pool or spa, the user should measure the water temperature at several occupant locations using an accurate thermometer since the tolerance of water temperature regulating devices may vary as much as  $\pm 5^{\circ}\text{F}$ ( $\pm 3^{\circ}\text{C}$ ).
- D. D.Alcohol, drugs or medication should not be used before or during pool or spa use since their use may lead to unconsciousness with the possibility of drowning.
- E. Persons suffering from obesity or with a medical history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a pool or spa.
- F. Persons using medication should consult a physician before using a pool or spa since some medications may induce drowsiness while other medications may affect heart rate, blood pressure and circulation.

### 3. SAVE THESE INSTRUCTIONS.

# **---WARNING---**

## **DANGER OF HYPERTHERMIA**

Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F. The symptoms of hyperthermia include dizziness, fainting, drowsiness, lethargy and an increase in the internal temperature of the body. The effects of hyperthermia include:

1. Unawareness of impending hazard.
2. Failure to perceive heat.
3. Failure to recognize the need to exit pool or spa.
4. Physical inability to exit pool or spa.
5. Fetal damage in pregnant women.
6. Unconsciousness resulting in a danger of drowning.

**WARNING---**The use of alcohol, drugs or medications can greatly increase the risk of fatal hyperthermia in pools and spas.

# LIMITED WARRANTY

The Company extends this limited warranty to the original purchaser of a Coates Electric Spa Heater.

Coates warrants the electrical components\* and wiring (excluding enclosure, enclosure parts, knobs and accessories) in this new Spa Heater to be free from defects in materials and workmanship for one (1) year from the provable date of purchase, or eighteen (18) months from date of factory shipment, whichever occurs first. Coates further warrants the stainless steel water containment vessel to be free from defects in materials and workmanship for two (2) years from the provable date of purchase or thirty (30) months from the factory shipment, whichever occurs first. Enclosure parts, knobs and accessories have no warranty whatsoever.

\*Exception: Heating elements are warranted for ninety 90 days after installation or one (1) year from date of factory shipment, whichever occurs first.

Coates will repair or replace at its option, defective component parts as explained above during the warranty period provided such parts are returned to the factory, Freight Prepaid. Factory authorization **MUST BE OBTAINED** under this warranty before returning defective parts.

## Limited Warranty Does Not Cover

1. New products purchased outside the United States of America and Canada.
2. Uncrating, unpacking, set-up, installation, and/or startup of this unit.
3. Adjustments to controls normally operated by consumer purchaser.
4. This limited warranty does not extend to any defect, malfunction or failure caused by, or resulting from improper service, maintenance or repair, abuse, neglect, accident, corrosion caused by improper water chemistry or by equipment that use salt to create a sanitizer, lack of water, or any other cause beyond the control of Coates Heater Company, Inc. or to any product where the nameplate shall have been removed, altered, replaced, defaced or rendered illegible.
5. This limited warranty is void if the Spa Heater is used in a salt water system or under any extreme or unusual corrosive condition for which stainless steel metals would not be recommended.
6. This limited warranty does not extend to the repair or replacement of defective components except at Coates or a service facility authorized by Coates.

IMPLIED WARRANTIES, WHEN APPLICABLE, SHALL COMMENCE UPON THE SAME DATE AS THE EXPRESS WARRANTY PROVIDED ABOVE, AND SHALL, EXCEPT FOR WARRANTIES OF TITLE, EXTEND ONLY FOR THE DURATION OF EXPRESS WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THE ONLY REMEDY PROVIDED TO YOU UNDER AN APPLICABLE IMPLIED WARRANTY AND THE EXPRESS WARRANTY SHALL BE THE REMEDY PROVIDED UNDER THE EXPRESS WARRANTY, SUBJECT TO THE TERMS AND CONDITIONS CONTAINED THEREIN.

THE COMPANY SHALL NOT BE LIABLE FOR INCIDENTAL AND CONSEQUENTIAL LOSSES AND DAMAGES UNDER THE EXPRESS WARRANTY, ANY APPLICABLE IMPLIED WARRANTY, OR CLAIMS FOR NEGLIGENCE, EXCEPT TO THE EXTENT THAT THIS LIMITATION IS FOUND TO BE UNENFORCEABLE UNDER APPLICABLE STATE LAW.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.



**HEATER COMPANY, INC.**

P.O. Box 1750 • Kent, WA 98035