INSTALLATION INSTRUCTION SUPPLEMENTS

FOR 2-5 TON RESIDENTIAL PACKAGE ULTRA LOW NOx GAS FURNACE

FOR STANDARD & LOW NOx MODELS REFER TO STANDARD INSTALLATION INSTRUCTIONS FOR PACKAGE GAS ELECTRIC RGEAYB BOOK 92-110127-01

RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

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Residential Furnaces
DOE 10 CFR Part 430

Contents

This booklet is a supplement of the standard book to cover specific items related to furnaces equipped with an Ultra Low NOx (ULN) heat exchanger that produces less than 14ng/J. Not all sections will be covered in this book and will refer you to the main book for all air conditioning information. Some sections have exceptions and are illustrated with a ♦ symbol

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Std Book

Std

Std

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SEE SECTION ON BOOK 92-110127-01

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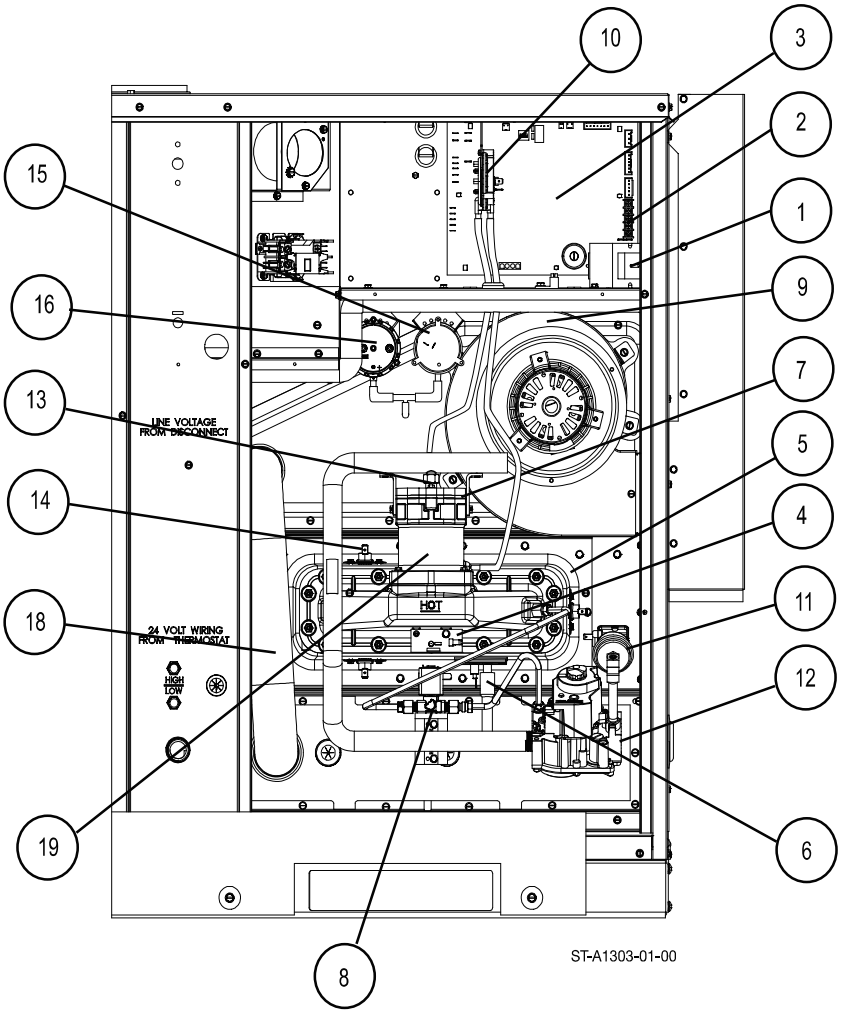
B. MAJOR COMPONENTS



ITEM NO.	DESCRIPTION
1.	TRANSFORMER
2.	T-STAT TERMINALS
3.	FURNACE CONTROL
4.	FLAME LED BOARD (ALT. FLAME LIGHT)
5.	BURNER ASSEMBLY
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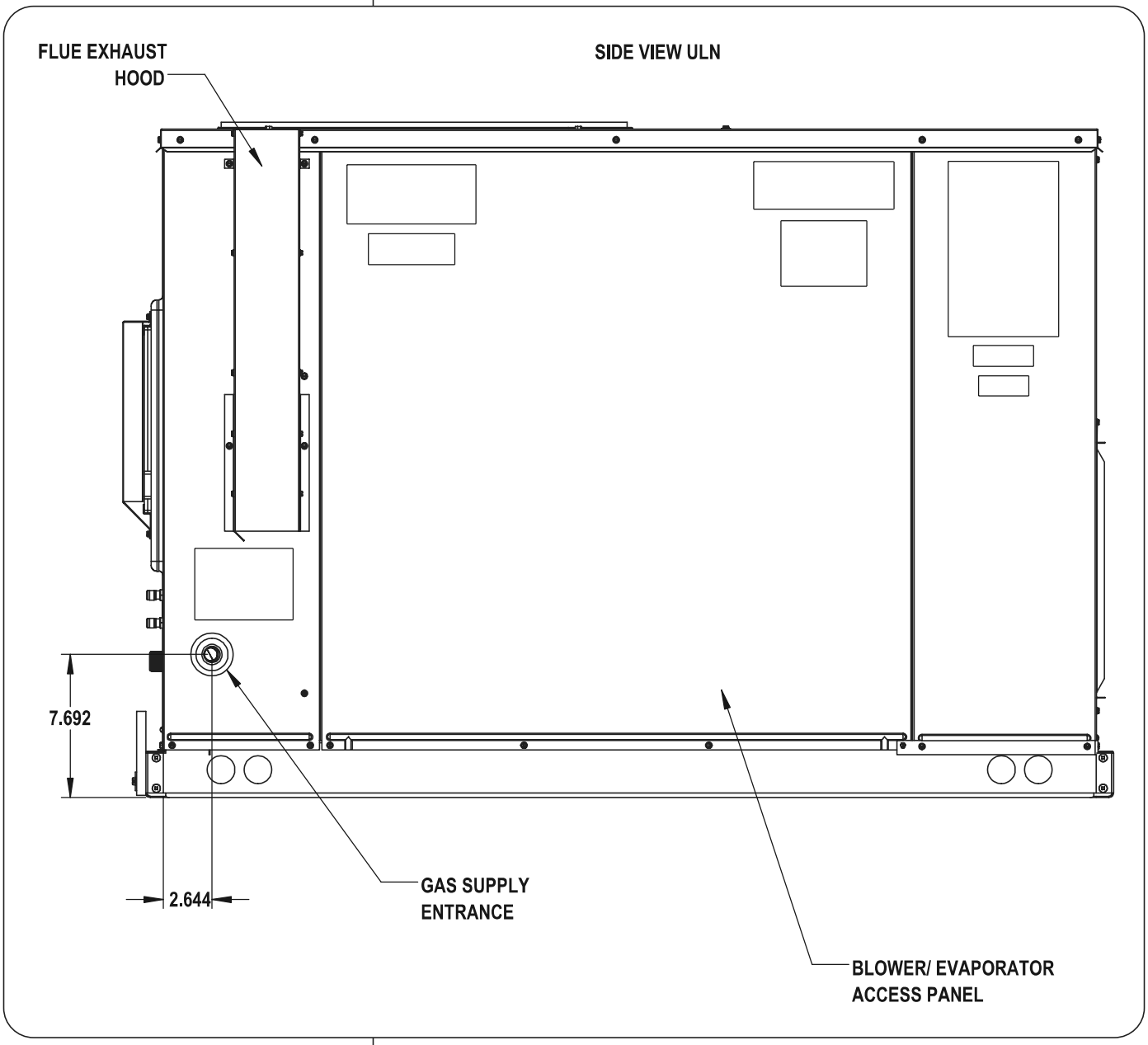
15.	COMBUSTION PRESSURE SWITCH
16.	IGNITION PRESSURE SWITCH
17.	PILOT ORIFICE
18.	TRANSFER TUBE (CAUTION HOT)
19.	VENTURI HOUSING

♦ VI.
UNIT DIMENSIONS

All unit dimensions are typical with standard furnace except the gas line location illustrated below.



♦ VII.

C. ATTACHING EXHAUST AND COMBUSTION AIR INLET HOODS

IMPORTANT: Do not operate this unit without the exhaust and combustion air inlet hood properly installed. These hoods are shipped in a carton in the return air compartment inside the unit and must be attached when the unit is installed.

To attach exhaust and combustion air inlet hood:

1. Remove 3 screws securing filter access panel and remove filter access panel.

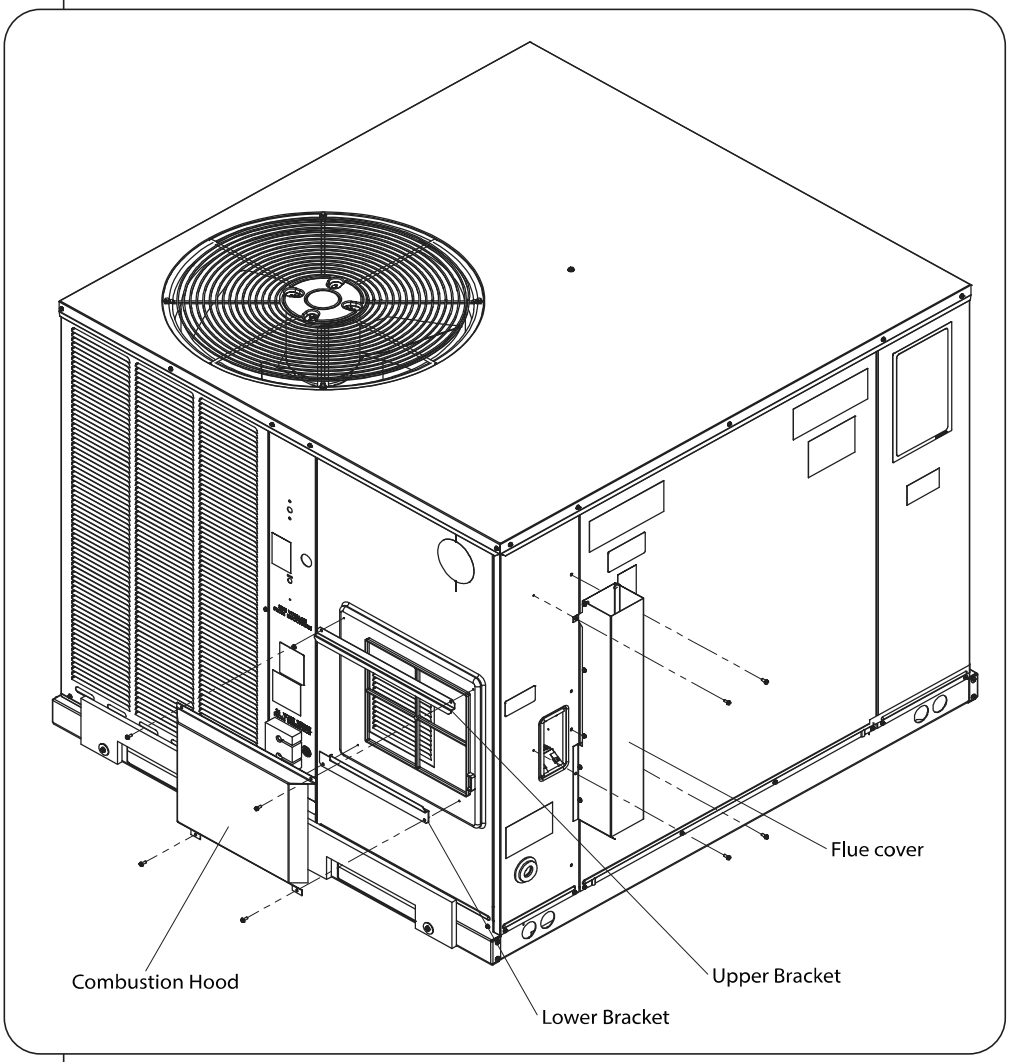
2. Remove exhaust and combustion air inlet hoods the 2 brackets and the filter from their carton, located inside the return air compartment. 2 brackets are for the filter to be retained under the air inlet hood

3. Attach combustion air inlet hood onto the access panel hood will cover the louvers in the panel. Capture the 2 rails horizontally on the top and bottom of the cover.

