

FOR INSTALLATION BY QUALIFIED SERVICE PERSONNEL ONLY

# CONVERSION KIT INSTRUCTIONS

## Commercial Electric Water Heaters



125 Southeast Parkway  
Franklin, TN 37068  
1-800-433-2545  
apcom-inc.com

# FOREWORD

---

The purpose of this manual is to explain how to change the voltage and wattage of your commercial electric water heater by changing the elements. This manual is not intended to explain the rebuilding of commercial electric water heaters in the field.

Addition of heating elements or subtraction of heating elements in the field is not approved by Underwriters Laboratories, Inc., and therefore, is not allowed and should not be attempted.

Please note the limitation that “both the heater required and the heater to be converted must be found on the same page” (in this manual) must be followed. Before attempting any conversion read the detailed instructions contained on pages 8, 9, 10 and 11.

## SAFETY

Be sure to disconnect appliance from electrical supply before working on or near the electrical system of the heater. Never touch electrical components with wet hands or when standing in water.

## REQUIRED ABILITY

CONVERSION OF ANY WATER HEATER LISTED IN THIS MANUAL REQUIRES ABILITY EQUIVALENT TO THAT OF A LICENSED ELECTRICAL TRADESMAN.

# TABLE OF CONTENTS

---

	Page		Page
Foreword .....	2	KW Conversion (Element Replacement).....	4
Conversion Materials.....	2	Voltage Conversion .....	4-5
<b>Conversion Guidelines</b> .....	3	Phase Conversion .....	5-6
<b>Conversion Instructions</b>		Caution .....	6
Introduction.....	4	Final Assembly .....	6-7
Heater Preparation .....	4	Check List.....	7
		Miscellaneous Information.....	7-8

# CONVERSION MATERIALS

---

1. Screw Plug Element Remover: 1-1/2” deep well socket and ratchet.
2. Screwdrivers: Two required, one #2 phillips and one slotted screwdriver.
3. Conversion kit: Includes conversion instructions, replacement electrical elements, conversion kit label, and caution label.
4. Thread sealer: When replacing screw-in type elements, be sure to use Dow Corning® silicone sealant (bathtub sealer) on threads.

# CONVERSION GUIDELINES

---

Be sure to read and understand the conversion limitations and instructions prior to conversion.

1. No addition or subtraction of heating elements are allowed in the conversion process;
2. Conversion kits are designed for specific voltage with Delta configuration, no other configuration or voltage is allowed;
3. Refer to “Branch Circuit Section” in User’s Manual for electrical specifications;
4. Check all water and electrical connections for tightness after conversion.

## TO USE THE TABLE:

1. Find the element number of the heater that you wish to convert.
2. Find the total kilowattage under “Desired Input” column, then move across the Table on same line to voltage desired. The kit number required for the conversion will be the one where the desired KW row intersects the voltage column.
3. Order the appropriate kit number.
4. Follow the conversion instructions detailed on pages 4 through 8 to complete conversion.
5. Fill out the check list on Page 7 after completing the unit conversion.

**CONVERSION KIT NUMBER TABLE**

Models Allowed For Conversion	Desired Input		Conversion Kit No. At Desired Voltage			
	Total KW	Element KW	208V	240V	277V	480V
models with 3 Elements	6	2	100109160	100109173	100109693	100109188
	9	3	100109161	100109174	100109694**	100109189
	12	4	100109162	100109175	100109695	100109190
	13.5	4.5	100109158	100109170	100109696**	100109185
	15	5	100109159	100109171	100109697**	100109186
	18	6	N/A	100109172	100109698	100109187
models with 6 Elements	18	3	100109165	100109179	100109699**	100109194
	24	4	100109166	100109180	100109700	100109195
	27	4.5	100109163	100109176	100109701**	100109191
	30	5	100109164	100109177	100109702**	100109192
	36	6	N/A	100109178	100109703	100109193
models with 9 Elements*	36	4	100109169	100109184	100109704	100109199
	40.5	4.5	100109167	100109181	100109705**	100109196
	45	5	100109168	100109182	100109706**	100109197
	54	6	N/A	100109183	100109707	100109198

\* No conversion kits available for 50 gallon capacity 9 element models equipped with surface-mounted thermostat.

\*\* Indicates the conversion kit with Incoloy Elements.

# CONVERSION INSTRUCTIONS

## REQUIRED ABILITY

CONVERSION OF ANY WATER HEATER LISTED IN THIS MANUAL REQUIRES ABILITY EQUIVALENT TO THAT OF A LICENSED ELECTRICAL TRADESMAN

### I. INTRODUCTION

Satisfying a customer order for a commercial electric heater from inventory may require modification to the KW input, the voltage, or the phase. Conversions may involve revision to 1, 2, or all 3 of these electrical characteristics.

