



POOL HEATER

with built-in flow switch

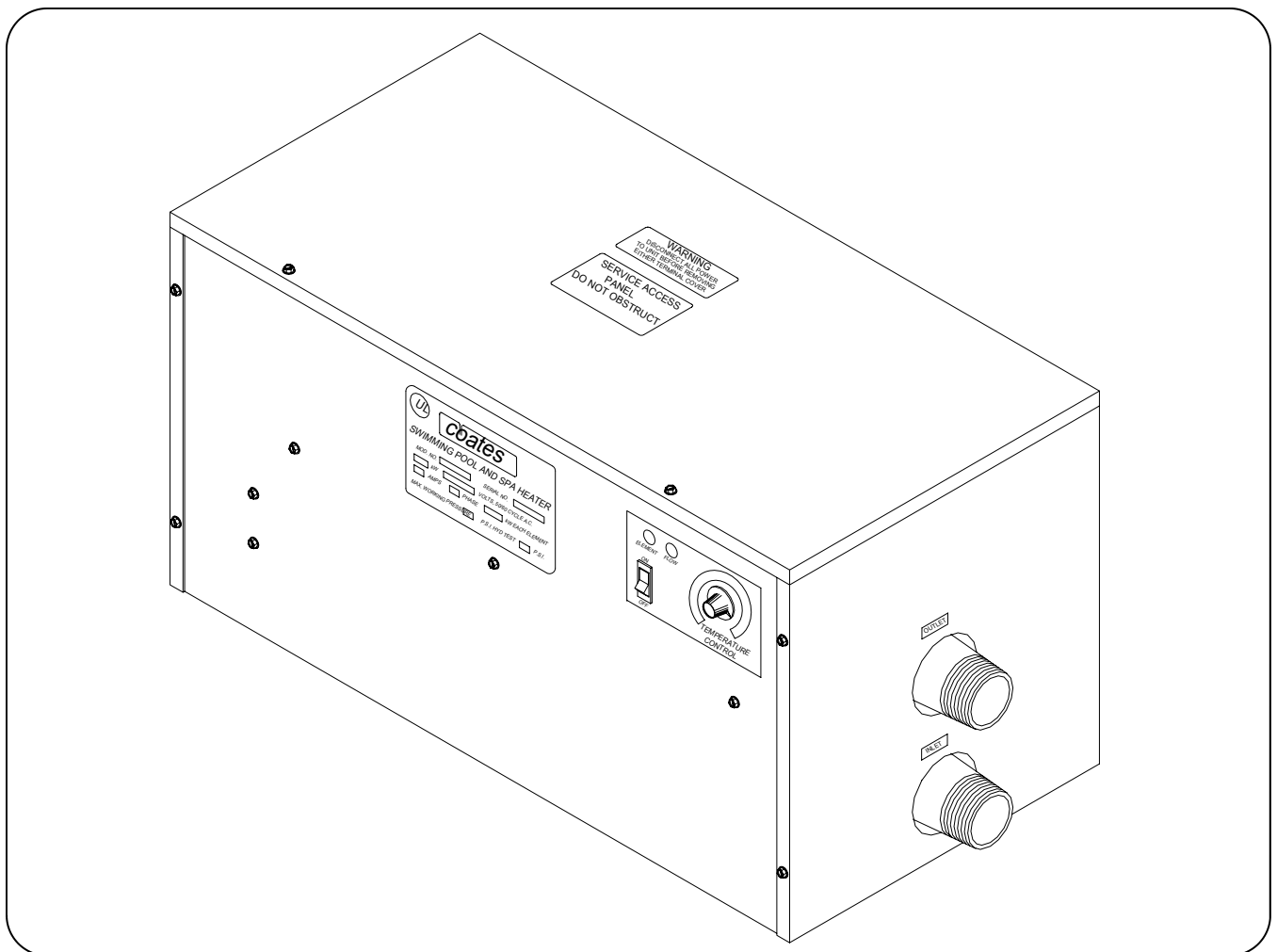
EXPORT MODELS:

32212CE-E thru 32272PHS-E

33812CE-E thru 33872PHS-E

34112CE-E thru 34172PHS-E

installation, operation and maintenance



WARNING

Only qualified personnel, as defined by National Electric 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 electrical 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, powder coat 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 2, 3 or 4 elements.

(2) **The control system;** consists of the pilot switch, high limit thermostat, flow switch, temperature control, magnetic contactors and transformer. These controls are wired into a 120V or 220V control circuit designed to control the temperature of the water leaving the heater. The high-limit thermostat is designed to open the control circuit and cut off the power in the event of excessive 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 (1.26 L/sec) or greater.

(3) **The main current-carrying components;** are the contactors. 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 heater has a temperature controller adjustable from 70°F(21°C) to 104°F(40°C) and has one manual reset type high temperature limit thermostat set at 122°F (50°C).

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.

Minimum clearance:

	PHS/CPH	CE
Front	36 (914)#	36 (914)#
Left	18 (457)	4 (102)
Right	*	4 (102)
Top	18 (457)	20 (508)
Back	6 (153)	*

* Required clearance is based on plumbing configuration used.

Refer to NEC Table 110.26 (A)(1)

- Dimensions: Inches (mm)

- Temperature control is located on the front side.

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 (50 °C).

A plumbing bypass around the pool heater is not necessary unless flow rates through the heater exceed 80 GPM (5 L/sec). A minimum flow rate of 20 GPM (1.26 L/sec) 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 placed in parallel, so that each heater takes equal flow.

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.

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 1 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 (4 mm²).

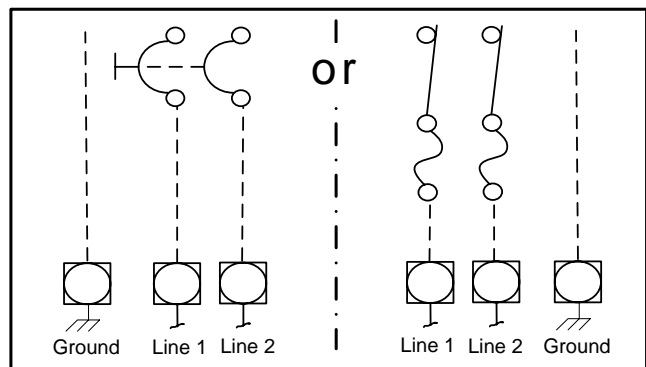
Table 1

KW	WIRE SIZE: AWG(mm ²)		
	220V/3Ø	380V/3Ø	415V/3Ø
12	8(10)	10(6)	10(6)
15	8(10)	10(6)	10(6)
18	6(16)	8(10)	8(10)
24	4(25)	8(10)	8(10)
30	3(35)	6(16)	6(16)
36	2(35)	6(16)	6(16)
45	1(50)	4(25)	4(25)
54	3/0(95)	3(35)	3(35)
57	3/0(95)	3(35)	3(35)
60	3/0(95)	2(35)	3(35)
72	4/0(120)	1(50)	2(35)

