

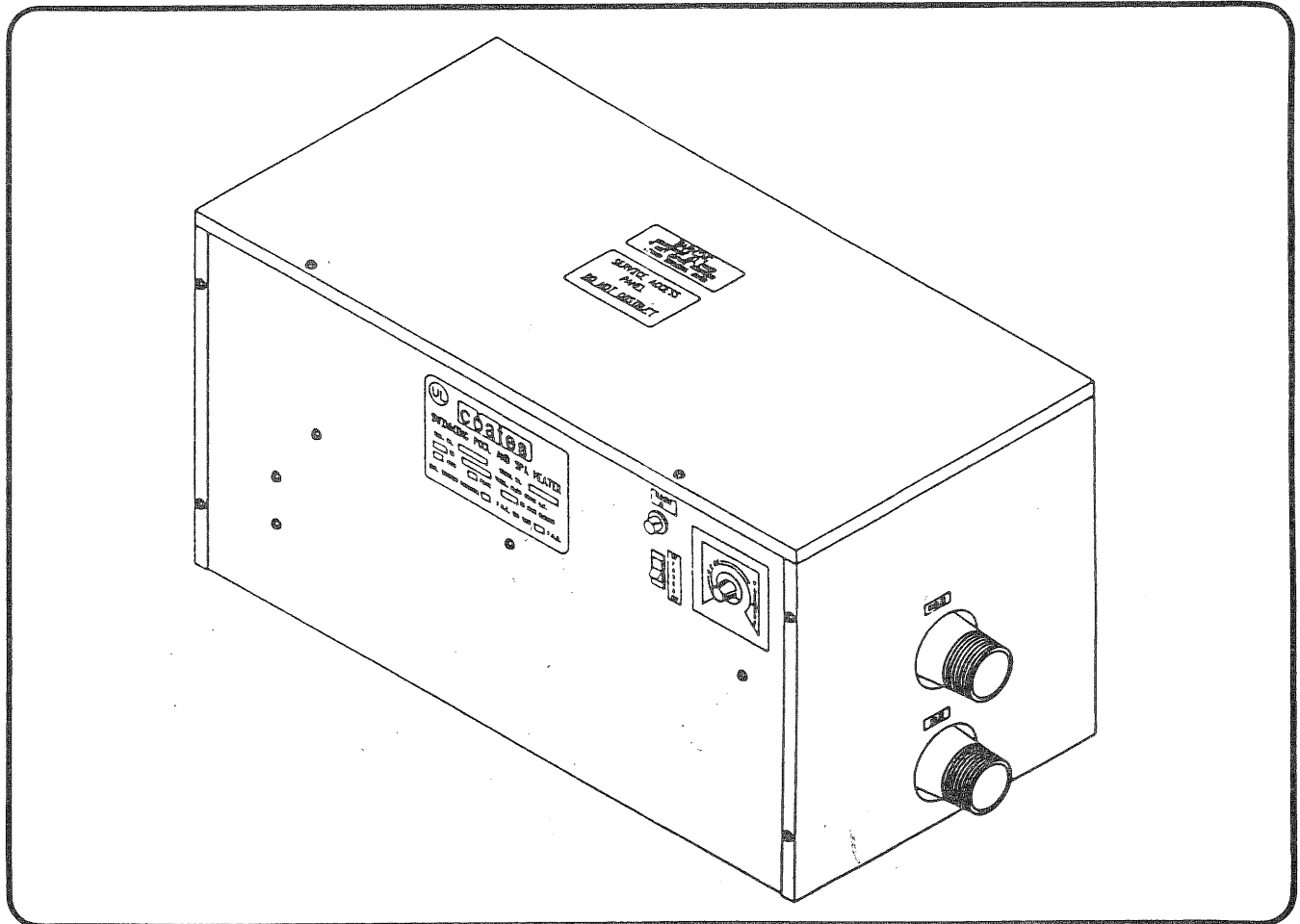
# POOL HEATER

with built-in flow switch

## MODELS:

12012 CE THRU 12018 CE	12024 CPH THRU 12030 CPH-2	12036 PHS-3 THRU 12057 PHS-4
12412 CE THRU 12418 CE	12424 CPH THRU 12430 CPH-2	12436 PHS-3 THRU 12457 PHS-4
32012 CE THRU 32018 CE	32024 CPH THRU 32030 CPH-2	32036 PHS-3 THRU 32057 PHS-4
32412 CE THRU 32418 CE	32424 CPH THRU 32430 CPH-2	32436 PHS-3 THRU 32457 PHS-4
34812 CE THRU 34818 CE	34824 CPH THRU 34830 CPH-2	34836 PHS-3 THRU 34857 PHS-4

## installation, operation and maintenance



## 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.

## INTRODUCTION

This manual provides installation procedures, operating and maintenance instructions and a parts list for the Coates Pool Heater.

Your Coates Electric Swimming Pool Heater has been designed and engineered to provide you with the most progressive quality heating system possible. Its operation is efficient and pollution-free. Models are available for every size or make of pool.

To insure a long life of trouble-free service, your Coates Pool Heater should be carefully installed in accordance with the instructions given in this manual. Failure to do so may damage the pool heater and the pool equipment to which it is connected. Only qualified personnel should install and maintain this unit, and, of course, local plumbing and electrical codes have precedence over these instructions.

### 1.0 DESCRIPTION

The Coates Swimming Pool Heater consists of a heating tank with external enclosure, and the electric heating and control system. In order to help maintain the heater in a satisfactory manner, a brief description of its components and their operation is included for the customer's convenience.

The pressure vessel and its enclosure comprise the main mechanical portion of the pool heater.

The pressure vessel, in conjunction with the flow switch and heating element are the only portions of this equipment in contact with the water.

The external enclosure is a sheet steel case totally enclosing the pressure vessel and electrical components. The enclosure is coated with a rust inhibiting, baked epoxy-polyester finish.

The electrical system, which is the heart of this unit, can be considered as three separate systems engineered to provide optimum use of energy. They are as follows:

(1) The heating elements; mounted on a four-bolt flange. There are either 1, 2, 3, or 4 elements.

(2) The control system; consists of the pilot switch high limit thermostat, flow switch, PoolStat, magnetic contactors, transformer and sequencer (on some single phase units only). These controls are wired into a control circuit designed to control the temperature of the water leaving the heater. Some single phase units turn on the heating elements in stages to prevent voltage drops in the main electrical service. The high-limit thermostat is designed to open the control circuit and cut off the power in the event of excessive water temperature.

A flow switch is built-in to prevent the pool heater from operating without water flow. The flow switch will activate at flow rates of 20 GPM or greater.

(3) The main current-carrying components; are the contactors and fuses. These are wired into circuits which carry the full amperage draw of the elements. The contactors function during a high temperature condition to de-energize the elements. The sequencers, as described under the control system, stage the heating elements on and off. Each sequencer has load switches, an auxiliary switch and a heater.

The sequencer steps are turn on at 18 to 45 second intervals, and, when de-energized, will turn off in three minutes. The element fuses in these units are rated at 30 or 60 Amps and have an interrupting capacity of 100,000 Amp rms. These fuses provide supplemental circuit protection for the internal wiring of the heater.

The heater has a temperature controller adjustable from 70°F to 105°F and has one manual reset type high temperature limit thermostat set at 122°F.

### 2.0 LOCATION AND PLUMBING

#### A. Installation: Location

Coates swimming pool heaters are quiet, do not expel exhaust fumes, and may be conveniently located in shed or basement. Normal positioning of the pool heater should be in close proximity to the pool filtration system. Select a location conveniently close to incoming electrical service and where excessively long piping runs are not required.

