December, 1997

Models PSH, BSH Separated Combustion High Efficiency WIRING DIAGRAMS gas-fired unit heaters

(Units manufactured after May 1991)
(For units manufactured between November 1987 and May 1991 see 6-453.2)
(Includes wiring diagrams for Energy Saver and Summer/Winter Switch Accessories)

Diagram Selection

Diagrams are provided for both single- and three-phase circuits, and are readily identified in the Selection Table on the following page. The Selection Table enables easy selection of the correct wiring diagram after the electrical components of the unit heater have been determined. The control codes are listed to aid in locating the correct diagram.

Diagram Interchangeability

The following gas-fired unit heater wiring diagrams are for either 115-volt, 60 Hertz, single-phase power, or for 230-volt, 60 Hertz, three-phase electrical service.The 115V/60Hz/1ϕ diagrams may also be utilized for 230V/60 Hz/1ϕ by substituting 230-volt components for the 115-volt shown.

The 230V/60 Hz/3ϕ diagrams may be modified to 460V/60 Hz/3ϕ by adding a 460V to 230V step down transformer and wiring the unit as shown in the wiring "inset" on all 3-phase wiring diagrams.

The 460V/60Hz/3ϕ diagrams may be modified to 575V/60Hz/3ϕ by adding a 575V to 230V transformer and wiring the unit as shown in the wiring "inset" on all 3-phase wiring diagrams.

NOTE: As indicated in every diagram, all wiring must comply with the National Electrical Code and all local codes. All components must agree with their respective power source.

⚠ CAUTION

Turn off all power and gas to unit before wiring. Failure to wire this unit according to the specified wiring diagram may result in injury to the installer or user. For deviations, contact factory.

Abbreviations and Symbols

To facilitate interpretation and enable simplification the abbreviations and symbols have been selected as recommended by ANSI (American National Standards Institute) and NEMA (National Electrical Manufacturers Association) standards.

XFMR or TR	Transformer
V	Volts
Hz	Cycle or Hertz
ϕ	Phase
LC	Limit Control
THERM or TH	Thermostat
MV	Main Valve
PV	Pilot Valve
SO	Shut Off
RC	Relay Contact or Coil
G	Ground
H	Hot
SW	Switch
EPS	Electric Pilot Switch
HI	High
Lo	Low
C	Common
"J" Box	Junction Box
H_1, H_2, etc.	Transformer Primary Terminals
SUM	Summer Contact (Summer-Winter Switch)
WIN	Winter Contact (Summer-Winter Switch)
S-W	Summer-Winter Switch
O.L.C.	Overload Contact
C.S.	Power Venter Centrifugal Switch
FT_C	Fan Timer Contact
SPDT	Single-Pole Double-Throw Switch
VA	Volt Ampere
W	Watts

Wire Color Coding

BK	Black
BL	Blue
R	Red
W	White
Y	Yellow
X1, X2, etc.	Transformer Secondary Terminals
L1, L2, etc.	Electric Load Terminals
T1, T2, etc.	Starter or Motor Terminals

Unit Power Requirements - Blower PSH Models

	Voltage									
	115/60/1		230/60/1		200/60/3		230/460/60/3		575/60/3	
HP	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts
1/6	4.6	400	2.5	400	2.4	400	2.8	560	3.2	560
1/3	7.2	610	3.5	610	3.4	610	2.8	560	3.2	560
1/2	9.3	800	4.5	800	4.4	800	3.5	850	4	850

Unit Power Requirements - Blower BSH Models

	Voltage									
	115/60/1		230/60/1		200/60/3		230/460/60/3		575/60/3	
HP	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts
1/4	7.2	520	3.7	520	2.5	500	2.4/1.2	500	0.9	500
1/3	6.4	515	3.3	515	2.7	530	2.6/1.3	530	1.1	530
1/2	10.3	730	4.8	730	3.4	730	3.6/1.8	730	1.3	730
3/4	12.8	1000	6.5	1000	4.1	970	3.8/1.9	970	1.5	970
1	15.2	1210	7.7	1210	4.9	1230	4.8/2.4	1230	1.9	1230
1-1/2	16.8	1690	8.5	1690	6.5	1630	6.2/3.1	1630	2.3	1630
2	-	-	-	-	8.6	2080	7.6/3.8	2080	2.7	2080

6-454 — WIRING DIAGRAM MODELS PSH/BSH

Wiring Diagram Selection

A. Field and Submittal Wiring Diagram Selection

Wiring in the field changes little when the brand of the controls furnished on the unit heater changes. Select correct wiring diagrams as follows:

1. Determine unit heater model and size.
2. Select control code number from Table 1.
3. Reference unit heater model in the Page Location Index with control code number and determine correct page number for single-phase or three-phase control. Single-phase wiring diagram page numbers are in the upper left of box and three-phase diagrams are in the lower right of box.
4. Wiring diagrams for unit heater accessories are listed in Table 2. Use the accessory diagrams along with the unit wiring diagrams for complete wiring instructions.

B. Service and Troubleshooting

Because internal or factory wiring may vary depending on the controls manufacturer, the wiring diagram must be selected with the series identity number when servicing or troubleshooting unit heater control system. Wiring diagrams in this bulletin are for unit heaters manufactured after May 1991 and the series identity number is the 5th thru the 7th digits of the unit heater serial number.

EXAMPLE: Serial No. — 01012010195 has a series identity number of 201.

To select the correct wiring diagram:

1. Determine unit heater model and size from serial plate located on the side of the unit.
2. Determine the control code numbers from box marked *Control Code,* also on the serial plate.
3. Determine the *series identity number* from unit serial number.
4. Select the Page Location Index which corresponds to the *series identity number* of the unit heater, then proceed with Steps 3 and 4 of Field and Submittal Wiring Diagram Selection.

Example Selection

Select correct single-phase wiring diagram for a BSH 170A, Control Code 30, series identity number 201.

Locate the Page Location Index which shows the page numbers for PSH and BSH units with series identity number 201 (see page iii). Select the page number where the column for the series identity number intersects with the line for control code 30. The correct single phase wiring diagram for this unit is found on page 1 as shown in the upper left hand corner of box. If this unit also had a summer/winter switch the accessory wiring diagram found on page C-1, as per Table 2, would also be required for complete wiring information.

Two-In-One Diagrams

Two wiring diagrams are furnished for each circuit configuration in this manual. Included are a connection diagram at the left for field installation and a circuit schematic at the right to aid in continuity and troubleshooting.

The heavier lines in the connection diagram indicate line voltage; the lighter lines indicate low voltage. Solid lines show pre-wiring performed at the factory; dotted lines inform the installer of connections required to put the heater in operation.

Table 1
Control Code Descriptions

Control Code Number	Description
08, 09	Single-Stage, Intermittent Pilot Ignition, Non-Lockout. Natural Gas.
28, 29	Single-Stage, Intermittent Pilot Ignition, with Lockout. Natural Gas.
30, 31, 32, 33	Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry. Propane Gas.
78, 79	Single-Stage, Intermittent Pilot Ignition, with Lockout. Propane Gas.
85, 86, 93, 94	Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry. Natural Gas

Table 2
Accessory Wiring Diagram Page Location Index ①

Page	Accessory
C-1	Summer/Winter Switch
C-2	Energy-Saver Kit

① See Paragraph A, Step 4 under "Wiring Diagram Selection".

6-454 — WIRING DIAGRAM MODELS PSH/BSH

Models PSH or BSH (all sizes) Page Location Index ①

Control Code	Series Identity Number					
	201	202	203	204	205	206
08 or 09		3 / 4	1 / 2	1 / 2		
28 or 29		3 / 4	1 / 2			
30 or 31	1 / 2	5 / 6	1 / 2	7 / 8	9 / 10	11 / 12
32 or 33	14	13				
78 or 79		3 / 4	1 / 2			
85 or 86	1 / 2	5 / 6	1 / 2	7 / 8	9 / 10	11 / 12
93 or 94	14	13				

