

**INSTALLATION
INSTRUCTIONS
FOR
ADD-ON ELECTRIC
BOILERS
HY SERIES AND
HYU SERIES**

HY AND HYU MODEL HYDRONIC HEATING UNIT

Introduction

Your Electric Boiler has been designed to exacting specifications to provide controlled and efficient heating and maximum service life. The HY and HYU series of Electric Boilers have been designed to add electric heat to existing oil heating systems. The HY series features a three position selector switch for a choice of all oil, all electric, or automatic electric/oil operation. The HYU has been designed to meet the requirements of Ontario Hydro's Dual Fuel Home Heating Program.

Their 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 pump and the heater elements energizing both at the same time. This is necessary because the compact tank permits rapid heating of the water. The Solid State Control system stages the power to the elements thus reducing sudden loading of the electrical service. The control board also offers "Load Shedding" capability which can be wired into the unit if required (optional extra).

W A R R A N T Y

The manufacturer warrants its Hydronic Boiler against any defect in material and workmanship for a period of one year 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 manufacturer's directions, design or specifications, as to any and all of which the Company shall be the sole judge, are specifically excluded from this guarantee. No liability is accepted for repair or replacement as aforesaid or for re-installation costs. No liability for loss or damage of any nature or kind, whether or not defective, is assumed.

SPECIFICATIONS

MODEL NO.	KW	AMPS @ 240V 1Ø	ELEMENTS	BTU	*MIN. RECOMM. GPM	MAX. TEMP. RISE	THERMOSTAT ANTICIPATOR SETTING
HY & HYU-9	9	37.5	3x5KW	30,708	3	17°F	0.15
HY & HYU-15	15	62.5	3x5KW	51,180	4	21°F	0.15
HY & HYU-18	18	75	1x3KW, 3x5KW	61,416	4	25°F	0.15
HY & HYU-20	20	83.3	4x5KW	68,240	4	28°F	0.15
HY-23	23	95.8	1x3KW, 4x5KW	78,476	5	26°F	0.65
HY-25	25	104.2	5x5KW	85,300	5	28°F	0.65
HY-30	30	125.0	6x5KW	102,360	6	28°F	0.90

Control Voltage	24 Vac	Boiler Capacity	2 gal.
Shipping Weight	95 lbs.	Inlet and Outlet Pipe Size	1-1/4" NPT
Recommended Max Operating Temp.	180°F	Pump Switch Capacity	1 H.P./120V
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.

*This is the minimum recommended GPM for satisfactory operation, higher GPMs will give more even heating.

IMPORTANT: SOME ELECTRONIC THERMOSTATS MAY NOT BE COMPATIBLE WITH THIS EQUIPMENT AND THEREFORE SHOULD BE ISOLATED BY USING A RELAY. RECOMMENDED RELAY IS LION PART NO. 40012.

See Page 4 for "Caution" detail on Installation.

FIELD TESTS

A. Before Installation of the Add-On Boiler

1. Ensure that the oil burner does not cycle due to repeated operation of the boiler's high limit control.
2. Ensure that the capacity of the add-on boiler is not more than the existing oil boiler.

Important

- 1) Do not add hydronic boiler to any oil fired boiler where the existing circulator cannot provide sufficient water flow.
- 2) If the existing circulator must be replaced with a larger one then ensure that the circulator control and wiring are adequate.

B. After Installation of Add-On Boiler

- 1) Ensure that the oil burner does not cycle due to repeated operation of the furnace's high limit control.
- 2) Operate the Add-On Boiler to ensure satisfactory operation. The aquastat on the Electric Boiler should be set to match the operating temperature of the Oil Boiler. You will note the Aquastat in the Electric Boiler has a maximum setting of 180°F.
- 3) The controls provided with this unit prevent simultaneous operation of the Add-On Boiler and the oil fired boiler. In the case of malfunction, shut down the equipment and call a qualified electrician.

GENERAL

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 immediately reported 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 contains fittings and accessories required to complete the assembly of the unit.

NEVER INSTALL A DAMAGED BOILER

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 connections and for the pressure relief valve (see Fig. 1)

The rear and base of the unit are considered as "Zero Clearance" faces (ref item III see Fig.1)

If wall mounting is chosen ensure that the wall can withstand the weight of the unit (approx 115# including water)

Two brackets are provided on top and are drilled for 3/8" bolts or screws these are for wall mounting. 3/8 dia. holes are 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 Clearance" may be mounted against combustible surfaces.

IV) Unit must be square and vertical with the outlet at the top.

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.

Mechanical Installation

- I) The electric boiler must be piped in parallel to the existing oil boiler. Flow is controlled by the 3-way valve supplied with your boiler. Refer to Fig.2 for connection of the electric boiler to the existing piping system.
- II) Packed with your "HY" unit are the following:
- 1 - Temperature/Pressure Gauge
 - 1 - 30# Relief Valve
 - 1 - 1½ NPT "T" unit
 - 1 - Adaptor 1½ NPT/½ Hex Bushing
 - 1 - 3-Way Valve
- Packed with your "HYU" unit are the following:
- 1 - Temp/Pressure Gauge
 - 1 - 30# Relief Valve
 - 1 - 1½ NPT "T" unit
 - 1 - Adaptor 1½ NPT/½ Hex Bushing
 - 1 - 3-Way Valve
 - 1 - 2 stage thermostat
 - 1 - Outdoor thermostat
 - 1 - pair Current Transformers
- Sub-assemble components to boiler as indicated in Fig. 2.
- III) Mount unit as per instruction under "location".
- IV) Install inlet and outlet piping.
- V) Verify that there is a tight water seal at all connections. Verify that the unit is rigidly mounted and that there is no vibration when the circulating pump is operating.
- VI) The 3 way valve must be installed to provide water through the electric boiler when it is in the un-energized mode.

