

December, 1991

models PAH, BAH *High Efficiency*

models PSH, BSH ***Separated Combustion*** 
High Efficiency

WIRING DIAGRAMS

gas-fired unit heaters

(Units manufactured after October 1987)

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/60 Hz/1 ϕ diagrams may also be utilized for 230v/60 Hz/1 ϕ by substituting 230-volt components for the 115-volt shown.

The 230v/60 Hz/3Ø diagrams may be modified to 460v/60 Hz/3Ø 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.

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.

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
ø	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

POWER REQUIREMENTS — PAH, PSH MODELS

Power Supply	—	—	PSH 130, 150 PSH 170	PSH 225	PSH 280	PSH 340
	PAH 40, 55	PAH 90, 110	PAH 130, 150 PAH 180	PAH 240	PAH 300	PAH 360
115V/1ϕ	2.6 amp	4.2 amp	4.5 amp	6.3 amp	8.4 amp	8.4 amp
230V/1ϕ	1.4 amp	2.2 amp	2.3 amp	3.1 amp	4.4 amp	4.4 amp
230V/3ϕ	—	—	3.0 amp	3.0 amp	3.5 amp	3.5 amp
460V/3ϕ	—	—	1.5 amp	1.5 amp	1.7 amp	1.7 amp

POWER REQUIREMENTS — BAH, BSH MODELS

[illegible]

6-453.2 WIRING DIAGRAM MODELS PAH/BAH/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 unshaded areas and three-phase diagrams are in the shaded areas.
- 4) Wiring diagrams for unit heater accessories are listed in Table 2. The accessory diagrams along with the unit wiring diagrams for complete wiring instructions.

B) Service and Trouble Shooting

Because internal or factory wiring may vary depending on controls manufacturer, the wiring diagrams must be selected with the series identity number when servicing or trouble shooting unit heater control system. Wiring diagrams in this bulletin are for unit heaters manufactured after October 1987 and the series identity number is the 5th thru the 7th digits of the unit heater serial number.

EXAMPLE: Serial No. — 0202201187 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 28, 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 BSH 170 intersects with the line for control code 28. The correct single phase wiring diagram for this unit is found on page 1 in the unshaded area. If this unit also had a summer/winter switch the accessory wiring diagram found on page 1A, 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 trouble shooting.

The heavier lines in the connection diagram indicate line voltage; the lighter lines are for 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

08, 09	Intermittent Pilot Ignition, Non-Lockout, fan-time delay, low voltage thermostat, Natural Gas.
28, 29	Intermittent Pilot Ignition with Lockout, fan-time delay, low voltage thermostat, Natural Gas.
78, 79	Intermittent Pilot Ignition with Lockout, fan-time delay, low voltage thermostat, Propane Gas.

TABLE 2 — ACCESSORY ①

Page	Accessory
1A	Summer/Winter Switch
1B	Energy-Saver Kit

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

MODELS PAH, BAH (ALL)

MODELS PSH, BSH Mfg'd before June 1991
PAGE LOCATION INDEX: Series Identity Number 201 and 203

Control Code	PAH 40	PAH/BAH 55	PAH/BAH 90	PAH/BAH 110	PAH/BAH 130	PAH/BAH 150	PAH/BAH 180	PAH/BAH 240	PAH/BAH 300	PAH/BAH 360
08, 09	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
28, 29	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2
78, 79	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2	1 2

PAGE LOCATION INDEX: Series Identity Number 202

Control Code	PAH 40	PAH/BAH 55	PAH/BAH 90	PAH/BAH 110	PAH/BAH 130	PAH/BAH 150	PAH/BAH 180	PAH/BAH 240	PAH/BAH 300	PAH/BAH 360
08, 09	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	-
28, 29	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	-
78, 79	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	3 4	-

MODELS PSH, BSH

Mfg'd After May 1991
PAGE LOCATION INDEX: Series Identity Number 202

Control Code	PSH/BSH 130	PSH/BSH 150	PSH/BSH 170	PSH/BSH 225	PSH/BSH 280	PSH/BSH 340
08, 09	5 6	5 6	5 6	5 6	5 6	5 6
28, 29	5 6	5 6	5 6	5 6	5 6	5 6
78, 79	5 6	5 6	5 6	5 6	5 6	5 6