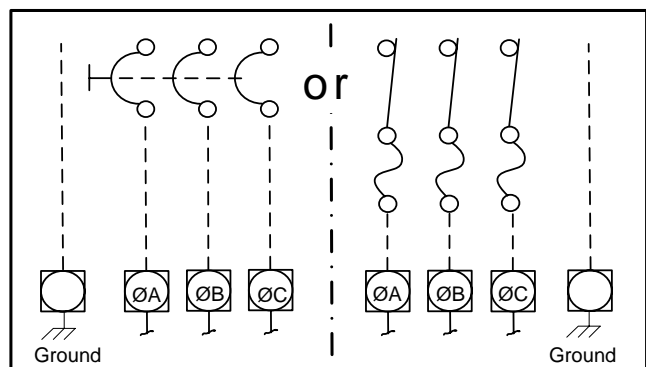
Suggested size for insulated copper conductor wires. Based on 125% correction factor for wire with 90°C insulation.

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 (Figure 1). Suggested wire sizes are shown in Table 1.



Wiring Diagram: Single-Phase Models



Wiring Diagram: Three-Phase Models

Figure 1

B. Startup Procedure:

1. Make sure that the pump is on and that there is at least 20 GPM (1.26 L/sec) flow through the pool heater. The heating elements will fail if allowed to operate dry.
2. Check temperature control setting, also, examine wiring for loose connections, etc.
3. Set temperature control to the desired temperature. Note: for each degree the temperature control setting is increased, power usage may increase up to 10%.
4. Turn on power at main disconnect switch.
5. 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 through 5. (Reinstall element with new gasket)

Semi-Annual Cleaning:

Accumulated sludge in the tank is the greatest cause of element failure. Twice yearly (before summer start-up and 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 alkalinity and calcium hardness will protect against scaling and also help to prevent corrosion.

		ACID							ALKALINE									
		CORROSIVE WATER							IDEAL RANGE	ALKALINE WATER								
HEATER CAN BE DAMAGED	0	1	2	3	4	5	6	7	7.2-7.8	8	9	10	11	12	13	14	HEATER CAN BE DAMAGED	

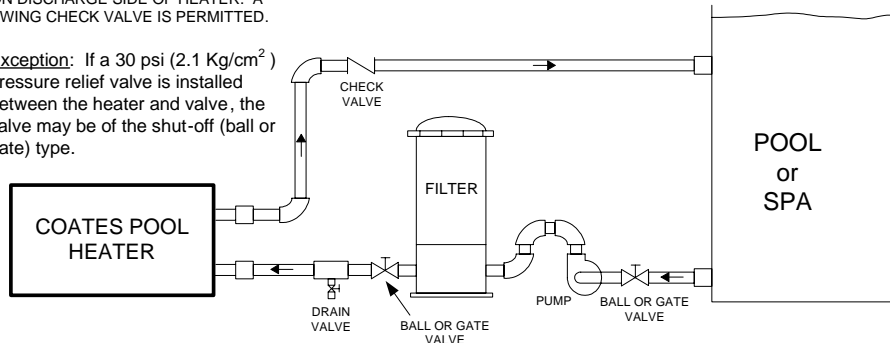
The correct level of sanitizer, pH, total alkalinity and calcium hardness will vary, depending on the type of pool (plaster, fiberglass or vinyl) and the chemical content of the fill water. Water that is out of balance can damage your pool heater and void the warranty. This heater is not for use in salt water pools.

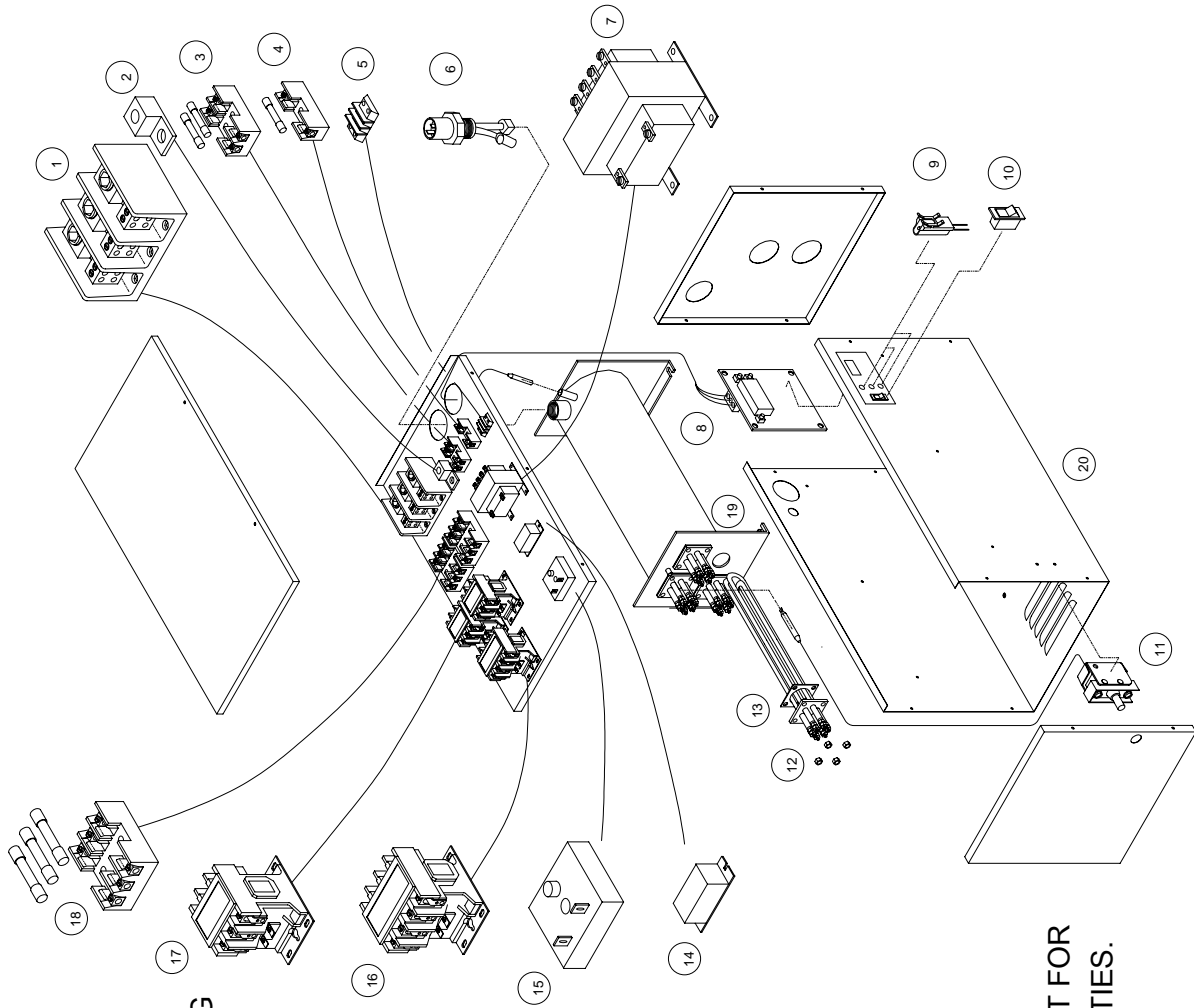
**** NOTICE ****

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

CAUTION
DO NOT INSTALL ANY SHUT-OFF VALVE ON DISCHARGE SIDE OF HEATER. A SWING CHECK VALVE IS PERMITTED.