### II. HEATER PREPARATION

The heater should be placed in a well lit area. Complete removal of the shipping crate is not required. The front of the heater with the control box will be visible through the clear plastic. Cut a 3-sided flap into the plastic, cut should be on top, bottom and right side approximately 4" from the wooden edge.

Release the two control panel screws and unlatch with knob on the water heater door.

To expose elements, remove the foam door covering directly in back of the control panel door.

Remove the T & P valve (separate package).

### III. KW CONVERSION (ELEMENT REPLACEMENT)

- A. Remove wires from one element at a time. It is not necessary to tag loose wires as the wiring schematic is inside the control panel door.
- B. Remove element from heater using a 1-1/2" deep well socket and ratchet. Return the elements to appropriate storage bin.
- C. Open the appropriate conversion kit and remove the elements. Check each element to ensure correct voltage and wattage.
- D. Install the new element, starting it by hand. A new "O" ring gasket should be installed on each element. Element threads should be lubricated with Dow Corning® silicon sealant (or equal). Screw element into fitting until it seats. Tighten 1/2 to 3/4 turn with wrench.
- E. Rewire the element as directed on wiring schematic, located inside control panel door. Screw terminals must be snug, however, caution must be exercised. Overtightening may break the terminal block, requiring replacement of the element.
- F. Repeat steps A thru E for all other elements being replaced.

### IV. VOLTAGE CONVERSION

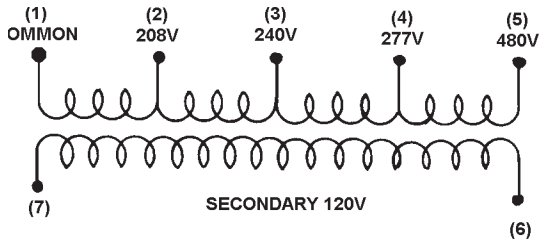
- A. Surface thermostat models merely require installation of the appropriate elements to accomplish a change in voltage. See KW conversion step III.
- B. Immersion thermostat models require installation of the appropriate elements AND may also require a transformer tap change. Immersion thermostat models are equipped with a transformer having 5 connections: common, 208, 240, 277 and 408 and 2 secondary connections. See the following diagrams.

Only one wire need be changed on the transformer to change voltage. Remove the wire from the terminal marked 208, 240, 277 or 480 and attach it to the appropriate terminal marked 208, 240, 277 or 480.

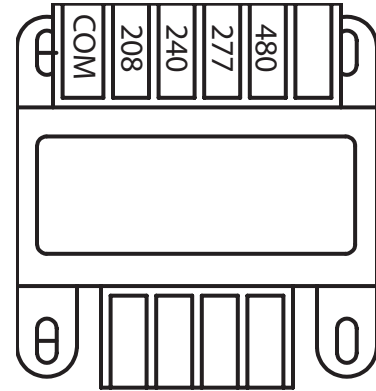
- C. Do not change the common connections or the secondary wire connections.

**IMMERSION THERMOSTAT MODEL TRANSFORMER  
CONNECTION TABLES**

Volts	Line On	Load on
208	Common & 208	Secondary 120V
240	Common & 240	
277	Common & 277	
480	Common & 480	



**IMMERSION THERMOSTAT MODEL TRANSFORMER**

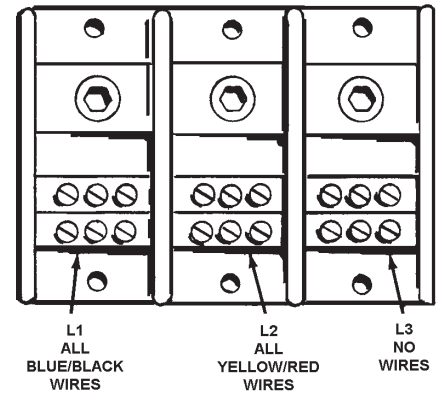


**V. PHASE CONVERSION**

**A. IMMERSION THERMOSTAT MODEL  
THREE PHASE TO SINGLE PHASE**

1. Disconnect blue wires and yellow wires from terminal L-3.
2. Connect all blue wires to terminal L-1 (with black wires).
3. Connect all yellow wires to terminal L-2 (with red wires).
4. Incoming power will be connected to terminals L-1 and L-2 at job site.