PAGE LOCATION INDEX: Series Identity Number 203

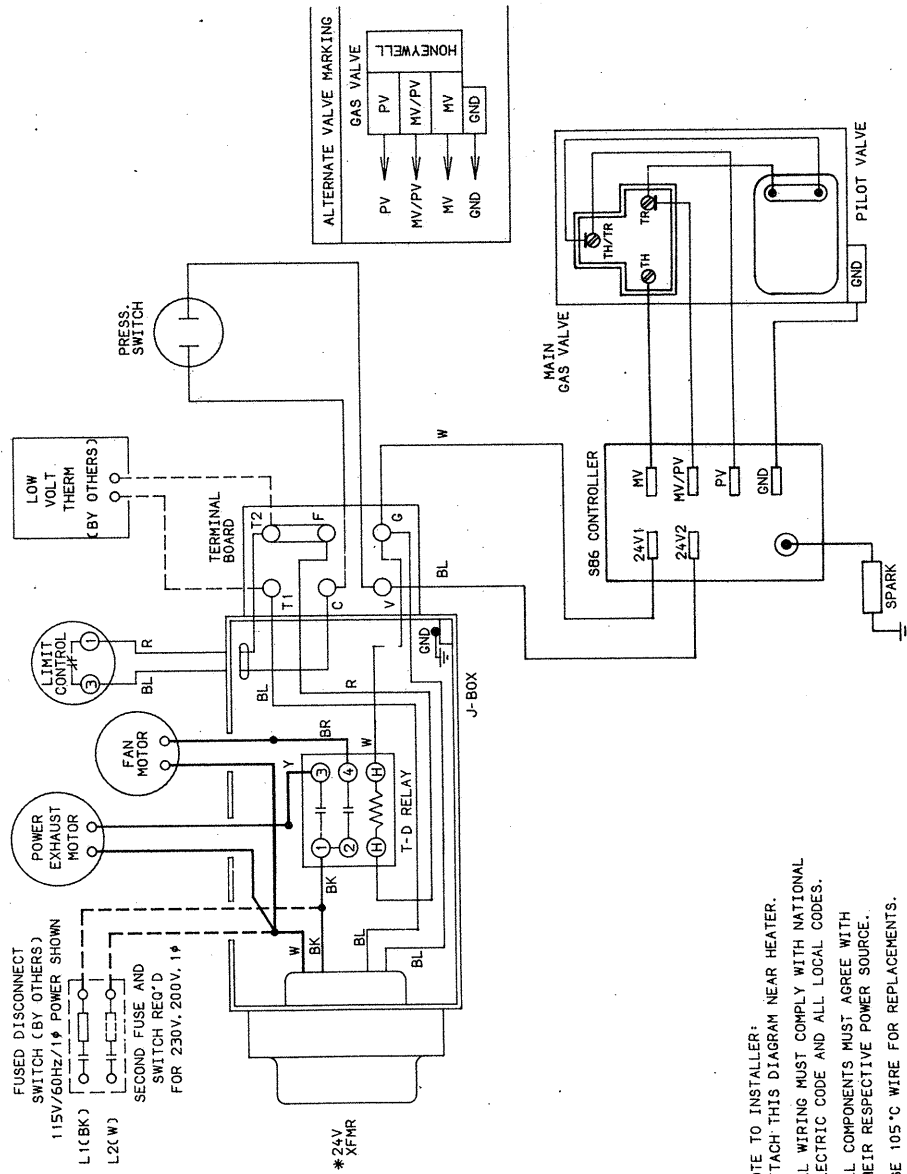
Control Code	PSH/BSH 130	PSH/BSH 150	PSH/BSH 170	PSH/BSH 225	PSH/BSH 280	PSH/BSH 340
08, 09	7 8	7 8	7 8	7 8	7 8	7 8
28, 29	7 8	7 8	7 8	7 8	7 8	7 8
78, 79	7 8	7 8	7 8	7 8	7 8	7 8



MODINE WIRING DIAGRAM

MODELS PAH. BAH. PSH. BSH

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.

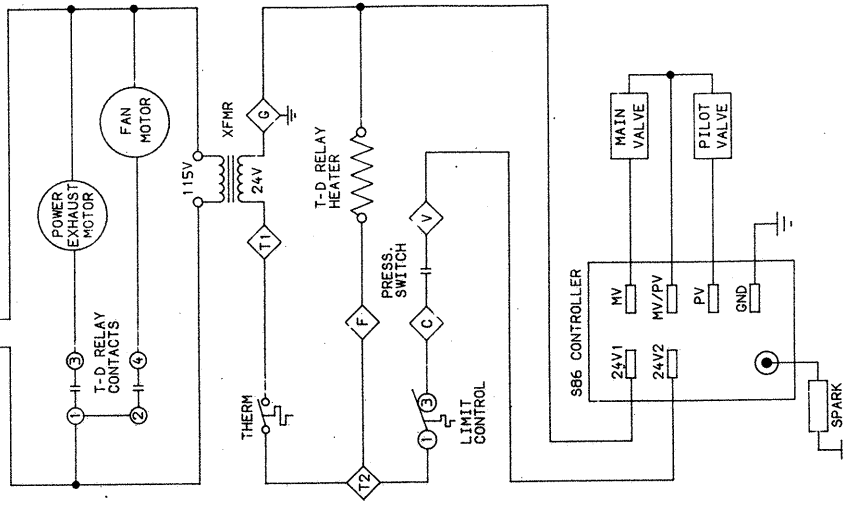
* ALTERNATE XFMR.
PRIMARY XFMR WIRES
230V/60Hz/10A-BK&O
200V/60Hz/10A-BK&R
WIRE NUT THE WIRE NOT USED

5H7215481

Single-phase. Intermittent pilot ignition, non-100% (and 100%)
shut-off. Fan time delay. Low-voltage thermostat.

115V/60Hz/10A POWER SHOWN
L1(BK) L2(W)

FUSED DISCONNECT
SWITCH (BY OTHERS)
SECOND FUSE AND
SWITCH REQ'D
FOR 230V, 200V, 10A



◇ INDICATES TERMINAL BOARD CONNECTION

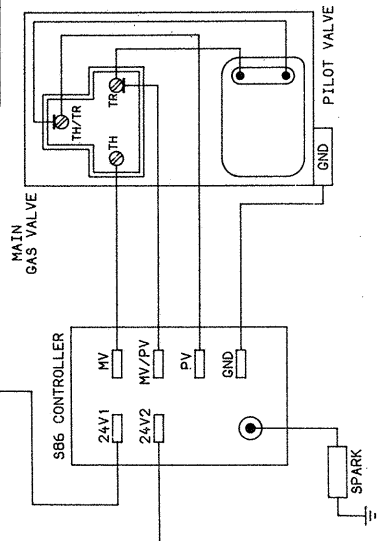
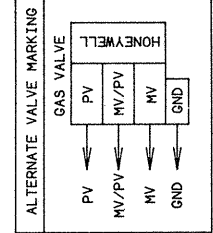
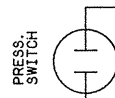
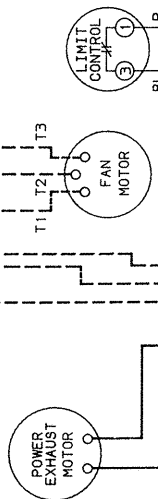
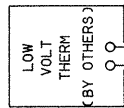
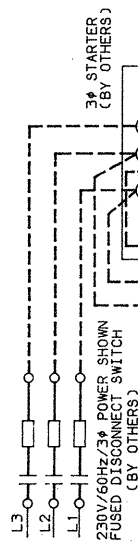
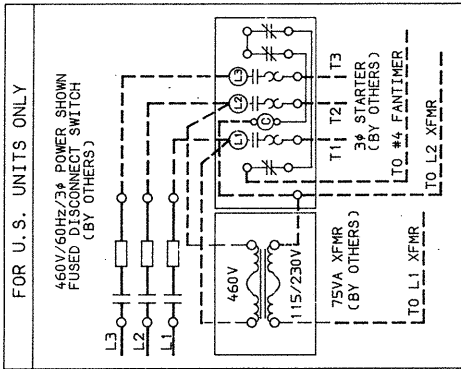


