

# LHW HYDRONIC HEATING UNIT INSTALLATION MANUAL

If you encounter problems with this boiler, please call: 1-800-465-4114

# LHW MODEL HYDRONIC HEATING UNIT

## Introduction

Your Electric Boiler has been designed to exacting specifications to provide controlled and efficient heating and maximum service life. It's operation differs from most fuel fired boilers in that almost 100% of the heat generated by the immersed elements is transferred to the water.

The electric boiler is controlled differently than fossil fuel fired boilers where the burners function independently of the circulating system and thermostat. With an electric boiler the thermostat controls both the circulating pump and the heating elements energizing both at the same time. This is necessary because the compact tank permits rapid heating of the water.

## Specifications

Model	kW	Amps@ 240 V	Elements	BTU	Min. G.P.M.	Max. Temp. Rise
LHW-3	3	12.5	1-3kW	10,236	3	6° F
LHW-5	5	20.8	1-5kW	17,060	3	9° F
LHW-6	6	25.0	2-3kW	20,472	3	11° F
LHW-8	8	33.3	1-3kW,1-5kW	27,296	3	15° F
LHW-10	10	41.7	2-5kW	34,120	4	14° F

Control Voltage 24 Vac

Boiler Capacity 2 Gallons

Shipping Weight 95 lbs.

Inlet and Outlet Pipe Size 1 1/4" NPT

Pump Switch Capacity 1 HP / 120 V

Recommended Maximum Operating Temperature 180° F

Recommended Operating Pressure 15 psi

Maximum Operating Pressure 28 psi

Note: The control transformer is sized to power only the internal controls. External devices must be powered from a separate power source.

## New Unit Inspection

All units are inspected and tested at the factory prior to shipment. On receipt of your new unit be sure to check for damage which may have occurred in shipping. Any such damage should be reported immediately to the carrier.

## Unpacking

The "Hydronic Boiler" is shipped to you in one carton which contains the basic unit, plus a quantity of smaller packages packed around it which contain fittings and accessories required to complete the assembly of the unit.

## **\*NEVER INSTALL A DAMAGED UNIT**

## System Design

For proper operation of the heating system; the hydronic boiler, the radiation system and the maximum heat loss of the building must be considered. The boiler selected should provide between 110% and 130% of the maximum design heat loss of the building.

The radiation system should be designed to dissipate 110% of the boilers capacity at the desired operating temperature of the system. Hot water radiators are usually rated as being able to dissipate varying amounts of heat at varying operating temperatures.

The recommended cold fill pressure of the system is 12 psi, this pressure should leave at least 4 psi at the highest point in the heating system. Pressure will decrease at a rate of 0.433 psi per foot above the fill point. An expansion tank must be included to allow for approximately 4% expansion of the water in the entire system ( that is the boiler all radiators and pipes). As water in the system is heated the pressure will increase, but a properly sized expansion tank will prevent the pressure from exceeding the maximum recommended operating pressure ( 28 psi ).

The radiators should be arranged in loops so that as many radiators are in parallel as possible since if to many radiators are connected in series the accumulated heat loss in each radiator may cause uneven heating. The minimum recommended G.P.M. must be used, but higher G.P.M.'s will give more even heating. If a number of parallel loops are used valves are usually required to balance the flow in each loop to provide uniform heating.

A zoned heating system is also possible with separate heating zones and individual thermostats in each zone. Care should be taken in a zoned heating system, so that the individual zones are not too small, as it is possible that only one zone may be operating and the entire heating capacity of the boiler is supplying heat to that zone, the units auto limit may operate before the zone thermostat is satisfied. Too low a flow rate or insufficient radiation can cause the auto limit to cycle. See Fig. 3 for recommended electrical connections and plumbing of zoned systems.

