Installation Instructions and Homeowner's Manual

Dettson

HYDRA INDUSTRIAL

Models :

HYDRAI016-208-3
HYDRAI016-240-3
HYDRAI016-480-3
HYDRAI016-600-3
HYDRAI024-208-3
HYDRAI024-240-3
HYDRAI024-480-3
HYDRAI024-600-3
HYDRAI032-208-3
HYDRAI032-240-3
HYDRAI032-480-3
HYDRAI032-600-3
HYDRAI040-208-3
HYDRAI040-240-3
HYDRAI040-480-3
HYDRAI040-600-3
HYDRAI048-240-3
HYDRAI048-480-3
HYDRAI048-600-3
HYDRAI064-480-3
HYDRAI064-600-3
HYDRAI080-480-3
HYDRAI080-600-3
HYDRAI096-480-3
HYDRAI096-600-3

Attention

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

ELECTRIC BOILER

ELECTRONIC CONTROL

INSTALLER / SERVICE TECHNICIAN:

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

HOMEOWNER:

PLEASE KEEP THIS MANUAL NEAR THE BOILER FOR FUTURE REFERENCE.

Manufactured by :
Dettson Industries Inc.
Sherbrooke (Quebec) Canada
http://www.dettson.ca/

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SECTION 1. INSTALLATION

1.1- 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 **WILL** result in death or serious injury.

WARNING

Hazards or unsafe practices which CAN result in death or injury.

CAUTION

Hazards or unsafe practices which **CAN** result in personal injury, product or property damage.

1.2- HEATING THE HOT WATER

Your HYDRA INDUSTRIAL electric boiler was carefully assembled and checked in our plant, so that it will deliver warmth and comfort 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;
- An exterior probe for modulation;
- Two 2'' X ¾'' reducing couplings for the pressure relief valve and drain valve.

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

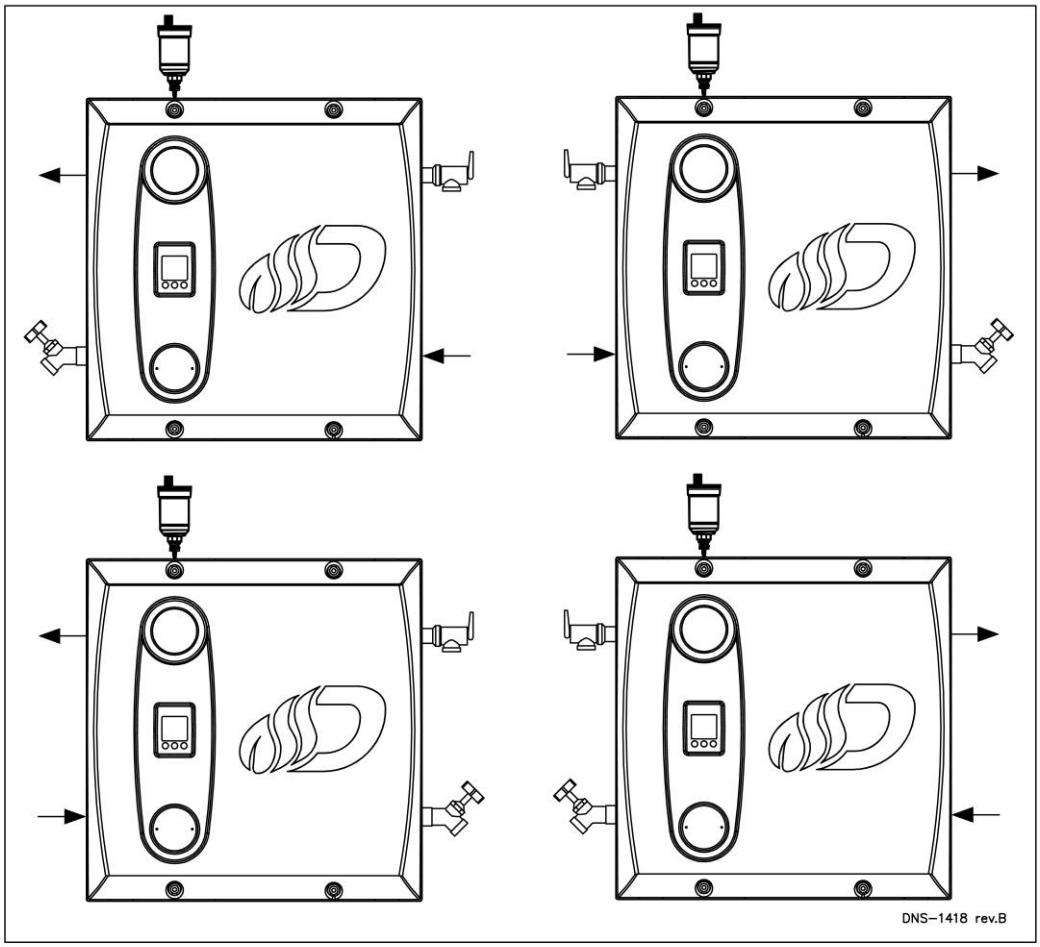
The unit must be installed in an area that is dry, non-corrosive, without excessive dust, well ventilated and where the ambient temperature does not exceed 27ºC (80ºF).
The boiler can be installed using the included mounting brackets. Position the top bracket and secure it to a wall. Place the boiler on the top bracket and then secure the bottom. Finally, use self-tapping screws to secure the tabs to the bracket. **Ensure that the unit is well fixed on the wall utilizing the 2 mounting brackets.**

The boiler can be installed in 4 possible configurations as shown in figure 1.

Ensure that it is installed level and that the clearances indicated in Table 1 are respected.

Figure 1 Mounting configurations

*** The arrows represent the direction of the water flow**



1.5- CLEARANCES

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

Table 1: Minimum clearance to combustible materials

LOCATION	CLEARANCE
Top (access to elements)	13 ¼'' (34 cm)
Sides	4'' (10 cm)
Bottom	0
Front*	0
Back	0

* **If the boiler is in an enclosure, provide a door or a removable panel in front to access the control panel**.