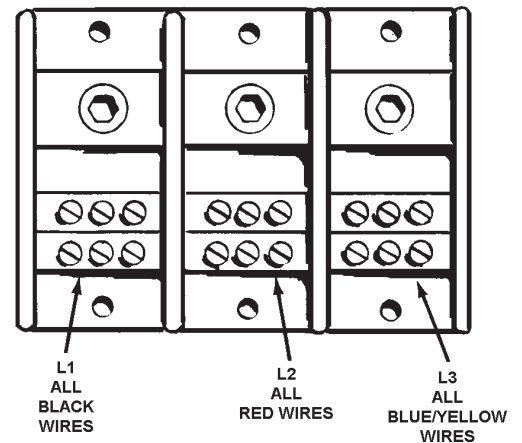
**IMMERSION THERMOSTAT MODEL  
SINGLE PHASE TERMINAL BLOCK**



**B. IMMERSION THERMOSTAT MODEL  
SINGLE PHASE TO THREE PHASE**

1. Disconnect blue wires from terminal L-1.
2. Disconnect yellow wires from terminal L-2.
3. Connect all blue wires and yellow wires to terminal L-3.
4. Incoming power will be connected to terminals L-1, L-2 and L-3 at job site.

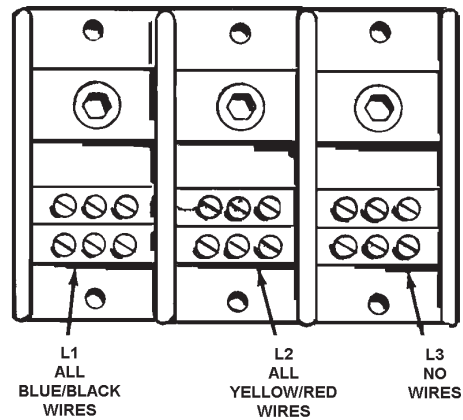
**IMMERSION THERMOSTAT MODEL  
THREE PHASE TERMINAL BLOCK**



**C. SURFACE THERMOSTAT MODEL  
THREE PHASE TO SINGLE PHASE**

1. Disconnect blue wires from terminal L-2.
2. Connect all blue wires to terminal L-1 (with black wires).
3. Disconnect all red wires from terminal L-3.
4. Connect all red wires to terminal L-2 (with yellow wires).
5. Incoming power will be connected to terminals L-1 and L-2 at job site.

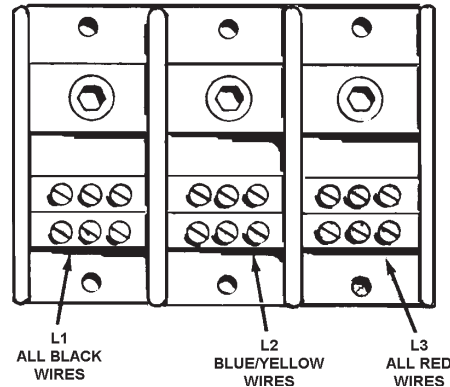
**SURFACE THERMOSTAT MODEL  
SINGLE PHASE TERMINAL BLOCK**



**D. SURFACE THERMOSTAT MODEL  
SINGLE PHASE TO THREE PHASE**

1. Disconnect blue wires from terminal L-1
2. Disconnect red wires from terminal L-2.
3. Connect all blue wires to terminal L-2 (with yellow wires).
4. Connect red wires to terminal L-3.
5. Incoming power will be connected to terminals L-1, L-2 and L-3 at job site.

**SURFACE THERMOSTAT MODEL  
THREE PHASE TERMINAL BLOCK**



**VI. ⚠ CAUTION**

Recheck all terminals for tightness, proper wiring per schematic, and neatness of wiring, Heater should be no less than factory constructed quality and appearance.

**CHECK ALL WATER AND ELECTRICAL CONNECTIONS FOR TIGHTNESS**



**VII. FINAL ASSEMBLY**

**A. CONTROL PANEL**

Replace foam door. Cover all elements and thermostats as originally constructed. Replace T & P valve package, close door, relatch and tighten the two control panel screws.

**B. RATING PLATE MODIFICATION**

Following is a sample of the standard rating plate supplied on the front of the control panel door.



		<b>COMMERCIAL STORAGE TANK WATER HEATER</b>				
MODEL NUMBER		SERIAL NUMBER		ITEM ID / PART NUMBER		
PHASE	VOLTS - AC	No. OF ELEMENTS	WATTS EACH	WATTS TOTAL	CITY OF NEW YORK DEPT. OF BUILDINGS MEA	
CAPACITY US GAL RATED	STANDBY LOSS MEASURED	STANDBY LOSS %	MAX WORKING WATTS	MAX WORKING PRESSURE		

**SAMPLE RATING PLATE**

The voltage, element KW, total KW data of the rating plate must be modified by covering them with the label provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

A/C VOLTS [ ]	KW EACH [ ]
NO. ELEMENTS [ ]	KIT NO. [ ]
TOTAL KW [ ]	

Peel off the back of the label and paste over the existing rating plate as shown below.