# INSTALLATION

## Location

- I) The site selected for installation of your boiler should leave at least 24" of clear space in front and above the unit. The sides require only enough room for plumbing and electrical connections ( see Fig. 1 ). The rear and base of the unit are considered as "Zero Clearance" faces ( see item III and Fig. 1 ). If wall mounting is chosen ensure that the wall can withstand the weight of the unit including water ( approximately 115 lbs. including water ). Two brackets are provided on top and are drilled for 3/8" bolts or screws, these are for wall mounting. Holes are also provided in the base for floor mounting.
- II) The space selected should be well ventilated and kept normally below 25° C.
- III) Though the unit is suitable for floor or wall mount, only faces indicated as "Zero Clearances" may be mounted against combustible surfaces.
- IV) Units must be square and vertical with the outlet at the top.
- V) The circulation pump should be connected to the unit bottom inlet fitting ( see Fig. 2 ) 1 1/4" NPT.

## Mechanical Installation

- I) Refer to Fig. 2 and study thoroughly before installation.
- II) Packed with your "LHW" unit are the following.
  - 1 - Temperature/Pressure Gauge.
  - 1 - 30 lb. Relief Valve.
  - 1 - 1 1/4 NPT "Cross" Unit.
  - 1 - Adaptor 1 1/4 NPT to 1/4 NPT Hex Bushing.
  - 1 - Adaptor 1 1/4 NPT to 3/4 NPT Hex Bushing.Sub-assemble components to boiler as indicated in Fig. 2.
- III) Mount unit as per instructions under "location".
- IV) Install inlet and outlet piping.
- V) Optional circulation pump ( if ordered ) is shipped separately.
- VI) An expansion tank must be installed upstream of the boiler ( see Fig. 2 ) This must be selected and sized by calculating the total water volume in the system and ensuring that the vessel is sized to allow for 4% expansion of water ( see system design and refer to installation instructions provided with expansion tank).

## Pump Installation

The circulating pump should be positioned as close to the unit as possible, with the delivery arranged to pump into the tank inlet on the bottom of the unit ( see Fig. 2 ).

The pump is powered by the "Hydronic Heater" through terminals PL and PN located on the 120 volt terminal block ( lower terminal in unit see Fig. 4 ). The pump starts on heating demand signal, and stops approximately 30 seconds after the thermostat is satisfied.

If desired, the pump may be operated continuously during the heating season, this offers certain advantages as follows

- Improved comfort in some radiation systems by distributing heat energy more evenly, with smaller changes in radiator average temperatures.
- Minimize the noise distraction associated with the starting and stopping of the pump.
- Maximize the life of the pump motor by minimizing the wear associated with frequent starts and stops.

Should you decide to wire the pump in this manner, it must be wired through the same supply as the boiler to prevent the pump from being turned off while the boiler is still powered.

Supply connections to the motor must be completed at the motor in an internal or attached CSA approved junction box.

## Electrical Installation

All wiring must comply with local regulations and codes. Verify the "Name Plate Rating" and check the "Canadian Electrical Code Part 1" to properly size conductors, switch and over current protection.

### Cautions

- 1) "Caution Before installation, ensure that the local electrical inspection authority will accept connection of this equipment to the existing panel."
- 2) "Caution: This equipment may only be installed and tested by qualified personnel."
- 3) The electrical power supply should be checked for adequacy for the proposed additional load. The hydronic boiler requires connection of 240 V single phase power to terminals L1, L2, and N on the 240 V terminal block, see Fig. 4.

### Low Voltage Terminal Block Connection

- Connect Thermostat to T1 T2 ( if the system is zoned, the end switches of all the zone valves should be connected in parallel across T1 T2).

## Thermostat Anticipator

- 1) The thermostat anticipator settings recommended is 0.4 amps for all models.
- 2.) This setting may have to be adjusted slightly to ideally match the boiler control system to the thermostat, as well as to overcome the normal inertia of the radiation system. A setting too low will be characterized by a short cycle which does not allow the space temperature to be satisfied before shutting down the boiler. A setting too high will be characterized by a long cycle which allows large swings and overshoot in the space temperature. Compensating adjustments should be made as required but should not exceed 0.1 amps per adjustment.
- 3.) In zoned systems where room thermostats control zone valves or external relays, the thermostat anticipator should be set to match the current draw of the zone valve being used.

