

# ***BTH ULTRA*** *Electric Boilers*

Models ranging from 6 kW to 33 kW :  
120/240 Volts ( 1 phase )

## **INSTALLATION & OPERATION MANUAL**



Your *BTH ULTRA Electric Boiler* has been carefully assembled and factory tested to provide years of trouble-free service. The following information and safety measures are provided to enable proper installation, operation, and maintenance of this product.

It is imperative that all persons who are expected to install, operate or adjust this boiler should read these instructions carefully.

Any questions regarding the operation, maintenance, service or warranty of this electric boiler should be directed to the supplier.

When all installation steps have been completed, insert this installation manual in its original envelope, and keep in a safe place (close to the boiler) for future reference.

## Section 1: DIMENSIONS AND SPECIFICATIONS

**Table 1: Electric Ratings for 240 VAC / 1 ph (3 wires cable)**

Model	Capacity KW at 240Vac**	Nominal amperage at 240VAC (Éléments seul.)* Amp.	Eléments	Stages	Wires Cu** 90°C	Fuse/ Breaker** A
BTH ULTRA 6	6	25.0	2 X 3KW	2	8	40
BTH ULTRA 8	8	33.3	1X 3KW 1 X 5KW	2	8	50
BTH ULTRA 10	10	41.6	2 X 5KW	2	6	60
BTH ULTRA 12	12	50.0	4 X 3KW	4	6	70
BTH ULTRA 15	15	62.5	2 X 3KW 2 X 4.5KW	4	6	80
BTH ULTRA 18	18	75.0	4 X 4.5KW	4	4	100
BTH ULTRA 20	20	83.4	4 X 5KW	4	3	110
BTH ULTRA 24	24	100.0	4 X 6KW	4	3	125
BTH ULTRA 27	27	112.5	6 X 4.5KW	6	2	150
BTH ULTRA 30	30	125.0	6 X 5KW	6	1	175
BTH ULTRA 33	33	138.0	3 X 5KW 3 X 6KW	6	1/0	175

\*Add electric consumption of the pump (max. 5A-1/6hp)and accessories if required.

\*\* Models 6 to 24kW are also certified for Aluminum cables of higher gauge.

Add electric consumption of the pump (max. 5A-1/6hp)and accessories if required.

Local Electrical codes may require different cable gauge according to the type of installation.

On a 208Vac supply, the capacity is reduced of 25% and the amperage of 13%

1kW=3412Btu

**Table 2: Connections sizes & Boiler overall dimensions**

Connections sizes		Boiler overall dimensions	
Boiler Inlet	1 " NPT M	Height	12 3/16 inches
Boiler Outlet	1 " NPT M	Width	16 7/16 inches
Waterworks	1/2 " NPT F	Depth	24 ½ inches
Safety valve	3/4 " NPT F	Shipping weight	99 lbs.
Drain valve	1/2 " NPT F		

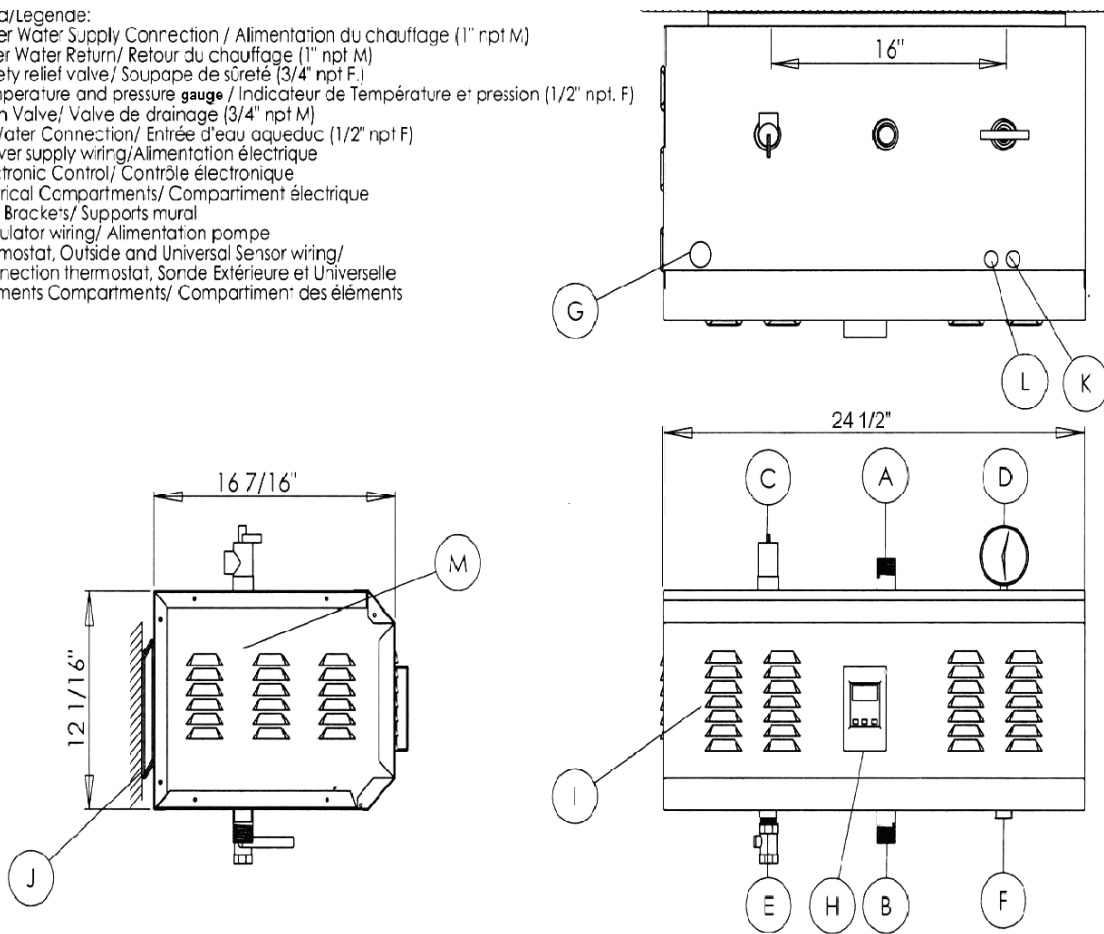
**Operating temperature : from 50°F to 190°F (10 to 90C)**

**Maximum operating pressure: 30 psi (207kPa)**

## Figure 1 : Component identification

Legend/Legende:

- A) Boiler Water Supply Connection / Alimentation du chauffage (1" npt M)
- B) Boiler Water Return/ Retour du chauffage (1" npt M)
- C) Safety relief valve/ Soupape de sûreté (3/4" npt F.)
- D) Temperature and pressure gauge / Indicateur de Température et pression (1/2" npt. F)
- E) Drain Valve/ Valve de drainage (3/4" npt M)
- F) Fill Water Connection/ Entrée d'eau aqueduc (1/2" npt F)
- G) Power supply wiring/Alimentation électrique
- H) Electronic Control/ Contrôle électronique
- I) Electrical Compartments/ Compartiment électrique
- J) Wall Brackets/ Supports mural
- K) Circulator wiring/ Alimentation pompe
- L) Thermostat, Outside and Universal Sensor wiring/ Connection thermostat, Sonde Extérieure et Universelle
- M) Elements Compartments/ Compartiment des éléments





## General Safety Precautions

Be sure to read and understand the entire Use & Care Manual before attempting to install or to operate this electric boiler. Pay particular attention to the following General Safety Precautions. Failure to follow these warnings could cause property damage, bodily injury or death. **Should you have any problems understanding the instructions in this manual, ask for help from a qualified installer or technician.**

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## Section 2: INTRODUCTION

### WARNING

**The important safeguards and instructions appearing in this manual are not meant to cover all possible conditions and situations that may occur. It should be understood that common sense, caution and care are factors which cannot be built into every product. They are the responsibility of the person(s) caring for and operating the unit.**

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### 2.1 LOCAL INSTALLATION REGULATIONS

This electric boiler must be installed in accordance with these instructions and in conformity with local codes, or in the absence of local codes, with the National Plumbing Code and the National Electric Code current edition. In any case where instructions in this manual differ from local or national codes, the local or national codes take precedence.

### 2.2 CORROSIVE ATMOSPHERE

The electric boiler should not be located near an air vent containing a corrosive atmosphere or high humidity. The limited warranty is void when the failure of the electric boiler is due to a corrosive atmosphere.

### 2.3 INSPECT SHIPMENT

Inspect the electric boiler for possible shipping damage. The manufacturer's responsibility ceases upon delivery of goods to the carrier in good condition. Consignee must file any claims for damage, shortage in shipments, or non-delivery immediately against carrier.

### 2.4 CHECK LIST

Please check the identification tag on the unit to make sure you have the right model.

#### List of components shipped with the unit :

- Pressure relief valve set at 30 PSI.
- Drain valve.
- Outdoor temperature sensor
- Tridicator (temperature & pressure gauge).

### CAUTION

**The electric boiler should not be located in an area where leakage of the tank or water connections will result in damage to the adjacent area or to lower floors of the structure. When such areas cannot be avoided, a suitable drain pan or non-flammable catch pan, adequately drained, must be installed under the boiler. The pan must be connected to a drain.**  
**NOTE: Auxiliary catch pan MUST conform to local codes.**

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## Section 3: INSTALLATION

### WARNING

The manufacturer's warranty does not cover any damage or defect caused by installation, or attachment, or use of any special attachment other than those authorized by the manufacturer into, onto, or in conjunction with the boiler. The use of such unauthorized devices may shorten the life of the boiler and may endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized devices

### 3.1 SECURITY CONSIDERATIONS

Domestic and commercial installations have a maximum design operating pressure limited to 30 psi (207 kPa) by a safety relief valve.

This boiler is designed to operate on a closed circuit system operating between 50 to 190°F. This boiler is designed **to be used only** in a hot water heating system.

The hi-limit control of the unit is fixed and set at 212F (100C). If the heating distribution system on which the boiler is installed requires a hi limit controller set at a lower temperature, this controller will have to be added to the system and connected in series with the hi-limit installed at the factory.

### WARNING

The heat transfer medium must be water or other non-toxic fluid. An antifreeze solution with propylene glycol specially formulated for heating system could be used up to a maximum concentration of 50%,

### 3.2 LOCATION

The electric boiler should be installed in a clean, dry location. Long hot water lines should be insulated to conserve water and energy. The electric boiler and water lines should be protected from exposure to freezing temperatures.

