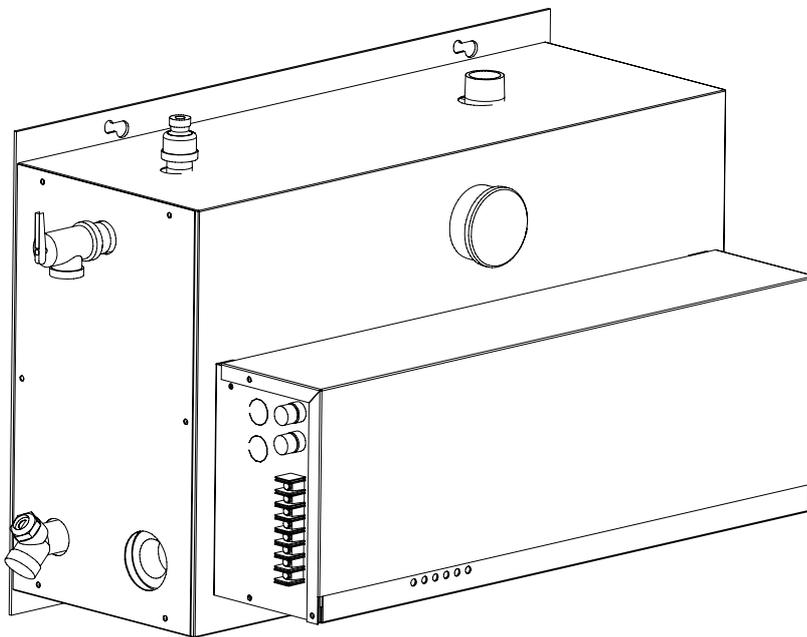


Installation Instructions and Homeowner's Manual

ELECTRIC BOILER



INSTALLER / SERVICE TECHNICIAN:

USE THE INFORMATION IN THIS MANUAL FOR THE INSTALLATION AND SERVICING OF THE UNIT AND KEEP THE DOCUMENT NEAR THE FURNACE FOR FUTURE REFERENCE.

HOMEOWNER:

PLEASE KEEP THIS MANUAL NEAR THE FURNACE FOR FUTURE REFERENCE.

Models:

HYDRA09-E2401M-C
HYDRA15-E2401M-C
HYDRA18-E2401M-C
HYDRA20-E2401M-C
HYDRA24-E2401M-C



Caution: Do not tamper with the unit or its controls.
Call a qualified service technician.

Manufactured by:

UTC Canada Corporation
ICP Division
3400 Industrial Boulevard
Sherbrooke, Quebec- Canada
J1L 1V8

SECTION 1 INSTALLATION

1.1) SAFETY LABELING AND SIGNS

DANGER, WARNING AND CAUTION

The words DANGER, WARNING and CAUTION are used to identify the levels of seriousness of certain hazards. It is important that you understand their meaning. You will notice these words in the manual as follows:

 DANGER
Immediate hazards which <u>WILL</u> result in death or serious injury.

 WARNING
Hazards or unsafe practices which <u>CAN</u> result in death or injury.

CAUTION
Hazards or unsafe practices which <u>CAN</u> result in personal injury, product or property damage.

1.2) HEATING WITH HOT WATER

Your HYDRA electric boiler was carefully assembled and checked in our plant, so that it will deliver warmth and comfort to your home for many years to come.

This manual is intended to provide the necessary information for the installation of the unit, how it functions and explains security measures which are particular to this type of equipment.

It is essential that the persons installing, operating or adjusting the boiler carefully read this manual, in order to completely understand and be familiar with the procedures to be followed.

Any questions relative to the operation, maintenance or guarantee should be directed to the company where the equipment was purchased.

Upon completion of the installation, this manual should be placed back into its original envelope and kept near the boiler for future reference.

1.3) DELIVERY

Upon delivery of the boiler, check the nameplate to be sure that you have received the model with the correct rating and proper voltage.

The following items are supplied with the unit:

- A pressure relief valve, adjusted to 30 psi ;
- A drain valve;
- A ½" NPT to ⅛" NPT reducer for the installation of an air purge valve;
- Modulating outdoor sensor

1.4) INSTALLATION

 WARNING
The installation of this unit must be performed by a qualified technician and it must conform to the standards and regulations in force as well as the Canadian Installation Code for Hydronic Heating Systems CSA B214-01.

1.4.1) Positioning

The unit must be installed in an area that is dry, non-corrosive, without excessive dust, well ventilated and where the ambient temperature does not exceed 27°C (80°F).

The boiler can be installed directly on a wall, by way of the mounting plate, supplied with the unit. Ensure that it is installed level and that the clearances indicated below are respected (Table 1).

1.5) CLEARANCES

The following clearances should be provided for the servicing of the unit:

Table 1

LOCATION	CLEARANCE
Access side to elements	0.41 m (16")
Other side	15.24 cm (6")
Above	15.24 cm (6")
Front	0.61 m (24")
Back	0"

1.6) DISTRIBUTION SYSTEM

The proper functioning of your heating system is directly related to the quality of the plumbing installation. Therefore, the entire installation must be performed by qualified technicians.

See Figure 1 for the functions of the various boiler connections.

The heating system must be set-up to operate at a maximum pressure of 28 psi and the operating temperature may range from 32°C to 88°C (90°F to 190°F).

Freeze protection (when required)



WARNING

Only propylene glycol may be used in this hydronic heating system, to prevent freezing.

It is recommended to add a maximum of 50% of propylene glycol mixture to ensure proper operation.

Do not use automotive anti-freeze, ethylene glycol or any undiluted anti-freeze.

If the above recommendations are not followed, severe personal injury, death or substantial property damage can result.

All installations must include the following items:

- a. 1 pressure regulator, adjusted to 12 psi, must be installed between the boiler and the main water supply in the building;
- b. 1 expansion tank, pre-pressurized to 12 psi and of appropriate size;
- c. 1 or more automatic air purge valves;
- d. 1 or more circulating pumps of appropriate capacity.

