BRADFORD WHITE®
WATER HEATERS

Conversion Kit Instructions

For Models: CEHD50(A), CEHD80(A) & CEHD120(A)

(To be performed ONLY by qualified service providers)

NOTICE

The conversion procedure outlined in this manual is to be executed ONLY by Qualified Service Personnel. Before attempting conversions, it is recommended that you read the detailed instructions described herein.

The purpose of this instruction manual is to outline the procedure for changing the wattage, voltage, and electrical phase for the commercial electric water heaters manufactured by Bradford White Corporation. Underwriters Laboratories Inc. and Intertek recognize this procedure as herein presented and no deviation from these instructions are allowed.

Special factory prepared "Conversion Kits" must be used for these conversions. There are separate conversion kits that have individual instructions and MUST be followed. Page 10 of these instructions lists the kits that have been prepared for the various wattages and voltages.

These instructions do not allow for a modification that adds or deletes the number of heating elements originally supplied with the heater; therefore such a modification must NOT be attempted.

These conversion kits are only applicable to models CEHD50, CEHD80 and CEHD120.

The following information is provided to assist in the successful conversion of the water heater:

Safety Precautions

NOTICE

The conversion procedure outlined in this manual is to be executed ONLY by Qualified Service Personnel. Before attempting conversions, it is recommended that you read the detailed instructions described herein.

⚠ WARNING

Water heaters are heat producing appliances. To avoid damage or injury, do not store materials against the water heater or vent-air intake system. Use proper care to avoid unnecessary contact (especially by children) with the water heater and vent-air intake components. **UNDER NO CIRCUMSTANCES MUST FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNER BE USED OR STORED IN THE VICINITY OF THIS WATER HEATER, VENT-AIR INTAKE SYSTEM OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE WATER HEATER OR VENT-AIR INTAKE SYSTEM.**

⚠ CAUTION

If sweat fittings are to be used **DO NOT** apply heat to the nipples on top of the water heater. Sweat the tubing to the adapter before fitting the adapter to the water connections. It is imperative that heat is not applied to the nipples containing a plastic liner.

⚠ WARNING

Hydrogen gas can be produced in an operating water heater that has not had water drawn from the tank for a long period of time (generally two weeks or more). Hydrogen gas is extremely flammable. To prevent the possibility of injury under these conditions, we recommend the hot water faucet to be open for several minutes at the kitchen sink before you use any electrical appliance which is connected to the hot water system. If hydrogen is present, there will be an unusual sound such as air escaping through the pipes as hot water begins to flow. Do not smoke or have open flame near the faucet at the time it is open.

⚠ CAUTION

Incorrect operation of this appliance may create a hazard to life and property and will nullify the warranty.

⚠ DANGER

Do not store or use gasoline or other flammable, combustible, or corrosive vapors and liquids in the vicinity of this or any other appliance.

IMPORTANT

Before proceeding, please inspect the water heater and its components for possible damage. **DO NOT** install any water heater with damaged components. If damage is evident then please contact the supplier where the water heater was purchased or the manufacturer listed on the rating plate for replacement parts.

⚠ WARNING

FAILURE TO INSTALL AND MAINTAIN A NEW, LISTED TEMPERATURE AND PRESSURE RELIEF VALVE WILL RELEASE THE MANUFACTURER FROM ANY CLAIM THAT MIGHT RESULT FROM EXCESSIVE TEMPERATURE AND PRESSURES.

⚠ WARNING

Be sure to disconnect the water heater from the electrical supply before performing any servicing of the electrical system or before attempting any of the conversion procedures. Never perform servicing of the electrical system or any of the conversion procedures with wet hands or when you are in contact with water that is on the floor or in the vicinity of the water heater.

Introduction

These conversion kits were created to provide greater flexibility to match the water heater to its needed application. Water heaters suitable for conversion have been wired at the factory to the maximum electrical duty for which they have been designed, to have the maximum current possible within the allowable conversion options. Therefore, internal electrical components are provided that satisfy the maximum voltage and maximum electrical current conditions.

The wattage, voltage, and phase can be changed to meet the needs of the field. Conversions may involve altering any one or all of these electrical characteristics.

Required Materials and Tools

- Screw-in element removal wrench --- or --- 1 ½" deep well socket wrench.
- Phillips head screwdriver
- ¼" Nut driver
- Slotted screwdriver
- Hammer and pry bar
- Masking tape
- Conversion Kit that includes: conversion instructions, electrical elements, product label overlay (related to the newly created electrical parameters), and element gaskets. Refer to page 10 of these instructions in order to determine the correct Conversion Kit numbers.

Water Heater Preparation

For narrow control cabinet (12” x 45” rectangle)

1. Complete removal of the water heater from the shipping crating is not required for conversions. Locate the front of the water heater with the control cabinet through the plastic. Using a hammer and/or pry bar remove the wood slat in the middle of the front crating and set aside (see Figure 1). Push the plastic cover to the top of the water heater.

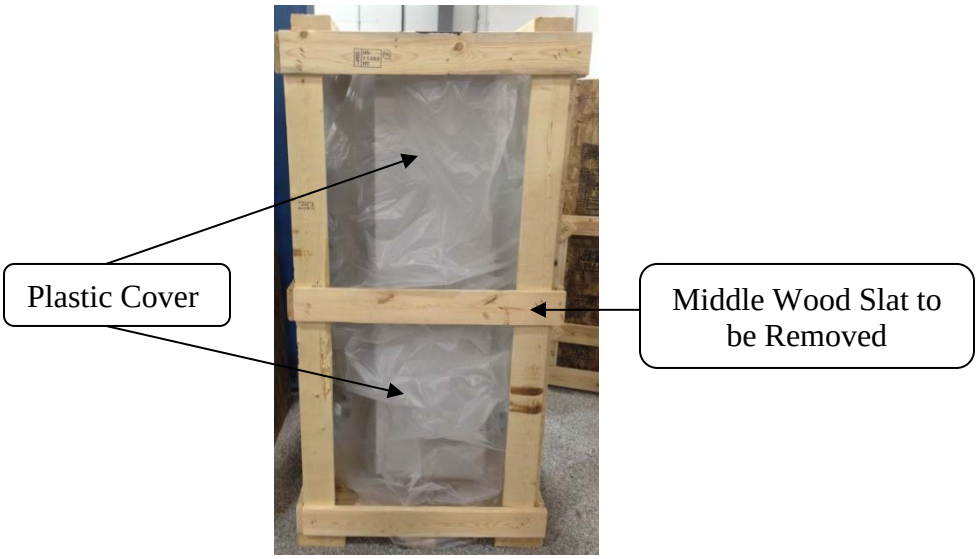


Figure 1. Water Heater Shown in Crating

2. Using a Phillips head screwdriver remove the 2 screws from the front right of the control cabinet door and set aside (see Figure 2). Open the control cabinet door to gain access to the electrical components.