The electric boiler must be installed horizontally, directly on the wall or on an adequate ground support. On wall hung applications, use the supplied wall mounting brackets. It is held on the wall by four 5/16" lag screws. The openings are located at 16" intervals (i.e. standard stud spacing). When the first bracket is installed you can hang the boiler on the wall (see figure 1). The lag screws must be suitably anchored to safely support the weight of the boiler including water content, piping and wiring.

The electric boiler must be located or protected so as not to be subject to physical damage, for example, by moving vehicles, area flooding, etc. All models can be installed on combustible floors and in alcoves. Ambient temperature must not exceed 90°F or 32°C.

### 3.3 CLEARANCE

Minimum clearances for adequate inspection and servicing are listed in the following table:

**Table 3: Boiler clearance**

Left side	16 inches
Right side	6 inches
Top & Bottom of the boiler	6 inches
Front side of the boiler	24 inches
Back side of the boiler	0 inch

### 3.4 PIPING INSTALLATION

#### 3.4.1 Type of installation

You will find below on figures 2 to 6 typical piping arrangement for the two main types of installation. The first being as a self operating unit and the others being connected to an auxiliary boiler in dual-energy.

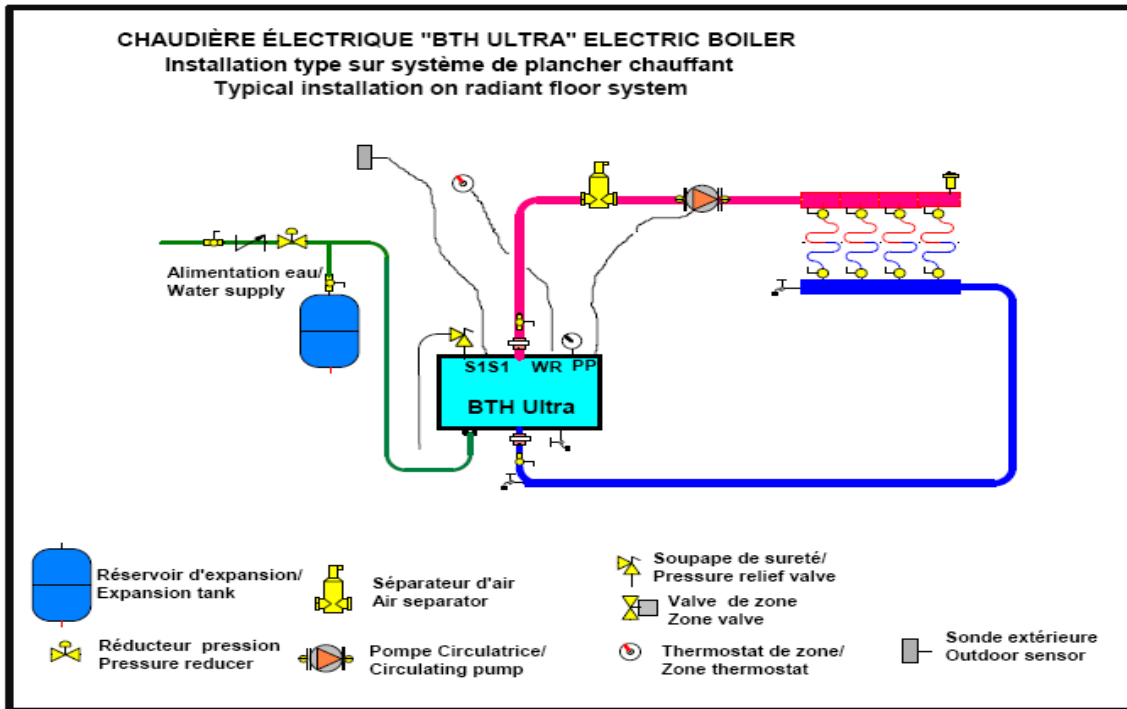


Figure 2

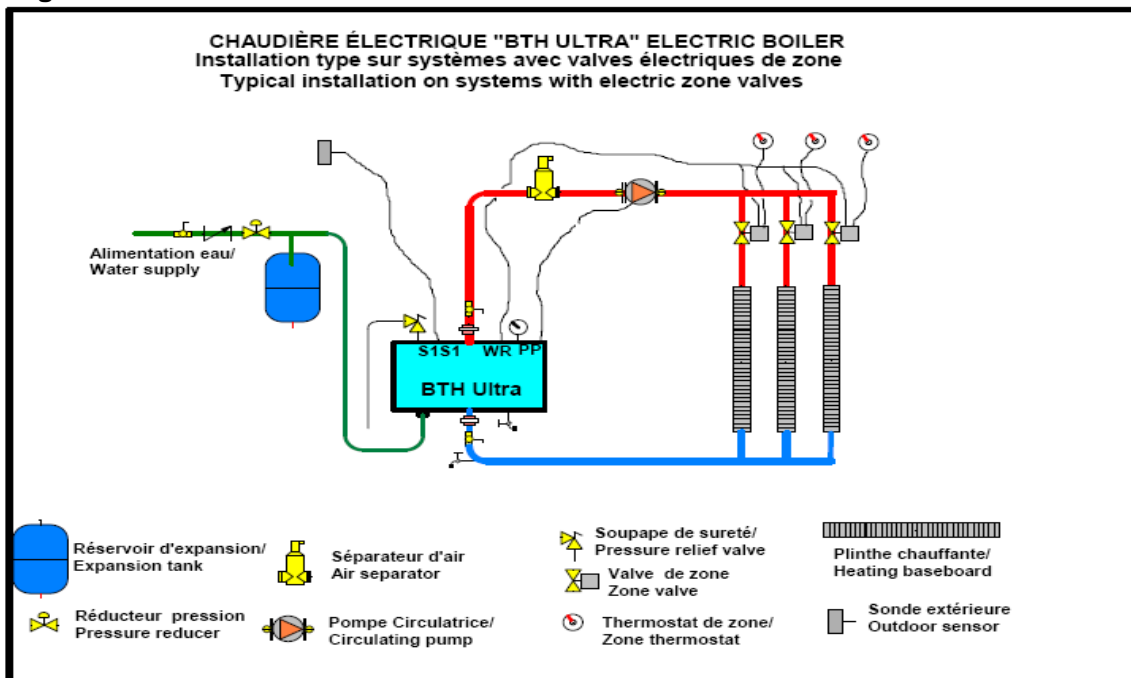


Figure 3

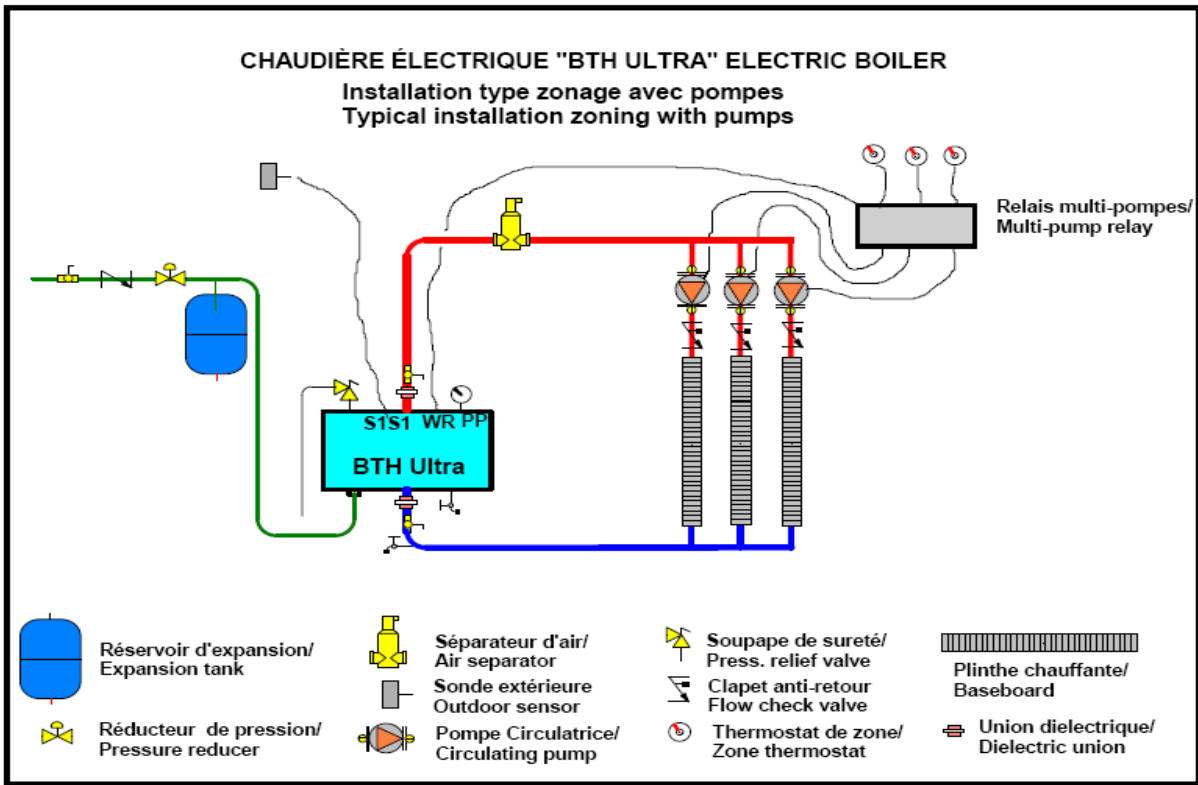


Figure 4

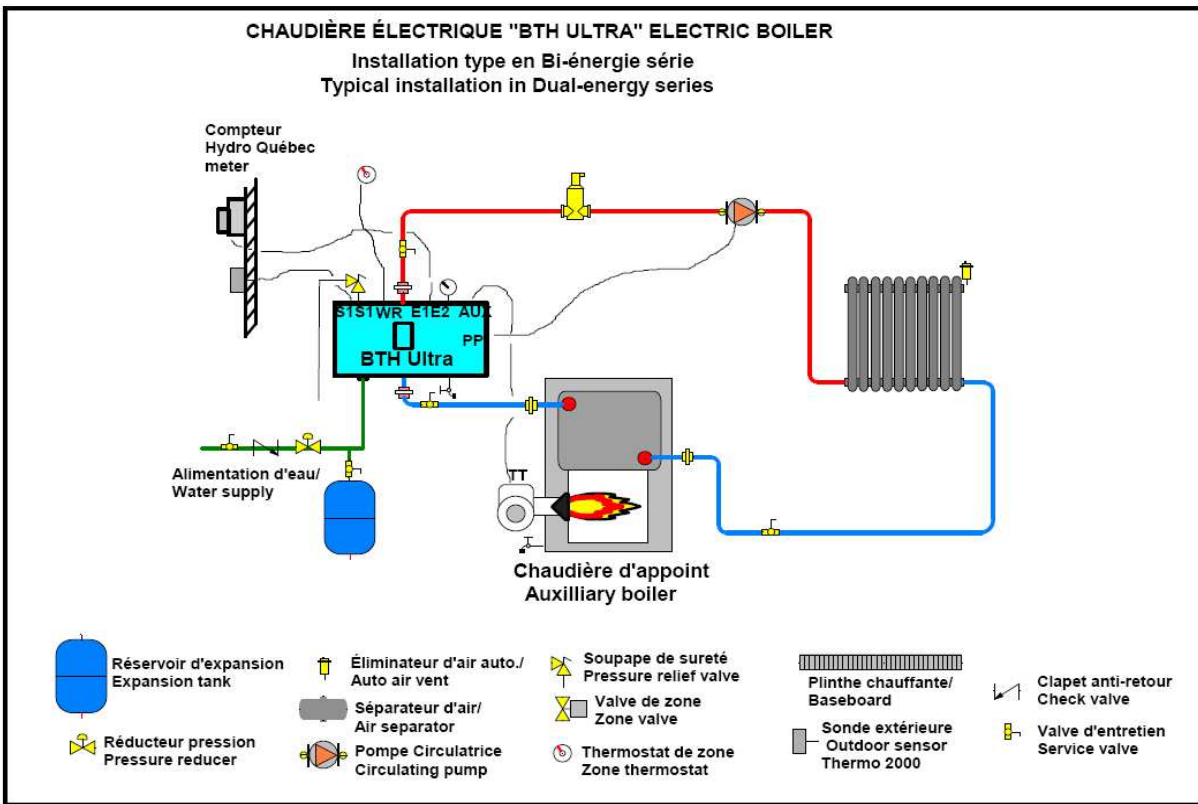
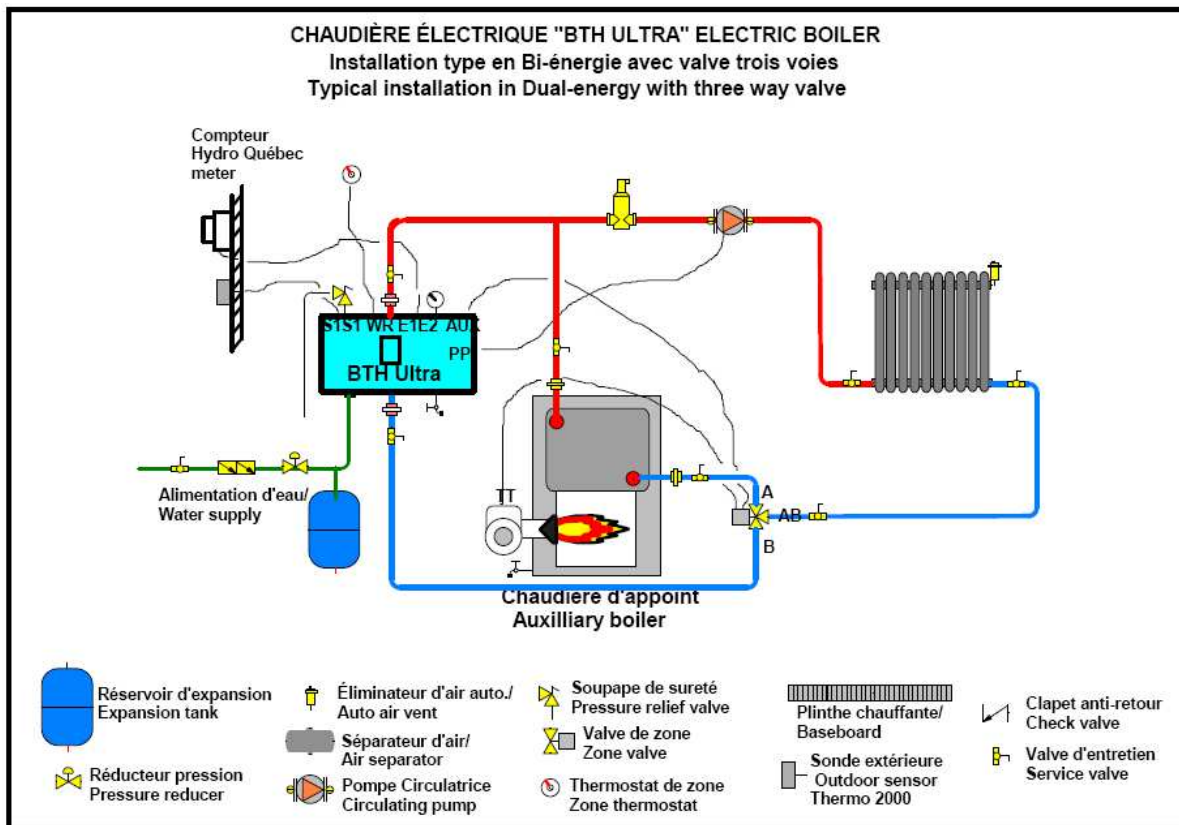


Figure 5



**Figure 6**

### 3.4.2 Boiler piping

The outlet of the boiler is located on the top side, and the inlet of the boiler is located on the bottom side of the boiler. They are steel pipes (1" male NPT threaded connection) where the connections are to be made.

Installing a union is recommended on the boiler water outlet and inlet piping to facilitate boiler disconnection for servicing.

Dielectric unions are required for protection of the boiler and piping if dissimilar pipe material such as galvanized steel and copper are present.

Use only clean pipe for boiler water lines. Local codes or regulations shall govern the exact type of material to be used.

Insulate all pipes containing hot water, especially in unheated areas.

Install shutoff (ball) valves for servicing convenience.

Cap or plug unused connections on the boiler. **Do not cap the pressure relief valve** on the boiler since it will damage and shorten the life of the boiler and may endanger life and property.

### 3.4.3 Pressure relief valve

An automatic pressure relief valve must be installed during boiler setup. The pressure rating of the relief valve must not exceed 30 psi.

Connect the outlet of the relief valve to a discharge line going to 6" above a floor drain, away of any live electrical parts. The discharge line must pitch downward from the valve to allow complete draining by gravity of the relief valve and discharge line, and be of a diameter no smaller than that of the valve outlet. The tip of the discharge line should not be threaded or concealed and should be protected from freezing. No valve of any type, restriction or reducer coupling should be installed on the discharge line. Local codes shall govern the installation of relief valves.

### 3.4.4 Expansion tank

The increase in boiler water volume resulting from higher temperature is stored in the expansion tank during periods of high operating temperature and is returned to the system when the temperature decreases.