CAUTION

To avoid water damage and/or scalding due to relief valve operation, a discharge line must be connected to the valve outlet and run to a drainage area. The discharge line shall be installed in such a way that it will allow for the complete drainage of the valve and the discharge line.

1.7) INSTALLATION OF THE BOILER

At the time of installation, the following steps should be followed. Refer to Figure 1 and 2.

1. Choose an appropriate location. Mount the boiler securely on the wall, with the help of the mounting plate. Ensure that it is level and that the minimum clearances are observed;
2. Install the drain valve and the safety valve as indicated in Figure 1;
3. An air vent can be installed on the unit. In such case, use the ½" NPT to ⅜" NPT reducer, which is provided;
4. Install the water supply and return piping with the 1" NPT fitting;
5. The heating supply line must include:
 - a. 1 circulator along with 2 maintenance valves;
 - b. 1 automatic pressure reducing valve adjusted to 12 psi, with a shut-off valve on the return water line;
 - c. 1 expansion tank;
 - d. 1 automatic vent.
6. The flow of water through the system must be sufficient to continuously discharge the energy generated by the boiler. If not, the High Limit protector will disconnect all the electric elements and a more or less frequent cycling mode will be established by the Safety Control (see the Technical Specifications Table);
7. In order to ensure satisfactory water flow, the friction in the piping system must not exceed the capacity of the circulator;

8. After having completed all piping connections, run water through the system and purge the air. The automatic vent should be in operation.

Note: Remove the panel on the right side of the unit and check to see if the elements are watertight.

1.8) ELECTRIC POWER SUPPLY

All electrical wiring must conform to the standards and regulations in force and the Canadian Electrical Code CSA C22.1.

Electrical power to the boiler must come from a 120/240V 60 Hz, single phase, 3-wire, grounded circuit, protected by an appropriately sized breaker, based on the total rating of the boiler. Refer to the boiler nameplate and the technical specifications in this manual to select the proper breaker and wire size.



WARNING

Risk of fire.

The conductor sizing must conform to the last edition of the local or national codes.

Failure to follow this rule can result in death, bodily injury and/or property damage.

Power supply to the unit can be made using copper or aluminum wires. The wire size must be decided in accordance to unit power consumption, the over current protection type and capacity, the wire type and length, and the environment where the unit is installed. If an aluminum wire is used, other precautions (such as the use of a DE-OX inhibitor) must be taken to insure the conformity of the installation. In all cases, all the factors affecting the wire gauge must be considered and the installation codes followed.

The exterior of the unit must have an uninterrupted ground to minimize the risk of bodily harm. A ground terminal is supplied with the control box for that purpose.

In the event that wires inside the unit require replacement, these must be as same type as originals. (Copper wiring only)

1.8.1) CONNECTING THE CIRCULATING PUMP

The electronic circuit is designed such a way that the circulator functions, based only on demand by the thermostat.

1.8.2) CONNECTING THE THERMOSTAT

Note: All wiring outside the control panel is 24V.

Single heating zone

Connect the low voltage thermostat to TH terminals located outside the control panel on the left side of the unit.

Multiple heating zones

Connect the contacts of the motorized valves or pump controls to TH terminals outside the control panel on the left side of the unit.

The anticipator inside the thermostat must be adjusted according to the electrical load connected to the thermostat.

1.8.3) CONNECTING THE OUTDOOR SENSOR

Mount the sensor on an outside wall, protected from direct sunlight, so that it will accurately measure the outside temperature. Install 2 only #20 wires between the outdoor sensor and the terminals identified as S₁ and S₂ on the side of the boiler.

SECTION 2 OPERATION

2.1) ADJUSTMENTS AND START-UP

CAUTION

The boiler must be filled with water and all air purged from the system, before turning on the power.

CAUTION

If the power is turned on before the boiler is filled with water, the elements will become seriously damaged.

1. With the help of a small screwdriver, adjust the boiler temperature screw, located on the control board, to between "90°F-140°F-190°F" (see Figure 3, note 4);
2. To check whether all the elements are functional, regardless of the outside temperature, move the modulation jumper from terminal "M~~M~~" to "M", thereby by-passing the exterior sensor;
3. Check if the jumper "NUMBER OF ELEMENTS" is in the proper position. Refer to Table 2 to determine the position of the jumper, based on the power rating;
4. Turn on the power;
5. Set the thermostat in the house to 30°C (85°F). The circulator should start-up and the elements should start sequentially, one by one, at approximately 15 second intervals. The pilot lights provide a visual check of the operation of the boiler:
 - 3 pilots on at 9 to 15kW;
 - 4 pilots on at 18 to 20 kW;
 - 6 pilots on at 24 kW;
6. The circulator stays on for as long as there is a call for heat;
7. As soon as the demand for heat is met or the assigned temperature is reached, the elements stop sequentially, one by one, at 1 second intervals between each;
8. **If an exterior modulating sensor is installed**, it is possible to deactivate the modulating function by moving the jumper from terminal "M" to "M~~M~~".

TABLE 2

Power (kW)	Number of Elements	Jumper Position
9, 15, 18, 20	2, 3 and 4	#4
24	6	#6

2.2) CHECKING THE CONTROLS

Operational Controls

After having made sure that the boiler is completely filled with water and that there is no call for heat, turn on the power to the unit.

By observing the temperature indicator, allow the water temperature to rise to 60°C (140°F). Then, turn the electronic Limit Control counter clockwise to 32°C (90°F). The elements will stop sequentially, one by one, at 1 second intervals between each. Now, the water temperature must be adjusted with the "90°F to 190°F set screw on the electronic board.

Mechanical High Limit Control

Use the same procedure as outlined in the preceding paragraph, but now on the mechanical aquastat, located at the bottom right of the control panel. This time the elements will all disengage at the same time. The mechanical limit aquastat must be set 20°F above the temperature on the electronic board.

Modulation Control

Turn off the power to the electric boiler. Place the jumper "M~~M~~" on the electronic board to the position "M". In this way, the total output of the boiler is governed by the evaluation of the outside temperature, as indicated in Table 3. The purpose of this feature is to considerably reduce the number of heating cycles. The shut-down sequence of the elements, based on the temperature, is described in Table 4.