MODINE WIRING DIAGRAM

MODELS PAH, BAH, PSH, BSH

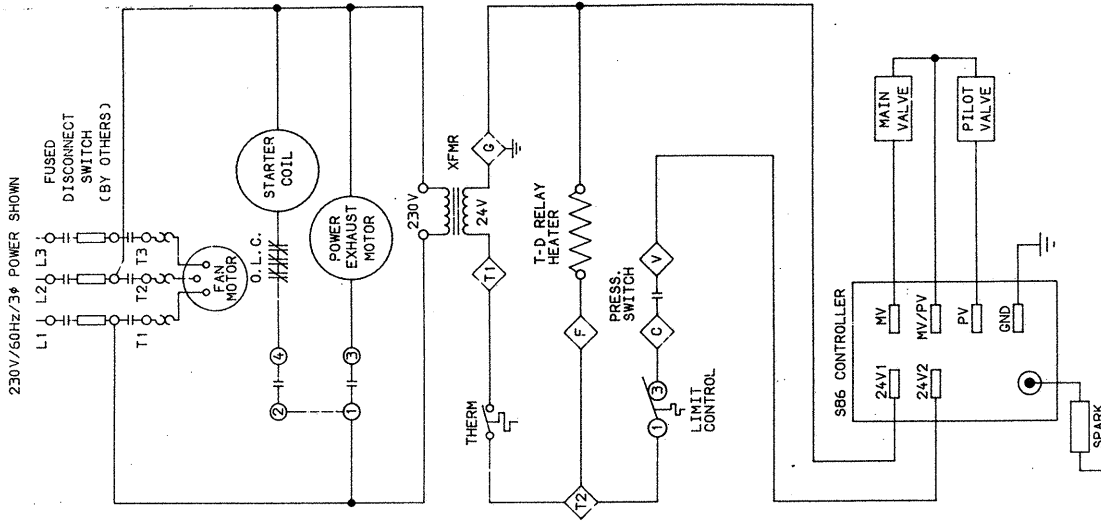
CAUTION
FAILURE TO WIRE THIS UNIT ACCORDING
TO THIS WIRING DIAGRAM MAY RESULT
IN INJURY TO THE INSTALLER OR USER.
FOR DEVIATIONS CONTACT THE FACTORY.

WIRING LEGEND	
FACTORY	24V.
FIELD	---
WIRE NUT	---



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/1/2-BK&O
200V/60Hz/1/2-BK&R
WIRE NUT THE WIRE NOT USED

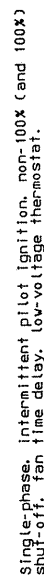


◇ INDICATES TERMINAL BOARD CONNECTION

Three-phase, intermittent pilot ignition, non-100% (and 100%)
shut-off, fan time delay, low voltage thermostat.