## Thermostat Connection

All external control wiring is 24 Vac. After ensuring the boiler and the entire radiation system is full of water, connect the low voltage thermostat wires to T1 and T2 on the low voltage terminal strip. Pass all thermostat wires through the K.O.'s provided on the enclosure.

## Aquastat

All boilers have an internal aquastat with an external temperature control. Care should be exercised in setting the water temperature. If the aquastat setting is too low, some heating capacity may be lost.

## Start Up

A new system must be thoroughly cleaned, flushed and drained, then refilled with clean water. Foreign material circulating through the system could be detrimental to the pump and to the heat transfer efficiency of the system and may lead to future problems.

Close maintenance valve and open purge valve. Run water through the system and out the purge valve for at least five minutes to ensure that there is no air in the system.

The automatic air vent is for the purpose of removing air from the vessel to prevent the elements from burning out. Additional air vents installed at high points of the system would be useful in removing air that accumulates from the water supply line. Ensure that **ALL EXCESS AIR IS REMOVED FROM VESSEL JUST BEFORE ELECTRICAL POWER IS TURNED ON.**

Oil the pump ( if applicable ) and otherwise prepare it for operation according to the manufacturer's instructions.

**CAUTION ELEMENTS WILL BURN OUT IF THE BOILER IS NOT FULL OF WATER WHEN ELECTRICAL POWER IS TURNED ON. DO NOT CONNECT THERMOSTAT WIRES UNTIL SYSTEM IS FULL OF WATER.**

## Check List

- 1.) Plumbing complete
- 2.) System flushed
- 3.) System free of air
- 4.) Pump rotates freely
- 5.) Thermostat connected
- 6.) Thermostat anticipator set
- 7.) Electrical supply connections complete

## Maintenance

At the start of each heating season, lubricate the circulation pump and motor ( if applicable ) with 6 to 10 drops of SAE 20 non detergent oil. Review and follow start up procedure.

## Troubleshooting Guide

Problem	Correction
a) Boiler not heating, water cool	-check power supply, fuses breakers etc. -check thermostat setting -check aquastat setting
b) Boiler heating pipes cool	-check for air in system -check pump circulation -check all valves
c) Boiler rapid cycles	-check anticipator setting -check pump circulation -check for flow stoppage ( air lock etc. )
d) Boiler operates continuously space overheats	-check anticipator setting
e) Boiler noisy	-oversized pump -too high flow rate -too low flow rate -pump location incorrect
f) Boiler not heating enough	-insufficient capacity -burnt elements -flow rate too low
g) Pressure too high ( above 28 psi )	-defective expansion tank -defective automatic fill valve -expansion tank too small
h) Safety relief valve dripping	-check expansion tank -flush relief valve

## WARRANTY

The manufacturer warrants its Hydronic Boilers against any defects in material and workmanship for a period of three years starting from the date of installation. The sole obligation hereunder shall be to repair, or at the Company's option to replace products as aforesaid provided same are returned "Transportation Prepaid" to the Company's plant within the said period. Other defects or failures due to improper or careless installation; storage or handling, or usage contrary to the manufacturers directions, design, or specifications, as to any and all of which the Company shall be the sole judge, and specifically excluded from this guarantee. No liability is accepted for repair or replacement as aforesaid for reinstallation costs. No liability for loss or damage of any nature or kind, whether or not defective, is assumed.