4. Attach the exhaust hood each with 4 screws as shown in Screws are in parts bag shipped in the burner compartment.

5. Slide the filter in from the right of the flue hood.

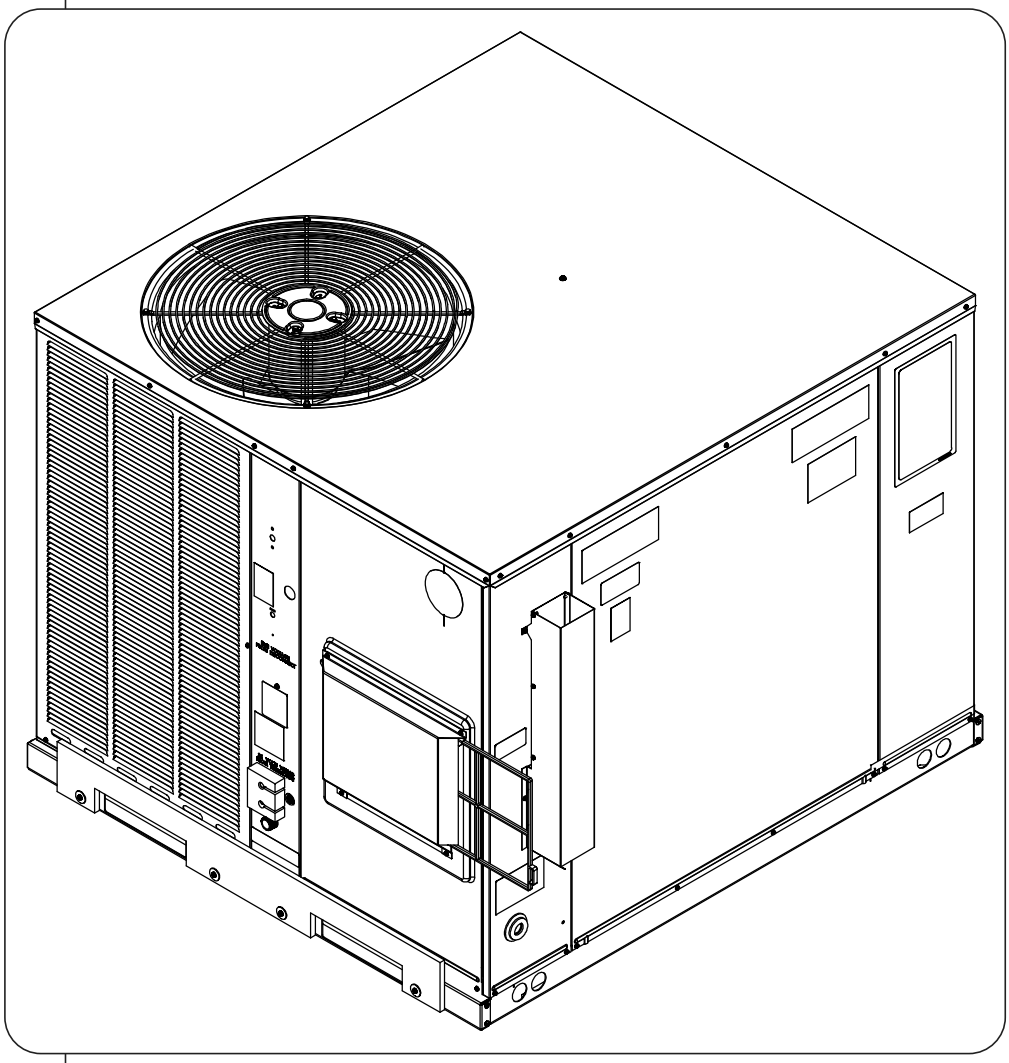
6. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration or addition. The only exception is with factory approved additions. Consult your local utility or other authority having jurisdiction for accepted venting techniques.



♦ VII. INSTALLATION

I. FILTERS

INDOOR AIR FILTERS SEE THE STANDARD BOOK. THE ULN HAS 2 SECONDARY FILTERS TO PREVENT DIRT AND DEBRIS FROM ENTERING THE SUPPLY AIR AND POTENTIALLY CAUSING A BLOCKAGE IN THE GAS INTAKE MANIFOLD. THESE FILTERS ARE REUSABLE AND CAN BE CLEANED AND REINSTALLED. ONE IS LOCATED ON THE VENTURI AND THE OTHER IS INSTALLED IN THE ACCESS PANEL DOOR.



VIII. GAS SUPPLY
A. GAS PIPING

⚠ WARNING

THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. THIS FURNACE IS NOT CERTIFIED FOR USE WITH LP GAS. DO NOT ATTEMPT TO CONVERT OR OPERATE WITH LP GAS.

IMPORTANT: *Any additions or changes required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts.*

IMPORTANT: *Connect this furnace only to gas supplied by a commercial utility or commercial fuel provider.*

IMPORTANT: *A U.L. or CSA recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations or customs.*

Install the gas piping according to all local codes, state codes and regulations of the utility company, whichever holds jurisdiction.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. **The gas line and manual gas valve must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve on the furnace.** Refer to Table 6 for the recommended pipe size for natural gas.

IMPORTANT: *It is permissible to run flexible gas connector inside the unit to a piece of black pipe. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Massachusetts law limits flexible gas connectors to a maximum of 36".*

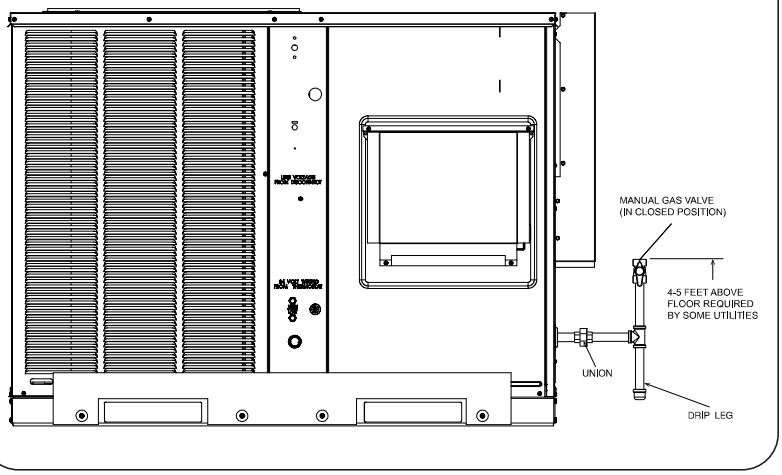
Install a ground joint union outside the cabinet and within 3 feet to easily remove the control valve assembly. Install a manual shut-off valve in the gas line outside the furnace casing. The valve should be readily accessible to turn the gas supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

IMPORTANT: *When making gas pipe connections, use a back-up wrench to prevent any twisting of the control assembly and gas valve. Do not overtighten the connection.*

IMPORTANT: *ENSURE that the furnace gas control valve not be subjected to high gas line supply pressures.*

DISCONNECT the furnace and its individual shut-off valve from the gas supply piping during **any pressure testing that exceeds ½ PSIG (3.48 kPa).**

FIGURE 16A
GAS PIPING INSTALLATION



GAS PRESSURE

IMPORTANT: ENSURE that the furnace gas valve is not to be subjected to high gas line supply pressures.

DISCONNECT the furnace and its individual manual gas stop from the gas supply piping during **any pressure testing that exceeds ½ PSIG. (3.48 kPa).**

Natural gas supply pressure must be 6" to 10.5" w.c. **This pressure must be maintained with all other gas-fired appliances in operation.**

The minimum gas supply pressure to the gas valve for proper furnace input adjustments is 6" w.c. for natural gas, however 7" is recommended. This furnace is equipped with a gas pressure switch that will not allow operation below 5" w.c. of inlet gas pressure.

⚠ WARNING

NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO ADHERE TO THIS WARNING CAN CAUSE A FIRE OR EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

TO CHECK FOR GAS LEAKAGE, USE AN APPROVED CHLORIDE-FREE SOAP AND WATER SOLUTION, OR OTHER APPROVED METHOD.

FIGURE 17A
TYPICAL GAS VALVE (HONEYWELL)

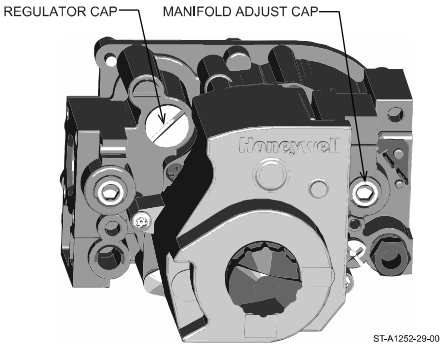


TABLE 6
NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
½	132	92	73	63	56	50	46	43
¾	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1-¼	1,050	730	590	500	440	400	370	350
1- ½	1,600	1,100	890	760	670	610	560	530

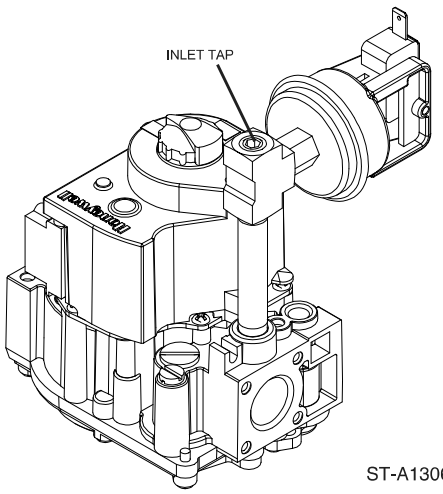
After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}_3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT^3) may be determined by consulting the local natural gas utility or the LP gas supplier.

GAS SUPPLY (cont.)

FIGURE 17B
INLET PRESSURE ("T" FITTING) TAP



GAS VALVE

This furnace has a 24-volt gas valve. It has ports for measuring supply and manifold gas pressure. The valve body contains a pressure regulator to maintain proper manifold gas pressure.

A control switch is on the valve body. It can be set to only the **"ON"** or **"OFF"** positions. The gas valve is a slow-opening valve. See Figures 17A and 17B.

When energized, it takes 2 to 3 seconds to fully open.

C. ADJUSTING OR CHECKING FURNACE INPUT

The maximum gas supply pressure to the furnace should be 10.5" w.c. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 6" w.c. for natural gas.

A calibrated manometer is required for accurate gas pressure readings.

The manifold pressure should be set at 3.5" w.c. for natural gas. Only small variations in the gas flow should be made by means of the pressure regulator adjustment. To adjust the pressure regulator, remove the regulator cap and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. Then replace the regulator cap securely. Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifice. See the Orifice Selection Chart on the following page for available orifice sizes and the approximate heating value ranges they will cover.

Before changing the orifice, shut off the manual gas valve and disconnect power to the furnace.

CHECKING FURNACE INPUT IS CRITICAL TO PREVENT UNDER FIRING OR OVER FIRING BEYOND ITS DESIGN-RATED INPUT. ADDITIONALLY, THERMAL ACOUSTICS IS AN INDICATOR OF INCORRECT OR LOW BTU INPUT.

Use the following formula to determine input rate.

$$\text{RATE} = \frac{3600 \times \text{Heating Value of Gas in BTU/hr}}{\text{Time in seconds to use 1 ft}^3 \text{ of gas}}$$

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation. See Table 10.

TABLE 10
METER TIME

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATINGS OF NATURAL GAS ULN FURNACES							
"INPUT (BTU/HR)"	"METER SIZE (FT3/REV)"	HEATING VALUE OF GAS (BTU/FT3)					
		990		1030		1070	
		MIN	SEC	MIN	SEC	MIN	SEC
40,000	ONE	1	29	1	32	1	37
	TEN	14	51	15	27	16	3
60,000	ONE	1	0	1	2	1	5
	TEN	9	54	10	18	10	42
80,000	ONE		45		47		49
	TEN	7	45	7	44	8	2
100,000	ONE		36		38		39
	TEN	5	57	6	11	6	26

Formula: $$Rate\ (BTU/H) = \frac{Heat\ Value\ of\ Gas\ x\ 3600}{Time\ (in\ seconds)\ for\ 1\ cubic\ FT\ of\ Gas}$$

The furnace is shipped from the factory with a specific sized orifice noted in the chart below. It is sized for natural gas having a heating value of 1030 BTU/cu. ft. and a specific gravity of .60.

See the Orifice Selection Chart below for available orifices and the approximate heating value ranges they will cover.

Since heating values vary geographically, the manifold pressure may need to be changed to adjust the furnace to its nameplate input. Consult the local gas utility to obtain the yearly average heating value.

ResiPak ULN Orifice Selection Chart				
Furnace Model Input	Orifice Size	Heating Valve Range (Approximate) in BTU/CUBIC FT	Part Number	Color
40K	1.25mm	940-1020	62-106977-12	NO COLOR
	1.30mm*	990-1070	62-106977-11	NO COLOR
	#55	1040-1120	62-106977-13	NO COLOR
	1.40mm**	HIGH ALTITUDE	62-106977-01	SILVER
60K	1.55mm	940-1020	62-106977-18	NO COLOR
	1.5875mm*	990-1070	62-106977-17	SILVER
	1.60mm	1040-1120	62-106977-19	NO COLOR
	1.70mm**	HIGH ALTITUDE	62-106977-21	NO COLOR
80K	#49	940-1020	62-106977-16	NO COLOR
	1.90mm*	990-1070	62-106977-14	BRASS
	#48	1040-1120	62-106977-15	NO COLOR
	2.00mm**	HIGH ALTITUDE	62-106977-22	NO COLOR
100K	2.15mm	940-1020	62-106977-09	RED
	2.10mm*	990-1070	62-106977-10	BLACK
	2.25mm	1040-1120	62-106977-03	NO COLOR
	2.35mm**	HIGH ALTITUDE	62-106977-20	NO COLOR
*-FACTORY ORIFICE SIZE **-HIGH ALTITUDE SIZE				
NOTE: HEATING VALUES LISTED ARE DRY				

D. HIGH ALTITUDE INSTALLATION

This Ultra Low NOx furnace maintains
efficiency by operating under a specific air fuel mixture. Maintaining the proper fuel mixture is essential to proper operation of the furnace. This unit does not require any component changes from 0 - 5,500 ft. above sea level. At elevations higher than 2,000 ft. these units require a 2% de-rate for every 1,000 ft. of elevation above sea level. Over 2,000 ft. of elevation, the manifold pressure can be adjusted between 3.00" - 4.50" W.C. to maintain the proper input capacity in BTUs per hour (referred to as rate) for the altitude of the installation.

Adjust the input rate by adjusting manifold pressure to match the rate and elevation in the chart below. To calculate rate see the section ADJUSTING OR CHECKING FURNACE INPUT.

To facilitate ignition at altitudes above 2,000 ft., adjust manifold pressure to approximately 4.0". Turn the manifold adjustment screw approximately 2 turns clockwise before attempting to start the unit for the first time (this will be approximately 4.0" WC on the manifold) Once lit, monitor manifold pressure while adjusting gas valve to achieve the desired rate per the relevant elevation of the installation (see chart).