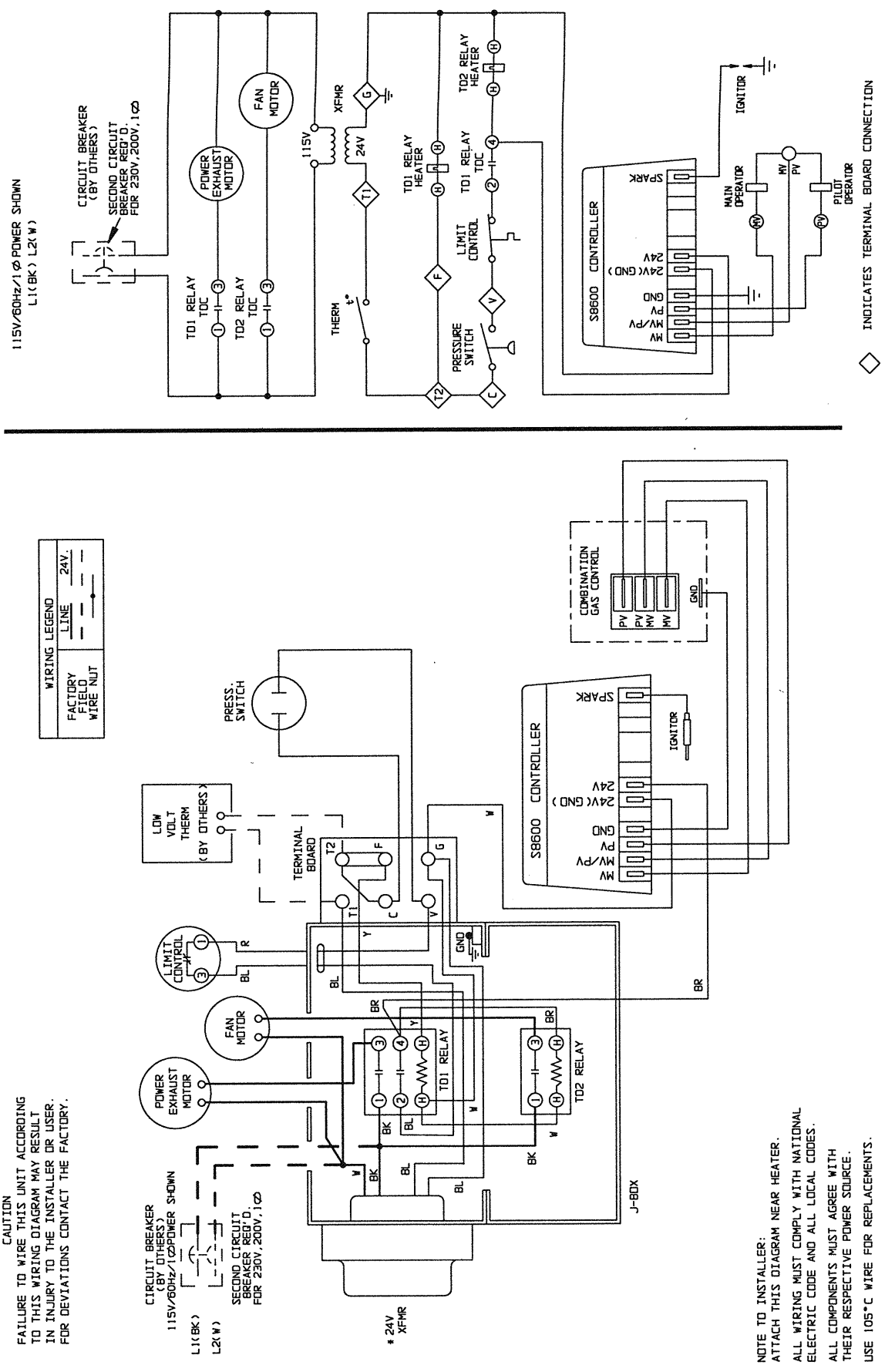
① Cell format represents page number for single phase or three phase power as shown in following example.

1Ph / 3 Ph

6-454 — WIRING DIAGRAM MODELS PSH/BSH

MODINE®

WIRING DIAGRAM



CAUTION
FAILURE TO WIRE THIS UNIT ACCORDING TO THIS WIRING DIAGRAM MAY RESULT IN INJURY TO THE INSTALLER OR USER. FOR DEVIATIONS CONTACT THE FACTORY.

NOTE TO INSTALLER:
ATTACH THIS DIAGRAM NEAR HEATER.

ALL WIRING MUST COMPLY WITH NATIONAL ELECTRIC CODE AND ALL LOCAL CODES.

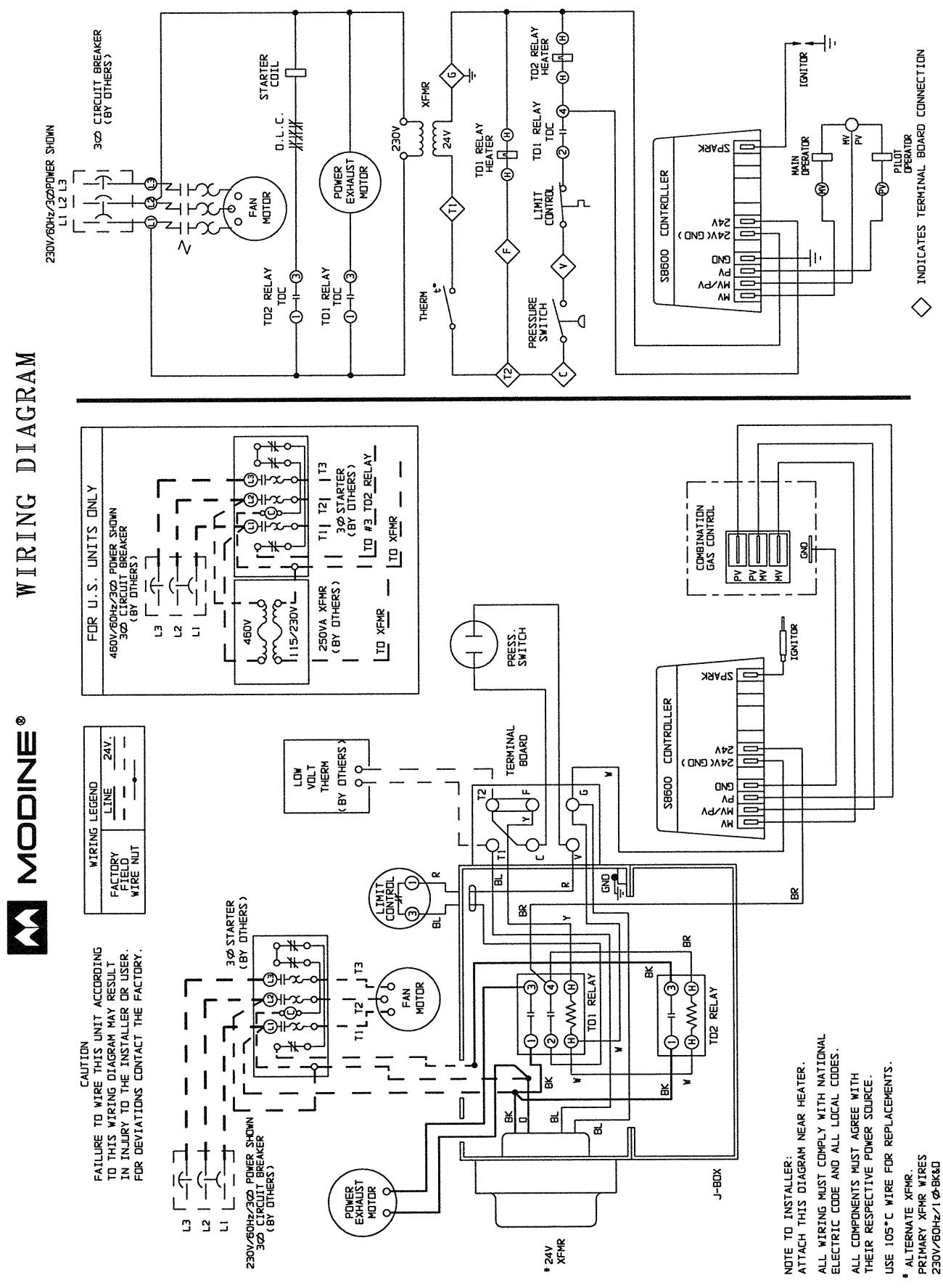
ALL COMPONENTS MUST AGREE WITH THEIR RESPECTIVE POWER SOURCE.

USE 105°C WIRE FOR REPLACEMENTS.

* ALTERNATE XFMR.
PRIMARY XFMR WIRES
230V/60Hz/1Ø-BK&O
200V/60Hz/1Ø-BK&R
WIRE NUT THE WIRE NOT USED

5H73048C1 REV B Single-Stage, Intermittent Pilot Ignition, Non-100% (and 100%) Shut-Off, Single-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH