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.

The heating system must be set-up to operate at a maximum pressure of 28 psi and the operating temperature may range from 15ºC to 88ºC (60ºF to 190ºF).

1.7- 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.

1.8- BOILER INSTALLATION

At the time of installation, the following steps should be followed.

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;

1. Install the drain valve and the safety valve according to the mounting configuration as shown in Figure 1;
2. An automatic air vent should be installed on the unit.
3. Install the water supply and return piping with the 2" NPT fitting;
4. The heating supply line must include:
   a. 1 circulator along with 2 maintenance valves;
   b. 1 automatic pressure reducing valve, with a shut-off valve on the return water line;
   c. 1 expansion tank;
   d. 1 automatic vent.
5. In order to ensure satisfactory water flow, the friction in the piping system must not exceed the capacity of the circulator;
6. 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 plastic cover and check to see if the elements are watertight.

1.9- 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 208 or 240 or 480 or 600 VAC 60 Hz 3 phase (3 conductors), 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.

Make sure to turn off all circuits when working in the appliance.

WARNING

Fire Hazard.

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 the same type as the originals. (Copper wiring only).

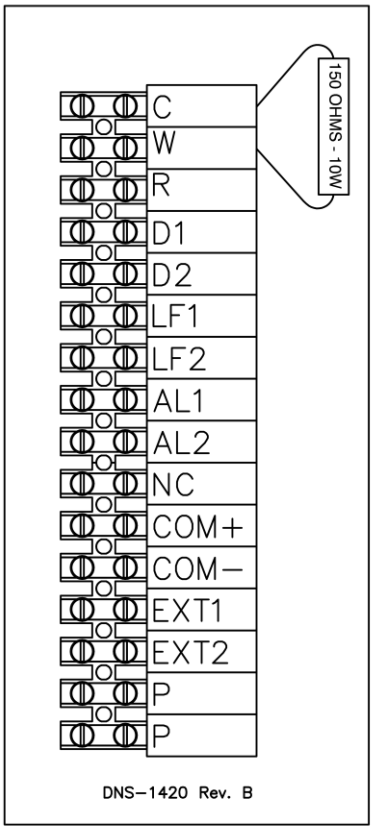
1.9.1- Connecting the circulating pump

Connect circulating PUMP-PUMP connection points in series with power source. The relay is limited to 400 VAC 5 amps. The electric control will activate the circulating pump on thermostat demand, with a heat purge delay at the end of the heating cycle or continuously. Refer to electronic control section to learn how to configure this function.

1.9.2- Power stealing thermostat

A 150 OHMS – 10W must be installed if a power stealing thermostat is used. This resistance must be connected to C-W as shown in Figure 2 Power stealing thermostat resistance.

Figure 2 Power stealing thermostat resistance



1.9.3- Thermostat connection

Single heating zone

Connect the low voltage thermostat to R-W terminals located inside the control panel.

Multiple heating zone

Connect the contacts of the motorized valves or pump controls to R-W terminals inside the control panel.

1.9.4- Outdoor sensor connection

Mount the sensor on an outside wall, protected from direct sunlight, so that it will accurately measure the outside temperature. Install 2 #20 wires between the outdoor sensor and the terminals identified as EXT1 and EXT2 inside the control panel of the boiler.

SECTION 2. OPERATION

2.1- ADJUSTEMENTS AND START-UP

CAUTION

The boiler must be filled with water and all air purged from the system, 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. Adjust the set point of the boiler on the electronic control. See control section for adjustments.
2. Turn on the power;
3. Set the thermostat at 30°C (85°F). The circulator should start as well as the electrical elements in sequence with a 15 seconds delay;
4. The circulator stays on for as long as there is a call for heat except if differently configured on the electronic control.

2.2- MECHANICAL HIGH LIMITS

The two high limit controls must be adjusted 28 above electronic control set point temperature. The aquastat labeled « high limit » will deactivate the upper contactors. The aquastat labeled “control” will deactivate the lower ones.

2.3- QUIET MODE

To make the boiler quieter, in the installer menu, choose noise mode to low.

The low noise option reduces the switching frequency of the contactors. This option shall be used only in installation areas where noise is problematic.

The normal mode allows the boiler to attain the temperature setpoint more precisely optimizing the energy consumption. Preferably, use the normal mode.

2.1- LOAD-SHEDDING

When a jumper in connected to the D1 and D2 terminals, the boiler will reduce the maximum power to the number of elements programmed in the installer menu. This function allows the building owner to reduce his peak consumption. Please refer to the electronic control section of this manual for more details on how to activate this mode.

2.2- LOW FLOW

The boiler will automatically detect a low flow condition and will keep a low heating power in order to avoid overshoots. It is also possible to connect a low flow switch to the LF1 and LF2 terminals. In this case, a low flow condition would turn off the high limit contactors which would de-energize the heating elements.

2.3- COMMUNICATION

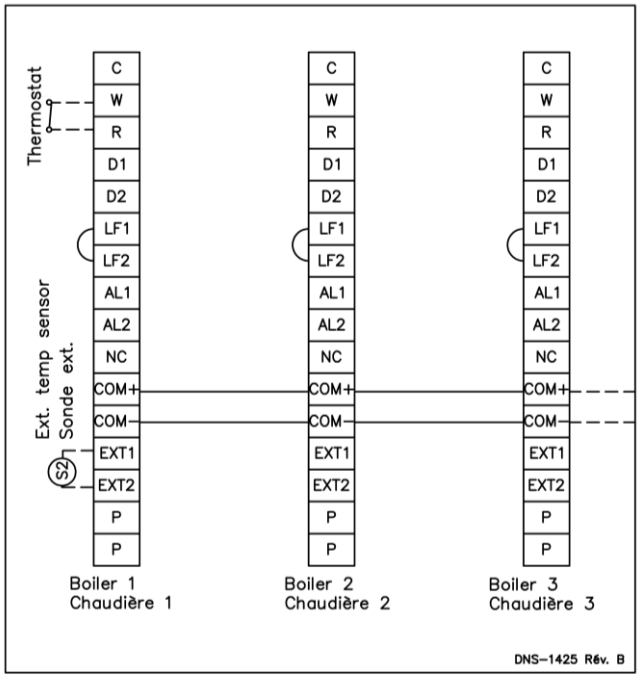
For installation needing more heating power many appliances can be connected in parallel. A serial communication allows the different units to exchange operational information. There can be up to 255 appliances connected on the same BUS.