NOTE: For altitudes above 5,500 ft, the included high altitude orifice that are in the orifice parts bag will need to replace the factory installed orifice in the manifold. Orifice size that need to be installed above 5,500 ft of elevation are:

- 40K BTU gas furnace: 1.40mm
- 60K BTU gas furnace: 1.70mm
- 80K BTU gas furnace: 2.00mm
- 100K BTU gas furnace: 2.35mm

Each high altitude orifice are included in their respective orifice parts bag.

WARNING: When using the supplied orifice for higher altitudes, manifold pressure will need to be verified and adjusted. A rate calculation will need to be performed to ensure the furnace is in operation range. Refer to the elevation chart below to get proper range for gas furnace

NOTE: Furnace out of operation range can emit noise if too lean. Increasing the rate can be achieved by using the larger orifice and/or increasing manifold pressure. Manifold pressure may not be set to 3.5" at the optimum operation range.

De-rate input BTU/h 2% per 1,000k ft above sea level this is unit is qualified up to 10,000 ft					
De-rate input = nameplate x ((1-(elevation ft/1000ft) x .02)					
% de-rated	**Elevation ft**	100,000 BTU/h	80,000 BTU/h	60,000 BTU/h	40,000 BTU/h
No de-rate required	2,000 and below	100,000	80,000	60,000	40,000
4-5%	2,001 to 2,500	95,000	76,000	57,000	38,000
5-6%	2,501 to 3,000	94,000	75,200	56,400	37,600
6-7%	3,001 to 3,500	93,000	74,400	55,800	37,200
7-8%	3,501 to 4,000	92,000	73,600	55,200	36,800
8-9%	4,001 to 4,500	91,000	72,800	54,600	36,400
9-10%	4,501 to 5,000	90,000	72,000	54,000	36,000
10-11%	5,001 to 5,500	89,000	71,200	53,400	35,600
11-12%	5,501 to 6,000	88,000	70,400	52,800	35,200
12-13%	6,001 to 6,500	87,000	69,600	52,200	34,800
13-14%	6,501 to 7,000	86,000	68,800	51,600	34,400
14-15%	7,001 to 7,500	85,000	68,000	51,000	34,000
15-16%	7,501 to 8,000	84,000	67,200	50,400	33,600
16-17%	8,001 to 8,500	83,000	66,400	49,800	33,200
17-18%	8,501 to 9,000	82,000	65,600	49,200	32,800
18-19%	9,001 to 9,500	81,000	64,800	48,600	32,400
19-20%	9,501 to 10,000	80,000	64,000	48,000	32,000

IX. ELECTRICAL WIRING

D. THERMOSTAT

The room thermostat must be compatible with the furnace. See manufacturer's thermostat spec sheet for compatibility concerns. Generally, all thermostats that are not of the "current robbing" type are compatible with the integrated furnace control.
The low voltage wiring should be sized as shown.

NOTE: Do not use 24 volt control wiring smaller than No. 18 AWG.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires inside the blower compartment and connect to low voltage terminals as shown on the wiring diagram. Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers.

FIGURE 19
TYPICAL THERMOSTAT WIRING

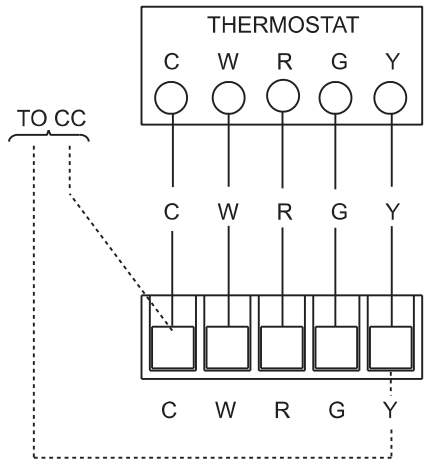


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FIGURE 20
ISOLATION RELAY FOR CURRENT-ROBBING THERMOSTAT

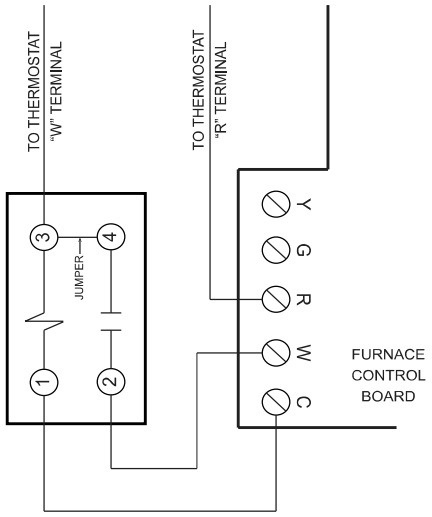

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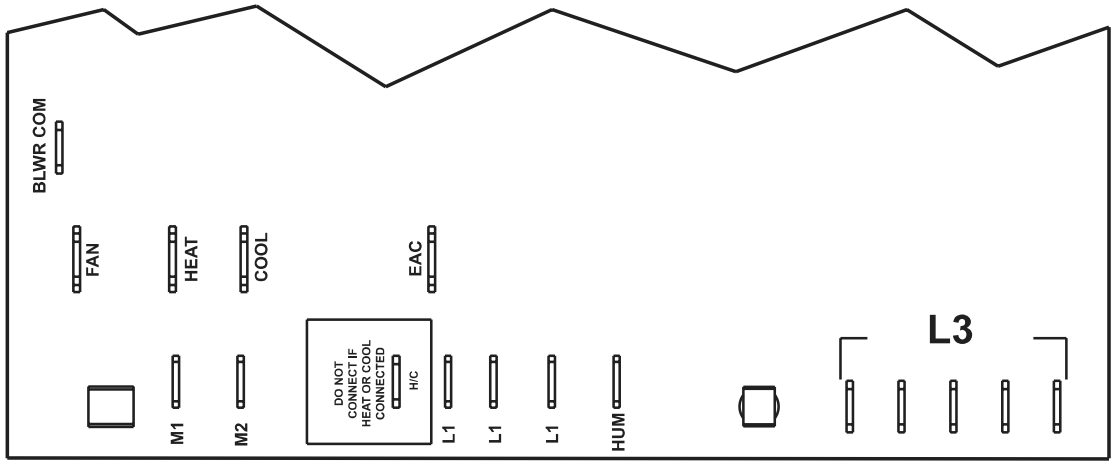
FIGURE 21
LINE VOLTAGE CONNECTIONS



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X. START-UP PROCEDURES

A. BASIC OPERATIONS

This furnace is equipped with an intermittent pilot control. Each time the room thermostat calls for heat, the ignitor lights the pilot which lights the burner directly. See the lighting instructions on the furnace.

TO START THE FURNACE

1.Remove the burner compartment control access door.

2. **IMPORTANT:** Be sure that the manual gas control has been in the “OFF” position for at least five minutes. Do not attempt to manually light the main burners.
3. Turn off the furnace electrical power and set the room thermostat to its lowest setting.
4. Turn the gas control to the “ON” position or move the gas control lever to the “On” position.
5. Turn on the furnace electrical power.
6. Set the room thermostat to a point above room temperature to light the main burners.
7. After the burners is lit, set the room thermostat to a desired temperature.
8. Operate gas heat for a minimum period of 15 minutes and adjust input rate. It is important that the input to this furnace be adjusted correctly.

TO SHUT DOWN THE FURNACE

1. Set the room thermostat to its lowest setting and wait for furnace to shut down.
2. Remove the burner compartment control access door.
3. Shut off the gas to the main burners by turning the gas control to the “OFF” position.

NOTE: It is important to remove as much air from the gas lines as possible before attempting to light. It may require multiple trials for ignition before successful initial ignition.

> **⚠ WARNING**
>
> **SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, CLOSE THE MANUAL GAS VALVE FOR THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

B. RESIPACK ULTRA LOW NOx SEQUENCE OF OPERATIONS

Learning/Calibration Cycle:

- This cycle is performed after power is cycled.
- When ambient temperature is in excess of 10 degrees from the previous calibration temperaure
- Once every 100 heat calls.
- When the previous attempt at calibration failed.
- When the ignition or combustion pressure switch fails to close within 60 seconds during a noncalibration cycle.
- The next heat attempt after either the ignition or combustion pressure switch opens long enough to interrupt the heat cycle.

Learning/Calibration Cycle Configuration:

A call for heat closes R and W on the control. The IFC (Internal Furance Control) turns the IDB (Induced Draft Blower) on at 2000 RPM and then begins to ramp up 25 RPM every 4 seconds until the ignition pressure switch closes then adds 300 RPM and saves this value as the “Ignition Speed.” The IFC then continues to ramp up the IDB speed 25 RPM every 4 seconds until the combustion pressure switch closes. The IFC then drops the IDB speed 25 RPM every 2.5 seconds until the combustion pressure switch opens then adds 500 RPM and saves this value as the “Cold Heat Speed.” The IDB then steps up to the “Cold Heat Speed.”

After 25 seconds of operation at the “Cold Heat Speed” the IFC drops the IDB speed back down to the “Ignition Speed.” After operating at the “Ignition Speed” for 10 seconds the IFC proceeds to the “Trial for Ignition.” During the “Trial for Ignition” the IFC energizes the gas valve pilot solenoid. One second later the external solenoid and sparker are energized. (The PSLD stays energized for 4 seconds after the main gas valve is energized.) When flame is sensed the IFC de-energizes the sparker. Gas valve pilot so-

lenoid and the PSLD remain energized. Once flame has been present for 2 seconds the main valve opens and the IFC starts to slowly ramp the IDB speed back up to the “Cold Heat Speed” within 120 seconds. The indoor blower comes on 20 seconds after the main gas valve is energized.

After 2 minutes the IFC performs a warm calibration. The IFC starts to drop the IDB speed 25 RPM every 2.5 seconds until the combustion pressure switch opens. Once the combustion pressure switch opens the IFC increases the IDB speed back up until the combustion pressure switch closes then adds 400 RPM and saves this value as the “Warm Heat Speed.”

Noncalibration Cycle “Normal Heat Cycle”:

A call for heat closes R and W on the IFC. The IFC turns on the IDB at the “Cold Heat Speed” and confirms that the ignition pressure switch and combustion pressure switch are closed.

After 25 seconds of operation at the “Cold Heat Speed” the IFC drops the IDB speed back down to the “Ignition Speed.” After running at the “Ignition Speed” for 10 seconds the IFC proceeds to the “Trial for Ignition.” During the “Trial for Ignition” the control energizes the gas valve pilot solenoid. One second later the PSLD and sparker are energized. (The Pilot Solenoid (PSLD) stays energized for 4 seconds after the main gas valve is energized.) When flame is sensed the IFC de-energizes the sparker. Gas valve pilot solenoid and the PSLD remain energized. Once flame has been present for 2 seconds the main valve opens and the IFC starts to slowly ramp the IDB speed back up to the “Warm Heat Speed” within 120 seconds. The indoor blower comes on 20 seconds after main gas valve is energized.

Hot Ignition Sequence:

If a call for heat or fault recycle is made within 10 minutes of termination of the previous heat cycle the IDB and the main blower will be energized for a 2 minute cool down period prior to the non-calibration cycle above.

Power Interruption:

If main power is interrupted the IDB and main blower will be energized for a 2 minute period prior to the learning cycle above.

SAFETY FEATURES

C. BURNER ASSEMBLY

NOTICE: This furnace is equipped with a pre-mix burner assembly. This burner assembly is non-serviceable and should be replaced as an entire assembly only. Burner assemblies are available from authorized parts dealer.

D. OVER TEMPERATURE SAFETY SWITCHES

Furnaces are equipped with safety switches to protect against over temperature conditions in the burner compartment, which, if tripped, will terminate the heating cycle. In the event of an over temperature condition, the switch will shut the furnace down. This switch for the furnace is located on the top,right & bottom of the burner box. If a switch is tripped, it must be manually reset. DO NOT jumper or reset this switch. If this switch should trip, a qualified installer, service agency or the gas supplier should be called to diagnose and/or correct the source of tripping. Caution must be used as some components may be hot.

E. PRESSURE SWITCHES

This furnace is equipped with (2) normally-open pressure switches that monitor pressure conditions within the furnace vent system during the heating cycle.

There are several reasons for the pressure switch not to close.

1. An inoperative induced draft blower.
2. A loose or leaky pressure switch hose.
3. A blockage in the exhaust vent.
4. Severe downdrafts canceling the draft from the inducer fan.
5. A leaky gasket at the induced draft blower.
6. Improperly sized or installed vent.

The pressure switch contacts must open before the unit can go through another heating cycle.

This furnace is also equipped with (1) normally or differential pressure switch that monitors the conditions of the inlet to the venturi/gas entry into the system. If this inlet becomes obstructed or restricted by a clogged filter (if equipped) the switch will open and shut down the system.

⚠ WARNING

DO NOT BYPASS, JUMPER, OR REMOVE ANY SAFETY SWITCH FROM THE FURNACE CONTROL CIRCUIT. IF A SAFETY SWITCH CAUSES THE FURNACE TO SHUT DOWN OR OPERATE INTERMITTENTLY, IT IS AN INDICATION OF A POTENTIAL SAFETY HAZARD THAT MUST BE ADDRESSED BY A QUALIFIED TECHNICIAN, SERVICE AGENCY OR THE GAS SUPPLIER. DO NOT RESET SAFETY CONTROLS WITHOUT CORRECTIVE ACTION AND/OR VERIFICATION OF PROPER SAFE OPERATION BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

REPLACE ANY SAFETY CONTROL COMPONENT ONLY WITH IDENTICAL OEM REPLACEMENT PARTS. WHEN A NEW SAFETY SWITCH IS INSTALLED, IT MUST BE TESTED FOR A MINIMUM OF 15 MINUTES WITH THE FURNACE OPERATING AT MAXIMUM INPUT RATE AND WITH BOTH BLOWER AND BURNER DOOR INSTALLED. IF THE FURNACE IS INSTALLED IN A CLOSET, THE CLOSET DOOR MUST ALSO BE CLOSED FOR THIS TEST. REPEAT THE TEST AT THE MINIMUM INPUT RATE IF THE FURNACE IS A MULTI-STAGE FURNACE.