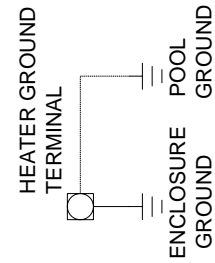
Exception: If a 30 psi (2.1 Kg/cm²) pressure relief valve is installed between the heater and valve, the valve may be of the shut-off (ball or gate) type.





1. POWER DISTRIBUTION BLOCK
2. GROUND LUG
3. CONTROL TRANSFORMER PRIMARY FUSING
4. CONTROL TRANSFORMER SECONDARY FUSING
5. EXTERNAL CONTROL CONNECTION
6. FLOW SWITCH
7. CONTROL TRANSFORMER (WHEN REQUIRED)
8. TEMPERATURE CONTROL
9. PILOT LIGHTS - ELEMENT, FLOW, RESET
10. PILOT SWITCH, LIGHTED "ON/OFF"
11. TEMPERATURE LIMIT SWITCH
12. HEATING ELEMENT
13. HEATING ELEMENT GASKET
14. FLOW RELAY
15. SEQUENCE TIMER (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.

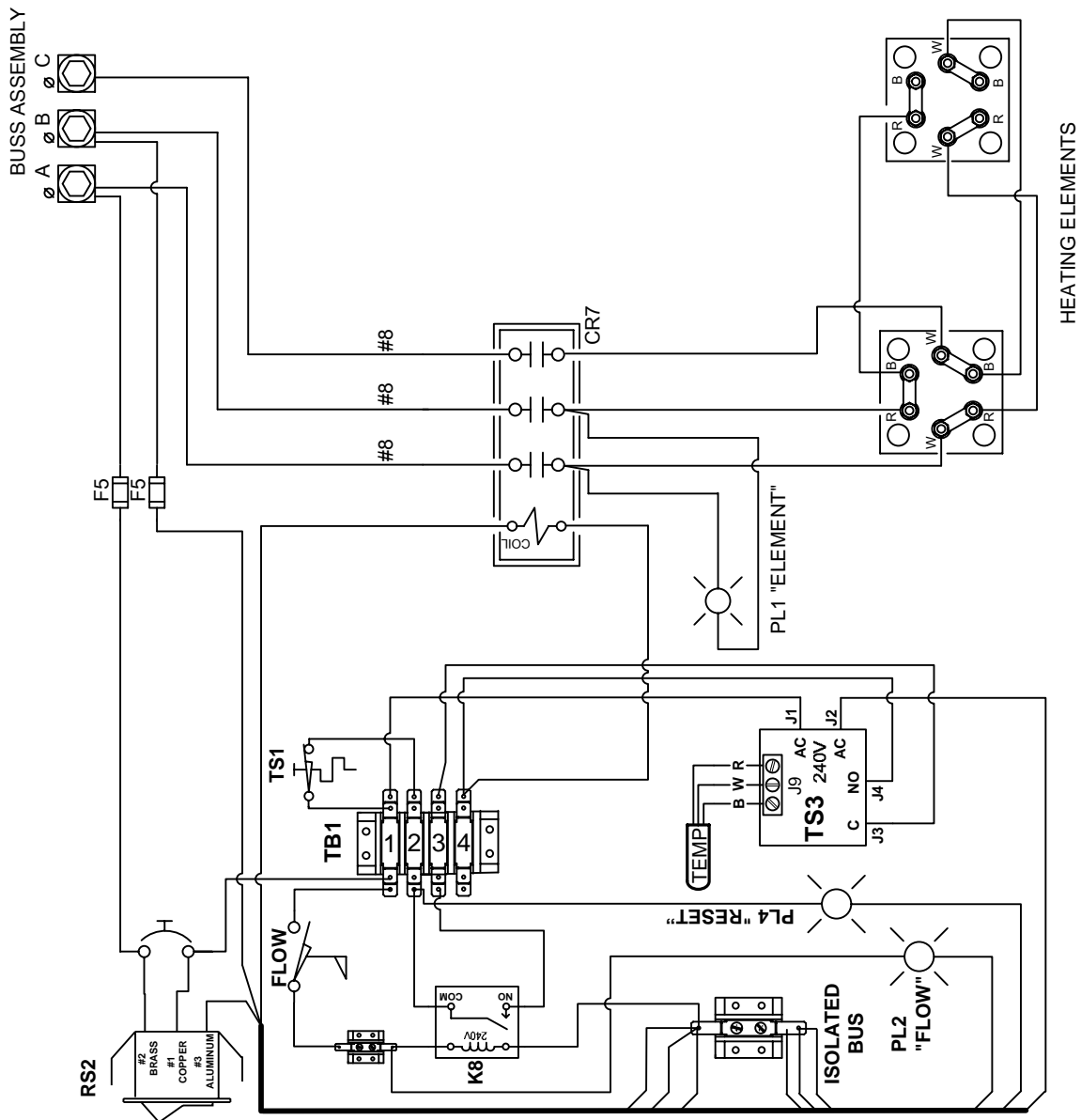


1 NOT USED

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

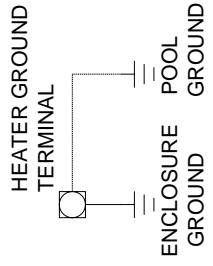
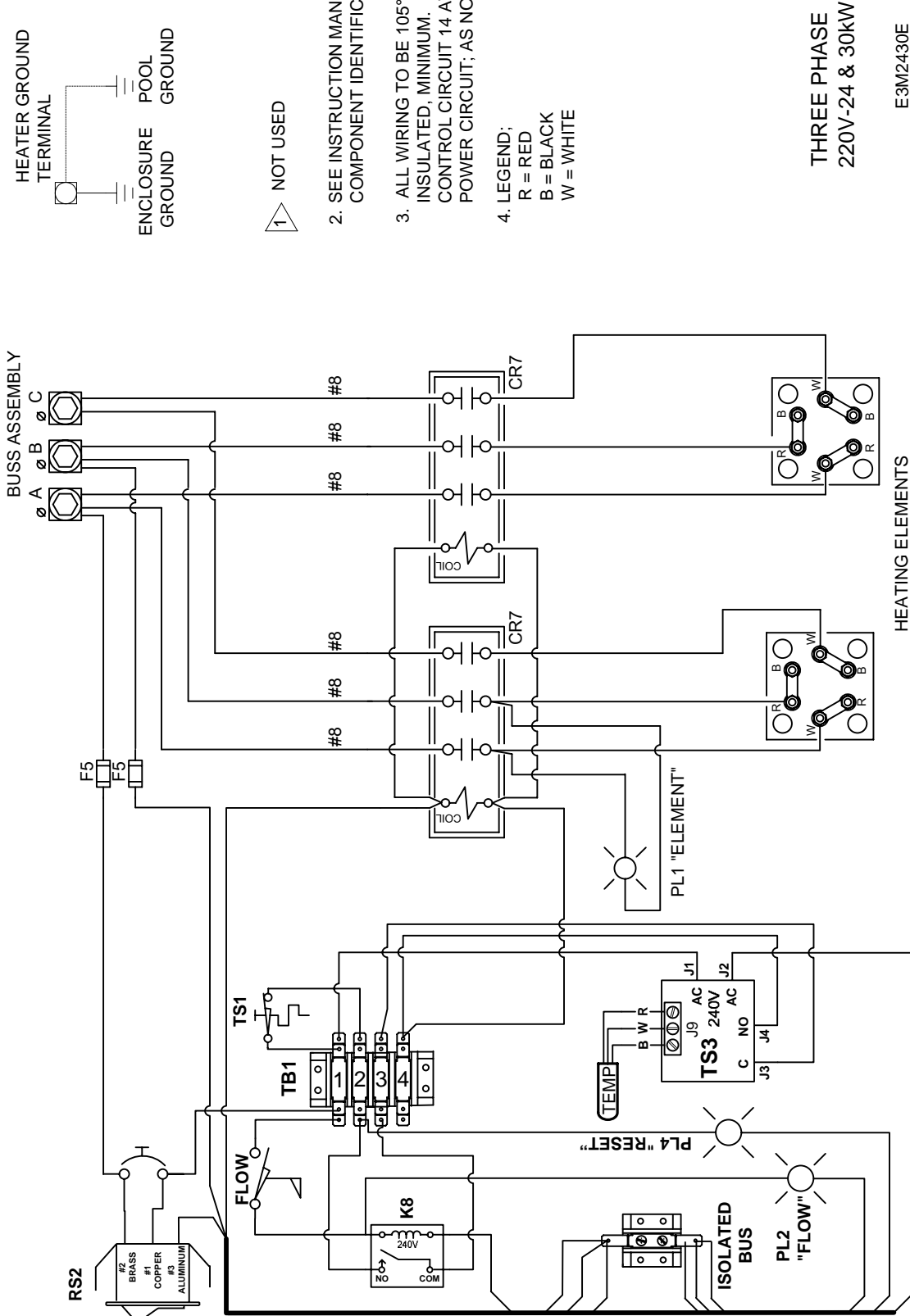
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT 14 AWG. POWER CIRCUIT; AS NOTED.

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



THREE PHASE
220V-12, 15 & 18kW

E3M1218D

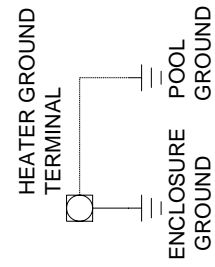


1 NOT USED

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT 14 AWG. POWER CIRCUIT; AS NOTED.
4. LEGEND:
R = RED
B = BLACK
W = WHITE

THREE PHASE
220V-24 & 30kW

E3M2430E



1 NOT USED

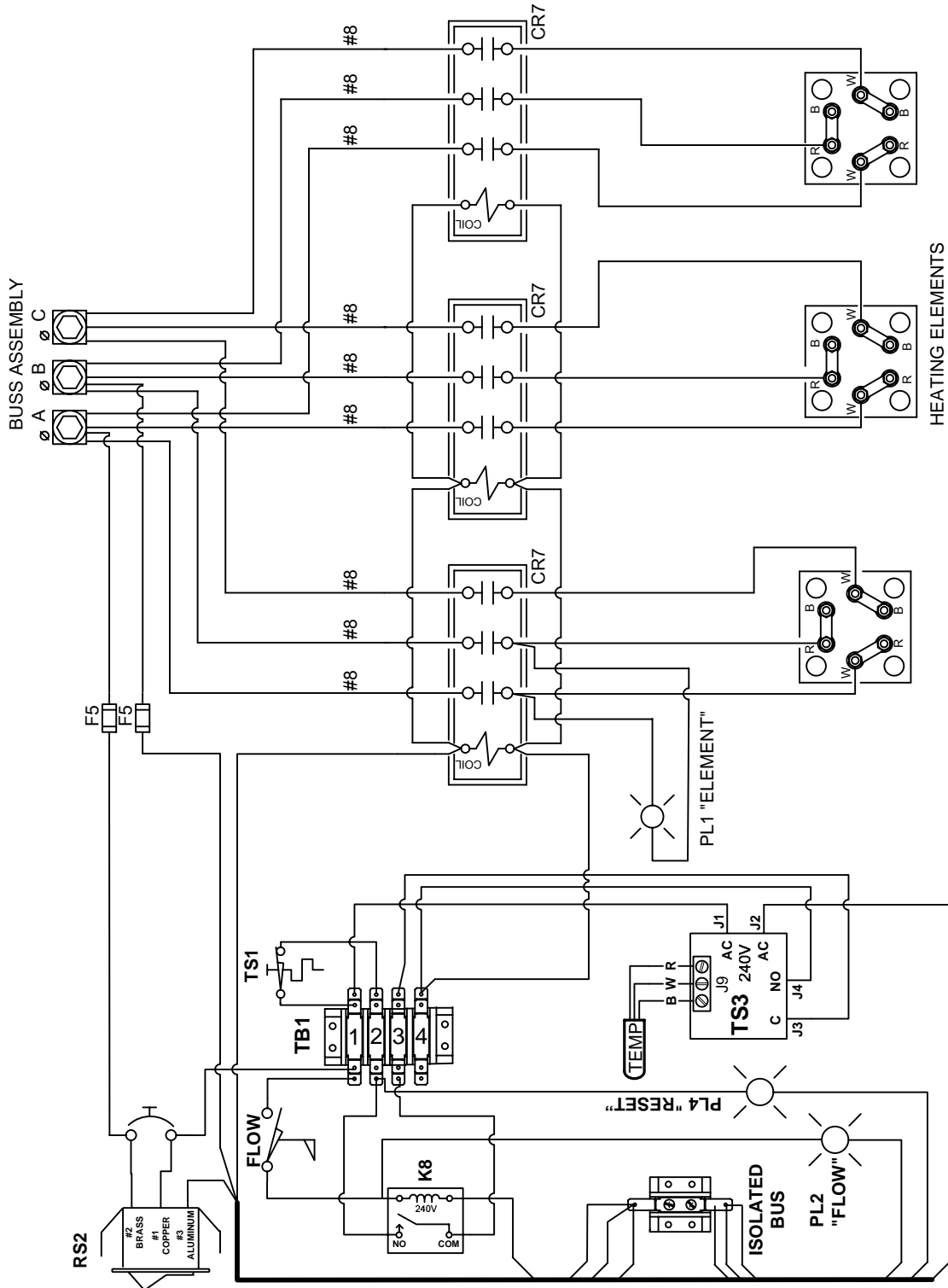
2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.