Suggested clearance: 24" on right, 24" on left, 42" above, 12" on the back, and 36" in front.

## B. Installation: Plumbing

Pipe the heater as shown in Figure 2 to the inlet and outlet openings on the right side. Connect the heater in line between the filter discharge and pool. The water line coming from the filter should be connected to the heater *inlet*, and the discharge line to the pool should be connected to the *outlet*. The pool will not heat properly unless it is plumbed correctly. If plastic pipe is used, it should be suitable for at least 122°F.

A plumbing bypass around the pool heater is not necessary unless flow rates through the heater exceed 80 GPM. A minimum flow rate of 20 GPM is required. Lack of sufficient flow will not allow the flow switch to activate the heater.

It may be necessary, in larger olympic-sized or public pools, to use two or more heaters to obtain sufficient KW capacity. If so, the heaters must be piped in parallel, so that each heater takes equal flow.

**DRAINAGE:** A method of draining water away from the heater and other equipment is to be provided. The heater should be flushed at the end of each swimming season. During flushing or service, water may be spilled and could cause damage to the floor or other equipment. A drain valve is to be installed in the INLET plumbing.

### 3.0 ELECTRICAL INSTALLATION

- First:
1. Check nameplate rating to insure the heater matches your electrical supply.
  2. CHECK ELECTRICAL CONNECTIONS TO ALL COMPONENTS within the heater for tightness. These can become loose during shipment and handling.
  3. Check components for any moisture, rust, or dust which may have accumulated during shipping, and clean or dry where necessary.

All pool heaters covered in this manual have integral thermostats, transformers, contactors and sequencers where required.

All other internal connections are completed and tested at the factory.

Wiring diagrams on pages 6 through 14 show internal wiring and required field connections for various models. Consult your local electrical code for proper wire and conduit sizes, and other local requirements. The heater is to be installed in accordance with Article 680 of the National Electrical Code.

Do not connect the pool heater to, or operate at, a voltage other than the voltage rated on the nameplate.

Bring wires of adequate size from a fused disconnect switch or circuit breaker with an ampere rating of 125% of the ampere rating shown on heater nameplate. Refer to Table I for wire sizes. Connect the power conductors to Bus Assembly on inside of the heater.

Ground wires must be insulated copper conductor and the same size as supply wiring, but not less than #12 AWG.

KW	SINGLE PHASE		THREE PHASE	
	240V	208V	240V	480V
12	6 AWG	8 AWG	8 AWG	12 AWG
15	4 AWG	6 AWG	8 AWG	10 AWG
18	3 AWG	6 AWG	6 AWG	10 AWG
24	1 AWG	4 AWG	4 AWG	8 AWG
30	2/0 AWG	2 AWG	3 AWG	8 AWG
36	3/0 AWG	1 AWG	2 AWG	8 AWG
45	250 MCM	2/0 AWG	1/0 AWG	6 AWG
54	300 MCM	3/0 AWG	2/0 AWG	4 AWG
57	350 MCM	3/0 AWG	2/0 AWG	3 AWG

*Suggested Wiring Insulated Copper Conductor Wires From NEC Article 310 With 125% Correction Factor and Based on 75°C Insulation.*

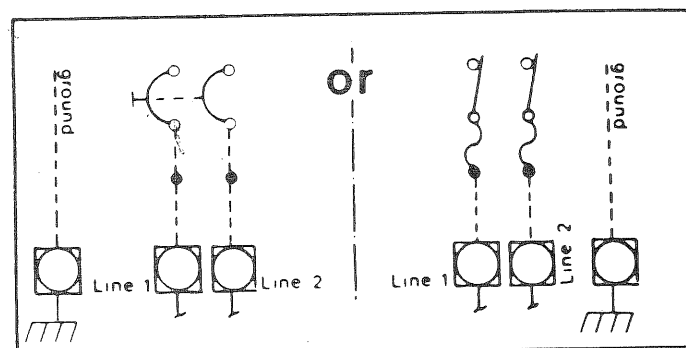
**TABLE 1**

### A. To Connect Pool Heater to Power Supply

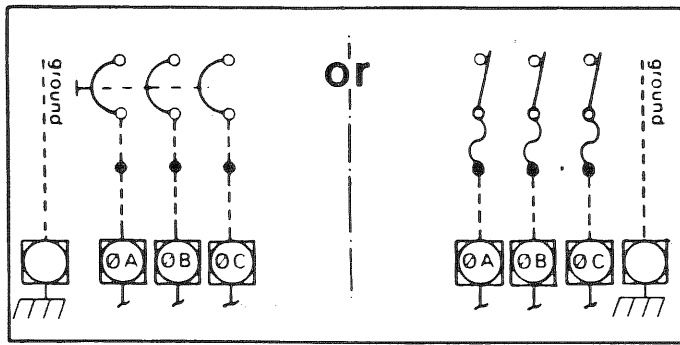
These pool heaters have branch supplemental fusing already installed in the element circuitry; see wiring diagrams. To connect to the power supply, one needs only to protect the main supply lines, either with a circuit breaker or fused disconnect switch. Suggested wire sizes are shown in Table 1.

#### CAUTION

The electrical installation must be in accordance with Article 680 of the National Electrical Code.



**Wiring Diagram, Single-Phase Models  
Fig. 1A**



Wiring Diagram, Three-Phase Models

Fig. 1B

### B. Startup Procedure:

- Make sure that the pump is on and that there is at least 20 GPM flow through the pool heater. The heating elements will fail if allowed to operate dry.
- Check PoolStat setting, also, examine wiring for loose connections, etc.
- Turn on power at main disconnect switch.
- Turn on pilot switch on pool heater.

When closing down the pool for any length of time, shut off the power at the main disconnect switch and **drain the water from the system. Water must not be allowed to freeze in the heater, as this will cause severe damage.**

## 4.0 MAINTENANCE

### Element Inspection and Replacement:

1. Turn off power at main disconnect switch and turn off water at water supply line.
2. Drain pool heater.
3. Remove left end service access panel.
4. Disconnect element leads.
5. Remove the four (4) element flange retaining nuts and extract element.
6. Installation is the reverse of steps 1 thru 5. (Reinstall element with new gasket).

### Annual Cleaning:

Accumulated sludge in the tank is the greatest cause of element failure. Yearly, before winter, the pool heater should be drained and cleaned to remove any scale or sludge. More frequent cleaning may be required if pool water contains sediment or any amount of foreign matter.

1. Turn off system at main disconnect switch.
2. Open drain valve.
3. Permit water to run until it is clear.
4. Close valve and restart normally.

If high temperature causes manual reset high limit switch to shut off the heater, disconnect power at disconnect switch and determine the cause before resetting.

### 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	7.2-7.8	8	9	10	11	12	13	14	

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.**

### \*\*NOTICE\*\*

NO PRESSURE RELIEF VALVE IS SHIPPED WITH THIS HEATER AND NONE IS REQUIRED PER UL STD. 1261. DO NOT INSTALL A SHUT OFF VALVE BETWEEN THE HEATER AND POOL OR SPA. A CHECK VALVE IS ACCEPTABLE AND IN ACCORDANCE TO UL STANDARD 1261 REVISED JULY 1983.