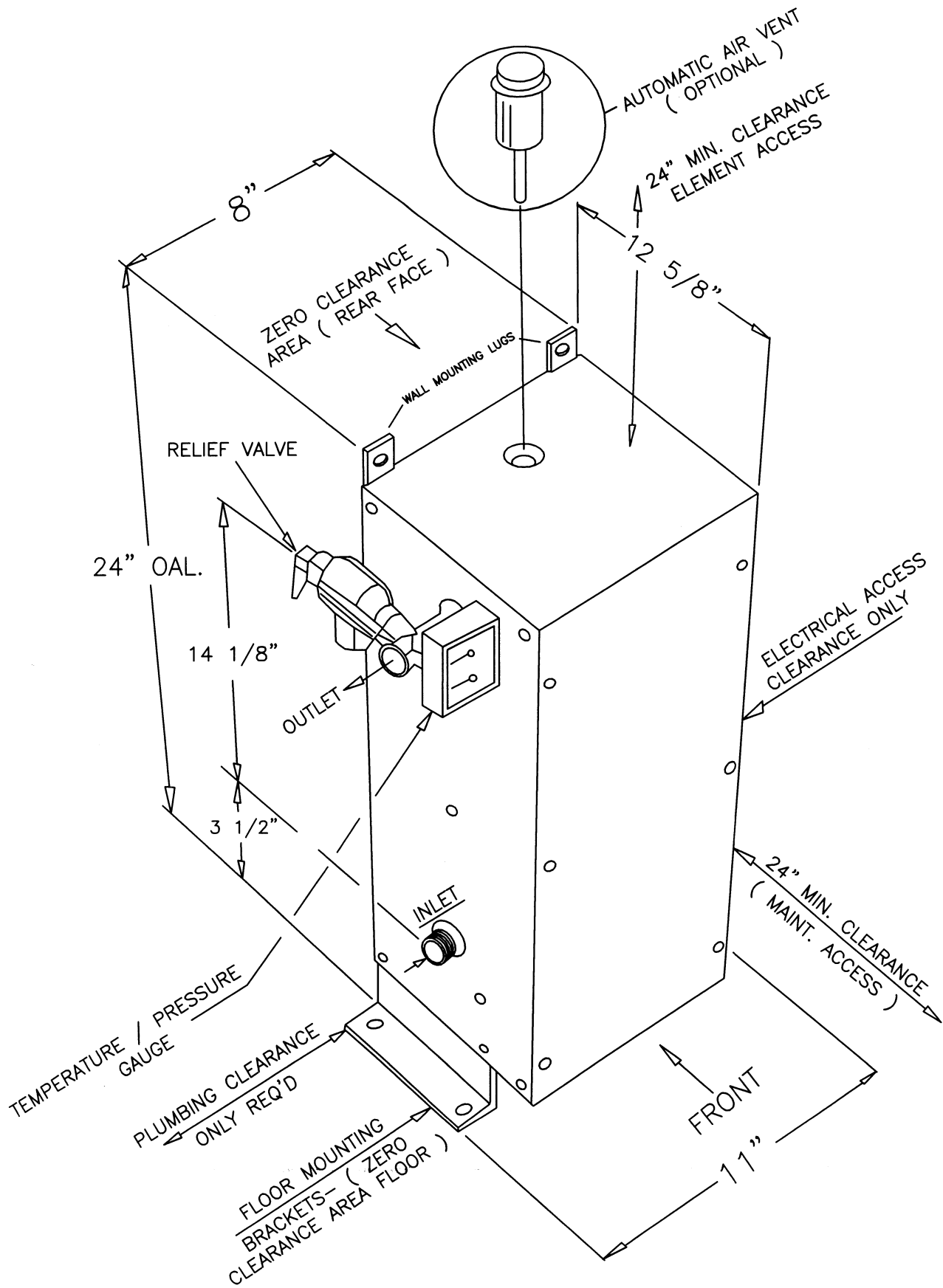