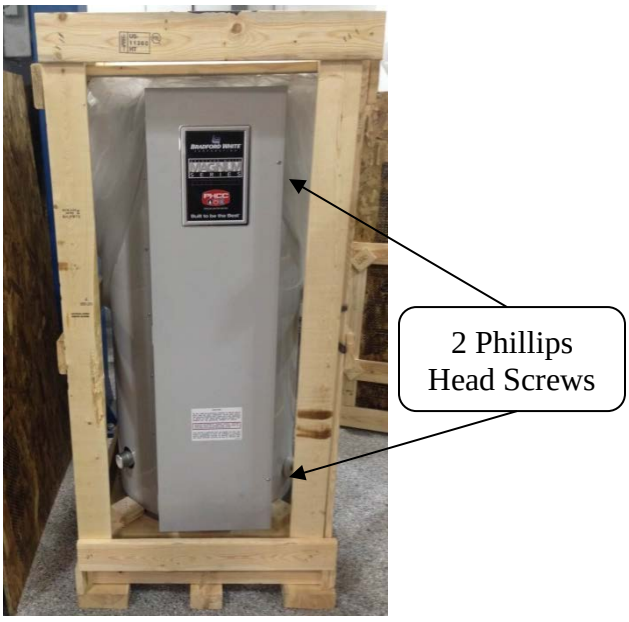


Figure 2. Control Cabinet Screws

3. Remove and set aside the insulation pieces that are inside the lower portion of the control cabinet to gain access to the elements (see Figure 3).

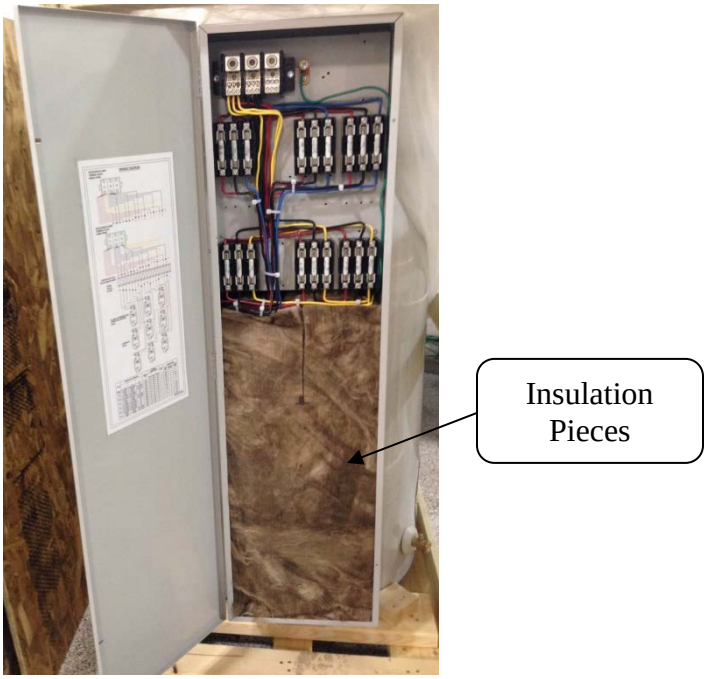


Figure 3. Inside Control Box

For wide control cabinet (19” x 19” upper section and 12” x 26” lower section (CEHD(50,80,120)(A)3(45,54)(L,C,H)CF)

1. Complete removal of the water heater from the shipping carton is not required for conversions. Locate the front of the water heater with the control cabinet through the plastic. Using a hammer and/or pry bar remove the wood slat in the middle of the front crating and set aside. Push the plastic cover to the top of the water heater.

2. Using a Phillips head screwdriver remove the 1 screw from the front right of the control cabinet door and set aside (see Figure 4). Open the control cabinet door to gain access to the electrical components. Remove the 8 – ¼” hex drive screws from the element cabinet cover and set aside the screws and cover (see Figure 4).

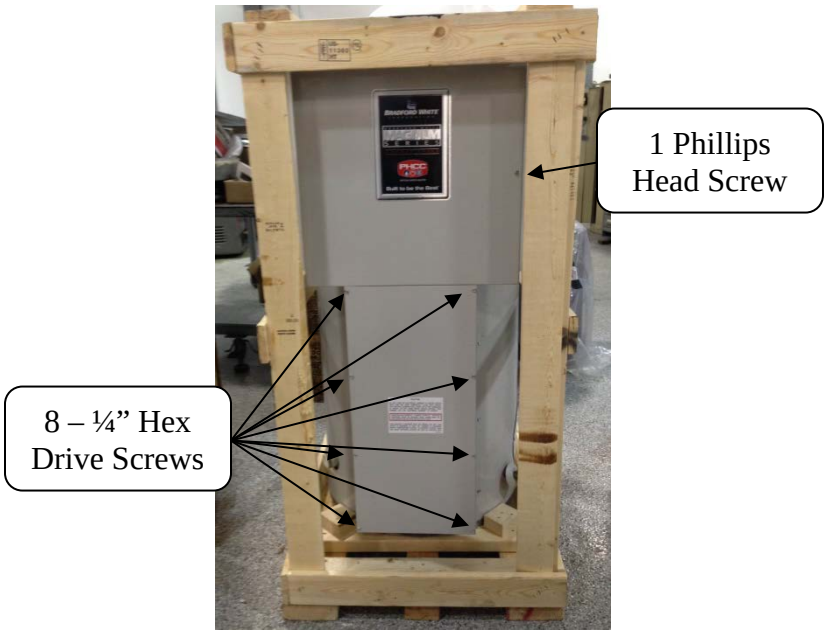


Figure 4. Control Box Screws

3. Remove and set aside the insulation pieces that are inside the lower portion of the control cabinet to gain access to the elements (see Figure 5).