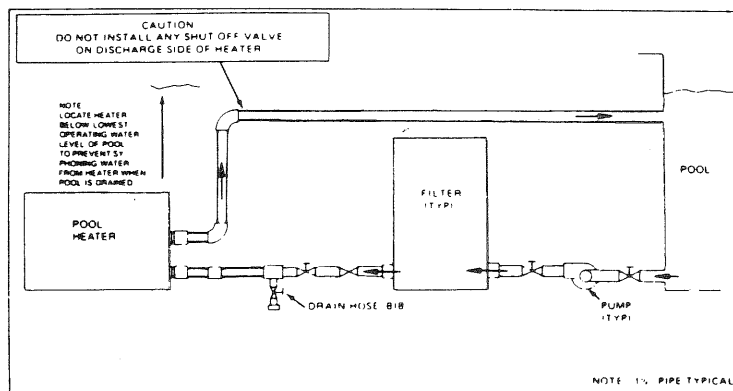
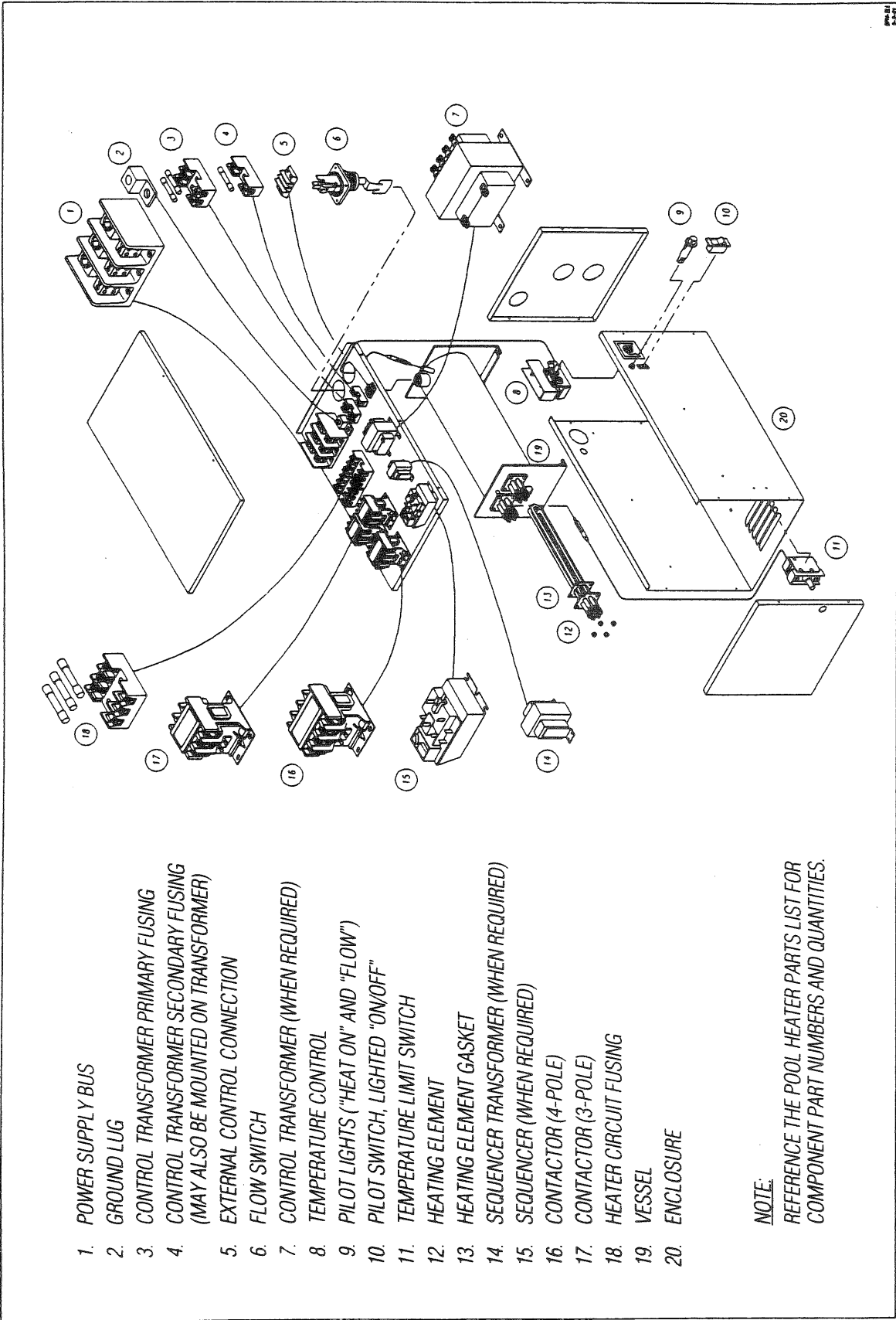