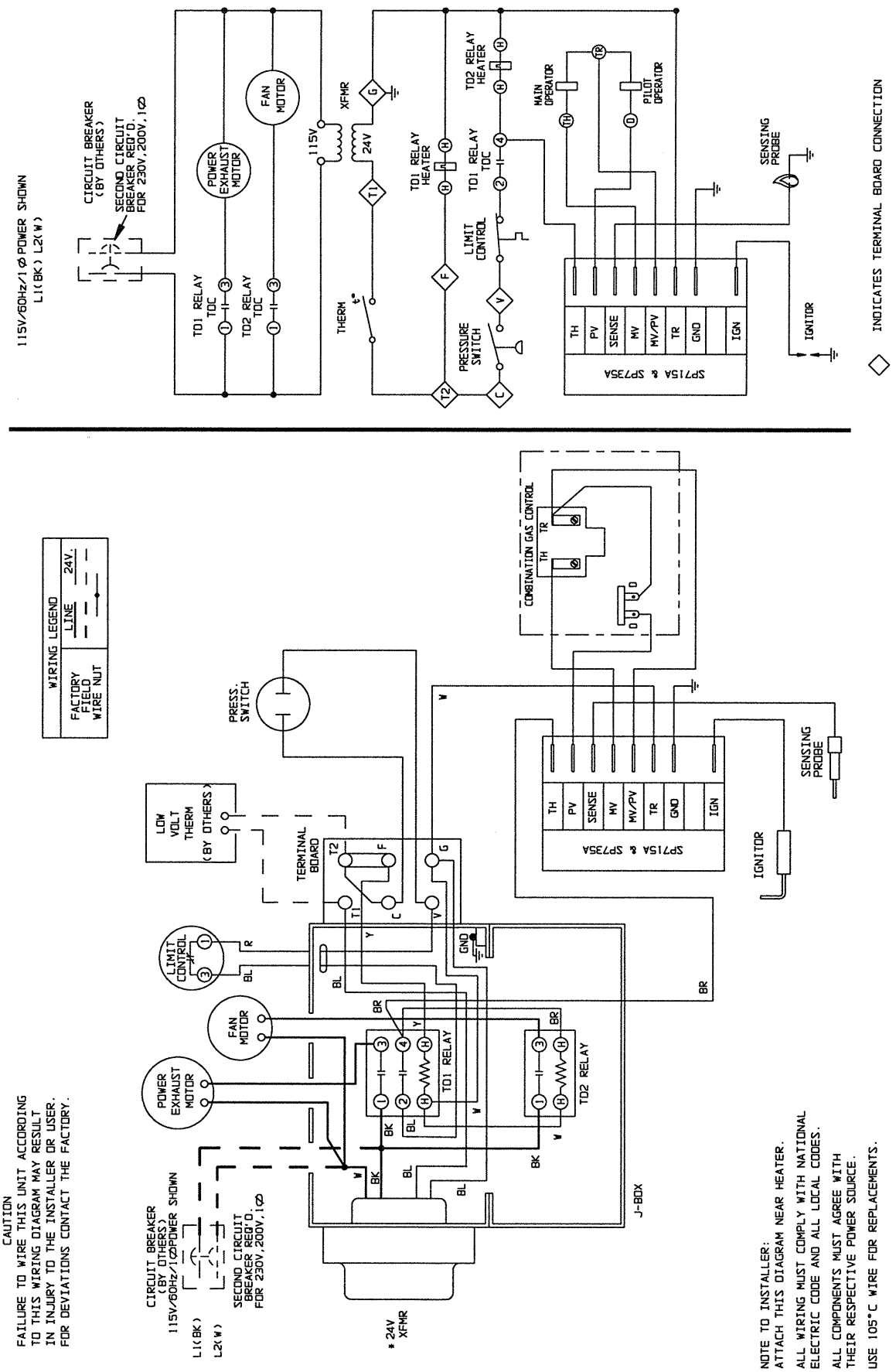


5H73048C1 REV B Single-Stage, Intermittent Pilot Ignition, Non-100% (and 100%) Shut-Off, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH

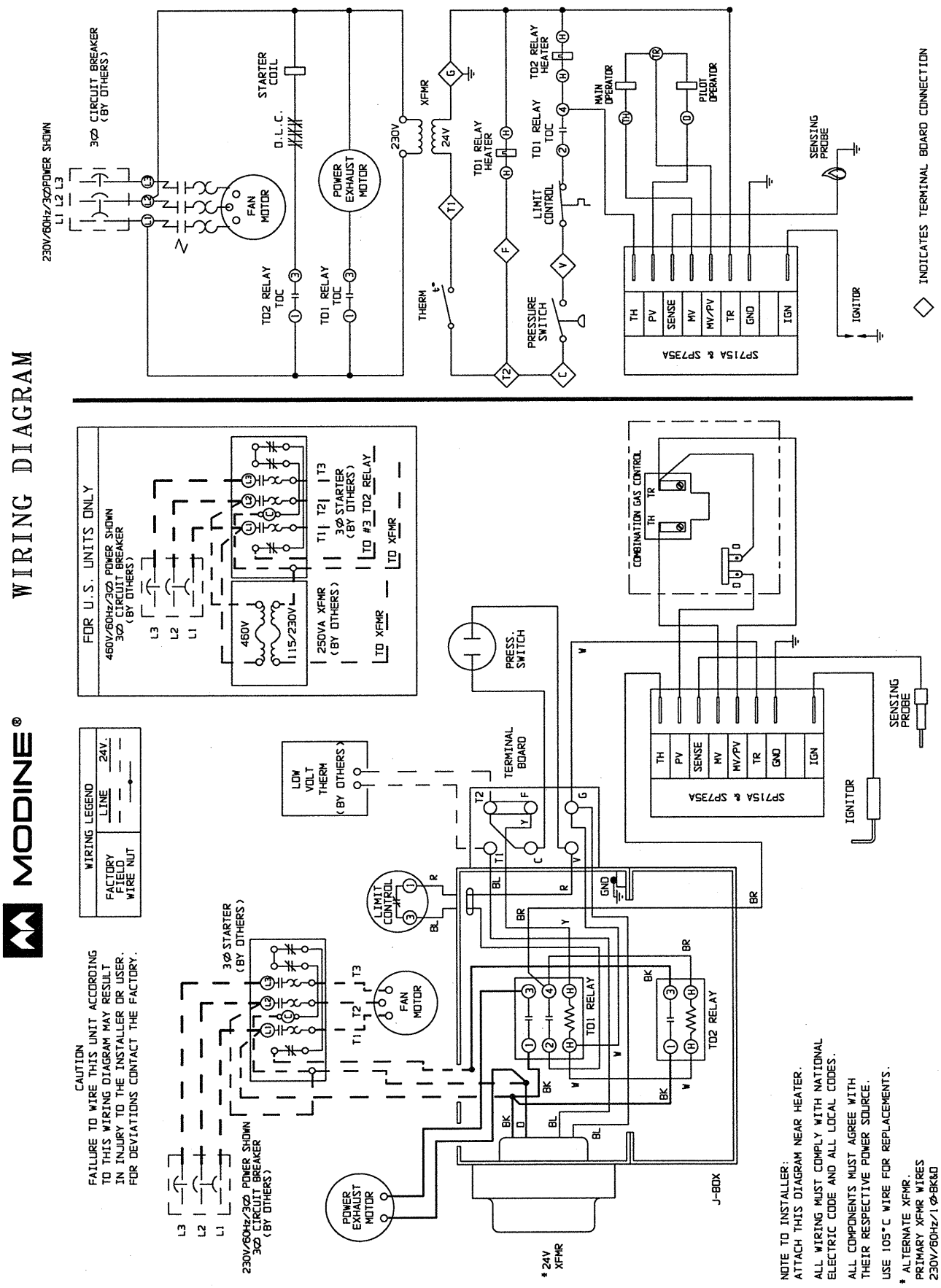
MODINE®

WIRING DIAGRAM



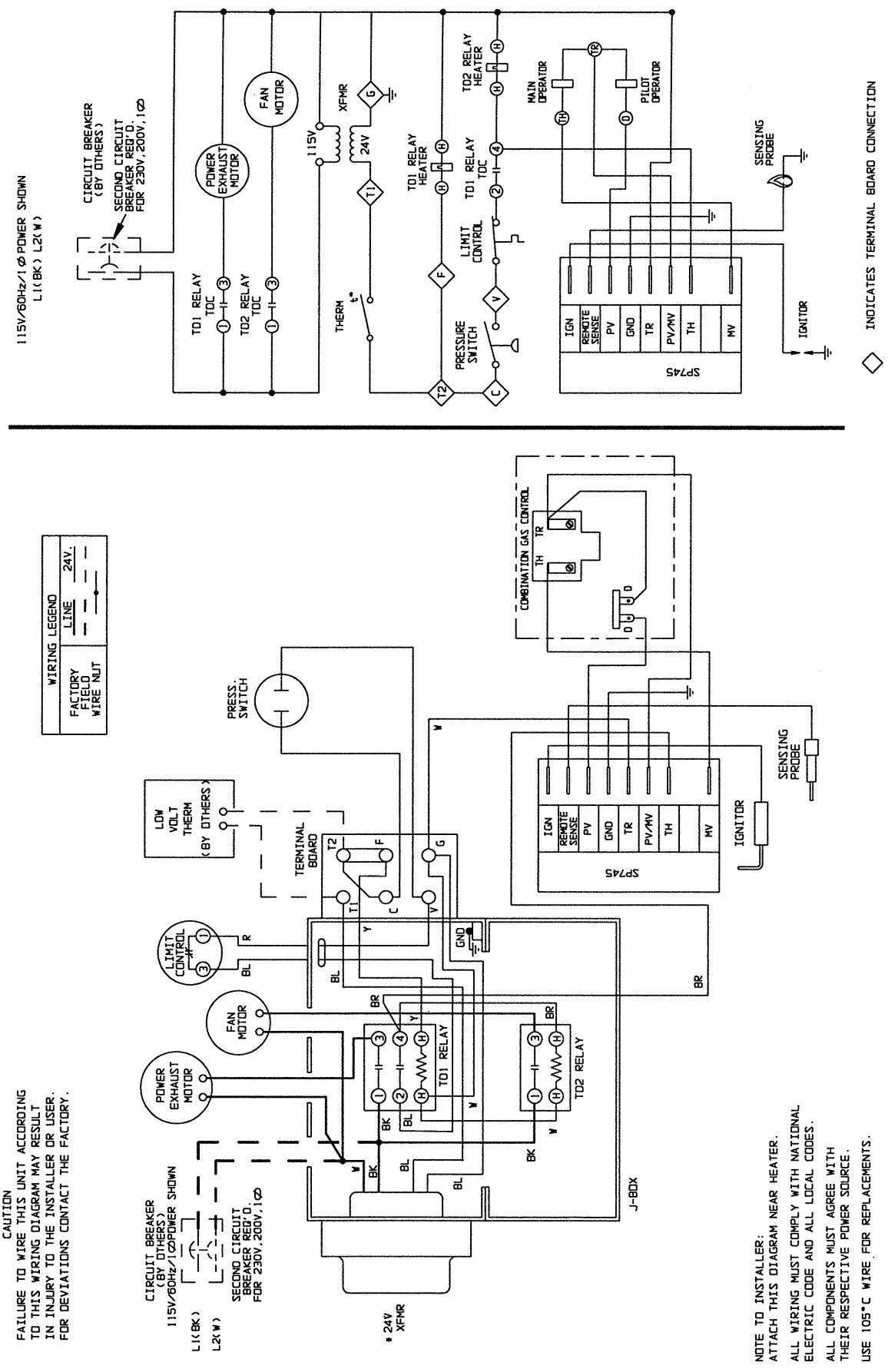
5H73048C2 REV A Single-Stage, Intermittent Pilot Ignition, Non-100% (and 100%) Shut-Off, Single-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