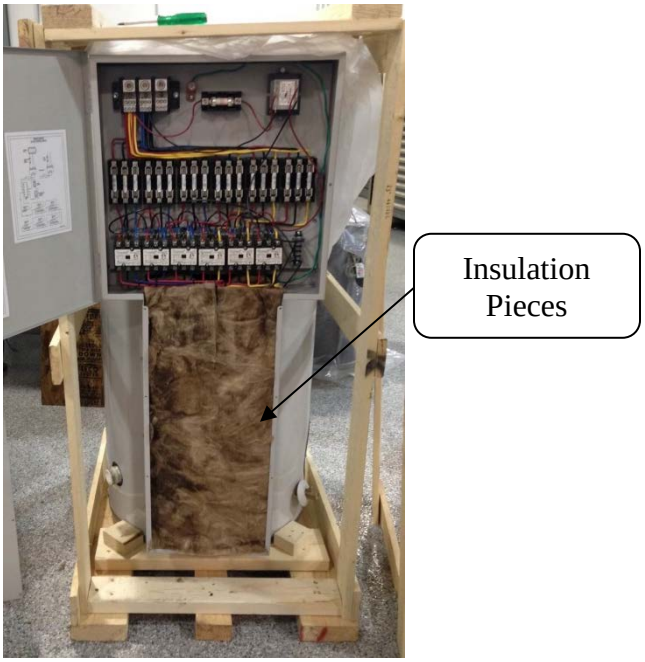


Figure 5. Inside Control Box

General Conversion Guidelines

- No addition or subtraction of heating elements is allowed in the conversion process (e.g. a 3-element water heater must remain a 3-element water heater).
- Conversion of a water heater to 208V, 54kW single phase is not allowed as the maximum amperage of the terminal block would be exceeded. This model configuration is not available from the factory.
- Voltage conversion is only allowed for models rated 480V and below as the maximum rating for the fuse blocks and fuses would be exceeded. Models rated 480V and below must not be converted to 600V.
- For models rated 600V, only kW conversion is allowed.
- Check all water and electrical connections for tightness after conversion.

Field Conversion Process

- A maximum of 48 amps is allowable in non-fused units. It is not allowable to convert a non-fused unit to a configuration exceeding 48 amps.
- Disconnect water heater from the power supply.
- Completely drain water heater.
- Convert the water heater to the desired configuration using the applicable procedures provided in this manual.
- Check all water and electrical connections for tightness after conversion.
- Ensure that water heater is completely filled with water prior to reconnecting it to the power supply.
- Reconnect water heater to the power supply.

Conversion Kits for Models CEHD50(A), CEHD80(A) and CEHD120(A)

1. Refer to Table 1 below, which contains water heater kW, element wattage, voltage, and kit part numbers.
2. Locate the kW of the required water heater.
3. Move across the table (to the right) until you reach the required voltage.
4. Select the required kit number.
5. Use that kit for this conversion.
6. Refer to the remaining pages for a detailed conversion procedure.

Table 1. Conversion Kits

Model	Desired Input		Conversion Kit Part Numbers						
	Total Kw	Element kW	208V	240V	277V	380V	415V	480V	600V*
CEHD w/ 3 Elements	6	2	415-51043-73	415-51043-61	415-51043-49	415-51043-37	415-51043-25	415-51043-85	415-51043-01
	9	3	415-51043-74	415-51043-62	415-51043-50	415-51043-38	415-51043-26	415-51043-14	415-51043-02
	12	4	415-51043-128	415-51043-63	415-51043-51	415-51043-104	415-51043-94	415-51043-15	415-51043-03
	13.5	4.5	415-51043-129	415-51043-64	415-51043-114	415-51043-105	415-51043-95	415-51043-86	415-51043-04
	15	5	415-51043-130	415-51043-122	415-51043-115	415-51043-106	415-51043-96	415-51043-87	415-51043-05
	18	6	415-51043-131	415-51043-123	415-51043-116	415-51043-107	415-51043-97	415-51043-88	415-51043-06
CEHD w/ 6 Elements	24	4	415-51043-132	415-51043-67	415-51043-55	415-51043-108	415-51043-98	415-51043-19	415-51043-07
	27	4.5	415-51043-133	415-51043-68	415-51043-117	415-51043-109	415-51043-99	415-51043-89	415-51043-08
	30	5	415-51043-134	415-51043-124	415-51043-118	415-51043-110	415-51043-100	415-51043-90	415-51043-09
	36	6	415-51043-135	415-51043-125	415-51043-119	415-51043-111	415-51043-101	415-51043-91	415-51043-10
CEHD w/ 9 Elements	45	5	415-51043-136	415-51043-126	415-51043-120	415-51043-112	415-51043-102	415-51043-92	415-51043-11
	54	6	415-51043-137**	415-51043-127	415-51043-121	415-51043-113	415-51043-103	415-51043-93	415-51043-12

***Only kW conversion is allowed for models rated 600V. Models rated 480V and below must not be converted to 600V.**

****Only available as a three phase conversion kit.**

*** Converting 3 Element Configurations (6-18kW)			*** Converting 6 or 9 Element Configurations (24-54kW)		
From	To	Transformer Required	From	To	Transformer Required
208/240/480 volt	277/380/415 volt	264-41994-02	208/240/480 volt	277/380/415 volt	264-41995-02
277/380/415 volt	208/240/480 volt	264-41994-01	277/380/415 volt	208/240/480 volt	264-41995-01
208/240/480 volt	208/240/480 volt	No Transformer Change Required	208/240/480 volt	208/240/480 volt	No Transformer Change Required
277/380/415 volt	277/380/415 volt	No Transformer Change Required	277/380/415 volt	277/380/415 volt	No Transformer Change Required

Wattage Conversion --- Element Changes

1. Disconnect the water heater from the electrical supply and completely drain the water heater tank.
2. Using a Phillips head screwdriver, disconnect the electrical wires from the element terminals (see Figure 6).

