

FOR INSTALLATION BY QUALIFIED SERVICE PERSONNEL ONLY

# **CONVERSION KIT INSTRUCTIONS**

## **for Models DEN & DEL 6 THRU 120 GALLONS**

### **Commercial Electric Water Heaters**



**⚠ CAUTION**

TEXT PRINTED OR OUTLINED IN RED CONTAINS INFORMATION RELATIVE TO YOUR SAFETY. PLEASE READ THOROUGHLY BEFORE ATTEMPTING ANY CONVERSION.

**ACSmith**

[www.aosmithwaterheaters.com](http://www.aosmithwaterheaters.com)

# FOREWORD

The purpose of this manual is to explain how to change the voltage and wattage of an A. O. Smith commercial electric water heater by changing the elements. This manual is not intended to explain the rebuilding of 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, should not be attempted.

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, please read the detailed instructions contained on pages 8, 9, 10 and 11.

## SAFETY

Be sure to disconnect water heater 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

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# CONVERSION MATERIALS

1. Screw Plug Element Remover: Product Service Kit no. 9004642 or 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 element(s), conversion kit label, caution label.

# DEL-6 WITH 1 ELEMENT, 120/277 VOLT, 1 PHASE, TWO WIRE C-2 CIRCUIT

## INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of the kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed instructions.

**TABLE 1.**

Total Voltage	Element KW Input	Kit Wattage	Number
120	1.5	1500	9003826
	2.0	2000	9003827
	2.5	2500	9003828
	3.0	3000	9003829
277	1.5	1500	9003830
	2.0	2000	9003831
	2.5	2500	9003832
	3.0	3000	9003833

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

# DEL-6 WITH 1 ELEMENT, 208/240/480 VOLT, 1 PHASE, TWO WIRE C-2 CIRCUIT

## INSTRUCTIONS:

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**TABLE 2.**

Total Voltage	Element KW Input	Kit Wattage	Number
208	1.5	1500	9003837
	2.0	2000	9003838
	2.5	2500	9003839
	3.0	3000	9003840
240	1.5	1500	9003846
	2.0	2000	9003847
	2.5	2500	9003848
	3.0	3000	9003849
480	2.5	2500	9003856
	3.0	3000	9003857

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

# DEL MODELS WITH 1 ELEMENT, 120/208/240/277/480 VOLT, 1 PHASE, TWO WIRE C-2 CIRCUIT (EXCEPT DEL-6)

## INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**TABLE 3.**

Total Voltage	Element KW Input	Kit Wattage	Number
120	1.5	1500	9003826
	2.0	2000	9003827
	2.5	2500	9003828
	3.0	3000	9003829
277	1.5	1500	9003830
	2.0	2000	9003831
	2.5	2500	9003832
	3.0	3000	9003833
	4.0	4000	9003834
	4.5	4500	9003835
208	6.0	6000	9003836
	1.5	1500	9003837
	2.0	2000	9003838
	2.5	2500	9003839
	3.0	3000	9003840
	3.5	3500	9003841
	4.0	4000	9003842
	4.5	4500	9003843
240	5.0	5000	9003844
	6.0	6000	9003845
	1.5	1500	9003846
	2.0	2000	9003847
	2.5	2500	9003848
	3.0	3000	9003849
	3.5	3500	9003850
	4.0	4000	9003851
	4.5	4500	9003852
	5.0	5000	9003853
480	5.5	5500	9003854
	6.0	6000	9003855
	2.5	2500	9003856
	3.0	3000	9003857
	4.0	4000	9003858
	4.5	4500	9003859
480	5.0	5000	9003860
	6.0	6000	9003861

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

## DEL MODELS WITH 1 ELEMENT, 120/208/240/277/480 VOLT, 1 PHASE, TWO WIRE C-2 CIRCUIT (EXCEPT DEL-6)

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
  2. On the same line, move to the right until you are in the column of kit number required.
  3. Order the corresponding kit.
- See pages 8 thru 11 for detailed conversion instructions.

TABLE 3.

