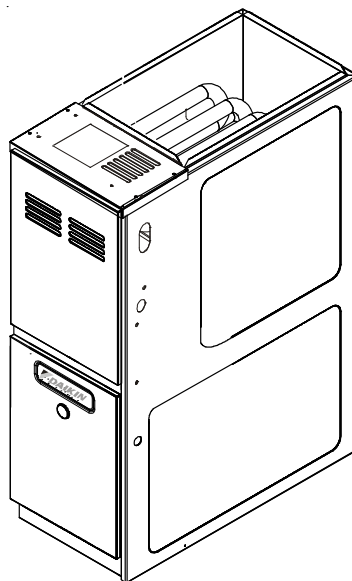


DAIKIN Service Instructions

Daikin 80% Single Stage Gas Furnaces DM80SE, DC80SE & Accessories



WARNING

ONLY PERSONNEL THAT HAVE BEEN TRAINED TO INSTALL, ADJUST, SERVICE OR REPAIR (HEREINAFTER, "SERVICE") THE EQUIPMENT SPECIFIED IN THIS MANUAL SHOULD SERVICE THE EQUIPMENT. THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR ANY INJURY OR PROPERTY DAMAGE ARISING FROM IMPROPER SERVICE OR SERVICE PROCEDURES. IF YOU SERVICE THIS UNIT, YOU ASSUME RESPONSIBILITY FOR ANY INJURY OR PROPERTY DAMAGE WHICH MAY RESULT. IN ADDITION, IN JURISDICTIONS THAT REQUIRE ONE OR MORE LICENSES TO SERVICE THE EQUIPMENT SPECIFIED IN THIS MANUAL, ONLY LICENSED PERSONNEL SHOULD SERVICE THE EQUIPMENT. IMPROPER INSTALLATION, ADJUSTMENT, SERVICING OR REPAIR OF THE EQUIPMENT SPECIFIED IN THIS MANUAL, OR ATTEMPTING TO INSTALL, ADJUST, SERVICE OR REPAIR THE EQUIPMENT SPECIFIED IN THIS MANUAL WITHOUT PROPER TRAINING MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

PROP 65 WARNING FOR CALIFORNIA CONSUMERS



WARNING

Cancer and Reproductive Harm -
www.P65Warnings.ca.gov

0140M00517-A

This manual is to be used by qualified, professionally trained HVAC technicians only. Daikin does not assume any responsibility for property damage or personal injury due to improper service procedures or services performed by an unqualified person.

The material in this manual does not supersede manufacturers installation and operation instructions.

Our continuing commitment to quality products may mean a change in specifications without notice.

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19001 Kermier Rd., Waller, TX 77484

www.daikincomfort.com

RSD6621006r1
December 2019

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IMPORTANT INFORMATION

Pride and workmanship go into every product to provide our customers with quality products. It is possible, however, that during its lifetime a product may require service. Products should be serviced only by a qualified service technician who is familiar with the safety procedures required in the repair and who is equipped with the proper tools, parts, testing instruments and the appropriate service manual. **REVIEW ALL SERVICE INFORMATION IN THE APPROPRIATE SERVICE MANUAL BEFORE BEGINNING REPAIRS.**

IMPORTANT NOTICES FOR CONSUMERS AND SERVICERS

RECOGNIZE SAFETY SYMBOLS, WORDS AND LABELS

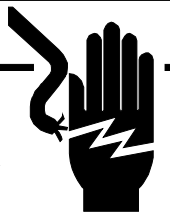
WARNING

THIS UNIT SHOULD NOT BE CONNECTED TO, OR USED IN CONJUNCTION WITH, ANY DEVICES THAT ARE NOT DESIGN CERTIFIED FOR USE WITH THIS UNIT OR HAVE NOT BEEN TESTED AND APPROVED BY THE MANUFACTURER. SERIOUS PROPERTY DAMAGE OR PERSONAL INJURY, REDUCED UNIT PERFORMANCE AND/OR HAZARDOUS CONDITIONS MAY RESULT FROM THE USE OF DEVICES THAT HAVE NOT BEEN APPROVED OR CERTIFIED BY THE MANUFACTURER.

WARNING

HIGH VOLTAGE

DISCONNECT **ALL** POWER BEFORE SERVICING OR INSTALLING THIS UNIT. **MULTIPLE** POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



WARNING

TO PREVENT THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH, DO NOT STORE COMBUSTIBLE MATERIALS OR USE GASOLINE OR OTHER FLAMMABLE LIQUIDS OR VAPORS IN THE VICINITY OF THIS APPLIANCE.

IMPORTANT INFORMATION

WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

- **DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.**
- **WHAT TO DO IF YOU SMELL GAS:**
 - **DO NOT TRY TO LIGHT ANY APPLIANCE.**
 - **DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.**
 - **IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.**
 - **IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.**
- **INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.**

WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, TURN OFF THE MANUAL GAS SHUTOFF VALVE EXTERNAL TO THE FURNACE BEFORE TURNING OFF THE ELECTRICAL SUPPLY.

To locate an authorized servicer, please consult your telephone book or the dealer from whom you purchased this product. For further assistance, please contact:

CONSUMER INFORMATION LINE- DAIKIN PRODUCTS

TOLL FREE

1-877-254-4729 (U.S. only)

email us at: **customerservice@daikincomfort.com**

fax us at: (713) 856-1821

(Not a technical assistance line for dealers.)

Outside the U.S., call 1-713-861-2500

(Not a technical assistance line for dealers.)

Your telephone company will bill you for the call.

IMPORTANT INFORMATION

 DANGER

CARBON MONOXIDE POISONING HAZARD
Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas
Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.
This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.
CO can cause serious illness including permanent brain damage or death. B10259-216

 DANGER PELIGRO

RIESGO DE INTOXICACIÓN POR MONÓXIDO DE CARBONO
Advertencia especial para la instalación de calentadores ó manejadoras de aire en áreas cerradas como estacionamientos ó cuartos de servicio.
Los equipos ó aparatos que producen monóxido de carbono (tal como automóvil, calentador de gas, calentador de agua por medio de gas, etc) no deben ser operados en áreas cerradas debido al riesgo de envenenamiento por monóxido de carbono (CO) que resulta de las emisiones de gases de combustión. Si el equipo ó aparato se opera en dichas áreas, debe existir una adecuada ventilación directa al exterior. Esta ventilación es necesaria para evitar el peligro de envenenamiento por CO, que puede ocurrir si un dispositivo que produce monóxido de carbono sigue operando en el lugar cerrado. Las emisiones de monóxido de carbono pueden circular a través del aparato cuando se opera en cualquier modo.
El monóxido de carbono puede causar enfermedades severas como daño cerebral permanente ó muerte. B10259-216

 DANGER

RISQUE D'EMPOISONNEMENT AU MONOXYDE DE CARBONE
Advertencia especial para la instalación de calentadores ó manejadoras de aire en áreas cerradas como estacionamientos ó cuartos de servicio.
Avertissement special au sujet de l'installation d'appareils de chauffage ou de traitement d'air dans des endroits clos, tels les garages, les locaux d'entretien et les stationnements. Evitez de mettre en marche les appareils produisant du monoxyde de carbone (tels que les automobile, les appareils de chauffage autonome, etc.) dans des endroits non ventilés tels que les d'empoisonnement au monoxyde de carbone. Si vous devez faire fonctionner ces appareils dans un endroit clos, assurez-vous qu'il y ait une ventilation directe provenant de l'exterieur.
Cette ventilation est nécessaire pour éviter le danger d'intoxication au CO pouvant survenir si un appareil produisant du monoxyde de carbone continue de fonctionner au sein de la zone confinée.
Les émissions de monoxyde de carbone peuvent etre recircules dans les endroits clos, si l'appareil de chauffage ou de traitement d'air sont en marche.
Le monoxyde de carbone peut causer des maladies graves telles que des dommages permanents au cerveau et meme la mort. B10259-216

PRODUCT IDENTIFICATION

The model and manufacturing number are used for positive identification of component parts used in manufacturing. Please use these numbers when requesting service or parts information.

D	M	8	0	S	E	0	6	0	3	B	N	A	A
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Brand												Minor Revision	
D - Daikin												A - Initial Release	
												B - 1st Revision	
Configuration												Major Revision	
M - Upflow/Horizontal												A - Initial Release	
C - Downflow/Horizontal												B - 1st Revision	
K - Dedicated Upflow													
D - Dedicated Downflow													
AFUE												Nox	
97 - 97% AFUE												N - Natural Gas	
80 - 80% AFUE												X - Low NOx	
Gas Valve												Cabinet Width	
M - Modulating												A - 14"	
V - 2 Stage												B - 17.5"	
S - Single Stage												C - 21"	
												D - 24.5"	
Motor												Maximum CFM	
C - Variable Speed/ComfortNet												3 - 1200 CFM	
E - High Efficiency												4 - 1600 CFM	
S - Single Speed												5 - 2000 CFM	
MBTU/h													
40 - 40,000													
60 - 60,000													
80 - 80,000													
100 - 100,000													
120 - 120,000													

PRODUCT IDENTIFICATION

MODEL #	80% GAS FURNACES
DM80SE0403A* DM80SE0603A* DM80SE0604B* DM80SE0803B* DM80SE0804B* DM80SE0805C* DM80SE1005C* DM80SE1205D*	DAIKIN 80% SINGLE STAGE GAS FURNACE, FOR INSTALLATION IN UPFLOW / HORIZONTAL LEFT OR RIGHT. SILICON NITRIDE IGNITER. MULTISPEED ECM BLOWER MOTOR, STAINLESS STEEL TUBULAR HEAT EXCHANGER. COMES IN 4 CHASSIS SIZES "A" = 14" , "B" = 17.5" , "C" = 21" , "D" = 24.5".

MODEL #	80% GAS FURNACES
DC80SE0403A* DC80SE0603A* DC80SE0804B* DC80SE1005C*	DAIKIN DOWNFLOW MODELS WITH MULTISPEED ECM BLOWER MOTOR. STAINLESS STEEL TUBULAR HEAT EXCHANGER. SILICON NITRIDE IGNITOR. CHASSIS SIZEZ "A" WIDTH = 14" , "B" WIDTH = 17.5" , "C" WIDTH = 21".

MODEL #	MFG #	DESCRIPTION
AFE18-60A	N/A	Fossil Fuel Kit. The AFE18-60A control is designed for use where the indoor coil is located above/downstream of a gas or fossil fuel furnace when used with a heat pump. It will operate with single and two stage heat pumps and single and two stage furnaces. The AFE18-60A control will turn the heat pump unit off when the furnace is turned on. An anti-short cycle feature initiates a 3 minute timed off delay when the compressor goes off.

MODEL #	MFG #	DESCRIPTION
EFR01	P1221001 P1221002F	External Filter Rack Kit. For use with upflow furnace models. This kit is intended to provide a location, external to the furnace casing, for installation of a permanent filter. The rack is mounted over the indoor air blower compartment area of either side panel, and provide filter retention as well as a location for attaching return air ductwork..
TK400	N/A	Twinning kit from Jackson Systems. Allows a single thermostat to control two separate furnaces / HVAC units. Can be expanded to control four units. When twinning cooling systems we recommend the use of coil freeze stats. (FSK01A) For use with single stage furnaces built with PCBBF145 control board

MODEL #	MFG #	DESCRIPTION
HANG21	N/A	High Altitude Natural Gas Kit. The kit is designed to convert 80% gas furnace models fired at 20,000 Btu's per cell for higher altitudes. This kit is required when installing these furnaces above their maximum rated altitude.

PRODUCT IDENTIFICATION

MODEL #	MFG.#	DESCRIPTION
LPLP03	N/A	<u>LP Gas Low Pressure Kit.</u> Designed for application on Daikin's gas fired furnace products installed on LP gas listed in this manual. This kit includes harness adapters to work with White-Rodgers single & two stage gas valves. Honeywell single and two-stage
LPT-03	N/A	<u>LP Conversion Kit.</u> This kit converts only single stage gas fired units from natural to propane gas. This kit supports both White-Rodgers and Honeywell single stage valves. The conversion from natural gas (as shipped from the factory) to propane gas require
MVK-01A MVK-02A	N/A	<u>Masonry Vent Kit.</u> For use with Daikin 80% AFUE, 33" tall "H" and "S" model furnaces installed in the upflow position only and will only be used with interior masonry chimneys. Kit incorporates a flue high limit safety switch which will interrupt power to
SBT 14 SBT 17 SBT 21	N/A	<u>Downflow subbase.</u> For use with Daikin 80% dedicated downflow furnace models. These kits are available for the following furnace widths: 14" wide (SBT 14) 17.5" wide (SBT 17) and 21" wide (SBT21).

ACCESSORIES

DAIKIN DM80SE DC80SE Model Furnace Accessories

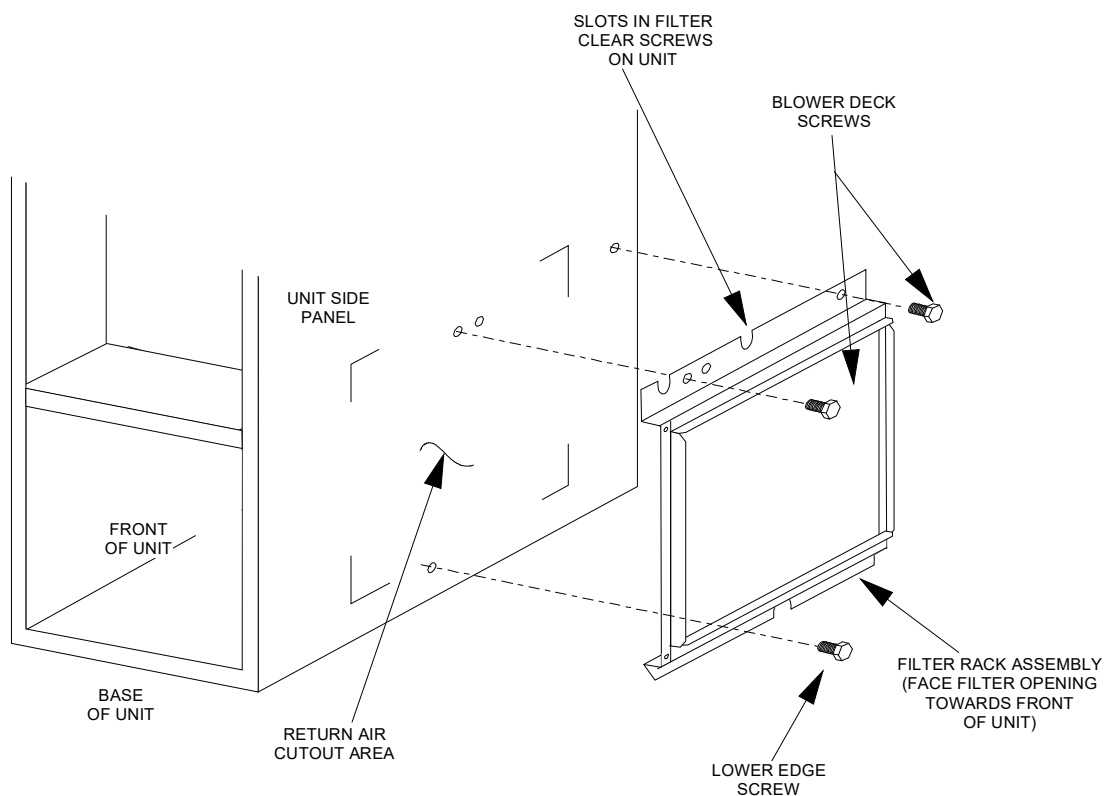
MODEL NUMBER	EFR-01	AFE18-60A	LPLP03	HANG21	MVK-01	MVK-02	SBT14	SBT17	SBT21	TK-400	LPT-03
Description	EFR External Filter Rack	Dual Fuel Kit	LP Low Pressure Shut Off Kit	High Altitude Orifices W/Pressure Switch	Masonry Vent Kit	Masonry Vent Kit	Counterflow Base	Counterflow Base	Counterflow Base	Twinning Kit	LP Conversion Kit
DM80SE0403AX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE0603AX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE0604BX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE0804BX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE0805CX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE1005CX**	▪	▪	▪	(1)	▪					▪	(2)
DM80SE1205DX**	▪	▪	▪	(1)		▪				▪	(2)
DC80SE0403AX**		▪	▪				▪			▪	(2)
DC80SE0603AX**		▪	▪				▪			▪	(2)
DC80SE0804BX**		▪	▪					▪		▪	(2)
DC90SE1005CX**		▪	▪						▪	▪	(2)

(1) 5,500 - 10,000 ft. Altitude

(2) W/R and H/W Gas Valves

ACCESSORIES

EXTERNAL FILTER RACK KIT (EFR01)