In order to use this function, the COM+ COM- connections must be used between each appliance.

The master appliance will need to be configured in the installer menu while the other appliances will be configured as slaves. When change in the configuration is required only the master appliance need to be configured, while the others will be automatically modified.

If an exterior sensor is used it shall be connected to the master appliance only.

Figure 3 Multiple boilers connection



2.4- ELECTRONIC CONTROL

Display and electronic controller :

```
PUMP   :  OFF
SET P  :  149.0 °F
TARGET :  149.0 °F
T° IN  :  62.5 °F
T° OUT :  UNUSED
Cmd    :  0%
```

PUMP: Pump state

SET P: Setpoint temperature

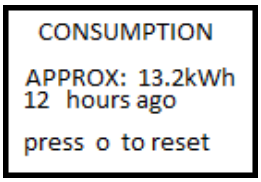
TARGET: Target temperature

T° IN: Water temperature

T° OUT: Outdoor temperature

Cmd : Indicates the percentage of power sent to the elements

Consumption:



The consumption menu shows an approximated value of the power consumed by the boiler since it was last reset.

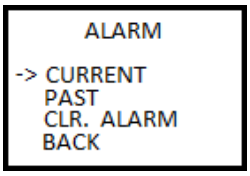
Consumption is written in kilowatt hour and time since last reset is given in hours or in days.

As shown on the screen, pressing the central button will reset the time and power consumed.

Alarm:

Some events may alter the functionality of the device in an undesired manner. These events trigger alarms in the system that remains stored in the device's memory. Reasons for alarms are: troubles with the internal or the external temperature sensors, problems with elements and overheating.

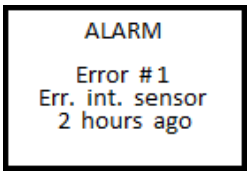
Using the left and right buttons, the arrow on the screen can be moved and the central button will allow the user to activate the element pointed by it.



CURRENT: Indicate the alarms currently afflicting the device.

PAST: Shows the history of the alarms triggered on the device.

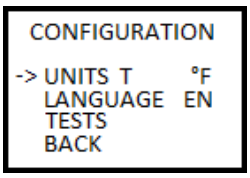
CLEAR ALARM: Ends alarms that still appear active on the device.



The past alarm function allows you to revisit the previous 25 alarm messages and an approximated time span since they happened. The arrow buttons allow the user to scroll through the alarm reports and the central button allows them to return to the alarm menu

Configuration:

The configuration menu's purpose is to allow the user to adjust settings linked to the interface, such as the temperature's units and the language.

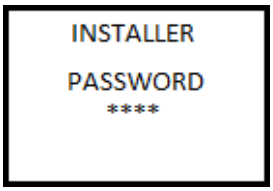


UNITS: allows switching between Fahrenheit and Celsius.

LANGUAGE: allows switching the displayed text between French and English.

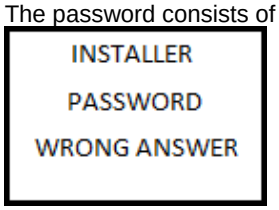
Important: Access to the Tests tab appearing on the controller's screen is protected by a password. Under no circumstances should a user try to access it. This function is used at the Dettson factory to test the Hydra before it is shipped. If the user manages to enter the correct password the machine will be stuck in the test function. To exit the test function, the machine must be shut down, it will then return to the main screen after being subsequently turned on.

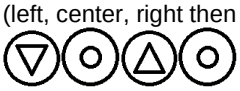
Installer:

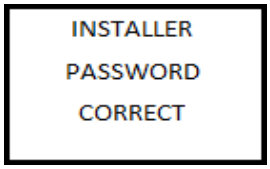


The installer menu's goal is to make the installer's work easier. This menu is protected by a password that can be found on the electrical schematic affixed to the plastic case of the Hydra.

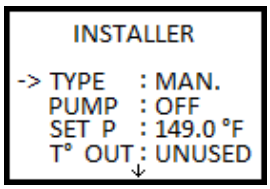
The password consists of a combination of characters entered with the three buttons of the Hydra (left, center, right then center).







The user shouldn't try to gain access to this menu as it is used to program the behavior of the device.

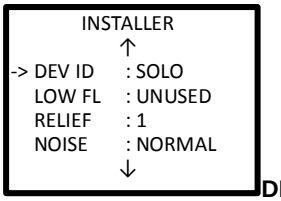


TYPE: Gives a preset value to the temperature set point. Mass, Plinth, Light and Cast Iron are the preset values. Manual allows the installer to manually choose the set point.

PUMP: Off means the pump will activate only when there is a demand from the thermostat. "On" means that the pump will always be active. 20 Seconds indicate that the pump will deactivate 20 seconds following the end of a heating demand from the thermostat.

SET P: Set the target temperature the device will try to reach upon the reception of a signal from the thermostat.

T° EXT: Allows the device to know if an external sensor is being used.