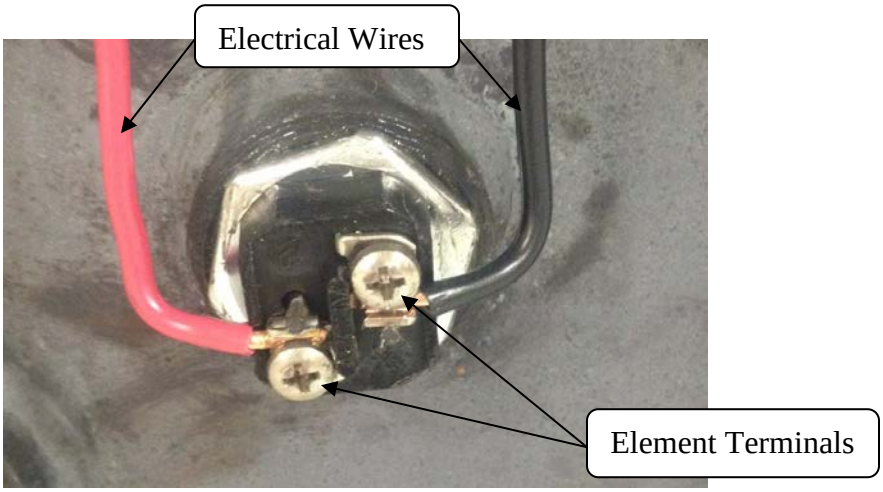


Figure 6. Electrical Wires and Element Terminals

3. Remove and replace one element at a time.
4. Remove the electrical element using the Screw-in element removal wrench or a 1 ½" deep well socket wrench.
5. Remove a replacement element from the conversion kit. Check the element markings to ensure correct wattage and voltage before installing.
6. Apply the new gasket (provided in the kit) to the element. Make sure the gasket is aligned correctly and it is not rolled-over (see Figure 7).

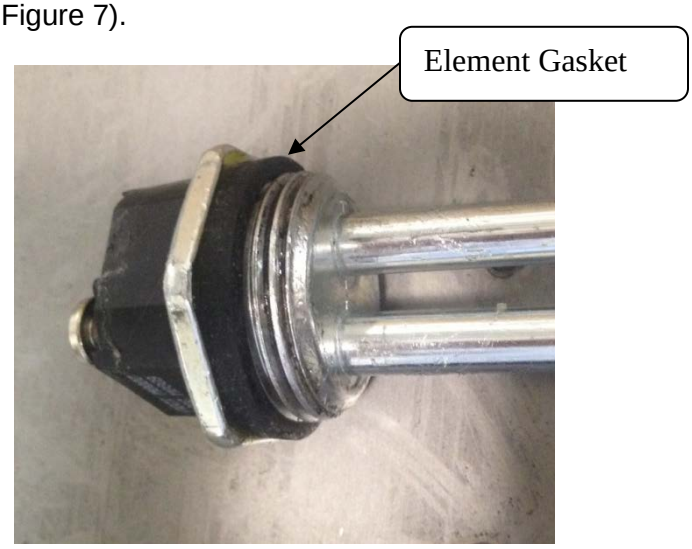


Figure 7. Element Gasket

7. Thread the replacement element into the element fitting until it is seated. Use caution not to cross-thread the element while installing. Tighten ½ to ¾ turns with the element wrench. Do not over tighten or damage to the element gasket can occur.

8. Re-connect the wiring to the element terminals. The screws must be snuggly tightened but caution must be exercised not to over tighten. Over tightening could fracture the element ceramic terminal block, and would require replacement.

9. Repeat this procedure (steps 2 through 8 above) for all other elements needing replacement.

Voltage Conversion

Immersion Thermostat Models --- (From 208, 240, 480V to 208, 240, 480V)
(Same process for 277, 380, 415V to 277, 380, 415V)

1. Immersion thermostat models require installation of the appropriate elements and a change to the transformer connection. Immersion thermostats are equipped with transformers having 4 input connections; common (COM), 208V, 240V and 480V or common (COM), 277V, 380V, AND 415V (see Figure 8).