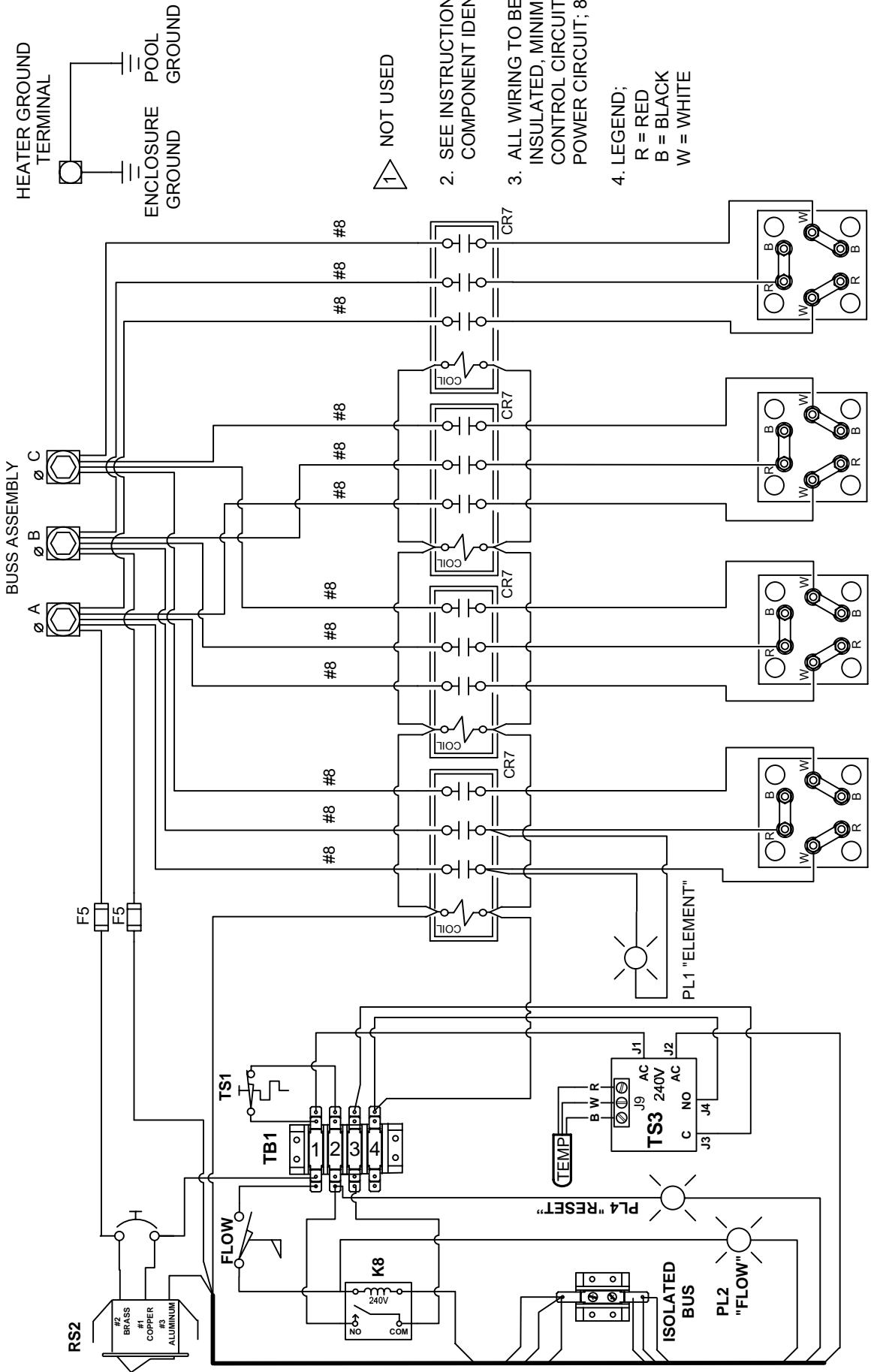
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT 14 AWG. POWER CIRCUIT; AS NOTED.

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

THREE PHASE
220V-36 & 45kW

E3M3645E





10

RS2
#2 BRASS
#1 COPPER
ALUMINUM

F5 F5

BUSS ASSEMBLY
A B C

HEATER GROUND
TERMINAL

ENCLOSURE GROUND
POOL GROUND

1 NOT USED

2. SEE INSTRUCTION MANUAL FOR
COMPONENT IDENTIFICATION.

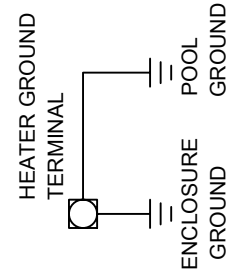
3. ALL WIRING TO BE 105°C
INSULATED, MINIMUM.
CONTROL CIRCUIT 14 AWG.
POWER CIRCUIT; 8 AWG