If it is not properly sized, the system pressure will get above the allowable operating pressure of 30psi (207kPa) and the pressure relief valve will open. Contact your local heating distributor for proper selection.

### 3.4.5 Pressure regulator

An automatic water feeding system **must be employed** as required by codes. An **automatic fill valve** must be used with a backflow preventer as required, to maintain minimum system pressure by supplying water to make up for leakage. The minimum usual pressure is 12psi.

### 3.4.6 Air bleeder

Installation of manual or automatic air vent devices prevents air from accumulating in the system. Air vents should be installed at all high points to remove trapped air during initial setup and to ensure that the system is tight. Regularly purge the air out of the system while taking care to avoid personal injuries or property damage caused by hot boiler water spray.

### 3.4.7 Pump selection

Performance characteristics of centrifugal pumps are described by pump curves, which plot flow versus head of pressure together with other information such as efficiency and power. Consult the manufacturer's pump curves to select the proper model or ask your pump dealer or your HVAC wholesaler for a recommendation.

Table below shows required flow in relation to the power capacity of the boiler and selected temperature drop in the heating distribution system. On System with baseboard heaters, 20F

temperature drop is normally recommended and on radiant floor application a value of 10F is generally used.

**Table 4: Temperature rise vs flow rate (GPM)**

Model	KW	BWTD			
		10° F	20°F	30°F	40°F
BTH ULTRA 6	6	4,1	2,0	1,4	1,0
BTH ULTRA 8	8	5,5	2,7	1,8	1,4
BTH ULTRA 10	10	6,8	3,4	2,3	1,7
BTH ULTRA 12	12	8,2	4,1	2,7	2,0
BTH ULTRA 15	15	10,2	5,1	3,4	2,6
BTH ULTRA 18	18	12,3	6,1	4,1	3,1
BTH ULTRA 20	20	13,7	6,8	4,6	3,4
BTH ULTRA 24	24	16,4	8,2	5,5	4,1
BTH ULTRA 27	27	18,4	9,2	6,1	4,6
BTH ULTRA 30	30	20,5	10,2	6,8	5,1
BTH ULTRA 33	33	22,5	11,3	7,5	5,6

### 3.4.8 Dual Energy piping

Piping connections between the two boilers can be made in parallel or in series as illustrated in fig. 5&6.

When installed in parallel, a three way motorized valve (1"NPTF) is used to guide the heating system return water toward the appropriate boiler according to the operating mode in demand. This way, the oil or gas boiler is not maintained hot by the return water when the operation is in Electricity.

N.B.: Make sure to select the appropriate port A, B and AB when making the connection of the piping (see fig.6)

## 3.5 ELECTRIC CONNECTIONS

### 3.5.1 Main Electric supply

Wiring must conform to the National Electrical Code and to state or local code requirements.

Wiring must be from a 120/240 Volt (single phase, 60 Hz) circuit protected by a properly sized breaker. Wire gauge (3 wires+ground) must be properly sized. Consult the boiler rating plate to select the proper breaker and wire gage.

Models 6 to 24 kW are certified for CU/AL cables. Aluminum cables being generally bigger than copper.

### 3.5.2 Connecting the thermostat and pump.

#### 3.5.2.1 Single heating zone

Using a 18 gauge cable, connect a low voltage thermostat to terminals **R W** (2 wire thermostat) **C R W** (3 wire thermostat) on the electric panel (**DO NOT apply any power to these terminals**).

Connect the pump directly to the **P P** 120volts terminals of the boiler using a 14gauge cable.

N.B. The amperage drawn by the pump shall not exceed 5A or 1/6HP

A two stage thermostat could also be installed. Then the second heating stage would be used to activate the “Boost” program allowing the boiler target to be gradually increased (see section 4.10).