2.3) BCEH DUAL-ENERGY INSTALLATION

In order to obtain a special rate (DT rate) from your hydro-electric power supplier on residential applications, your HYDRA boiler can be hooked-up to an existing oil heater.

Contact your Hydro office to find out if your property is eligible to receive this rate and how to go about obtaining it.

BCEH dual-energy controls are specially designed to Hydro standards. The BCEH control selects the least expensive energy source, either oil or electricity, based on outside temperature or a signal from Hydro.

The BCEH dual-energy control will start-up the oil burner when the contact in the outdoor dual-energy sensor closes (due to a drop in temperature or other signal), even if the thermostat in the house is not calling for heat. It will stop when the temperature in the boiler reaches its target on the Limit Control. Only in such a case is an anti-gravity valve (flow check valve) or are motorized zone valves required.

A three-way, motorized valve will direct the water flow either to the oil fired heater or to your electric HYDRA boiler, depending on the signal received from the outdoor dual-energy sensor.

Refer to Figures 5 and 6 for installation instructions.

SECTION 3 MAINTENANCE

The property owner has the following responsibilities:

- a. To maintain the area around the boiler clean at all times and free from combustible and highly flammable material;
- b. To ensure that the ambient air at the boiler is not excessively dusty or humid;
- c. To have all water leaks repaired in the system as they arise.
- d. To ensure that the ambient temperature in the area where the unit is installed does not exceed 27°C (80°F).

CAUTION

The boiler guaranty may be invalidated if: water leaks in the system are not repaired; the boiler is used as a source of domestic hot water or a significant amount of new water or air is introduced into the system.

It is recommended that the boiler be purged annually, in order to eliminate sediment and sludge that may have accumulated at the bottom of the boiler and covered the heating elements.

Procedure:

1. Let the boiler cool down;
2. Close the maintenance valves, which are installed at the water inlet and outlet of the boiler. N.B.: It is not recommended to drain the water from the heating pipe system;
3. Hook-up a garden hose to the drain valve and place it close to a floor drain;
4. Open the purge valve until the water comes out clean and clear;
5. Close the valve.

It is recommended to perform a visual inspection of the boiler electrical compartment annually, during the heating season. The items to check are the water tightness of the elements, signs of overheating of the electrical components and the wiring. Corrective measures must be undertaken as required, as soon as possible.

Defective components should always be replaced with the Original Equipment Manufacturer's parts.

SECTION 4 INFORMATION

Model: _____ Serial number: _____

Installation date of the electric boiler: _____

Service telephone # – Day: _____ Night: _____

Dealer name and address: _____

TABLE 3
Power vs Outside Temperature (with modulation)

Temperature	Power (Kw)				
	HYDRA09	HYDRA15	HYDRA18	HYDRA20	HYDRA24
0°C (32°F) or less	9	15	18	20	24
0°C (32°F) or more	6	10	13	15	20
5°C (41°F) or more	6	10	10	10	16
10°C (50°F) or more	6	10	10	10	12

Element De-Activation Sequence (with modulation)
TABLE 4

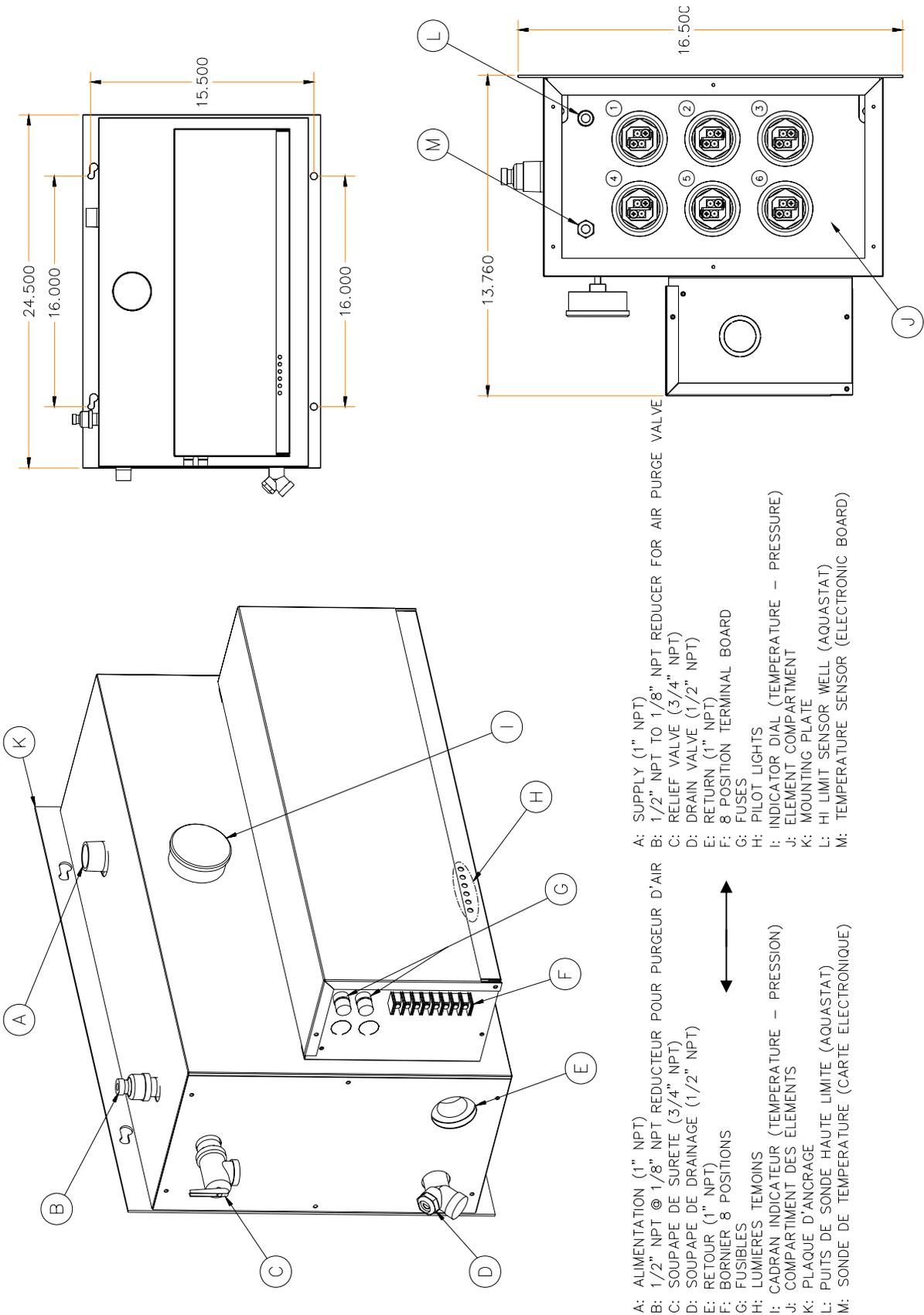
Outside Temperature	Element De-Activated		
	1 st	2 nd	3 rd
0°C (32°F) to 5°C (41°F)	#3	 	
5°C (41°F) to 10°C (50°F)	#3	#4	
10°C (50°F) to 15°C (59°F)	#3	#4	#5