EFR01 EXTERNAL FILTER RACK KIT

Used on Models

80% Upflow Model Furnaces

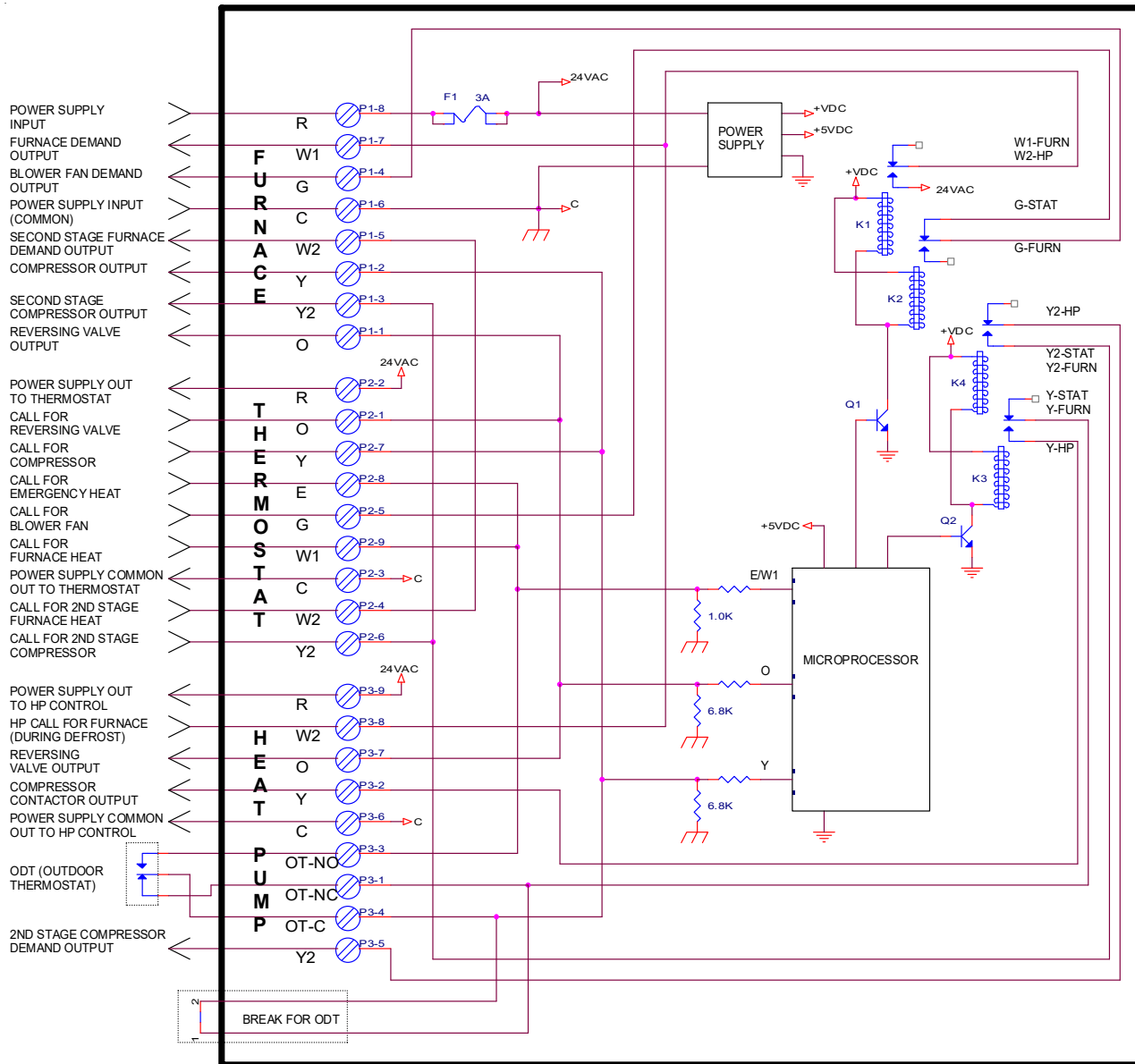
ACCESSORY WIRING DIAGRAMS



WARNING

HIGH VOLTAGE!

DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



ALL FUEL SYSTEM CONTROL BOARD - AFE18-60A

This wiring diagram is for reference only. Not all wiring is as shown above.

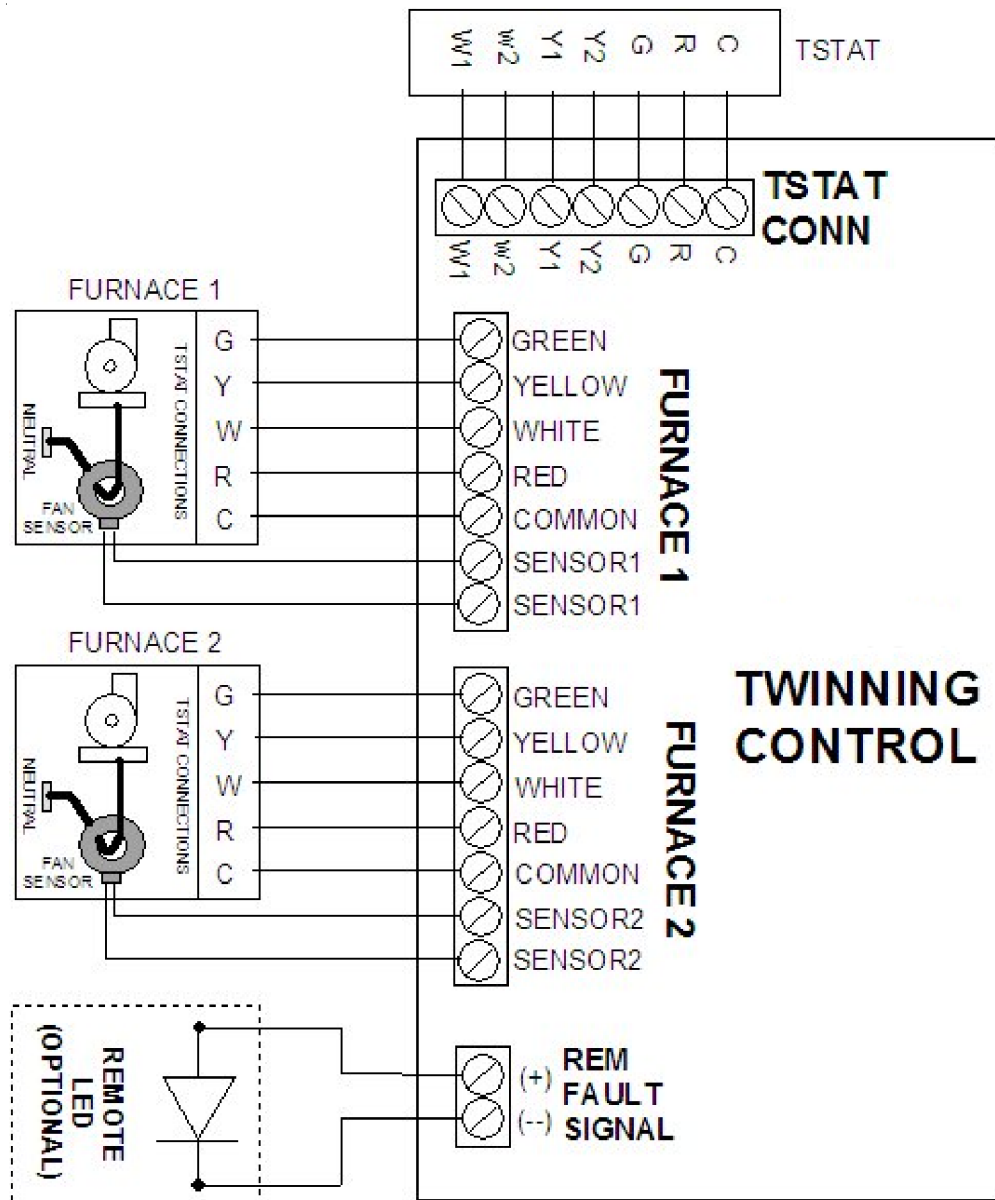
Refer to the appropriate wiring diagram for the unit being serviced.

(For use with Heat Pumps in conjunction with 80% or 90% Single-Stage or Two-Stage Furnaces)

ACCESSORY WIRING DIAGRAMS

WARNING

HIGH VOLTAGE!
DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



FURNACE TWINNING KIT - FTK04 (UTEC Control Board)

This wiring diagram is for reference only. Not all wiring is as shown above.

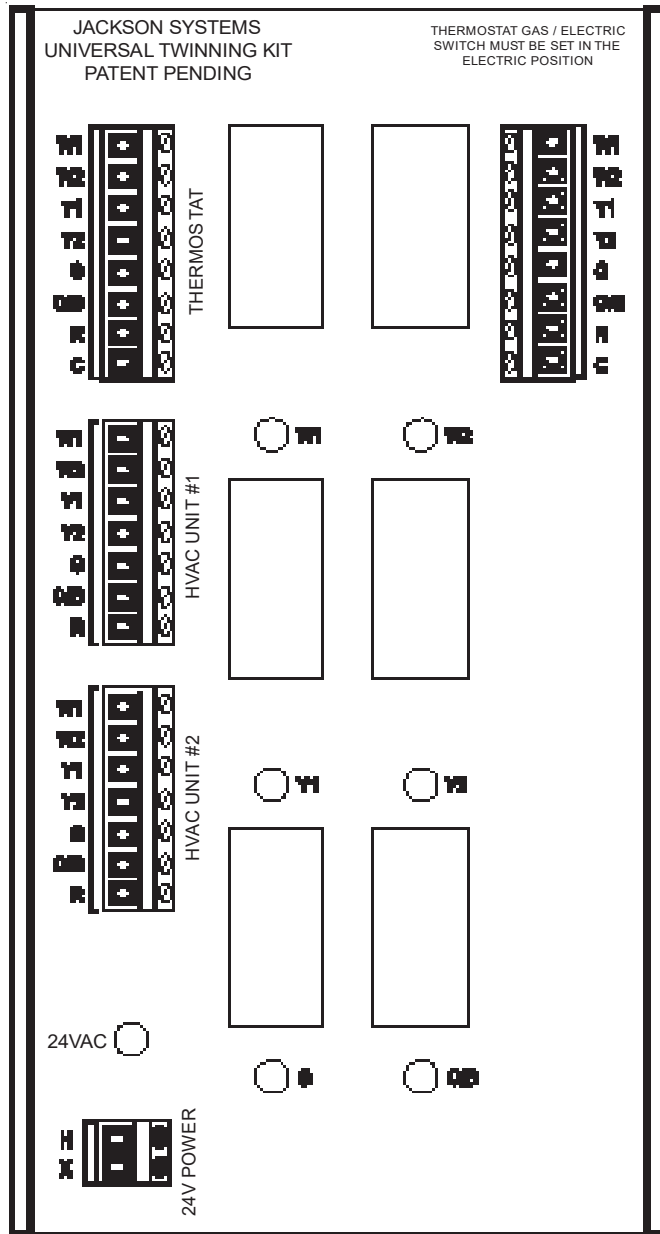
Refer to the appropriate wiring diagram for the unit being serviced.

(For use only with 80% or 90% Single-Stage Furnaces)

Not compatible with PCBBF134 control board.

ACCESSORY WIRING DIAGRAMS

WARNING HIGH VOLTAGE!
DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



Jackson Systems TK-400 Twinning Kit

OPERATING INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING



WARNING



WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

ADVERTENCIA: En caso de no seguir estas instrucciones cuidadosamente, se podría producir un incendio o explosión que ocasionaría daños a la propiedad, lesiones personales e incluso la muerte.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any telephone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.

If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to move the gas control switch or knob. Never use tools. If the gas control switch or knob will not operate, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the user's information manual provided with this furnace. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

ADVERTENCIA: La instalación, el ajuste, la alteración, el servicio o el mantenimiento inadecuados pueden causar lesiones o daños a la propiedad. consulte el manual de información del usuario que acompaña a este horno. Para obtener ayuda o información adicional, consulte con un instalador calificado, una agencia de servicio o el proveedor de gas.

This furnace must be installed in accordance with the manufacturers instructions and local codes. In the absence of local codes, follow the National Fuel Gas Code, ANSI Z223.1.

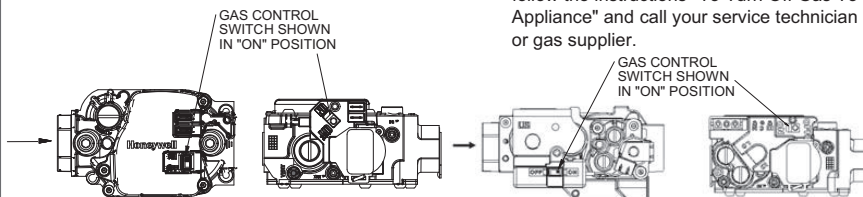
WARNING: If not installed, operated and maintained in accordance with the manufacturer's instructions, this product could expose you to substances during fuel combustion which can cause death or serious illness and which are known to the state of California to cause cancer, birth defects or other reproductive harm. This product contains fiberglass insulation. Fiberglass insulation contains a chemical known by the state of California to cause cancer.

ADVERTENCIA: Si no se instala, se activa y se mantiene conforme a las instrucciones del fabricante, este producto podría exponerlo a sustancias durante la combustión del carburante, lo que puede causar la muerte o enfermedades severas. El estado de California sabe que estas sustancias causan cáncer, defectos de nacimiento u otros riesgos reproductivos. Este producto contiene aislante de fibra de vidrio. El aislante de fibra de vidrio contiene un producto químico que el estado de California sabe que causa cáncer.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an automatic ignition system which automatically lights the burners. Do not try to light the burners by hand.
5. Remove control access panel.
6. Move the gas control switch or knob to "OFF".

7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Move the gas control switch or knob to "ON".
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set the thermostat to the desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.



TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Move the gas control switch or knob to "OFF". Do not force.
5. Replace control access panel.

FOR YOUR SAFETY:

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

PARA SU SEGURIDAD:

No almacene ni use gasolina u otros vapores y líquidos inflamables cerca de este o cualquier otro aparato.

0140F02310-A

Safety

Please adhere to the following warnings and cautions when installing, adjusting, altering, servicing, or operating the furnace.



WARNING

TO PREVENT PERSONAL INJURY OR DEATH DUE TO IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE, REFER TO THIS MANUAL. FOR ADDITIONAL ASSISTANCE OR INFORMATION, CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.



WARNING

TO PREVENT POSSIBLE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK, THE FURNACE MUST BE LOCATED TO PROTECT THE ELECTRICAL COMPONENTS FROM WATER.

Charge (ESD) Precautions

NOTE: Discharge your body's static electricity before touching unit. An electrostatic discharge can adversely affect electrical components.

Use the following precautions during furnace installation and servicing to protect the integrated control module from damage. By putting the furnace, the control, and the person at the same electrostatic potential, these steps will help avoid exposing the integrated control module to electrostatic discharge. This procedure is applicable to both installed and uninstalled (ungrounded) furnaces.

1. Disconnect all power to the furnace. Do not touch the integrated control module or any wire connected to the control prior to discharging your body's electrostatic charge to ground.
2. Firmly touch a clean, unpainted, metal surface of the furnace near the control. Any tools held in a person's hand during grounding will be discharged.
3. Service integrated control module or connecting wiring following the discharge process in Step 2. Use caution not to recharge your body with static electricity; (i.e., do not move or shuffle your feet, do not touch ungrounded objects, etc.). If you come in contact with an ungrounded object, repeat Step 2 before touching control or wires.
4. Discharge any static electricity from your body to ground before removing a new control from its container. Follow Steps 1 through 3 if installing the control on a furnace. Return any old or new controls to their containers before touching any ungrounded object.

Product Application

This product is designed for use as a residential home gas furnace. It is **not** designed or certified for use in mobile home, trailer, or recreational vehicle applications.

This furnace can be used in the following non-industrial commercial applications: **Schools, Office buildings, Churches, Retail stores, Nursing homes, Hotels/motels, Common or office areas.** In such applications, the furnace must be installed with the installation instructions.

Daikin 80% furnaces are ETL certified appliances and are appropriate for use with natural or propane gas. (**NOTE:** If using propane gas, a propane conversion kit is required).

IMPORTANT NOTE: The 80% furnace cannot be installed as a direct vent (i.e., sealed combustion) furnace. The burner box is present only to help reduce sound transmission from the burners to the occupied space.

To ensure proper installation, operation and servicing, thoroughly read the installation manual for specifics pertaining to the installation of this product.



WARNING

POSSIBLE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE, EXPLOSION, SMOKE, SOOT, CONDENSATION, ELECTRICAL SHOCK OR CARBON MONOXIDE MAY RESULT FROM IMPROPER INSTALLATION, REPAIR, OPERATION, OR MAINTENANCE OF THIS PRODUCT.



WARNING

TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE, DO NOT INSTALL THIS FURNACE IN A MOBILE HOME, TRAILER, OR RECREATIONAL VEHICLE.

To ensure proper furnace operation, install, operate, maintain and service the furnace in accordance with the installation, operation and service instructions, all local building codes and ordinances. In their absence, follow the latest edition of the National Fuel Gas Code (NFPA 54/ANSI Z223.1), and/or CAN/CGA B149 Installation Codes, local plumbing or waste water codes, and other applicable codes. A copy of the National Fuel Gas Code (NFPA 54/ANSI Z223.1) can be obtained from any of the following:

American National Standards Institute
1430 Broadway
New York, NY 10018

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269
CSA International
8501 East Pleasant Valley
Cleveland, OH 44131

A copy of the CAN/CGA B149 Installation Codes can be obtained from:

CSA International
178 Rexdale Boulevard
Etobicoke, Ontario, Canada M9W, 1R3

Propane Gas and/or High Altitude Installations



WARNING

POSSIBLE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH MAY OCCUR IF THE CORRECT CONVERSION KITS ARE NOT INSTALLED. THE APPROPRIATE KITS MUST BE APPLIED TO INSURE SAFE AND PROPER FURNACE OPERATION. **ALL** CONVERSIONS MUST BE PERFORMED BY A QUALIFIED INSTALLER OR SERVICE AGENCY.