### 3.5.2.2 Multi-Zone systems

#### □ Zoning with motorised valves

The components shall be connected in such a way that when a thermostat is in demand, only the corresponding valve opens. Connect the zone valve end switch to terminals **R W** on the electric panel (**DO NOT apply any power to these terminals!**). Proper connection of the valve shall be made according to the manufacturer instruction.

Connect the circulating pump to terminals **P1 P2** 120v of the boiler

N.B. The amperage drawn by the pump shall not exceed 5A or 1/6HP

Typical connection schematic below

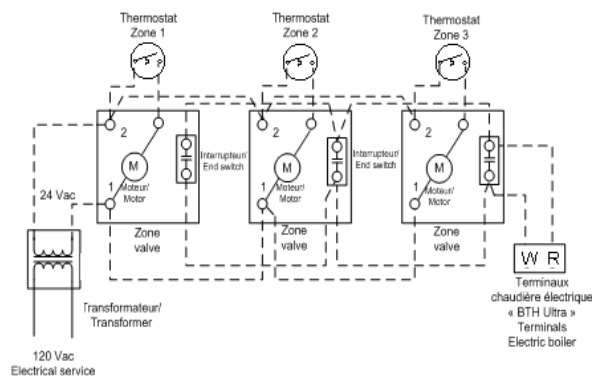


Figure 7

#### □ Circulator zoning

The components shall be connected in such a way that when a thermostat is in demand, only the corresponding pump is activated. Connect the low voltage thermostat to the corresponding pump relay (Honeywell #RA-832 or multipump relay) and connect its auxiliary dry contact to terminals **R W** on the electric panel (**DO NOT apply any power to these terminals!**).

The **P P**, 120V terminals will then not be used.

N.B.: Do not install a jumper between the **R W** terminals of the boiler.

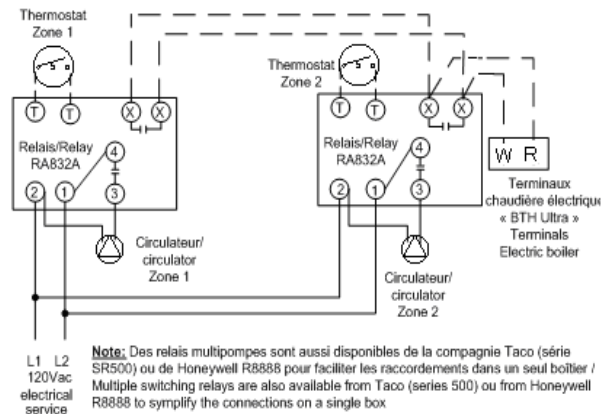


Figure 8

### 3.5.3 Outdoor sensor

If you wish that the target boiler temperature modulate according to the outdoor temperature (the target temperature will increase as the outdoor temperature drops), the supplied outdoor sensor will need to be connected to **S1 S1** terminals. It will need to be connected before applying the electrical power to the unit.

The installation of the sensor enables also to stop the operation of the boiler when the outdoor temperature gets to a temperature when no need for heating is required.

If you wish to operate the boiler at a fixed temperature set point, do not install the sensor before applying the power to the unit.

The sensor should be located on an insulated wall exposed to outdoor temperature. The selected location should best reflect the heat load of the building. Generally a North wall except on a building having large window areas exposed to the South where the sensor should then be located.

The sensor shall be connected to **S1 S1** terminals using 18ga. wires not exceeding 200ft. **Do not apply current to these terminals.**

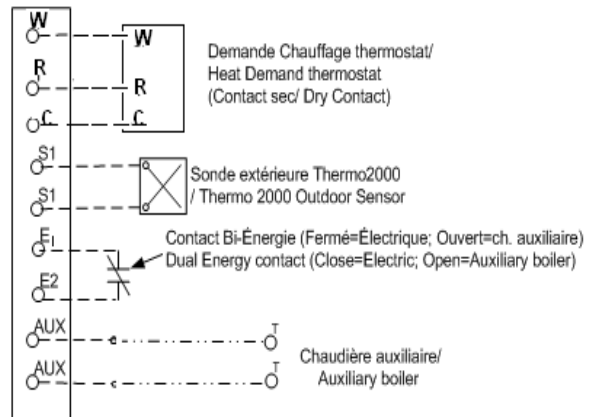
### 3.5.4 Dual-energy connection with an auxiliary boiler.

The BTH ULTRA boiler is designed to enable the installation on Dual-energy applications without the need to install an interface controller between the boilers and the electricity supplier authorization signal. Upon the reception of that signal, the BTH ULTRA will select the appropriate heating mode and will activate the required boiler.

If the heating distribution system is equipped with only one pump connected to the **P P** terminals of the boiler, it will be activated on heat calls from the thermostat whatsoever the heating mode selected.

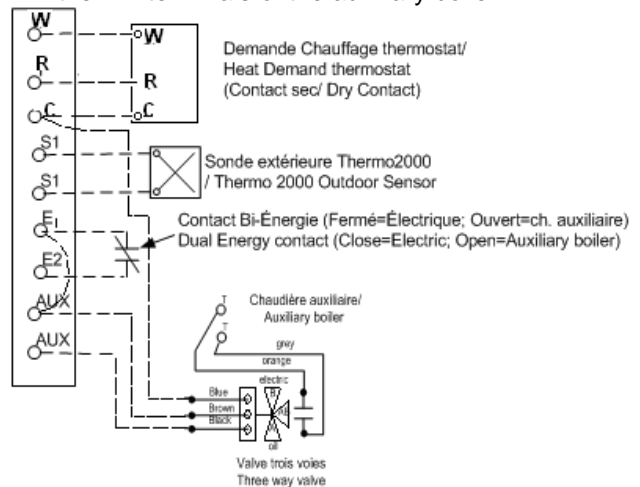
To do so,

- Open the front access panel to the boiler electric compartment where the controller is mounted and position the switch located on its back at “Bi-Energie”.
- Install a 2 wire 18ga cable between the contact (N/F close contact to allow the operation in electricity, Red R wire and green V wire of Hydro-Quebec) of the authorization signal to terminals **E1E2** of the electric boiler.
- If the piping installation is made as shown on fig.5 then without three way valve, install an 18ga two wire cable between boiler terminals “**AUX**” and the **R W** terminals of the auxiliary boiler.
- N.B. The capacity of the **AUX** contact is 2A/24Vac max.
- See the operating sequence in Dual-energy at section 4.11.



**Figure 9: Connexions without three way valve**

- If the installation is made as shown on fig.6, then with a three way valve (in Option) orienting the heating return water only in the operating boiler: Install a three wire 18ga cable between the valve and the electric boiler terminals. Following this, connect the end switch of the valve (grey and orange wire) to the **T T** terminals of the auxiliary boiler.



**Figure10: Connexions with three way valve**

Diagramme électrique/ Wiring diagram BTH UltraSmart 240V  
modèle/ model 6-10 KW

Légende/ Legend

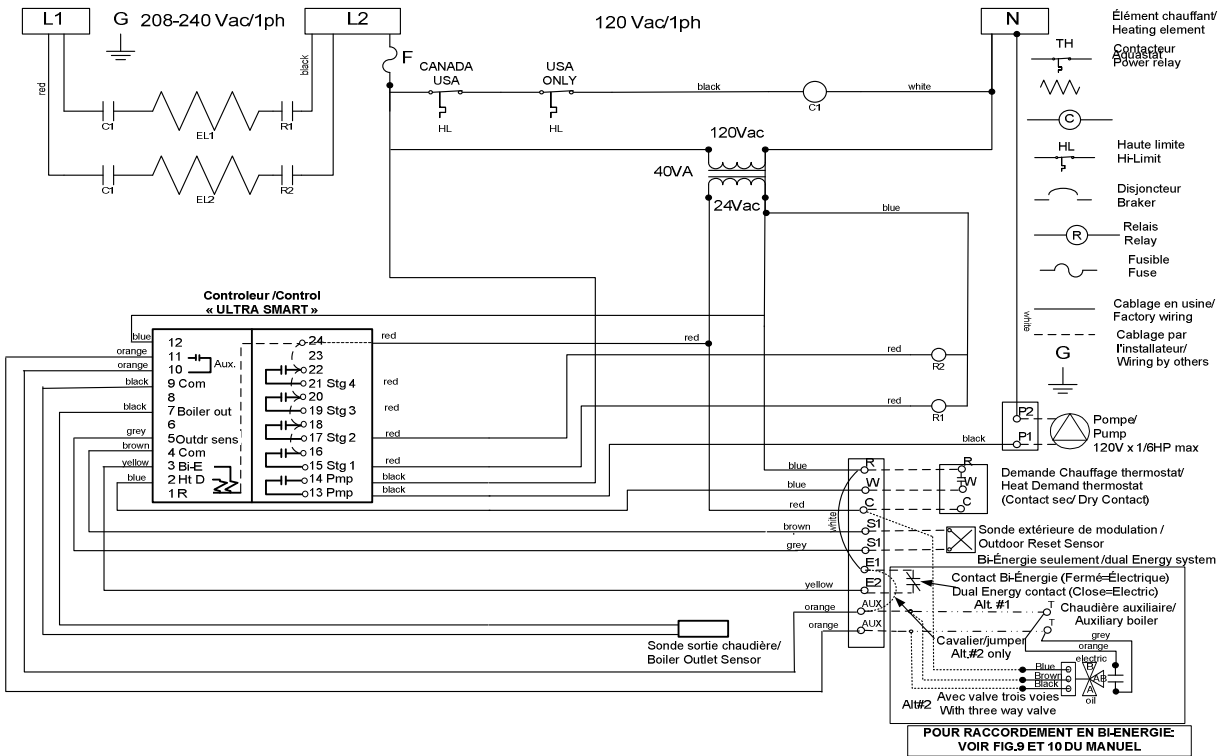


Figure 11

Diagramme électrique/ Wiring diagram BTH UltraSmart 240V  
modèle/ model 12 - 24 KW