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

HEATING ELEMENTS

THREE PHASE
220V - 54, 57, 60 & 72 KW

E3M5472E

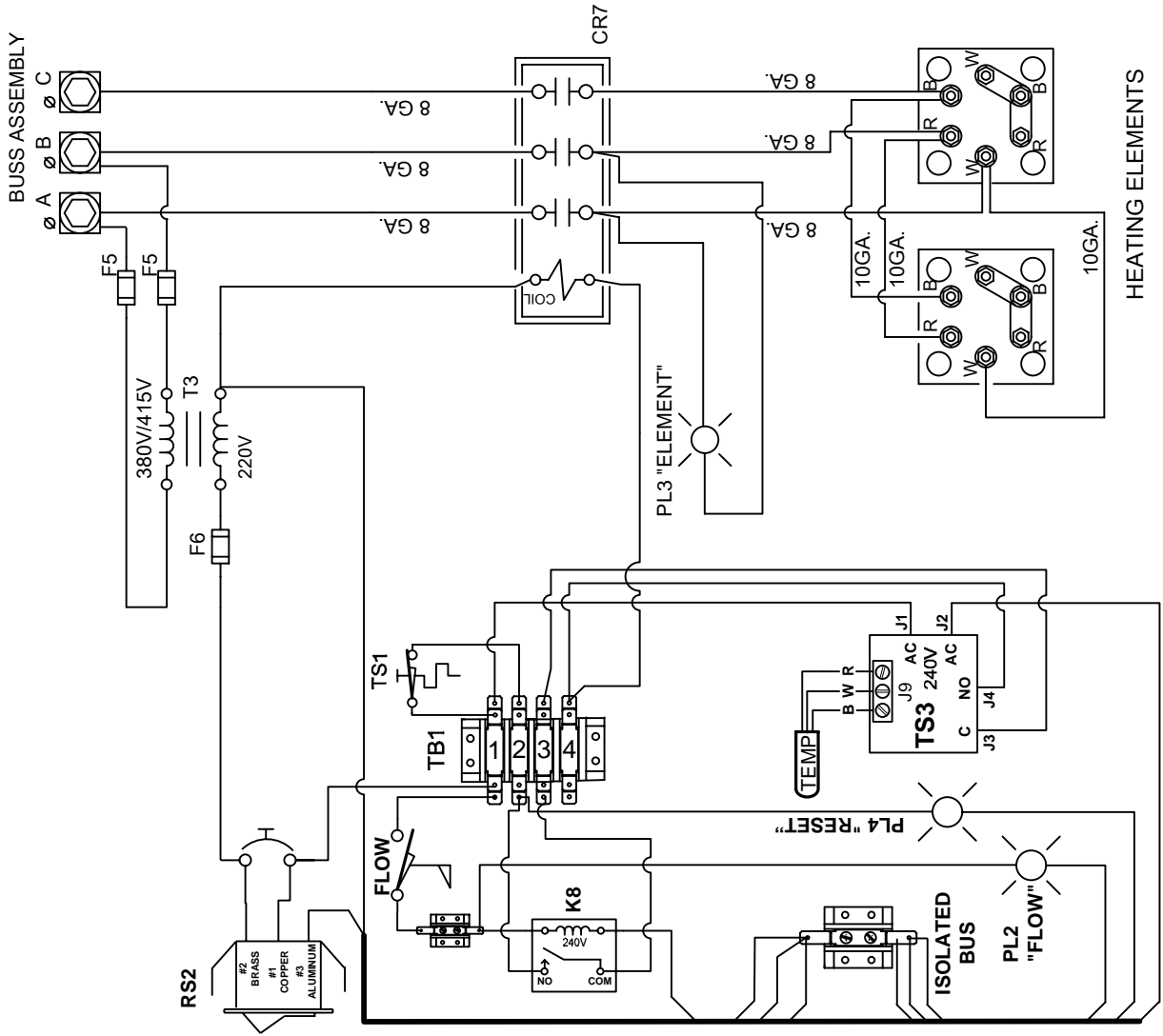


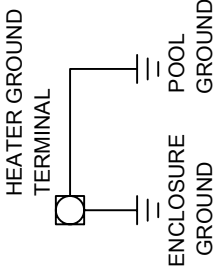
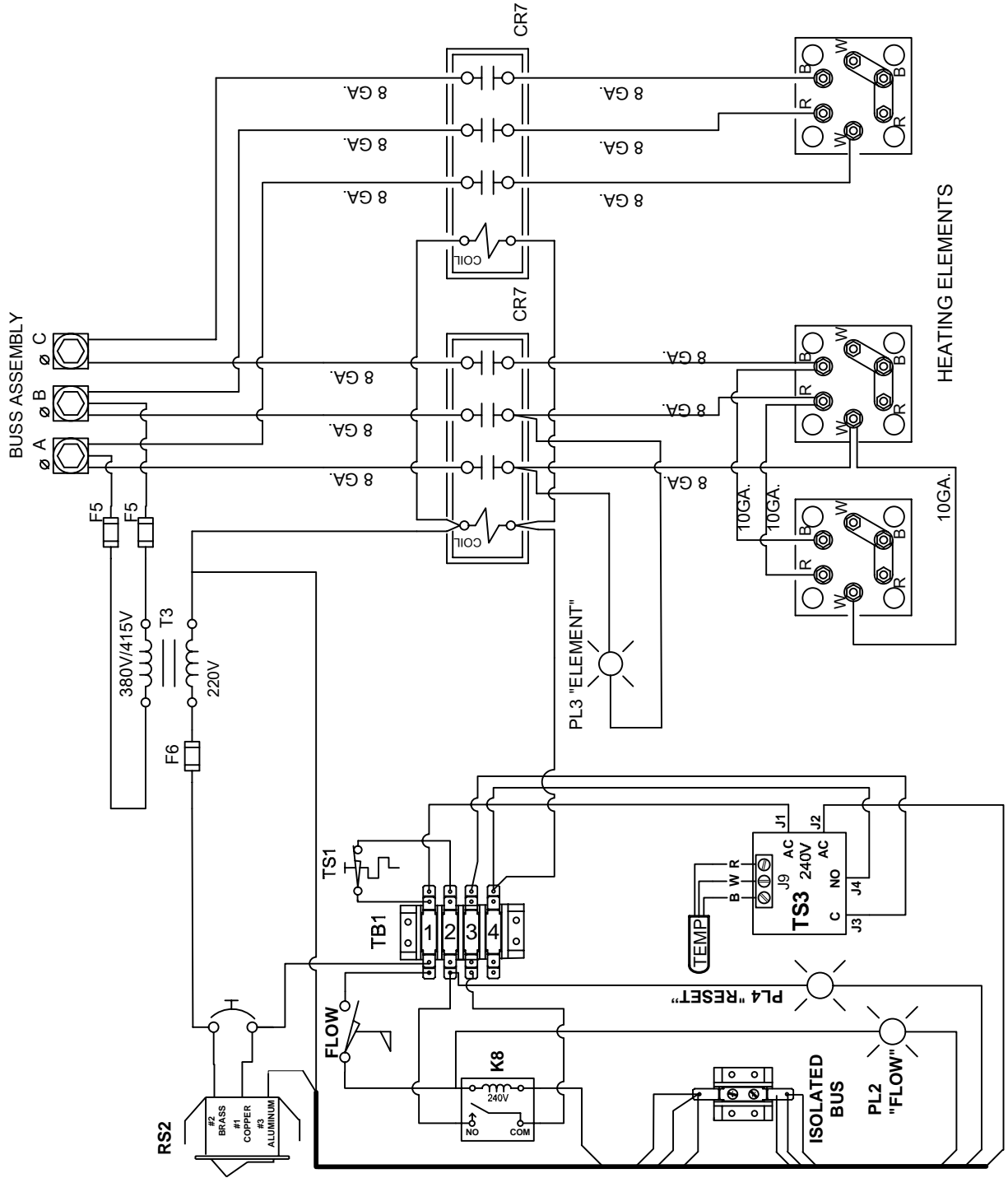
1. FLOW SWITCH