This furnace is shipped from the factory configured for natural gas at standard altitude. Propane gas installations require an orifice change to compensate for the energy content difference between natural and propane gas.

High altitude installations may require both a pressure switch and an orifice change. These changes are necessary to compensate for the natural reduction in the density of both the gas fuel and the combustion air at higher altitude.

Refer to the *Accessories Charts* in this manual or product Specification Sheet for a tabular listing of appropriate manufacturer's kits for propane gas and/or high altitude installations. The indicated kits must be used to insure safe and proper furnace operation. All conversions must be performed by a qualified installer, or service agency.



WARNING

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN BODILY INJURY OR DEATH. **CAREFULLY READ AND FOLLOW ALL INSTRUCTIONS GIVEN IN THIS SECTION.**



WARNING

UPON COMPLETION OF THE FURNACE INSTALLATION, CAREFULLY INSPECT THE ENTIRE FLUE SYSTEM BOTH INSIDE AND OUTSIDE THE FURNACE TO ASSURE IT IS PROPERLY SEALED. **LEAKS IN THE FLUE SYSTEM CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH DUE TO EXPOSURE TO FLUE PRODUCTS, INCLUDING CARBON MONOXIDE.**



CAUTION

TO PREVENT UNRELIABLE OPERATION OR EQUIPMENT DAMAGE, THE INLET GAS SUPPLY PRESSURE MUST BE AS SPECIFIED ON THE UNIT RATING PLATE WITH ALL OTHER HOUSEHOLD GAS FIRED APPLIANCES OPERATING.

Inlet gas supply pressures must be maintained within the ranges specified below. The supply pressure must be constant and available with all other household gas fired appliances operating. The minimum gas supply pressure must be maintained to prevent unreliable ignition. The maximum must not be exceeded to prevent unit overfiring.

INLET GAS SUPPLY PRESSURE

Natural Gas	Minimum: 4.5" w.c.	Maximum: 10.0" w.c.
Propane Gas	Minimum: 11.0" w.c.	Maximum: 13.0" w.c.

GAS VALVE

This unit is equipped with a 24 volt gas valve controlled during furnace operation by the integrated control module. As shipped, the valve is configured for natural gas. The valve is field convertible for use with propane gas by using the appropriate propane gas conversion kit. Taps for measuring the gas supply pressure and manifold pressure are provided on the valve.

NOTE: The gas supply pressure on White-Rodger "J" model gas valve, used on single stage furnaces, can be checked with a gas pressure test kit (Part #0151K00000S) available through our authorized distributors.

The gas valve has a manual ON/OFF control located on the valve itself. This control may be set only to the "ON" or "OFF" position. Refer to the *Lighting Instructions Label* located on the furnace door.

GAS PIPING CHECKS

Before placing unit in operation and after servicing, leak test the unit and gas connections.



WARNING

TO AVOID THE POSSIBILITY OF EXPLOSION OR FIRE, NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS.

Check for leaks using an approved chloride-free soap and water solution, an electronic combustible gas detector, or other approved testing methods.

NOTE: Never exceed specified pressures for testing. Higher pressure may damage the gas valve and cause subsequent overfiring, resulting in heat exchanger failure. Disconnect this unit and shutoff valve from the gas supply piping system before pressure testing the supply piping system with pressures in excess of 1/2 psig (3.48 kPa). Isolate this unit from the gas supply piping system by closing its external manual gas shutoff valve before pressure testing supply piping system with test pressures equal to or less than 1/2 psig (3.48 kPa).

ELECTRICAL CONNECTIONS

⚠ WARNING

TO AVOID THE RISK OF ELECTRICAL SHOCK, WIRING TO THE UNIT MUST BE PROPERLY POLARIZED AND GROUNDED.

⚠ WARNING

HIGH VOLTAGE

DISCONNECT **ALL** POWER BEFORE SERVICING OR INSTALLING THIS UNIT. **MULTIPLE** POWER SOURCES MAY BE PRESENT. **FAILURE** TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



⚠ CAUTION

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. **WIRING ERRORS** CAN CAUSE IMPROPER AND DANGEROUS OPERATION. **VERIFY** PROPER OPERATION AFTER SERVICING.

WIRING HARNESS

The wiring harness is an integral part of this furnace. Field alteration to comply with electrical codes should not be required. Wires are color coded for identification purposes. Refer to the wiring diagram for wire routings. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C. Any replacement wiring must be copper conductor.

115VOLT LINE CONNECTIONS

Before proceeding with electrical connections, ensure that the supply voltage, frequency, and phase correspond to that specified on the unit rating plate. Power supply to the furnace must be N.E.C. Class 1, and must comply with all applicable codes. The furnace must be electrically grounded in accordance with local codes or, in their absence, with the latest edition of The National Electric Code, ANSI NFPA 70 and/or The Canadian Electric Code CSA C22.1.

Use a separate fused branch electrical circuit containing properly sized wire, and fuse or circuit breaker. The fuse or circuit breaker must be sized in accordance with the maximum overcurrent protection specified on the unit rating plate. An electrical disconnect must be provided at the furnace location.

NOTE: Line polarity must be observed when making field connections.

⚠ WARNING

IN 90% FURNACE UPRIGHT UPFLOW INSTALLATIONS, THE DRAIN TRAP MUST BE MOUNTED ON THE OPPOSITE SIDE OF THE UNIT FROM THE JUNCTION BOX. THIS WILL REDUCE THE RISK OF WATER REACHING THE JUNCTION BOX IN THE EVENT OF A BLOCKED DRAIN CONDITION.

Connect hot, neutral, and ground wires as shown in the wiring diagram located on the unit's blower door. Line polarity must be observed when making field connections. Line voltage connections can be made through either the right or left side panel.

⚠ CAUTION

EDGES OF SHEET METAL HOLES MAY BE SHARP. **USE GLOVES** A PRECAUTION WHEN REMOVING HOLE PLUGS.

NOTE: Wire routing must not interfere with circulator blower operation, filter removal, or routine maintenance.

⚠ WARNING

TO AVOID THE RISK OF ELECTRICAL SHOCK, INJURY, OR DEATH, THE FURNACE MUST BE ELECTRICALLY GROUNDED IN ACCORDANCE WITH LOCAL CODES OR, IN THEIR ABSENCE, WITH THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE.

115 VOLT LINE CONNECTION OF ACCESSORIES (HUMIDIFIER AND ELECTRONIC AIR CLEANER)

⚠ WARNING

HIGH VOLTAGE

DISCONNECT **ALL** POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING. **MULTIPLE** POWER SOURCES MAY BE PRESENT. **FAILURE** TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



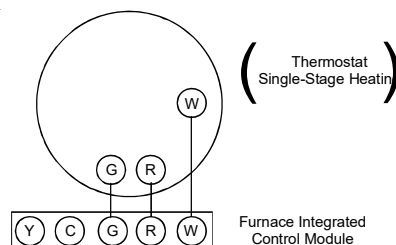
24 VOLT THERMOSTAT WIRING

NOTE: Low voltage connections can be made through either the right or left side panel. Wire routing must not interfere with circulator blower operation, filter removal, or routine maintenance.

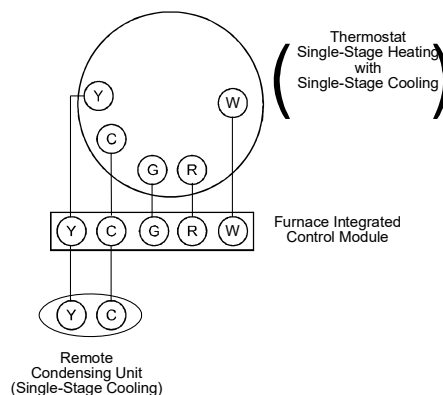
A 40 V.A. transformer and an integrated electronic control are built into the furnace to allow use with most cooling equipment. Consult the wiring diagram, located in the Technical Manual or on the blower door for further details of 115 Volt and 24 Volt wiring.

THERMOSTAT WIRING - SINGLE-STAGE

The single stage furnace will have a "W" terminal and will use a single stage thermostat. The following drawing illustrates the typical field wiring for a heat only single stage system and a single stage heating/single stage cooling system. Refer to the following figures for proper connections to the integrated control module.



Single-Stage Heating Only



Single-Stage Heating with Single-Stage Cooling

CONTINUOUS FAN OPERATION SINGLE STAGE FURNACES

The single stage furnace control will energize the **heating** circulator fan speed when the fan switch on the thermostat is turned to the "ON" position.

CIRCULATOR BLOWER SPEED ADJUSTMENT

WARNING

HIGH VOLTAGE
DISCONNECT **ALL** POWER BEFORE CHANGING SPEED TAPS.
MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

To adjust the circulator blower speed, proceed as follows:

1. Motor speed Tap wiring must remain in factory position on the control board and motor.
2. There are 4 speed Tap wires to the motor T1, T2, T3, T4.
3. There are 5 speeds available, depending on DIP switch settings mentioned in air flow tables for each size furnace.
4. Cooling speed can be adjusted by adjusting S1-1, S1-2, S1-3 (see cooling airflow Chart for reference).
5. Heating speed can be adjusted by adjusting S2-1, S2-2 (see Heating airflow Chart).
6. Circulation / Continuous Fan speed can be adjusted by adjusting S2-3, S2-4 (see Circulation airflow Chart).
7. Verify Proper temperature rise as outlined in the Temperature Rise section of Startup Procedure and Adjustment. Please refer to the tables below for dip switch settings.

Motor Tap Identification		
CONNECTOR ID	DESCRIPTION	CONNECTOR VOLTAGE
L	LINE, L1	LINE, L1
G	GROUND	CHASSIS GROUND
N	LINE, L2	LINE, L2
C	SIGNAL COMMON	24VAC COMMON
1	TAP 1	24VAC
2	TAP 2	24VAC
3	TAP 3	24VAC
4	TAP 4	24VAC
5	TAP 5	24VAC

Heat Off Delay (S1-4)				
S1-4	Min	Nom	Max	Units
ON		*150		Seconds
OFF		100		Seconds

* – DEFAULT SETTING

COOL MOTOR SPEED DIP SWITCH SETTING (S1-1, S1-2, S1-3)					
		1 2 3	1 2 3	1 2 3	1 2 3
	Position	OFF OFF OFF	ON OFF OFF	ON ON OFF	OFF ON OFF
Motor Speed COOL	Y	T1	T2	T3	T4
		*1 2 3	1 2 3	1 2 3	1 2 3
	Position	OFF OFF ON	OFF ON ON	ON OFF ON	ON ON ON
Motor Speed COOL	Y	T1+T2	T1	T1	T1

* – DEFAULT SETTING

HEAT MOTOR SPEED DIP SWITCH SETTING (S2-1, S2-2)					
		1 2	*1 2	1 2	1 2
	Position	OFF OFF	ON OFF	ON ON	OFF ON
Motor Speed HEAT	W	T1	T2	T3	T4

* = DEFAULT SETTING

FAN MOTOR SPEED DIP SWITCH SETTING (S2-3, S2-4)					
		*3 4	3 4	3 4	3 4
	Position	OFF OFF	ON OFF	OFF ON	ON ON
Motor Speed FAN	G	T1	T2	T4	T1+T2

* = DEFAULT SETTING

FILTERS

Filters must be used and well maintained. There are no provisions to install filters inside the furnace cabinet. Refer to the chart below for minimum filter sizes. A deep pleated filter or electronic air filter may also be used.

DM80SE MODELS

DM80SE furnaces require installer provision of a return air filter located on the side or bottom of the furnace or a centrally located filter.

DC80SE MODELS

DC80SE furnaces require installer provision of a filter rack located in the return air plenum or a centrally located filter

Upflow / Horizontal Models	Minimum Recommended Filter Size [^]
0403A	1 - 16 X 25 Side or 1 - 14 X 24 Bottom Return
0603A	1 - 16 X 25 Side or 1 - 14 X 24 Bottom Return
0604B	1 - 16 X 25 Side or Bottom Return
0803B	1 - 16 X 25 Side or Bottom Return
0804B	1 - 16 X 25 Side or Bottom Return
0805C	1 - 16 X 25 Side or Bottom Return ¹
0805D	2 - 16 X 25 Side or 1 - 20 X 25 Bottom Return
1005C	2 - 16 X 25 Side or 1 - 20 X 25 Bottom Return
1205D	2 - 16 X 25 Side or 1 - 24 X 24 Bottom Return
1405D	2 - 16 X 25 Side or 1 - 24 X 24 Bottom Return

Downflow Models	Minimum Recommended Filter Size [^]
0403A	2 - 10 X 20 or 1 - 14 X 25 Top Return
0603A	2 - 10 X 20 or 1 - 14 X 25 Top Return
0804B	2 - 14 X 20 or 1 - 16 X 25 Top Return
1005C	2 - 14 X 20 or 1 - 20 X 25 Top Return

[^] Filters may also be centrally located

¹ = use 2 - 16 X 25 filters and two side returns or 20 X 25 filter on bottom return if furnace is connected to a cooling unit over 4 tons nominal capacity

ADDITIONAL FILTERING ACCESSORIES

External Filter Rack Kit (EFR01)

The external filter rack kit is intended to provide a location external to the furnace casing, for installation of a permanent filter on upflow model furnaces. The rack is designed to mount over the indoor blower compartment area of either side panel, and provide filter retention as well as a location for attaching return air ductwork.

PRODUCT DESIGN

NORMAL SEQUENCE OF OPERATION

POWER UP

1. 115 VAC power applied to furnace.
2. Integrated ignition control module performs internal checks.
3. Integrated ignition control module LED will light.
4. Integrated ignition control monitors safety circuits continuously.
5. Furnace awaits call from thermostat.

NORMAL HEATING SEQUENCE

1. R and W thermostat contacts close, initiating a call for heat.
2. Integrated control module performs safety circuit checks.
3. The induced draft blower is energized causing pressure switch contacts to close. Induced draft blower remains energized for pre-purge period. Humidifier terminals are energized with induced draft blower.
4. Ignitor warm up begins after pre-purge is completed.
5. Gas valve opens at end of ignitor warm up period, delivering gas to burners to establish flame.
6. The control checks for a signal from the flame sensor within seven (4) seconds after the gas valve is energized. Gas will only continue to flow if a flame signal is present.
7. Circulator blower is energized on heat speed following a fixed thirty (30) second blower on delay. Electronic air cleaner terminals are energized with circulator blower.
8. Furnace runs, integrated control module monitors safety circuits continuously.
9. R and W thermostat contacts open, allowing the gas valve to cycle off.
10. Induced draft blower is de-energized following a fifteen (15) -second post purge. Humidifier terminals are de-energized.
11. Circulator blower is de-energized following a selectable heat off delay period (90, 120, 150 or 180 seconds). Electronic air cleaner terminals are de-energized.
12. Furnace awaits next call from thermostat.

The adjustable delay-off timing allows the installer to customize the comfort level.

Cooling Mode

The normal operational sequence in cooling mode is as follows:

1. R and Y thermostat contacts close, initiating a call for cool.
2. Integrated control module performs safety circuit checks.
3. Outdoor fan and compressor are energized.
4. Circulator blower is energized on cool speed following a fixed five (5) second on delay. Electronic air cleaner terminals are energized with circulator blower.
5. Furnace circulator blower and outdoor cooling unit run, integrated control module monitors safety circuits

continuously.

6. R and Y thermostat contacts open, completing the call for cool.
7. Outdoor fan and compressor are de-energized.
8. Circulator blower is de-energized following a fixed sixty-five (65) second cool off delay period. Electronic air cleaner terminals are de-energized.
9. Furnace awaits next call from thermostat.

Fan Only Mode

The normal operational sequence in fan only mode is as follows:

1. R and G thermostat contacts close, initiating a call for fan.
2. Integrated control module performs safety circuit checks.
3. Circulator blower is energized on **heat speed**. Electronic air cleaner terminals are energized.
4. Circulator blower runs, integrated control module monitors safety circuits continuously.
5. R and G thermostat contacts open, completing the call for fan.
6. Circulator blower is de-energized. Electronic air cleaner terminals are de-energized.
7. Furnace awaits next call from thermostat.

SYSTEM OPERATION

HEATING - Abnormal Operation

The following presents the probable causes of questionable furnace operation and how to fix them. Look through the observation window in the blower access door and make a note of the number of flashes in sequence between pauses. Next, refer to the *Troubleshooting Chart* on the following pages for an interpretation of the LED signals and to the information in this section for a description of the problem.