Légende/ Legend

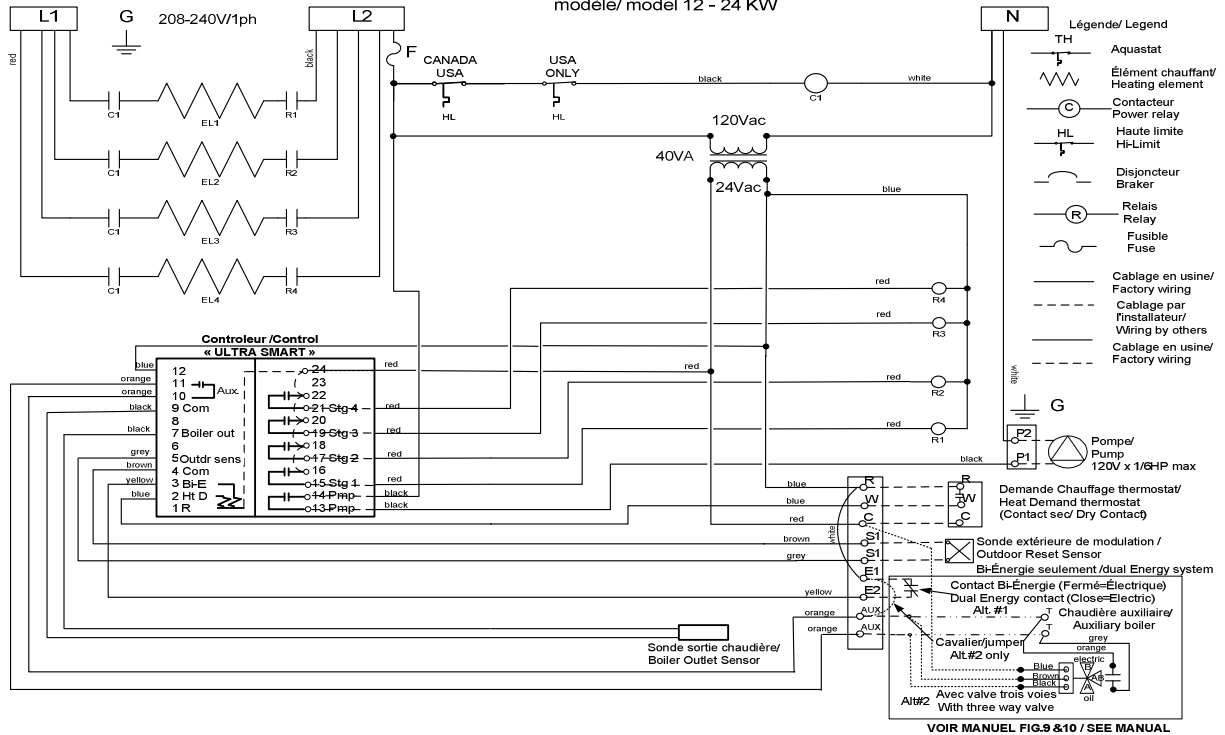
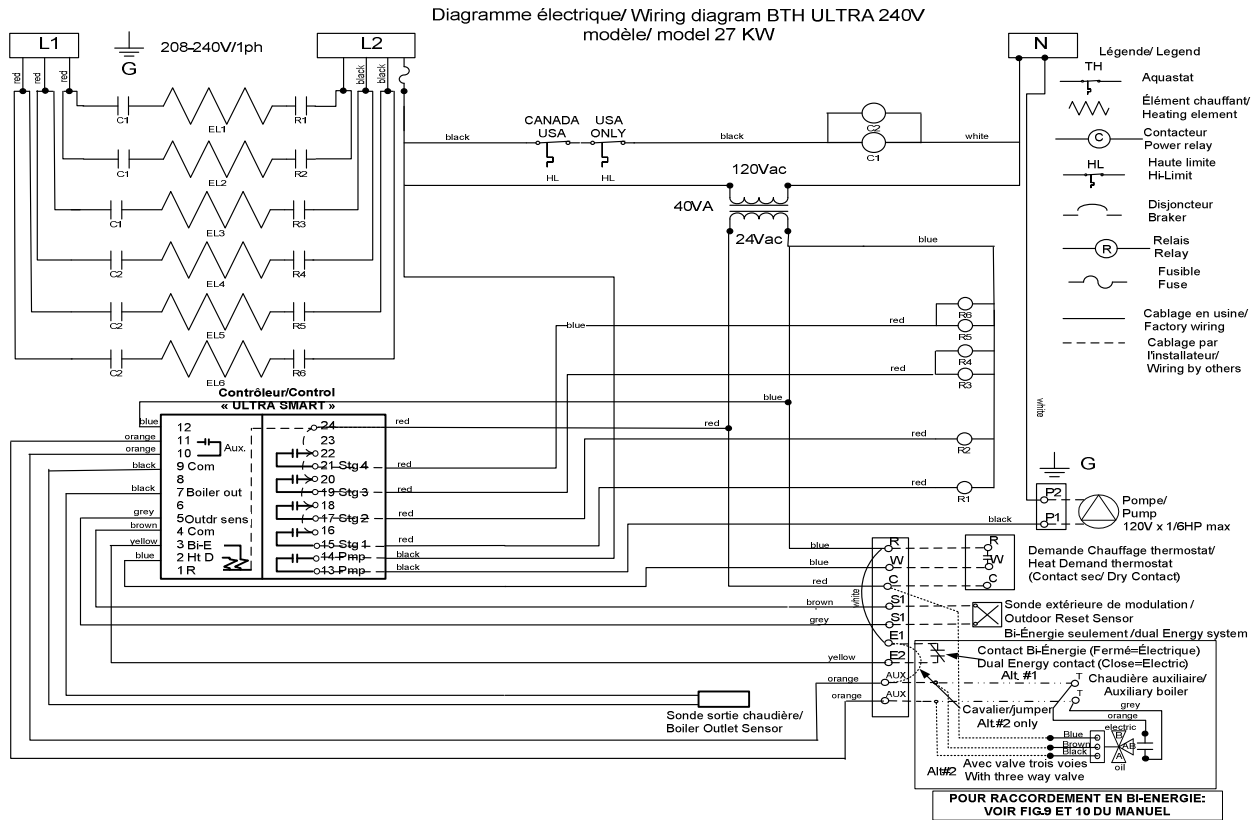
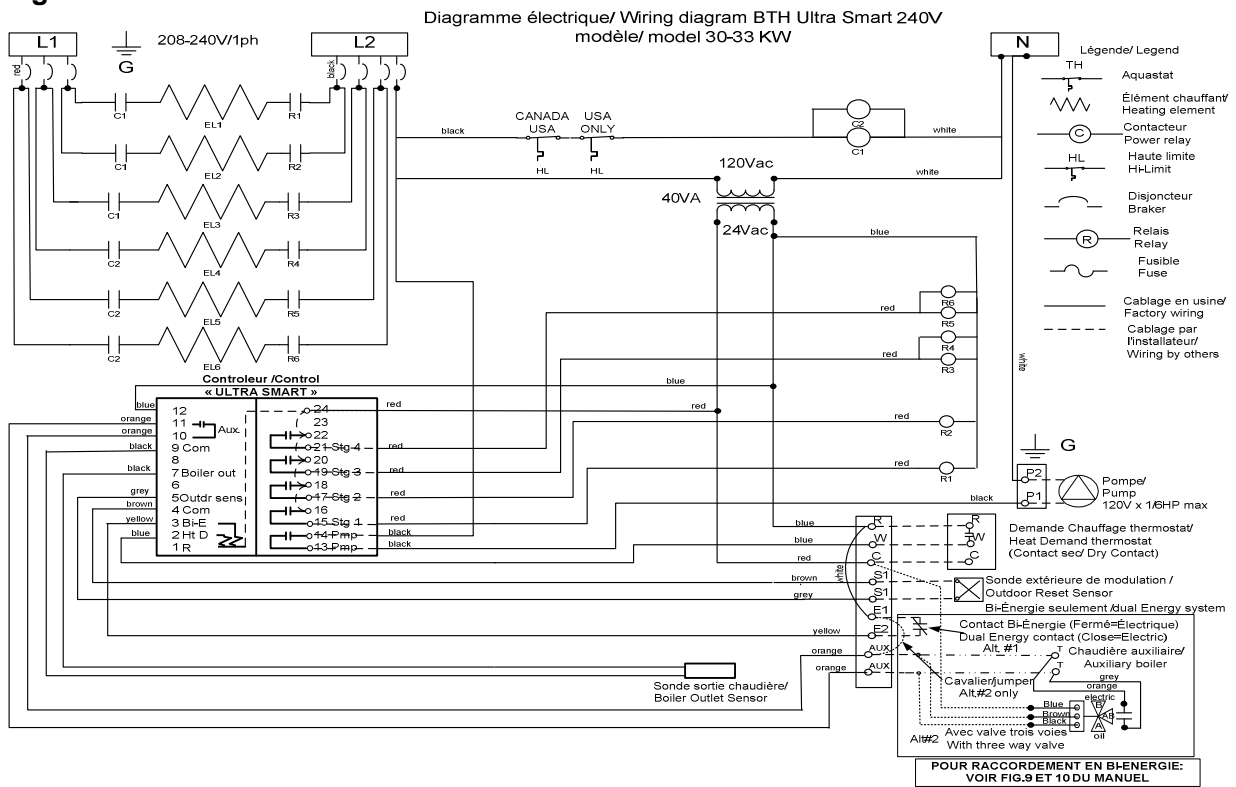


Figure 12



**Figure 13**



**Figure 14**

## Section 4 : ADJUSTMENT OF THE CONTROLLER

### 4.1 INTRODUCTION

The BTH Ultra boiler is mainly designed to be installed on closed circuit applications where the water of the heating system flows directly from the boiler to the heating distribution system (Standard parallel Piping system)

Two operation modes are then offered:

- Fixed boiler temperature set point (the outdoor sensor shall not be installed)

Or

- Outdoor reset

### 4.2 DISPLAYED INFORMATION

The electronic control uses an LCD display to make all adjustments and to visualize the operation of the system.