5H7215481

MODELS PAH. BAH. PSH. BSH



200V/60Hz/1φ-BK&R
WIRE NUT THE WIRE NOT USED

*ALTERNATE XFMR.
PRIMARY XFMR WIRES
2230V/60Hz/1φ-BK&O
200V/60Hz/1φ-BK&R

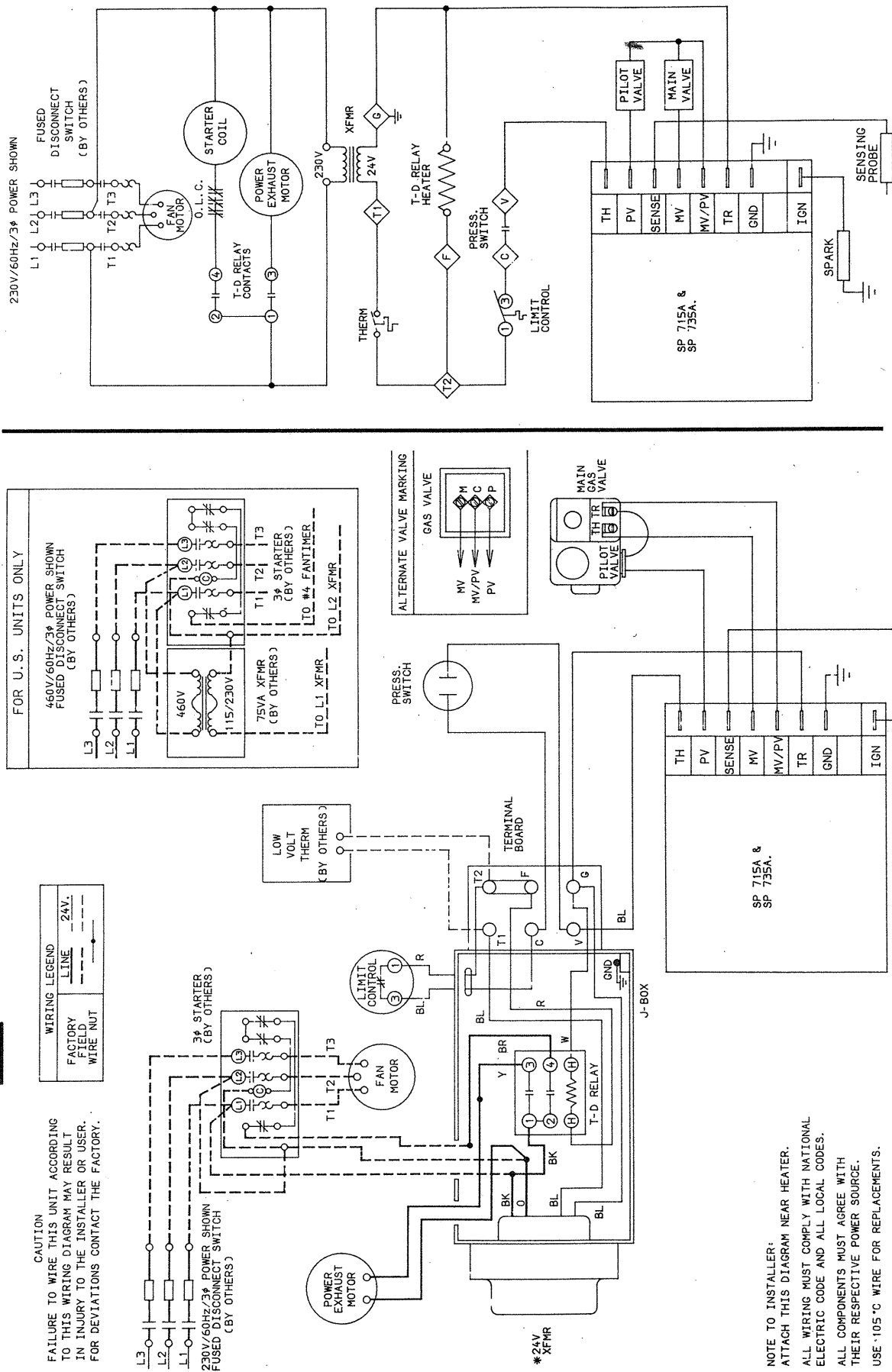


MODINE WIRING DIAGRAM

MODELS PAH, BAH, PSH, BSH

CAUTION
FAILURE TO WIRE THIS UNIT ACCORDING
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FOR DEVIATIONS CONTACT THE FACTORY.

WIRING LEGEND	
FACTORY FIELD WIRE NUT	LINE 24V.
---	---
---	---



NOTE TO INSTALLER:
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ALL COMPONENTS MUST AGREE WITH
THEIR RESPECTIVE POWER SOURCE.
USE 105°C WIRE FOR REPLACEMENTS.

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

Three-phase, intermittent pilot ignition, non-100% (and 100%)
shut-off, fan time delay, low voltage thermostat.

5H72154B2

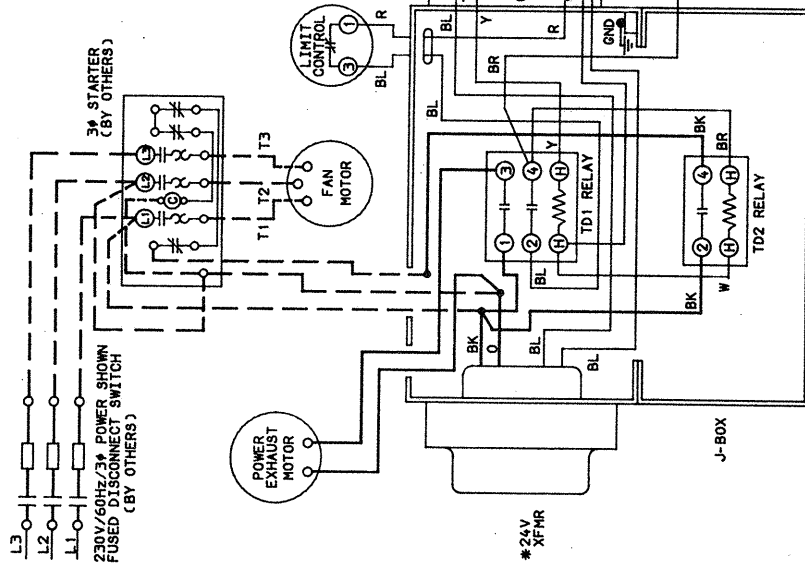
INDICATES TERMINAL BOARD CONNECTION



WIRING DIAGRAM

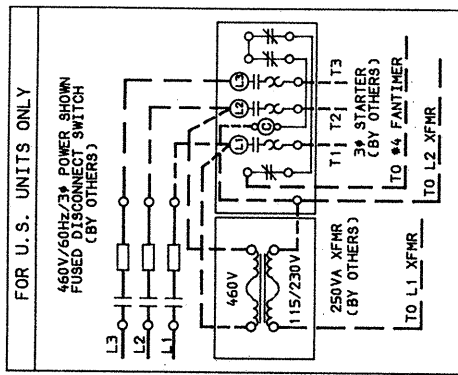
CAUTION
FAILURE TO WIRE THIS UNIT ACCORDING TO THIS WIRING DIAGRAM MAY RESULT IN INJURY TO THE INSTALLER OR USER. FOR DEVIATIONS CONTACT THE FACTORY.

WIRING LEGEND	
FACTORY FIELD WIRE NUT	---
LINE	---
24V.	---

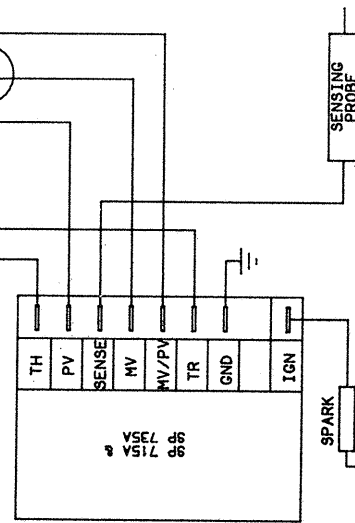
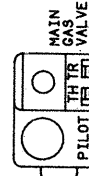
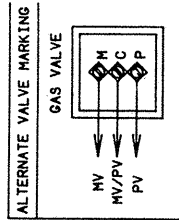