1. **Internal Control Failure with Integrated Ignition Control.** Check for voltage to the furnace and low voltage at the control board. Check for blown fuse on the control board. If the control determines it has an internal fault, it enters a locked-out state. Any of the situations mentioned will cause the diagnostic LED to provide **no signal**. The control board should only be replaced after all other checks from the *Troubleshooting Chart* have been verified.
2. **System Lockout.** If a flame is not sensed during the first seven (4) seconds after the gas valve is energized, the control turns off the gas. There will then be a 30 second delay while the induced draft blower is energized to purge the heat exchanger. The ignitor will next be energized and preheated for (8) seconds. The gas valve will then be energized. If flame is not sensed in seven (4) seconds the gas valve will be de-energized and another purge will occur. The control will cycle the gas valve a total of three (3) times before it determines it cannot establish measurable combustion and enters a locked out state. The diagnostic light code for this problem is **one short flash** followed by a longer pause. The control can be reset and brought out of lockout mode by turning the thermostat off for more than (5) seconds and less than (20) seconds and then back on. It can also be reset by turning off the electrical disconnect switch to the furnace for a minimum of 5 seconds.

NOTE: The control board will automatically reset one hour after lockout occurs. If the furnace frequently has to be reset, it means that a problem exists that should be corrected. Refer to *Troubleshooting Chart* on the following pages for aid in determining the cause.

3. **Pressure Switch Stuck Closed.** If the control senses the pressure switch is closed when the induced draft blower is off, it waits until the fault is corrected. The diagnostic light code for this problem is **two short flashes** followed by a longer pause. The probable cause is either a faulty pressure switch or wiring.
4. **Pressure Switch Stuck Open.** If, after the induced draft blower is energized, the pressure switch does not close within 5 minutes, the control will go into a 1-hour lockout. The control will automatically reset from lockout and restart the ignition sequence. The diagnostic light code for this problem is **three short flashes** followed by a pause. The probable causes are either

disconnected hose to the pressure switch, faulty pressure switch or wiring, or restricted air intake or flue piping.

5. **Open Primary or Auxiliary Limit.** If the limit control opens, the air circulator blower will be turned on until the limit closes. The induced draft blower will turn off for 5 seconds then turn off. The diagnostic light code for this problem is **four short flashes** followed by a pause. The probable cause is either low conditioned air flow due to dirty filter or resistance in duct work, faulty limit, faulty blower, or blower speed set to low.
6. **Flame Sensed with No Call for Heat.** If the control senses a flame when the gas valve is de-energized, it will run the air circulation blower and the induced draft blower continuously with no further furnace operation. The diagnostic flash code for this is a **five flashes**. The probable causes are either a short to ground in flame sense circuit, miswiring, lingering burner flame or a slow closing gas valve.
7. **Open Rollout Limit.** If the rollout control opens, the air circulator blower will be energized all the time. The diagnostic light code for this problem is **six flashes** followed by a pause. The probable cause is either restricted flue piping or improper air requirements.
8. **Low Flame Sense Signal.** If the furnace continues to operate and the micro-amp signal from the flame sensor falls below specified level, the diagnostic light code for this problem will be **seven flashes** followed by a pause. The probable cause is either a coated/oxidized sensor, incorrectly positioned sensor in burner flame or lazy burner flame due to improper gas pressure or combustion air.
9. **Igniter circuit or poor ground.** Improperly connected igniter, bad igniter or poor ground to the equipment. The diagnostic light code for this problem is **eight flashes**.

TROUBLESHOOTING

TROUBLESHOOTING CHART

PCBBF145(S) CONTROL BOARD

Symptoms of Abnormal Operation	Associated LED Code ²	Fault Description(s)	Possible Causes	Corrective Action	Cautions and Notes
- Furnace fails to operate. - Integrated control module diagnostic LED provides no signal.	OFF	- No 115 volt power to furnace, or no 24 volt power to integrated control module. - Blown fuse or circuit breaker. - Integrated control module has an internal fault.	- Manual disconnect switch OFF, door switch open, or 24 volt wires improperly connected or loose. - Blown fuse or circuit breaker. - Integrated control module has an internal fault.	- Assure 115 and 24 volt power to furnace integrated control module. - Check integrated control module fuse (3A). Replace if necessary. - Check for possible shorts in 115 and 24 volt circuits. Repair as necessary. - Replace bad integrated control module.	- Turn power OFF prior to repair. - Replace integrated control module fuse with 3A automotive fuse. - Read precautions in "Electrostatic Discharge" section of manual.
LED is Steady On.	 CONTINUOUS ON	Normal Operation	Normal Operation	None	Normal Operation
- Furnace fails to operate. - Integrated control module diagnostic LED is flashing ONE (1) flash.	 1 FLASH	Furnace lockout due to an excessive number of ignition "retries" (3 total)¹.	- Failure to establish flame. Cause may be no gas to burners, front cover pressure switch stuck open, bad igniter or igniter alignment, improper orifices, coated/oxidized or improperly connected flame sensor. - Loss of flame after establishment. Cause may be interrupted gas supply, lazy burner flames (improper gas pressure or restriction in flue and/or combustion air piping), front cover pressure switch opening, improper induced draft blower performance.	- Locate and correct gas interruption. - Check front cover pressure switch operation (hose, wiring, contact operation). Correct if necessary. - Replace or realign igniter. - Check flame sense signal. Sand sensor if coated and/or oxidized. - Check flue piping for blockage, proper length, elbows, and termination. - Verify proper induced draft blower performance.	- Turn power OFF prior to repair. - Igniter is fragile, handle with care. - Sand flame sensor with emery cloth. - See "Vent/ Flue Pipe" section for piping details.
- Furnace fails to operate. - Integrated control module diagnostic LED is flashing TWO (2) flashes.	 2 FLASHES	- Pressure switch circuit is closed. - Induced draft blower is not operating.	- Induced draft blower pressure switch contacts sticking. - Shorts in pressure switch circuit.	- Replace induced draft blower pressure switch. - Repair short.	- Turn power OFF prior to repair. - Replace pressure switch with proper replacement part.

TROUBLESHOOTING

TROUBLESHOOTING CHART

PCBBF145(S) CONTROL BOARD

Symptoms of Abnormal Operation	Associated LED Code ²	Fault Description(s)	Possible Causes	Corrective Action	Cautions and Notes
- Induced draft blower runs continuously with no further furnace operation. - Integrated control module diagnostic LED is flashing THREE (3) flashes.	 3 FLASHES	- Pressure switch circuit not closed. - Induced draft blower is operating.	- Pressure switch hose blocked, pinched or connected improperly. - Blocked flue and/or inlet air pipe, blocked drain system, or weak induced draft blower. - Incorrect pressure switch setpoint or malfunctioning switch contacts. - Loose or improperly connected wiring.	- Inspect pressure switch hose. Repair, if necessary. - Inspect flue and/or inlet air piping for blockage, proper length, elbows, and termination. Check drain system. Correct as necessary. - Correct pressure switch setpoint or contact motion. - Tighten or correct wiring connection.	- Turn power OFF prior to repair. - Replace pressure switch with proper replacement part.
- Circulator blower runs continuously. No furnace operation. - Integrated control module diagnostic LED is flashing FOUR (4) flashes.	 4 FLASHES	Primary or auxiliary limit circuit is open.	- Faulty primary or auxiliary limit switch. - Insufficient conditioned air over the heat exchanger. Blocked filters, restrictive ductwork, improper circulator blower speed, or failed circulator blower. - Loose or improperly connected wiring.	- Check primary/auxiliary limit. Replace if necessary. - Check filters and ductwork for blockage. Clean filters or remove obstruction. - Check circulator blower speed and performance. Correct speed or replace blower if necessary. - Tighten or correct wiring connection.	- Turn power OFF prior to repair. - Replace primary/auxiliary limit with proper replacement part. - Replace blower with correct replacement part.
- Induced draft blower and circulation blower runs continuously. No furnace operation. - Integrated control module diagnostic LED is flashing FIVE (5) flashes.	 5 FLASHES	Flame sensed with no call for heat.	Short to ground in flame sense circuit.	Correct short at flame sensor or in flame sensor wiring.	Turn power OFF prior to repair.
- Furnace fails to operate. - Integrated control module diagnostic LED is flashing SIX (6) flashes. - No furnace operation.	 6 FLASHES	- Rollout limit open. - Integrated control module fuse is blown.	- Flame rollout. - Misaligned burners, blocked flue and/or air inlet pipe, or failed induced draft blower. - Loose or improperly connected wiring. - Short in 24 volt AC control circuits or safety circuits. - Faulty rollout limit.	- Check burners for proper alignment. - Check flue and air inlet piping for blockage, proper length, elbows, and termination. Correct as necessary. - Check rollout limit. Replace if necessary. - Check induced draft blower for proper performance. Replace, if necessary. - Tighten or correct wiring connection.	- Turn power OFF prior to repair. - See "Vent/Flue Pipe" section for piping details. - Replace induced draft blower with correct replacement part. - Replace integrated control module fuse with 3A automotive fuse. - Read precautions in "Electrostatic Discharge" section of manual. - Replace rollout limit with correct replacement part.
- Normal furnace operation. - Integrated control module diagnostic LED is flashing SEVEN (7) flashes.	 7 FLASHES	Flame sense microamp signal is low.	- Flame sensor is coated/oxidized. - Flame sensor incorrectly positioned in burner flame. - Lazy burner flame due to improper gas pressure or combustion air.	- Sand flame sensor. - Inspect for proper sensor alignment. - Compare current gas pressure to rating plate info. Adjust as needed.	- Turn power OFF prior to repair. - Clean flame sensor with steel wool. - See "Vent/Flue Pipe" section for piping details. - See rating plate for proper gas pressure.

TROUBLESHOOTING

TROUBLESHOOTING CHART

PCBBF145(S) CONTROL BOARD

Symptoms of Abnormal Operation	Associated LED Code ²	Fault Description(s)	Possible Causes	Corrective Action	Cautions and Notes
- Furnace not operating. - Integrated control module diagnostic LED is flashing EIGHT (8) flashes.	 8 FLASHES	Igniter Relay Fault	- Improperly connected igniter. - Bad igniter. - Poor unit ground. - Poor burner ground. - Faulty integrated control module.	- Check and correct wiring from integrated control module to igniter. - Replace bad igniter. - Check & correct unit ground wire. - Replace bad integrated control module.	- Turn power OFF prior to repair. - Replace igniter w/proper replacement part. - Read precautions in "Electrostatic Discharge" section of manual.
Circulating blowers not operating simultaneously. No blower operation.	 9 FLASHES	Twinning Fault	- Furnace twin terminals not connected together by field wiring. - Isolating relay not used or improperly installed	- Install field wiring connecting twin terminals, check continuity of wiring. - Verify each furnace fan motor is operable without twinning connection. - Wire per twinning diagram in this installation manual	Verify line voltage supply is turned off before proceeding with corrections
- Furnace not operating. - Integrated control module diagnostic LED is flashing TEN (10) flashes.	 10 FLASHES	Open Fuse / No 24V power to integrated control module	High voltage surge blows off the fuse.	Replace the Fuse.	Verify line voltage supply is turned off before proceeding with corrections
- Furnace not operating. - Integrated control module diagnostic LED is flashing ELEVEN (11) flashes.	 11 FLASHES	Igniter Open	- Improperly connected igniter. - Bad igniter. - Poor unit ground. - Poor burner ground.	- Check and correct wiring from integrated control module to igniter. - Replace bad igniter. - Check & correct unit ground wire. - Replace bad integrated control module.	- Turn power OFF prior to repair. - Replace igniter w/proper replacement part. - Read precautions in "Electrostatic Discharge" section of manual.
- Furnace not operating. - Integrated control module diagnostic LED is flashing TWELVE (12) flashes.	 12 FLASHES	Inducer Relay Fault	- Improperly connected inducer. - Bad inducer. - Poor unit ground. - Faulty integrated control module.	- Check and correct wiring from integrated control module to inducer. - Check for Blockage in inducer & in Vent / replace Inducer. - Check & correct unit ground wire. - Replace bad integrated control module.	- Turn power OFF prior to repair. - Replace inducer w/proper replacement part. - Read precautions in "Electrostatic Discharge" section of manual.
- Furnace fails to operate. - Integrated control module diagnostic LED is flashing continuously.	 CONTINUOUS RAPID FLASH	Polarity of 115 or 24 volt power is reversed.	- Polarity of 115 volt AC power to furnace or integrated control module is reversed. - Orange and gray wires to transformer are reversed. - Poor unit ground.	- Review wiring diagram to correct polarity. - Reverse orange and gray wires going to transformer. - Verify proper ground. Correct if necessary.	Turn power OFF prior to repair

¹Integrated control module will automatically attempt to reset from lockout after one hour.

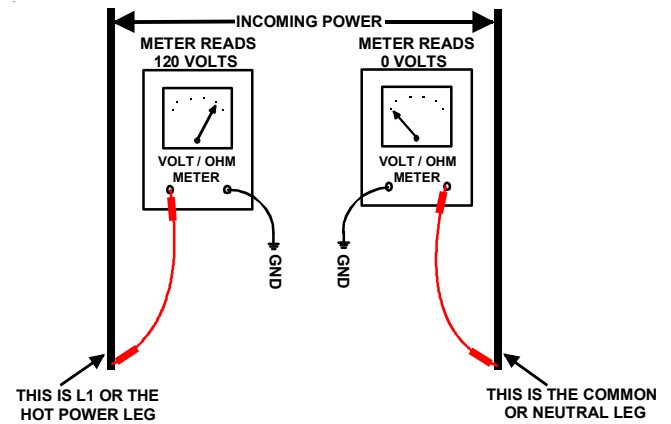
²LED Flash code will cease if power to the control module is interrupted through the disconnect or door switch.

POLARIZATION AND PHASING

As more and more electronic's are introduced to the Heating Trade, Polarization of incoming power and phasing of primary to secondary voltage on transformers becomes more important.

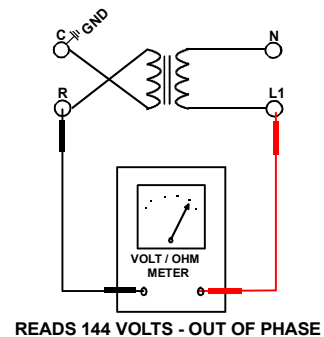
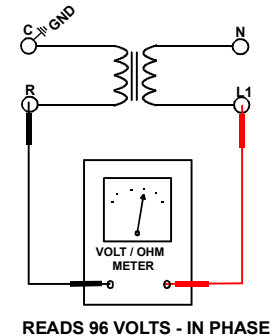
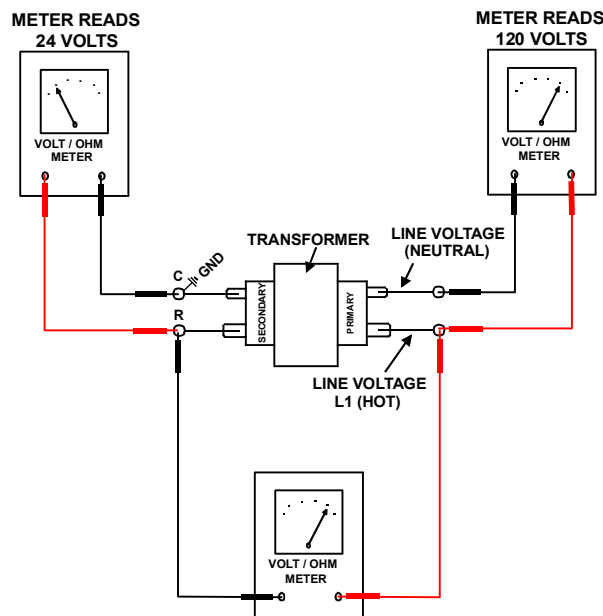
Polarization has been apparent in the Appliance industry since the introduction of the three prong plug, however, the Heating Industry does not use a plug for incoming power, but is hard wired.

Some of the electronic boards being used today, with flame rectification, will not function properly and/or at all without polarization of incoming power. Some also require phasing between the primary and secondary sides of step-down transformers.



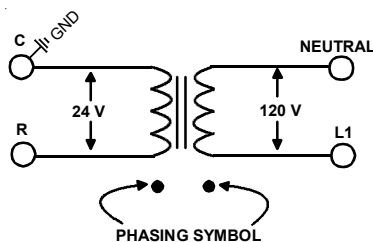
These then should be wired to the furnace accordingly.

CHECKING FOR PHASING - PRIMARY TO SECONDARY OF UNMARKED TRANSFORMERS*



If meter reads approximately 96 volts - the primary to secondary are in phase - if reads approximately 144 volts out of phase - reverse low voltage wires.

***NOTE:** For flame rectification the common side of the secondary voltage (24 V) is cabinet grounded. If you were to bench test a transformer the primary neutral and secondary common must be connected together for testing purposes.



WARNING

HIGH VOLTAGE

DISCONNECT **ALL** POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

MAINTENANCE

CAUTION

IF YOU MUST HANDLE THE IGNITOR, HANDLE WITH CARE. TOUCHING THE IGNITOR BODY WITH BARE FINGERS, ROUGH HANDLING, OR VIBRATION COULD RESULT IN EARLY IGNITOR FAILURE. ONLY A QUALIFIED SERVICER SHOULD EVER HANDLE THE IGNITOR.