F. LIMIT CONTROL

The high limit cut-off temperature is set at the factory and cannot be adjusted. The temperature setting prevents the air temperature leaving the furnace from exceeding the maximum outlet air temperature, which, if exceeded, will shut the furnace down.

There are several reasons for a limit switch to open and almost always involve low airflow through the furnace.

1. A dirty or restricted return air filter.
2. A dirty or restricted cooling coil.
3. Undersized or restricted return air system.
4. Undersized or restricted supply air system.
5. A problem affecting the main blower:
   A. A wrong speed tap selection.
   B. Failing motor bearings.
   C. Low voltage to the motor.
   D. Dirty blower wheel.
   E. Wrong motor rotation.
   F. Blower wheel slipping on the motor shaft.
6. Overfiring the furnace with too much gas pressure.
7. Ventilation problems.
8. Failed blower motor.

G. BLOWER FILTER

Keep filters clean at all times. **A filter is not provided with the furnace, but one must be field-supplied and installed.**

It is recommended to replace the furnace filter periodically to maintain optimum furnace performance.

XI. SYSTEM OPERATING INFORMATION

SYSTEM OPERATION INFORMATION

A. ADVISE THE CUSTOMER

1. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on the system.
4. Avoid excessive use of kitchen exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles 3 feet from the furnace and vent system.
7. **IMPORTANT:** Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.
8. Explain the advantages of continuous fan operation to the customer.

ANNUAL INSPECTION

The furnace should operate for many years without excessive scale build-up in the flue passageways. However, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the vent system and the main burners for continued safe operation. Pay particular attention to deterioration from corrosion or other sources.

- **IMPORTANT:** It is recommended that at the beginning and at approximately half way through the heating season, a visual inspection be made of the main burner flames for the desired flame appearance by a qualified installer, service agency or the gas supplier. If the flames are distorted and/or there is evidence of back pressure, check the combustion and ventilation air system for blockage. If there is carbon and scale in the heat exchanger tubes, the heat exchanger assembly should be replaced.
- **IMPORTANT:** It is recommended that at the beginning of the heating season, the flame sensor be cleaned with fine steel wool or Scotch Bright Pad by a qualified installer, service agency or the gas supplier.
- **IMPORTANT:** It is recommended that an annual inspection and cleaning of all furnace markings be made to assure legibility. Attach a replacement marking, which can be obtained through the distributor, If any are found to be illegible or missing.
- **IMPORTANT:** It is recommended that the Venturi inlet filter if equipped should be removed and cleaned before each heating season and periodically during if required based on the amount of dust and lint in your area.

⚠ WARNING

HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME, RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.

XI. SYSTEM OPERATING INFORMATION

B. FURNACE SECTION MAINTENANCE

⚠ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

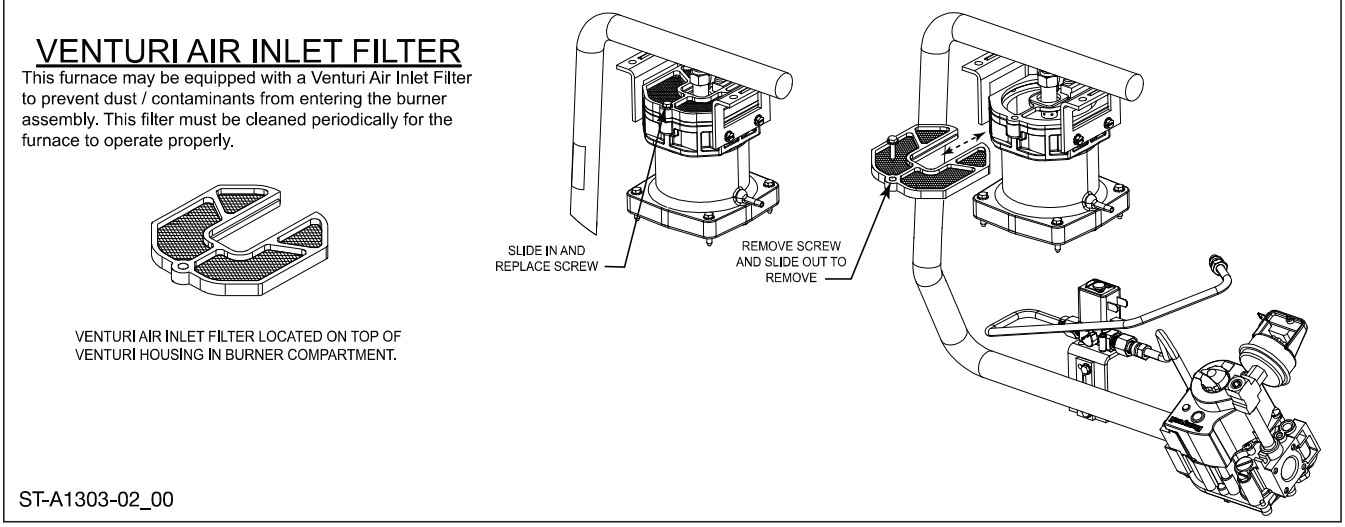
FILTERS

⚠ CAUTION

DO NOT OPERATE THE SYSTEM FOR EXTENDED PERIODS WITHOUT FILTERS. A PORTION OF THE DUST ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY RECIRCULATED DUST PARTICLES WILL BE HEATED AND CHARRED BY CONTACT WITH THE FURNACE HEAT EXCHANGER. THIS RESIDUE WILL SOIL CEILINGS, WALLS, DRAPES, CARPETS AND OTHER HOUSEHOLD ARTICLES.

VENTURI AIR INLET FILTER

This furnace may be equipped with a Venturi air inlet filter to prevent dust/contaminants from entering the burner assembly. This filter must be cleaned periodically for the furnace to operate properly.



C. LUBRICATION

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are permanently lubricated by the manufacturer and do not require further attention.

It is recommended that the blower motor and induced draft blower motor be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean. Dirty filters can restrict airflow. The motor depends upon sufficient air flowing across and through it to keep from overheating.

XI. SYSTEM OPERATING INFORMATION (cont.)

NOTE: This furnace is currently approved for upflow only. Leave switch in "OFF" position.

E. REPLACEMENT PARTS

Homeowners please visit www.rheem.com for product information.
Replacement parts division visit http://www.rheemparts.com/Catalog/

F. REFRIGERANT CHARGE VERIFICATION AND ADJUSTMENT PROCESS

This unitary packaged system comes fully charged and tested with R-454B refrigerant from the factory. Adjustment of the refrigerant charge is not required unless the unit is suspected of not having the proper refrigerant charge. Any adjustment must not exceed 2% of the total refrigerant weight listed on the rating plate of the unit and should not supersede correctly weighed-in refrigerant.

Note: Factory charge chart and/or design target subcooling are for gross charge verification.

Charge verification instructions:

1. Allow the unit to operate for 15 minutes before checking or adjusting the charge.

2. Return air temperature must be within comfort conditions (72°F - 82°F).

3. Remove caps from the high-side and low-side pressure service fittings.

4. Record the following measurements:

   a. High-side pressure at service fitting

   b. Low-side pressure at service fitting

   c. Outdoor ambient (air temperature) near the condenser coil

5. Place an "X" on the chart where the high-side and low-side pressures intersect.

6. If the "X" is above the outdoor ambient line by more than 20 PSI, verify the airflow and check for component issues. If no issues are found, reclaim the refrigerant, evacuate the system, and weigh in the refrigerant quantity listed on the rating plate.

7. If the "X" is above the outdoor ambient line by less than 20 PSI, the system can be considered properly charged and no adjustment is necessary.

8. If the "X" is below the outdoor ambient line by more than 20 PSI, inspect the unit for potential loss of refrigerant. Recover the refrigerant and perform a leak check using nitrogen to pressurize the system. If necessary, make repairs and perform a leak check again. Then, evacuate nitrogen from the system, and weigh in the refrigerant quantity listed on the rating plate.

9. If the "X" is below the outdoor ambient line by less than 20 PSI, the refrigerant charge can be increased. If the unit requires an adjustment greater than 2% of the refrigerant quantity listed on the rating plate; follow inspection, repair, and recharge procedures in step 8.

H. BLOWER MOTOR SPEED ADJUSTMENTS FIELD SELECTIONS - DIPSITCHES

A dipswitch bank; SW1 is provided for some field adjustments. Heating blower off delay, cooling (and heat-pump) blower off delay, display (7-Segment) orientation and fault clear are the adjustments and functions that can be handled using the dipswitches.

SEVEN-SEGMENT DISPLAY ORIENTATION; SW1

As the control will be applied in a multi-position future furnace design a means of changing the orientation of the seven segment display is required. This dipswitch is to be labeled SW1. Factory setting of the SW1 dipswitch is OFF. The factory setting display orientation is with the control placed in a vertical orientation and the low voltage terminal block T2 is in the bottom position.

NOTE: This furnace is currently approved for upflow only. Leave switch in "OFF" position.

HEAT BLOWER-OFF DELAY; SW2 & SW3

A means of controlling the HEAT speed blower "off" delay time is provided. The dipswitches are labeled SW2 and SW3. The following table defines the settings:

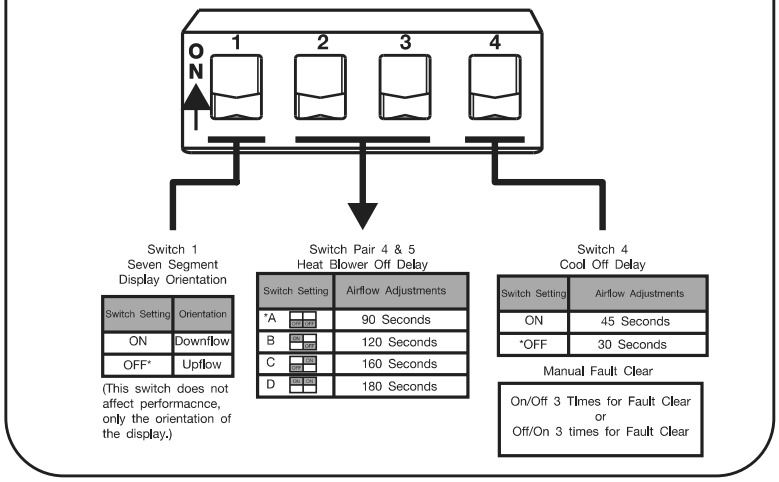
SW2	SW3	
OFF	OFF	90 seconds (Factory Setting)
ON	OFF	120 seconds
OFF	ON	160 seconds
ON	ON	180 seconds

COOLING & HEAT-PUMP HEAT BLOWER OFF DELAY; SW4

A means of controlling the COOL speed blower "off" delay time is required. The dipswitch is labeled SW4. The following table defines the settings:

SW4	
OFF	30 seconds (Factory Setting)
ON	45 seconds

FIGURE 24
DIPSWITCH MAP



XI. SYSTEM OPERATING INFORMATION (cont.)

FAULT CLEAR

MANUAL FAULT CLEAR; SW4

Faults will automatically be cleared from the fault buffer after one week. The fault buffer can also be manually cleared if this is desired. For the first 30 seconds after a change in state of dipswitch SW4, the furnace control will wait to determine if the switch becomes ***on/off/on/off/on/off*** or ***off/on/off/on/off/on*** within 30 seconds. When this action is detected within 30 seconds, the fault code memory buffer shall be cleared. Be sure to return the dipswitch to the original state (on or off) or is in the desired position after clearing the fault buffer using this method.

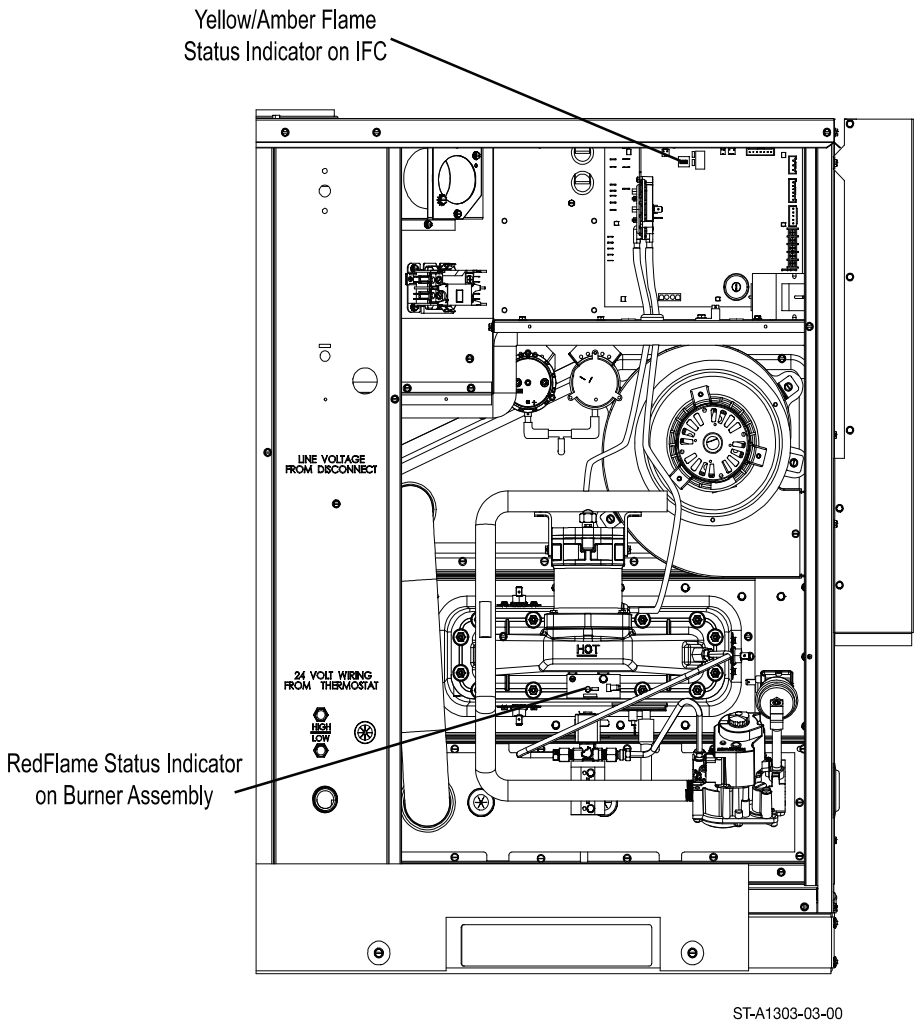
FAULT RECALL

Upon power reset, the three most recent faults which are less than one week old will be flashed in succession from the most recent to the oldest. This will be done as a diagnostic aid to the field technician. After one week, a fault will be removed from the fault buffer.