NOTE TO INSTALLER:
ATTACH THIS DIAGRAM NEAR HEATER.
ALL WIRING MUST COMPLY WITH NATIONAL ELECTRIC CODE AND ALL LOCAL CODES.
ALL COMPONENTS MUST AGREE WITH THEIR RESPECTIVE POWER SOURCE.
USE 105°C WIRE FOR REPLACEMENTS.
* ALTERNATE XFMR.
PRIMARY XFMR WIRES
230V/60Hz/1Ø-BK&O
200V/60Hz/1Ø-BK&R
WIRE NUT THE WIRE NOT USED

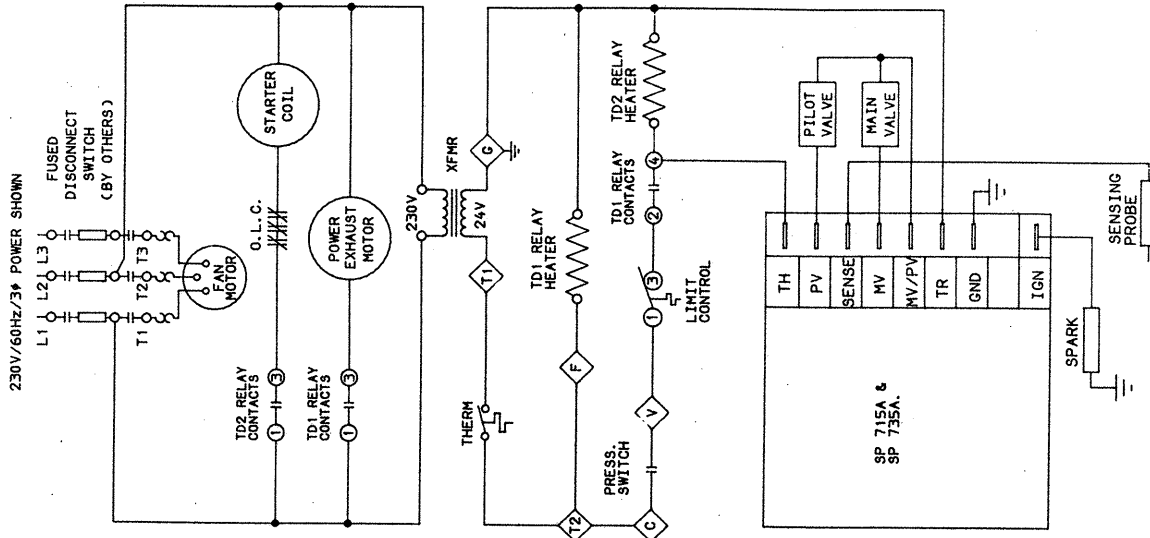
5H7304BC2



FOR U.S. UNITS ONLY
460V/60Hz/3Ø POWER SHOWN
FUSED DISCONNECT SWITCH
(BY OTHERS)



Three-phase, intermittent pilot ignition, non-100% (and 100%) shut-off, fan time delay, low voltage thermostat.

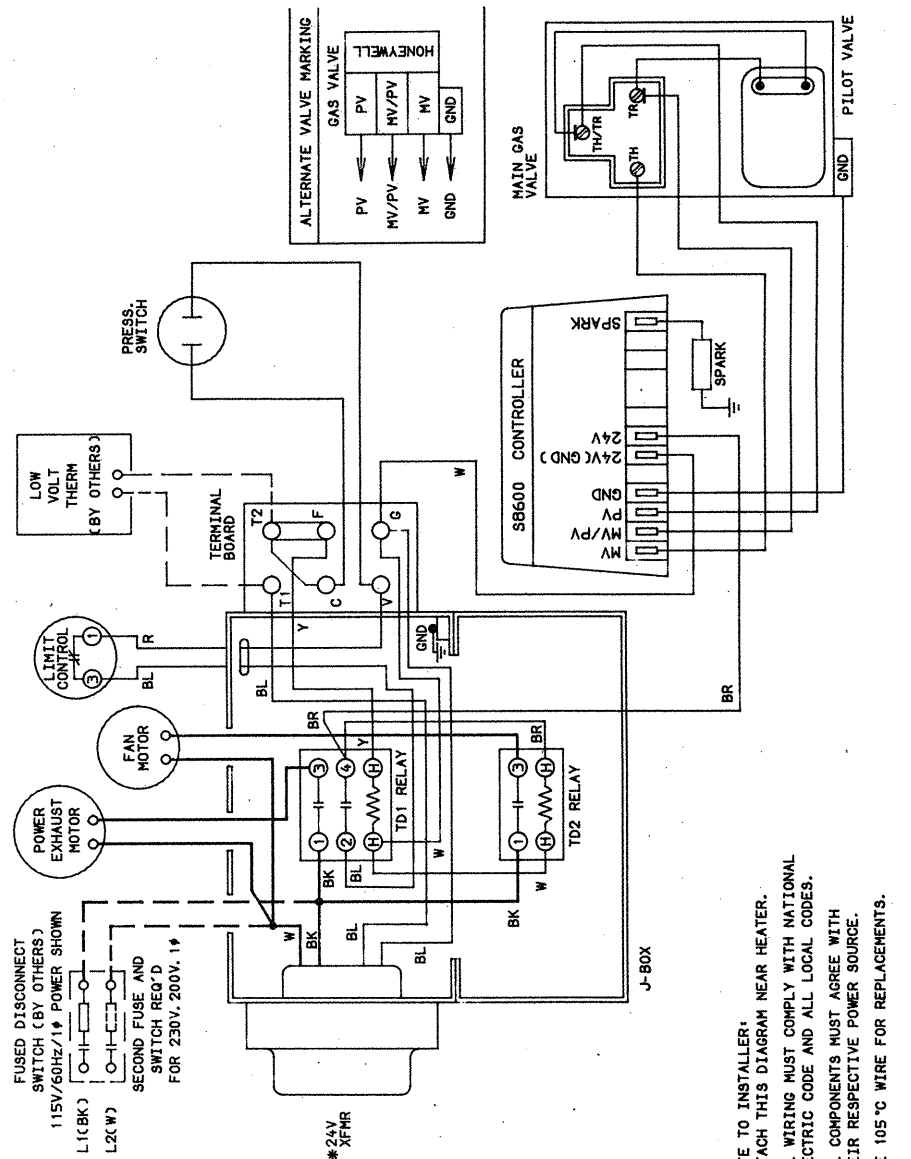


◇ INDICATES TERMINAL BOARD CONNECTION

MODINE WIRING DIAGRAM

CAUTION
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WIRING LEGEND		
FACTORY	WIRE	24V.
FIELD	---	---
WIRE NUT	---	---