Total Voltage	Element KW Input	Kit Wattage	Number
120	1.5	1500	9003826
	2.0	2000	9003827
	2.5	2500	9003828
	3.0	3000	9003829
277	1.5	1500	9003830
	2.0	2000	9003831
	2.5	2500	9003832
	3.0	3000	9003833
	4.0	4000	9003834
	4.5	4500	9003835
	6.0	6000	9003836
208	1.5	1500	9003837
	2.0	2000	9003838
	2.5	2500	9003839
	3.0	3000	9003840
	3.5	3500	9003841
	4.0	4000	9003842
	4.5	4500	9003843
	5.0	5000	9003844
	6.0	6000	9003845
240	1.5	1500	9003846
	2.0	2000	9003847
	2.5	2500	9003848
	3.0	3000	9003849
	3.5	3500	9003850
	4.0	4000	9003851
	4.5	4500	9003852
	5.0	5000	9003853
	5.5	5500	9003854
	6.0	6000	9003855
480	2.5	2500	9003856
	3.0	3000	9003857
	4.0	4000	9003858
	4.5	4500	9003859
	5.0	5000	9003860
	6.0	6000	9003861

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

## DEN AND DEL MODELS WITH 2 ELEMENTS, 120/277 VOLT, 1 PHASE WITH NON-SIMULTANEOUS OR SIMULTANEOUS FOUR WIRE A-8 CIRCUIT

### INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

TABLE 4.

Voltage	Total KW Input		Element Wattage	Kit Number
	Simultaneous Operation	Non-Simultaneous Operation		
120	3	1.5	1500	9003816
	4	2.0	2000	9003817
	5	2.5	2500	9003818
	*	3.0	3000	9003886
277	3	1.5	1500	9003819
	4	2.0	2000	9003820
	5	2.5	2500	9003821
	6	3.0	3000	9003822
	8	4.0	4000	9003823
	9	4.5	4500	9003824
	12	6.0	6000	9003825

\* Cannot convert to Simultaneous Operation Mode.

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

# DEN AND DEL MODELS WITH 2 ELEMENTS, 208/240/480 VOLT, 1 PHASE OR 3 PHASE, WITH SIMULTANEOUS OR NON-SIMULTANEOUS FOUR WIRE A-8 CIRCUIT

## INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**TABLE 5.**

Voltage	Total KW Input	Element Wattage	Kit Number
208	2.0	1000	9003862
	3.0	1500	9003863
	4.0	2000	9003864
	5.0	2500	9003865
	6.0	3000	9003866
	7.0	3500	9003867
	8.0	4000	9003868
	9.0	4500	9003869
	*	5000	9003870
240	3.0	1500	9003871
	4.0	2000	9003872
	5.0	2500	9003873
	6.0	3000	9003874
	7.0	3500	9003875
	8.0	4000	9003876
	9.0	4500	9003877
	10.0	5000	9003878
	11.0	5500	9003879
480	5.0	2500	9003880
	6.0	3000	9003881
	8.0	4000	9003882
	9.0	4500	9003883
	10.0	5000	9003884
	12.0	6000	9003885

\* Cannot convert to simultaneous operation mode.

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

# DEN AND DEL MODELS WITH 2 ELEMENTS, 208/240/480 VOLT, 1 PHASE OR 3 PHASE, WITH SIMULTANEOUS OR NON-SIMULTANEOUS FOUR WIRE A-8 CIRCUIT

## INSTRUCTIONS

1. Find the voltage and KW of the required heater.
2. On the same line, move to the right until you are in the column of kit number required.
3. Order the corresponding kit.

See pages 8 thru 11 for detailed conversion instructions.

**TABLE 5.**

Voltage	Total KW Input	Element Wattage	Kit Number
208	2.0	1000	9003862
	3.0	1500	9003863
	4.0	2000	9003864
	5.0	2500	9003865
	6.0	3000	9003866
	7.0	3500	9003867
	8.0	4000	9003868
	9.0	4500	9003869
	*	5000	9003870
240	3.0	1500	9003871
	4.0	2000	9003872
	5.0	2500	9003873
	6.0	3000	9003874
	7.0	3500	9003875
	8.0	4000	9003876
	9.0	4500	9003877
	10.0	5000	9003878
	11.0	5500	9003879
480	5.0	2500	9003880
	6.0	3000	9003881
	8.0	4000	9003882
	9.0	4500	9003883
	10.0	5000	9003884
	12.0	6000	9003885

\* Cannot convert to simultaneous operation mode.