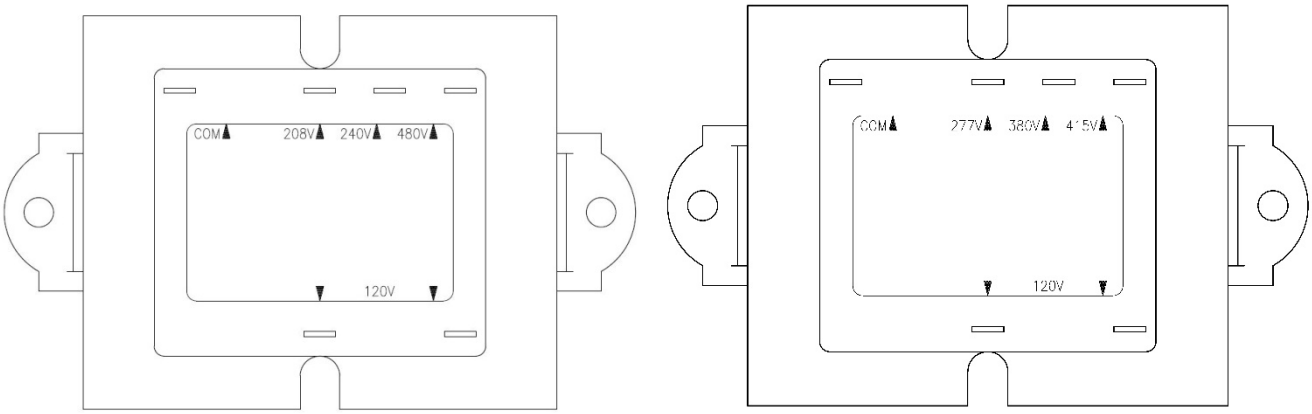


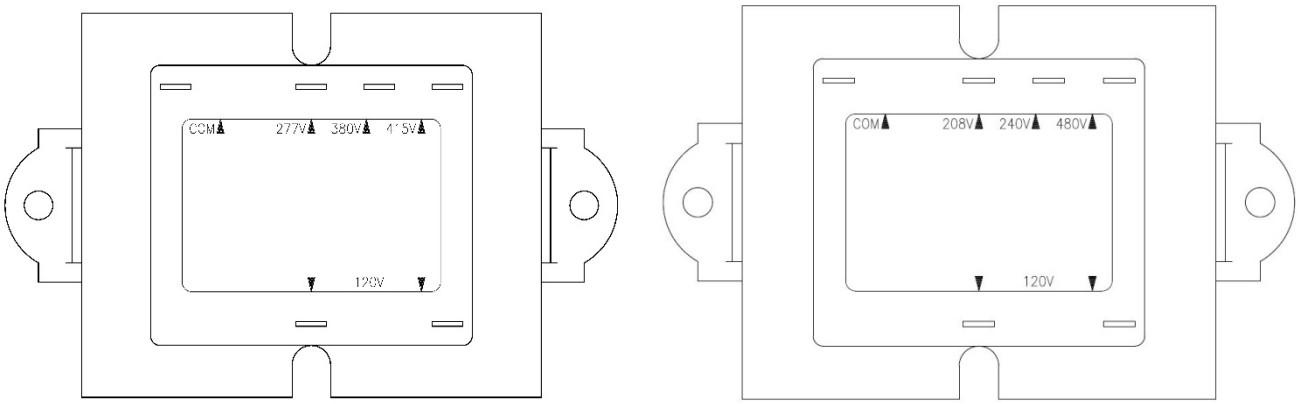
Figure 8. Transformer Connections

2. Only one wire needs to be changed on the transformer to change the voltage input. Remove the wire from the connection marked 208V, 240V or 480V and attach it to the appropriate connection marked 208V, 240V or 480V.

3. Do not change the common connection or the secondary 120V connections.

Immersion Thermostat Models --- (From 208V, 240V, 480V to 277V, 380V, 415V)
(Same process for 277V, 380V, 415V to 208V, 240V, 480V)

1. Conversion from 208, 240 or 480V immersion thermostat models to 277, 380, or 415V requires installation of the appropriate elements and installation of a new transformer. The new transformer must be purchased separately from the kit.



2. Using the masking tape, label the 4 wires connected to the transformer with the appropriate connection (see Figure 9 which is shown as a 240V connection (as an example). Keep in mind that the 240V wire may be connected to the 208V or 480V connection based on the initial configuration of the water heater).

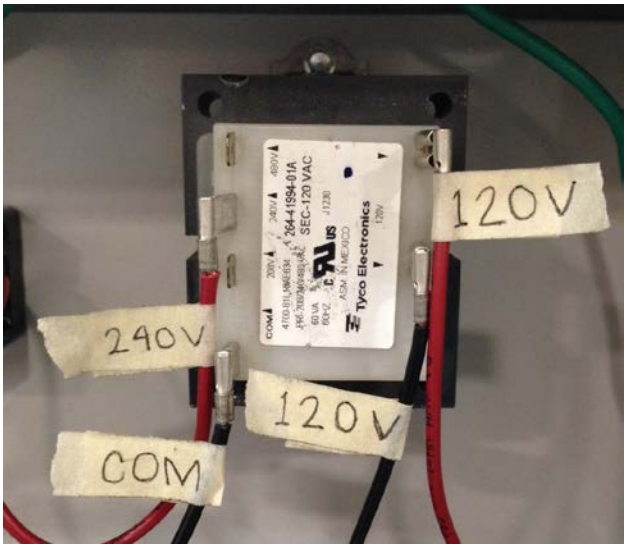


Figure 9. Labeled Transformer Connections

3. Remove the four wires from the transformer.

4. Remove the transformer from the control panel by removing the 2 Phillips head screws (see Figure 10).

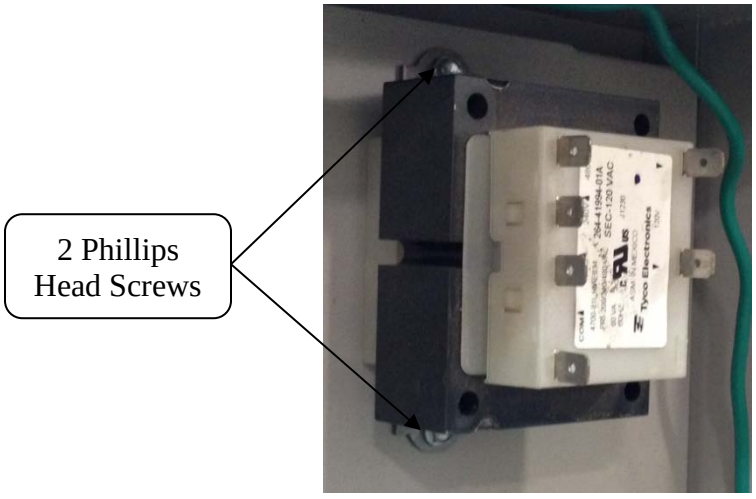


Figure 10. Transformer Screw Locations

5. Install the new transformer to the control panel with the 2 screws removed in the previous step. Reconnect the common (COM) and both 120V wires to their appropriately labeled connection. The wire previously connected to the 208, 240 or 480V terminal of the previous transformer must now be connected to the 277, 380, or 415V terminal of the new transformer.

Electrical Phase Conversion

Electrical phase conversion will require a change from single-phase to three-phase or from three-phase to single-phase. Each of these conversions will be explained separately.

Instructions to convert FROM Three-Phase TO Single-Phase:

1. Figure 11 shows a three phase terminal block as originally manufactured. Disconnect blue wires and yellow wires from terminal L-3 of the terminal block.