FIG. 2 PLUMBING

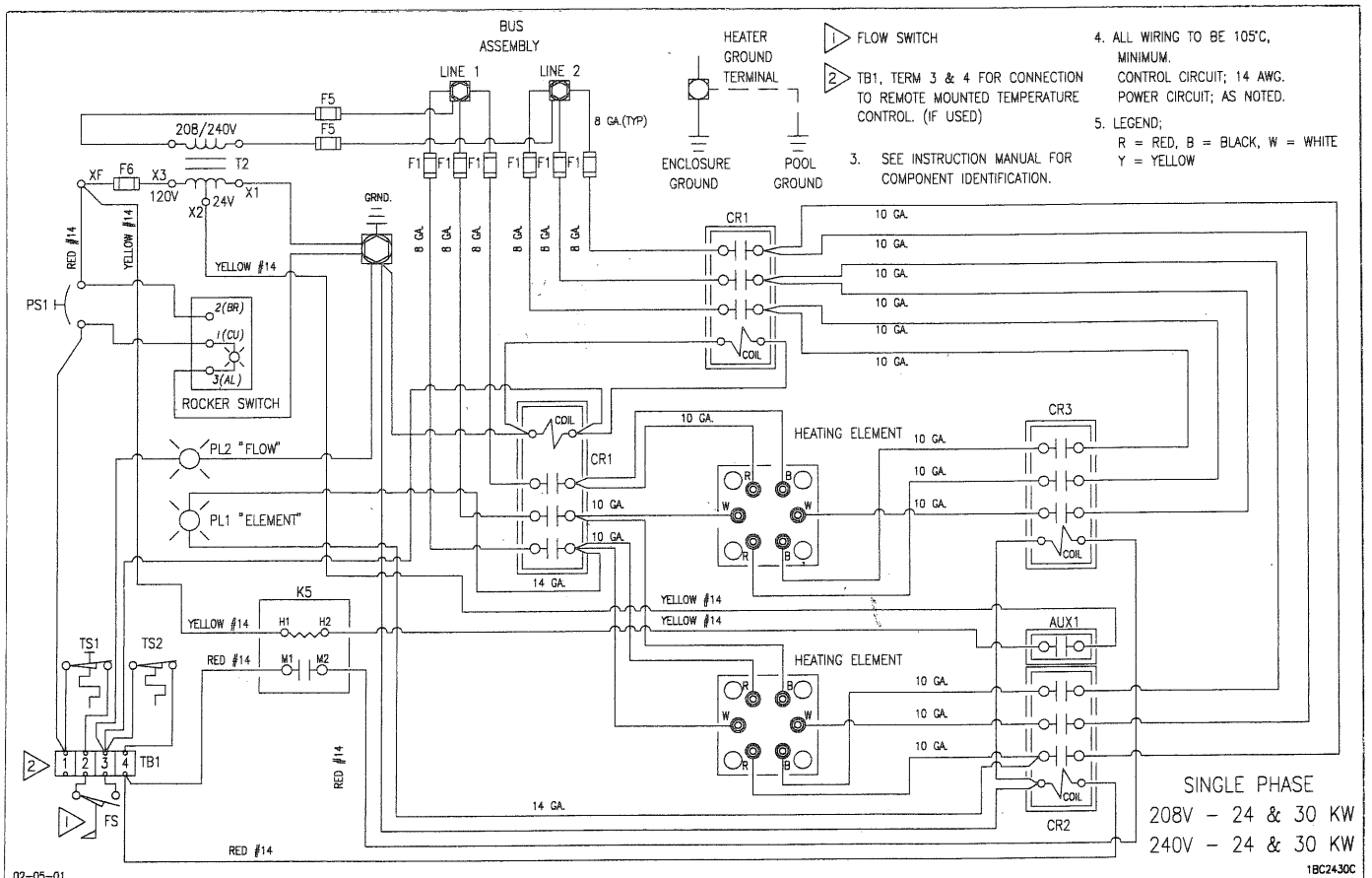
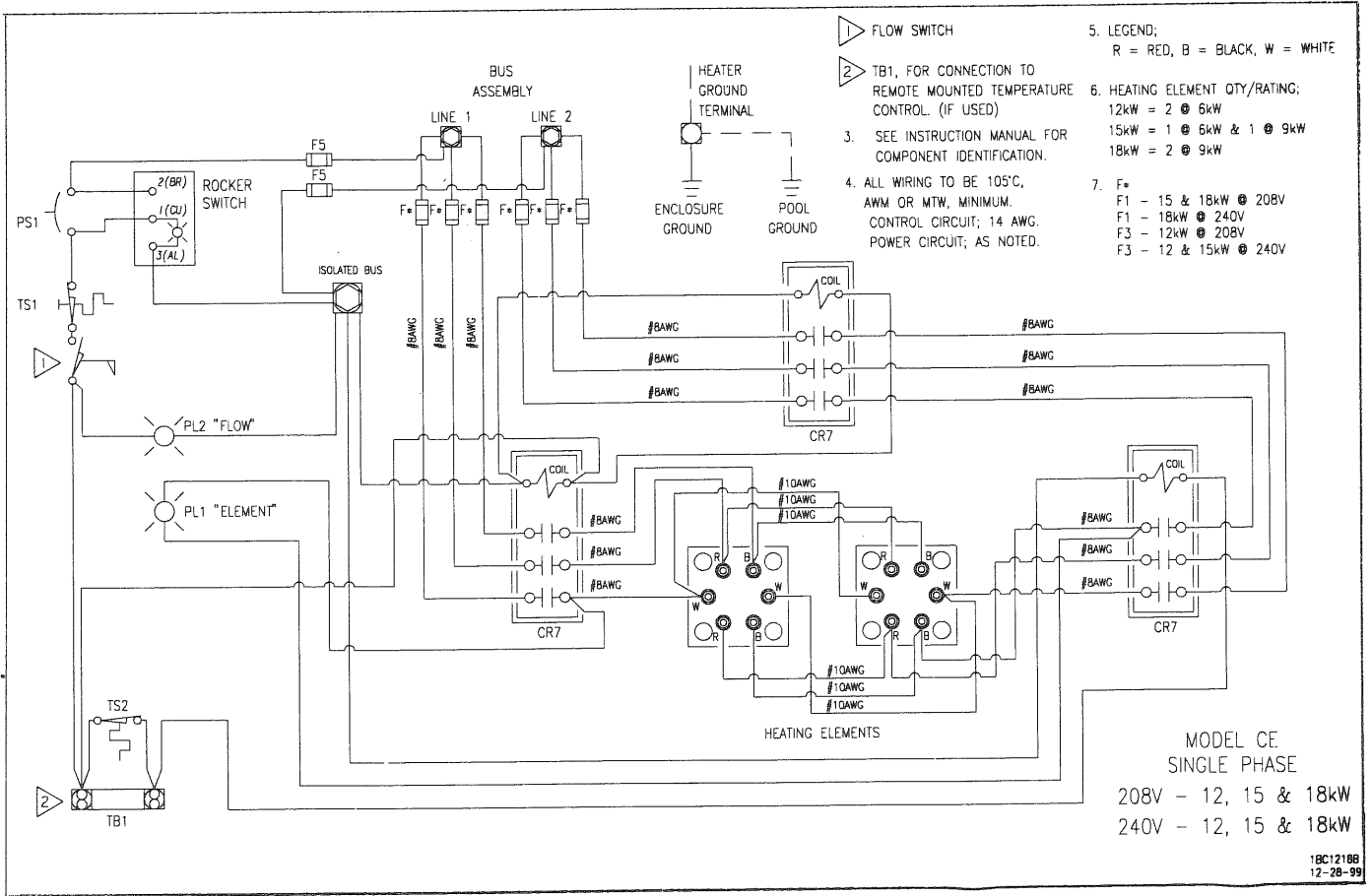




1. POWER SUPPLY BUS
2. GROUND LUG
3. CONTROL TRANSFORMER PRIMARY FUSING
4. CONTROL TRANSFORMER SECONDARY FUSING  
(MAY ALSO BE MOUNTED ON TRANSFORMER)
5. EXTERNAL CONTROL CONNECTION
6. FLOW SWITCH
7. CONTROL TRANSFORMER (WHEN REQUIRED)
8. TEMPERATURE CONTROL
9. PILOT LIGHTS ("HEAT ON" AND "FLOW")
10. PILOT SWITCH, LIGHTED "ON/OFF"
11. TEMPERATURE LIMIT SWITCH
12. HEATING ELEMENT
13. HEATING ELEMENT GASKET
14. SEQUENCER TRANSFORMER (WHEN REQUIRED)
15. SEQUENCER (WHEN REQUIRED)
16. CONTACTOR (4-POLE)
17. CONTACTOR (3-POLE)
18. HEATER CIRCUIT FUSING
19. VESSEL
20. ENCLOSURE