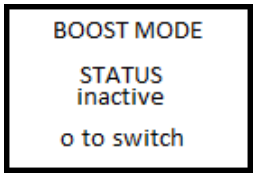
DEV ID: Allows to configure the boiler when used in parallel with other boilers

LOW FL: When active, the boiler will make sure the water flow is adequate before activating more elements

RELIEF: This parameter represents the number of elements active when a jumper is connected between D1 and D2

NOISE: The low noise function will prevent contactors to cycle rapidly which will make the output temperature less precise

Boost Mode:



The boost mode menu allows the user to raise the boiler's temperature set point by 10 degrees Fahrenheit during 24 hour. Press the central button while in this menu to activate or deactivate this measure

Figure 4 Navigation in menus

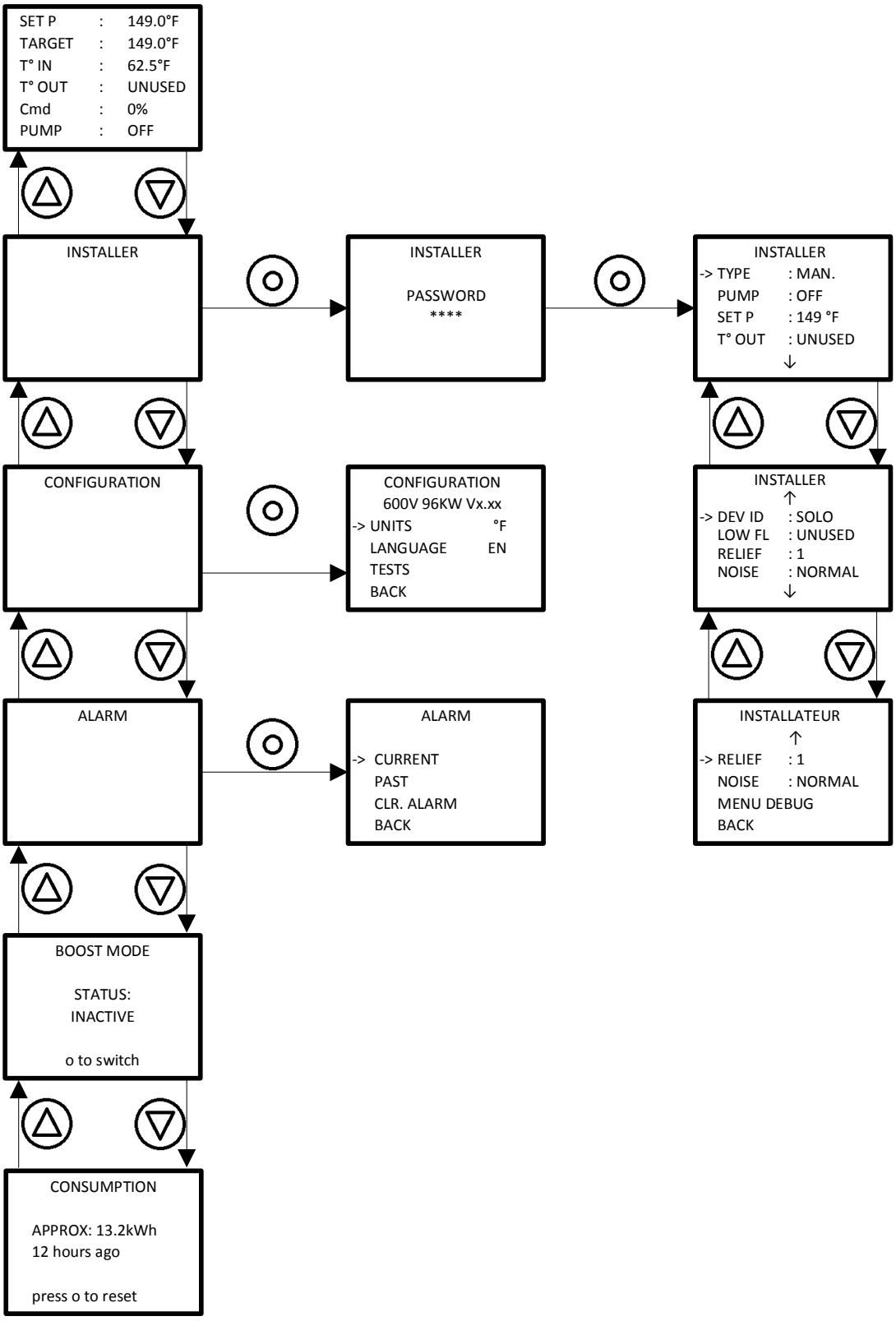
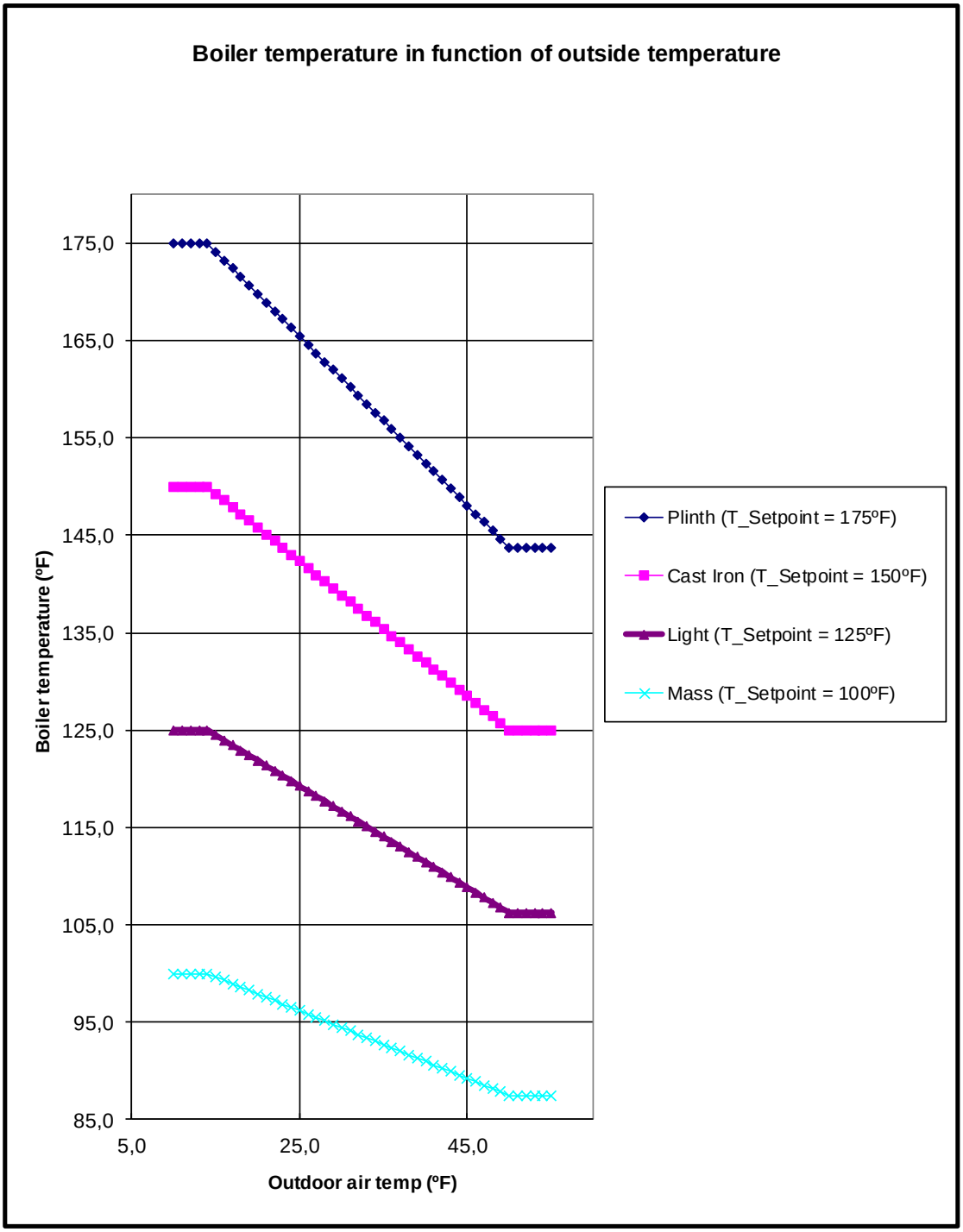