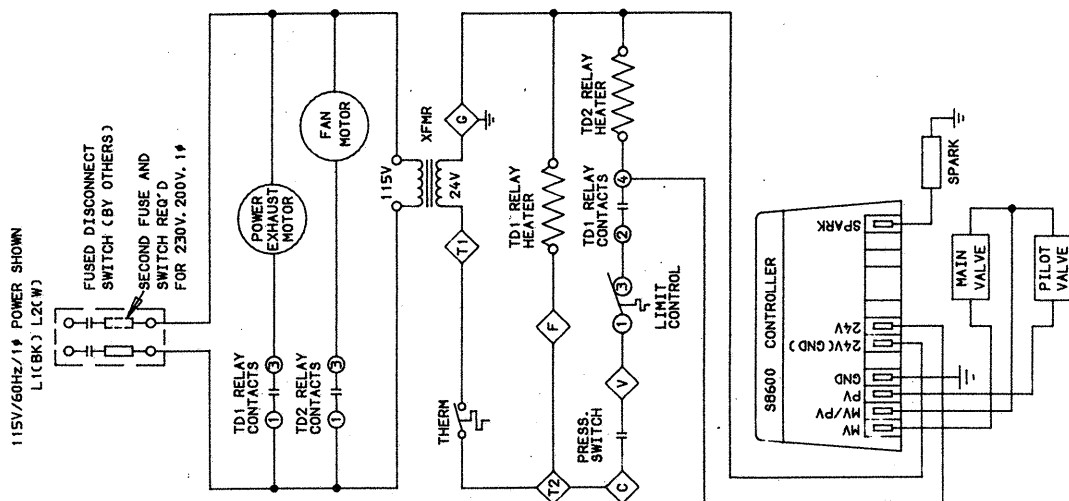


NOTE TO INSTALLER:
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ALL COMPONENTS MUST AGREE WITH
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USE 105°C WIRE FOR REPLACEMENTS.

* ALTERNATE XFMR.
PRIMARY XFMR WIRES
230V/60Hz/1φ-BKGO
200V/60Hz/1φ-BKGR
WIRE NUT THE WIRE NOT USED

SH7304BC1

Single-phase. Intermittent pilot ignition. non-100% (and 100%)
shut-off. Fan time delay. low-voltage thermostat.



◇ INDICATES TERMINAL BOARD CONNECTION

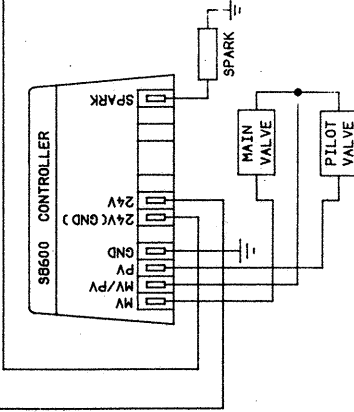
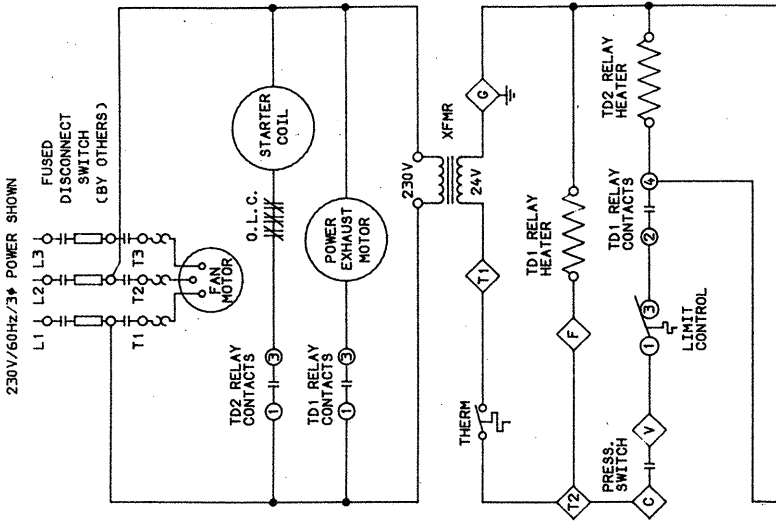
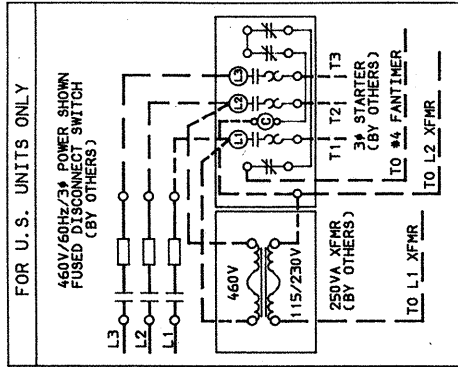