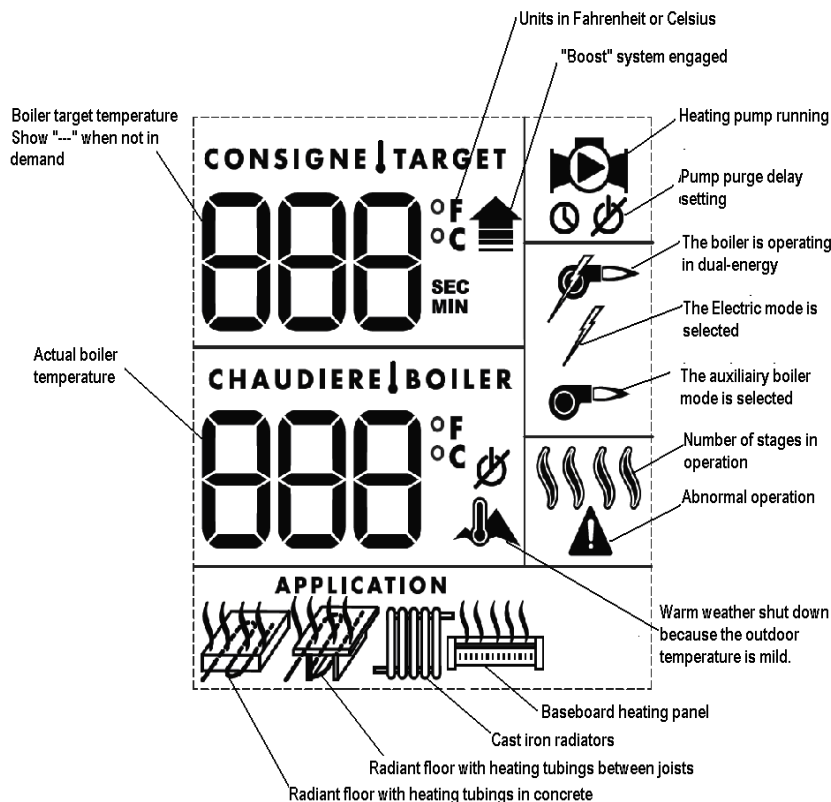



Figure 15





Figure 16

### 4.3 OPERATION OF THE INTERFACE


The controller uses four push buttons at the bottom of the display to select and adjust the parameters.

The button  is used to access the configuration menu and confirm a selection.

The  buttons are used to select an item or adjust a value.

The  button enables the illumination of the display under two different modes.

The default mode will enable the illumination of the display for a period of 10 sec. each time a

button is pressed. If the  is pushed, the light will be continuously illuminated. Just press the button to change the mode of activation.

#### 4.4 OPERATION IN “FIXED BOILER TEMPERATURE SET POINT”

For installation where the boiler target temperature shall be maintained at a fixed temperature that will not vary in relation to the outdoor temperature, the sequence of operation will be as follow:

On a call for heat from the room thermostat, the circulating pump will start and the boiler will activate the number of stages required to get to and maintain the outlet temperature of the boiler near the selected target temperature. A rotation of the stages based on an equal time period of operation is provided.

N.B. The supplied outdoor temperature sensor shall not be connected before applying the electrical power to the unit

#### 4.5 OPERATION WITH “OUTDOOR RESET”:

For installation where the boiler target temperature shall modulate in relation to the outdoor temperature; when the outdoor temperature gets colder, the boiler target temperature will increase.

On a call from the room thermostat, the circulating pump will start and the boiler will activate the number of stages required to get to and maintain the outlet boiler temperature near the target temperature established by the controller according to the outdoor temperature. A rotation of the stages based on an equal time period of operation is provided.

N.B. The supplied outdoor temperature sensor must be connected before applying the electrical power to the unit.

The boiler target temperature will be calculated by the controller in relation to the parameters selected in the menu



and the maximum target temperature required when the outdoor temperature will get to -10F (-23C). The “STD” curve corresponds to the default maximum temperature for a typical system and this value can be modified from the “MIN” to “MAX” value shown on the following tables.

The following tables show the values of the target temperature that will be obtained in relation to the outdoor temperature.

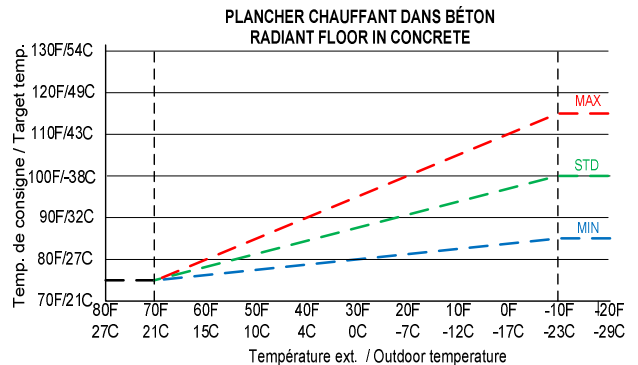


Figure 17: Radiant floor in concrete

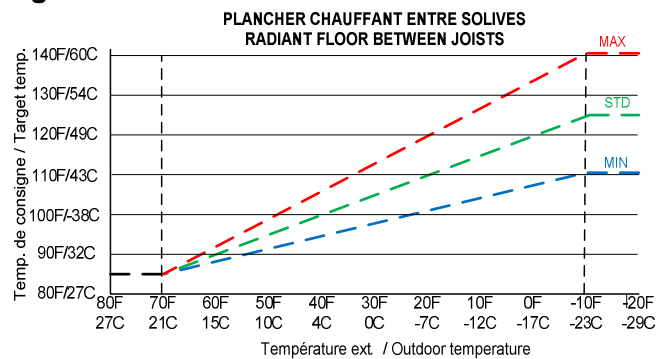


Figure 18 : Radiant floor between joists

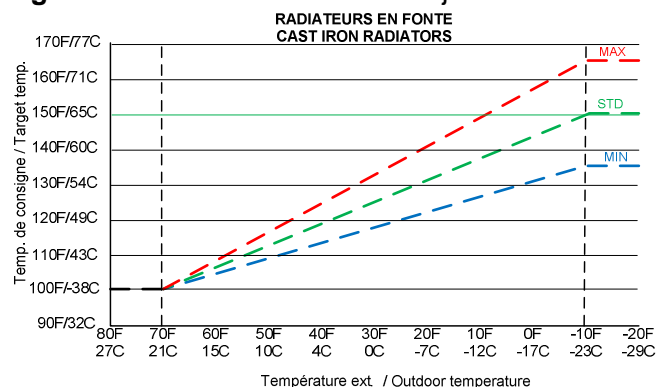


Figure 19 : Cast iron radiators

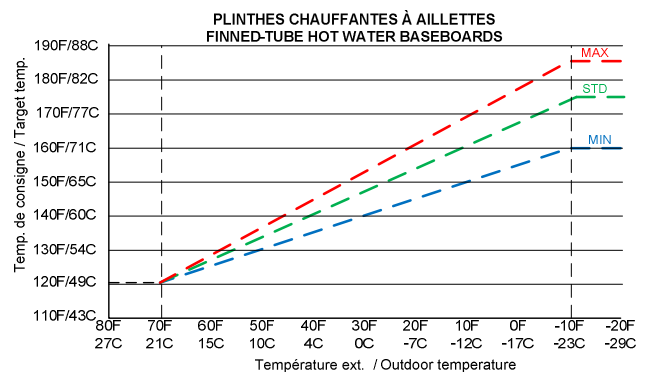


Figure 20 : Hot water baseboards

#### 4.6 PURGE DELAY OF THE PUMP



The controller offers the possibility to stop the operation of the pump after an adjustable delay once the heat demand has been completed.

The following choices are offered:

-“OFF” The pump will stop immediately when the heat demand has been satisfied. This selection shall be selected on systems equipped with motorised fast closing zone valves in order to prevent noise from water hammering.

-“15 sec to 60 min” delay where the pump will be kept running to enable the pump to circulate water into the system to equilibrate the heat in all the building.

-“ON” The pump is in continuous operation. Required on particular heating distribution systems.

#### 4.7 AUTOMATIC HEATING SHUT DOWN



When the outdoor sensor is installed and the unit then operates in the “outdoor reset” mode, the controller offers the user the possibility to automatically stop the boiler when the outdoor temperature reaches an adjustable value (0F (-17C) à 105F (40C)). This characteristic is especially interesting on the following applications:

-Heating systems equipped with many thermostats where the user wants to prevent the operation of the unit if one of the thermostats has inadvertently been activated.

-Heating systems where the owner supplies heat to a lodger

-Systems connected to a geothermic heat pump where we do not want the electric boiler to be operating unless the outdoor temperature drops to a selected degree.

#### 4.8 CONFIGURATION OF THE CONTROLLER

Since each type of heating distribution system is designed to operate at water temperatures that are particular to its operation, the proper configuration of the operating parameters of this particular system is important to maximize its performance.

In order to do this, the installer will first have to tell the controller if the application is in Dual-energy with an auxiliary boiler. The selection is made by selecting the position “Elect.” Or “Bi-Energ” on the switch located at the back of the controller. This selection will have to be made before applying voltage to the unit. The default setting is “Elect.”



Figure 21

This being done, the installer will have to access the configuration menu by pressing the button for 2 sec. until the first menu appears. The selection of the item or value is made by pressing the button and by pressing the button to get to the next menu. See table 1 below to visualize the menu list that will gradually be displayed.







If the buttons remain untouched for a period of 10 sec., the controller will register the value of the selection made and return to the regular display position. It will also return to the regular display after reviewing all the operating parameters of the controller.

In case of a power failure, the parameters will be restored as they were established before the failure.

Table 5 below shows the presentation sequence of the menus.





**Table 5 :**

ITEM	DESCRIPTION	RANGE	DEFAULT
	Choose the units the user prefers to work with	F <sup>0</sup> or C <sup>0</sup>	F <sup>0</sup>
	Select the type of heating system on which the boiler will be installed.	-Radiant Floor in concrete -Radiant Floor between joists -Cast iron radiator Hot water baseboards	
CONSIGNE   TARGET 	Adjust the maximum boiler target temperature required to adequately heat the building when the outdoor temperature is very cold.	-Radiant Floor in concrete 85à 105F -Radiant Floor between joists 110Fà140F -Cast iron radiator 135F à 165F -Baseboard 160F à 185F	100F 125F 150F 175F
	Select the purge period that the pump will be running once the heat demand is completed. Select OFF if the heat system is equipped with electric zone valves.	OFF 15 sec. to 60min. ON	30sec
	Select the outdoor temperature at which no heating of the building is required (the outdoor sensor has to be installed)	0F à 105F	75F

Note 1: Once the operating parameters have been set, the controller will automatically come back to normal display screen. If the user needs to increase or decrease the target temperature, he can do it without having to enter in the configuration menu (see the following section)

## 4.9 ADJUSTMENTS OF THE TARGET TEMPERATURE BY THE USER:

By pressing the  the end user has the possibility to offset the programmed target temperature without going through the tool menus. When the + or- button is pressed, the value "0" will appear and blink to show a "0" offset value from the original settings. When the + or- buttons are pressed again the offset value will change up to a value of + - 10F(5C) from the original setting made in the configuration menu. The new value will blink during 5 sec. and the display will then go back to the standard view and the new target temperature will be shown.