Table 2: Alarm description

Alarm	Description	Possible causes
T in	**The boiler temperature sensor returns a temperature that is not within standard values**	**Misconnected sensor T in and T ext inverted Damaged wire**
T out	**The outdoor temperature sensor returns a temperature that is not within standard values**	**Misconnected sensor T in and T ext inverted Damaged wire**
Overheat	**The control is experiencing an increase in temperature when it does not send command to elements**	**Remaining heat in system Oil boiler active in dual energy systems Defective relay or element**
Err. Heater	**The temperature in the boiler does not increase at a standard rate**	**The load is more important than usual (large house, concrete floor, beginning of season) Not all the elements are heating Make sure the current drawn by the unit corresponds to the one on the rating plate**

Figure 5 Modulation in function of the exterior temperature



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 27ºC (80ºF).

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: _____

_____

_____

SECTION 5. TECHNICAL SPECIFICATIONS

Table 3: Technical specifications

Model Number	POWER (KW)	Electric element #1 (kW)	Electric element #2 (kW)	Electric element #3 (kW)	Electric element #4 (kW)	Electric element #5 (kW)	Electric element #6 (kW)	Consumption (Amps)	VOLTAGE - FREQUENCY - PHASES	General information	Supply - Return	Minimum water flow USG/min	Overall Dimensions (W x D x H) in	Shipping Weight (Lbs)
HYDRAI016-208-3	16	8	8	-	-	-	-	44.4	208V - 60Hz - 3			5.8		
HYDRAI016-240-3	16	8	8	-	-	-	-	38.5	240V - 60Hz - 3			5.8		
HYDRAI016-480-3	16	16	-	-	-	-	-	19.2	480V - 60Hz - 3			5.8		
HYDRAI016-600-3	16	16	-	-	-	-	-	15.4	600V - 60Hz - 3			5.8		
HYDRAI024-208-3	24	8	8	8	-	-	-	66.6	208V - 60Hz - 3			8.6		
HYDRAI024-240-3	24	8	8	8	-	-	-	57.7	240V - 60Hz - 3			8.6		
HYDRAI024-480-3	24	8	8	8	-	-	-	28.9	480V - 60Hz - 3			8.6		
HYDRAI024-600-3	24	8	8	8	-	-	-	23.1	600V - 60Hz - 3			8.6		
HYDRAI032-208-3	32	8	8	8	8	-	-	88.8	208V - 60Hz - 3			11.5		
HYDRAI032-240-3	32	8	8	8	8	-	-	77.0	240V - 60Hz - 3			11.5		
HYDRAI032-480-3	32	16	16	-	-	-	-	38.5	480V - 60Hz - 3			11.5		
HYDRAI032-600-3	32	16	16	-	-	-	-	30.8	600V - 60Hz - 3			11.5		
HYDRAI040-208-3	40	8	8	8	8	8	-	111.0	208V - 60Hz - 3			14.4		
HYDRAI040-240-3	40	8	8	8	8	8	-	96.2	240V - 60Hz - 3			14.4		
HYDRAI040-480-3	40	8	8	8	8	8	-	48.1	480V - 60Hz - 3			14.4		
HYDRAI040-600-3	40	8	8	8	8	8	-	38.5	600V - 60Hz - 3			14.4		
HYDRAI048-240-3	48	8	8	8	8	8	8	115.5	240V - 60Hz - 3			17.3		
HYDRAI048-480-3	48	16	16	16	-	-	-	57.7	480V - 60Hz - 3			17.3		
HYDRAI048-600-3	48	16	16	16	-	-	-	46.2	600V - 60Hz - 3			17.3		
HYDRAI064-480-3	64	16	16	16	16	-	-	77.0	480V - 60Hz - 3			23.0		
HYDRAI064-600-3	64	16	16	16	16	-	-	61.6	600V - 60Hz - 3			23.0		
HYDRAI080-480-3	80	16	16	16	16	16	-	96.2	480V - 60Hz - 3			28.8		
HYDRAI080-600-3	80	16	16	16	16	16	-	77.0	600V - 60Hz - 3			28.8		
HYDRAI096-480-3	96	16	16	16	16	16	16	115.5	480V - 60Hz - 3			34.6		
HYDRAI096-600-3	96	16	16	16	16	16	16	92.4	600V - 60Hz - 3			34.6		
In all cases, refer to applicable local and national codes														

