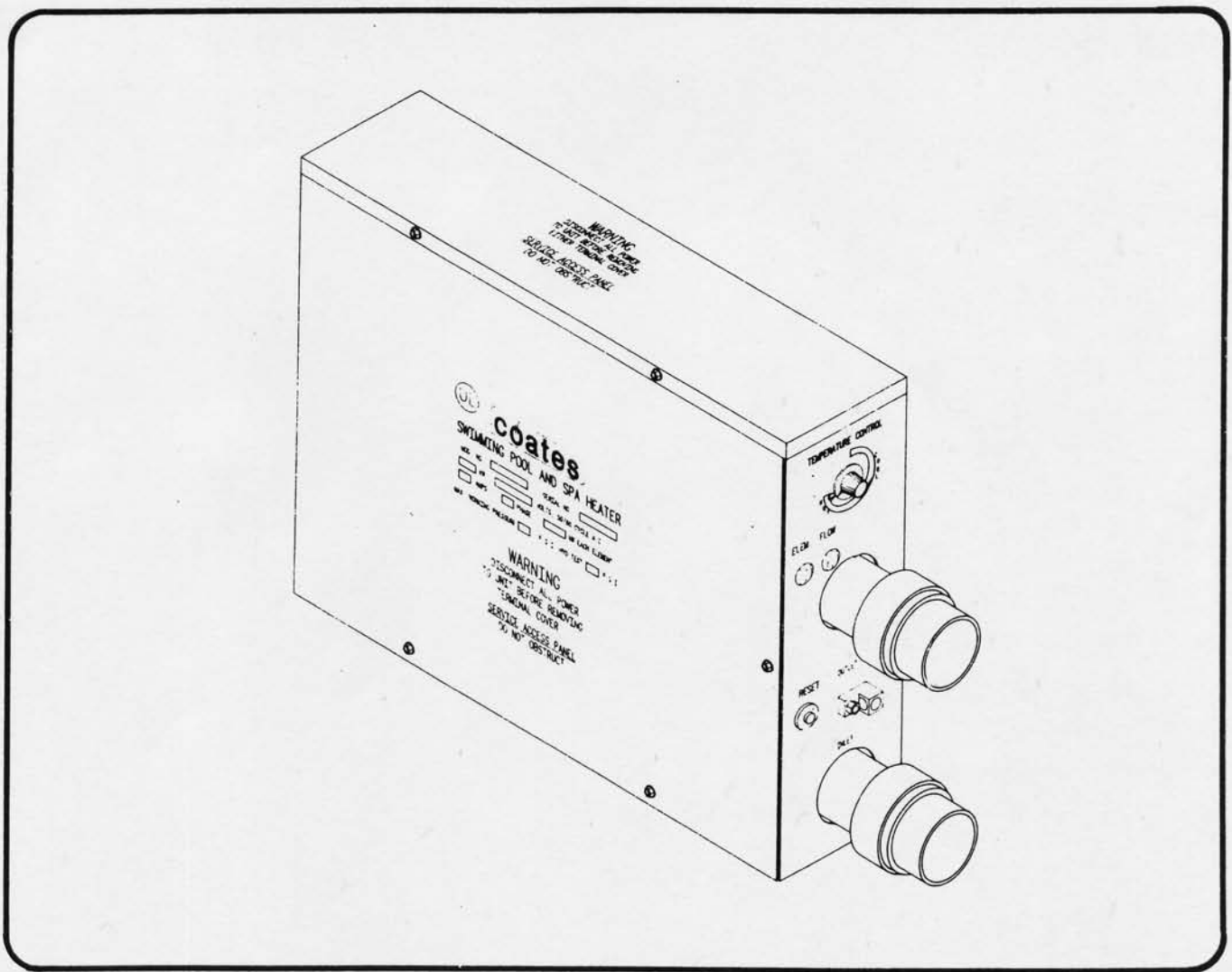




# SPA HEATER

**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 front 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.

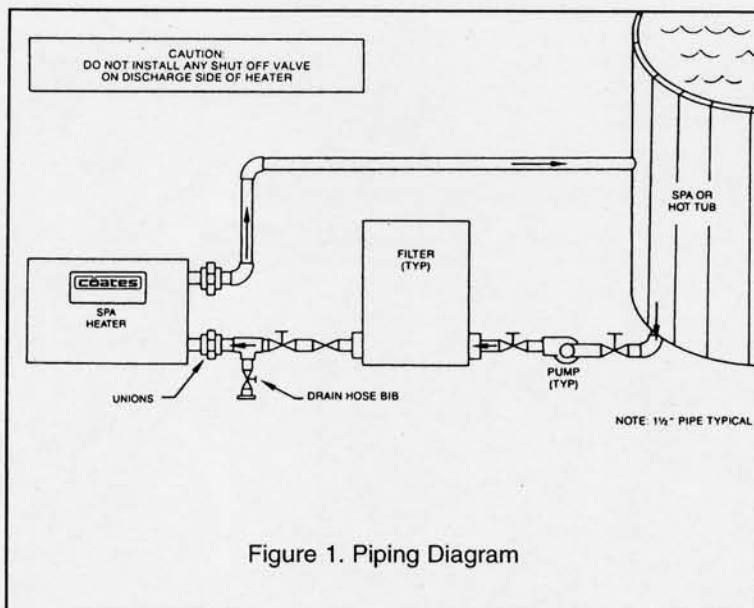