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 overcurrent protection.

The Hydronic Boilers requires connection of 240V 1Ø power to terminals L1 and L2 on the 240V terminal block. Ground wire to the ground lug

Electrical Installation con't

adjacent to the block - see Fig. 3.

Power for the internal controls etc. is obtained from a separate 120 Volt supply block.

Connections should be made to terminals SL and SN - see Fig. 3 .

Low Voltage Terminal Block Connections

Refer to Fig. 3 for low voltage terminal block connections.

Thermostat Connection

All external control wiring is 24V AC.

After ensuring that the furnace and radiation system is full of water, connect the low voltage thermostat wires to terminals T1 and T2 on the low voltage terminal strip. Pass all thermostat wires through the K.O.s provided on the enclosure.

Thermostat Connection for HYU

Connect supplied thermostat to T1 T2 refer also to Fig. 4 for thermostat connection.

THE HYU MAY NOT BE USED IN MULTI-ZONED SYSTEMS.

Thermostat Connection for HY

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

Thermostat Anticipator

- I) The thermostat anticipator setting recommended for all models is shown on page 2. Failure to correctly adjust this setting will result in unsatisfactory comfort conditions and could result in permanent damage to the thermostat.
- II) This setting may have to be changed slightly to ideally match the furnace control system to the thermostat, as well as to overcome the normal inertia of the thermal 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 furnace.

Thermostat Anticipator con't

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 .1 amp per adjustment.

III) In zoned systems where room thermostat control zone valves or external relays, the thermostat anticipator should be set to match the current draw of the zone valve being used.

3 Way Valve

A 3 way valve is supplied with every HY and HYU boiler. This valve is to be connected to the V1 V2 terminals using class 1 wiring (see Fig. 3).

Outdoor Thermostat

The outdoor thermostat is connected to R1 R2, refer to Fig. 5 for hook-up. It's function is to override the electric system and energize the oil boiler in cold weather.

Current Transformers

Current Transformers are used for load shedding purposes, these should be connected to X1, X2, X3 as shown in Fig. 6 and Fig. 6A. The load shedding system allows a larger kW unit to be hooked up to the existing service panel than normally would be possible, by controlling the elements in the heater so that 80% of the service capacity is never exceeded.

120 Volt Wiring

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. 3). The pump starts on heating demand signal, and stops approx. 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 system by distributing heat energy more evenly, with smaller changes in radiator average temperatures.
- minimize the noise distraction associated with starting and stopping the pump, and

- maximize the life of the pump motor by minimizing the wear associated with frequent starts and stops.

Should you decide to operate in this manner, the pump should not be connected to PL and PN terminals, but rather connected to a 120 Volt supply and operated by an S.P.S.T. switch (not supplied).

When the pump is controlled in this manner the 120V supply to the "Hydronic Heater" must be controlled by the same switch in order to prevent stopping of the pump whilst elements are operating see Fig. 3A.

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

The existing oil furnace now must be powered through the hydronic boiler. The terminals OL and ON are used to supply 120V power to the oil furnace only when the oil furnace is to be operated. The T-T terminals on the oil furnace must be jumpered.

SEQUENCE OF OPERATION
FOR HY

The following is a sequence of operation with the switch positioned in the three different modes:

- 1) "Oil/Electric" Mode a) 1) Thermostat calls for heat
2) Electric Boiler elements are energized in 3 or 5K steps depending on units Kw rating.
3) Once first element is energized the existing circulator starts.
4) Thermostat is satisfied.
5) All loads drop out

In the event that the electric boiler cannot satisfy the total heating requirement, the sequence of events are:

- b) 1) Thermostat calls for heat.
2) Electric boiler elements are energized in 3 or 5Kw steps depending on units Kw rating.
3) Once first element is energized the existing circulator starts.
4) Thermostat not satisfied within a factory adjustable time frame then the controller will drop all electric loads and energize the oil boiler.
5) Thermostat is satisfied
6) The next time the thermostat calls for heat the cycle is repeated.

Note: Everytime the thermostat calls for heat the controller will always try the electric heating mode first.

- | | |
|---------------------------|------------------------------|
| 2) <u>"Electric" Mode</u> | 1) Thermostat calls for heat |
| | 2) Thermostat is satisfied |

Note: Automatic changeover does not occur in this mode.

- | | |
|----------------------|---|
| 3) <u>"Oil Mode"</u> | In this position the add-on heater does not operate at all, the boiler operates as a normal oil-boiler. |
|----------------------|---|

SEQUENCE OF OPERATION FOR HYU

- 1) Thermostat calls for heat.
- 2) Electric heater elements are energized in 5 Kw steps or less (stage 1).
- 3) Circulating pumps starts at the same time as the first element is energized.
- 4) Thermostat satisfied.
- 5) All loads drop out.