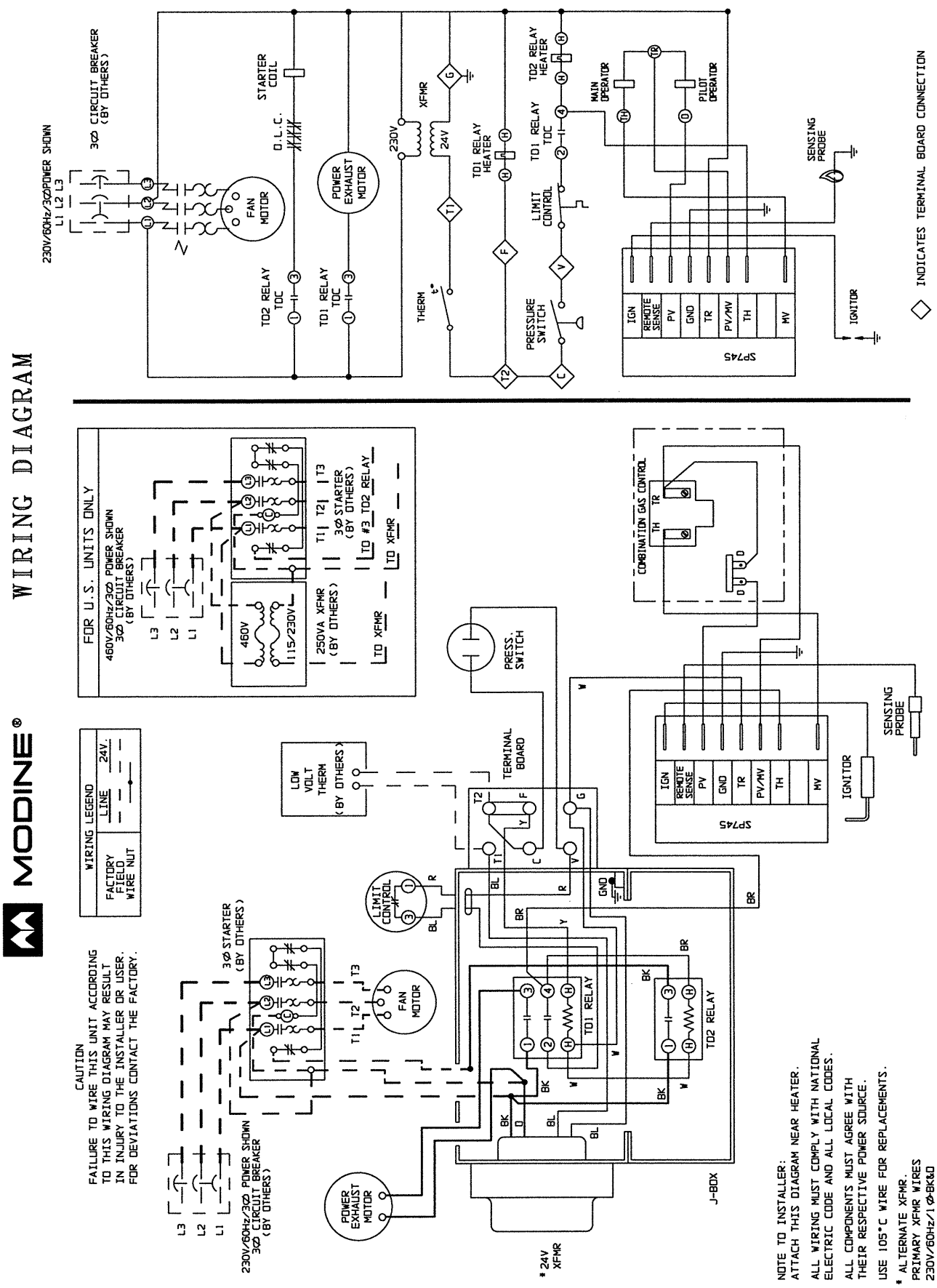
5H73048C2 REV A Single-Stage, Intermittent Pilot Ignition, Non-100% (and 100%) Shut-Off, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



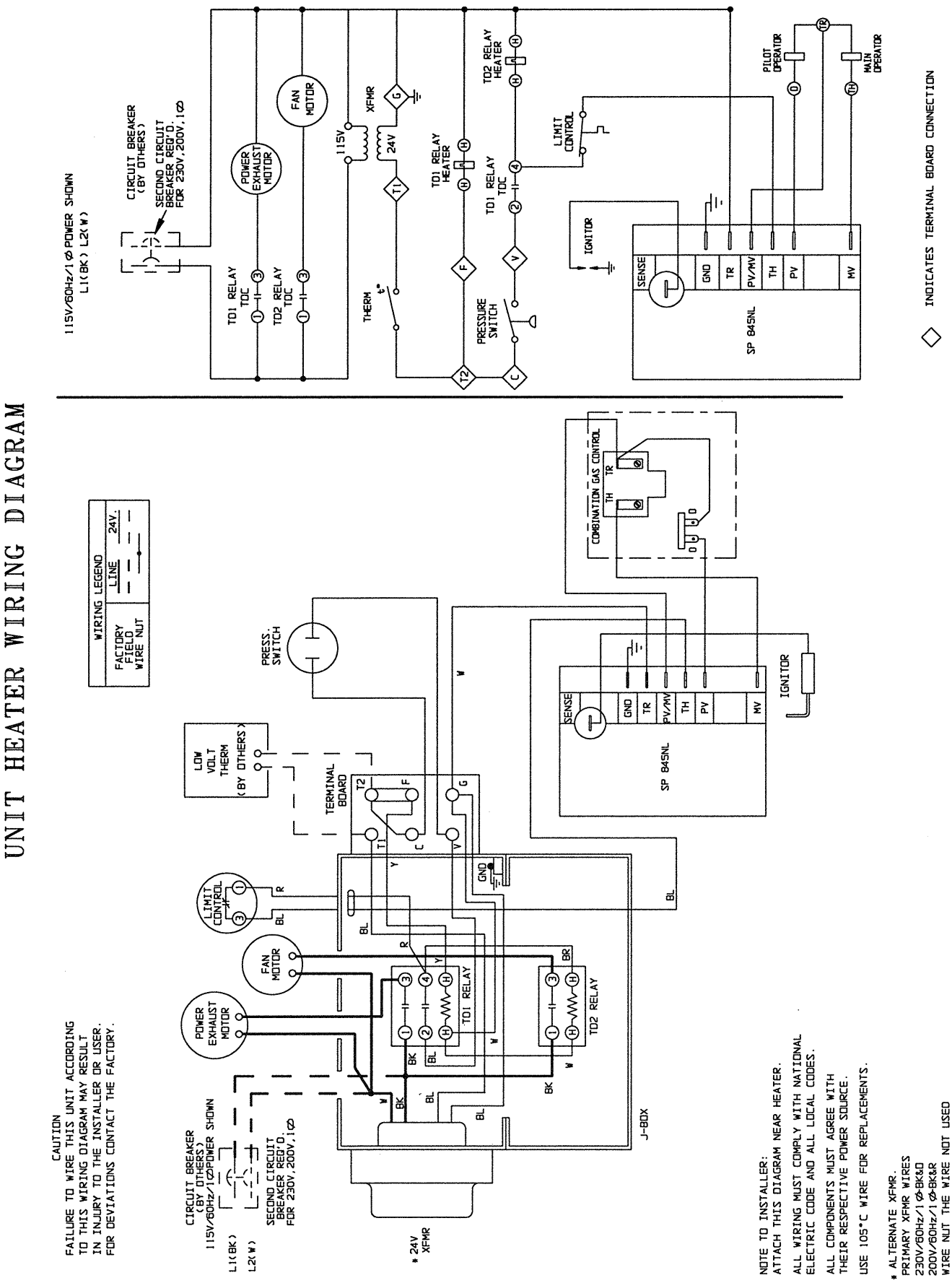
5H73048C3 REV A Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off, Single-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