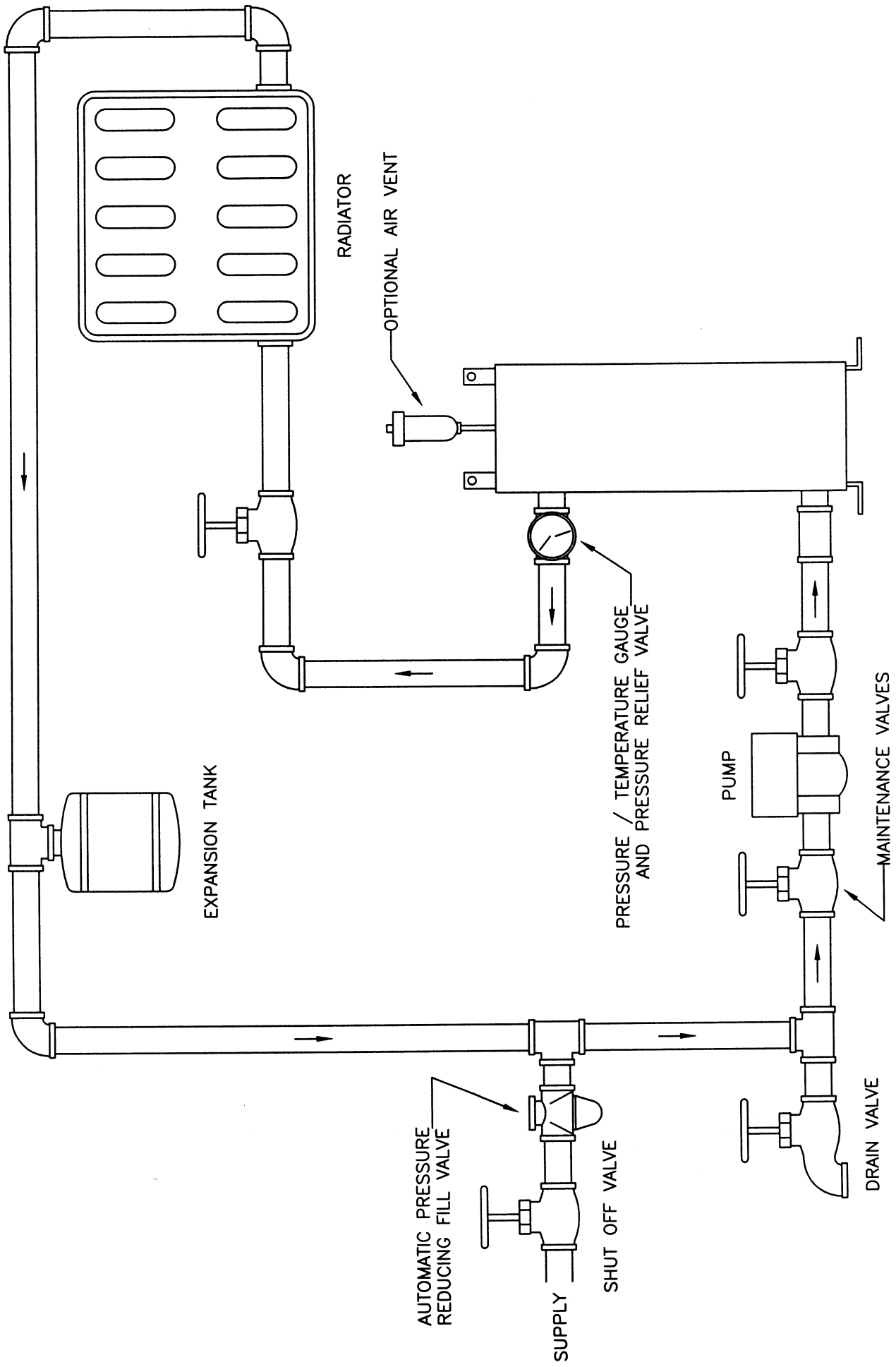