In the event that the electric heater cannot keep up with the thermostat demand then the Hydronic will drop out and the oil-fired hot-water boiler will be energized.

Also if the outdoor temperature drops below the outdoor thermostat setting, the Hydronic is overridden and the oil-fired hot-water boiler will function.

Note: The Hydronic series HYU is equipped with a safety "No Freeze" thermostat.

In the event that the oil-fired boiler fails to come on and the house temperature drops to 15°C (60°F) the "No Freeze" thermostat will turn the Hydronic boiler back on again.

CHECKOUT PROCEDURE FOR
LOAD SHEDDER INSTALLATION

Model with Load Shedder

- 1) Do required field tests after installation of Add-on Heater as detailed on page 3.
- 2) Switch "Off" as many electrical loads as possible in the house.
- 3) Simulate maximum heating demand by:
 - energizing step 1 on 2 stage thermostat - HYU
 - turning thermostat up (switch in electric position) - HY
- 4) Switch "On" the disconnect switch controlling the heater.
- 5) The heating elements will come on in sequence and the circulating pumps will start up at the same time as the first element energizes.
- 6) Measure the amperage drawn by the heater, and compare it with that shown on the nameplate.
- 7) Lower the setting of the room temperature. All the relays should de-energized and the amperage should drop to zero.
- 8) Raise the setting again so that all stages of heating are on.
- 9) Switch on some electrical loads such as dryer, stove, oven lights, etc. As more loads are added the heating current should decrease. Check the total house current at the main disconnect switch. It should never exceed 48 amps for a 60 amp electrical service, (7.5 and 9kW models) 80 amps for a 100 amp service (10.0, 12.5 and 15kW).
- 10) Let the heater operate at full capacity, by switching off all the other loads.

**THIS PLENUM UNIT HAS BEEN FITTED WITH THE OPTIONAL LOAD
MANAGEMENT ADAPTOR. THE LOAD MANAGEMENT SYSTEM IS TO BE HOOKED TO
THE TWO YELLOW WIRES.**

OPEN CIRCUIT - OIL FURNACE WILL OPERATE

CLOSED CURCUIT - PLENUM UNIT WILL OPERATE NORMALLY

**IF YOUR LOAD MANAGEMENT SYSTEM OPERATES OPOSITE TO THIS, REMOVE
THE ADAPTOR AND HOOK THE LOAD MANAGEMENT SYSTEM DIRECTLY TO R1,R2.**

Start Up

- a) 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.
- b) 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.
- c) 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.
- d) Oil the pump (if applicable) and otherwise prepare it for operation according to the manufacturer's instructions.
- e) "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.
- f) 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

- a) 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.
- b) Review and follow start-up procedure.

TROUBLE SHOOTING GUIDE

<u>PROBLEM</u>	<u>CORRECTION</u>
a) Furnace not heating, water cool	<ul style="list-style-type: none">- check power supply, fuses breakers etc.- check thermostat setting- check aquastat setting
b) Furnace heating, pipes cool	<ul style="list-style-type: none">- check for air in system- check pump circulation- check all valves
c) Furnace rapid cycles	<ul style="list-style-type: none">- check anticipator setting- check pump circulation- check for flow stoppage (air lock etc).
d) Furnace operates continuously - space overheats	<ul style="list-style-type: none">- check anticipator setting
e) Furnace noisy	<ul style="list-style-type: none">- oversized pump- too high flow rate- too low flow rate- pump location incorrect
f) Furnace not heating enough	<ul style="list-style-type: none">- insufficient capacity- burnt elements- flow rate too low
g) Pressure too high (above 28 psi)	<ul style="list-style-type: none">- defective expansion tank- defective automatic fill valve- expansion tank too small
h) Safety relief valve dripping	<ul style="list-style-type: none">- check expansion tank- flush relief valve
i) High Limit Tripping	<ul style="list-style-type: none">- boiler oversized for system- flow rate too low