TABLE 5
HYDRA - Technical Specifications

RATING AND PERFORMANCE					
Power (Kw)	9	15	18	20	24
Net capacity (BTU/h)	30 708	51 180	61 416	68 240	81 888
ELECTRICAL SYSTEM					
Volts - Hertz - Phase	120 / 240 - 60 - 1				
Electrical element #1 (Kw)	3	5	5	5	4
Electrical element #2 (Kw)	3	5	5	5	4
Electrical element #3 (Kw)	3	5	5	5	4
Electrical element #4 (Kw)	N/A	N/A	3	5	4
Electrical element #5 (Kw)	N/A	N/A	N/A	N/A	4
Electrical element #6 (Kw)	N/A	N/A	N/A	N/A	4
Consumption (Amp)	38	62	75	83	100
Circuit Amperage (wire sizing)	48	78	94	104	125
Maximum recommended circuit breaker (Amp)	50	80	100	125	125
Recommended fuses (Amp) ¹	50	80	100	110	125
GENERAL INFORMATION					
Supply - Return	1" NPT male - 1" NPT female				
Minimum water flow USG/min (L/min.)	3.25 (12.3)	5.15 (19.5)	6.44 (24.4)	6.84 (25.9)	8.2 (31.0)
24 VAC output ("C-24 VAC" terminals)	20 VA				
Overall dimensions (width x depth x height)	25.5" x 14" x 16"				
Shipping weight	50 kg / 110 lbs				

1) Always refer to applicable local and national codes.