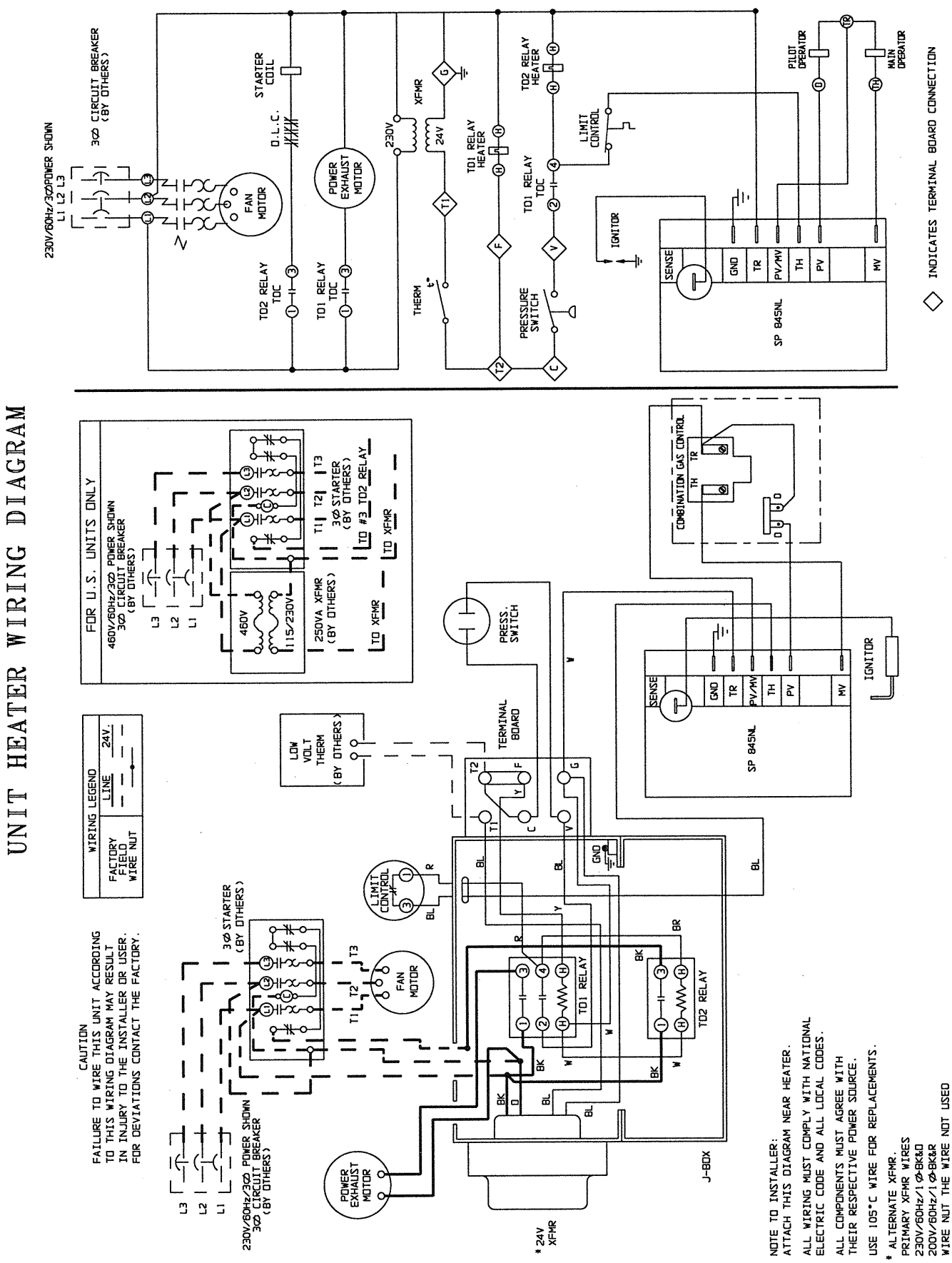
5H73048C3 REV A Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



5H73048C7 REV Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off, Single-Phase.

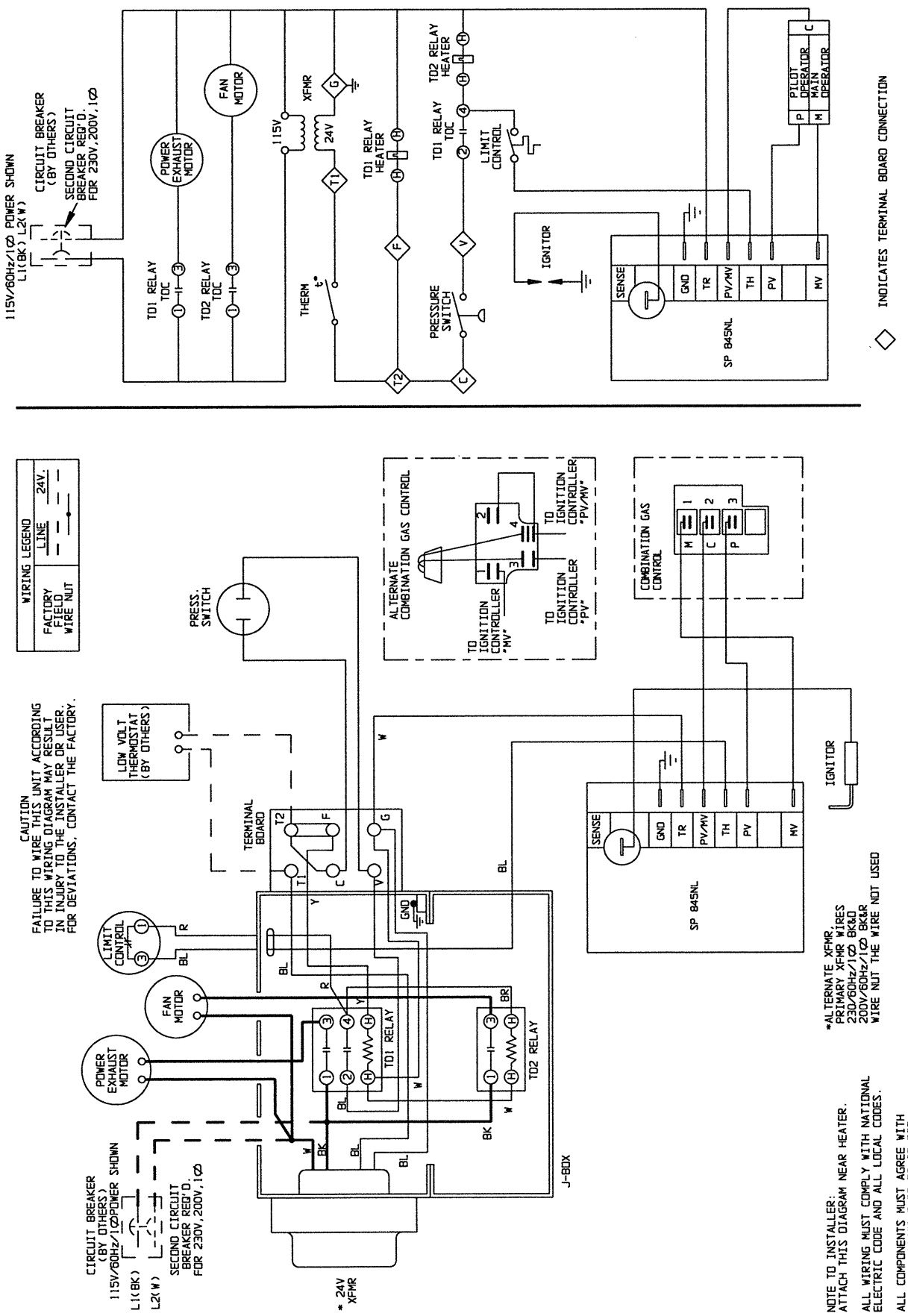
6-454 — WIRING DIAGRAM MODELS PSH/BSH



5H73048C7 REV Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off, Three-Phase.