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

## 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 DEN or DEL 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 carton is not required. Locate front of carton (opposite side of heater identification label). Cut a 3-sided flap into front of carton, cut should be on top, bottom and right side approximately 4" from carton edges. Leave the left side of the flap as a hinge. Cuts made 4" from the edge of carton will permit proper reclosure when conversion is completed.

Remove the two control panel screws on the water heater door(s).

To expose elements, fold insulation from right to left. **DO NOT RIP INSULATION.** Remove the personnel protector(s). Take care not to damage protector.

### III. KW CONVERSION (ELEMENT REPLACEMENT)

- A. Remove wires from one element at a time.
- B. Remove element from heater using Product Service Kit no. 9004642 or 1-1/2" deep well socket and ratchet. Return the elements to appropriate bin.
- C. Open the appropriate conversion kit and remove the element(s). Check each element head to ensure correct voltage and wattage.
- D. Install the new element with a 1-1/2" socket wrench. A new "O" ring gasket should be installed on each element. Screw element into fitting until it seats. Tighten 1/2" to 3/4" turn with wrench.
- E. Rewire the element. 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. DEN/DEL models merely require installation of the appropriate elements to accomplish a change in voltage. See KW conversion step III.
- B. **DO NOT CHANGE THE GROUND CONNECTIONS.**

### V. PHASE CONVERSION

- A. DEN/DEL THREE PHASE TO SINGLE PHASE
  1. Disconnect black wire from terminal L-3.
  2. Connect black wire to terminal L-2 (with blue wire).
  3. Incoming power will be connected to terminals L-1 and L-2 at job site.

## VI. SIMULTANEOUS CONVERSION

- A. Disconnect red wire from power terminal "J".
- B. Reconnect red wire to terminal L1, along with yellow wire on terminal block.

\*See diagram below. Note: Steps V and VI pertain only to conversions on page 7 of this manual.

### **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.

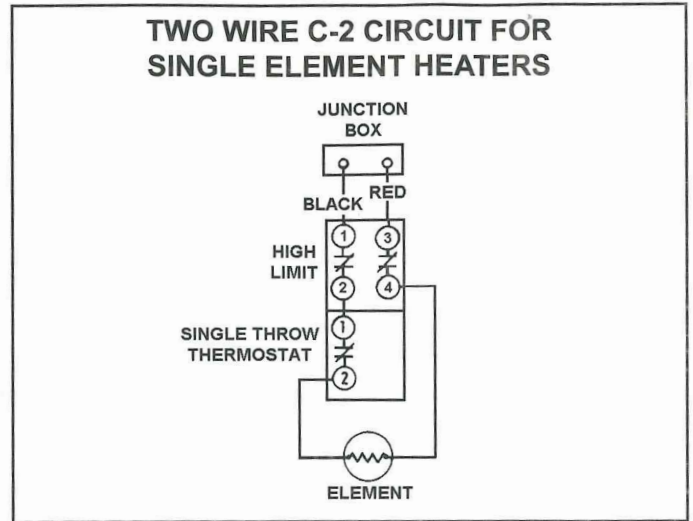


FIGURE 1.