Figure 1. Piping Diagram

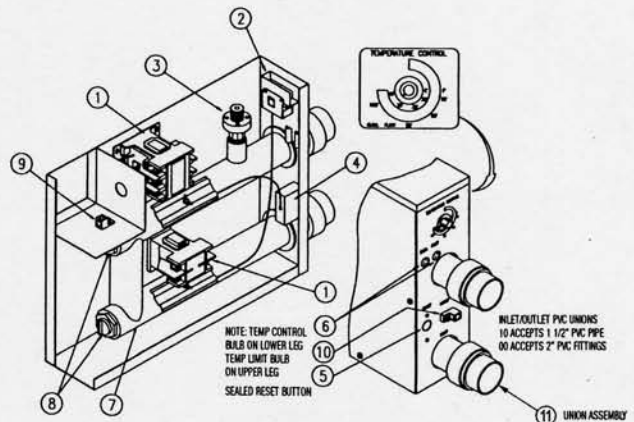
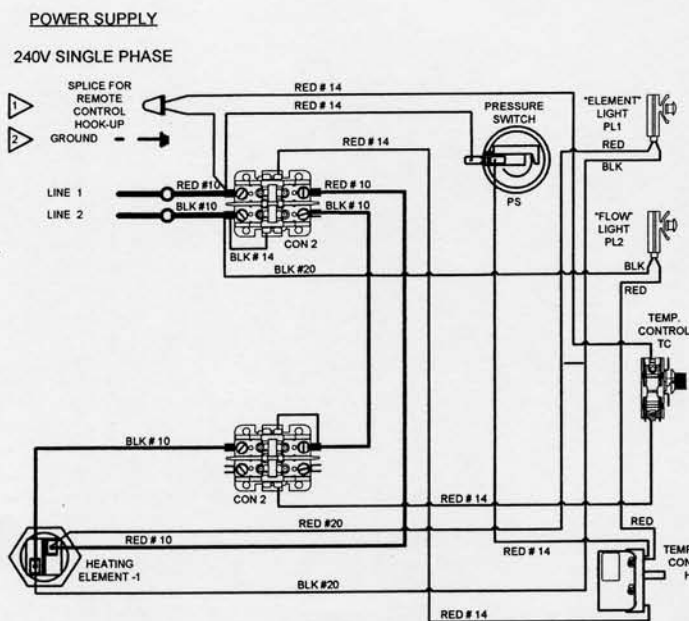
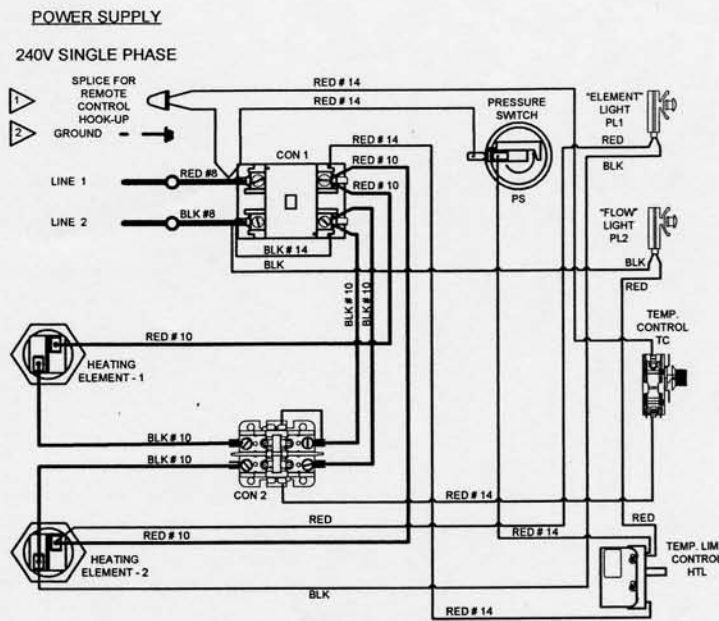


Figure 2. Coates Spa Heater Assembly  
Refer to Table 2 for part description.