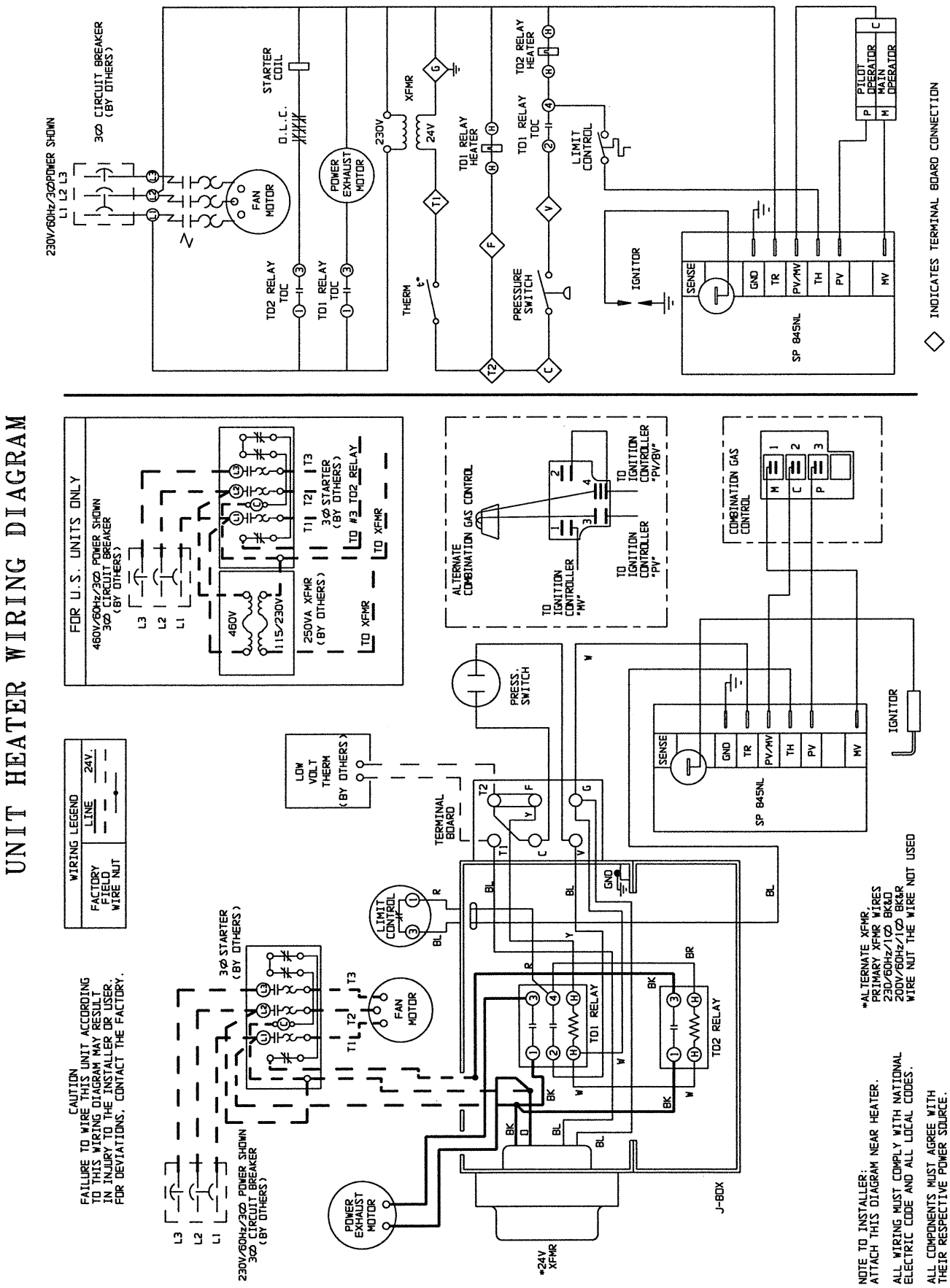
6-454 — WIRING DIAGRAM MODELS PSH/BSH

UNIT HEATER WIRING DIAGRAM



5H73048C8 REV Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry, Single-Phase.

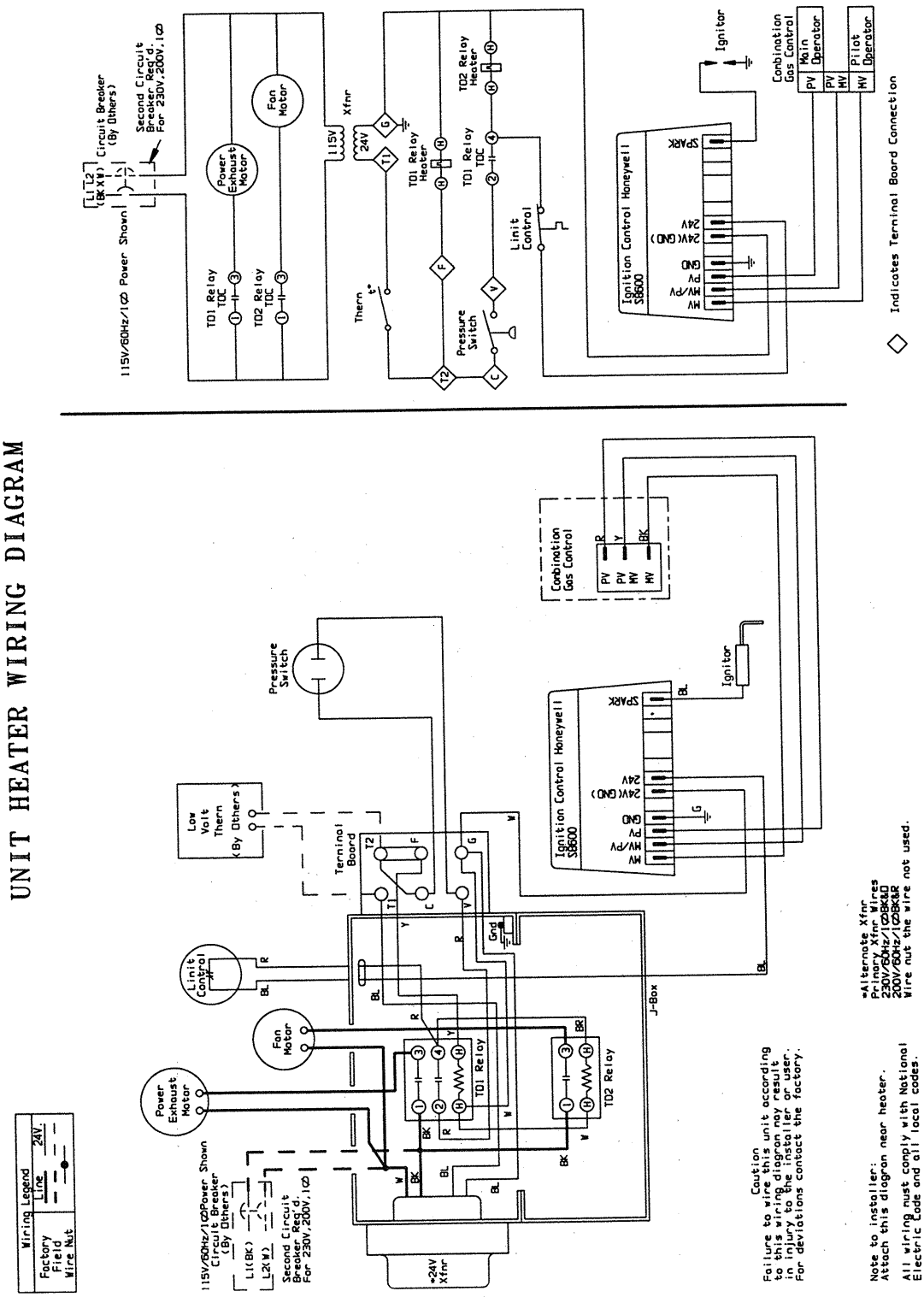
6-454 — WIRING DIAGRAM MODELS PSH/BSH



5H73048C8 REV Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry, Three-Phase.