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.
4. LEGEND;
R = RED
B = BLACK
W = WHITE

THREE PHASE
380/415V – 12, 15 & 18kW
380/415V – 24 & 30kW

EEFG1218D
EEFG2430E



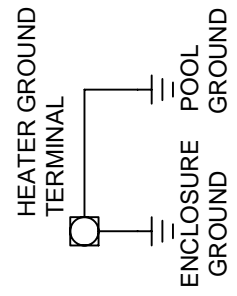


1. FLOW SWITCH

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.
4. LEGEND;
R = RED
B = BLACK
W = WHITE

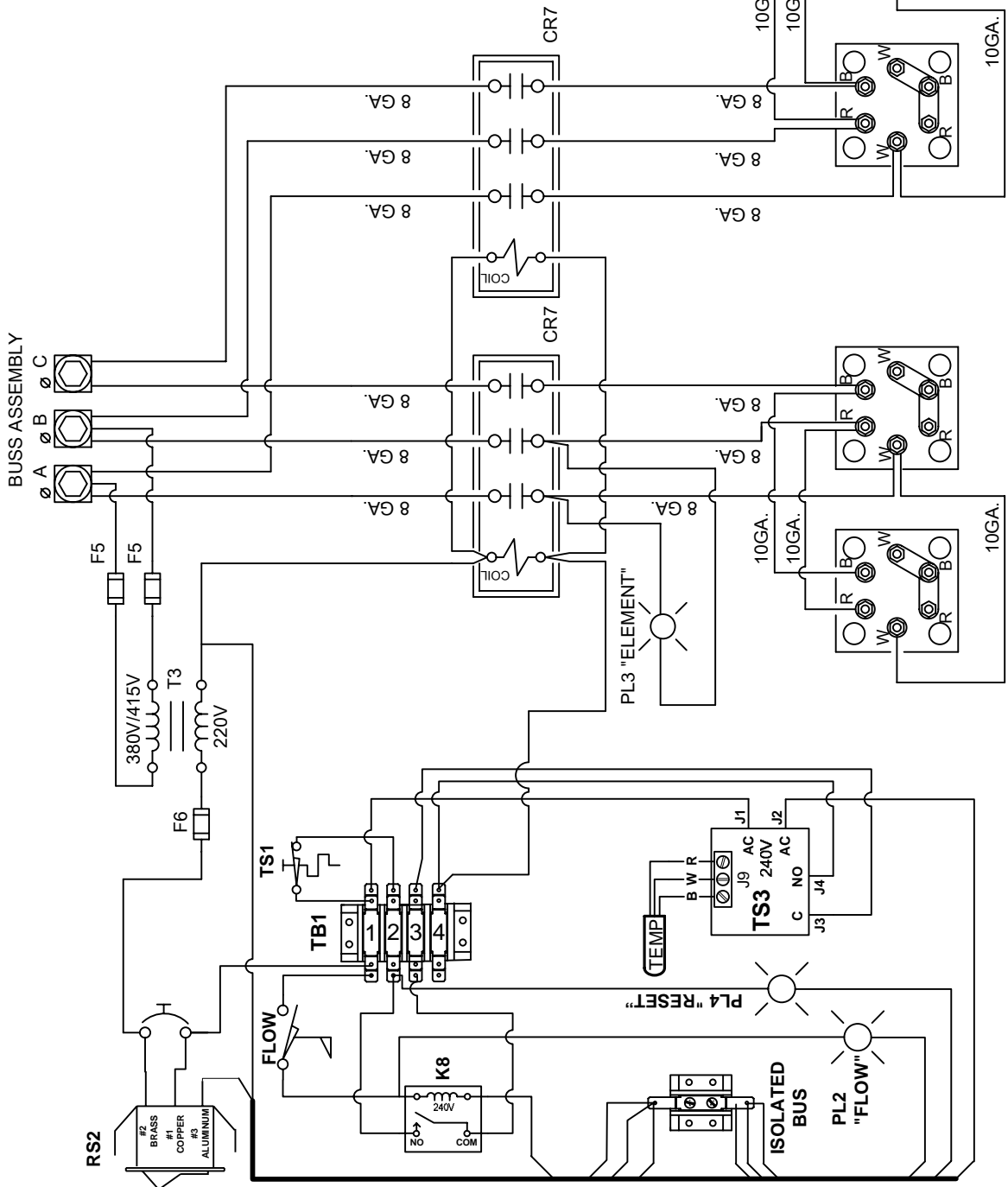
THREE PHASE
380/415V - 36 & 45kW

EEFG3645F



1 NOT USED

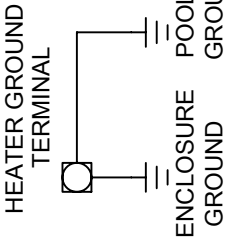
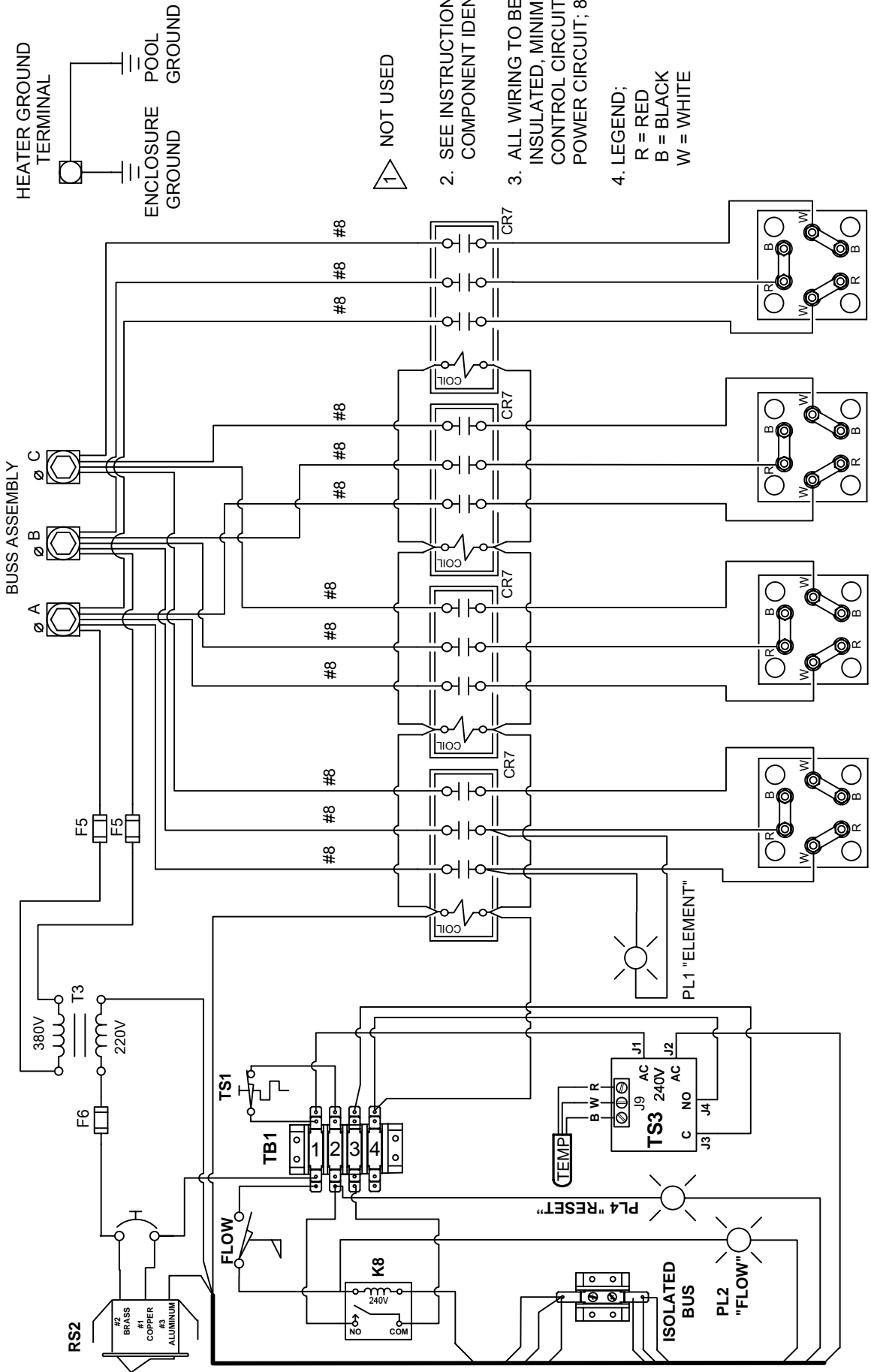
2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT WIRING; 14 AWG. POWER CIRCUIT WIRING; AS NOTED.
4. LEGEND;
R = RED