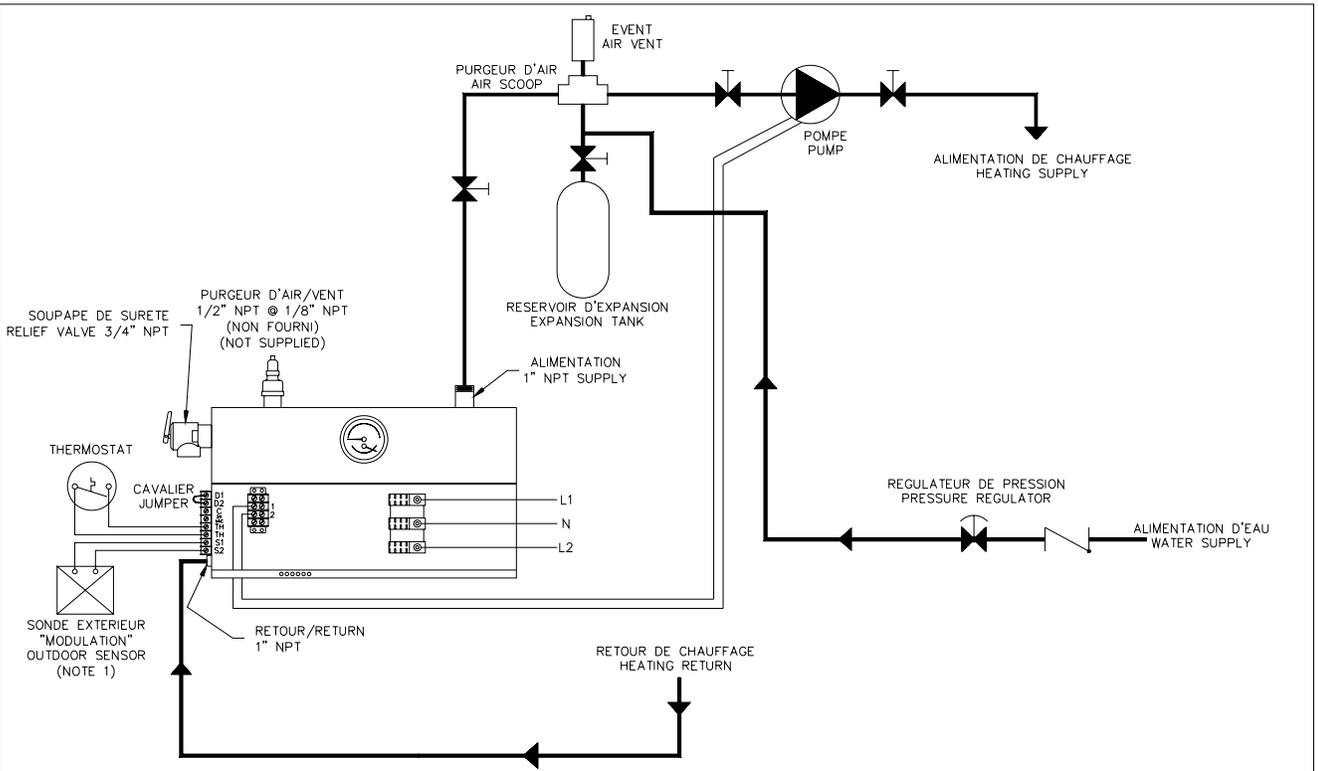
FIGURE 1
Component Identification



DNS-0951 Rev.C

- | | | |
|---|----------|---|
| <p>A: ALIMENTATION (1" NPT)
 B: 1/2" NPT @ 1/8" NPT REDUCTEUR POUR PURGEUR D'AIR
 C: SOUPAPE DE SURETE (3/4" NPT)
 D: SOUPAPE DE DRAINAGE (1/2" NPT)
 E: RETOUR (1" NPT)
 F: BORNIER 8 POSITIONS
 G: FUSIBLES
 H: LUMIERES TEMOINS
 I: CADRAN INDICATEUR (TEMPERATURE - PRESSION)
 J: COMPARTIMENT DES ELEMENTS
 K: PLAQUE D'ANCRAGE
 L: PUIXS DE SONDE HAUTE LIMITE (AQUASTAT)
 M: SONDE DE TEMPERATURE (CARTE ELECTRONIQUE)</p> | <p>↕</p> | <p>A: SUPPLY (1" NPT)
 B: 1/2" NPT TO 1/8" NPT REDUCER FOR AIR PURGE VALVE
 C: RELIEF VALVE (3/4" NPT)
 D: DRAIN VALVE (1/2" NPT)
 E: RETURN (1" NPT)
 F: 8 POSITION TERMINAL BOARD
 G: FUSES
 H: PILOT LIGHTS
 I: INDICATOR DIAL (TEMPERATURE - PRESSURE)
 J: ELEMENT COMPARTMENT
 K: MOUNTING PLATE
 L: HI LIMIT SENSOR WELL (AQUASTAT)
 M: TEMPERATURE SENSOR (ELECTRONIC BOARD)</p> |
|---|----------|---|

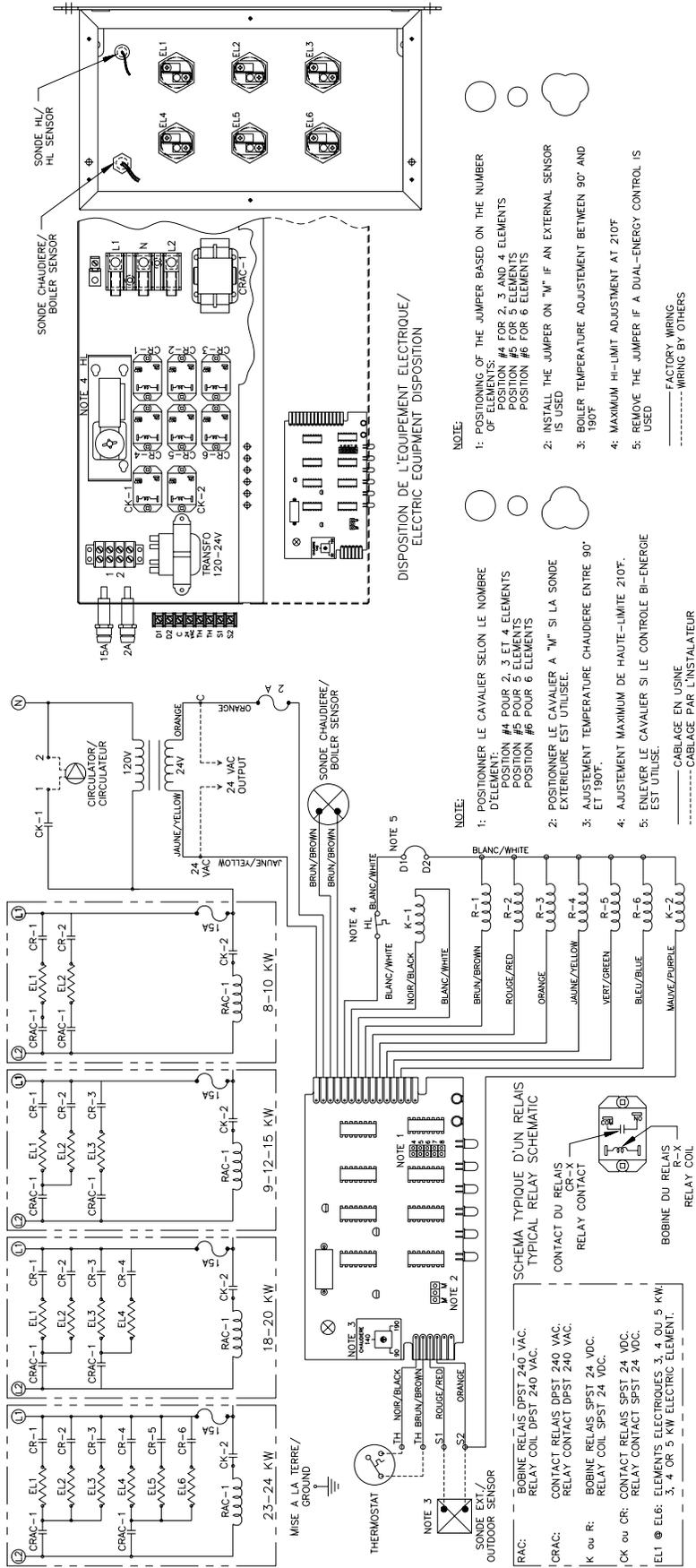
FIGURE 2
Typical Diagram of a Single Zone Installation



NOTE1: SI LA SONDE EST INSTALLÉE, DEPLACER LE CAVALIER SUR LA POSITION "M" DE LA CARTE ÉLECTRONIQUE (VOIR FIG 3).
 IF AN OUTDOOR SENSOR IS INSTALLED, MOVE THE JUMPER TO THE "M" POSITION ON THE ELECTRONIC BOARD (SEE FIG 3).

NOTE: POUR LES INSTALLATIONS AVEC UN SYSTEME DE DISTRIBUTION MULTI-ZONE, REFERER AU INSTRUCTION D'INSTALLATION DES CONTROLES MULTI-ZONES.
 ON A MULTI-ZONE DISTRIBUTION SYSTEM REFER TO THE INSTALLATION INSTRUCTIONS OF YOUR MULTI-ZONE CONTROLS.