ANNUAL INSPECTION

The furnace should be inspected by a qualified installer, or service agency at least once per year. This check should be performed at the beginning of the heating season. This will ensure that all furnace components are in proper working order and that the heating system functions appropriately. Pay particular attention to the following items. Repair or service as necessary.

- Flue pipe system. Check for blockage and/or leakage. Check the outside termination and the connections at and internal to the furnace.
- Combustion air intake pipe system (where applicable). Check for blockage and/or leakage. Check the outside termination and the connection at the furnace.
- Heat exchanger. Check for corrosion and/or buildup within the heat exchanger passageways.
- Burners. Check for proper ignition, burner flame, and flame sense.
- Wiring. Check that electrical connections are tight and free from corrosion. Check wires for damage.
- Filters.

AIR FILTER

WARNING

NEVER OPERATE FURNACE WITHOUT A FILTER INSTALLED AS DUST AND LINT WILL BUILD UP ON INTERNAL PARTS RESULTING IN LOSS OF EFFICIENCY, EQUIPMENT DAMAGE, AND POSSIBLE FIRE.

Filters must be used with this furnace. Filters do not ship with these furnaces but must be provided by the installer for proper furnace operation.

WARNING

HIGH VOLTAGE
DISCONNECT ALL POWER BEFORE SERVICING, REMOVING THE FILTER OR PERFORMING ANY OTHER MAINTENANCE. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



Maintenance

Improper filter maintenance is the most common cause of inadequate heating or cooling performance. Filters should be cleaned (permanent) or replaced (disposable) every two months or as required. It is the owner's responsibility to keep air filters clean. When replacing a filter, it must be replaced with a filter of the same type and size.

INDUCED DRAFT AND CIRCULATION BLOWERS

The bearings in the induced draft blower and circulator blower motors are permanently lubricated by the manufacturer. No further lubrication is required. Check motor windings for accumulation of dust which may cause overheating. Clean as necessary.

FLAME SENSOR (QUALIFIED SERVICER ONLY)

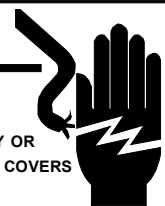
Under some conditions, the fuel or air supply can create a nearly invisible coating on the flame sensor. This coating acts as an insulator, causing a drop in the flame sensing signal. If this occurs, a qualified servicer must carefully clean the flame sensor with steel wool. After cleaning, the flame sensor output should be as listed on the specification sheet.

BURNERS

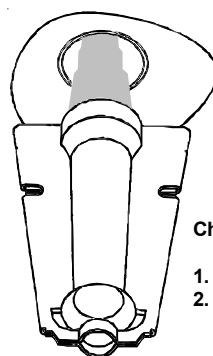
WARNING

HIGH VOLTAGE

ELECTRICAL COMPONENTS ARE CONTAINED IN BOTH COMPARTMENTS. TO AVOID ELECTRICAL SHOCK, INJURY OR DEATH, DO NOT REMOVE ANY INTERNAL COMPARTMENT COVERS OR ATTEMPT ANY ADJUSTMENT. CONTACT A QUALIFIED SERVICE AGENT AT ONCE IF AN ABNORMAL FLAME APPEARANCE SHOULD DEVELOP.



Periodically during the heating season make a visual check of the burner flames. Turn the furnace on at the thermostat. Wait a few minutes since any dislodged dust will alter the normal flame appearance. Flames should be stable, quiet, soft and blue with slightly orange tips. They should not be yellow. They should extend directly outward from the burner ports without curling downward, floating or lifting off the ports.



Check the burner flames for:

1. Stable, soft and blue
2. Not curling, floating, or lifting off.

Burner Flame

TEST EQUIPMENT

Test equipment list for furnace servicing should include;

1. Multi-Meter for checking voltage & resistance
2. Clamp-on amp meter
3. Digital thermometer
4. Gas pressure test equipment
5. Combustible gas / Carbon Monoxide detector
6. Combustion Analyzer
7. Micro-amp meter

MAINTENANCE

HEATING PERFORMANCE TEST

Before attempting to diagnose an operating fault, run a heating performance test and apply the results to the *Service Problem Analysis Guide*.

To conduct a heating performance test, the BTU input to the furnace must be calculated.

After the heating cycle has been in operation for at least fifteen minutes and with all other gas appliances turned off, the gas meter should be clocked.

To find the BTU input, multiply the number of cubic feet of gas consumed per hour by the heating value of the gas being used. (The calorific value of the gas being used is found by contacting your local utility.)

EXAMPLE: It is found by the gas meter, that it takes forty (40) seconds for the hand on the cubic foot dial to make one complete revolution, with all appliances off, except the furnace. Take this information and locate it on the gas rate chart. Observe the forty (40) seconds, locate and read across to the one (1) cubic foot dial column. There we find the number 90, which shows that ninety (90) cubic feet of gas will be consumed in one (1) hour.

Let's assume the local gas utility has stated that the calorific value of the gas is 1,025 BTU per cubic foot.

Multiplying the ninety (90) cubic feet by 1,025 BTU per cubic foot gives us an input of 92,250 BTUH.

Checking the BTU input on the rating plate of the furnace being tested.

EXAMPLE:

INPUT: 92,000 BTU/HR

OUTPUT CAP: 84,000

Should the figure you calculated not fall within five (5) percent of the nameplate rating of the unit, adjust the gas valve pressure regulator or resize orifices.

The dissipation of the heat transferred to the heat exchanger is now controlled by the amount of air circulated over its surface.

The amount (CFM) of air circulated is governed by the external static pressure in inches of water column of duct work, cooling coil, registers, etc., applied externally to the unit versus the motor speed tap (direct drive) or pulley adjustments of the motor and blower (belt drive).

A properly operating unit must have the BTU per hour input and CFM of air, within the limits shown to prevent short cycling of the equipment. As the external static pressure goes up, the temperature rise will also increase. Consult the proper tables for temperature rise limitation.



CAUTION

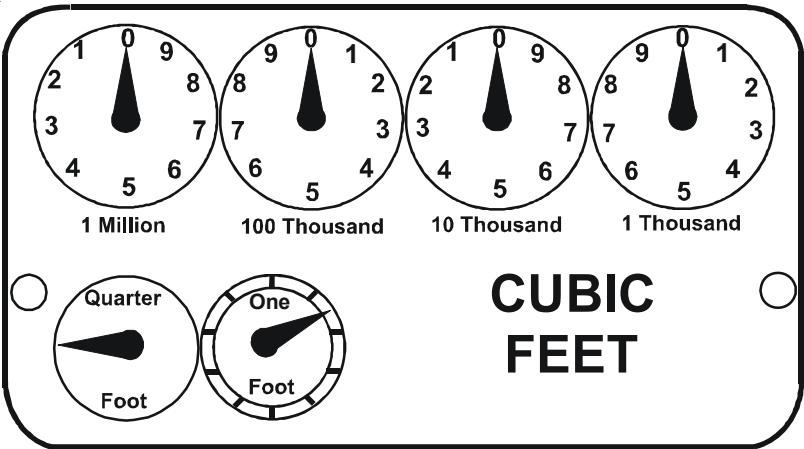
ALWAYS CONNECT A MONOMETER TO THE OUTLET TAP AT THE GAS VALVE BEFORE ADJUSTING THE PRESSURE REGULATOR. IN NO CASE SHOULD THE FINAL MANIFOLD PRESSURE VARY MORE THAN PLUS OR MINUS .3 INCHES WATER COLUMN FROM 3.5 INCHES WATER COLUMN FOR NATURAL GAS OR 10 INCHES WATER COLUMN FOR PROPANE GAS.

To adjust the pressure regulator on the gas valve, turn down (clockwise) to increase pressure and input, and out (counterclockwise) to decrease pressure and input.

Since normally propane gas is not installed with a gas meter, clocking will be virtually impossible. The gas orifices used with propane are calculated for 2500 BTU per cubic foot gas and with proper inlet pressures and correct piping size, full capacity will be obtained.

With propane gas, no unit gas valve regulator is used; however, the second stage supply line pressure regulator should be adjusted to give 11" water column with all other gas consuming appliances running.

SERVICING



GAS RATE -- CUBIC FEET PER HOUR											
Seconds for One Revolution	Size of Test Dial					Seconds for One Revolution	Size of Test Dial				
	1/4 cu/ft	1/2 cu/ft	1 cu/ft	2 cu/ft	5 cu/ft		1/4 cu/ft	1/2 cu/ft	1 cu/ft	2 cu/ft	5 cu/ft
10	90	180	360	720	1800	36	25	50	100	200	500
11	82	164	327	655	1636	37	--	--	97	195	486
12	75	150	300	600	1500	38	23	47	95	189	474
13	69	138	277	555	1385	39	--	--	92	185	462
14	64	129	257	514	1286	40	22	45	90	180	450
15	60	120	240	480	1200	41	--	--	--	176	439
16	56	113	225	450	1125	42	21	43	86	172	429
17	53	106	212	424	1059	43	--	--	--	167	419
18	50	100	200	400	1000	44	--	41	82	164	409
19	47	95	189	379	947	45	20	40	80	160	400
20	45	90	180	360	900	46	--	--	78	157	391
21	43	86	171	343	857	47	19	38	76	153	383
22	41	82	164	327	818	48	--	--	75	150	375
23	39	78	157	313	783	49	--	--	--	147	367
24	37	75	150	300	750	50	18	36	72	144	360
25	36	72	144	288	720	51	--	--	--	141	355
26	34	69	138	277	692	52	--	--	69	138	346
27	33	67	133	265	667	53	17	34	--	136	340
28	32	64	129	257	643	54	--	--	67	133	333
29	31	62	124	248	621	55	--	--	--	131	327
30	30	60	120	240	600	56	16	32	64	129	321
31	--	--	116	232	581	57	--	--	--	126	316
32	28	56	113	225	563	58	--	31	62	124	310
33	--	--	109	218	545	59	--	--	--	122	305
34	26	53	106	212	529	60	15	30	60	120	300
35	--	--	103	206	514						

SERVICING

Service Problem		No Heat			Unsatisfactory Heat						Test Method Remedy	See Service Procedure Reference
POSSIBLE CAUSE DOTS IN ANALYSIS GUIDE INDICATE "POSSIBLE CAUSE"	SYMPTOM	System Will Not Start	Burner Won't Ignite	Burner Ignites-Locks Out	Burner Shuts Off prior to T'Stat being Satisfied	Short Cycles	Long Cycles	Soot and /or Fumes	Too Much Heat	Not Enough Heat		
Power Failure		●									Test Voltage	S-1
Blown Fuse		●									Test Voltage	S-4
Loose Connection		●									Check Wiring	S-2
Shorted or Broken Wires		●									Check Wiring	S-3A
No Low Voltage		●									Check Transformer	S-4
Faulty Thermostat		●				●	●		●	●	Check Thermostat	S-3A
Faulty Transformer		●									Check Transformer	S-4
Poor or High Resistance Ground				●							Measure Ground Resistance	S-17B
Improper Heat Anticipator Setting						●	●		●	●	Adjust Heat Anticipator Setting	S-3B
Improper Thermostat Location						●	●		●	●	Relocate Thermostat	S-316
Faulty Limit or Roll Out Switch			●		●						Test Control	S-300 / S-302
Faulty Flame Sensor				●							Test Flame Sensor	S-314
Faulty Ignition Control		●	●	●							Test Control	S-313
Gas Valve or Gas Supply Shut Off			●								Turn Valves to On Position	S-317
Faulty Induced Draft Blower			●					●			Test Induced Draft Motor	S-303
Faulty Blower Motor (ECM)			●		●						Test Blower Motor (ECM)	S-16A,B,C
Broken or Shorted Ignitor			●								Test Ignitor	S-308
Dirty Flame Sensor, Low UA				●							Clean Flame Sensor	S-314
Stuck Gas Valve			●					●	●		Replace Gas Valve	S-304
Faulty Gas Valve			●					●		●	Replace Gas Valve	S-304
Open Auxiliary Limit			●		●						Reset Control	S-301
Improper Air Flow or Distribution					●					●	Check Duct Static	S-200
Cycling on Limit					●	●				●	Check Controls & Temperature Rise	S-201 / S-300
Delayed Ignition								●			Test for Delayed Ignition	S-312
Flashback								●			Test for Flashback	S-309 / S-311
Orifice Size								●	●	●	Check Orifices	S-306 / S-311
Gas Pressure			●					●	●	●	Check Gas Pressure	S-307
Cracked Heat Exchanger								●			Check Burner Flames	S-305
Furnace Undersized							●			●	Replace with Proper Size Furnace	S-318
Furnace Oversized						●					Replace with Proper Size Furnace	S-318
Faulty Pressure Switch			●	●	●						Test Pressure Switch	S-310
Blocked or Restricted Flue								●			Check Flue/Drawdown Pressure	S-310
Open Roll Out Switch			●	●							Test Flame Roll Out Control	S-302
Bouncing On Pressure Switch				●							Test Negative Pressure	S-310

SERVICING

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SERVICING

S-1 CHECKING VOLTAGE

 WARNING	
HIGH VOLTAGE	
DISCONNECT ALL POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.	

1. Remove the burner door to gain entry to the Junction Box.
2. Remove cover from the Junction Box and gain access to incoming power lines.

With Power ON:

 WARNING
LINE VOLTAGE NOW PRESENT

3. Using a voltmeter, measure the voltage across the hot and neutral connections.

NOTE: To energize the furnace, the Door Interlock Switch must be engaged at this point.

4. No reading - indicates open wiring, open fuse, no power, or faulty Door Interlock Switch from unit to fused disconnect service. Repair as needed.
5. With ample voltage at line voltage connectors, energize the furnace blower motor by jumpering terminals R to G on the integrated ignition control.
6. With the blower motor in operation, the voltage should be 115 volts $\pm$ 10 percent.
7. If the reading falls below the minimum voltage, check the line wire size. Long runs of undersized wire can cause low voltage. If wire size is adequate, notify the local power company of the condition.
8. After completing check and/or repair, replace Junction Box cover and reinstall the service panel doors.
9. Turn on electrical power and verify proper unit operation.

S-2 CHECKING WIRING

 WARNING
DISCONNECT ALL POWER BEFORE SERVICING.

1. Check wiring visually for signs of overheating, damaged insulation and loose connections.
2. Use an ohmmeter to check continuity of any suspected open wires.
3. If any wires must be replaced, replace with AWM, 105°C. 2/64 thick insulation of the same gauge or its equivalent.

CHECKING THERMOSTAT, WIRING AND ANTICIPATOR

S-3A THERMOSTAT AND WIRING

 WARNING
DISCONNECT ALL POWER BEFORE SERVICING.

1. Remove the blower compartment door to gain access to the thermostat low voltage wires located at the furnace integrated control module terminals.
2. Remove the thermostat low voltage wires at the furnace control panel terminal board.
3. Jumper terminals R to W on the integrated ignition control.

With Power On (and Door Interlock Switch closed):

 WARNING
LINE VOLTAGE NOW PRESENT

4. Induced Draft Motor must run and pull in pressure switch.
5. If the hot surface ignitor heats and at the end of the ignitor warm-up period the gas valve opens and the burners ignite, the trouble is in the thermostat or wiring.
6. With power off, check the continuity of the thermostat and wiring. Repair or replace as necessary.

If checking the furnace in the air conditioning mode, proceed as follows.

7. With power off, Jumper terminals R to Y to G.
8. Turn on the power.
9. If the furnace blower motor starts and the condensing unit runs, then the trouble is in the thermostat or wiring. Repair or replace as necessary.
10. After completing check and/or repair of wiring and check and/or replacement of thermostat, reinstall blower compartment door.
11. Turn on electrical power and verify proper unit operation.

S-3B HEATING ANTICIPATOR

On older thermostats the heating anticipator is a wire wound adjustable heater which is energized during the "ON" cycle to help prevent overheating of the conditioned space.

The anticipator is a part of the thermostat and if it should fail for any reason, the thermostat must be replaced. Some thermostats have a cycle rate adjustment switch to set cycles per hour.

The heating anticipator setting for furnaces covered in this manual is **0.70 Amps**.

Cooling Anticipator

The cooling anticipator is a small heater (resistor) in the thermostat. During the "OFF" cycle it heats the bimetal element helping the thermostat call for the next cooling cycle. This prevents the room temperature from rising too high before the

SERVICING

system is restarted. A properly sized anticipator should maintain room temperature within 1 1/2 to 2 degrees.

The anticipator is fixed in the subbase and is not to be replaced. If the anticipator should fail for any reason, the subbase must be changed.

S-4 CHECKING TRANSFORMER AND CONTROL CIRCUIT

A step-down transformer 120 volt primary to 24 volt secondary, 40 VA (Heating and Cooling Models) supplies ample capacity of power for either operation.


WARNING



HIGH VOLTAGE
DISCONNECT ALL POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

1. Remove blower compartment door to gain access to the thermostat low voltage wires located at the furnace integrated control module.
2. Remove the thermostat low voltage wires at the furnace integrated control module terminals.