MODINE

WIRING DIAGRAM

CAUTION
FAILURE TO WIRE THIS UNIT ACCORDING
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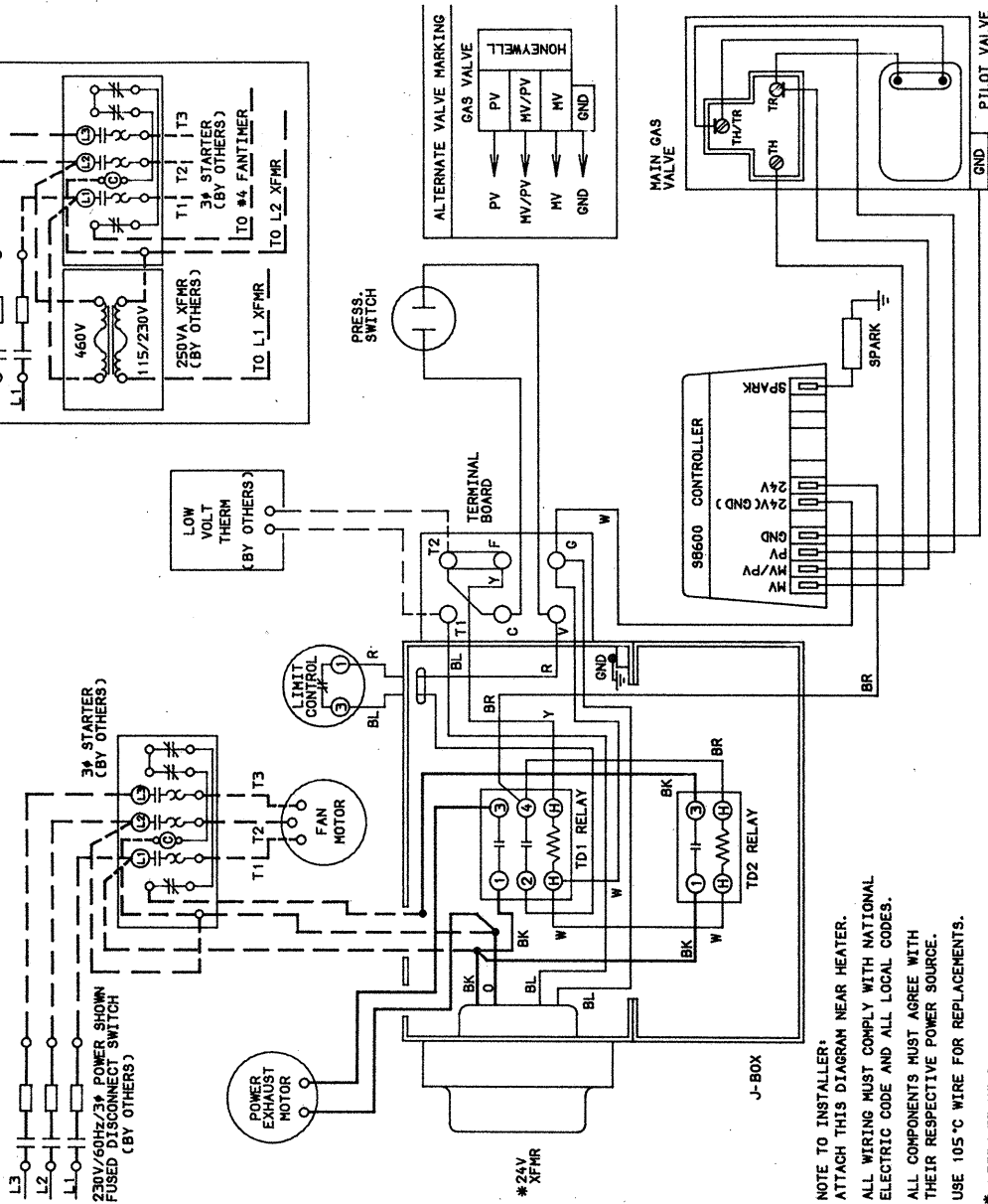
WIRING LEGEND	
FACTORY FIELD WIRE NUT	24V.
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◇ INDICATES TERMINAL BOARD CONNECTION

Three-phase, intermittent pilot ignition, non-100% (and 100%) shut-off, fan time delay, low voltage thermostat.

5H73048C1



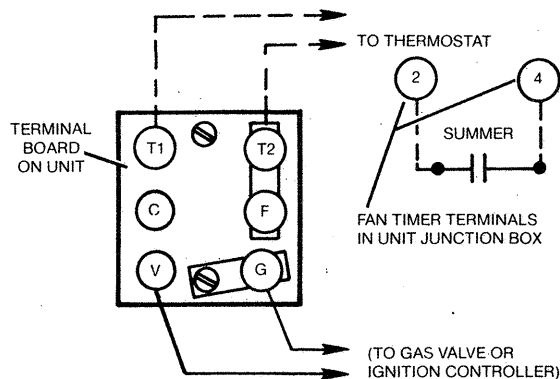
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USE 105°C WIRE FOR REPLACEMENTS.

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

TYPICAL SUMMER/WINTER SWITCH WIRING (taken from 6-554.2, page 4)

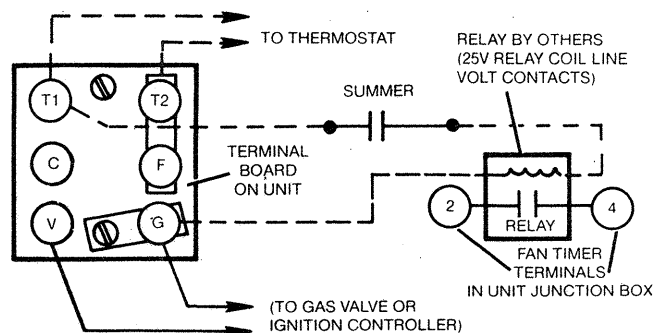
CAUTION: Turn off all power and gas to unit before wiring. Failure to wire this unit according to this wiring diagram may result in injury to the installer or user. For deviations, contact factory.

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.