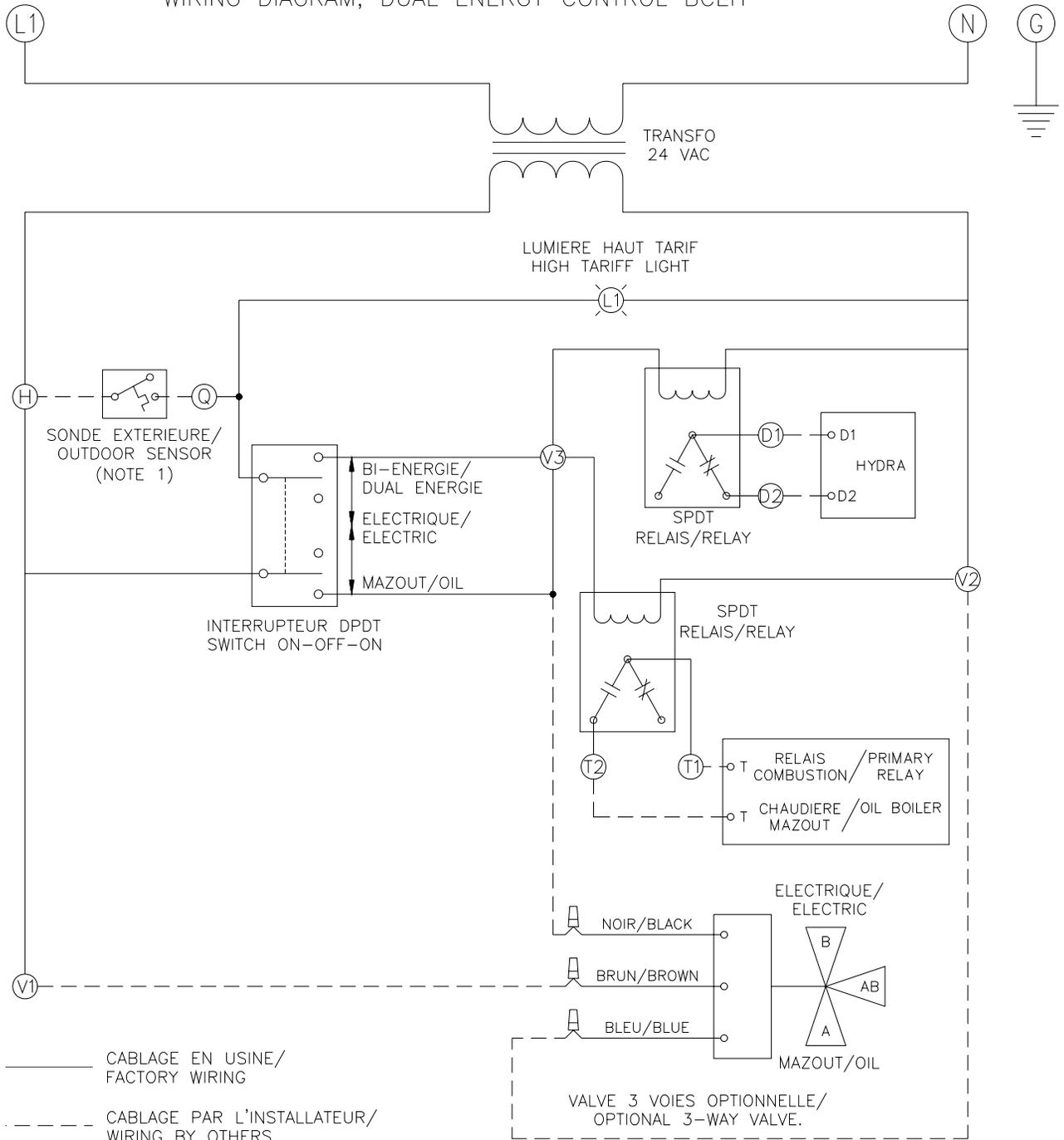
FIGURE 3 Electrical Diagram



DNS-1022 Rev.A

FIGURE 4
Ladder Diagram

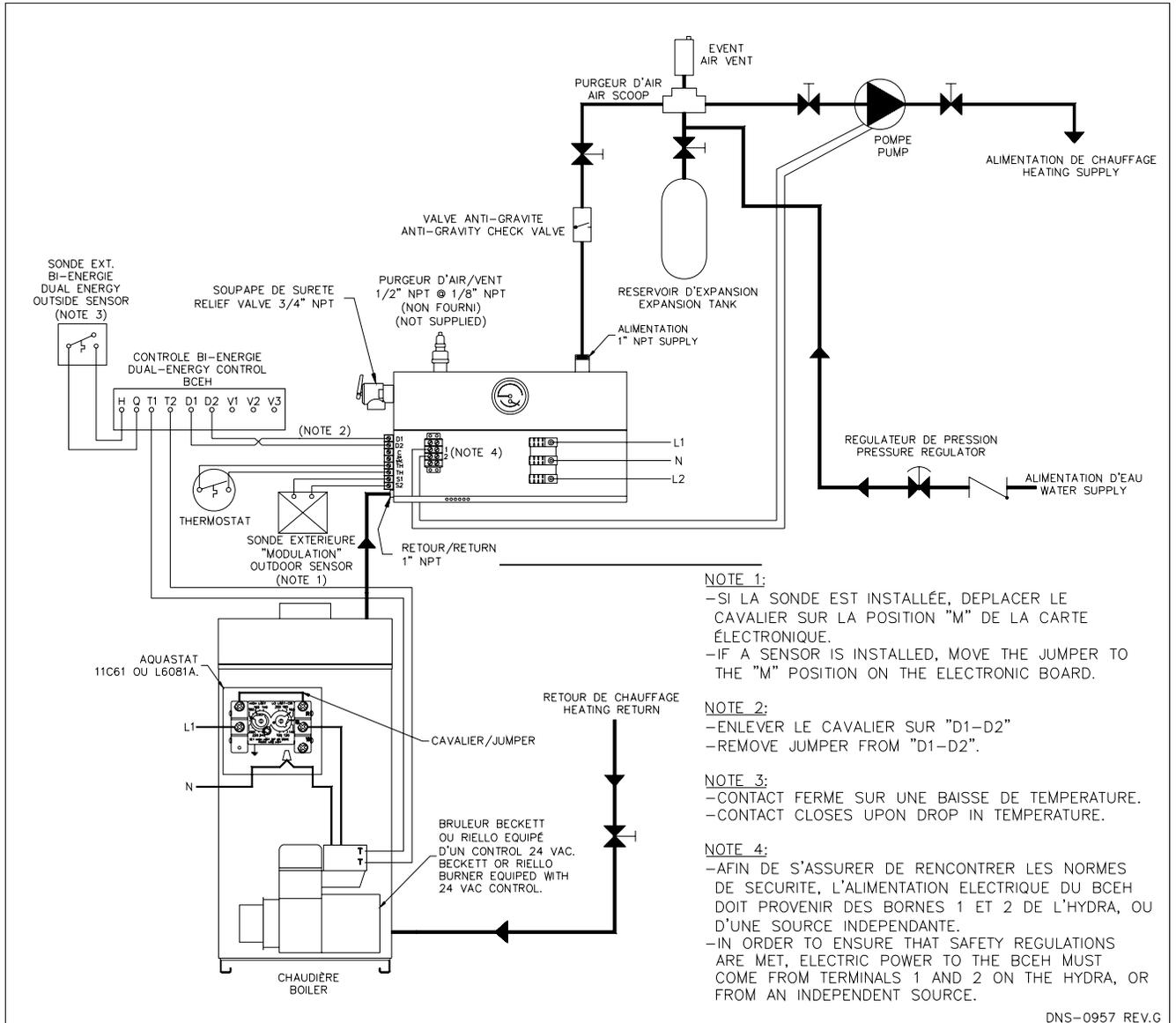
DIAGRAMME ELECTRIQUE CONTROLE BI-ENERGIE BCEH
WIRING DIAGRAM, DUAL ENERGY CONTROL BCEH