**NOTE:**  
 REFERENCE THE POOL HEATER PARTS LIST FOR  
 COMPONENT PART NUMBERS AND QUANTITIES.

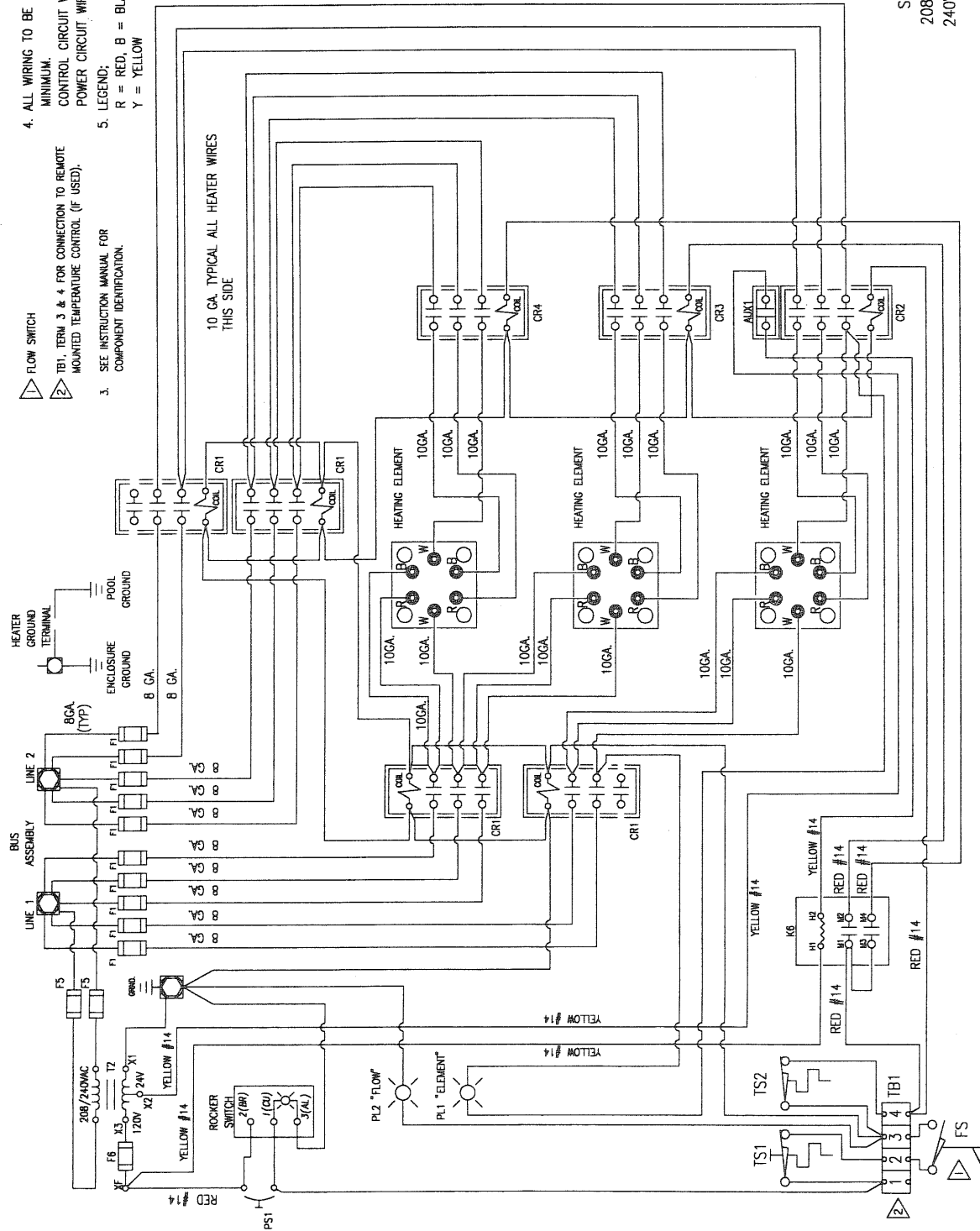
# WIRING DIAGRAMS



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- 4. ALL WIRING TO BE 105°C INSULATED, MINIMUM.
- CONTROL CIRCUIT WIRING; 14 AWG.
- POWER CIRCUIT WIRING; AS NOTED.
- 5. LEGEND:
- R = RED, B = BLACK, W = WHITE
- Y = YELLOW

- △ FLOW SWITCH
- ② TB1, TERM 3 & 4 FOR CONNECTION TO REMOTE MOUNTED TEMPERATURE CONTROL (IF USED).
- 3. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

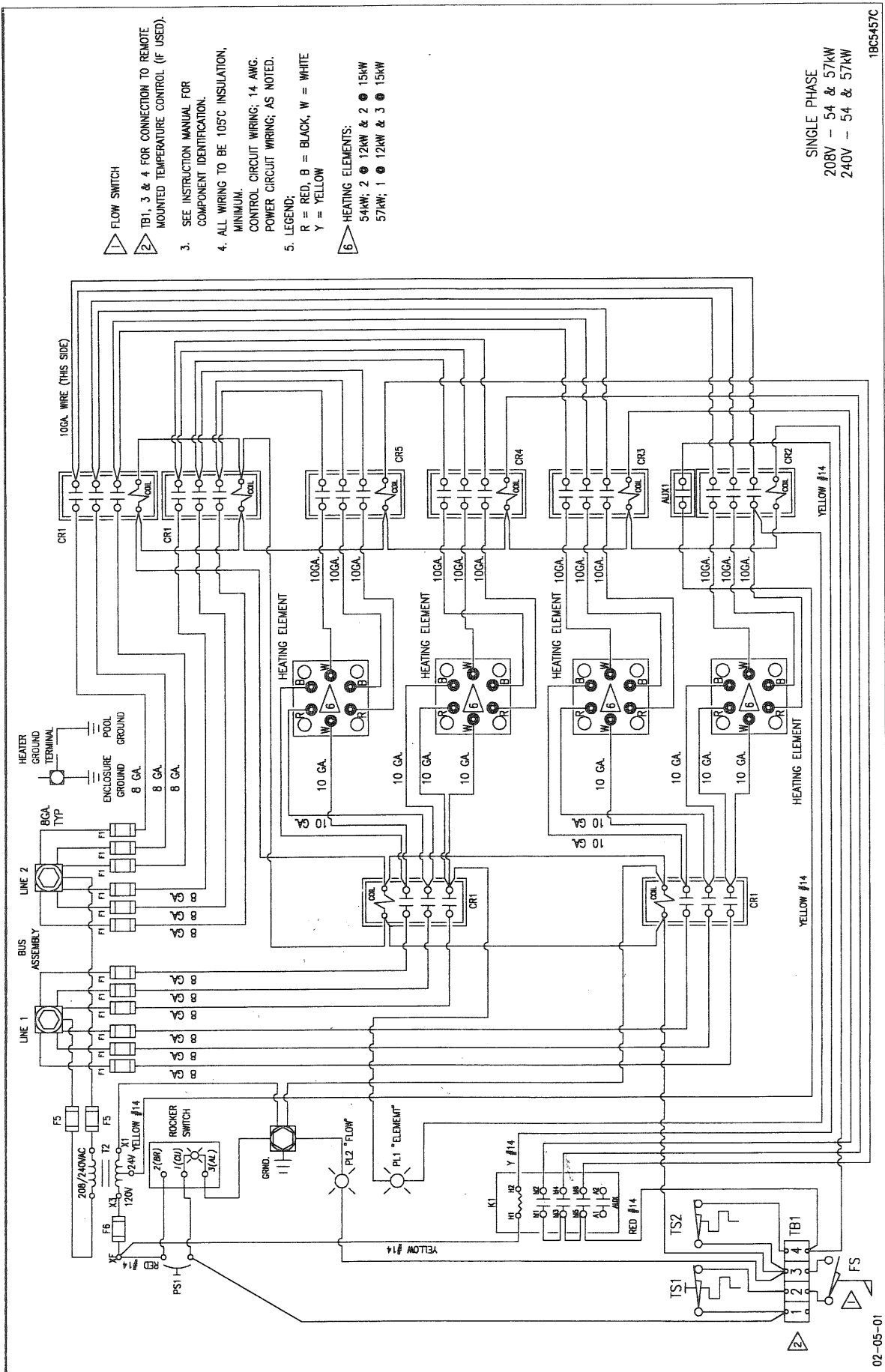


SINGLE PHASE  
 208V - 36 & 45kW  
 240V - 36 & 45kW

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△ FLOW SWITCH

② TB1, 3 & 4 FOR CONNECTION TO REMOTE MOUNTED TEMPERATURE CONTROL (IF USED).

3. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

4. ALL WIRING TO BE 105°C INSULATION, MINIMUM.

CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.