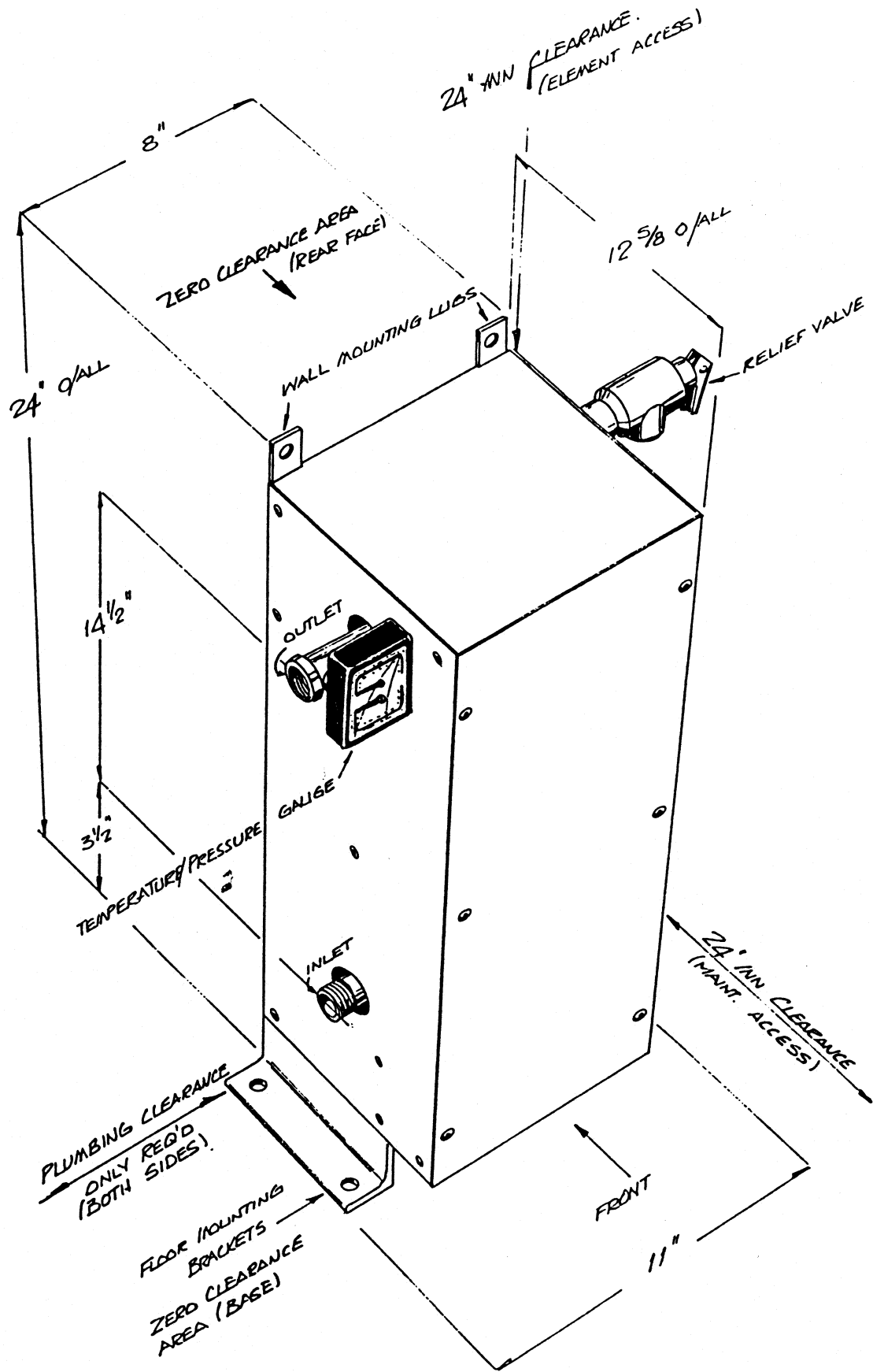
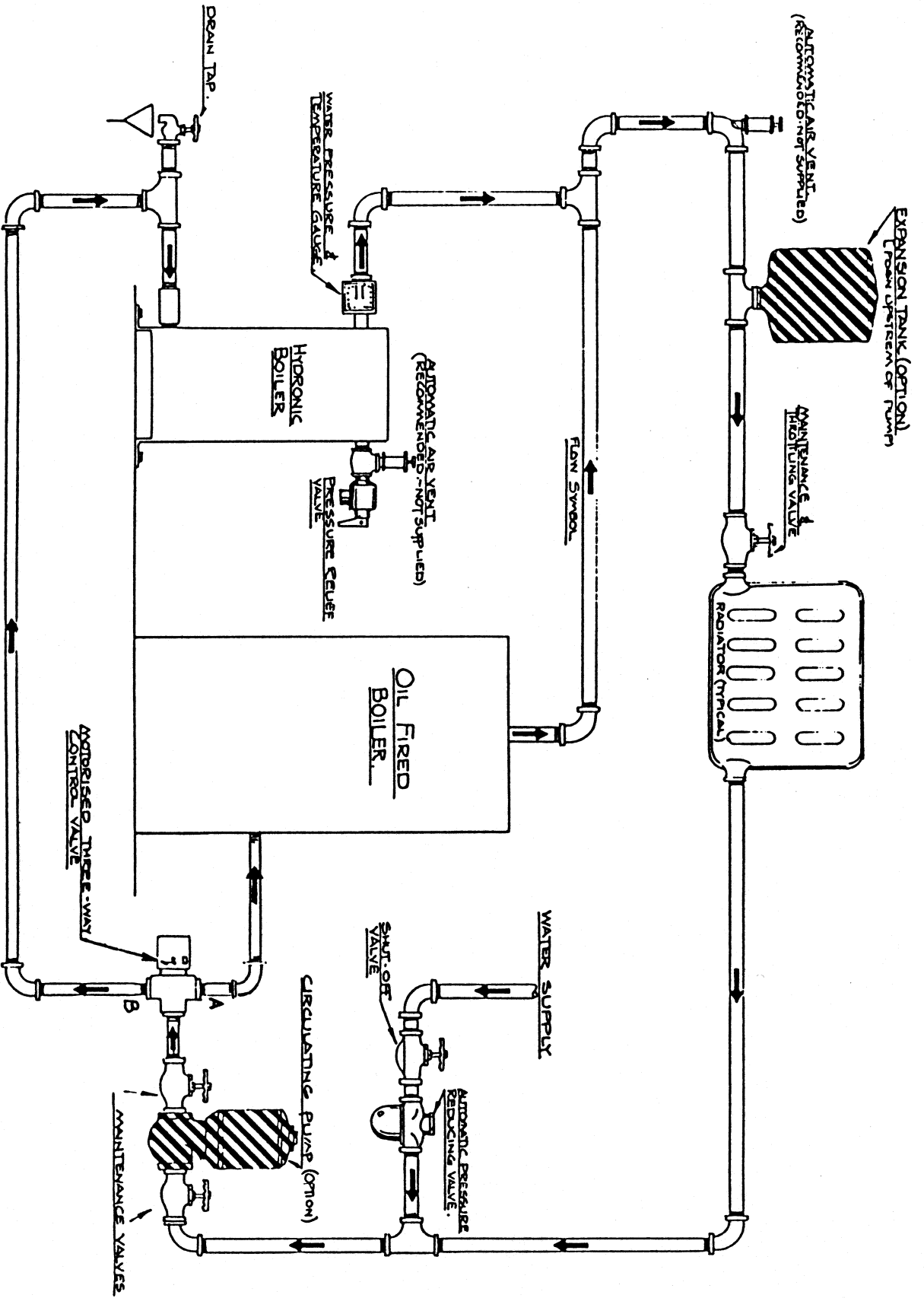