Figure 6 Boiler dimensions

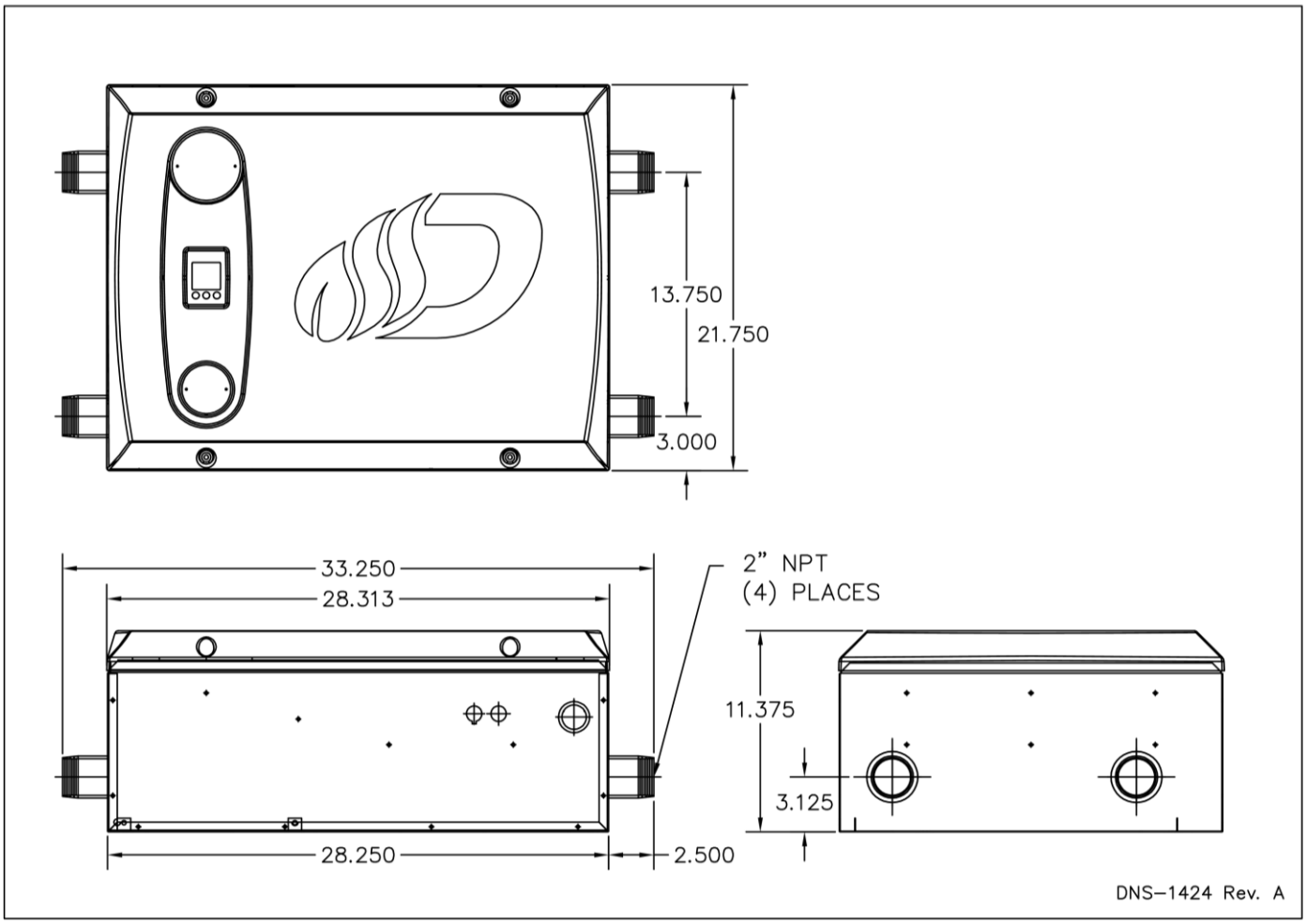


Figure 7 One boiler installation schematic

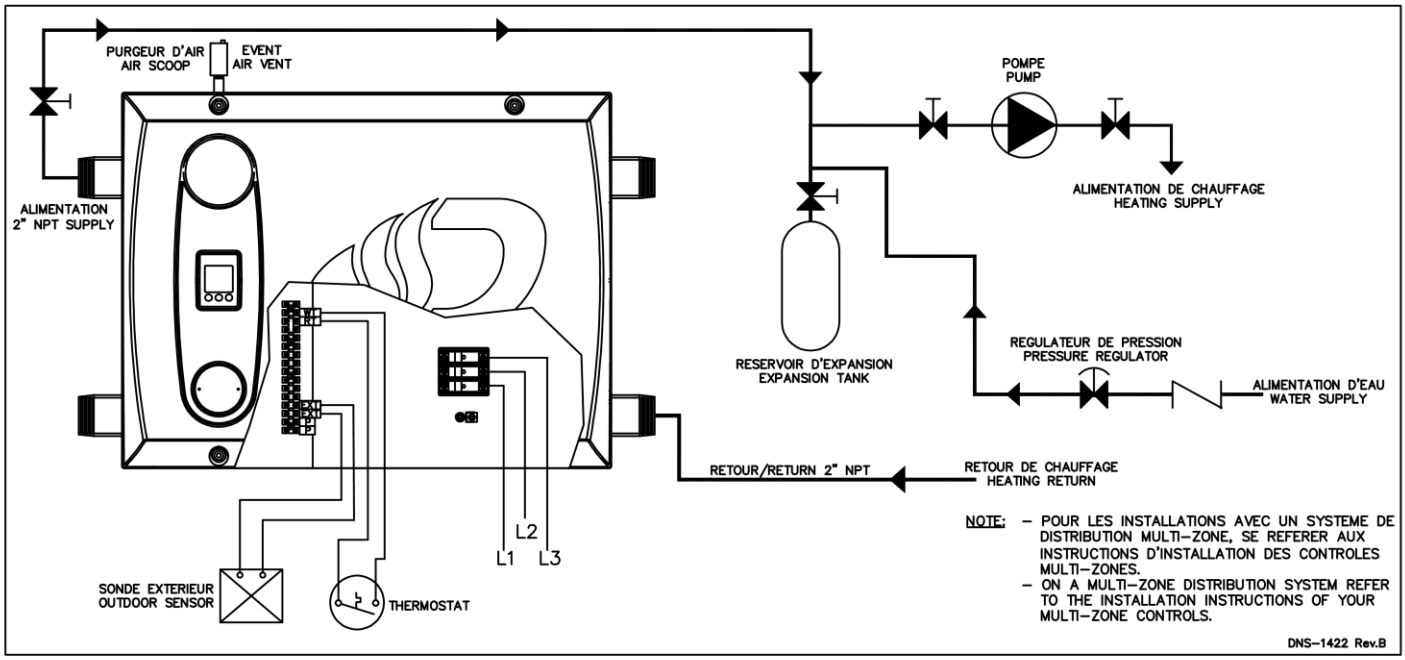