5. LEGEND:

R = RED, B = BLACK, W = WHITE  
Y = YELLOW

⑥ HEATING ELEMENTS:

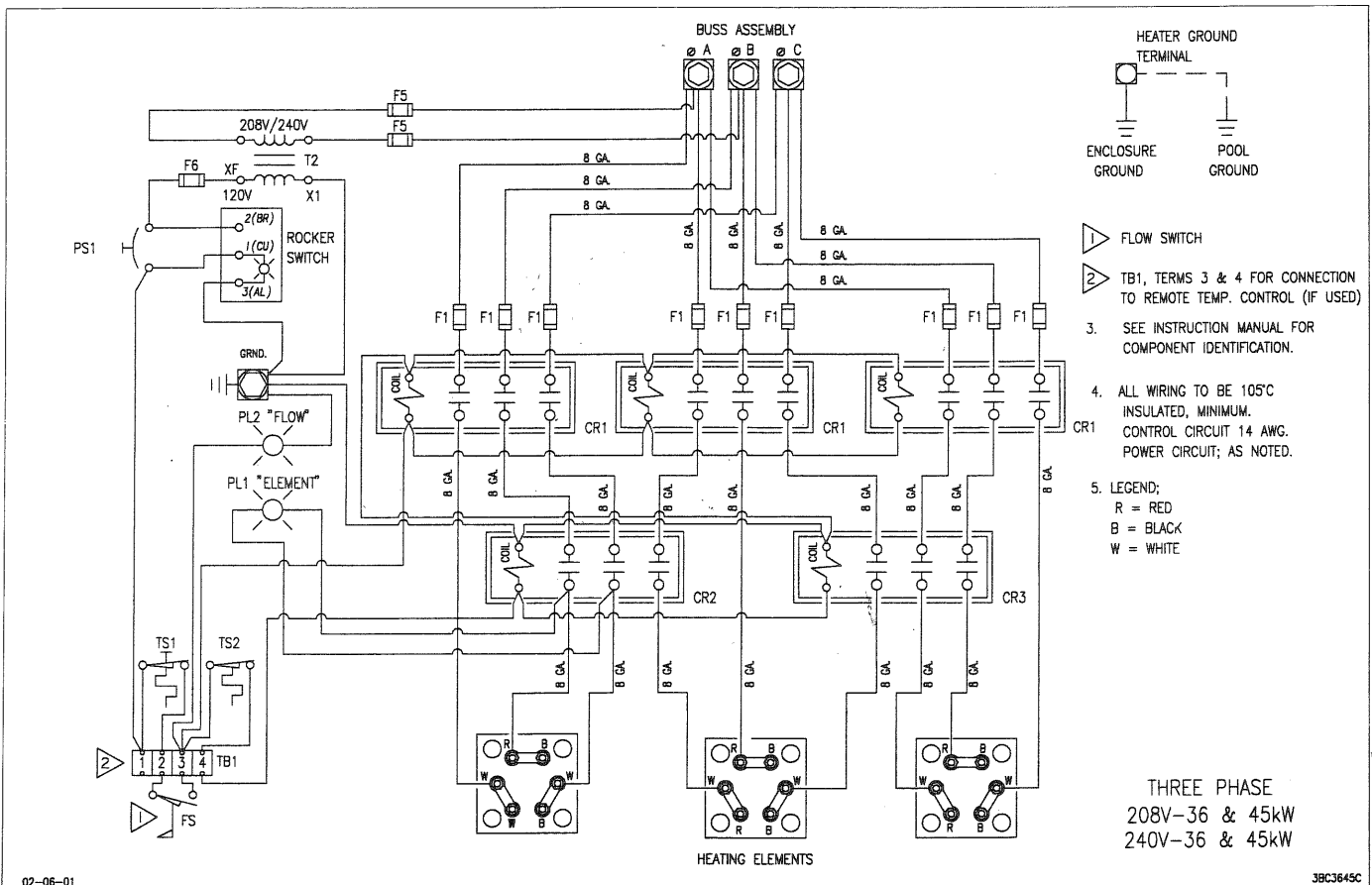
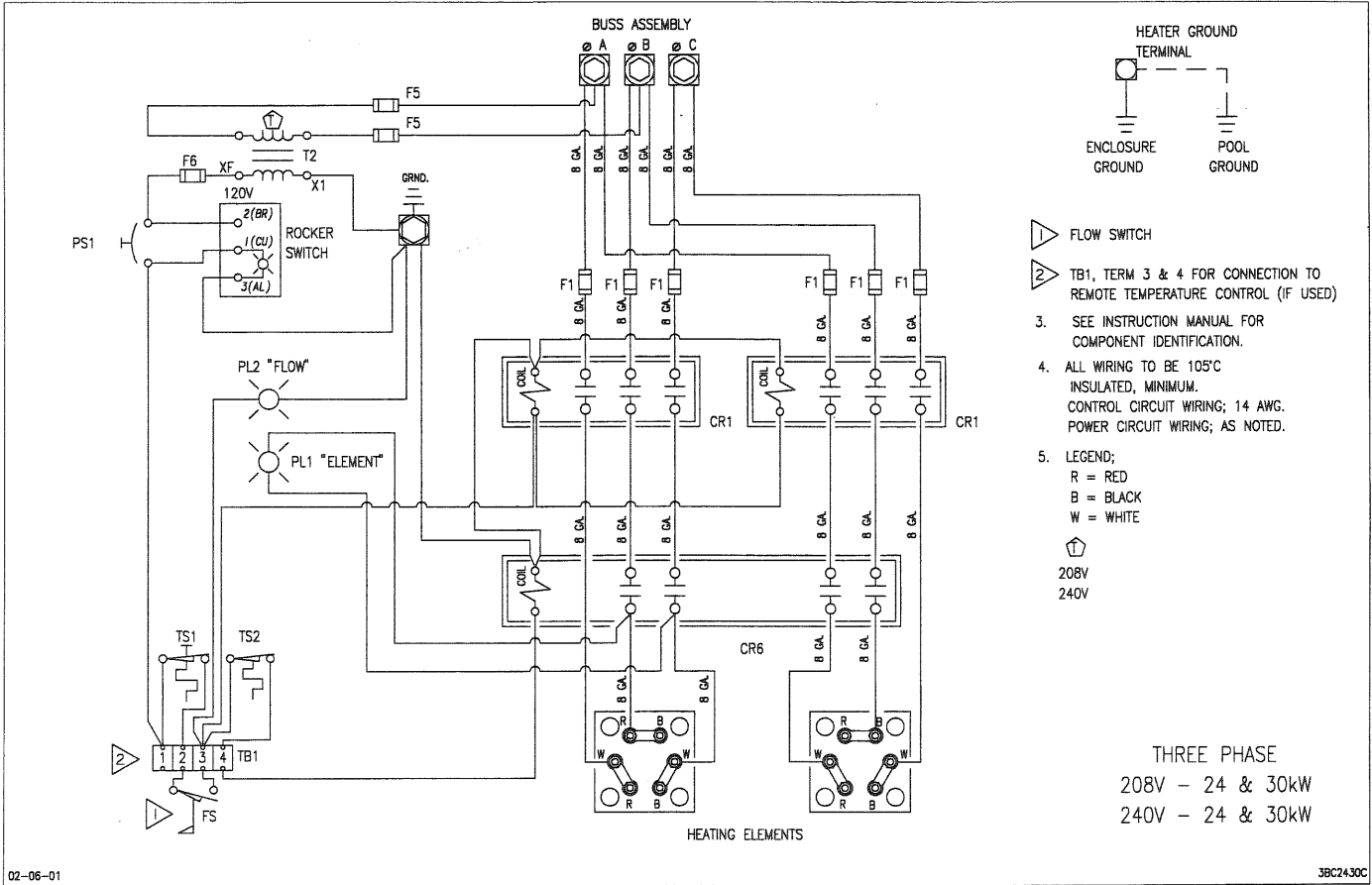
54kW; 2 ● 12kW & 2 ● 15kW  
57kW; 1 ● 12kW & 3 ● 15kW