MODEL 12406ST  
Wiring Diagram  
Figure 3A



MODEL 12411ST  
Wiring Diagram  
Figure 3B

HTL: HI-TEMP CUT OFF "MANUAL RESET".  
TC: TEMPERATURE CONTROL - THERMOSTAT.  
ELM 1 - 2: HEATING ELEMENT(S).  
CON 1: CONTACTOR, 2 POLE, 50 AMP RES..  
CON 2: CONTACTOR, 2 POLE, 35 AMP RES.

CB: CIRCUIT BREAKER (CUSTOMER SUPPLIED).  
PL 1: PILOT LIGHT "ELEMENT".  
PL 2: PILOT LIGHT "FLOW SWITCH".  
PS: PRESSURE SWITCH

▷ FACTORY SPICED LEADS ARE PROVIDED FOR CONNECTION TO CUSTOMER SUPPLIED AUXILIARY CONTROLS. I.e. REMOTE THERMOSTAT OR HEATER "ON/OFF" SWITCH. SEE YOUR DEALER FOR FURTHER INFORMATION.

▷ INSULATED GROUND CONDUCTOR, COPPER ONLY. MUST BE SAME SIZE AS THE SUPPLY WIRING, BUT NOT LESS THEN #12 AWG.

TABLE 1

MODEL NO.	HEATER KW/VOLT RATING	WIRING DIAG. FIG. NO.	NO. & KW OF HEAT. ELEMENTS	HEATER CURRENT RATING	NO. RECOM. CIRCUIT RATING	RECOMMENDED SUPPLY WIRING
						COPPER @ 60° C
12406 ST	5.5@240 VAC	3-A	1@5.5 KW	23 AMPS	30 AMPS	#10 AWG
12411 ST	11@240 VAC	3-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 12406ST/11ST	2/1
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
11	32705010	UNION ASSEMBLY	2

\* 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 65°F to 104°F, one manual reset type high temperature limit thermostat set at 122°F and a pressure 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, as factory set, may provide proper operation for many installations. The factory setting of the pressure switch may need to be adjusted if the heater is installed above or below the level of the spa, or for two speed pumps.

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.

#### 5.0 OPERATION SEQUENCE

1. Power supplied to heater (Circuit Breaker).
2. Pressure switch closes (with sufficient flow from pump).
3. Flow light illuminates.
4. Upper contactor closes. (High limit must be closed)
5. Rotate temperature dial until it is greater than water temperature.
6. Lower contactor closes.
7. Element light illuminates and the element(s) heat(s) the water.

**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	INDICATORS	POSSIBLE CAUSES	ACTION
No Heat	No lights ON	No Power to heater	Check Circuit Breaker "ON".
		Insufficient Flow/Pressure	Check that pump is running and filter is clean.
		Pressure Switch out of adjustment	Consult this manual, <b>Section 3.3</b> , for adjustment instructions.
		Pressure Switch inoperative	Use Ohm meter to check continuity across switch while pump is running. Replace Pressure Switch if Open.
	Flow light ON Element light OFF	Hi-Limit Reset Tripped	Push "Reset" button
		High Limit switch inoperative	Use Ohm meter to check continuity across switch. Replace High Limit Switch if always open.
		Temp Control inoperative or set too low	Adjust control higher or replace as required. You should hear it "click" if the switch is operational.
		Contactor (upper) inoperative	Replace upper contactor
		Contactor (lower) inoperative	Replace lower contactor
		Element Light burned out	Replace Element Light
Flow light ON Element light ON	Heating Element(s) inoperative	Replace Element(s) as required.	
Insufficient Heat	Flow light ON Element light ON	Heater too small for Spa	Check heater sizing requirement of Spa.
		One element inoperative on 11KW model	Replace Element as required.
High Limit RESET Trips	Flow light ON Element light OFF	Temperature control inoperative, water overheats in Spa.	Replace Temperature Control.
		Pressure Switch not turning off heater when pump/flow stops	Consult this <b>Manual Section 3.3</b> for adjustment instructions. Replace as required.
		Heater subjected to high ambient temperature (i.e. Direct sunlight)	Cool Equipment room or shade heater from sun.
		High Limit switch inoperative	Replace High Limit Switch
Water Temp Greater than setpoint	Flow light ON Element light ON	Thermostat out of calibration/inoperative	Replace thermostat.
	Flow light ON Element light OFF	External heat source (i.e. Solar Heating, heat from the pump, etc.)	Turn off power to heater and verify problem continues.

Elements ⑧ can be checked with an Ohm meter only when power is disconnected from heater. 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.

DAMAGE TO HEATER	ACID							IDEAL RANGE	ALKALINE							DAMAGE TO HEATER
	CORROSIVE WATER								ALKALINE WATER							
	0	1	2	3	4	5	6		7	8	9	10	11	12	13	
								7.2-7.8								

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.**

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