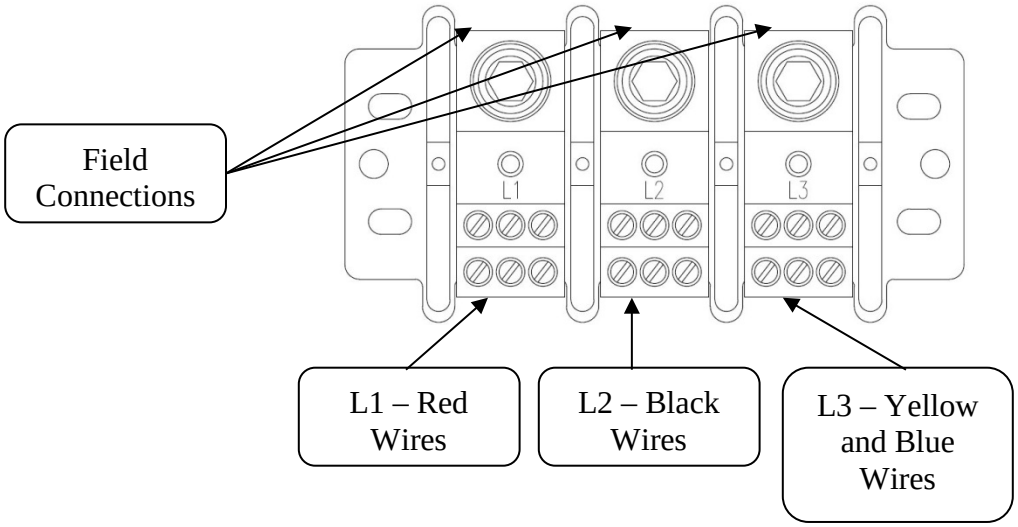


Figure 11. Three Phase Terminal Block Connections

2. Connect yellow wires to terminal L-1 of the terminal block. The red wires should remain connected to L-1 of the terminal block as it was originally manufactured.
3. Connect blue wires to terminal L-2 of the terminal block. The black wires should remain connected to L-2 of the terminal block as it was originally manufactured. Figure 12 shows the new single phase wire configuration (no more than 2 wires per port opening).

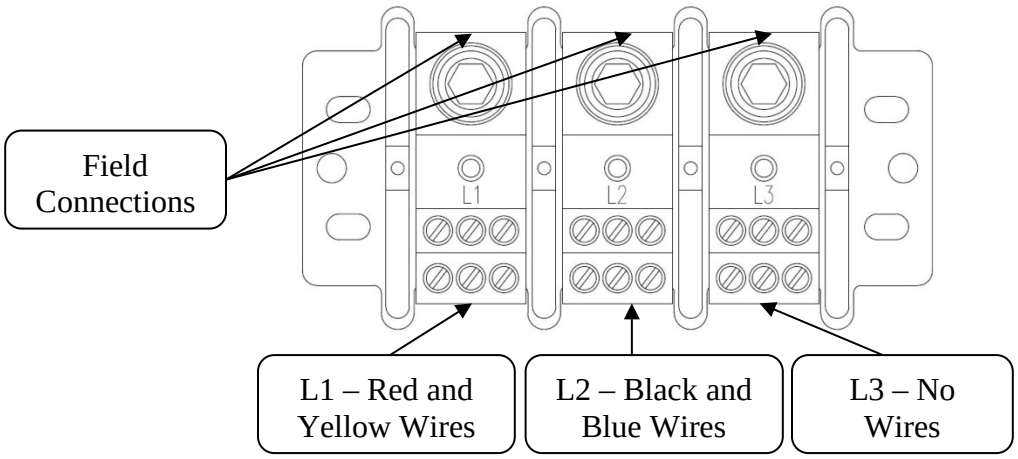


Figure 12. Single Phase Terminal Block Connections

4. Field wiring for the water heater power supply will eventually be connected to the line terminals L-1 and L-2 of the terminal block when the product is installed.

Instructions to convert FROM Single-Phase TO Three-Phase:

1. Figure 12 shows a single phase terminal block as originally manufactured. Disconnect yellow wires from terminal L-1 of the terminal block.

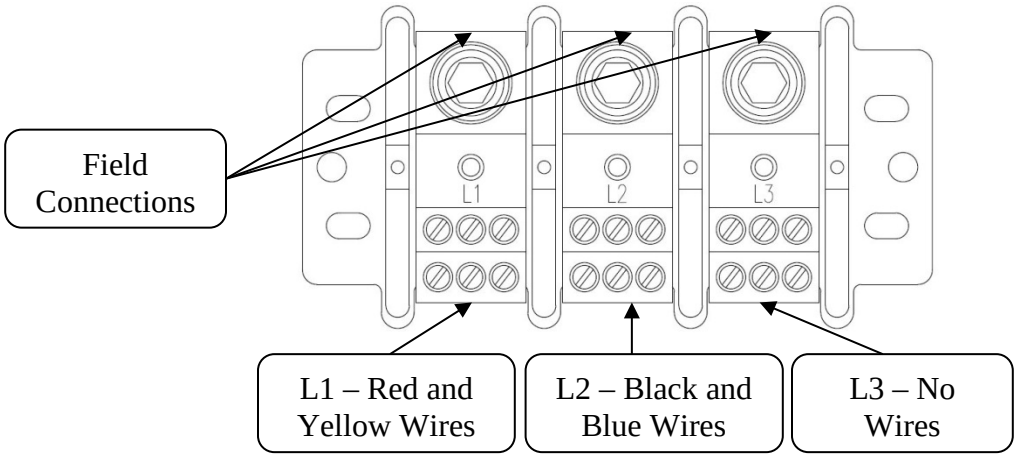


Figure 12. Single Phase Terminal Block Connections

2. Disconnect blue wires from terminal L-2 of the terminal block.
3. Connect both blue and yellow wires to L-3 of the terminal block. Figure 11 shows the new three phase wire configuration.

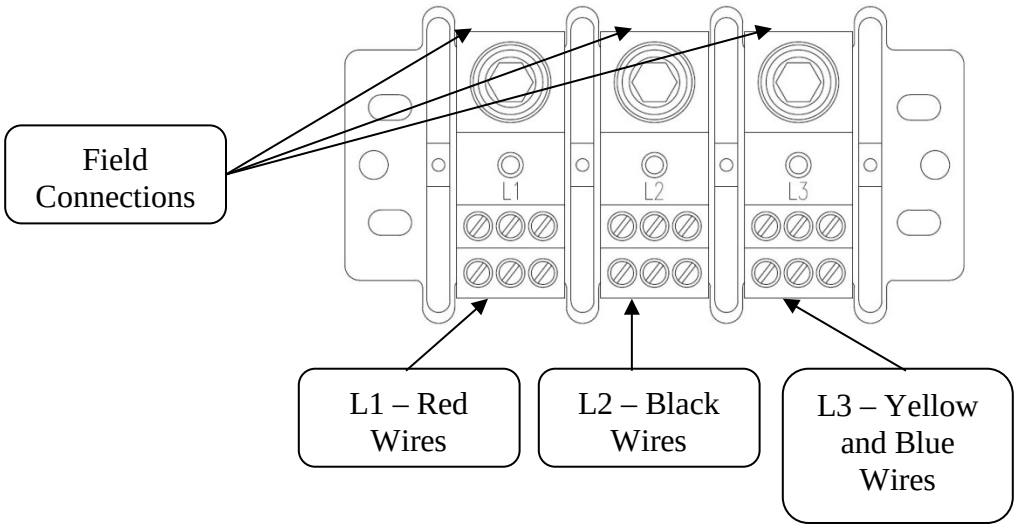


Figure 11. Three Phase Terminal Block Connections

4. Field wiring for the water heater power supply will eventually be connected to the line terminals L-1, L-2, and L-3 of the terminal block when the product is installed.