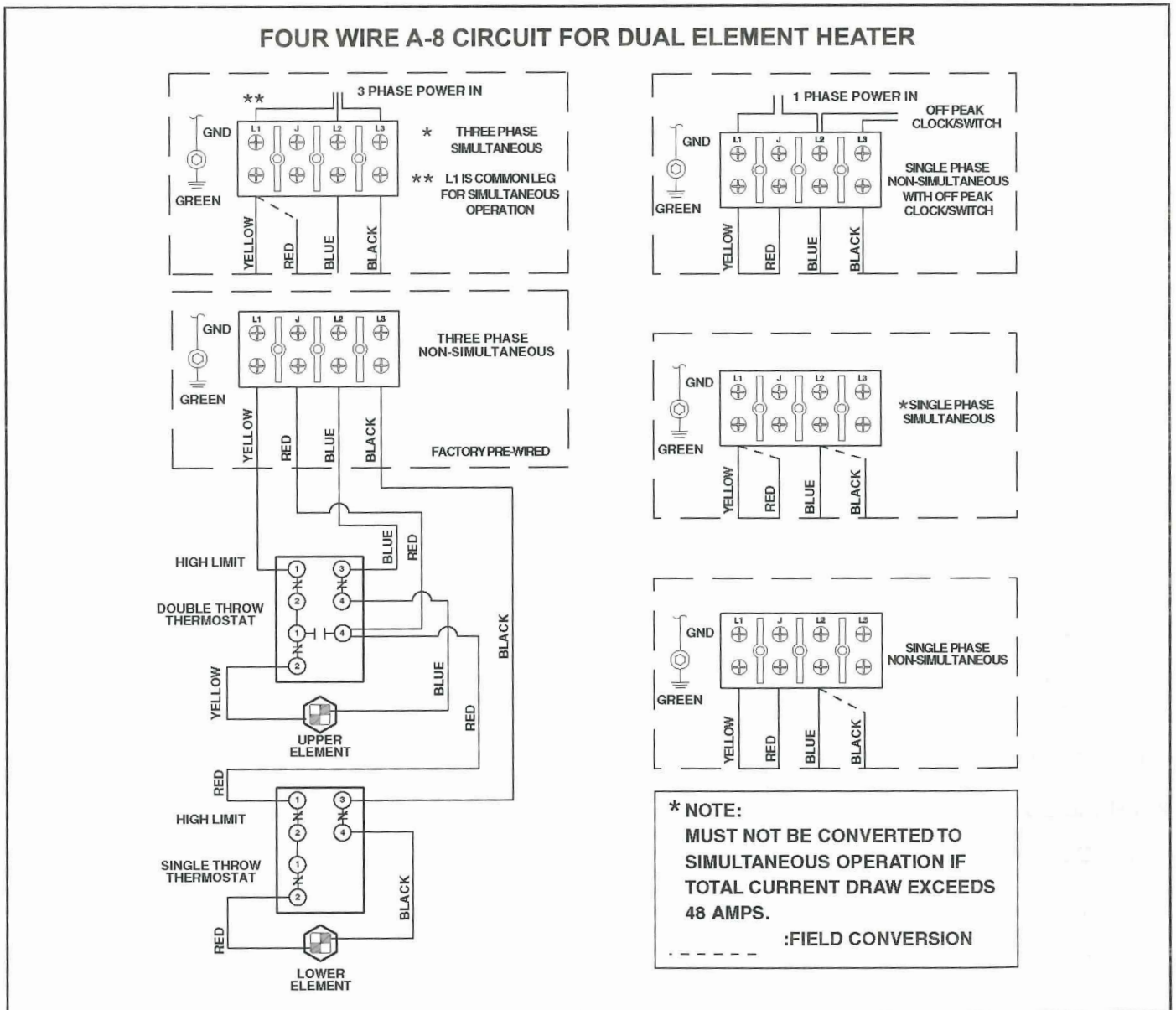


FIGURE 2.



## VI. SIMULTANEOUS CONVERSION

- A. Disconnect red wire from power terminal "J".
- B. Reconnect red wire to terminal L1, along with yellow wire on terminal block.

\*See diagram below. Note: Steps V and VI pertain only to conversions on page 7 of this manual.



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

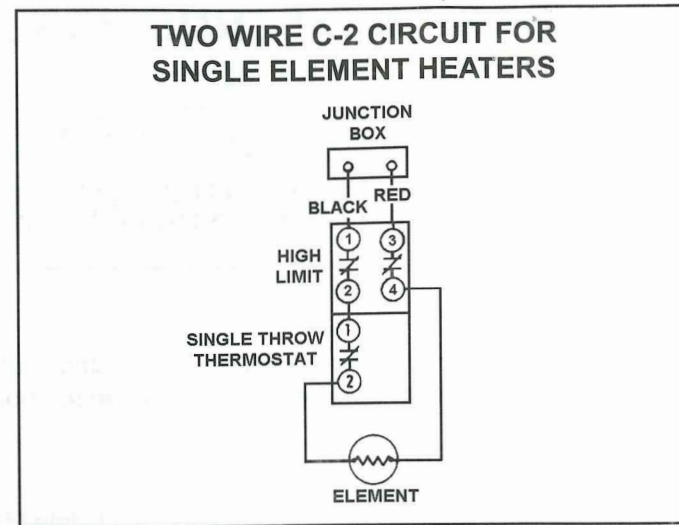


FIGURE 1.