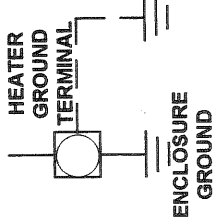
SINGLE PHASE  
208V - 54 & 57kW  
240V - 54 & 57kW

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SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT, 14 AWG. POWER CIRCUIT, 8 AWG

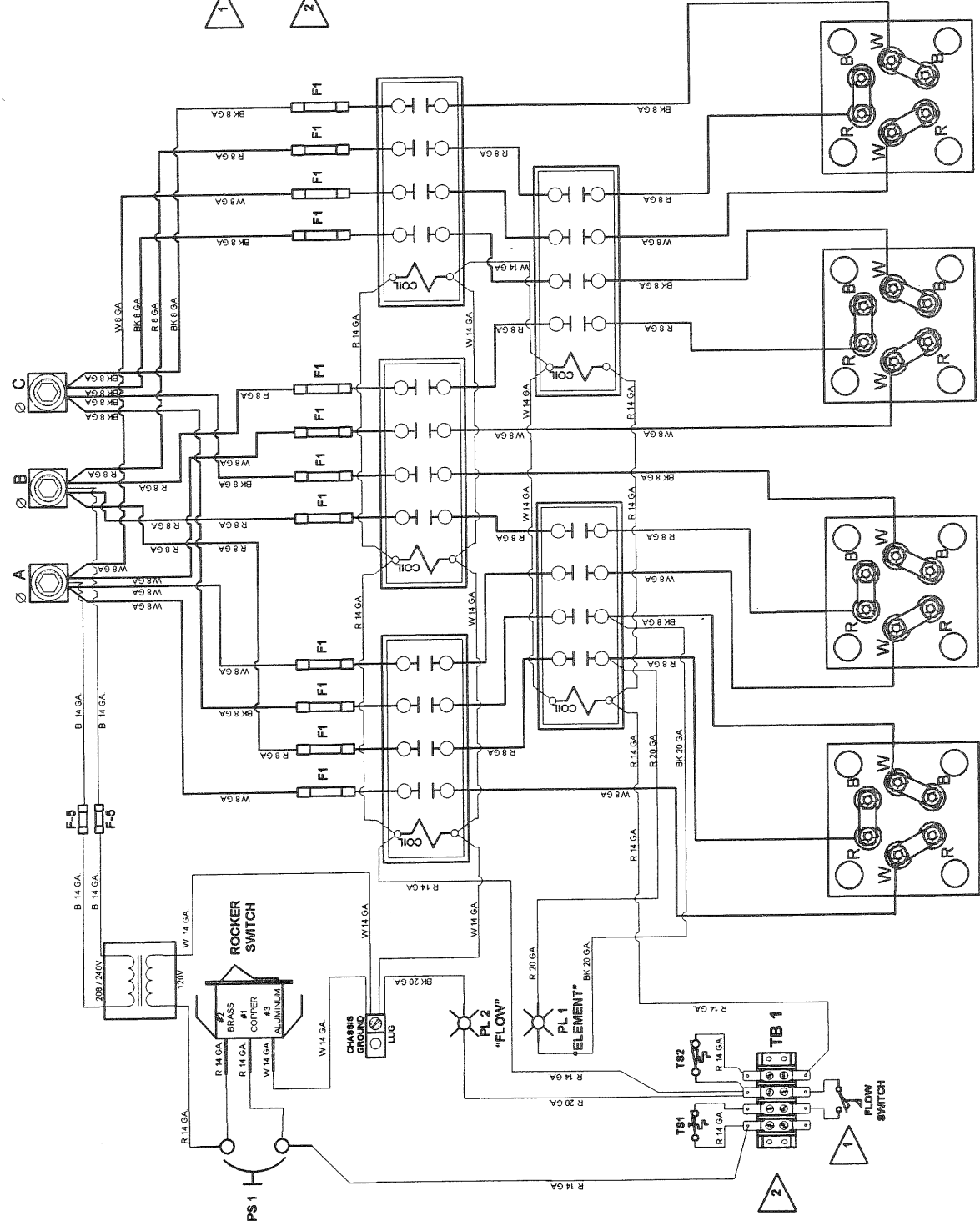
LEGEND:  
R = RED  
BK = BLACK  
W = WHITE

HEATING ELEMENTS, QTY. / RATING.  
54kW = 2 @ 12kW & 2 @ 15kW  
57kW = 1 @ 12kW & 3 @ 15kW

**MODEL PHS  
THREE PHASE  
54 & 57kW @ 208V  
54 & 57kW @ 240V**

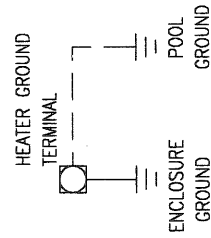
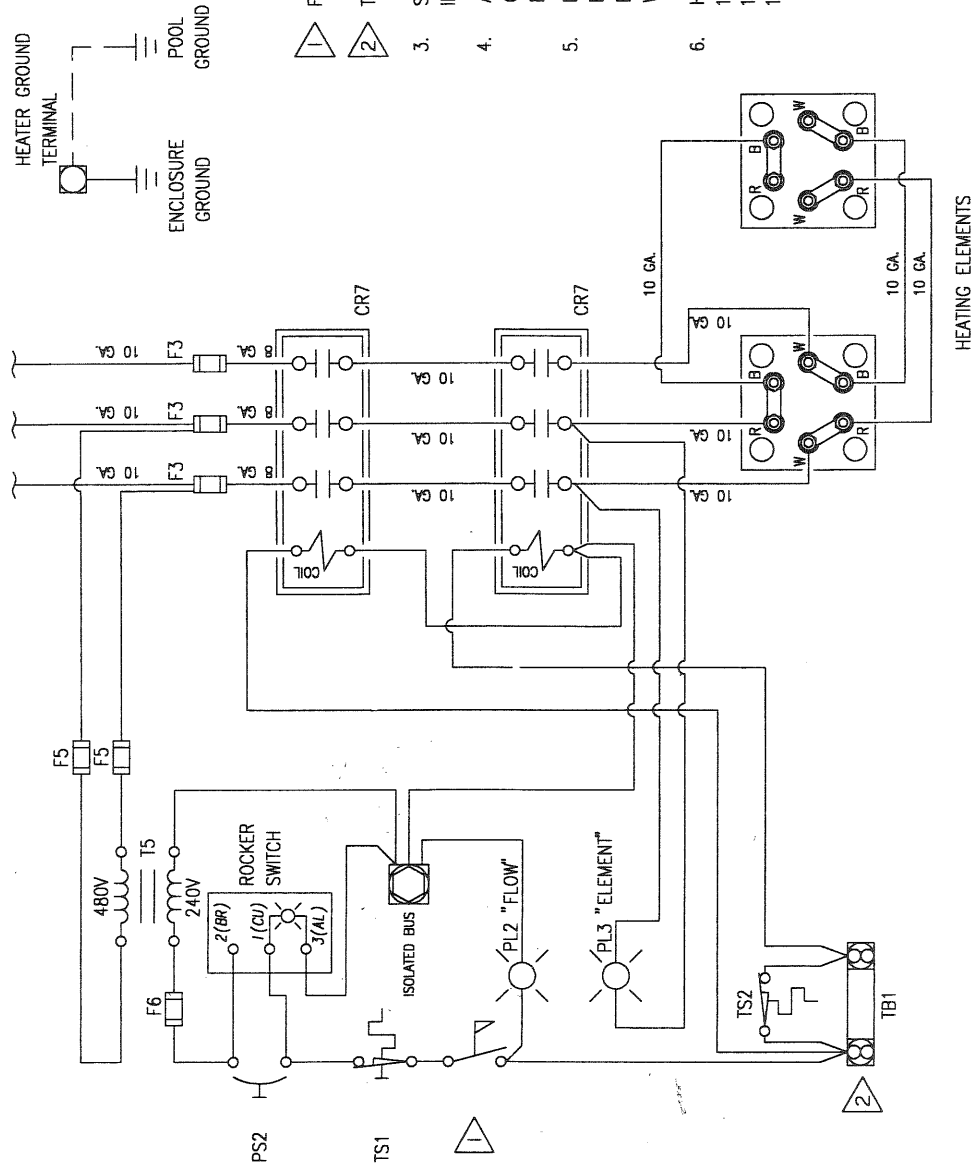
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**BUSS ASSEMBLY**