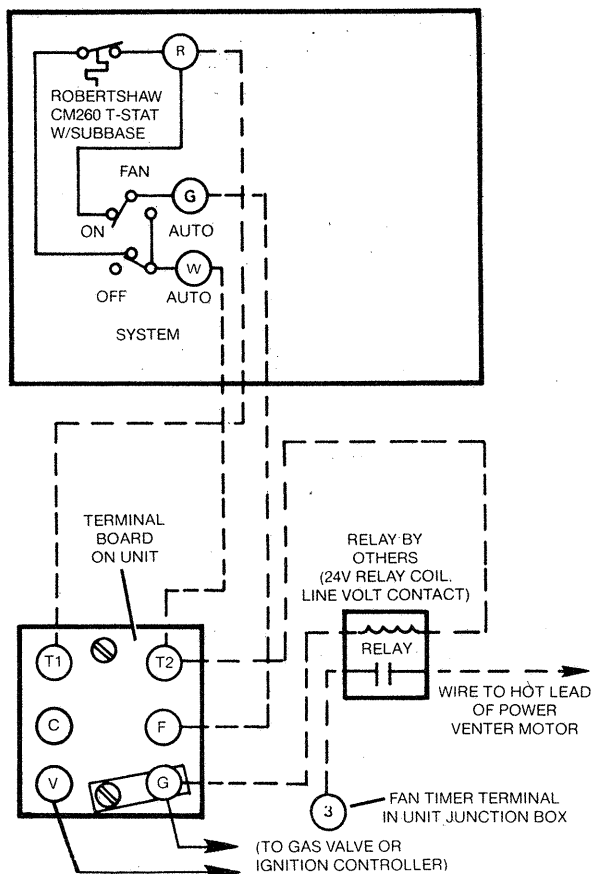
(Figure 1)

Typical Wiring — Summer/Winter Switch
(25V Thermostat, 115V or 208/230V Summer/Winter Switch)



(Figure 2)

Typical Wiring — Summer/Winter Switch
(25V Thermostat, 25V Summer/Winter Switch)



(Figure 3)

Alternate Wiring Using Robertshaw CM260
w/SB-3A-1 Subbase (25V Thermostat and Subbase)

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 not 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 1½ minutes to make sure it will continue running. Modine units are equipped with a fan timed delay relay and the motor will run approximately 1 to 1½ minutes after the fan timer 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 fan time delay 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.

(This wiring diagram is a stand alone item found also in 6-554.2)

TYPICAL ENERGY-SAVER KIT 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.

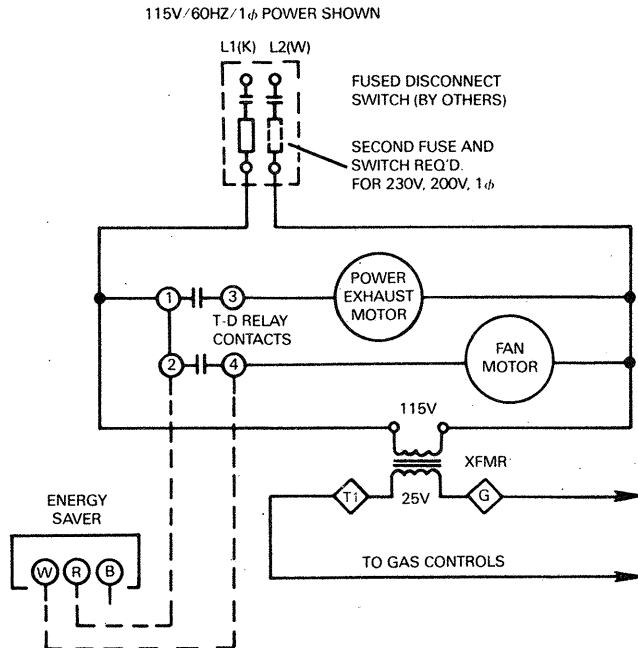


Figure 1
Single-phase,
low-voltage thermostat.

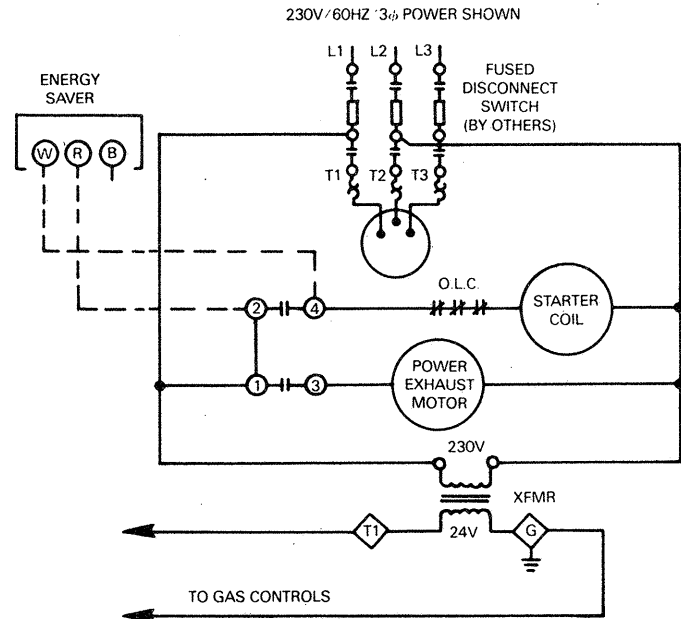


Figure 2
Three-phase,
low-voltage thermostat.

WIRING

1. Turn off power and gas to unit heater.
2. Connect "R" of controller to fan-timer contact terminal #2.
3. Connect "W" of controller to fan-timer contact terminal #4.

OPERATIONAL CHECK

1. Set room thermostat to its lowest setting and restore gas and power supply to unit heater.
2. Turn the adjustment knob of the thermostat to more the temperature dial across the indicator and back again.

When the control is wired for ventilating application (R to W), 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.

For Service Contact your local qualified installation and service contractor or appropriate utility company.



MODINE

Heating Division

Modine Manufacturing Company
1221 Magnolia Avenue
Buena Vista, Virginia 24416
Phone: 703/261-2166
Fax: 703/261-1563

5/92-7M Litho in U.S.A.