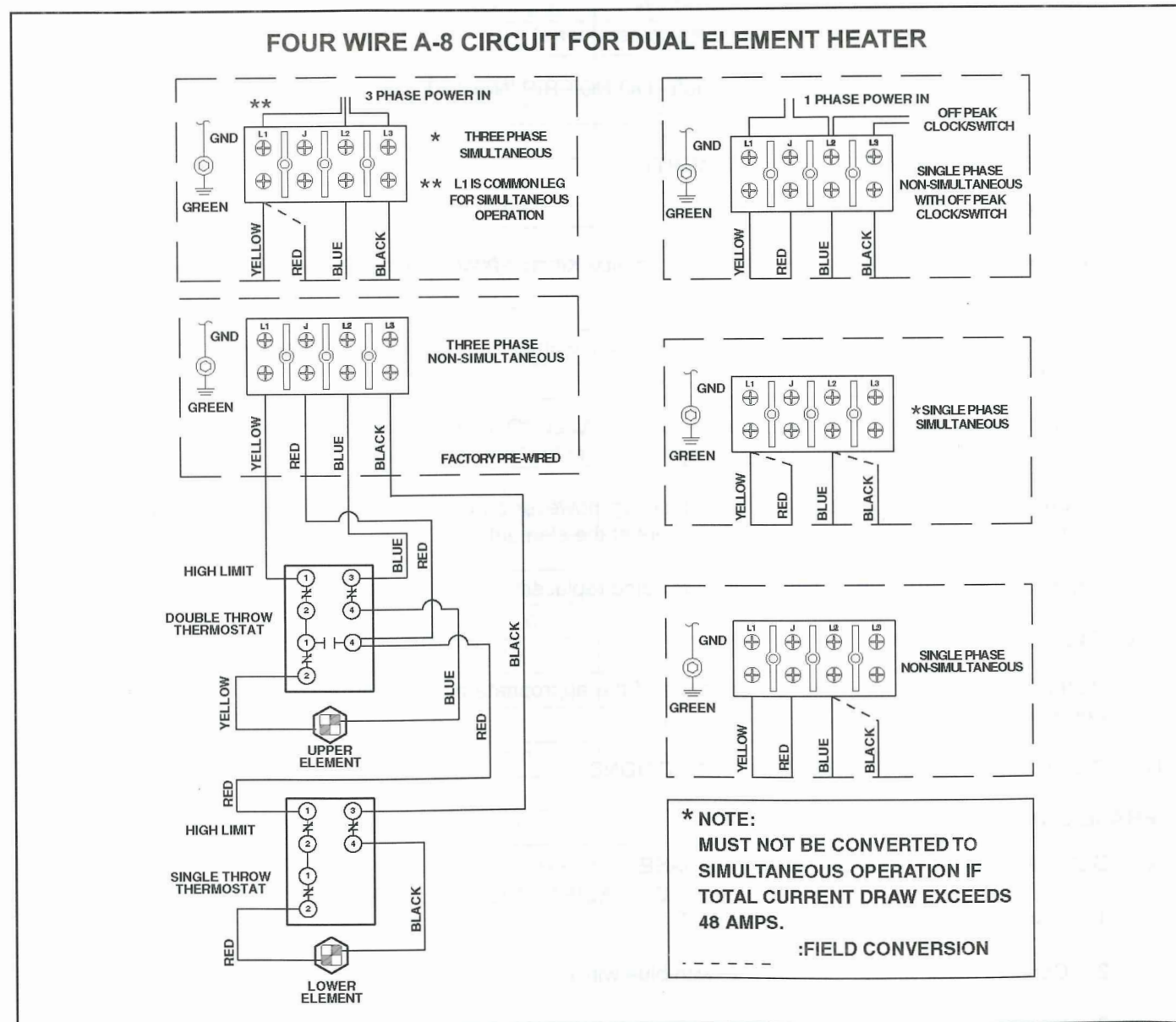


FIGURE 2.