Afterward, when the  button will be pressed, it will show the value of the offset made previously and can be re-adjusted.

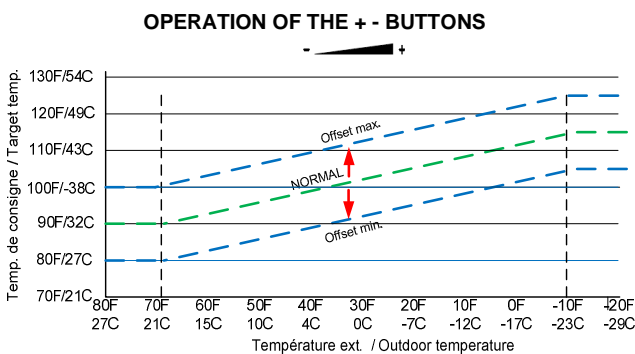




Figure 22

## 4.10 BOOST SYSTEM OPERATION


The controller incorporates a unique feature that enables the target boiler temperature to automatically be increased when the building heat load increases but cannot be fulfilled with the actual boiler target temperature and consequently the room thermostat(s) cannot be satisfied within a pre-determined period.

Example:

- Return to normal heat load after low demand periods occurring during sunny days.
- Long periods without heating which needs higher boiler temperature to recuperate.
- Return to normal room temperature after thermostat's "nights set back" program.

Three "Boost" operating options are available when the  is pressed for 6 sec. The  icon will appear and the three options **ON1**, **ON2** and **OFF** will be proposed. Press the + - button to select. The controller will register the selected item and will return to normal operation after 5 sec.

### Operation in "Boost" Option ON1 (default setting)

The controller will engage the "Boost" program when the heat demand on terminals RW has been maintained for a pre-determined period according to the type of selected application. Once this period has been reached, the "Boost"  icon will appear on the display and the boiler target temperature will start increasing very slowly over a pre-determined period and up to a pre-calculated maximum value until the heat demand applied on RW terminals has been completed. On a new heat demand, the previous boost period is forgotten and the boiler target gets back to its original setting

### Operation in "Boost" Option ON2 (only offered on installation not operating in Dual-energy)

The boost program is a marvellous feature that works fine on applications where the number of room thermostats is in limited quantity otherwise it may happen that during very cold periods the heat demand from all the thermostats may not become satisfied. This option requires the installation of one or two stages heating thermostats. The second stage of the thermostat(s) will have to be connected to **E<sub>1</sub>-E<sub>2</sub>** of the boiler and the option ON2 selected. Then the Boost mode will be instantaneously started increasing the target temperature when the signal from the second heating stage will be received. The target temperature will immediately start increasing.

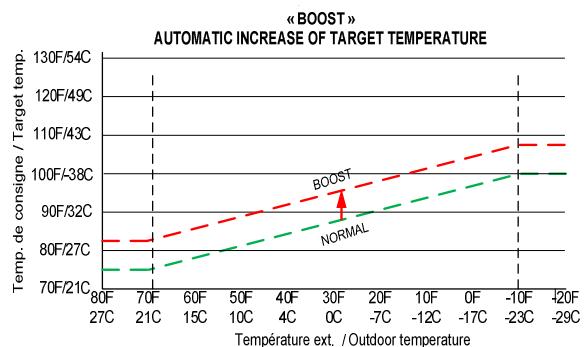



Figure 23

N.B. If the system is in "boost" most of the time, this means that the boiler target parameter established during "Setting procedure" would be too low for the heating system on which the unit is applied. This boiler target could simply be gradually increased by pressing the + button or by re-setting the operating parameters using the tool menu . The Boost menu can be cancelled by selecting "OFF" in the Boost menu.

#### 4.11 OPERATION IN DUAL-ENERGY:

In Dual-energy mode, the display will indicate that this mode is active in showing the icon



If it is not shown, check the position of the switch located at the back of the controller. It must be set to "Bi-Energy" position.

N.B. The controller will have to be reset to register the new mode of operation. Just turn the power OFF and back ON to the unit.

##### Operation in Dual-energy with Electric

When the authorisation signal to operate in electricity is received, (close contact between  $E_1$  &  $E_2$ ), the following icons will be shown.



The circulating pump and the heating elements will be activated according to the operating parameters established earlier.

##### Operation in Dual-energy with the auxiliary boiler

When the authorisation signal will be absent (open contact between  $E_1$  &  $E_2$ ), the following icons will be shown.




Upon reception of a heat demand on terminals **R W** of BTH ULTRA boiler, terminals **P<sub>1</sub> & P<sub>2</sub>** will be energized at 120volts and the pump will be activated. At the same time, the contact will close on the "AUX" terminals to activate the auxiliary boiler. This boiler will be activated only when there will be a heat demand to the **R W**

terminals and when the auxiliary boiler temperature will be lower than the settings of its own temperature controls.


If a three way valve is used on the piping as shown in fig.6, it will change position when the contact will close on AUX terminals and it will be the end switch of the valve that will give the signal to the auxiliary boiler to come on. The water flow will then circulate only in the auxiliary boiler.

##### Manual selection for the electricity or auxiliary boiler mode.


If the user wishes to manually select the electricity or auxiliary boiler operation, it can be done in following the sequence below:

- o Push on the  button for 6 sec. and the following icons will appear



The selection of the dual-energy or electric only or auxiliary boiler only is made with the + - button. Once the selection has been made it will be registered by pressing the  or by waiting for 5sec.

If the electricity only or auxiliary boiler only has been



selected, the corresponding icon and the  icons will blink to advise the user that an unusual heating mode has been selected.

## Section 5: START UP OPERATION

### ▲ SAFETY PRECAUTIONS

Before operating this boiler, be sure to read and follow these instructions, as well as the warnings printed in this manual. Failure to do so can result in unsafe operation of the boiler resulting in property damage, bodily injury, or death. Should you have any problems reading, following or difficulty in understanding the instructions in this manual, STOP, and get help from a qualified person. Do not turn on the boiler unless it is filled with water. Do not turn on the boiler if the cold water supply shut-off valve is closed.

#### 5.1 PREPARATORY STEPS

- ❑ Make sure that all the piping and electrical connections have been made.
- ❑ Fill the boiler and the heating system with water.
- ❑ Check for leaks.
- ❑ Check the pressure reading at the temperature and pressure indicator. It should be around 12psi.
- ❑ Turn On the electrical supply to the boiler with no heat demand from the thermostat(s).
- ❑ Completely eliminate all the air from the boiler and the distribution piping system. To do so, activate the circulating pump without the heating elements. If the pump is connected directly on PP terminals of the boiler, it can be activated by selecting "ON" in the configuration menu after having pressed  and .
- ❑ Adjust the UltraSmart boiler temperature controller as explained earlier and set the purge delay of the pump to its normal operation setting.

#### 5.2 START UP

- ❑ Set the room thermostat ON to generate a heat demand. The pump shall start. The heating

elements shall gradually come on and the boiler temperature will increase.

N.B. A rapid check of the operation of all the boiler components could be made by pressing simultaneously the + and- buttons of the controller and maintaining them pressed until all the components have come ON.

- ❑ Measure the amperage value drawn by the unit. It shall be around the value indicated on the boiler name plate.
- ❑ **Partially** close the isolating valve at the outlet of the boiler to reduce the water flow and consequently **slowly** increase the outlet temperature. The heating elements shall gradually stop as the temperature increase and gets near the target temperature.
- ❑ Lower the adjustment of the room thermostat(s) the heating elements shall stop and the pump shall stop after the delay set on the controller.
- ❑ Check the pressure reading on the gauge of the unit. It should not be higher than 28psi when the distribution system reaches its maximum operating temperature. If the pressure gets to that value, it may be because the expansion tank is not large enough for the application.

#### 5.3 COMPLEMENTARY CHECKS ON DUAL-ENERGY INSTALLATIONS

- ❑ Check the proper operation of the authorization signal to operate on electricity or auxiliary in simulating the operation of the signal on E<sub>1</sub> and E<sub>2</sub> and verifying the change of the operating mode.

N.B. On initial start up it may take a considerable amount of time before the water reaches the target temperature

Further adjustments may be necessary as you use your boiler and the space heating system.

## Section 6 MAINTENANCE

### 6.1 INTRODUCTION

Properly maintained, your boiler will provide years of dependable, trouble free service. It is recommended that a regular routine maintenance program be established and followed by the user. Components are subject to eventual failure that requires service. Failure to use the correct procedures or parts in these circumstances may make the unit unsafe or reduce the life of the boiler.

The owner should have the following inspection and maintenance procedures performed:

### 6.2 AT ALL TIME

An immediate inspection shall be made if:

- ❑ An odor of melted plastic or overheated material is detected
- ❑ A leak coming from the unit or the heating system is observed

If a leak is detected at the outlet of the safety relief valve, it could be related to a problem with components installed on your heating distribution system. A quick correction is then required.

Do not plug the outlet of this valve if a dripping condition occurs.

### 6.3 TWICE A YEAR

- ❑ Check for the proper operation of the automatic air purger(s) and eliminate air from the radiators.

### 6.4 ANNUALY

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It is recommended that a visual inspection be made on the electrical compartments of the boiler to check the water tightness of the gasket on the element flange and also check for any signs of overheating of the components and wires. At the beginning of the heating season, check the proper operation of the operating/safety controls, circulating pump and heating distribution system components. Required corrections should be made as soon as possible. Parts used for replacement shall be the same as the original equipment.