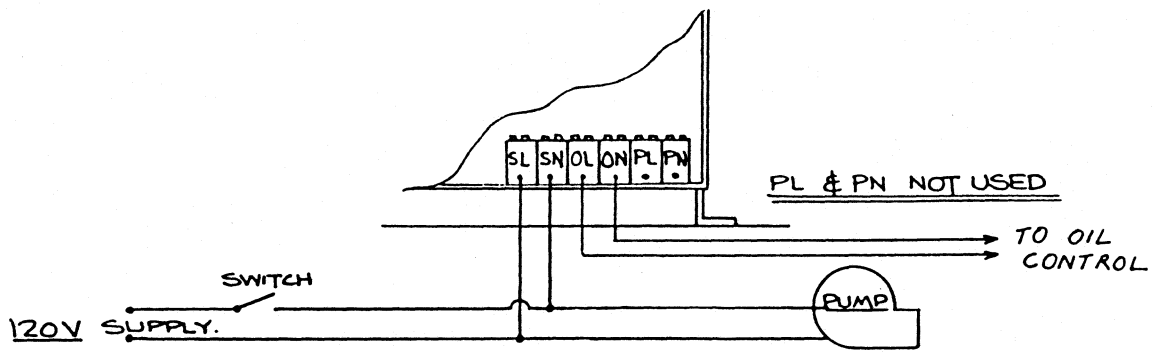