B = BLACK
W = WHITE



THREE PHASE
380/415V - 54, 57 & 60kW

HEATING ELEMENTS

EEFG5460F



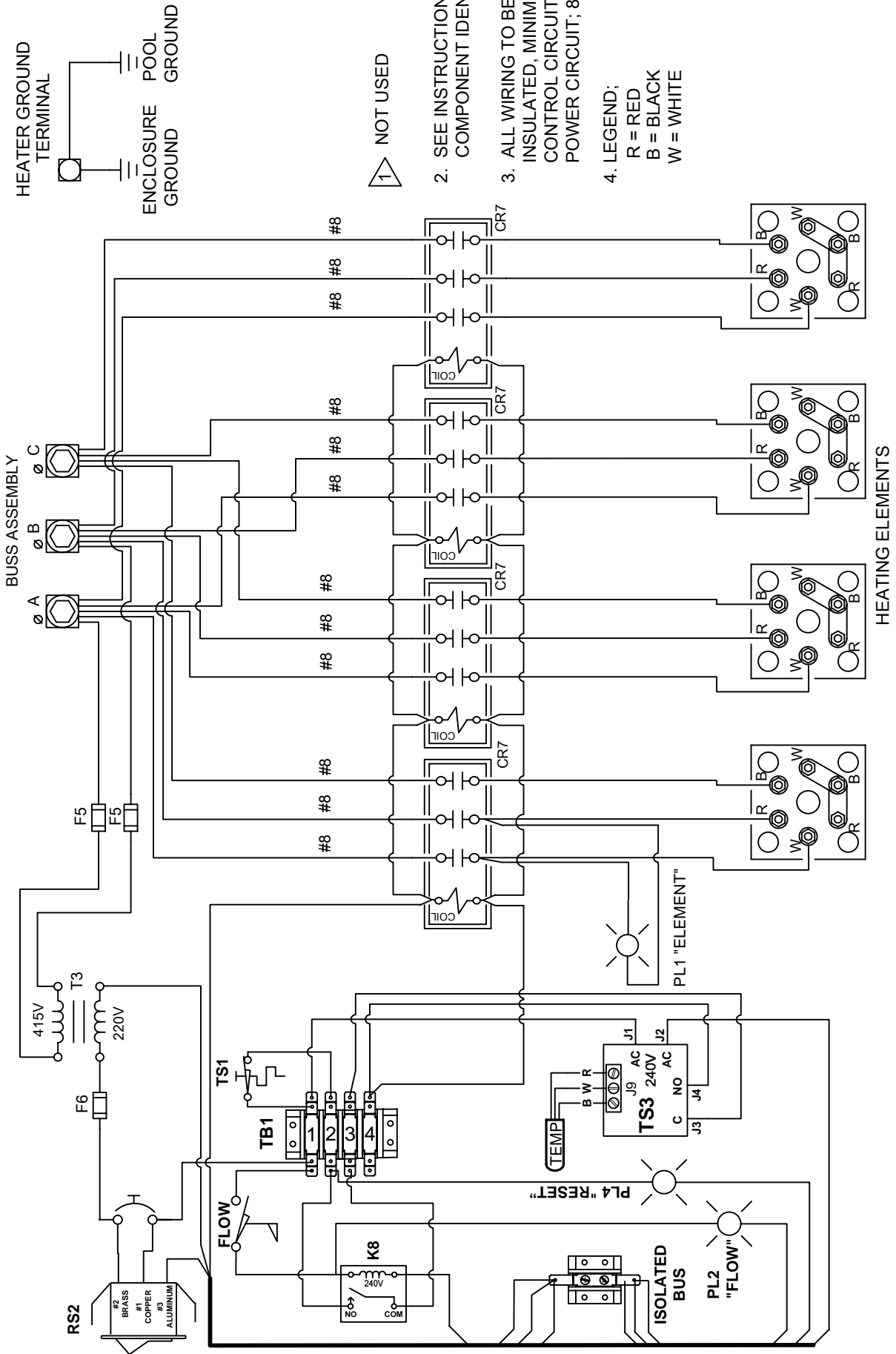
1 NOT USED

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT 14 AWG. POWER CIRCUIT; 8 AWG

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

HEATING ELEMENTS

THREE PHASE
380V - 72kW



1 NOT USED

2. SEE INSTRUCTION MANUAL FOR COMPONENT IDENTIFICATION.
3. ALL WIRING TO BE 105°C INSULATED, MINIMUM. CONTROL CIRCUIT 14 AWG. POWER CIRCUIT; 8 AWG

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

**THREE PHASE
 415V - 72kW**



HEATER CO., INC.

P.O. Box 1750
Kent, WA 98035
coatesheater.com