## V. FINAL ASSEMBLY

- A. CONTROL COVER(S).

Replace personnel protector(s). Unfold insulation blanket. Cover all elements and thermostats as originally constructed. Replace door and tighten the two screws.

- B. RATING PLATE MODIFICATION OF DUAL ELEMENTS ELECTRIC WATER HEATERS.

Following is a sample of the standard rating plate supplied on the front of DEN/DEL dual elements commercial electric water heaters.

ELECTRIC WATER HEATER CHAUFFE-EAU ELECTRIQUE		UL LISTED 22U1	
MODEL NUMBER N° DE MODELE	SERIAL NUMBER N° DE SERIE	ITEM ID / PART NUMBER	
DEL 30 110	1112M001862	9990042063	
VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	CAPACITY CAPACITE GAL. LITRE
120	1500	1500	27.0 102.1
TOTAL WATTS CONNECTED COURANT TOTAL		MAX. WORKING PRESSURE PRESSION DE SERVICE MAXIMALE	
INTERLOCK 1 PH / 3 PH	SIMULTANEOUS 1 PH 3 PH	CIRCUIT	PSI KPA
1500	3000	N/A A8	150 1034
A.O. SMITH WATER PRODUCTS CO. MCBEE, SC. USA			

FIGURE 3.

Peel off the back of label and paste over the area as shown on the revised rating plate below.

COMMERCIAL STORAGE TANK WATER HEATER		UL LISTED 932N	
MODEL NUMBER	SERIAL NUMBER	ITEM ID / PART NUMBER	
VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER
X	X	X	X
TOTAL WATTS CONNECTED INTERLOCK SIMULTANEOUS		CAPACITY US GALS	MAX. WORKING PRESSURE
X	X		

FIGURE 5.

VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS UPPER COURANT DE L'ELEMENT DU BAS EN WATTS	PHASE
TOTAL WATTS CONNECTED COURANT TOTAL			
INTERLOCK 1 PH/3 PH		SIMULTANEOUS 1 PH 3 PH	
321371-XXX			

The volts, upper & lower watts, phase, & total watts (Interlock & Simultaneous) & phase must be modified by covering them with 321371-XXX provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 4.

VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER
X	X	X	X
TOTAL WATTS CONNECTED INTERLOCK SIMULTANEOUS			
X	X		
(Part No. 195205-XXX)			

The volts, phase, watts information of the rating plate must be modified by covering them with conversion label (Part No. 195205) provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 6.

C. RATING PLATE MODIFICATION OF SINGLE ELEMENT ELECTRIC WATER HEATERS.

The following is a sample of the standard rating plate supplied on the front of DEL single element electric water heaters.


ELECTRIC WATER HEATER CHAUFFE-EAU ELECTRIQUE						
MODEL NUMBER N° DE MODELE		SERIAL NUMBER N° DE SERIE		ITEM ID / PART NUMBER		
DEL 6 102		1112J002803		9990038002		
VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE		
120		1500	1500	1		
MAX. WORKING PRESSURE PRESSION DE SERVICE MAXIMALE			CAPACITY CAPACITE			
PSI	KPA	US GAL.	LITRE	CIRCUIT		
150	1034	5.8	21.9	C2		
MADE IN MEXICO A.O. SMITH WATER PRODUCTS CO. MCBEE, SC. USA						

FIGURE 7.

VOLTS - AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE
321370-XXX				

The volts, upper & lower watts, total watts & phase, must be modified by covering them with 321370-XXX provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 8.

Peel off the back of the label and paste over the area as shown on the revised rating plate below.


HOUSEHOLD STORAGE TANK WATER HEATER						
MODEL NUMBER		SERIAL NUMBER		ITEM ID / PART NUMBER		
VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED	CAPACITY US GALS	MAX. WORKING PRESSURE
X	X	X	X	X		
CIRCUIT						

FIGURE 9.

VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED
X	X	X	X	X

(Part No. 195204-XXX)

The volts, phase, watts information of the rating plate must be modified by covering them with conversion label (Part No. 195204) provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 10.

C. RATING PLATE MODIFICATION OF SINGLE ELEMENT ELECTRIC WATER HEATERS.

The following is a sample of the standard rating plate supplied on the front of DEL single element electric water heaters.