With Power On (and Door Interlock Switch closed):


WARNING

LINE VOLTAGE NOW PRESENT

3. Use a voltmeter, check voltage across terminals R and C. Must read 24 VAC.
4. No voltage indicates faulty transformer, open fuse, bad wiring, bad splice, or open door interlock switch.
5. Check transformer primary voltage at incoming line voltage connections, fuse, splices, and blower door interlock switch.
6. If line voltage is available to the primary side of transformer and not at secondary side, the transformer is inoperative. Replace.
7. After completing check and/or replacement of transformer and check and/or repair of control circuit, reinstall blower compartment door.
8. Turn on electrical power and verify proper unit operation.

S-16 CHECKING AIR CIRCULATOR BLOWER MOTOR (MULTI-SPEED ECM)


WARNING

DISCONNECT ALL POWER BEFORE SERVICING.

1. Remove blower compartment door to gain access to the circulator blower motor and integrated ignition control.
2. Check for any obstruction that would keep the fan wheel / fan motor from turning.
3. Check wiring, the motor has two wiring harnesses, a main harness and a control harness. The main pin harness has:

White neutral wire connected to the Neutral terminal on the control board.

Black wire connected to the CIRC H terminal on the control board.

Red wire connected to the COM terminal, which is a female spade connection next to the T1 – T4 wires on the control board.

Green ground wire connected to cabinet ground

The control harness has:

Blue wire connected to T1 on the control board.

Red wire connected to T2 on the control board.

Orange wire connected to T3 on the control board.

Black wire connected to T4 on the control board.

The multi-speed ECM motor requires a line voltage power supply (black connected to CIRC H and white connected to neutral on the control board) as well as a signal on one of the speed taps (T1-T4).

The speed tap voltage is A.C. and can vary which tap is energized depending on DIP switch selection. The voltage reading from any one of the speed taps is referenced between the female COM terminal next to the speed taps on the control board.

From COM to T1 or T2, T3, T4, you should read 24 VAC on the low voltage speed taps depending on Dip switch settings.

Motor Tap Identification		
CONNECTOR ID	DESCRIPTION	CONNECTOR VOLTAGE
L	LINE, L1	LINE, L1
G	GROUND	CHASSIS GROUND
N	LINE, L2	LINE, L2
C	SIGNAL COMMON	24VAC COMMON
1	TAP 1	24VAC
2	TAP 2	24VAC
3	TAP 3	24VAC
4	TAP 4	24VAC
5	TAP 5	24VAC

SERVICING

Heat Off Delay (S1-4)				
S1-4	Min	Nom	Max	Units
ON		*150		Seconds
OFF		100		Seconds
* = DEFAULT SETTING				

COOL MOTOR SPEED DIP SWITCH SETTING (S1-1, S1-2, S1-3)					
		1 2 3	1 2 3	1 2 3	1 2 3
	Position	OFF OFF OFF	ON OFF OFF	ON ON OFF	OFF ON OFF
Motor Speed COOL	Y	T1	T2	T3	T4
		*1 2 3	1 2 3	1 2 3	1 2 3
	Position	OFF OFF ON	OFF ON ON	ON OFF ON	ON ON ON
Motor Speed COOL	Y	T1+T2	T1	T1	T1
* = DEFAULT SETTING					

HEAT MOTOR SPEED DIP SWITCH SETTING (S2-1, S2-2)					
		1 2	*1 2	1 2	1 2
	Position	OFF OFF	ON OFF	ON ON	OFF ON
Motor Speed HEAT	W	T1	T2	T3	T4
* = DEFAULT SETTING					

FAN MOTOR SPEED DIP SWITCH SETTING (S2-3, S2-4)					
		*3 4	3 4	3 4	3 4
	Position	OFF OFF	ON OFF	OFF ON	ON ON
Motor Speed FAN	G	T1	T2	T4	T1+T2
* = DEFAULT SETTING					



WARNING

DISCONNECT **ALL** POWER BEFORE SERVICING.

S-200 CHECKING DUCT STATIC

The maximum and minimum allowable external static pressures are found in the specification section. These tables also show the amount of air being delivered at a given static by a given motor speed or pulley adjustment.

The furnace motor cannot deliver proper air quantities (CFM) against statics other than those listed.

Too great of an external static pressure will result in insufficient air that can cause excessive temperature rise, resulting in limit tripping, etc. Whereas not enough static may result in motor overloading.

To determine proper air movement, proceed as follows:

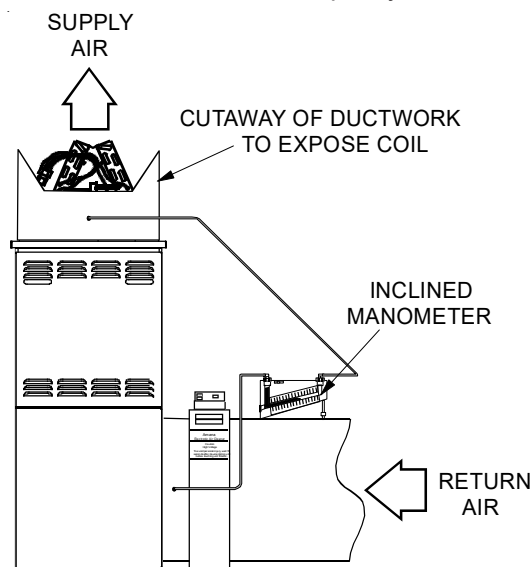
1. With clean filters in the furnace, use a draft gauge (inclined manometer) to measure the static pressure of the return duct at the inlet of the furnace. (Negative Pressure)

2. Measure the static pressure of the supply duct. (Positive Pressure)
3. Add the two (2) readings together for total external static pressure.

NOTE: Both readings may be taken simultaneously and read directly on the manometer if so desired. If an air conditioner coil or Electronic Air Cleaner is used in conjunction with the furnace, the readings must also include these components, as shown in the following drawing.

4. Consult proper tables for the quantity of air.

If the total external static pressure exceeds the minimum or maximum allowable statics, check for closed dampers, registers, undersized and/or oversized poorly laid out duct work.



Checking Static Pressure
(80% Furnace Shown, 90% Similar)

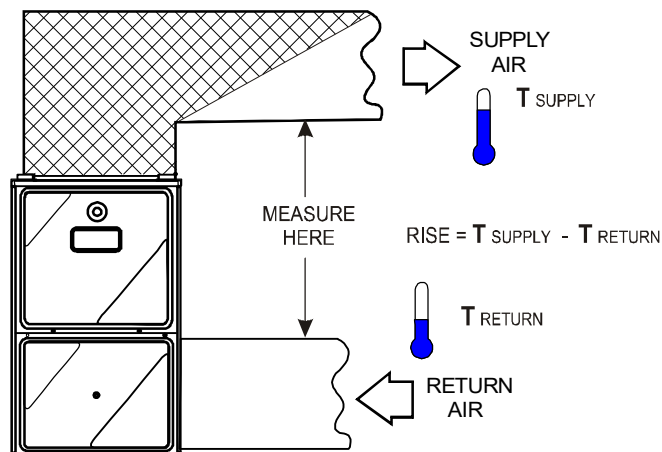
S-201 CHECKING TEMPERATURE RISE

The more air (CFM) being delivered through a given furnace, the less the rise will be; so the less air (CFM) being delivered, the greater the rise. The temperature rise should be adjusted in accordance to a given furnace specifications and its external static pressure. An incorrect temperature rise may result in condensing in or overheating of the heat exchanger. An airflow and temperature rise table is provided in the blower performance specification section. Determine and adjust temperature rise as follows:

1. Operate furnace with burners firing for approximately ten minutes. Check BTU input to furnace - do not exceed input rating stamped on rating plate. Ensure all registers are open and all duct dampers are in their final (fully or partially open) position.
2. Place thermometers in the return and supply ducts as close to the furnace as possible. Thermometers must not be influenced by radiant heat by being able to "see" the heat exchanger.

SERVICING

CROSS-HATCHED AREA SUBJECTED TO RADIANT HEAT. DO NOT MEASURE SUPPLY AIR TEMPERATURE IN THIS AREA.

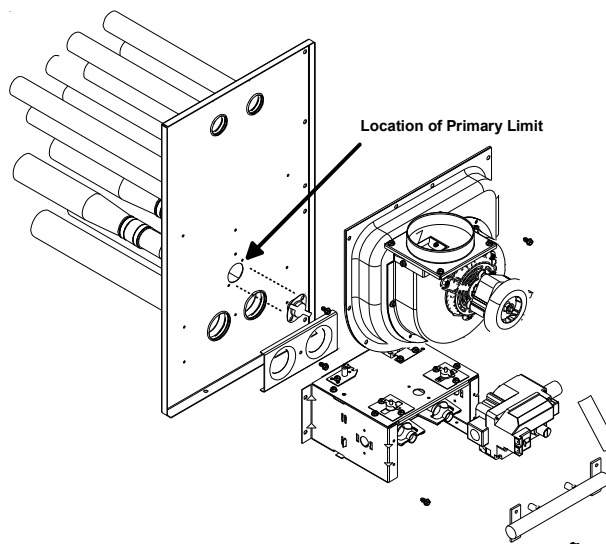


Checking Temperature Rise

3. Subtract the return air temperature from the supply air temperature to determine the air temperature rise. Allow adequate time for thermometer readings to stabilize.
4. Adjust temperature rise by adjusting the circulator blower speed. Increase blower speed to reduce temperature rise. Decrease blower speed to increase temperature rise. Refer to *Circulator Blower Speed* section in the Product Design section of this manual for speed changing details. Temperature rise is related to the BTUH output of the furnace and the amount of air (CFM) circulated over the heat exchanger. Measure motor current draw to determine that the motor is not overloaded during adjustments.

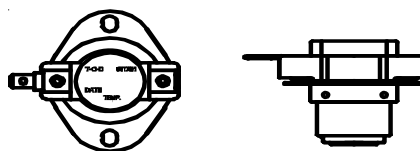
S-300 CHECKING PRIMARY LIMIT CONTROL

All use a nonadjustable, automatic reset, bi-metal type limit control. Refer to the following drawing for the location of the primary limit.



Primary Limit Control Location (80% Upflow Furnace Shown, Counterflow Similar)

Style 1 drawing illustrates the Primary Limit used on the 80% furnaces.

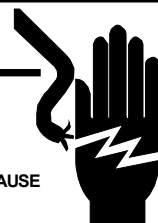


Style 1

WARNING

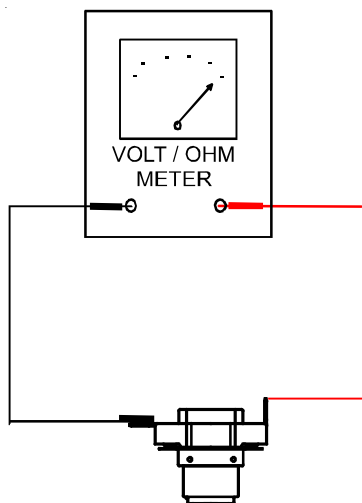
HIGH VOLTAGE

DISCONNECT ALL POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

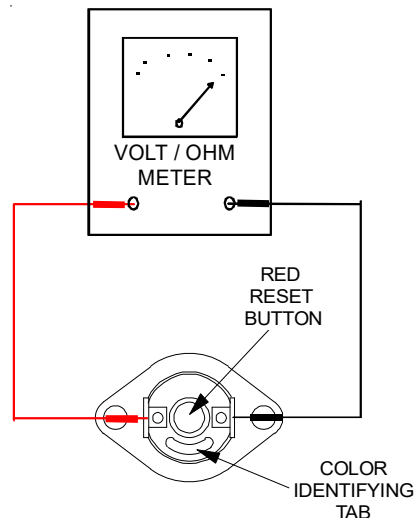


1. Remove burner compartment door to gain access to the primary limit.
2. Remove low voltage wires at limit control terminals.
3. With an ohmmeter, test between these two terminals as shown in the following drawing. The ohmmeter should read continuous unless heat exchanger temperature is above limit control setting. If not as above, replace the control.

SERVICING

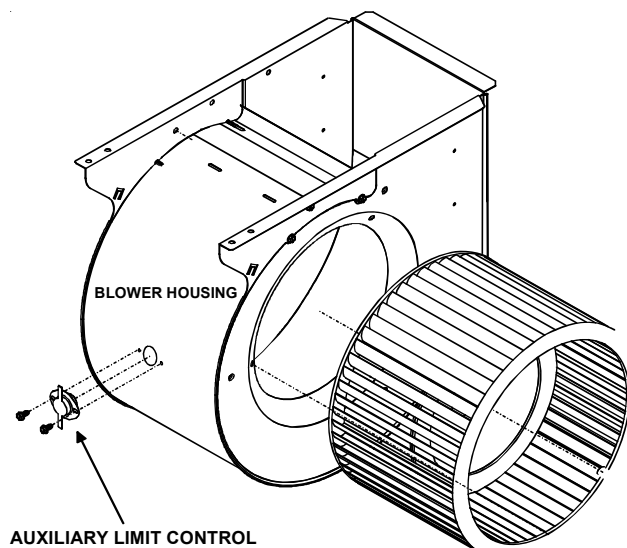


Testing Primary Limit Control



Testing Auxiliary Limit Control

S-301 CHECKING AUXILIARY LIMIT CONTROL



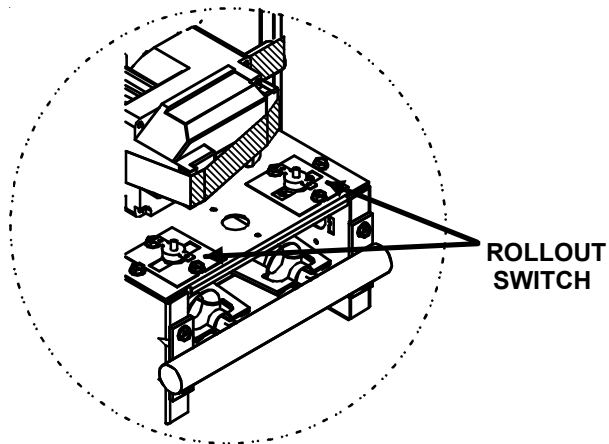
Auxiliary Limit Control Location

WARNING

TO AVOID POSSIBLE FIRE, ONLY RESET THE AUXILIARY LIMIT CONTROL ONCE. IF IT SHOULD OPEN A SECOND TIME, A QUALIFIED SERVICER MUST DETERMINE WHY THE AUXILIARY LIMIT OPENED BEFORE RESETTNG AGAIN.

S-302 CHECKING FLAME ROLLOUT CONTROL

A temperature activated manual reset control is mounted to the manifold assembly on 80% furnaces,



WARNING

HIGH VOLTAGE

DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



SERVICING

Flame Rollout Switch Location (80% Upflow Furnace Shown, Downflow Similar)

The control is designed to open should a flame roll out occur. An over firing condition or flame impingement on the heat shield may also cause the control to open. If the rollout control opens, the air circulation blower will run continuously.

On single-stage 80% and 90% models, the ignition control diagnostic light will flash (6) six times indicating a trip of the rollout switch.



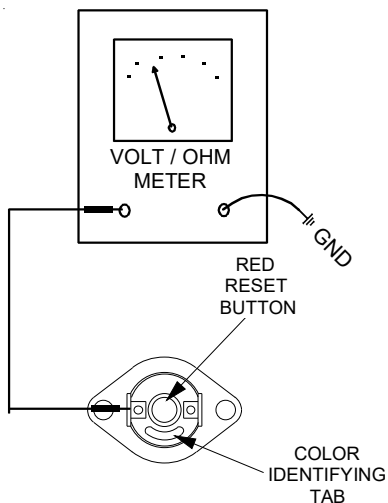
WARNING

LINE VOLTAGE NOW PRESENT

1. Remove the burner compartment door to gain access to the rollout switch(es) mounted to burner bracket.

The servicer should reset the ignition control by opening and closing the thermostat circuit. Then look for the ignitor glowing which indicates there is power to the ignition control. Measure the voltage between each side of the rollout control and ground while the ignition control tries to power the gas valve.

2. Measure the voltage between each side of the rollout control and ground during the ignition attempt. Refer to the following figure.



Checking Flame Rollout Switch

- a. If no voltage is measured on either side of control it indicates ignition control or wiring to control problem.
- b. If voltage is measured on one side of the control and

not the other it indicates the control is open.

- c. If voltage is measured on both sides of the control the wiring to gas valve or valve is at fault.

3. After check and/or replacement of rollout switch, reinstall burner compartment door and verify proper unit operation.

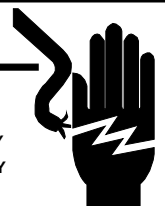
S-303 INDUCED DRAFT BLOWER MOTOR



WARNING

HIGH VOLTAGE

DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



1. Remove burner compartment door to gain access to the induced draft blower motor.
2. Disconnect the motor wire leads from its connection point at the induced draft motor.
3. Using a ohmmeter, test for continuity between each of the motor leads.
4. Touch one probe of the ohmmeter to the motor frame (ground) and the other probe in turn to each lead.
If the windings do not test continuous or a reading is obtained to ground, replace the motor.
5. If the windings have a continuity reading, reconnect wires. Turn power on to the furnace and turn the thermostat on in the heating mode. Check voltage for 115V at the induced draft motor terminals during the trial for ignition. If you have 115V and the motor does not run, replace the induced draft motor.
6. After completing check and/or replacement of induced draft motor, reinstall burner compartment door.
7. Turn on electrical power and verify proper unit operation.