FIG. 1

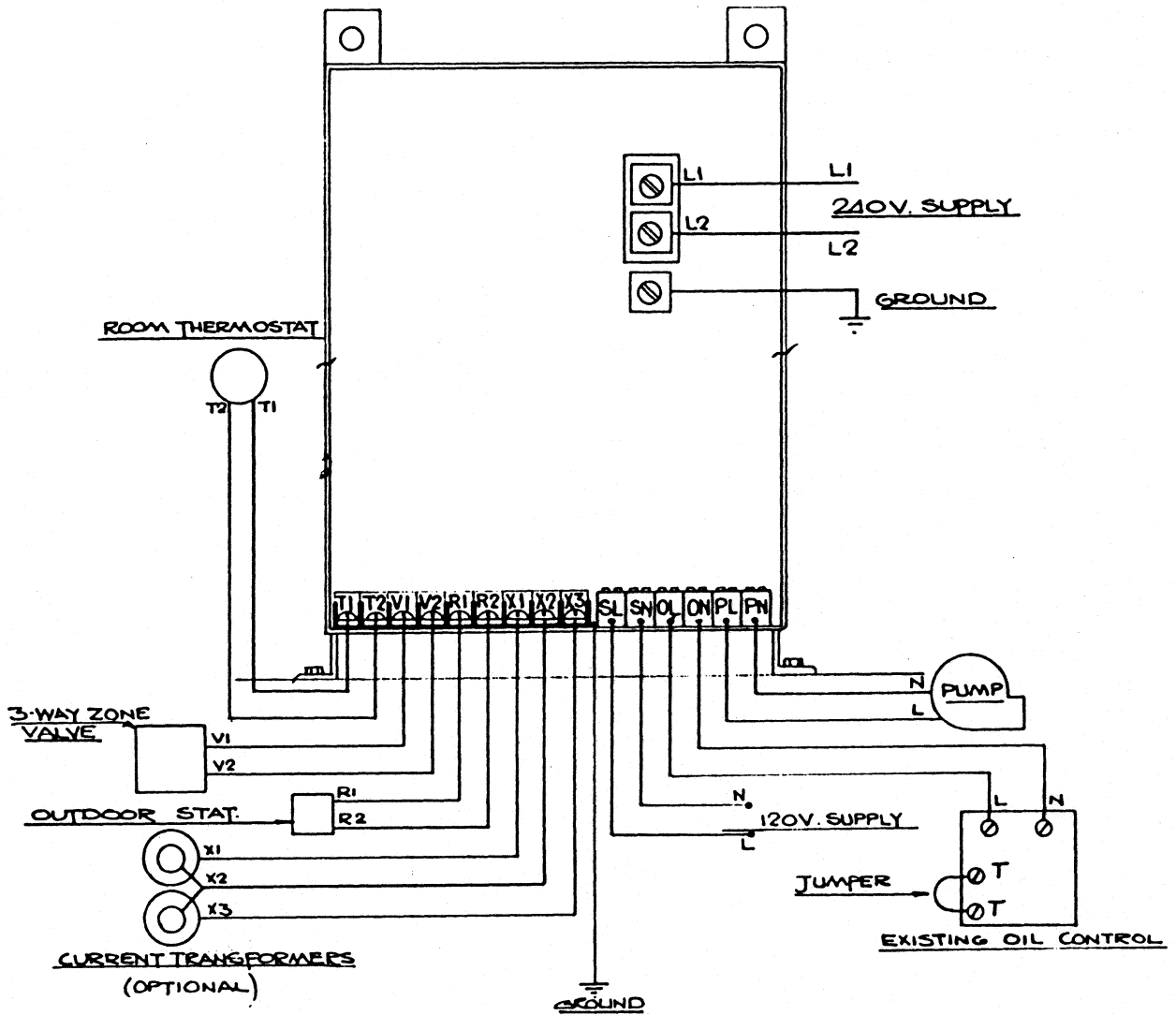


MECHANICAL INSTALLATION (HYBRID)