HEATING ELEMENTS

HEATING ELEMENTS



1 FLOW SWITCH

2 TBI FOR REMOTE TEMPERATURE CONTROL (IF USED).

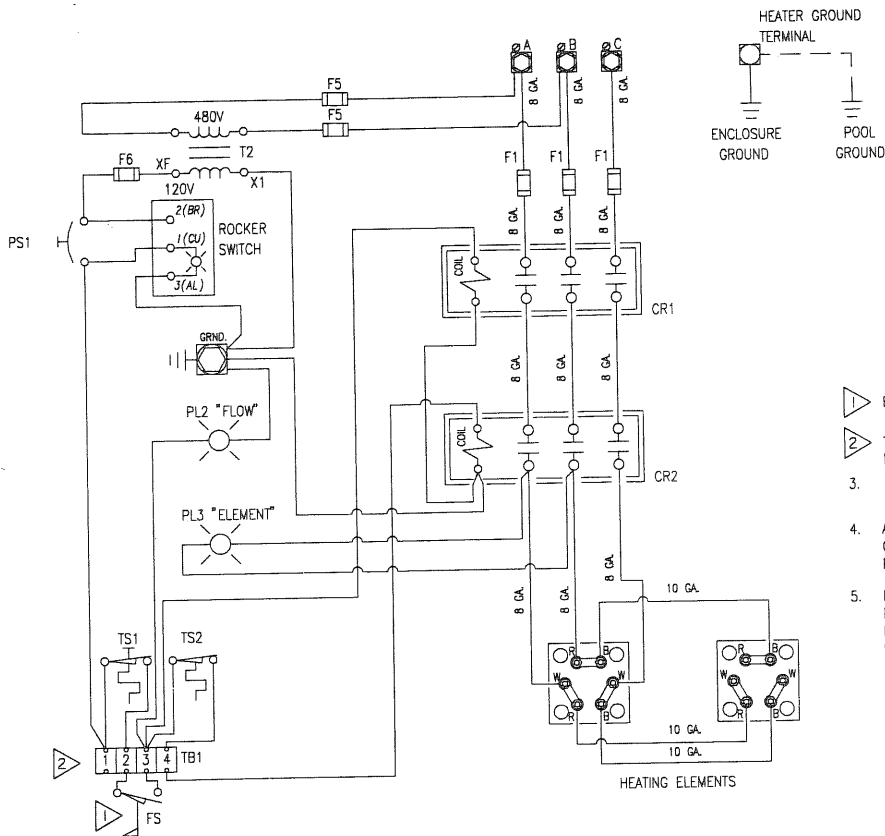
3. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

4. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.

5. LEGEND;  
R = RED  
B = BLACK  
W = WHITE

6. HEATING ELEMENT QTY/RATING;  
12kW = 2 @ 6kW  
15kW = 1 @ 6kW & 1 @ 15kW  
18kW = 2 @ 9kW

MODEL CE  
THREE PHASE  
480V - 12, 15 & 18kW

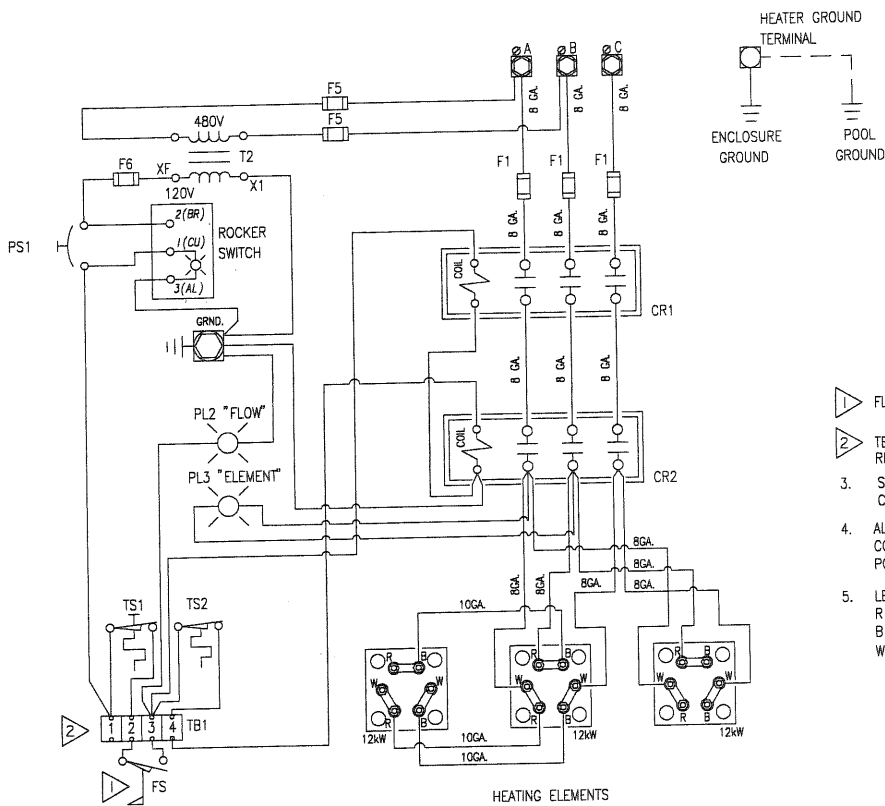


- ▷ FLOW SWITCH
- ▷ TB1, TERM 3 & 4 FOR CONNECTION TO REMOTE TEMPERATURE CONTROL (IF USED)
- 3. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
- 4. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.
- 5. LEGEND;  
R = RED  
B = BLACK  
W = WHITE

THREE PHASE  
480 VOLT  
24 & 30kW

3J2430C

02-06-01



- ▷ FLOW SWITCH
- ▷ TB1, TERM 3 & 4 FOR CONNECTION TO REMOTE TEMPERATURE CONTROL (IF USED)
- 3. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
- 4. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.
- 5. LEGEND;  
R = RED  
B = BLACK  
W = WHITE

THREE PHASE  
36kW @ 480V

3J36C

02-06-01



# LIMITED WARRANTY

The company extends this limited warranty to the original purchaser of a Coates Electric Pool 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, enclosure parts, knobs and accessories have no warranty whatsoever.

\*Exception: Factory installed heating elements are warranted for ninety 90 days from the date of heater installation, or eighteen (18) months 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 such 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 or installer.
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 THE 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.

COATES 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 OF 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.

4/03 Reprint



HEATER COMPANY, INC.

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