S-304 CHECKING GAS VALVE (Redundant)

A combination redundant operator type gas valve which provides all manual and automatic control functions required for gas fired heating equipment is used.

The valve provides control of main burner gas flow, pressure regulation, and 100 percent safety shut-off.



WARNING

DISCONNECT ALL POWER BEFORE SERVICING

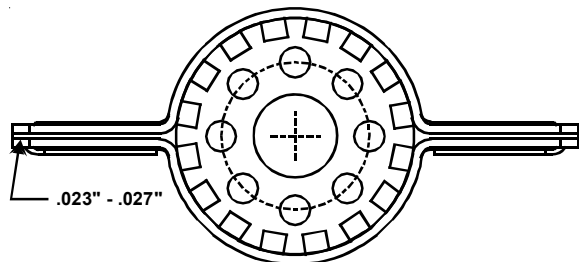
Single stage gas valves should be tested on the furnace with 24 VAC connected to the gas valve and manometers reading supply line and manifold pressures.

SERVICING

S-305 CHECKING MAIN BURNERS

The main burners are used to provide complete combustion of various fuels in a limited space, and transfer this heat of the burning process to the heat exchanger.

Proper ignition, combustion, and extinction are primarily due to burner design, orifice sizing, gas pressure, primary and secondary air, vent and proper seating of burners.



Beckett Burner



WARNING

DISCONNECT ALL GAS AND ELECTRICAL POWER SUPPLY.

In checking main burners, look for signs of rust, oversized and undersized carry over ports restricted with foreign material, etc, refer to previous drawing. Burner cross-over slots must not be altered in size.

S-306 CHECKING ORIFICES

A predetermined fixed gas orifice is used in all of these furnaces. That is an orifice which has a fixed bore and position as shown in the following drawing.

No resizing should be attempted until all factors are taken into consideration such as inlet and manifold gas pressure, alignment, and positioning, specific gravity and BTU content of the gas being consumed.

The only time resizing is required is when a reduction in firing rate is required for an increase in altitude.

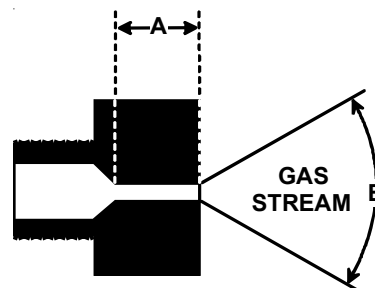
Orifices should be treated with care in order to prevent damage. They should be removed and installed with a box-end wrench in order to prevent distortion. In no instance should an orifice be peened over and redrilled. This will change the angle or deflection of the vacuum effect or entraining of primary air, which will make it difficult to adjust the flame properly. This same problem can occur if an orifice spud of a different length is substituted.



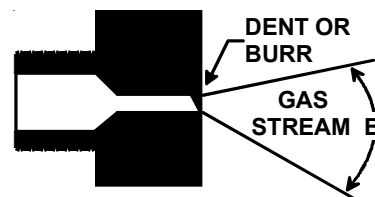
WARNING

DISCONNECT ALL GAS AND ELECTRICAL POWER SUPPLY.

1. Check orifice visually for distortion and/or burrs.
2. Check orifice size with orifice sizing drills.
3. If resizing is required, a new orifice of the same physical size and angle with proper drill size opening should be installed.



The length of Dimension "A" determines the angle of Gas Stream "B".



A dent or burr will cause a severe deflection of the gas stream.

S-307 CHECKING GAS PRESSURE

Gas Supply Pressure Measurement



CAUTION

TO PREVENT UNRELIABLE OPERATION OR EQUIPMENT DAMAGE, THE INLET GAS SUPPLY PRESSURE MUST BE AS SPECIFIED ON THE UNIT RATING PLATE WITH ALL OTHER HOUSEHOLD GAS FIRED APPLIANCES OPERATING.

Gas inlet and manifold pressures should be checked and adjusted in accordance to the type of fuel being consumed.

The line pressure supplied to the gas valve must be within the range specified below. The supply pressure can be measured at the gas valve inlet pressure tap or at a hose fitting installed in the gas piping drip leg. The supply pressure must be measured with the burners operating. To measure the gas supply pressure, use the following procedure.



WARNING

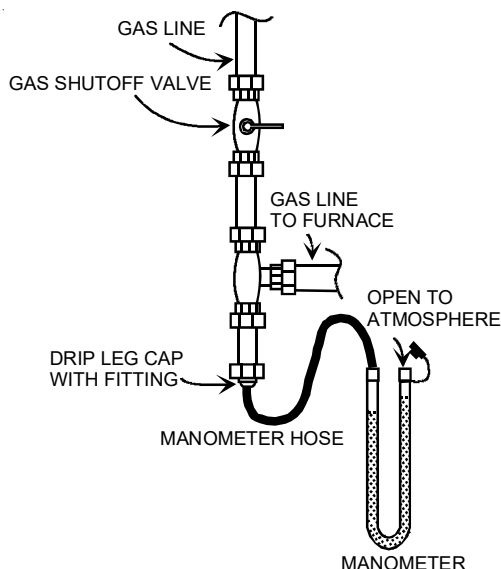
DISCONNECT ELECTRICAL POWER AND SHUT OFF GAS SUPPLY.

1. After turning off gas to furnace at the manual gas shutoff valve external to the furnace, remove burner compartment door to gain access to the gas valve.
2. Connect a calibrated water manometer (or appropriate gas pressure gauge) at either the gas valve inlet pressure tap or the gas piping drip leg as shown in the following figures. Refer to *Measuring Gas Pressure: Single Stage Valves* figure for single stage valve inlet pressure tap connections.

SERVICING

NOTE: At either location, a hose fitting must be installed prior to making the hose connection.

NOTE: Use a papter kit #0151K00000S to measure gas pressure on White-Rodgers 36J22.



**Measuring Inlet Gas Pressure
(Alternate Method)**

3. Turn ON the gas and electrical power supply and operate the furnace and all other gas consuming appliances on the same gas supply line.
4. Measure furnace gas supply pressure with burners firing. Supply pressure must be within the range specified in the following table.

INLET GAS SUPPLY PRESSURE		
Natural Gas	Minimum: 4.5" w.c.	Maximum: 10.0" w.c.
Propane Gas	Minimum: 11.0" w.c.	Maximum: 13.0" w.c.

If supply pressure differs from above, make necessary adjustments to pressure regulator, gas piping size, etc., and/or consult with local gas utility.


WARNING



HIGH VOLTAGE
DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY BEFORE SERVICING OR INSTALLING THIS UNIT.
MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

5. Disconnect manometer after turning off gas at manual shutoff valve. Reinstall plug before turning on gas to furnace.
6. Turn OFF any unnecessary gas appliances started in step 3.
7. Turn on gas to furnace and check for leaks. If leaks are found, repair and then reinstall burner compartment door.
8. Turn on electrical power and verify proper unit operation.

Gas Manifold Pressure Measurement and Adjustment

CAUTION

TO PREVENT UNRELIABLE OPERATION OR EQUIPMENT DAMAGE, THE GAS MANIFOLD PRESSURE MUST BE AS SPECIFIED ON THE UNIT RATING PLATE. ONLY MINOR ADJUSTMENTS SHOULD BE MADE BY ADJUSTING THE GAS VALVE PRESSURE REGULATOR.

NOTE: Use a papter kit #0151K00000S to measure gas pressure on White-Rodgers 36J22 gas valves.

Only small variations in gas pressure should be made by adjusting the gas valve pressure regulator. The manifold pressure must be measured with the burners operating. To measure and adjust the manifold pressure, use the following procedure.

WARNING

HIGH VOLTAGE

DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY BEFORE SERVICING OR INSTALLING.

1. After turning off gas to furnace at the manual gas shutoff valve external to the furnace, remove burner compartment door to gain access to the gas valve.
2. Connect a calibrated water manometer (or appropriate gas pressure gauge) at the gas valve outlet pressure tap. Refer to *Measuring Gas Pressure: Single Stage Valves* figure for single stage valve outlet pressure tap connections.

WARNING

LINE VOLTAGE NOW PRESENT

3. Turn ON the gas and electrical power supply and operate the furnace.
4. Measure gas manifold pressure with burners firing. Adjust manifold pressure using the table below.

Manifold Gas Pressure	
Natural Gas	3.5" w.c.
Propane Gas	10.0" w.c.

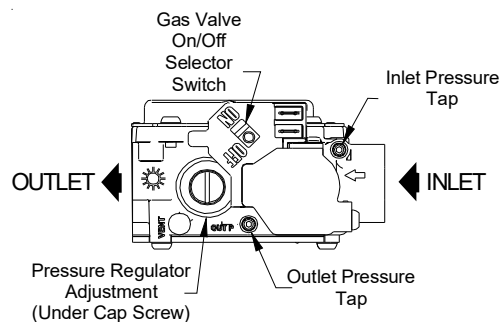
The final manifold pressure must not vary more than ± 0.3 " w.c. from the above specified pressures. Any necessary major changes in gas flow rate should be made by changing the size of the burner orifice.

5. White-Rodgers 36J22 Valves:
 - a. Back outlet pressure test screw (inlet/outlet pressure boss) out one turn (counterclockwise, not more than one turn).

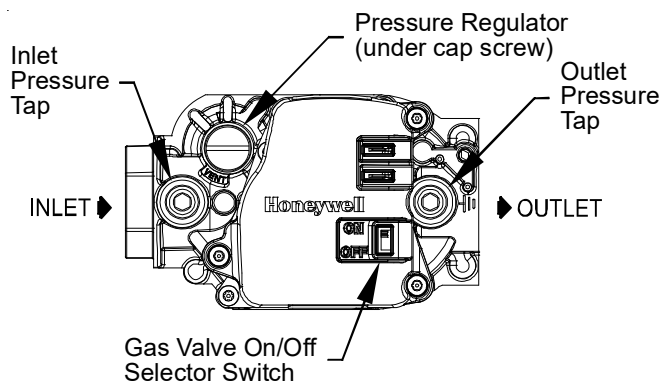
SERVICING

- b. Attach a hose and manometer to the outlet pressure outlet pressure boss.
 - c. Turn ON the gas supply.
 - d. Turn on power and close thermostat "R" and "W" contacts to provide a call for low stage heat.
 - e. Measure the gas manifold pressure with burners firing. Adjust manifold pressure using the *Manifold Gas Pressure* table shown below.
 - f. Remove regulator cover screw from the outlet pressure regulator adjust tower and turn screw clockwise to increase pressure or counterclockwise to decrease pressure. Replace regulator cover screw.
 - i. Turn off all electrical power and gas supply to the system.
 - j. Remove the manometer hose from the hose barb fitting or outlet pressure boss.
 - k. Turn outlet pressure test screw in to seal pressure port (clockwise, 7 in-lb minimum).
6. Honeywell VR8215 Valve:
- a. Remove the outlet pressure boss plug. Install an 1/8" NPT hose barb fitting into the outlet pressure tap.
 - b. Attach a hose and manometer to the outlet pressure barb fitting.
 - c. Turn ON the gas supply.
 - d. Turn on power and close thermostat "R" and "W" contacts to provide a call for low stage heat.
 - e. Measure the gas manifold pressure with burners firing. Adjust manifold pressure using the *Manifold Gas Pressure* table shown below.
 - f. Remove regulator cover screw from the outlet pressure regulator adjust tower and turn screw clockwise to increase pressure or counterclockwise to decrease pressure. Replace regulator cover screw.
 - i. Turn off all electrical power and gas supply to the system.
 - j. Remove the manometer hose from the hose barb fitting or outlet pressure boss.
 - k. Remove the 1/8" NPT hose barb fitting from the outlet pressure tap. Replace the outlet pressure boss plug and seal with a high quality thread sealer.

8. Turn on electrical power and verify proper unit operation.



White-Rodgers Model 36J22 (Single-Stage)



Honeywell Model VR8215



WARNING

HIGH VOLTAGE

DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY BEFORE SERVICING OR INSTALLING.

Manifold Gas Pressure

Gas	Rate	Range	Nominal
Propane Gas	High Stage	9.7 to 10.3" w.c.	10.0" w.c.
	Low Stage	5.7 to 6.3" w.c.	6.0" w.c.



WARNING

HIGH VOLTAGE

DISCONNECT ALL ELECTRICAL POWER AND SHUT OFF GAS SUPPLY BEFORE SERVICING OR INSTALLING THIS UNIT.

MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



7. Turn on gas to furnace and check for leaks. If leaks are found, repair and then reinstall burner compartment door.

SERVICING

S-308 CHECKING HOT SURFACE IGNITOR

120V Mini Igniter Single Stage - furnaces use a 120V carbide mini igniter for ignition. The normal operating temperature is approximately 2550°F - 2876°F. At room temperature a good igniter will have an ohm reading range of 50 - 300.

WARNING

DISCONNECT ALL POWER BEFORE SERVICING.

1. Remove burner compartment door to gain access to the ignitor.
2. Ignitor cool - approximately 70 - 77°F.
3. Disconnect the ignitor from the Ignition Control.
4. Using an ohmmeter measure the resistance of the ignitor:
Mini Igniter : Carbide Mini Igniter should read between 30 to 300 ohms.
5. Reconnect ignitor.

WARNING

LINE VOLTAGE NOW PRESENT

6. Place unit in heating cycle, measure current draw of ignitor during preheat cycle.
Models using 120V Mini Igniter :
Should read approximately 1 amp maximum. The steady state current at 120V is a nominal of .7 plus or minus .3 amps.
7. After checking and/or replacing of hot surface ignitor, reinstall burner compartment door and verify proper unit operation. **120V Silicone Nitride Igniter** - (pt # 0130F00008) furnaces with a 120V silicone nitride igniter ; The normal operating temperature is approximately 2156° F - 2678° F. At room temperature the igniter ohm reading should be from 37-68 ohms.

S-309 CHECKING FOR FLASHBACK

Flashback will also cause burning in the burner venturi, but is caused by the burning speed being greater than the gas-air flow velocity coming from a burner port.

Flashback may occur at the moment of ignition, after a burner heats up or when the burner turns off. The latter is known as extinction pop.

Since the end results of flashback and delayed ignition can be the same (burning in the burner venturi) a definite attempt should be made to determine which has occurred.

If flashback should occur, check for the following:

1. Improper gas pressure - adjust to proper pressure (See S-307 CHECKING GAS PRESSURE)..
2. Check burner for proper alignment and/or replace burner.
3. Improper orifice size - check orifice for obstruction.

S-310 CHECKING PRESSURE SWITCH

The pressure switch a safety device to prevent the combustion cycle from occurring with inadequate venting caused by a restricted or blocked vent pipe on the 80% and 90% furnaces.

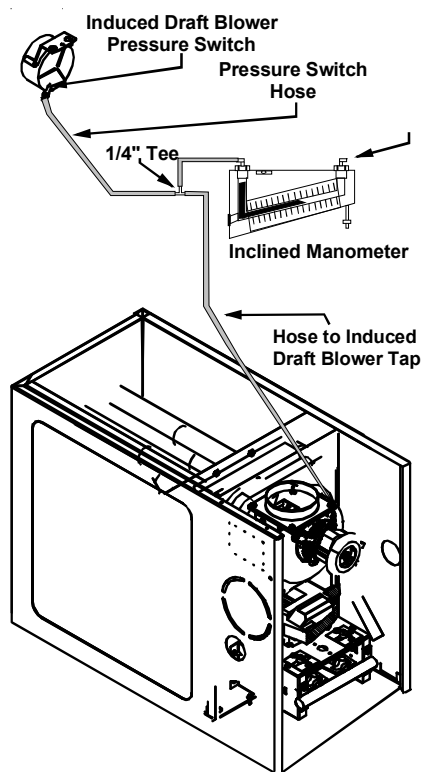
WARNING

HIGH VOLTAGE

DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



1. Remove burner compartment door to gain access to pressure switch(es).
 2. Remove wires from the pressure switch(es) electrical terminals.
 3. Using a VOM check from common terminal to NC (Normally Closed) - should read open.
- If switch reads as above proceed to Step 4, otherwise replace control.
4. Remove the pressure control hose from the control and interconnect with an inclined manometer as shown in the following figures.



**ID Blower Pressure Switch
Negative Pressure Measurement
(80% Upflow Single-Stage Furnace Shown,
Counterflow Similar)**

SERVICING

S-311 HIGH ALTITUDE APPLICATION (USA)

The furnace as shipped requires no change to run between 0 - 5500 feet. Do not attempt to increase the firing rate by changing orifices or increasing the manifold pressure below 5500 feet. This can cause poor combustion and equipment failure. High altitude installations above 5500 feet may require both a pressure switch and an orifice change. These changes are necessary to compensate for the natural reduction in the density of both the gasfuel and the combustion air at higher altitude.

For installations above 5500 feet, please refer to your distributor for required kit(s). Contact the distributor for a tabular listing of appropriate manufacturer's kits for propane gas and/or high altitude installations. The indicated kits must be used to insure safe and proper furnace operation. All conversions must be performed by a qualified installer, or service agency.