Re-check and Inspection of Conversion

⚠ WARNING

Re-check and inspect to make certain all components involved in the conversion are correct and secure.

1. Re-check all of the electrical wiring changes made against the wiring diagram requirements for accuracy.

2. Check to insure all of the electrical connections are tightly secured and the electrical wire routings are orderly.

3. Special attention must be given to the electrical heating elements. The wattage and voltage rating of the element is marked on the element itself (see Figure 13 for an example). Confirm the marking agrees with the intended conversion.

Figure 13. Example of Wattage/Voltage Marking on Element

4. Alternatively, the element wattage can be verified by checking the electrical resistance (ohms of resistance) with a multi-meter. This must be done before connecting the element to the circuit. The electrical resistance of the element is checked by pressing the multi-meter leads against the screw terminal on each side of the element (see Figure 14).

Figure 14. Resistance Check of Element using a Multi-Meter

5. The element resistance should be within the range shown in Table 2:

Table 2. Ohms of Electrical Resistance.

Element Wattage	Electrical Resistance of the Element						
	208 volts	240 volts	277 volts	380 volts	415 volts	480 volts	600 volts
2000	20.3-22.9	27.1-30.5	36.1-40.7	67.9-76.5	80.9-91.3	114.3-122.1	169.2-190.8
3000	13.5-15.3	18.0-20.4	24.1-27.1	45.2-51.0	54.0-60.8	72.2-81.4	112.8-127.2
4000	10.2-11.4	13.5-15.3	18.0-20.4	33.9-38.3	40.5-45.7	54.1-61.0	84.6-95.4
4500	9.0-10.2	12.0-13.6	16.1-18.1	30.2-34.0	36.0-40.6	48.1-54.3	75.2-84.8
5000	8.2-9.2	10.8-12.2	14.4-16.2	27.2-30.6	32.3-36.5	43.3-48.9	67.7-76.3
6000	6.7-7.6	9.0-10.2	12.0-13.6	22.7-24.5	27.0-30.4	36.1-40.7	56.4-63.6

Concluding Steps

1. Refer to Figure 13, which displays a typical commercial electric rating plate that must be altered. This rating plate is placed on every commercial electric water heater produced by Bradford White Corporation. Locate this rating plate on the water heater you have just converted. If the kW rating or the voltage rating of the water heater was modified, the rating plate must be modified because the conversion altered the electrical characteristics of the water heater.

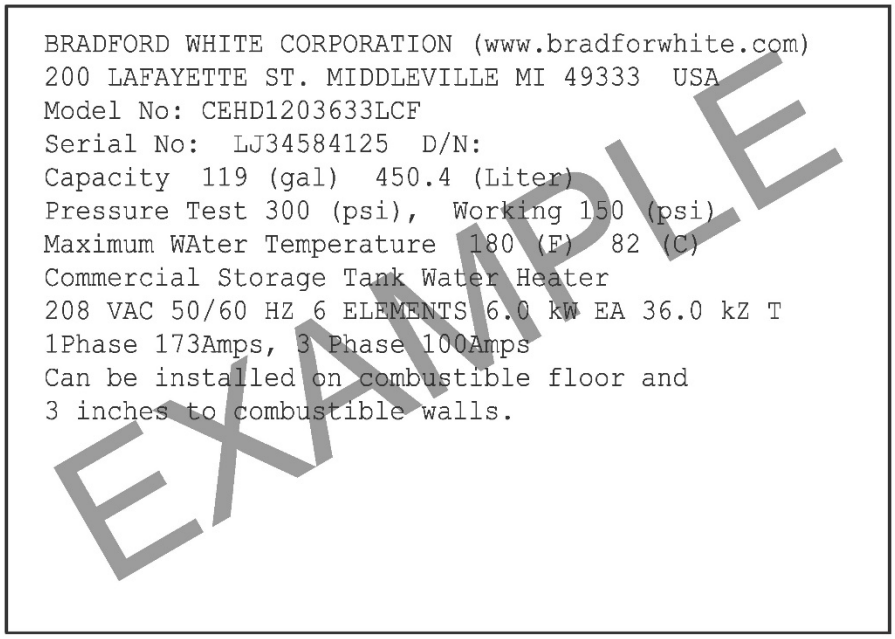


Figure 13. Typical Commercial Electric Rating Plate

2. Locate the adhesive backed label (see Figure 14) that is provided inside the kit. The label will be marked with the new electrical data that is accurate for the conversion just executed.

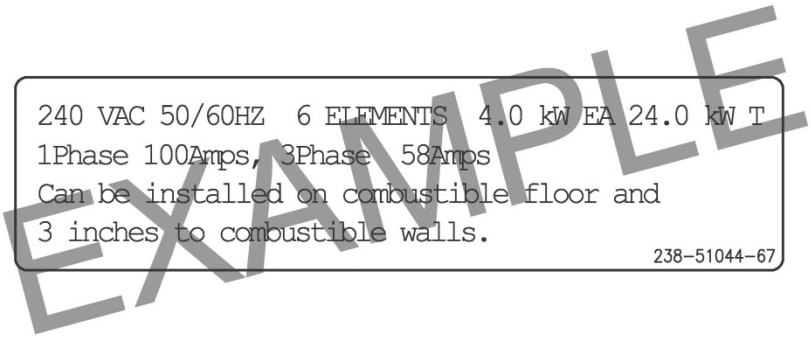


Figure 14. Adhesive Backed Label Overlay

3. Remove the adhesive peel strip and place this label onto the rating plate in such a manner that the new electrical data will appear in place of the data originally marked (see Figure 15).