NOTE 1: CONTACT FERME SUR UNE BAISSSE DE TEMPERATURE/
CONTACT CLOSES UPON DROP IN TEMPERATURE

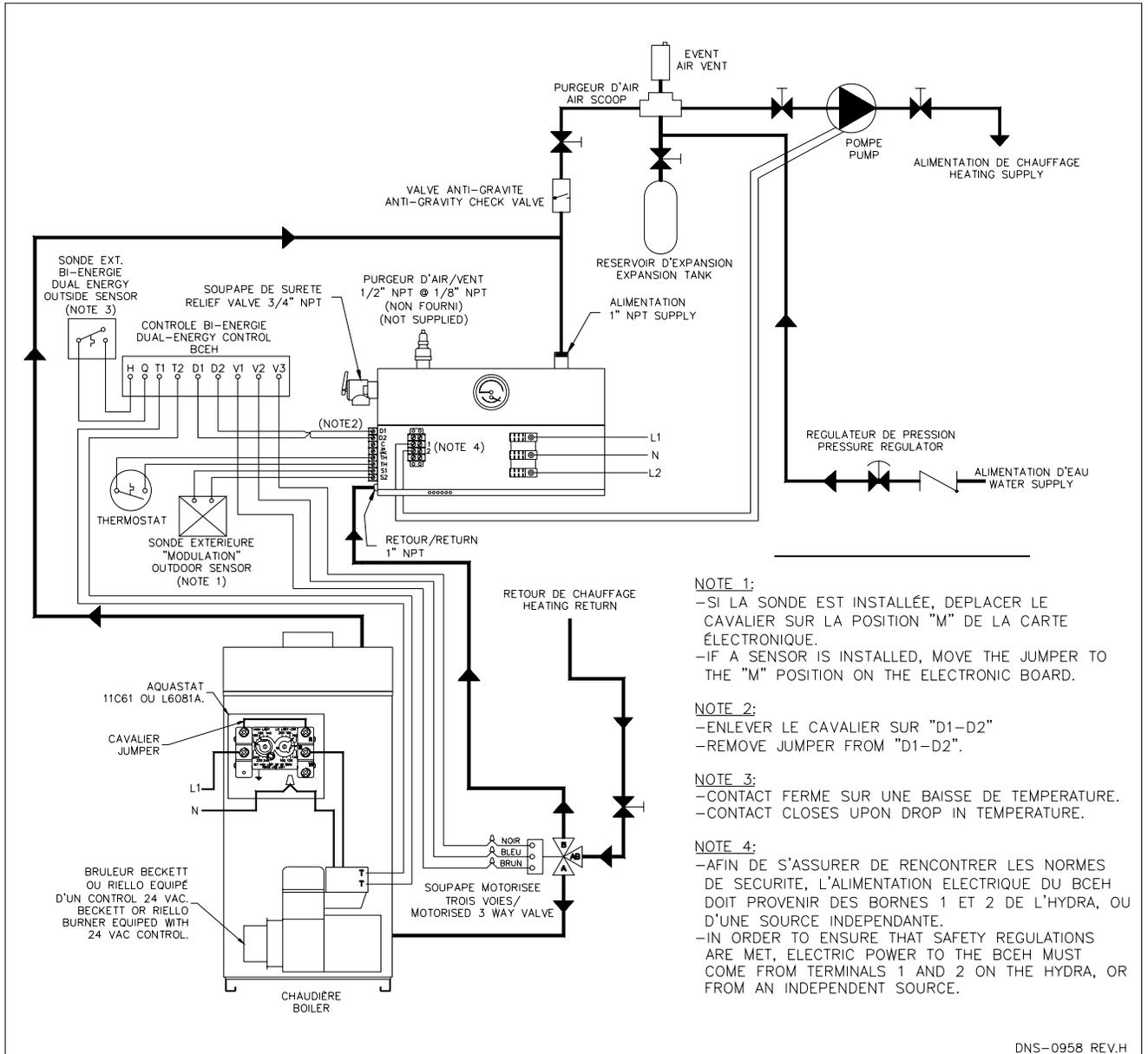
NOTE 2: AFIN DE S'ASSURER DE RENCONTRER LES NORMES DE SECURITE, L'ALIMENTATION ELECTRIQUE DU
BCEH DOIT PROVENIR DES BORNES 1 ET 2 DE L'HYDRA, OU D'UNE SOURCE INDEPENDANTE./
IN ORDER TO ENSURE THAT SAFETY REGULATIONS ARE MET, ELECTRIC POWER TO THE BCEH MUST
COME FROM TERMINALS 1 AND 2 ON THE HYDRA, OR FROM AN INDEPENDENT SOURCE.