ELECTRIC WATER HEATER CHAUFFE-EAU ELECTRIQUE					UL LISTED 932N	
MODEL NUMBER N° DE MODELE		SERIAL NUMBER N° DE SERIE		ITEM ID / PART NUMBER		
DEL 6 102		1112J002803		9990038002		
VOLTS AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE		
120		1500	1500	1		
MAX. WORKING PRESSURE PRESSION DE SERVICE MAXIMALE		CAPACITY CAPACITE			CIRCUIT	
PSI	KPA	US GAL.	LITRE			
150	1034	5.8	21.9	C2		
MADE IN MEXICO A.O. SMITH WATER PRODUCTS CO. MCBEE, SC. USA						

FIGURE 7.

Peel off the back of the label and paste over the area as shown on the revised rating plate below.

HOUSEHOLD STORAGE TANK WATER HEATER						UL LISTED 932N	
MODEL NUMBER		SERIAL NUMBER		ITEM ID / PART NUMBER			
VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED	CAPACITY US GALS	MAX. WORKING PRESSURE	
X	X	X	X	X			
CIRCUIT							

FIGURE 9.

VOLTS - AC ONLY VOLT CA SEULEMENT	WATTS UPPER COURANT DE L'ELEMENT DU HAUT EN WATTS	WATTS LOWER COURANT DE L'ELEMENT DU BAS EN WATTS	TOTAL WATTS CONNECTED COURANT TOTAL	PHASE
321370-XXX				

The volts, upper & lower watts, total watts & phase, must be modified by covering them with 321370-XXX provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 8.

VOLTS - AC	PHASE	WATTS UPPER	WATTS LOWER	TOTAL WATTS CONNECTED
X	X	X	X	X

(Part No. 195204-XXX)

The volts, phase, watts information of the rating plate must be modified by covering them with conversion label (Part No. 195204) provided in the conversion kit. Be sure the new ratings on the label match the conversion you have just completed.

FIGURE 10.

D. CAUTION LABEL

Peel off back of caution label and place as near to rating plate as possible, taking care not to cover any existing labels.

E. CARTON IDENTIFICATION

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

F. SHIPPING CARTON

Close and tape the cardboard flap on the front of carton.

IX. MISCELLANEOUS INFORMATION

TABLE 6. FULL LOAD CURRENT IN AMPERES

KW Input	Single (1) Phase					Three (3) Phase		
	120V	208V	240V	277V	480V	208V	240V	480V
1.5	12.5	7.2	6.3	5.4	N/A	N/A	N/A	N/A
2.0	16.7	9.6	8.3	7.2	N/A	8.3/4.8	N/A	N/A
2.5	20.8	12.0	10.4	9.0	5.2	N/A	N/A	N/A
3.0	25.0	14.4	12.5	10.8	6.3	12.5/7.2	10.8/6.3	N/A
3.5	N/A	16.8	14.6	N/A	N/A	N/A	N/A	N/A
4.0	N/A	19.2	16.7	14.4	8.3	16.7/9.6	14.4/8.3	N/A
4.5	N/A	21.6	18.8	16.2	9.4	N/A	N/A	N/A
5.0	N/A	24.0	20.8	N/A	10.4	20.8/12.0	18.0/10.4	9.0/5.2
5.5	N/A	N/A	22.9	N/A	N/A	N/A	N/A	N/A
6.0	N/A	28.8	25.0	21.7	12.6	25.0/14.4	21.7/12.5	10.8/6.3
7.0	N/A	33.6	29.2	N/A	N/A	29.1/16.8	25.3/14.6	N/A
8.0	N/A	38.6	33.4	N/A	16.6	33.3/19.2	28.9/16.7	14.4/8.3
9.0	N/A	43.2	37.6	N/A	18.8	37.5/21.6	32.5/18.8	16.2/9.4
10.0	N/A	48.0	41.6	N/A	20.8	41.6/24.0	36.1/20.8	18.0/10.4
11.0	N/A	N/A	45.8	N/A	N/A	46.0/26.5	39.7/22.9	N/A
12.0	N/A	N/A	N/A	43.3	25.2	N/A	43.5/25.0	21.7/12.5