FLAME STATUS L.E.D. (AMBER)

A yellow or amber L.E.D. is provided to indicate flame status. There is also a red LED on the Flame status board just below the burner assembly. The LEDs are active from pilot ignition throughout main ignition. When normal flame is sensed, the flame L.E.D. is continuously on. The flame L.E.D. will flash at a rate of one to four flashes per second if a weak flame is detected. If an unexpected flame is detected, the L.E.D. will flash rapidly. The L.E.D. is off when there is no flame detected.

For more diagnostics information, consult the wiring diagram and diagnostics chart at the end of this book.



XV. AIRFLOW

The importance of proper air flow over the heat exchanger cannot be over emphasized.

⚠ CAUTION

IT IS IMPORTANT THAT EACH DUCT SYSTEM BE SIZED AND INSTALLED FOR THE SPECIFIC APPLICATION BY PROPERLY APPLYING THE APPROPRIATE INDUSTRY ACCEPTED STANDARD. IF LESS THAN MINIMUM STANDARDS ARE APPLIED, THE EQUIPMENT USER COULD EXPECT TO EXPERIENCE HIGHER UTILITY BILLS, MAJOR COMPONENT FAILURE, VARYING DEGREES OF AIR NOISE OR OTHER UNSATISFACTORY ISSUES, OVER WHICH THE MANUFACTURER HAS NO CONTROL.

One of the most common causes of heat exchanger failure is overheating due to low air flow. An air flow table is located on the following pages.

TEMPERATURE RISE CHECK

To determine if the air flow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet ot of a direct line from the heat exchanger.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate.

If the measured temperature rise is above the approved range, either the air flow is too low or the manifold pressure needs to be adjusted. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, either the air flow is too much or the manifold pressure needs to be adjusted. Use lower speed tap on the multi-speed blower.

IMPORTANT: *The measured temperature rise should be in the middle of the range.*

IMPORTANT: *Some high-efficiency filters have a greater than normal resistance to airflow. This can adversely affect furnace operation. BE SURE TO CHECK AIRFLOW if using any filter other than factory-provided filter.*

⚠ WARNING

THE MEASURED TEMPERATURE RISE SHOULD BE AS CLOSE TO THE MIDDLE OF THE STATED RANGE AS POSSIBLE. FOR EXAMPLE, IF THE RISE RANGE IS 40 TO 70°F (4.5°-21°C), THE MIDDLE OF THE RISE RANGE IS 55°F (12.8°C). IN ALL APPLICATIONS, THE INSTALLER MUST ADJUST THE TEMPERATURE RISE TO THIS "MIDDLE" POINT AS CLOSELY AS POSSIBLE. ALSO, THE TEMPERATURE RISE SHOULD NEVER BE ABOVE OR FALL BELOW THE STATED RANGE. DOING SO COULD CAUSE DAMAGE TO THE HEAT EXCHANGER OR INTERMITTENT OPERATION. THIS COULD CAUSE INJURY OR DEATH AND WILL VOID THE MANUFACTURER'S WARRANTY FOR THIS PRODUCT.

Indoor Airflow Performance RGEAYB ULN (208/230V, 1-Phase) Constant Torque Motor

Nominal Cooling Capacity Tons [kW]	Motor Speed from Factory		Heating Input BTU/HR [kW]	Manufacturer Recommended Cooling Airflow (Min/Max)	Blower Size, Motor HP [W] & # of Speeds	Motor Tap - Usage		External Static Pressure - Inches W.C. [kPa] (Side Discharge-Dry Coil)									
	Cool	Heat						0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.12]	0.6 [.15]	0.7 [.17]	0.8 [.20]	0.9 [.22]	1.0 [.25]
2.0 [7.03]	Tap 3			700 CFM / 900 CFM	10X9 Blower 1/3 HP [249] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	890	842	788	736	660	623	579	521	462	408
							RPM	680	729	783	835	895	926	967	1021	1062	1098
							Watts	111	118	124	132	140	144	150	157	162	167
		Tap 2	40,000 [11.72]			Tap 2 - 40K	CFM	744	686	553	502	454	399	324	276	240	212
							RPM	601	658	737	778	822	882	921	957	1000	1046
							Watts	74	80	88	92	97	103	106	110	115	119
		Tap 2	60,000 [17.58]			Tap 2 - 60K	CFM	880	839	784	713	650	578	530	469	423	375
							RPM	674	718	775	841	888	920	960	1015	1052	1089
							Watts	108	114	121	130	137	141	147	153	158	163
						Tap 3 - Low Static Cool	CFM	874	825	771	703	590	553	511	451	398	347
							RPM	671	721	774	842	888	921	959	1016	1057	1092
							Watts	105	112	119	128	134	138	143	150	156	160
						Tap 4 - Med Static Cool *	CFM	1037	1000	957	905	838	776	738	701	668	616
							RPM	757	796	839	886	949	994	1026	1057	1089	1128
							Watts	156	163	171	178	190	197	204	207	214	217
						Tap 5 - High Static Cool	CFM	1274	1239	1208	1168	1138	1098	1024	865	796	713
							RPM	882	922	953	989	1027	1066	1101	1131	1138	1149
							Watts	268	277	285	295	303	313	312	285	272	253

Down Discharge Pressure Drop (Add to External Static Pressure)							
CFM [L/s]	800 [378]	1000 [472]	1200 [566]	1400 [661]	1600 [755]	1800 [849]	2000 [944]
Pressure Drop - Inches W.C. [kPa]	.02 [.005]	.05 [.012]	.07 [.017]	.1 [.025]	.12 [.030]	.15 [.037]	.17 [.042]

Notes:

(1) FOR CONSTANT TORQUE MOTORS: USE MOTOR TAPS 3-5 TO ACHIEVE RATED AIRFLOW AT AHRI MINIMUM EXTERNAL STATIC PRESSURE.
(a) Use * marked tap for AHRI 210/240-2023

(2) GRAYED OUT PORTIONS NOT RECOMMENDED FOR USE IN FIELD.

Indoor Airflow Performance RGEAYB ULN (208/230V, 1 & 3-Phase) Constant Torque Motor

Nominal Cooling Capacity Tons [kW]	Motor Speed from Factory		Heating Input BTU/HR [kW]	Manufacturer Recommended Cooling Airflow (Min/Max)	Blower Size, Motor HP [W] & # of Speeds	Motor Tap - Usage		External Static Pressure - Inches W.C. [kPa] (Side Discharge-Dry Coil)									
	Cool	Heat						0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.12]	0.6 [.15]	0.7 [.17]	0.8 [.20]	0.9 [.22]	1.0 [.25]
2.5 [8.79]	Tap 3			875 CFM / 1125 CFM	10X9 Blower 1/2 HP [372] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	944	895	852	801	716	669	633	585	546	498
							RPM	715	760	805	855	923	964	993	1031	1085	1118
							Watts	128	135	141	149	159	165	170	176	184	190
		Tap 2	40,000 [11.72]			Tap 2 - 40K	CFM	713	564	483	438	375	296	248	220	189	
							RPM	591	635	708	749	817	862	902	955	989	
							Watts	68	69	75	78	84	89	92	97	101	
		Tap 2	60,000 [17.58]			Tap 2 - 60K	CFM	870	826	766	689	646	599	558	490	430	402
							RPM	675	719	776	848	882	921	958	1013	1057	1083
							Watts	106	111	119	129	132	139	143	151	157	160
						Tap 3 - Low Static Cool	CFM	980	930	891	840	764	717	676	646	602	536
							RPM	731	775	814	866	935	970	1002	1030	1076	1131
							Watts	138	144	149	159	171	175	181	185	193	202
						Tap 4 - Med Static Cool *	CFM	1212	1178	1144	1103	1064	1018	966	912	829	734
							RPM	856	897	935	967	1011	1054	1102	1136	1151	1160
							Watts	235	244	253	260	271	280	291	293	279	261
						Tap 5 - High Static Cool	CFM	1549	1522	1463	1404	1339	1270	1161	970	857	769
							RPM	1044	1074	1099	1113	1124	1134	1147	1162	1167	1174
							Watts	464	472	467	452	432	411	378	325	298	281
3.0 [10.55]	Tap 3			1050 CFM / 1350 CFM	12x9T Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	967	917	840	779	708	580	492	419	335	300
							RPM	615	658	718	771	817	855	887	911	929	943
							Watts	118	126	136	145	152	160	164	168	171	176
		Tap 2	60,000 [17.58]			Tap 2 - 60K	CFM	922	854	766	698	553	466	400	325	286	256
							RPM	592	629	700	748	796	834	856	875	885	928
							Watts	107	110	119	127	133	140	143	147	149	153
		Tap 2	80,000 [23.45]			Tap 2 - 80K	CFM	1152	1116	1071	993	939	883	824	762	684	612
							RPM	700	733	773	831	870	917	955	989	1025	1048
							Watts	179	188	197	206	219	229	237	246	255	262
						Tap 3 - Low Static Cool	CFM	1336	1297	1264	1225	1188	1105	1043	984	931	867
							RPM	771	804	837	866	897	952	988	1022	1056	1083
							Watts	249	259	271	278	285	300	315	319	328	337
						Tap 4 - Med Static Cool *	CFM	1486	1449	1418	1386	1351	1311	1240	1189	1135	1098
							RPM	840	874	902	930	958	988	1036	1069	1100	1130
							Watts	332	344	353	364	374	384	398	412	422	433
						Tap 5 - High Static Cool	CFM	1517	1493	1465	1429	1401	1364	1294	1249	1203	1148
							RPM	868	893	922	947	973	1003	1052	1088	1113	1145
							Watts	362	371	380	391	400	411	430	443	453	462

Down Discharge Pressure Drop (Add to External Static Pressure)							
CFM [L/s]	800 [378]	1000 [472]	1200 [566]	1400 [661]	1600 [755]	1800 [849]	2000 [944]
Pressure Drop - Inches W.C. [kPa]	.02 [.005]	.05 [.012]	.07 [.017]	.1 [.025]	.12 [.030]	.15 [.037]	.17 [.042]

Notes:

(1) FOR CONSTANT TORQUE MOTORS: USE MOTOR TAPS 3-5 TO ACHIEVE RATED AIRFLOW AT AHRI MINIMUM EXTERNAL STATIC PRESSURE.
(a) Use * marked tap for AHRI 210/240-2023

(2) GRAYED OUT PORTIONS NOT RECOMMENDED FOR USE IN FIELD.