Figure 8 Multiple boilers installation schematic

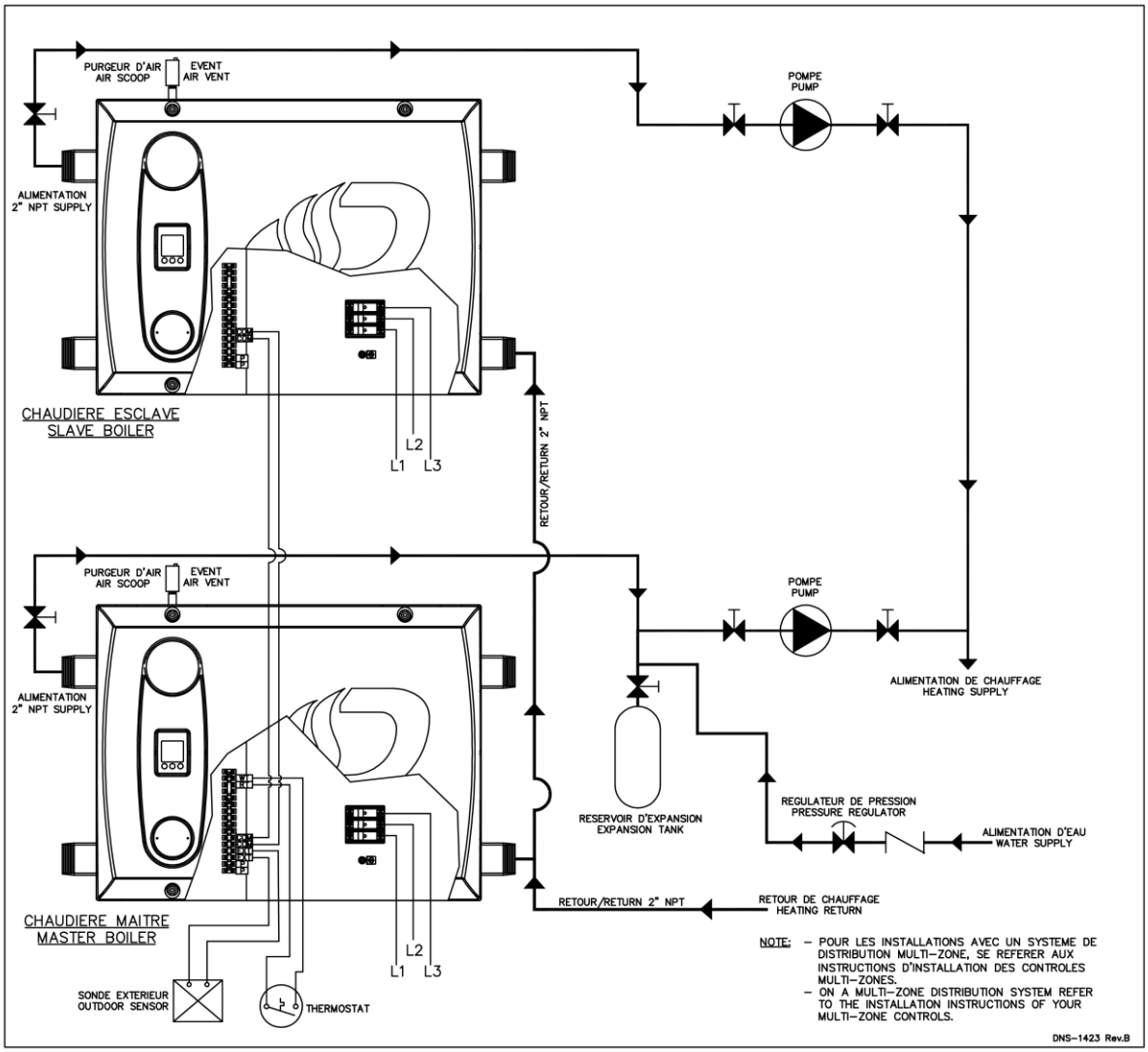
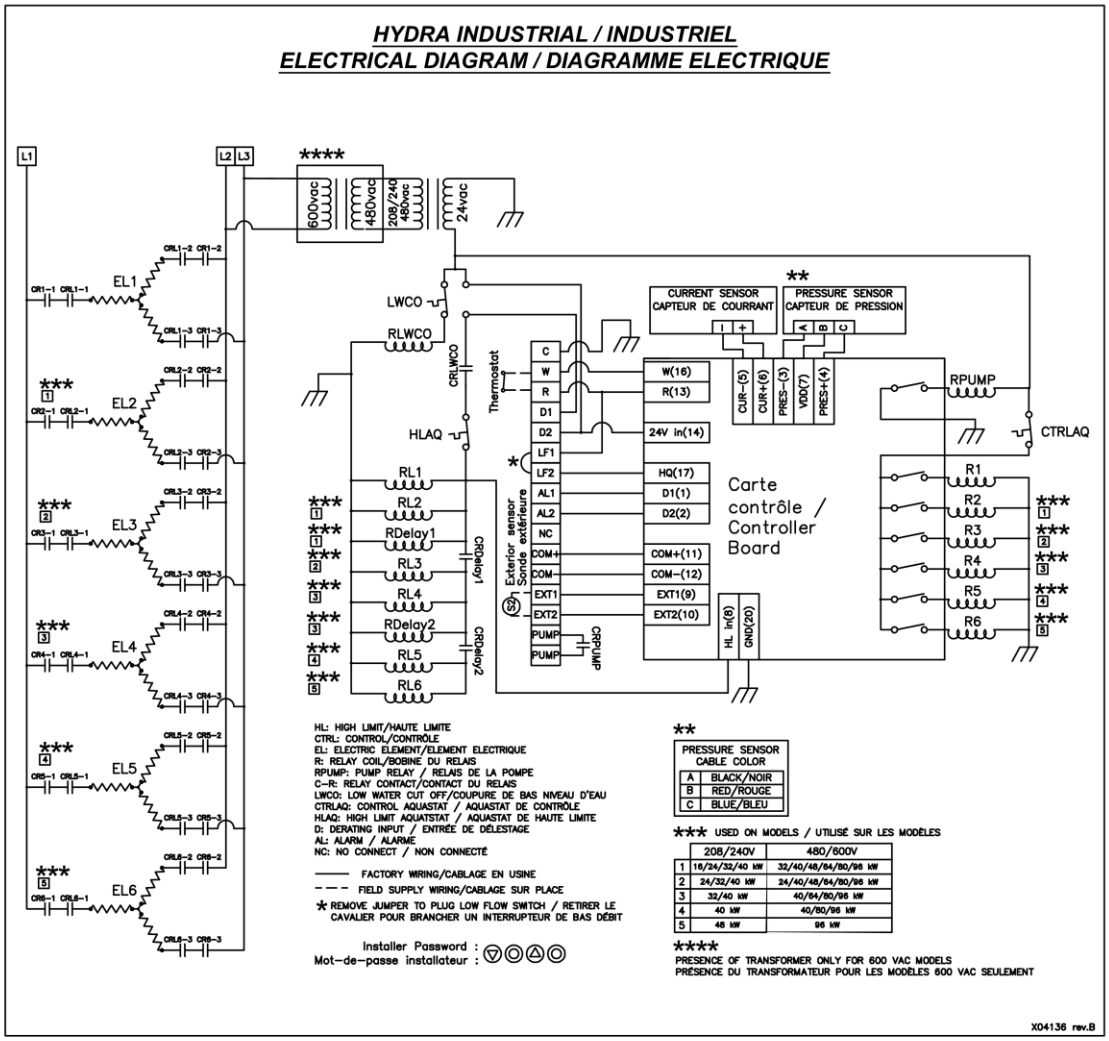


