

FOR INSTALLATION BY QUALIFIED SERVICE PERSONNEL ONLY

CONVERSION KIT INSTRUCTIONS

**Models DRE & DVE 52, 80, & 120
Commercial Electric Water Heaters
———— Series 100 ————**



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 4 through 7.

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
Conversion Guidelines	3	Phase Conversion	5-6
Conversion Instructions		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
DVE/DRE 52, 80, 120 with 3 Elements	6	2	100110522	100110535	100110550	100110556
	9	3	100110523	100110536	100110551**	100110557
	12	4	100110524	100110537	100110552	100110558
	13.5	4.5	100110520	100110532	100110547**	100110553
	15	5	100110521	100110533	100110548**	100110554
DVE/DRE 52, 80, 120 with 6 Elements	18	6	N/A	100110534	100110549	100110555
	18	3	100110527	100110541	100110562**	100110567
	24	3	100110528	100110542	100110563	100110568
	27	4.5	100110525	100110538	100110559**	100110564
	30	5	100110526	100110539	100110560**	100110565
DRE 80, 120 DVE 52, 80, 120 with 9 Elements	36	6	N/A	100110540	100110561	100110566
	36	4	100110531	100110546	100110572	100110576
	40.5	4.5	100110529	100110543	100110569**	100110573
	45	5	100110530	100110544	100110570**	100110574
	54	6	N/A	100110545	100110571	100110575

* 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 on the water heater door.

To expose elements, remove the foam door inside the control panel.

Remove the T & P valve (separate package).

III. KW CONVERSION (ELEMENT REPLACEMENT)

- 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.
- Remove element from heater using a 1-1/2" deep well socket and ratchet. Return the elements to appropriate storage bin.
- Open the appropriate conversion kit and remove the elements. Check each element to ensure correct voltage and wattage.
- 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.
- 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.
- Repeat steps A thru E for all other elements being replaced.

IV. VOLTAGE CONVERSION

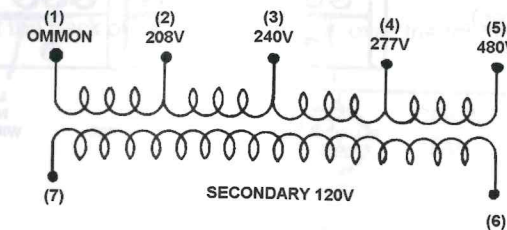
- Surface thermostat models merely require installation of the appropriate elements to accomplish a change in voltage. See KW conversion step III.
- Immersion thermostat models require installation of the appropriate elements AND may also require a transformer tap change. Immersion thermostat models 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 408 and attach it to the appropriate terminal marked 208, 240, 277 or 480.

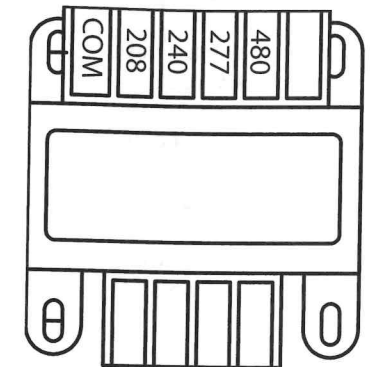
- Do not change the common connections or the secondary wire connections.

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

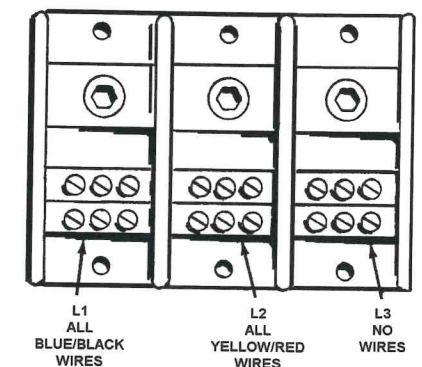


V. PHASE CONVERSION

A. IMMERSION THERMOSTAT MODEL THREE PHASE TO SINGLE PHASE

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

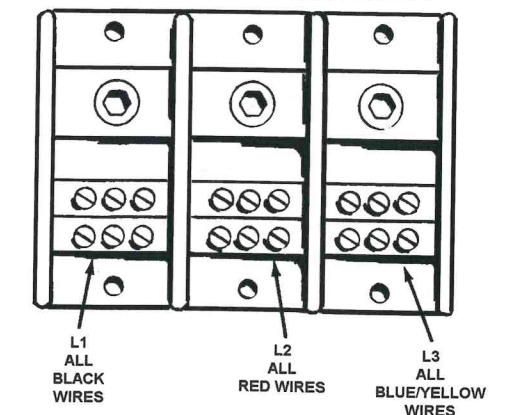
IMMERSION THERMOSTAT MODEL SINGLE PHASE TERMINAL BLOCK



B. IMMERSION THERMOSTAT MODEL SINGLE PHASE TO THREE PHASE

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

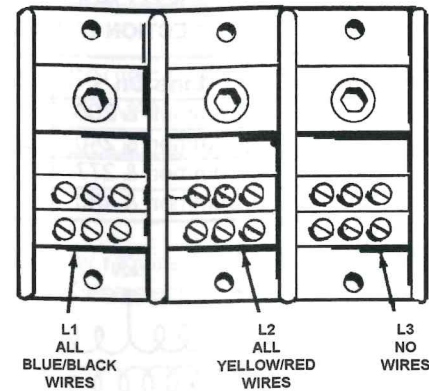
IMMERSION THERMOSTAT MODEL THREE PHASE TERMINAL BLOCK



**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.

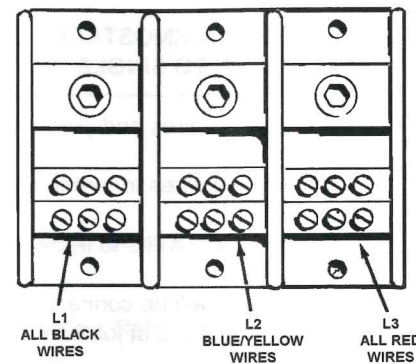
**SURFACE THERMOSTAT MODEL
SINGLE PHASE TERMINAL BLOCK**



**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.

		COMMERCIAL STORAGE TANK WATER HEATER			
LISTED 22U1		ANSI / NSF-5			
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 MEASURED		STANDBY LOSS % 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 four lines as shown on the revised rating plate below.

		COMMERCIAL STORAGE TANK WATER HEATER			
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	MEASURED	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.

NOTES

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	3	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	56.3	28.1	37.5	32.5	16.2
15		5.0	72.1	62.5	31.3	41.6	36.1	18.0
18		6.0	6.0	----	75.0	37.5	----	43.3
18	6	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
36	9	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

⚠ CAUTION

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