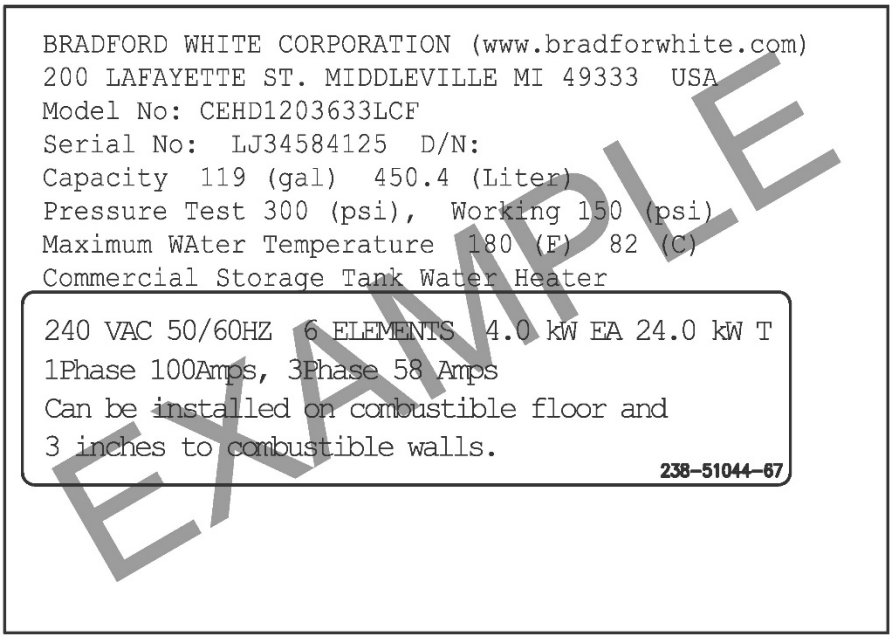


Figure 15. Rating Plate with Overlay

4. Replace the insulation pieces in the lower portion of the control box that were removed in Step 3 of the Water Heater Preparation instructions.

Figure 16. Inside Control Box

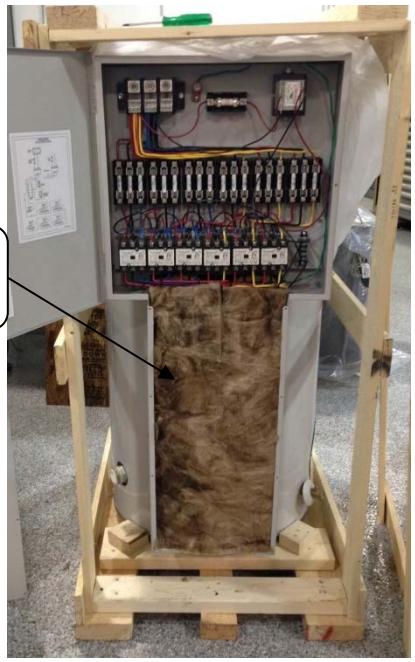


Figure 17. Inside Control Box

5. Close the control cabinet door and secure with the screws removed in Step 2 of the Water Heater Preparation instructions. If the converted water heater had a wider control box, replace the element cover with the screws removed in Step 2 of the Water Heater Preparation instructions.

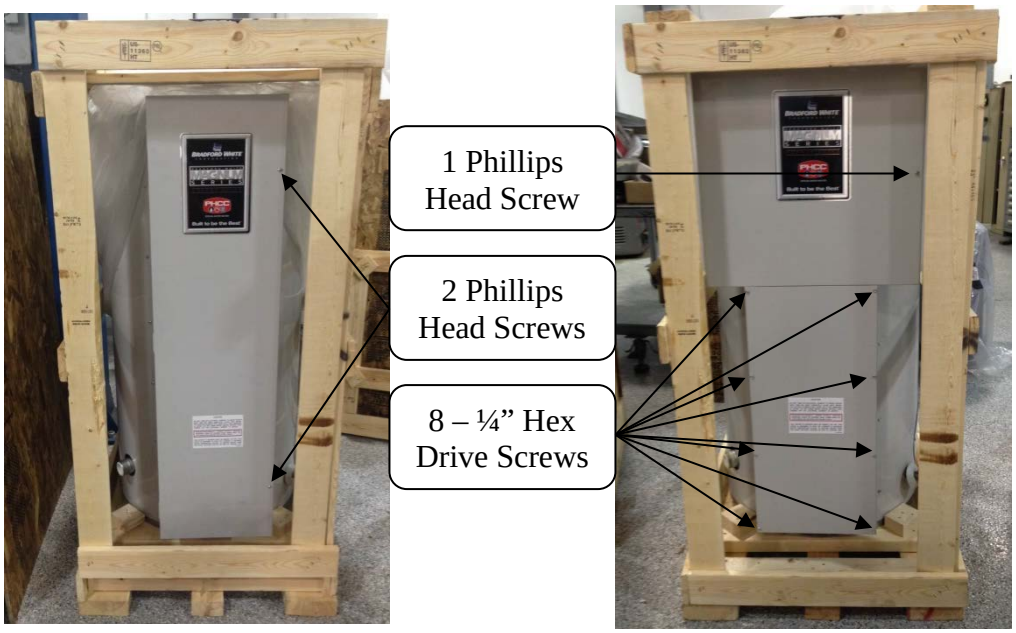


Figure 18. Control Cabinet Screws

Figure 19. Control Cabinet Screws

6. Nail or staple the wooden slat that was removed in Step 1 of the Water Heater Preparation instructions back into its original position.

Fig. 20 Water Heater Shown in Crating

7. The water heater identification information that was placed on the water heater wooden crate must also be altered. This can be done by making a bold face inscription on the wooden crate with a large size black ink marker. Write the new electrical data in place of the original data.

NOTES

NOTES

BRADFORD WHITE®
WATER HEATERS

Ambler, PA

For U.S. and Canada field service,
Contact your professional installer or
local Bradford White representative.

Sales/**800-523-2931**
*Fax/**215-641-1670***
*Parts Fax/**215-641-2180***

Technical Support/**800-334-3393**
*Fax/**269-795-1089***

Warranty/**800-531-2111**
*Fax/**269-795-1089***

International:
Telephone/**215-641-9400**
*Telefax/**215-641-9750***

BRADFORD WHITE™
WATER HEATERS

Halton Hills, ON

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