Figure 9 Electrical Diagram



SECTION 6. PARTS LIST

DESCRIPTION	PART #	16kW 600VAC	32kW 600VAC	16kW 240V
TERMINAL BLOCK	L99F007	1	1	1
GROUND TERMINAL	L99G005	1	1	1
CONTROL TERMINAL BLOCK	L05F013	2	2	2
AQUASTAT - HL(B04184)	R02F018	2	2	2
CONTACTOR	L01H032	2	4	4
HIGH LIMIT RELAY	L01H009	1	1	1
24V RELAY (PUMP)	L01H030	1	1	1
RECTIFIER RELAY CARD	R99G006	1	1	1
TRANSFORMATOR 680V - 480V	L01F015	1	1	0
TRANSFO 120/208/240/277/480 - 24VAC	L01F014	1	1	1
ELEMENT 208V - 8KW	L99H023	0	0	0
ELEMENT 240V - 8KW	L99H021	0	0	2
ELEMENT 480V - 8KW	L99H019	0	0	0
ELEMENT 480V - 16KW	L99H020	0	0	0
ELEMENT 600V - 8KW	L99H017	0	0	0
ELEMENT 600V - 16KW	L99H018	1	2	0
RELIEF VALVE	G11F025	1	1	1
PURGE VALVE	G11Z002	1	1	1
LOW WATER CUTOFF	R99H006	1	1	1
PRESSURE TRANSDUCER	R99F052	1	1	1
TEMPERATURE SENSOR	R02Z010	2	2	2
SENSOR WELL	R02J013	2	2	2
RELAY DELAY CONTROL CARD	R99G007	0	0	0
CURRENT TRANSDUCER	R99F054	1	1	1
OUTDOOR TEMPERATURE SENSOR	A20015	1	1	1
2" - 3/4" NPT REDUCER	G03J012	2	2	2
DETTSON LABEL 3.5" DIA	X50044	1	1	1
ELEC LABEL 2.5" DIA	X50043	1	1	1
PLASTIC DOOR	B04238	1	1	1
HIGH TEMPERATURE WIRE HARNESS (ELEMENTS)	B04241	1	2	2
CONTACTORS WIRE HARNESS	B04256	1	1	1
CONTROL WIRE HARNESS	B04257	1	1	1
DETTSON CONTROLLER (INDUSTRIAL)	R99G021	1	1	1
CONTROLLER LABER	X50039	1	1	1
END INSULATION	B04218	1	1	1
CONTOUR INSULATION	B04240	1	1	1
GASKET ELEMENT	B03970	1	2	2
HEXAGONAL NUT 5/16-18 BRASS	F07F015	4	8	8
END PLATE	B04247	1	1	1
TOP REAR PLATE	B04249	1	1	1
TOP FRONT PLATE	B04248	1	1	1
CONTROLLER BRACKET	B04251	1	1	1
WALL BRACKET	B04252	2	2	2
MACHINE BRACKET	B04262	2	2	2
CONTACTOR BRACKET	B04263	2	2	2
TANK ASSEMBLY		B04268-01	B04268-02	B04268-02