Indoor Airflow Performance RGEAYB ULN (208/230V, 1 & 3-Phase) Constant Torque Motor

TABLE 13
AIR FLOW PERFORMANCE – ULTRA LOW NOx SERIES MODELS

Nominal Cooling Capacity Tons [kW]	Motor Speed from Factory		Heating Input BTU/HR [kW]	Manufacturer Recommended Cooling Airflow (Min/Max)	Blower Size, Motor HP [W] & # of Speeds	Motor Tap - Usage		External Static Pressure - Inches W.C. [kPa] (Side Discharge-Dry Coil)									
	Cool	Heat						0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.12]	0.6 [.15]	0.7 [.17]	0.8 [.20]	0.9 [.22]	1.0 [.25]
3.5 [12.31]	Tap 3			1225 CFM / 1575 CFM	12x9T Blower 3/4 HP [559] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	1130	1077	1027	946	841	764	692	634	551	497
							RPM	647	685	723	770	822	854	905	929	956	974
							Watts	148	155	164	174	182	190	198	206	210	215
		Tap 2	80,000 [23.45]			Tap 2 - 80K	CFM	1317	1266	1226	1170	1105	1032	945	873	817	748
							RPM	718	753	785	821	863	904	947	977	1001	1051
							Watts	213	221	231	239	250	261	271	280	286	298
						Tap 3 - Low Static Cool *	CFM	1557	1517	1475	1436	1398	1352	1306	1245	1178	1119
							RPM	821	849	882	908	936	966	997	1033	1068	1102
							Watts	330	339	350	360	370	381	390	403	415	428
						Tap 4 - Med Static Cool	CFM	1703	1659	1624	1589	1549	1508	1469	1424	1351	1263
							RPM	870	900	926	952	979	1009	1033	1062	1102	1121
							Watts	407	418	430	439	451	462	472	483	497	484
						Tap 5 - High Static Cool	CFM	1832	1807	1775	1740	1704	1672	1639	1583	1505	1348
							RPM	940	961	984	1009	1033	1061	1083	1103	1119	1136
							Watts	519	530	540	552	562	577	586	583	570	531
4.0 [14.07]	Tap 3 - Low Stage Tap 4 - High Stage			1400 CFM / 1800 CFM	12x9R Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	1174	1130	1076	1026	947	872	810	744	689	641
							RPM	664	696	729	759	800	828	860	897	924	942
							Watts	166	173	180	187	195	201	208	217	223	227
		Tap 2	80,000 [23.45]			Tap 2 - 80K	CFM	1262	1220	1175	1117	1058	993	923	870	805	751
							RPM	695	726	756	788	824	856	884	908	948	974
							Watts	197	203	211	218	227	235	242	248	258	265
		Tap 2	100,000 [29.31]			Tap 2 - 100K	CFM	1460	1416	1385	1342	1298	1253	1200	1128	1076	1037
							RPM	780	811	837	865	893	919	949	981	1003	1024
							Watts	285	296	303	313	322	329	340	349	358	364
						Tap 3 - Low Stage Cool	CFM	1354	1316	1273	1229	1179	1121	1062	997	954	891
							RPM	745	773	802	826	856	888	919	945	968	1007
							Watts	239	247	255	260	270	280	287	295	301	312
						Tap 4 - High Stage Cool * Med Static	CFM	1769	1734	1706	1665	1634	1595	1560	1526	1481	1444
							RPM	903	931	953	980	999	1028	1048	1071	1094	1117
							Watts	468	481	490	500	511	524	532	543	554	566
						Tap 5 - High Stage Cool High Static	CFM	1966	1938	1916	1882	1855	1822	1803	1778	1739	1700
							RPM	1003	1027	1047	1070	1091	1115	1128	1150	1172	1195
							Watts	657	670	682	695	707	721	730	742	756	769
5.0 [17.59]	Tap 3 - Low Stage Tap 4 - High Stage			1750 CFM / 2250 CFM	12x9R Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	1171	1124	1068	1012	943	886	829	766	702	642
							RPM	659	692	727	762	800	829	857	891	924	953
							Watts	166	173	181	190	197	204	209	218	225	233
		Tap 2	100,000 [29.31]			Tap 2 - 100K	CFM	1567	1532	1495	1460	1418	1383	1340	1291	1244	1186
							RPM	828	854	879	907	935	960	985	1012	1042	1070
							Watts	350	361	371	380	391	400	410	420	430	442
						Tap 3 - Low Stage Cool	CFM	1419	1381	1350	1301	1256	1207	1140	1086	1035	977
							RPM	763	791	817	847	876	909	943	970	995	1020
							Watts	268	277	285	295	304	314	323	332	340	348
						Tap 4 - High Stage Cool * Med Static	CFM	1938	1904	1873	1841	1813	1811	1754	1726	1694	1661
							RPM	976	1002	1019	1043	1063	1065	1107	1130	1159	1180
							Watts	622	638	645	657	669	670	693	707	725	737
						Tap 5 - High Stage Cool High Static	CFM	2138	2106	2084	2050	2025	1990	1963	1943	1914	1891
							RPM	1057	1075	1094	1117	1134	1162	1186	1206	1229	1245
							Watts	823	833	848	860	873	891	908	924	941	953

Down Discharge Pressure Drop (Add to External Static Pressure)							
CFM [L/s]	800 [378]	1000 [472]	1200 [566]	1400 [661]	1600 [755]	1800 [849]	2000 [944]
Pressure Drop - Inches W.C. [kPa]	.02 [.005]	.05 [.012]	.07 [.017]	.1 [.025]	.12 [.030]	.15 [.037]	.17 [.042]

Notes:

(1) FOR CONSTANT TORQUE MOTORS: USE MOTOR TAPS 3-5 TO ACHIEVE RATED AIRFLOW AT AHRI MINIMUM EXTERNAL STATIC PRESSURE.
(a) Use * marked tap for AHRI 210/240-2023

(2) GRAYED OUT PORTIONS NOT RECOMMENDED FOR USE IN FIELD.

Indoor Airflow Performance RGEAYB ULN (460V, 3-Phase) Constant Torque Motor

Nominal Cooling Capacity Tons [kW]	Motor Speed from Factory		Heating Input BTU/HR [kW]	Manufacturer Recommended Cooling Airflow (Min/Max)	Blower Size, Motor HP [W] & # of Speeds	Motor Tap - Usage		External Static Pressure - Inches W.C. [kPa] (Side Discharge-Dry Coil)									
	Cool	Heat						0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.12]	0.6 [.15]	0.7 [.17]	0.8 [.20]	0.9 [.22]	1.0 [.25]
3.0 [10.55]	Tap 3			1050 CFM / 1350 CFM	12x9T Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	964	915	839	775	707	643	537	473	388	335
							RPM	603	643	708	758	804	842	887	908	931	940
							Watts	121	128	140	150	160	167	176	180	184	187
		Tap 2	60,000 [17.58]			Tap 2 - 60K	CFM	942	882	801	733	661	532	453	376	320	300
							RPM	592	632	693	746	791	840	869	889	904	938
							Watts	113	119	130	140	148	157	163	167	168	176
		Tap 2	80,000 [23.45]			Tap 2 - 80K	CFM	1099	1066	1026	954	896	873	814	741	653	586
							RPM	667	704	740	798	843	894	930	961	1001	1025
							Watts	167	176	184	199	209	222	230	239	248	254
						Tap 3 - Low Static Cool	CFM	1285	1271	1247	1213	1159	1100	1041	991	941	892
							RPM	770	794	827	857	903	947	986	1019	1050	1080
							Watts	259	266	278	287	303	317	330	340	350	360
						Tap 4 - Med Static Cool *	CFM	1422	1414	1396	1370	1340	1303	1244	1183	1129	1086
							RPM	841	860	884	914	940	970	1018	1060	1093	1122
							Watts	342	349	359	370	380	392	410	426	440	452
						Tap 5 - High Static Cool	CFM	1467	1459	1441	1414	1383	1354	1315	1244	1187	1125
							RPM	865	880	905	932	958	985	1016	1068	1108	1138
							Watts	370	376	388	399	409	420	433	455	470	480
4.0 [14.07]	Tap 3 - Low Stage Tap 4 - High Stage			1400 CFM / 1800 CFM	12x9R Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	1177	1130	1075	1024	949	886	832	773	700	663
							RPM	662	692	729	762	802	829	862	893	928	946
							Watts	175	182	191	200	210	217	225	233	241	247
		Tap 2	80,000 [23.45]			Tap 2 - 80K	CFM	1274	1233	1183	1133	1078	1016	949	899	843	781
							RPM	704	734	769	801	832	864	895	921	956	986
							Watts	213	222	232	241	250	259	268	275	285	294
		Tap 2	100,000 [29.31]			Tap 2 - 100K	CFM	1472	1432	1392	1350	1303	1253	1202	1145	1090	1046
							RPM	787	814	842	866	897	924	957	989	1012	1039
							Watts	306	316	326	334	345	355	368	380	389	398
						Tap 3 - Low Stage Cool	CFM	1359	1322	1277	1232	1179	1123	1065	1021	964	918
							RPM	748	779	809	838	869	903	928	947	975	1008
							Watts	255	266	276	284	295	305	313	319	329	338
						Tap 4 - High Stage Cool *	CFM	1751	1717	1680	1645	1610	1581	1534	1494	1449	1408
							RPM	901	925	951	976	1001	1024	1050	1075	1105	1128
							Watts	481	495	507	517	530	542	557	567	582	594
						Tap 5 - High Stage Cool High Static	CFM	1942	1913	1884	1850	1824	1790	1759	1725	1682	1640
							RPM	991	1012	1033	1054	1075	1098	1119	1142	1163	1187
							Watts	654	669	680	693	706	717	728	743	753	765
5.0 [17.59]	Tap 3 - Low Stage Tap 4 - High Stage			1750 CFM / 2250 CFM	12x9R Blower 1 HP [746] 5 Speed (Constant Torque)	Tap 1 - FAN	CFM	1171	1124	1068	1012	943	886	829	766	702	642
							RPM	659	692	727	762	800	829	857	891	924	953
							Watts	166	173	181	190	197	204	209	218	225	233
		Tap 2	100,000 [29.31]			Tap 2 - 100K	CFM	1558	1519	1485	1454	1413	1369	1328	1280	1229	1173
							RPM	825	849	879	905	932	962	989	1019	1047	1073
							Watts	362	374	385	395	408	420	433	445	456	467
						Tap 3 - Low Stage Cool	CFM	1407	1365	1335	1294	1247	1189	1131	1081	1034	981
							RPM	761	790	817	845	879	912	946	970	994	1031
							Watts	278	289	299	308	319	330	342	350	360	369
						Tap 4 - High Stage Cool * Med Static	CFM	1947	1918	1881	1858	1828	1794	1760	1732	1689	1655
							RPM	981	1003	1025	1047	1069	1093	1114	1136	1157	1178
							Watts	657	672	684	696	708	723	733	745	756	770
						Tap 5 - High Stage Cool High Static	CFM	2137	2104	2078	2051	2014	1983	1954	1926	1894	1855
							RPM	1067	1083	1097	1122	1138	1164	1182	1198	1215	1237
							Watts	876	889	898	912	924	936	947	957	968	978

Down Discharge Pressure Drop (Add to External Static Pressure)							
CFM [L/s]	800 [378]	1000 [472]	1200 [566]	1400 [661]	1600 [755]	1800 [849]	2000 [944]
Pressure Drop - Inches W.C. [kPa]	.02 [.005]	.05 [.012]	.07 [.017]	.1 [.025]	.12 [.030]	.15 [.037]	.17 [.042]

Notes:

(1) FOR CONSTANT TORQUE MOTORS: USE MOTOR TAPS 3-5 TO ACHIEVE RATED AIRFLOW AT AHRI MINIMUM EXTERNAL STATIC PRESSURE.
(a) Use * marked tap for AHRI 210/240-2023

(2) GRAYED OUT PORTIONS NOT RECOMMENDED FOR USE IN FIELD.

XIV. BLOWER SPEED SELECTIONS

The UT Electronic Controls control boards have four quick connect terminals for connecting the motor speed leads. These are:

1. FAN SPEED — motor runs on this speed when the thermostat is in the “FAN” position.
2. COOL — connect desired cooling speed.
3. HEAT — connect desired heating speed.
4. HEAT/COOL — connect desired speed when heating and cooling speed are the same.

⚠ CAUTION

DO NOT CONNECT ANY MOTOR SPEEDS TO “HEAT” OR “COOL” IF YOU USE THE “HEAT/COOL” TERMINAL. DOING SO WILL DAMAGE THE BLOWER MOTOR. UNUSED MOTOR WIRE TAPS MUST BE CONNECTED TO PARKING TERMINALS M1 AND M2 OF THE IFC, OR PROPERLY INSULATED.

GAS FURNACE (DIRECT DRIVE) INSTRUCTIONS FOR CHANGING BLOWER SPEED

⚠ WARNING

DISCONNECT THE ELECTRICAL SUPPLY TO THE FURNACE BEFORE ATTEMPTING TO CHANGE THE BLOWER SPEED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

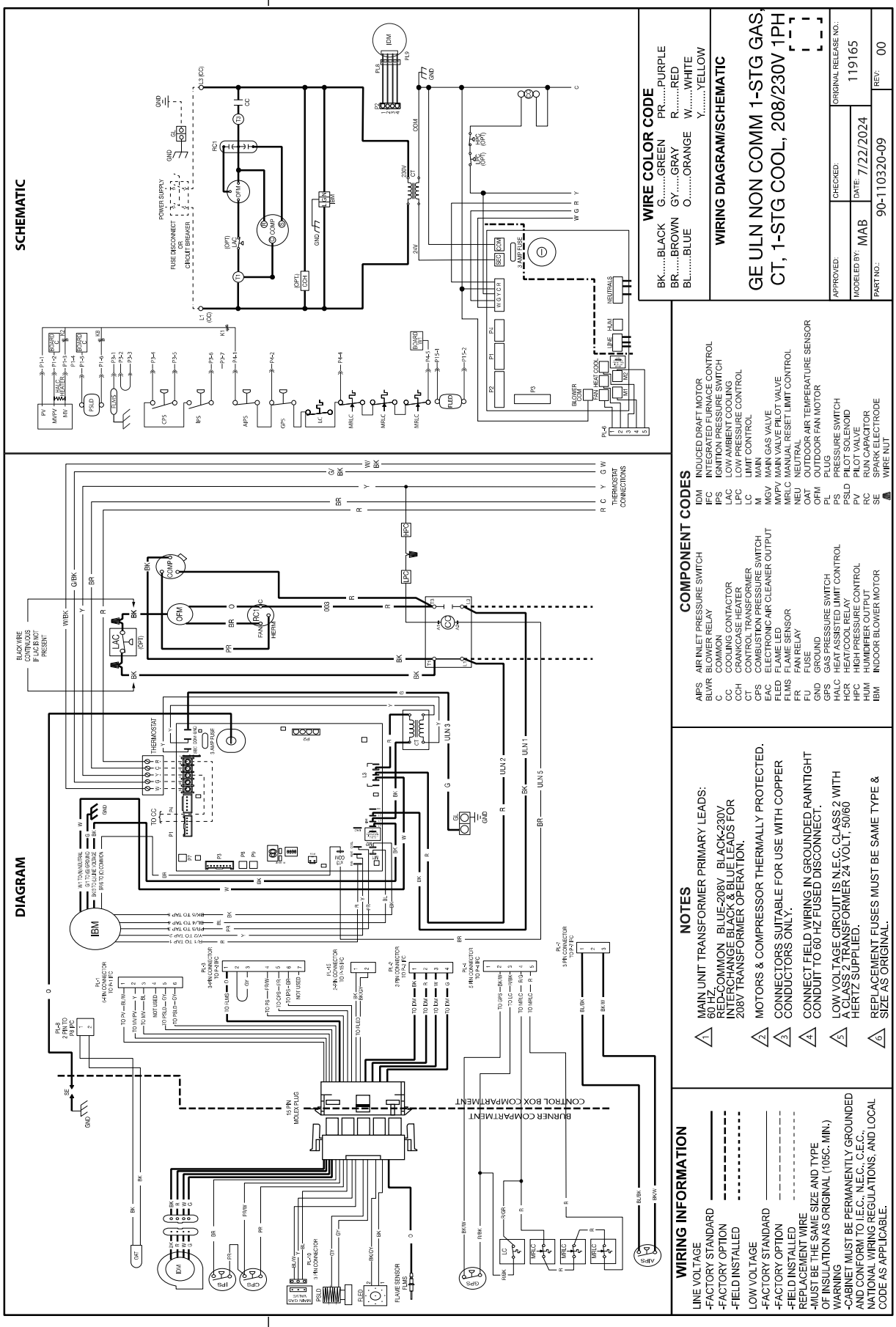
The blower motor is wired for blower speeds required for normal operation as shown.