FIGURE 5
Typical Diagram of a Dual-Energy Installation without 3-way Valve

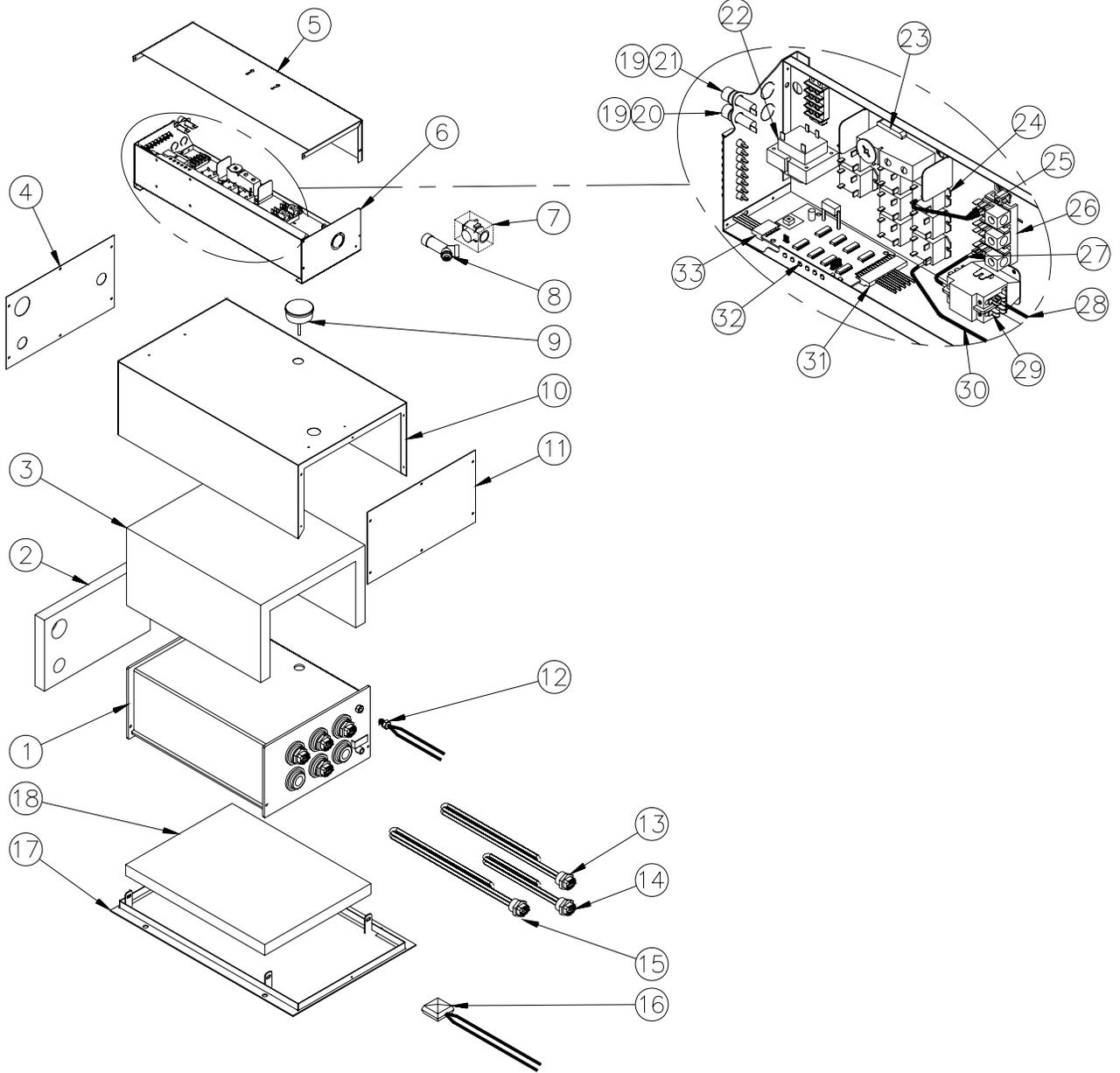


DNS-0957 REV.G

FIGURE 6
Typical Diagram of a Dual-Energy Installation with 3-way Valve



PARTS LIST
HYDRA



**PARTS LIST
HYDRA**



ITEM	PART #	DESCRIPTION
1	B20180	Electric Boiler Assembly
2	B20197	Insulation, left side
3	B02293-20	Insulation
4	B20170	Cabinet panel, left
5	B20168-01	Electrical box, cover
6A	B20217	Electrical box
6B	B20166	Electrical box right side panel
6C	B20117	Electrical box left side panel
7	G11F012	Pressure relief valve, 30 PSI, 3/4" x 3/4"
8	G11Z001	Sediment faucet, 1/2
9	R02L001	Tridicator, 0-75PSI 1/4" NPT
10	B20219	Cabinet
11	B20171	Cabinet panel, right
12	A20013	Thermistor probe
13	L99H001	Water Element, 240V / 5 Kw
14	L99H002	Water Element, 240V / 3 Kw
15	L99H003	Water Element, 240V / 4 Kw
16	A20015	Outdoor sensor, -12°C
17	B20179	Mounting plate
18	B02293-24	Insulation
19	L02G001	Fuse holder, BUSS
20	L01G002	Fuse 2A
21	L01G007	Fuse 15A
22	L01F009	Transformer, 120-24 Volts, 40VA
23	R02F001	Single action aquastat, Honeywell L4008A
24	L01H002	Relay, SPST 24 VDC
25	A20022-01	Electrical wire, black
26	L99F004	Terminal block
27	A20023-01	Electrical wire, red
28	A20009-01	Electrical wire, red
29	L01H024	Contactactor 240 VAC
30	A20009-02	Electrical wire, black
31	B20120	Electrical kit
32	B20098	Electronic Board Hydra 3
33	B20119	Electrical kit