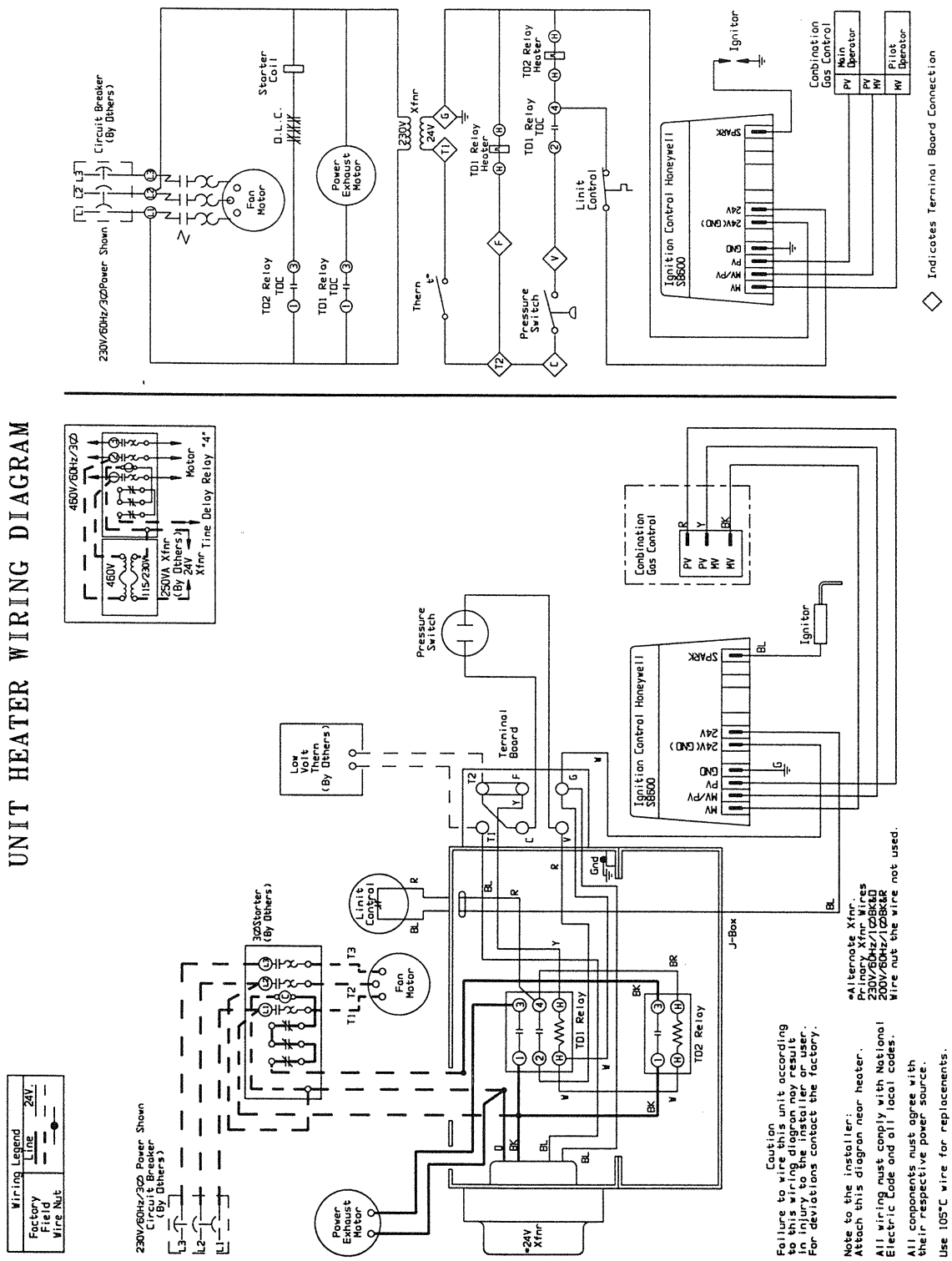
6-454 — WIRING DIAGRAM MODELS PSH/BSH

UNIT HEATER WIRING DIAGRAM



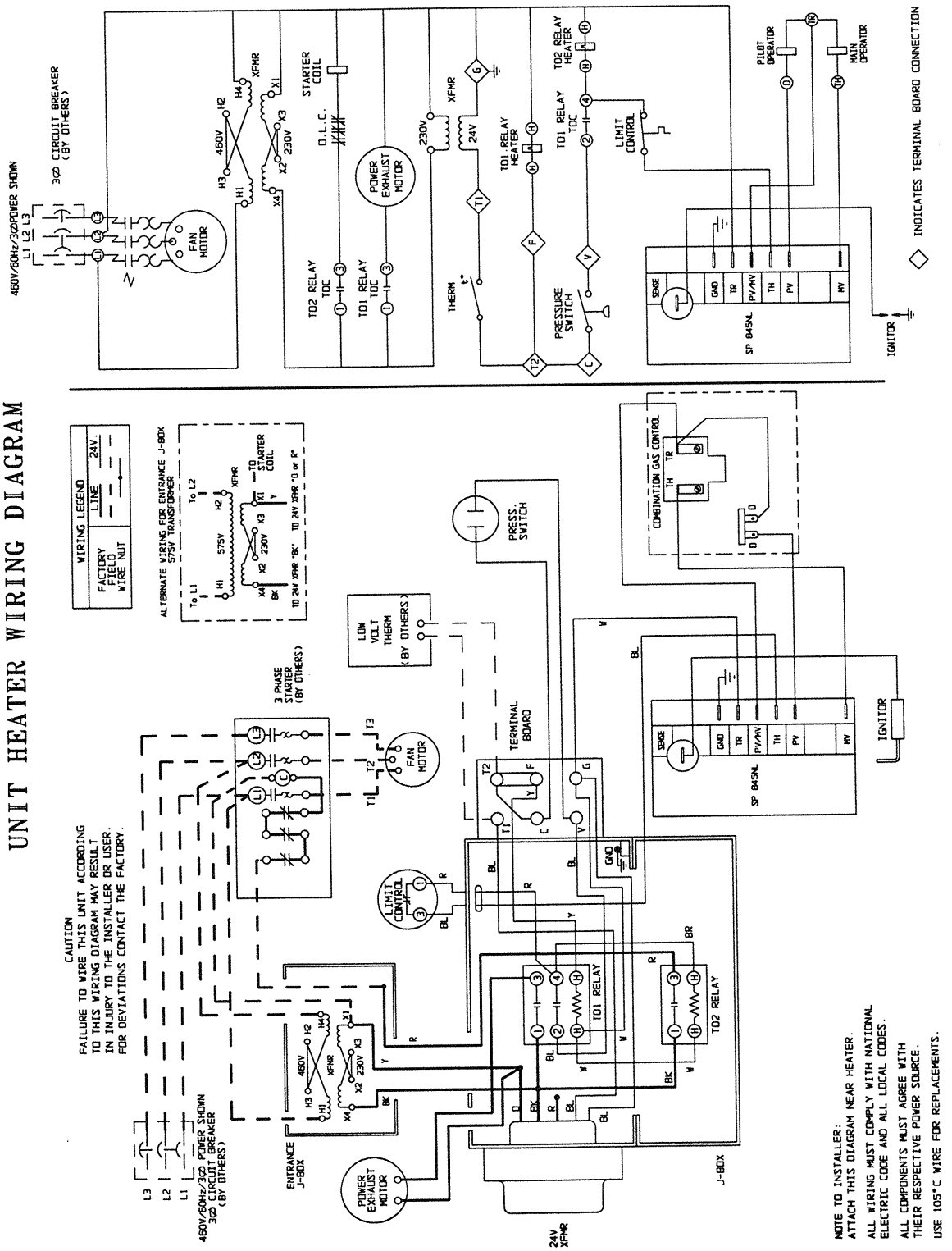
5H73048C9 REV A Single-Stage, Intermittent Pilot Ignition,100% Shut-Off with Continuous Retry, Single-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



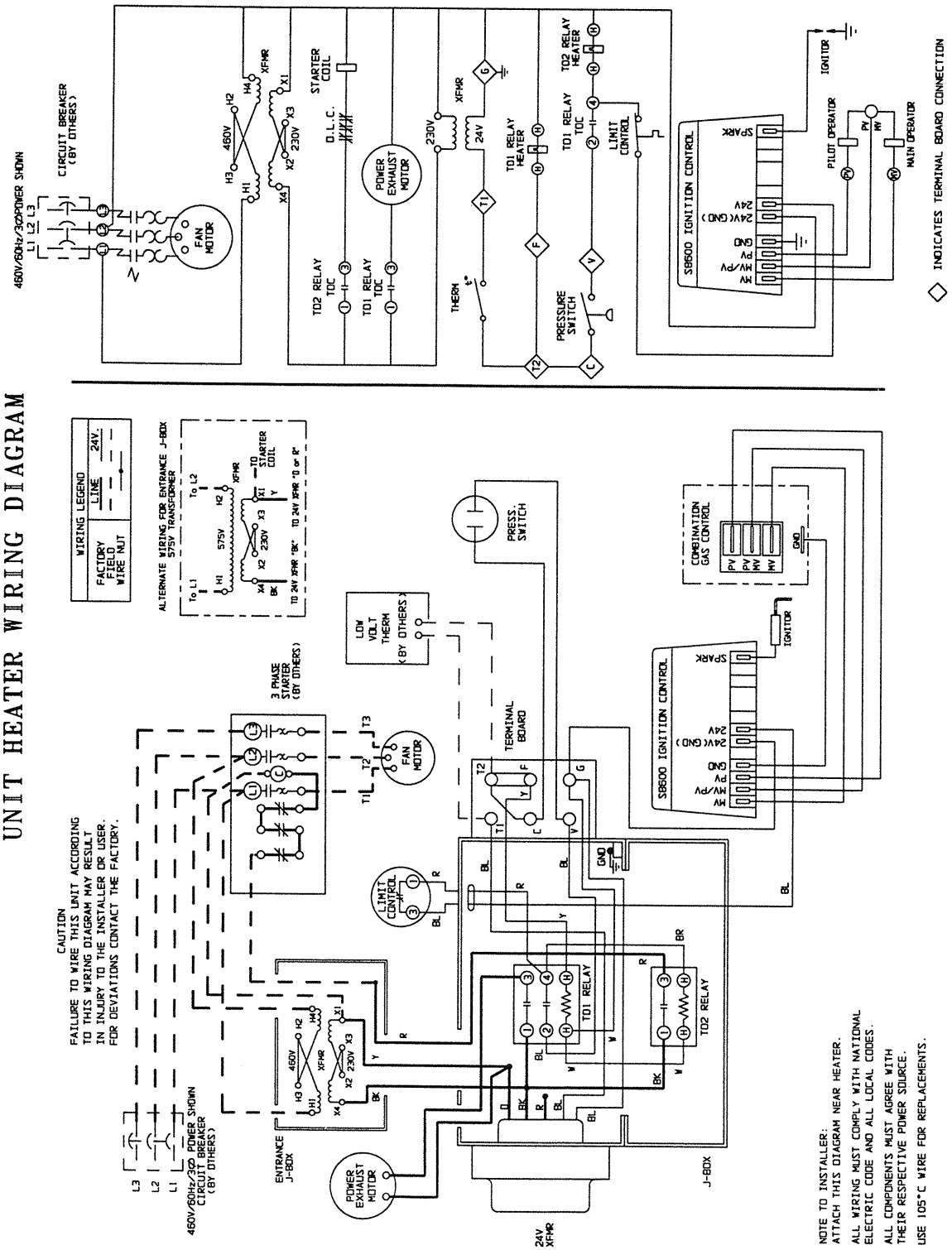
5H73048C9 REV A Single-Stage, Intermittent Pilot Ignition,100% Shut-Off with Continuous Retry, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



5H73048B6 REV A Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH



5H73048B10 REV Single-Stage, Intermittent Pilot Ignition, 100% Shut-Off with Continuous Retry, Three-Phase.

6-454 — WIRING DIAGRAM MODELS PSH/BSH

Models PSH/BSH Summer/Winter Switch Wiring

⚠ CAUTION

Turn off all power and gas to unit before wiring. Failure to wire this unit according to this wiring diagram may result in injury to the installer or user. For deviations, contact factory.

Before proceeding with wiring the accessories described, make sure the unit has been installed, vented, piped and wired according to the Installation/Service Manual and Standard Wiring Diagram furnished with the unit heater.