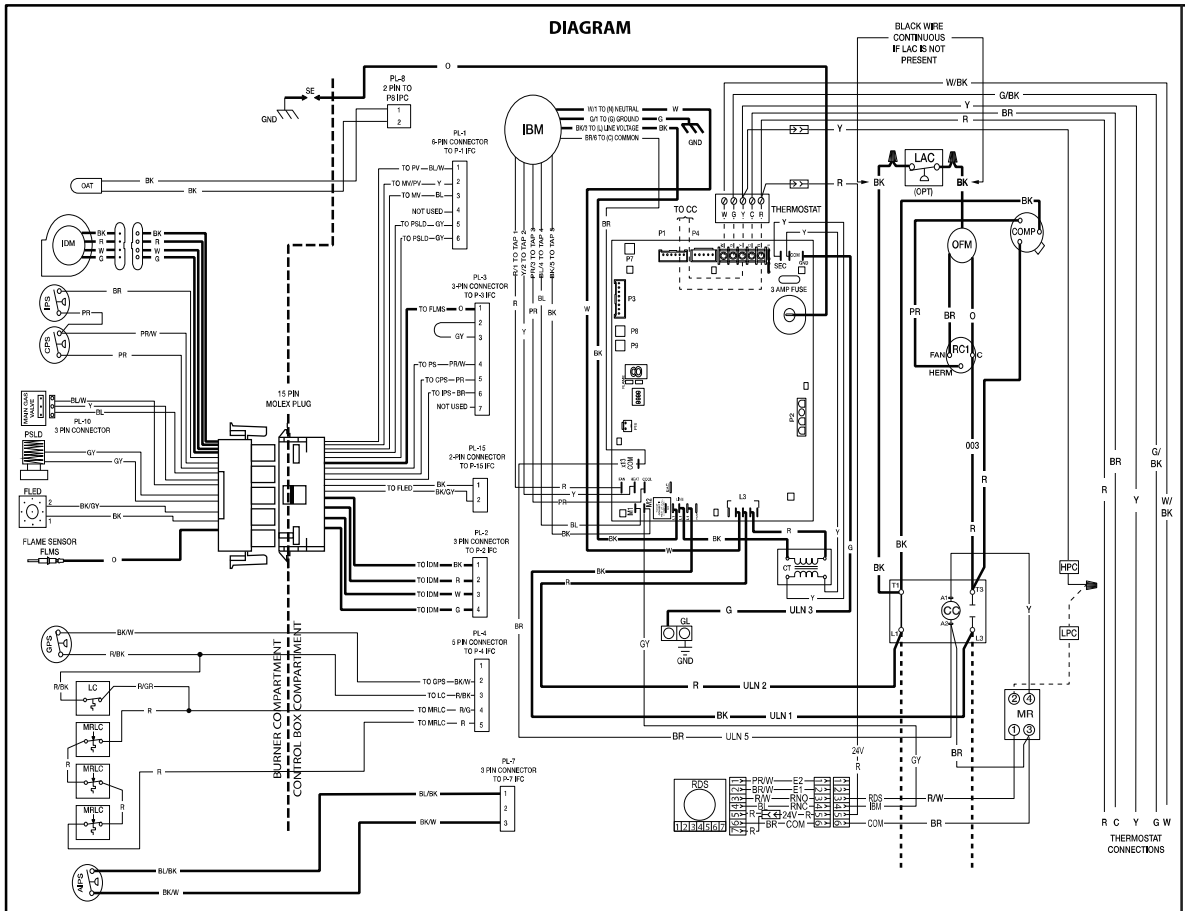
If additional blower speed taps are available (leads connected to “M1” and “M2” on the electronic control), speeds may be changed if necessary to fit requirements of the particular installation. Reconnect the unused motor leads to “M1” or “M2.” Check motor lead color for speed designation.

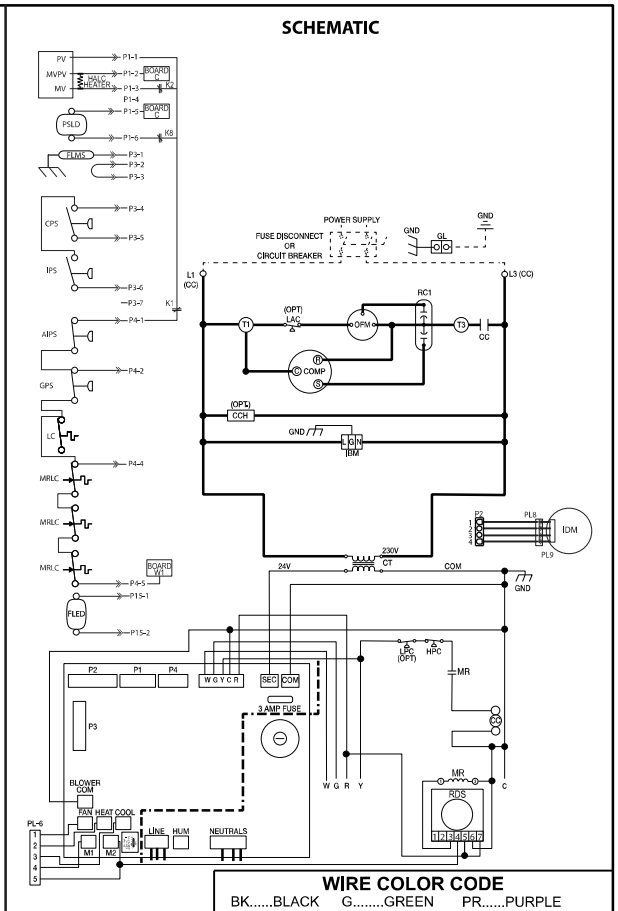
Heating speeds should not be reduced where it could cause the furnace air temperature to rise to exceed the maximum outlet air temperature specified for the unit.

XVI. WIRING DIAGRAMS

A wiring diagram is also available on the unit.







WIRE COLOR CODE

BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - -
-FIELD INSTALLED · · · · · · ·

LOW VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - -
-FIELD INSTALLED · · · · · · ·

REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ. RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.
7. HPC CONTINUOUS TO MR, WHEN LPC NOT PRESENT.

COMPONENT CODES

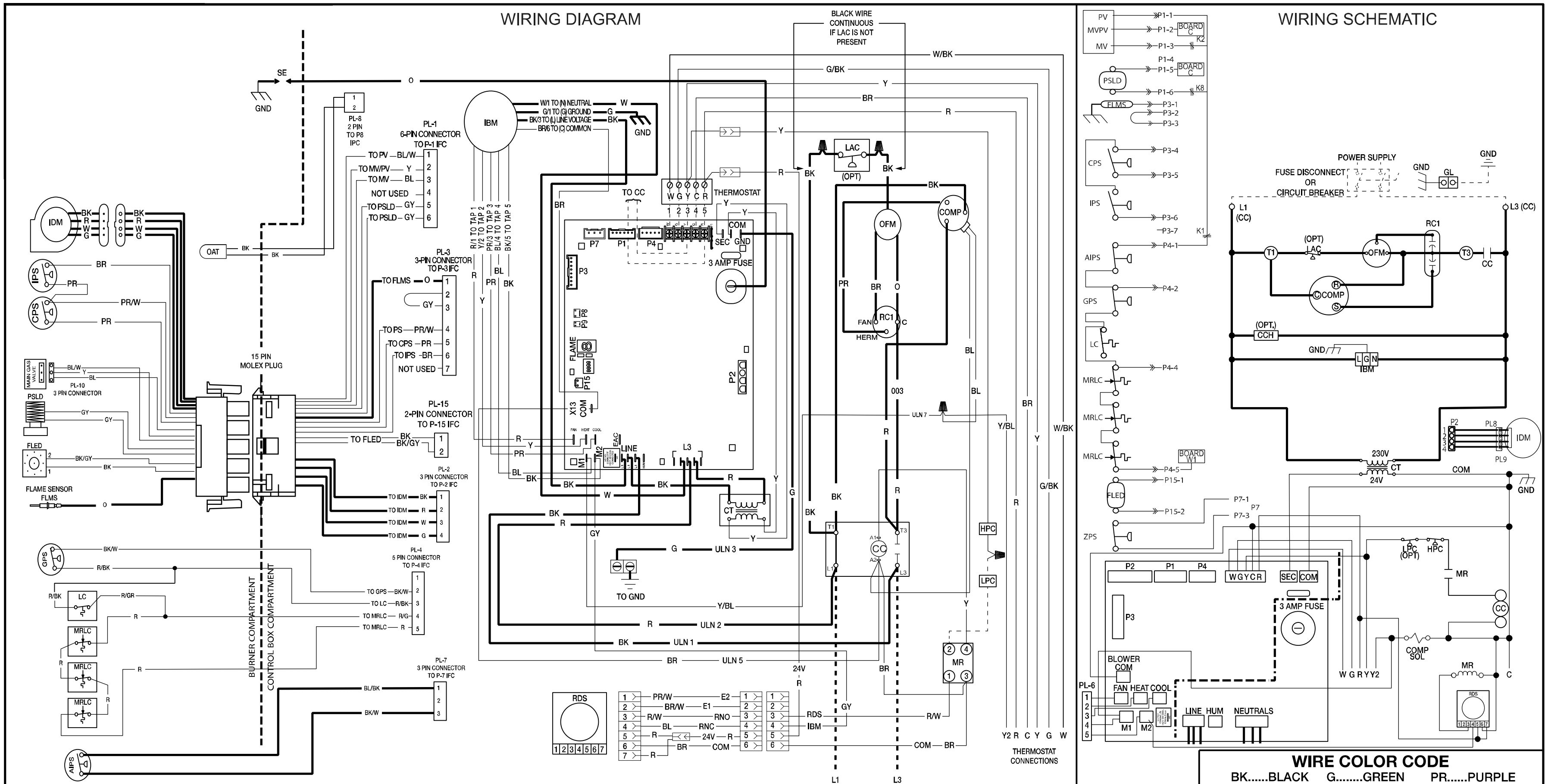
AIPS	AIR INLET PRESSURE SWITCH	IPS	IGNITION PRESSURE SWITCH
BLWR	BLOWER RELAY	LAC	LOW AMBIENT COOLING
C	COMMON	LPC	LOW PRESSURE CONTROL
CC	COOLING CONTACTOR	LC	LIMIT CONTROL
CCH	CRANKCASE HEATER	M	MAIN
CT	CONTROL TRANSFORMER	MGV	MAIN GAS VALVE
CPS	COMBUSTION PRESSURE SWITCH	MVPV	MAIN VALVE PILOT VALVE
EAC	ELECTRONIC AIR CLEANER OUTPUT	MR	MITIGATION RELAY
FLED	FLAME LED	MRLC	MANUAL RESET LIMIT CONTROL
FLMS	FLAME SENSOR	NEU	NEUTRAL
FR	FAN RELAY	OAT	OUTDOOR AIR TEMPERATURE SENSOR
FU	FUSE	OFM	OUTDOOR FAN MOTOR
GL	GROUND LUG	PL	PLUG
GND	GROUND	PS	PRESSURE SWITCH
GPS	GAS PRESSURE SWITCH	PSLD	PILOT SOLENOID
HALC	HEAT ASSISTED LIMIT CONTROL	PV	PILOT VALVE
HCR	HEAT/COOL RELAY	RC	RUN CAPACITOR
HPC	HIGH PRESSURE CONTROL	RDS	REFRIGERANT DETECTION SYSTEM
HUM	HUMIDIFIER OUTPUT	SE	SPARK ELECTRODE
IBM	INDOOR BLOWER MOTOR		WIRE NUT
IDM	INDUCED DRAFT MOTOR		
IFC	INTEGRATED FURNACE CONTROL		

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 1-STG COOL, RDS, 208/230V 1PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.:	
MODELED BY: MAB	DATE: 7/22/2024	119165	
PART NO.: 90-110320-10		REV: 00	

FIGURE 29



WIRING INFORMATION

LINE VOLTAGE
- FACTORY STANDARD
- FACTORY OPTION
- FIELD INSTALLED

LOW VOLTAGE
- FACTORY STANDARD
- FACTORY OPTION
- FIELD INSTALLED

REPLACEMENT WIRE
- MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
- CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODES AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ.
   RED-COMMON BLUE-208V BLACK-230V
   INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.
7. HPC CONTINUOUS TO MR, WHEN LPC NOT PRESENT