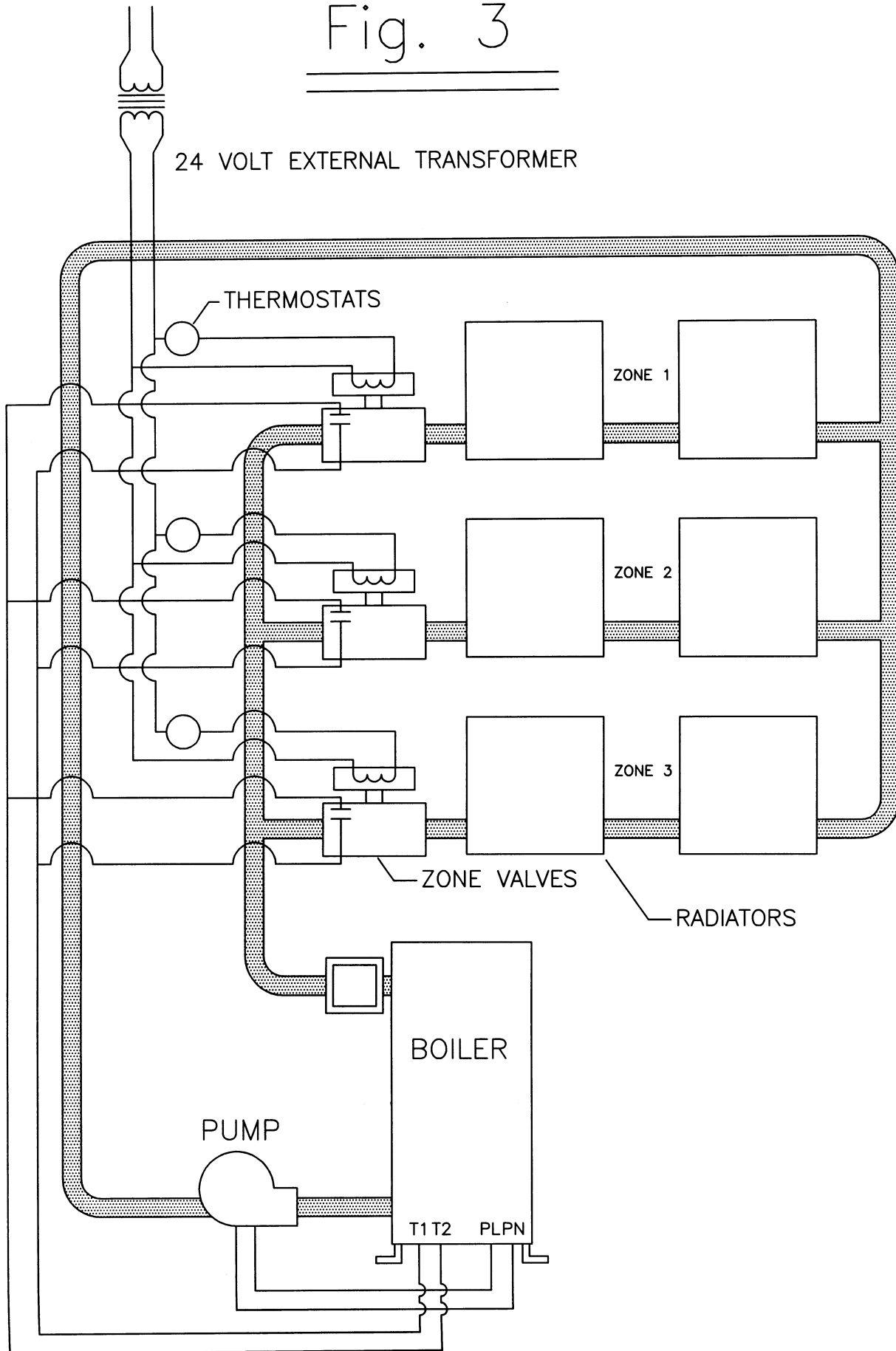
Fig. 1

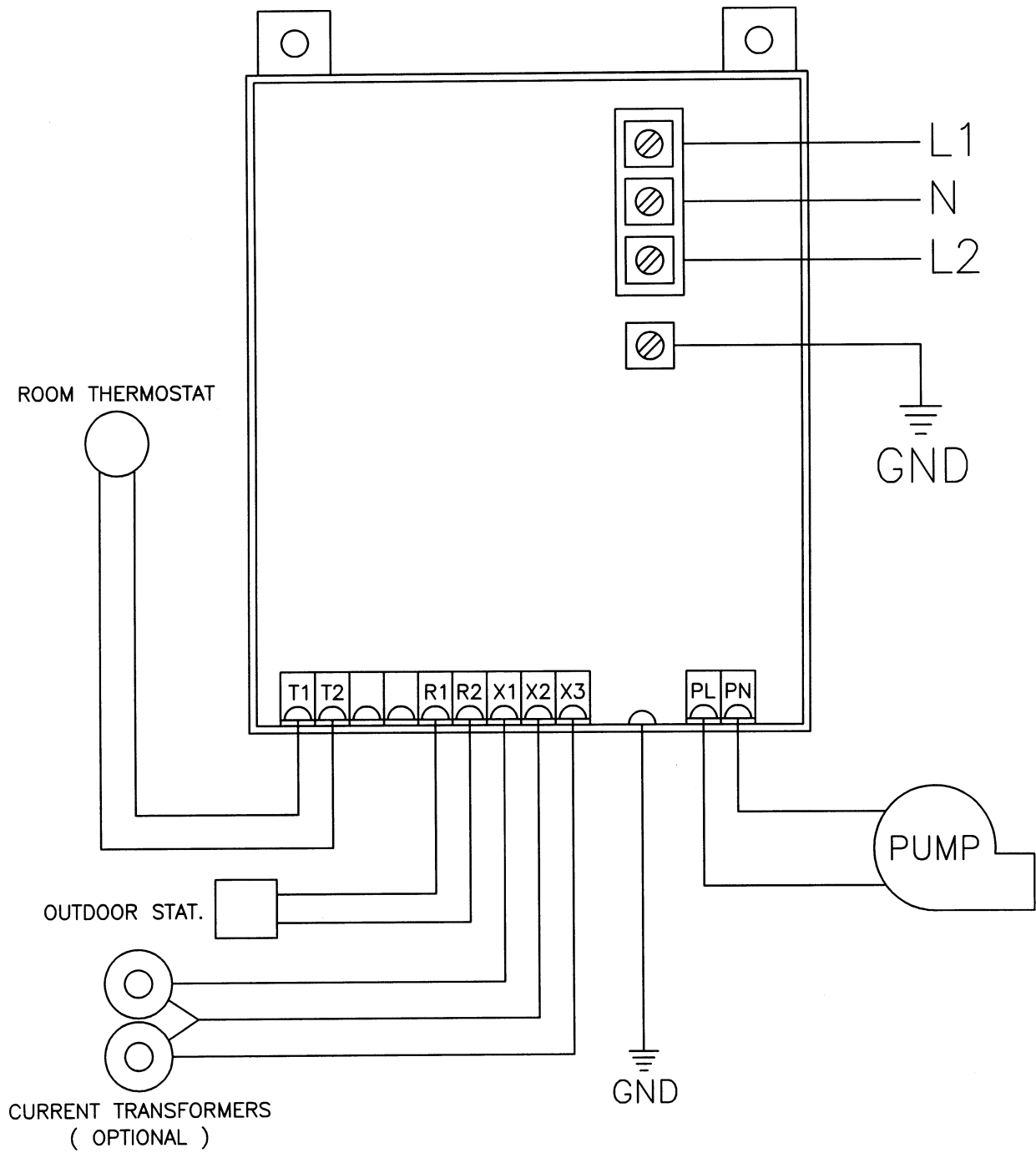


MECHANICAL INSTALLATION  
 FIG. 2

# MULTI-ZONE PIPING

## Fig. 3





# ELECTRICAL WIRING

Fig. 4