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### WARNING

**Make sure that the power on the unit has been turned off before opening the electrical compartments of the boiler.**

- ❑ Open the boiler drain valve to eliminate deposits that could have settled at the bottom of the boiler. Stop when water gets clear. If there is no flow or a very small flow, it could be due to a large accumulation of deposits at the bottom of the unit. If so, close the isolating valves at the inlet and outlet of the boiler, remove heating element(s) and clean the inside of the tank with a strong jet of water

## Section 7- TROUBLE SHOOTING

### 7.1 TROUBLE SHOOTING TABLE

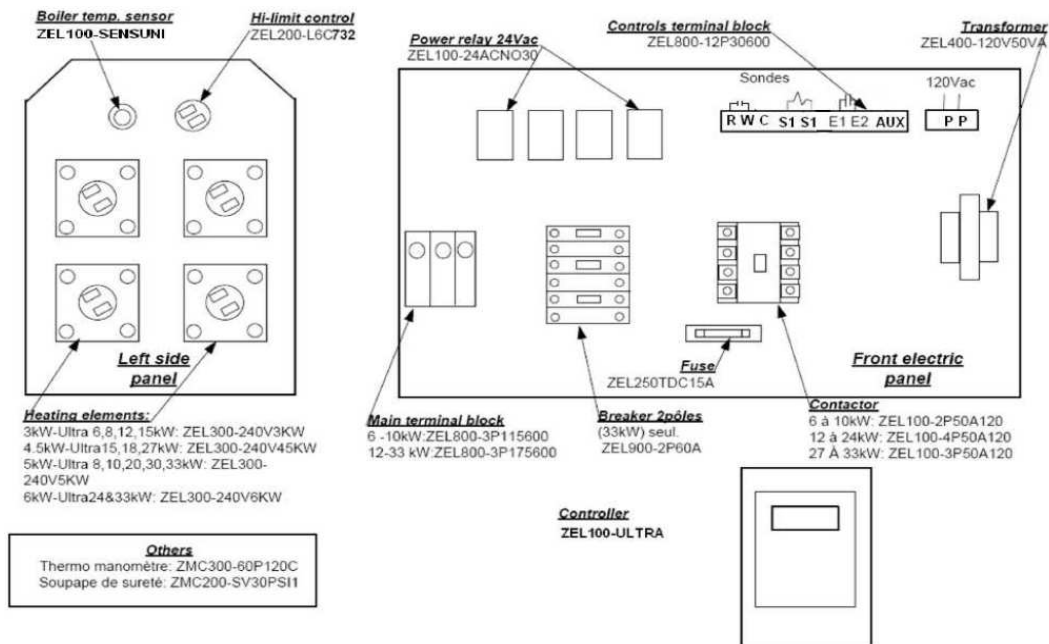
PROBLEM	CAUSES	SOLUTION
The display shows --- in "TARGET TEMP"	<p>-There is no heating demand when the outdoor sensor is used and the icon  shown, the outside temperature is above the boiler shut down setting.</p> <p>-The switch located on the back of the controller is set to "Bi-Energ" and the icon  is shown.</p>	<p>-Generate a heat demand</p> <p>-Temporarily increase the value of this setting on the controller configuration.</p> <p>-Set the switch to "Elect"</p>
The display shows "Er1" and the icon  is displayed.	The controller is not detecting the presence of the outdoor sensor.	<p>-Make sure that the sensor cable connected to the unit is not in short or open circuit. Do not install a jumper between S1-S1 when the sensor is not required.</p> <p>-Check the resistance value (ohms) of the sensor. It should correspond to the value shown on the table below otherwise it should be replaced. Check for proper connection of the wires inside the boiler connected to S1S1 and at the controller terminals.</p>
The display shows "Er2" and blinks	The controller is not detecting the presence of the boiler temperature sensor.	<p>-Check the state of the sensor located in the immersion well located at the top of the elect. element compartment.</p> <p>--Check the resistance value (ohms) of the sensor. It should correspond to the value shown on the table below otherwise it should be replaced.</p>
Stage 2 is ON but not Stage 1	There is no problem. A rotation of the stages is provided to allow an equal time of operation of the stages	
When stage 3 or 4 comes ON, stage 1 or 2 comes OFF	This sequence is normal on boilers from 27 to 33kW since stage 2 and 3 activate two elements. Stage 1 or 2 is disactivated to obtain an equal increase of capacity of the boiler.	
The boiler target temperature does not change when the outdoor temperature varies	The outdoor sensor has not been detected when the power has been applied to the unit.	Check the connection of the outdoor sensor to terminals S1S1. Turn OFF the power to the unit for 5 sec. and set it back ON.
The boiler water temperature at the outlet of the unit "BOILER T <sup>0</sup> " does not get to the "BOILER TARGET T <sup>0</sup> "	<p>-The room thermostat is not in constant demand.</p> <p>-Some heating elements are defective</p> <p>-The total capacity of the boiler is expelled to the heating distribution system at this temperature.</p>	<p>-Adjust the thermostat anticipator (If available) to obtain longer operating cycles</p> <p>-Replace defective elements</p> <p>-If a boiler water temperature higher is required to satisfy the heat demands of the thermostats, a boiler having a larger capacity is required.</p>

Boiler stays in demand even when the thermostat is not in demand. (Systems with more than one thermostat)	-On systems with electric zone valves, one or many end switches included in the valve is defective. -A jumper has been installed on terminals TT of the boiler	-Change defective "end switch".  -Make appropriate connections as shown in fig.7
An overheated plastic odour is released from the boiler	Turn the power OFF to the boiler. Open the front and left side panel of the boiler. Check the components and electric wires for indications of overheating.	Replace overheated components and check supply voltage to the boiler.
Boiler safety valve is leaking	-Pressure reading at the indicator shows a pressure above 28psi  -Pressure is below 28psi	-The pressure regulator on the distribution system is defective or the expansion tank is too small or defective. -Replace the safety valve

**Table 6: Resistance value of the outdoor sensor vs outdoor temperature**

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	20	-7	46,218	90	32	7,334	160	71	1,689
-45	-43	405,710	25	-4	39,913	95	35	6,592	165	74	1,538
-40	-40	336,606	30	-1	34,558	100	38	5,828	170	77	1,403
-35	-37	280,279	35	2	29,996	105	41	5,210	175	79	1,281
-30	-34	234,196	40	4	26,099	110	43	4,665	180	82	1,172
-25	-32	196,358	45	7	22,763	115	46	4,184	185	85	1,073
-20	-29	165,180	50	10	19,900	120	49	3,760	190	88	983
-15	-26	139,402	55	13	17,436	125	52	3,383	195	91	903
-10	-23	118,018	60	16	15,311	130	54	3,050	200	93	829
-5	-21	100,221	65	18	13,474	135	57	2,754	205	96	763
0	-18	85,362	70	21	11,883	140	60	2,490	210	99	703
5	-15	72,918	75	24	10,501	145	63	2,255	215	102	648
10	-12	62,465	80	27	9,299	150	66	2,045	220	104	598
15	-9	53,658	85	29	8,250	155	68	1,857	225	107	553

## 7.2 SPARE PARTS



# BTH ULTRA LIMITED WARRANTY

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## **Warranty Coverage for Residential Installation.**

Thermo 2000 Inc. hereby warrants to the original residential purchaser that the BTH ULTRA tank installed in a residential setting shall be free of leaks during normal use and service for a period of fifteen (15) years from the date of purchase as long as the original residential purchaser owns the home in which the unit was originally installed. Residential setting shall mean usage in a single-family dwelling in which the consumer resides on a permanent basis. Also, residential setting shall mean use in multiple family dwellings in which one (1) BTH ULTRA tank is to be used in only one (1) dwelling. In the event that a leak should develop and occur within this limited warranty period due to defective material or workmanship, such leak having been verified by an authorized company representative, Thermo 2000 inc. will repair or replace at our sole discretion the failed unit with the nearest comparable model at the time of replacement.

The original residential purchaser is responsible for all costs associated with the removal and reinstallation, shipping and handling to and from manufacturing plant. The replacement unit will be warranted for the remaining portion of the original Warranty.

## **Warranty Coverage for Commercial Installation.**

Thermo 2000 Inc. warrants to the original purchaser that the BTH ULTRA tank installed in a commercial setting shall be free of leaks during normal use and service for a period of fifteen (15) years from the date of purchase.

Commercial setting shall mean use in other than residential setting stated above in the residential setting definition. In the event that a leak should develop and occur within this limited warranty period due to defective material or workmanship, such leak having been verified by an authorized company representative, Thermo 2000 inc. will repair or replace at our sole discretion the failed unit with the nearest comparable model at the time of replacement.

The original purchaser is responsible for all costs associated with the removal and reinstallation, shipping and handling to and from Manufacturer. The replacement unit will be warranted for the remaining portion of the original Warranty.

## **Limited two years warranty on all BTH ULTRA components & parts**

All other BTH ULTRA components & parts are warranted for a period of two (2) years against defects due to defective material or workmanship. The original purchaser is responsible for all costs associated with the removal and reinstallation, shipping and handling to and from Manufacturer. The components, repaired or replaced are warranted for the residual period of the initial warranty on the unit.



## **THERMO 2000 INC.**

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## **Exclusions.**

**This warranty is void and shall not apply if:**

1. Defects or malfunctions resulting from installation, repair, maintenance and/or usage that are not done in conformity with the manufacturer's installation manual; or
2. Defects or malfunctions resulting from installation, maintenance, or repair that are not done in accordance with regulations in force; or
3. Defects or malfunctions resulting from improper installation, maintenance or repair done carelessly or resulting from consumer damage (improper maintenance, misuse, abuse, accident or alteration); or
4. Installation in which a relief valve (pressure) is not installed or if it is not functioning properly, or when it is not connected to a drain to avoid damage to the property; or
5. Installation in which liquid circulating in the tank does not remain in closed circuit or installation in which piping is leaking; or
6. A polybutylene pipe or radiant panel installation without an oxygen absorption barrier is used; or
7. Installation where the acidity of water is not within the normal Environmental Protection Agency (EPA) (between pH 6.5 – 8.5) guidelines or the domestic water contains abnormal levels of particulate matter or water exceeding 10.5 gpg; or
8. Your home contains any type of water softener system and the unit is not installed and maintained in accordance with the manufacturer specifications; or
9. The BTH ULTRA unit has been subject to non authorized modifications; or
10. Defects or malfunction resulting from storing or handling done elsewhere than Thermo 2000's manufacturing plant; or
11. Units on which the serial number is removed or obliterated.

## **Limitations.**

Thermo 2000 shall not be responsible for any damage, loss, and inconvenience of any nature whatsoever, directly or indirectly, relating to the breakdown or malfunction of the unit. This warranty limits its beneficiary's rights. Nevertheless, the beneficiary may have other rights, which vary from state to state.

This warranty replaces any other expressed or implicit warranty and constitutes the sole obligation of Thermo 2000 towards the consumer. The warranty does not cover cost of removal, reinstallation or shipping to repair or replace the unit, nor administration fees incurred by the original consumer purchaser.

Thermo 2000 reserves its rights to make changes in the details of design, construction, or material, as in its judgment constitute an improvement of former practices.

This warranty is valid only for installations made within the territorial limits of Canada and the United States.

## **Warranty service procedure**

Only authorized BTH ULTRA dealers are permitted to perform warranty obligations. The owner or its contractor must provide Thermo 2000's head office or authorized depot with the defective unit together with the following information: BTH ULTRA model and serial number, copy of the original sales receipt and owner's identification certificate.