	<b>COMMERCIAL STORAGE TANK WATER HEATER</b>	
LISTED 22U1		ANSI / NSF-5
MODEL NUMBER	SERIAL NUMBER	ITEM ID / PART NUMBER
[ ]	[ ]	[ ]
A/C VOLTS [ ]	KW EACH [ ]	CITY OF NEW YORK DEPT. OF BUILDINGS MEA
NO. ELEMENTS [ ]	KIT NO. [ ]	
TOTAL KW [ ]		
CAPACITY US GAL RATED	STANDBY LOSS % WATTS	MAX WORKING PRESSURE
[ ]	[ ]	[ ]

**SAMPLE RATING PLATE WITH CONVERSION LABEL**

C. Peel off back of caution label and attach label to upper right hand corner of control panel door.

**D. CRATE IDENTIFICATION**

Using a black magic marker, cross out heater identification on crate as appropriate. In bold letters, write new electrical specifications in crate, matching those on the revised rating plate.

**E. SHIPPING CRATE**

Close and tape the plastic flap on front of crate.

**CHECK LIST**

- All affected parts have been installed properly and have been checked for tightness.
- All affected wires have been checked for tightness.
- New elements have been wired per wiring diagram label on the unit.
- New elements have been tightened properly.
- New elements have been leak checked.
- New rating plate overlay has been installed properly over the existing rating plate.

**VIII. MISCELLANEOUS INFORMATION.**

**A. NON STANDARD CONSTRUCTION**

At 480 and 240 volts, 18KW is normally supplied using three 6,000 watt elements. They can however, be constructed using six 3,000 watt elements.

At 480 volts and 240 volts, 36KW is normally supplied using six 6,000 watt elements. It can however, be supplied using nine 4,000 watt elements.



**B. ELEMENT SIZE VERIFICATION**

All elements are marked with both wattage and voltage. Verification can be made by measuring the ohms resistance across the terminals of the elements. Element must be disconnected from the circuit. The following table gives resistance in ohms for all elements used in commercial electric water heaters.

**OHMS RESISTANCE TABLE**

WATTAGE	VOLTAGE		
	208	240	480
2000	21.63	28.80	115.20
3000	14.42	19.20	76.80
4000	10.82	14.40	57.60
4500	9.61	12.80	51.20
5000	8.65	11.52	46.08
6000	7.21	9.60	38.40

Element ohms resistance should be within  $\pm 5\%$  of the above values.

Examples: Elements with an ohm resistance of 14 ohms indicates that it is either a 3,000 watt/208 volt element and/or a 4,000 watt/240 volt element (dual rated type).

**FULL LOAD CURRENT IN AMPERES**

KW Input	Number of Elements	KW Each Elements	Single (1) phase			Three (3) Phase			
			208V	240V	480V	208V	240V	480V	
6	<b>3</b>	2.0	28.8	25.0	12.5	16.7	14.4	7.2	
9		3.0	43.3	37.5	18.8	25.0	21.7	10.8	
12		4.0	57.7	50.0	25.0	33.3	28.9	14.4	
13.5		4.5	64.9	64.9	56.3	28.1	37.5	32.5	16.2
15		5.0	72.1	72.1	62.5	31.3	41.6	36.1	18.0
18		6.0	6.0	-----	75.0	37.5	-----	43.3	21.7
18	<b>6</b>	3.0	86.5	-----	-----	50.0	-----	-----	
24		4.0	115.4	100.0	50.0	66.6	57.7	18.9	
27		4.5	129.8	112.5	56.3	74.9	65.0	32.5	
30		5.0	144.2	125.0	62.5	83.3	72.2	36.1	
36		6.0	6.0	-----	150.0	75.0	-----	86.6	43.3
36	<b>9</b>	4.0	173.1	-----	-----	99.9	-----	-----	
40.5		4.5	194.7	168.8	84.4	112.4	97.4	48.7	
45		5.0	216.3	187.5	93.8	124.9	108.3	54.1	
54		6.0	6.0	-----	225.0	112.5	-----	129.9	65.0



**CAUTION**

NEVER OPERATE THE HEATER WITHOUT FILLING WITH WATER PER THE FILLING INSTRUCTIONS. FAILURE TO DO SO WILL DAMAGE INTERNAL PARTS.



# NOTES

# NOTES

# NOTES



125 Southeast Parkway  
Franklin, TN 37068  
1-800-433-2545  
[apcom-inc.com](http://apcom-inc.com)