Figure 1
Typical Wiring – Summer/Winter Switch (Modine # 78727)
(24v Thermostat, 115v or 200/230v Summer/Winter Switch)

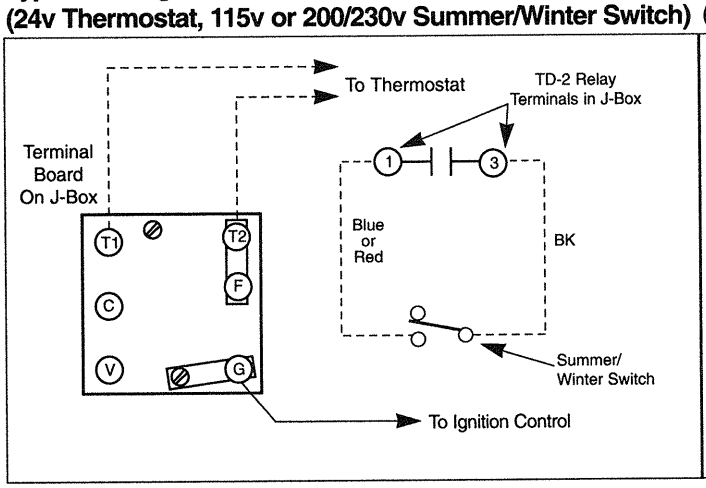


Figure 2
Typical Wiring – Summer/Winter Switch (Modine # 78727)
(24v Thermostat, 24v Summer/Winter Switch)

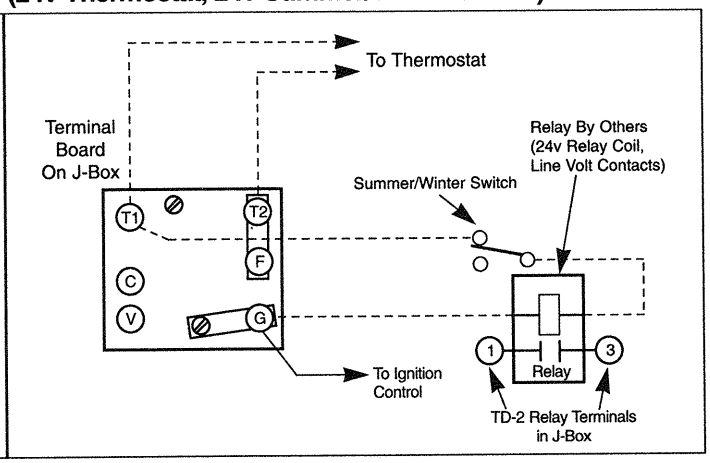
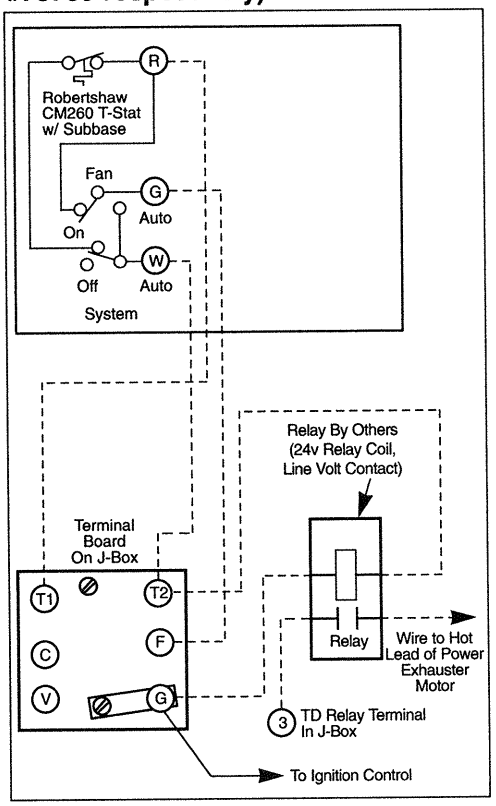


Figure 3
Alternate Wiring Using Robertshaw CM260 Thermostat w/SB-3A-1 Subbase (25v Thermostat and Subbase) (Modine #79187 and #78785 respectively)



1. Turn off gas and power supply to unit.
2. Determine which method of summer/winter control is desired, Figure 1, 2 or 3.
3. Wire unit according to the method selected. **Note: If the method selected is as described in Figure 3, the factory supplied buss bar between terminals "T2" and "F" must be removed** prior to wiring in thermostat and subbase.
4. Check wiring using the Check-Out Procedure below.

Check-Out Procedure

With the power and gas supply turned off, set the thermostat to its lowest setting and place the summer/winter switch to the winter position. After making these adjustments proceed as follows:

1. Turn on gas and power supply to the unit. Nothing should happen.
2. Place the summer/winter switch in the summer position. The fan motor should start, except when wired as shown in Figure 3. In that case, after a delay of approximately 30 seconds, the fan motor should start.
3. While the summer/winter switch is still in the summer position, and with the fan motor running, turn the thermostat up to call for heat. The main burner should now fire. Allow burner to fire for 1 to 2 minutes.
4. Turn the thermostat down again. The main burner should shut off and the fan motor should continue to run. During this step, allow the fan to run at least 1-1/2 minutes to make sure it will continue running. Modine units are equipped with a time delay relay and the motor will run approximately 1 to 1-1/2 minutes after the time delay relay has been de-energized.
5. After insuring that the fan motor will continue to run in the summer position, and with the thermostat set to its lowest setting, place the summer/winter switch in the winter position and wait for the time delay relay to turn the fan motor off.
6. After the fan motor has stopped, and with the summer/winter switch in the winter position, turn the thermostat up to call for heat. The main burner should fire and after a delay of approximately 30 seconds, the fan motor should run.

If the above sequence of operation does not occur, recheck all wiring until the necessary correction to the wiring is found and corrected. Set the thermostat to the desired set point and place summer/winter switch in desired position. Unit is now ready for use.

6-454 — WIRING DIAGRAM MODELS PSH/BSH

Energy-Saver Kit Wiring

Power Exhausted, Separated Combustion, Propeller and Blower Models – (Single and Three Phase)

NOTE: Energy saver accessory (Part No. 79200) wiring diagram used on models PSH/BSH. This to be used in conjunction with unit wiring diagram.

⚠ CAUTION

Turn off all power and gas to unit before wiring. Failure to wire this unit according to this wiring diagram may result in injury to the installer or user. For deviations, contact factory.

Before proceeding with wiring the accessories described, make sure the unit has been installed, vented, piped and wired according to the Installation/Service Manual and Standard Wiring Diagram furnished with the unit heater.

Installation

All wiring for this control must comply with the National Electric Code and all local codes and ordinances.

Do not locate control on an outside wall or where it will be affected by drafts or radiant heat. It does not require level mounting.

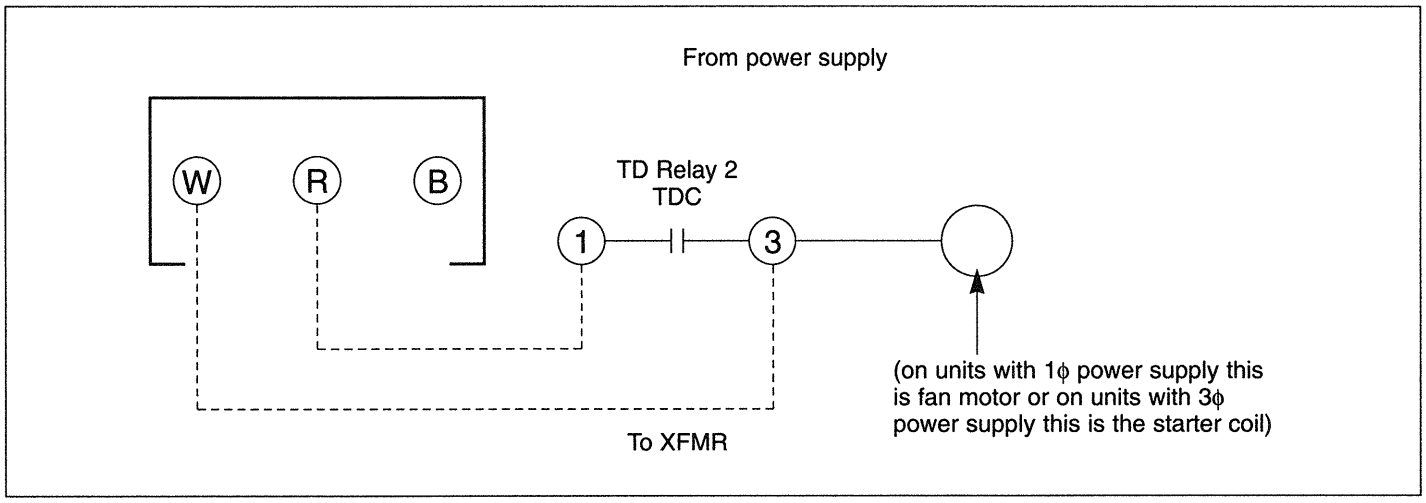
1. Remove front cover and one wiring access knockout from control.
2. Attach control to mounting surface with three screws through back of case. Use a wooden shim for insulation if surface is metal or masonry.
3. Thread two wires through knockout and connect to R and W control terminals. Leads must be long enough to extend to unit heater junction box.
4. Disconnect power to unit heater and open junction box on unit heater. Select correct wiring diagram for unit heater model (and size if applicable) and complete wiring of control to unit.

Operational Check

1. Set room thermostat to its lowest setting and restore power supply to unit heater.
2. Familiarize yourself with the adjustment knob of the energy-saver control. In step 5 you will want to set it at 3-6 degrees (approximately) above the thermostat, but for now, turning the dial clockwise to a lower setting simulates a rise in temperature and only the unit heater fan should come on. If the wiring is correct, the controlled equipment will switch on and off as the temperature dial indicates the approximate space temperature
3. If the controlled equipment does not start and stop as the thermostat dial is turned, disconnect the power supply and check the wiring and terminal connections.
4. If the controlled equipment operates opposite to the sequence desired, shut off the power and check for reversed leads on the switch.
5. After checkout, reset room thermostat to desired comfort level. Set energy-saver control 3 to 6 degrees above room thermostat (depending on mounting height, room conditions, etc.) for ceiling air circulation.

Wiring Instructions

1. Turn off power to unit heater.
2. Connect "R" of Energy Saver to terminal 1 of time delay relay 2.
3. Connect "W" of Energy Saver to terminal 3 of time delay relay 2.



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