FIG. 2



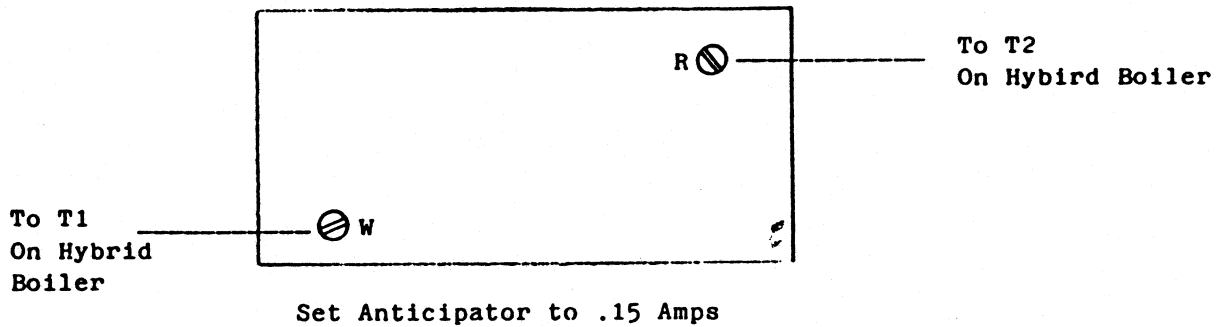
FOR CONTINUOUS PUMP OPERATION
FIG. 3A



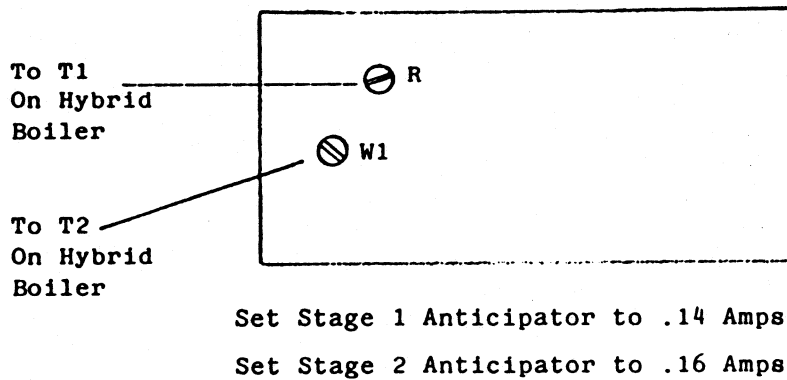
ELECTRICAL WIRING.
FIG 3

INSTALLATION INSTRUCTIONS
FOR (2 Wire) 2 STAGE
HEATING THERMOSTATS
FOR HYU SERIES

WHITE-RODGERS MODEL IF32-301

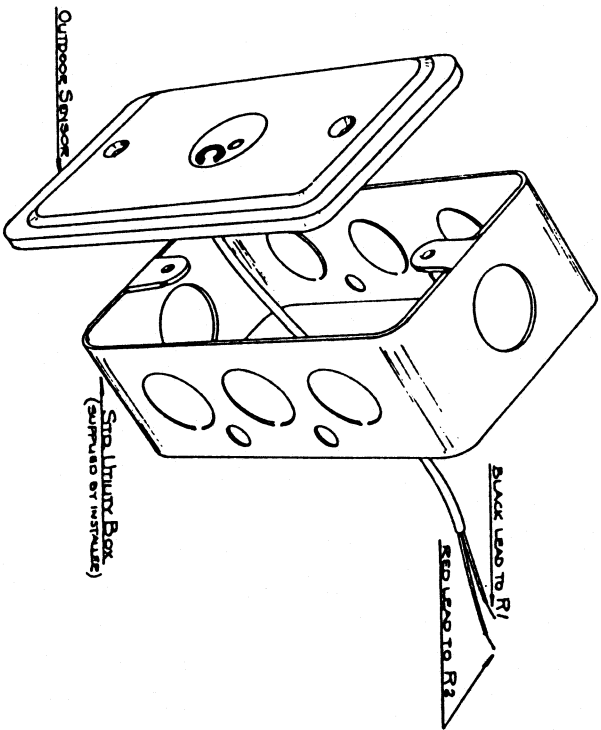


HONEYWELL MODEL Y594F1022

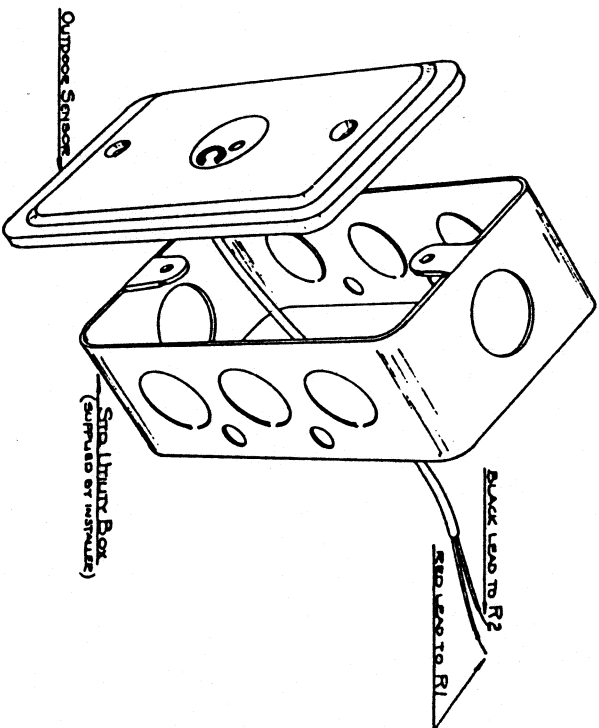


Caution: If T1 and T2 are interchanged the hybrid system will operate in the oil mode only.