In some areas the gas supplier may artificially derate the gas in an effort to compensate for the effects of altitude. If the gas is artificially derated the appropriate orifice size must be determined based on the BTU/ft³ content of the derated gas and the altitude. Refer to the National Fuel Gas Code, NFPA 54/ANSI Z223.1, and information provided by the gas supplier to determine the proper orifice size.

S-312 CHECKING FOR DELAYED IGNITION

Delayed ignition is a delay in lighting a combustible mixture of gas and air which has accumulated in the combustion chamber.

Furnace design makes this extremely unlikely unless safety controls have been by-passed or tampered with. Never by-pass or alter furnace controls.

If delayed ignition should occur, the following should be checked:

1. Improper gas pressure - adjust to proper pressure (See S-307 CHECKING GAS PRESSURE).
2. Improper burner positioning - burners should be in locating slots, level front to rear and left to right.
3. Carry over (lighter tube or cross lighter) obstructed - clean.
4. Main burner orifice(s) deformed, or out of alignment to burner - replace.

S-313 CHECKING INTEGRATED IGNITION CONTROL BOARDS

NOTE: Failure to earth ground the furnace, reversing the neutral and hot wire connection to the line (polarity), or a high resistance connection in the neutral line may cause the control to lockout due to failure to sense flame.



WARNING

TO AVOID THE RISK OF ELECTRICAL SHOCK, WIRING TO THE UNIT MUST BE PROPERLY POLARIZED AND GROUNDED. DISCONNECT POWER BEFORE PERFORMING SERVICE LISTED BELOW.

The ground wire must run from the furnace all the way back to the electrical panel. Proper grounding can be confirmed by disconnecting the electrical power and measuring resistance between the neutral (white) connection and the burner closest to the flame sensor. Resistance should be less than 10 ohms.

The ignition control is a combination electronic and electro-mechanical device and is not field repairable. Complete unit must be replaced.



WARNING

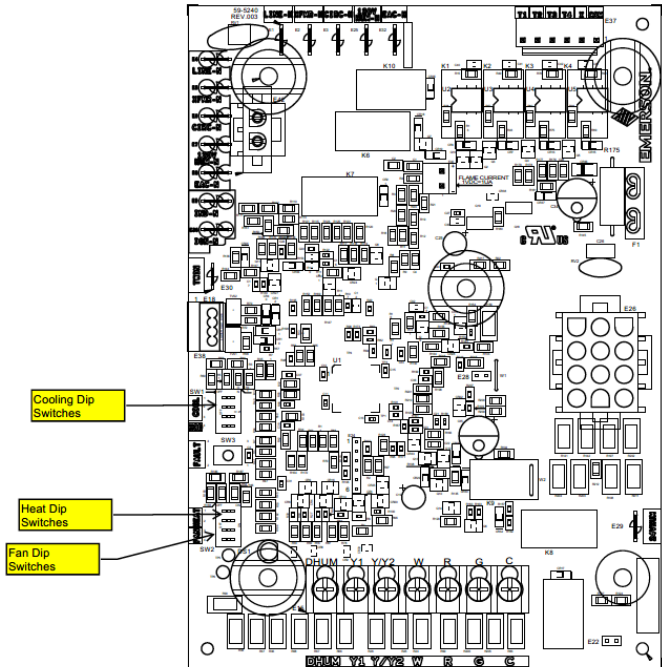
LINE VOLTAGE NOW PRESENT

1. Check for 120 volts from Line 1 (Hot) to Line 2 (Neutral) at the ignition control. No voltage, check the door switch connections and wire harness for continuity.
2. Check for 24 volts from W to C terminal on the ignition control. No voltage. Check transformer, room thermostat, and wiring.
If you have 24 volts coming off the transformer but receive approximately 13 volts on the terminal board between (C) and (R), check for blown fuse.
3. Check for 120 volts to the induced draft blower by measuring voltage between Pin 1 (on the 2-pin connector) and Line (Neutral) on the control board. No voltage, replace ignition control.
4. If voltage is present in Steps 1 through 3 and the induced draft blower is operating, check for 120 volts to the ignitor during the preheat cycle. Measure voltage between Pin 2 (on the 2-pin connector) and Line (Neutral) on the control board. No voltage, check pressure switch.
5. After the ignitor warmup time, begin checking for 24 volts to the gas valve. Voltage will be present for seven seconds only if proof of flame has been established.

ERROR CODE

Red LED Flash	Error / Condition
Flash Codes stored in memory (auto-erased after 14 days)	
1	System Lockout (Retries Exceeded)
2	Pressure Switch stuck Closed
3	Pressure Switch stuck Open
4	Open High Temperature Limit Switch
5	Flame Sensed > 4.25 Seconds with Gas Valve De-Energized
6	Open High Temperature Limit Switch
8	Igniter Relay Fault
10	Open Fuse
11	Igniter Open
12	Inducer Relay Error
Flash Codes NOT stored in memory	
7	Low Flame Sense Signal
9	Twinning Fault
OFF	Control Failure / No Power / Internal Fault / IRQ Loss. Gas Heating Lockout (Gas valve energized when it should be de-energized) Or Gas Valve De-energized when it should be Energized
Rapid Flash	Reverse Polarity
Continuous On	Normal Operation

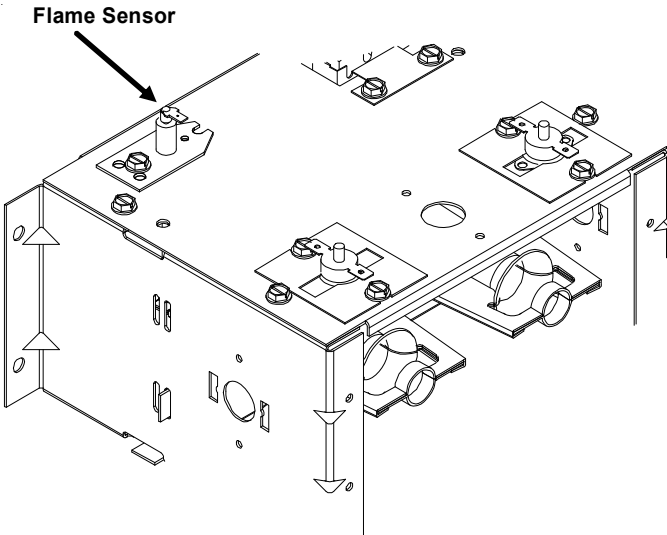
SERVICING



S-314 CHECKING FLAME SENSOR

A flame sensing device is used in conjunction with the ignition control module to prove combustion. If proof of flame is not present the control will de-energize the gas valve and "retry" for ignition or lockout.

The following drawings illustrate from a bottom view, the approximate distances for the ignitor and flame sensor to the gas inshot burner. You will note they are in the main burner stream, not in the carry over ports as shown in the following figure.



Models with Integrated Ignition

Control & Flame Sensor Probe (80% Upflow Model Shown, Counterflow Similar)

**WARNING**

HIGH VOLTAGE
Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.



1. Disconnect the orange flame sensor wire from the sensor .
2. Connect a micro-amp meter in series with this wire and the sensor terminal.
3. Place the unit into a heating cycle.

**WARNING**

LINE VOLTAGE NOW PRESENT

4. As soon as flame is established a micro-amp reading should be evident once proof of flame (micro-amp reading) is established, the hot surface ignitor will be de-energized.
5. The Integrated Ignition controls will have 1 to 4 micro-amps. If the micro-amp reading is less than the minimum specified, check for high resistance wiring connections, sensor to burner gap, dirty flame sensor, or poor grounding.
6. If absolutely no reading, check for continuity on all components and if good - replace ignition control module.

NOTE: Contaminated fuel or combustion air can create a nearly invisible coating on the flame sensor. This coating works as an insulator causing a loss in the flame sense signal. If this situation occurs the flame sensor must be cleaned with steel wool.

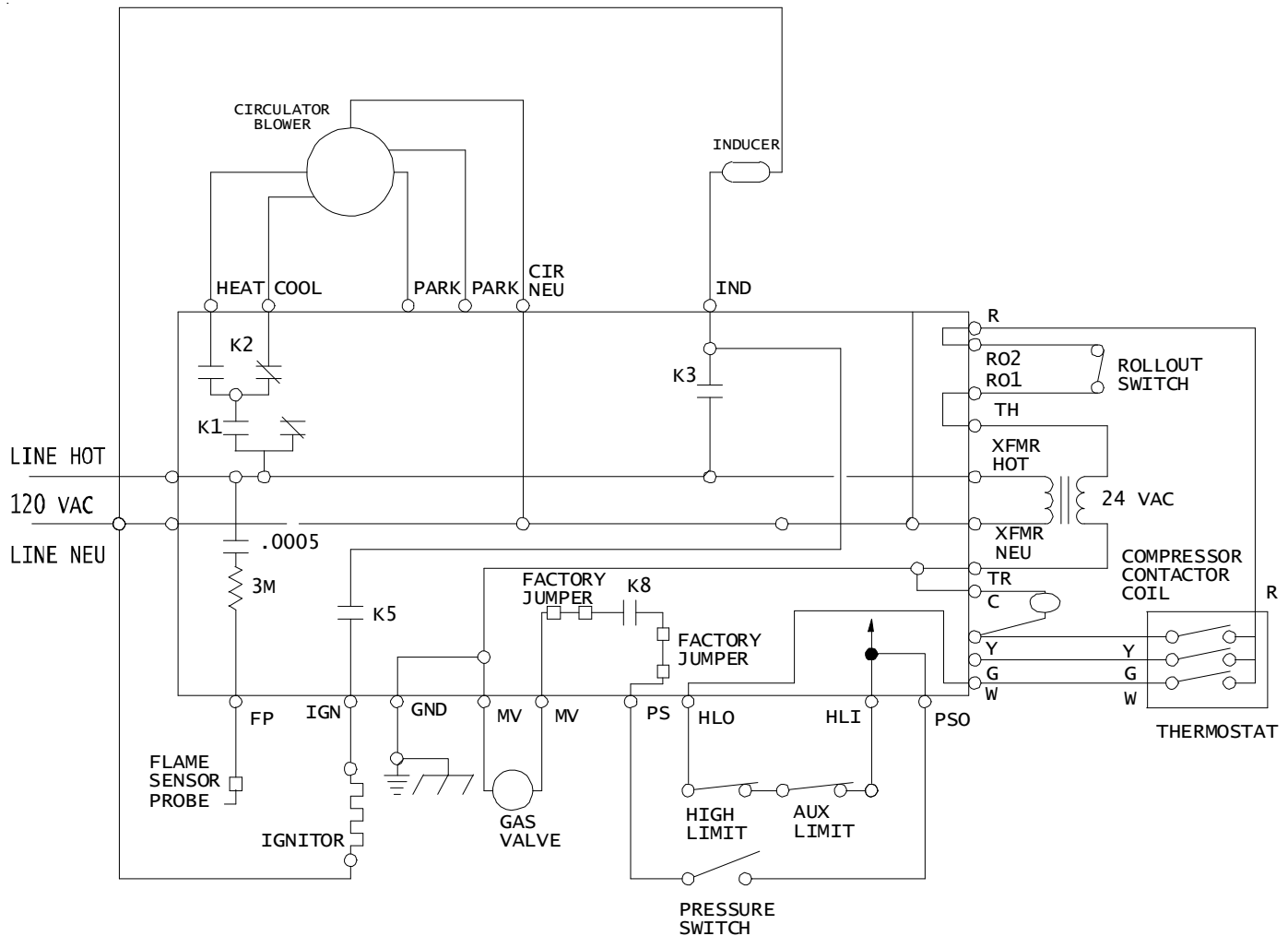
SERVICING

DM80SE / DC80SE Pressure Switch Trip Points And Usage Chart			
MODEL	ID BLOWER		
	Set Point on Pressure Fall (PF) W.C.	Max Make Pressure On Rise W.C.	Pressure Switch Part#
DM80SE0403A *	-0.70 ±0.06	-0.85	0130F00505
DM80SE0603A *	-0.75 ±0.07	-0.90	0130F00506
DM80SE0604B *	-0.75 ±0.07	-0.90	0130F00506
DM80SE0803B *	-0.70 ±0.06	-0.85	0130F00505
DM80SE0804B *	-0.70 ±0.06	-0.85	0130F00505
DM80SE0805C *	-0.75 ±0.07	-0.90	0130F00506
DM80SE1005C *	-0.70 ±0.06	-0.85	0130F00505
DM80SE1205D *	-0.80 ±0.05	-0.95	0130F00507
DC80SE0403A *	-0.60 ±0.06	-0.75	0130F00504
DC80SE0603A *	-0.60 ±0.06	-0.75	0130F00504
DC80SE0804B *	-0.60 ±0.06	-0.75	0130F00504
DC80SE1005C *	-0.80 ±0.05	-0.95	0130F00507


WARNING

HIGH VOLTAGE!
 DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.





TYPICAL SCHEMATIC
DM80SE * MODEL FURNACES
WR 50T55-289 INTEGRATED IGNITION CONTROL

This schematic is for reference only. Not all wiring is as shown above. Always refer to the appropriate wiring diagram for the unit being serviced.

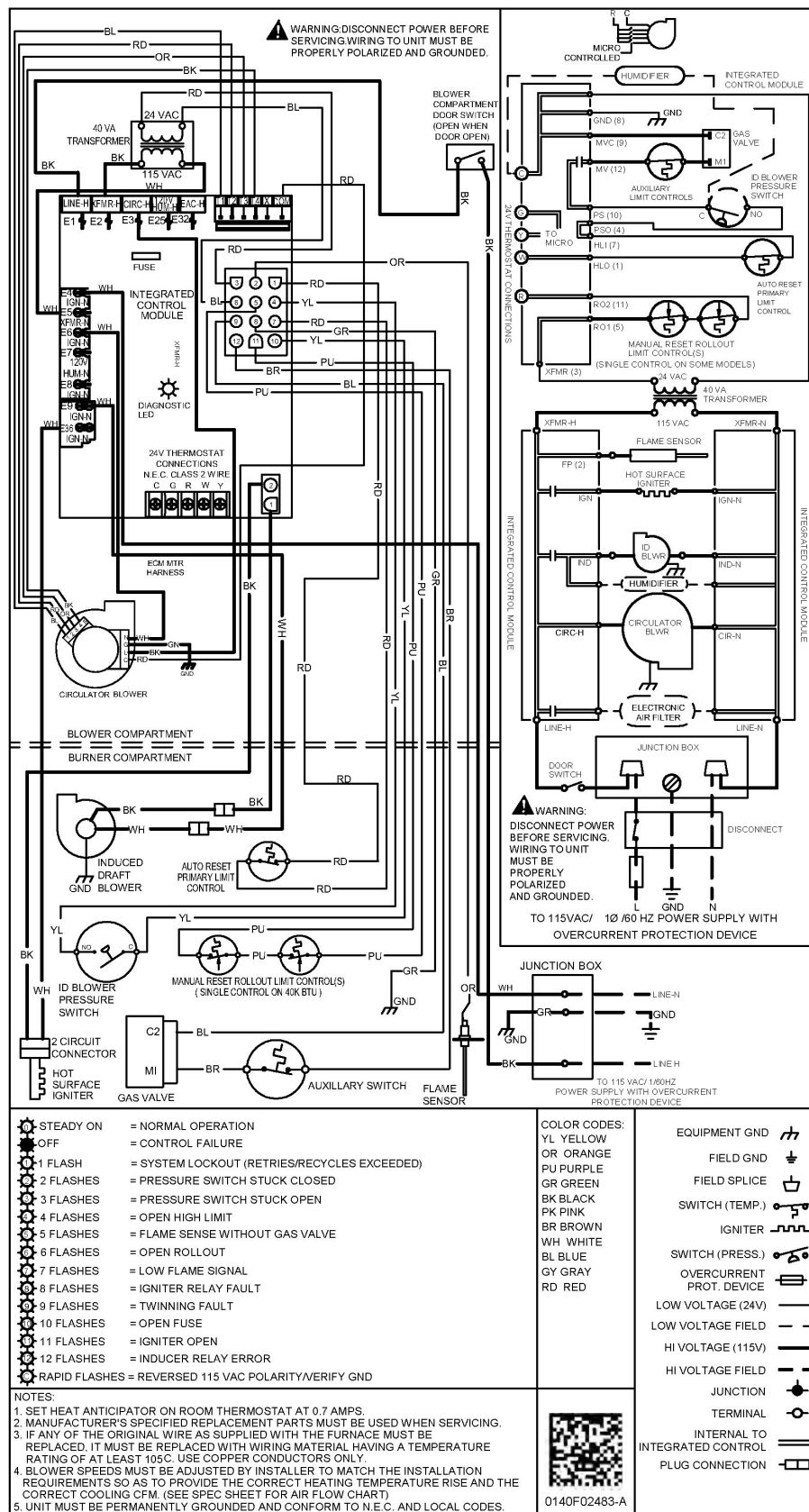
WIRING DIAGRAMS

PCBBF145 CONTROL BOARD



WARNING

HIGH VOLTAGE!
DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.