HYU SERIES



HY SERIES



OUTDOOR SENSOR INSTALLATION
FIG. 5

EXISTING SERVICE ENTRANCE

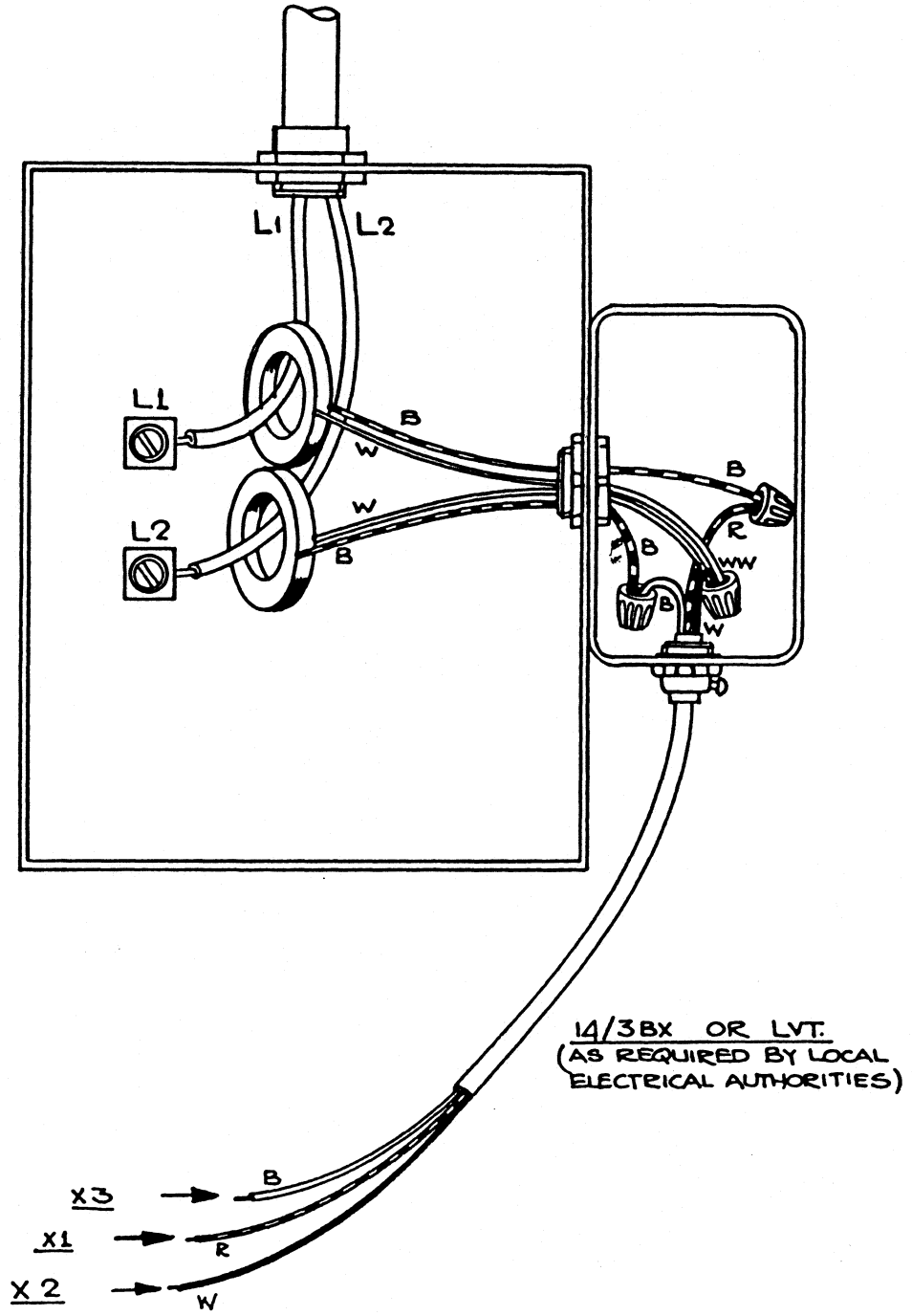


FIG. 6

LOAD SHEDDER INSTALLATION.

(IF SEPARATE BOX REQ'D BY AUTHORITIES
SEE FIG 6 A.)

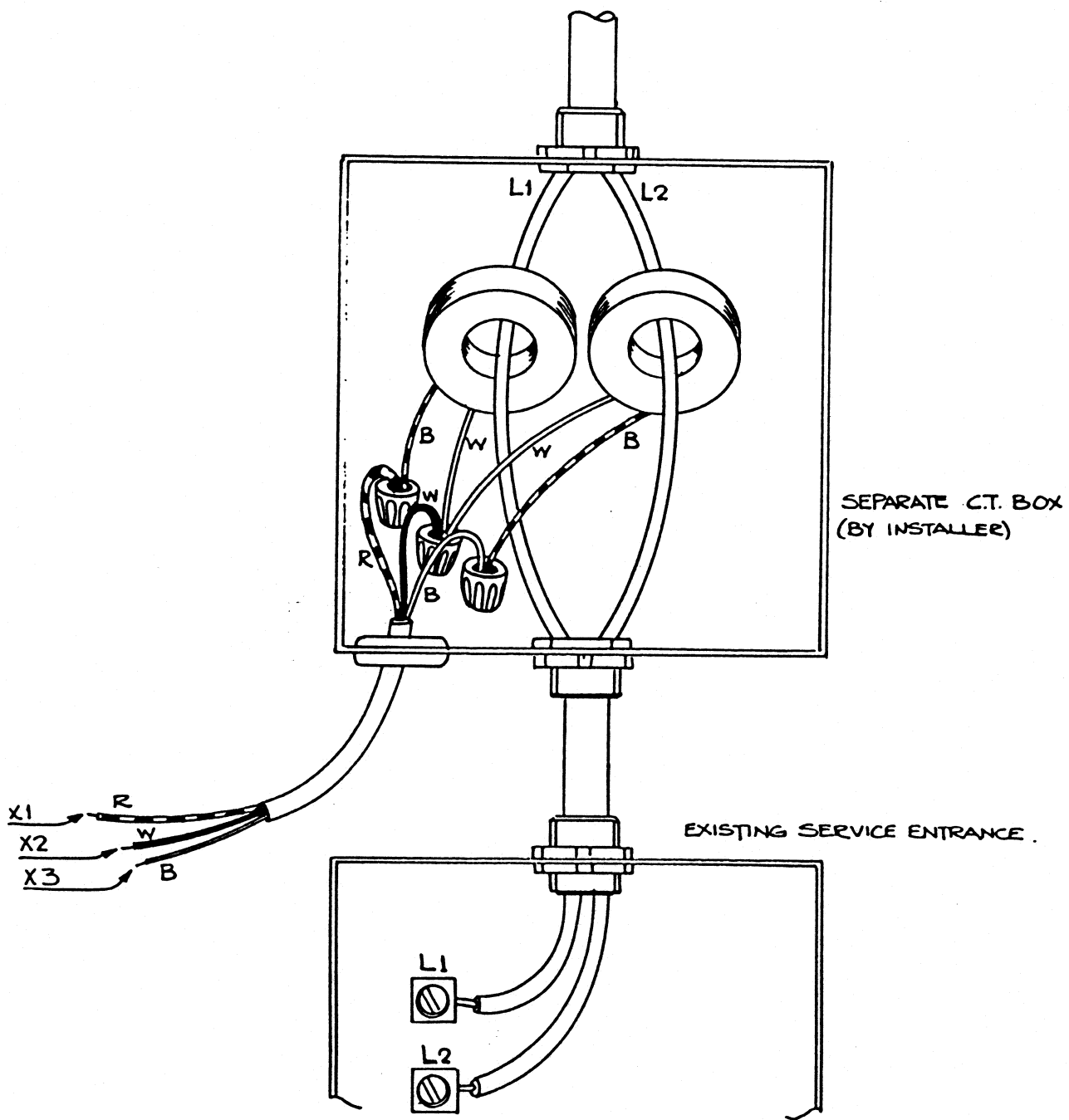


FIG 6 A.