COMPONENT CODES

AIPS	AIR INLET PRESSURE SWITCH	IFC	INTEGRATED FURNACE CONTROL
BLWR	BLOWER RELAY	IPS	IGNITION PRESSURE SWITCH
C	COMMON	LAC	LOW AMBIENT COOLING
CC	COOLING CONTACTOR	LPC	LOW PRESSURE CONTROL
CCH	CRANKCASE HEATER	LC	LIMIT CONTROL
CT	CONTROL TRANSFORMER	M	MAIN
CPS	COMBUSTION PRESSURE SWITCH	MGV	MAIN GAS VALVE
EAC	ELECTRONIC AIR CLEANER OUTPUT	MVPV	MAIN VALVE PILOT VALVE
FLED	FLAME LED	MR	MITIGATION RELAY
FLMS	FLAME SENSOR	MRLC	MANUAL RESET LIMIT CONTROL
FR	FAN RELAY	NEU	NEUTRAL
FU	FUSE	OAT	OUTDOOR AIR TEMPERATURE SENSOR
GND	GROUND	OFM	OUTDOOR FAN MOTOR
GL	GROUND LUG	PL	PLUG
GPS	GAS PRESSURE SWITCH	PS	PRESSURE SWITCH
HALC	HEAT ASSISTED LIMIT CONTROL	PSLD	PILOT SOLENOID
HCR	HEAT/COOL RELAY	PV	PILOT VALVE
HPC	HIGH PRESSURE CONTROL	RC	RUN CAPACITOR
HUM	HUMIDIFIER OUTPUT	RDS	REFRIGERANT DETECTION SYSTEM
IBM	INDOOR BLOWER MOTOR	SE	SPARK ELECTRODE
IDM	INDUCED DRAFT MOTOR	▲	WIRE NUT

WIRE COLOR CODE

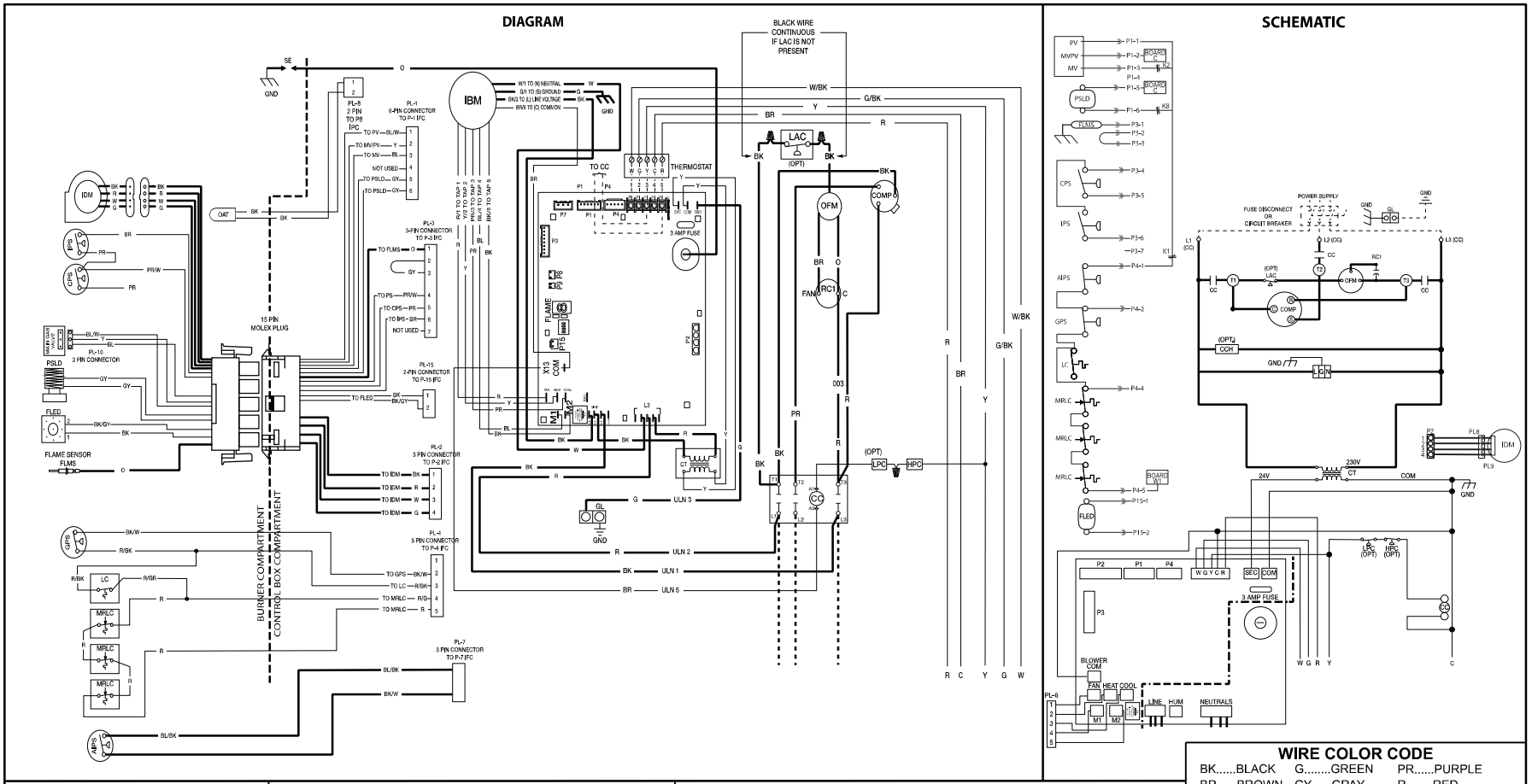
BK......BLACK	G........GREEN	PR......PURPLE
BR......BROWN	GY......GRAY	R........RED
BL.......BLUE	O........ORANGE	W.......WHITE
		Y........YELLOW

WIRING DIAGRAM / SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 2-STG COOL, RDS, 208/230V 1PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.:
MODELED BY: VYM	DATE: 7/1/2024	118718
PART NO: 90-110320-11		REV: 00

FIGURE 30



WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - - - - -
-FIELD INSTALLED ----------

LOW VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION – – – – – – – – – –
-FIELD INSTALLED - - - - - - - - - - -

REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ. RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.

COMPONENT CODES

AIPS	AIR INLET PRESSURE SWITCH	IDM	INDUCED DRAFT MOTOR
BLWR	BLOWER RELAY	IFC	INTEGRATED FURNACE CONTROL
C	COMMON	IPS	IGNITION PRESSURE SWITCH
CC	COOLING CONTACTOR	LAC	LOW AMBIENT COOLING
CCH	CRANKCASE HEATER	LPC	LOW PRESSURE CONTROL
CT	CONTROL TRANSFORMER	LC	LIMIT CONTROL
CPS	COMBUSTION PRESSURE SWITCH	M	MAIN
EAC	ELECTRONIC AIR CLEANER OUTPUT	MGV	MAIN GAS VALVE
FLED	FLAME LED	MVPV	MAIN VALVE PILOT VALVE
FLMS	FLAME SENSOR	MRLC	MANUAL RESET LIMIT CONTROL
FR	FAN RELAY	NEU	NEUTRAL
FU	FUSE	OAT	OUTDOOR AIR TEMPERATURE SENSOR
GND	GROUND	OFM	OUTDOOR FAN MOTOR
GPS	GAS PRESSURE SWITCH	PL	PLUG
HALC	HEAT ASSISTED LIMIT CONTROL	PS	PRESSURE SWITCH
HCR	HEAT/COOL RELAY	PSLD	PILOT SOLENOID
HPC	HIGH PRESSURE CONTROL	PV	PILOT VALVE
HUM	HUMIDIFIER OUTPUT	RC	RUN CAPACITOR
IBM	INDOOR BLOWER MOTOR	SE	SPARK ELECTRODE
			WIRE NUT

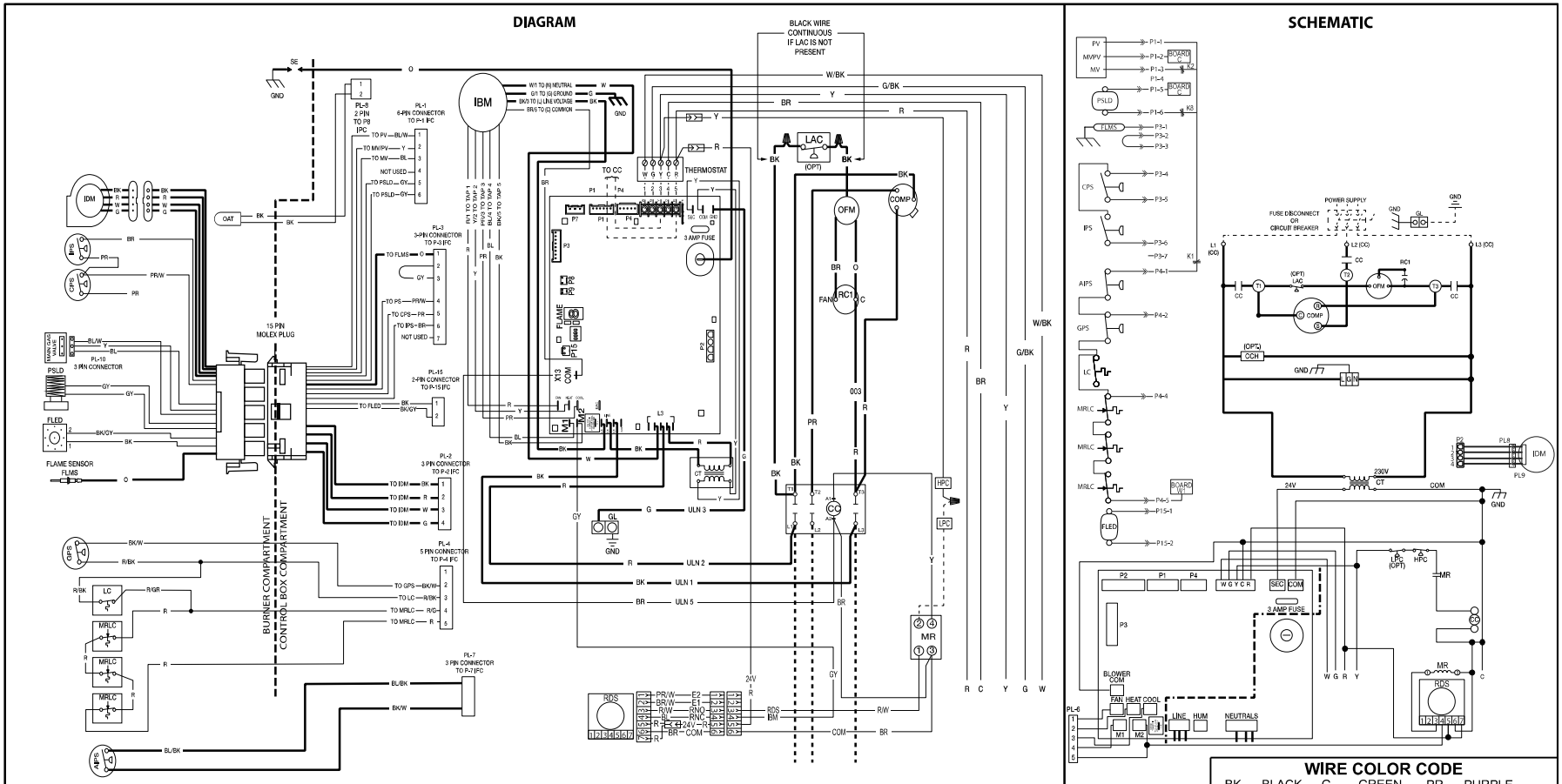
WIRE COLOR CODE

BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 1-STG COOL, 208/230V 3PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.: 119165
MODELED BY: MAB	DATE: 7/22/2024	
PART NO.: 90-110320-12		REV: 00



WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - - - - -
-FIELD INSTALLED . . . . . .

LOW VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - - - - -
-FIELD INSTALLED . . . . . .
REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)
WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ. RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.
7. HPC CONTINUOUS TO MR, WHEN LPC NOT PRESENT.

COMPONENT CODES

AIPS	AIR INLET PRESSURE SWITCH	IPS	IGNITION PRESSURE SWITCH
BLWR	BLOWER RELAY	LAC	LOW AMBIENT COOLING
C	COMMON	LPC	LOW PRESSURE CONTROL
CC	COOLING CONTACTOR	LC	LIMIT CONTROL
CCH	CRANKCASE HEATER	M	MAIN
CT	CONTROL TRANSFORMER	MGV	MAIN GAS VALVE
CPS	COMBUSTION PRESSURE SWITCH	MVPV	MAIN VALVE PILOT VALVE
EAC	ELECTRONIC AIR CLEANER OUTPUT	MRLC	MANUAL RESET LIMIT CONTROL
FLED	FLAME LED	MR	MITIGATION RELAY
FLMS	FLAME SENSOR	NEU	NEUTRAL
FR	FAN RELAY	OAT	OUTDOOR AIR TEMPERATURE SENSOR
FU	FUSE	OFM	OUTDOOR FAN MOTOR
GL	GROUND LUG	PL	PLUG
GND	GROUND	PS	PRESSURE SWITCH
GPS	GAS PRESSURE SWITCH	PSLD	PILOT SOLENOID
HALC	HEAT ASSISTED LIMIT CONTROL	PV	PILOT VALVE
HCR	HEAT/COOL RELAY	RC	RUN CAPACITOR
HPC	HIGH PRESSURE CONTROL	RDS	REFRIGERANT DETECTION SYSTEM
HUM	HUMIDIFIER OUTPUT	SE	SPARK ELECTRODE
IBM	INDOOR BLOWER MOTOR		WIRE NUT
IDM	INDUCED DRAFT MOTOR		
IFC	INTEGRATED FURNACE CONTROL		

WIRE COLOR CODE

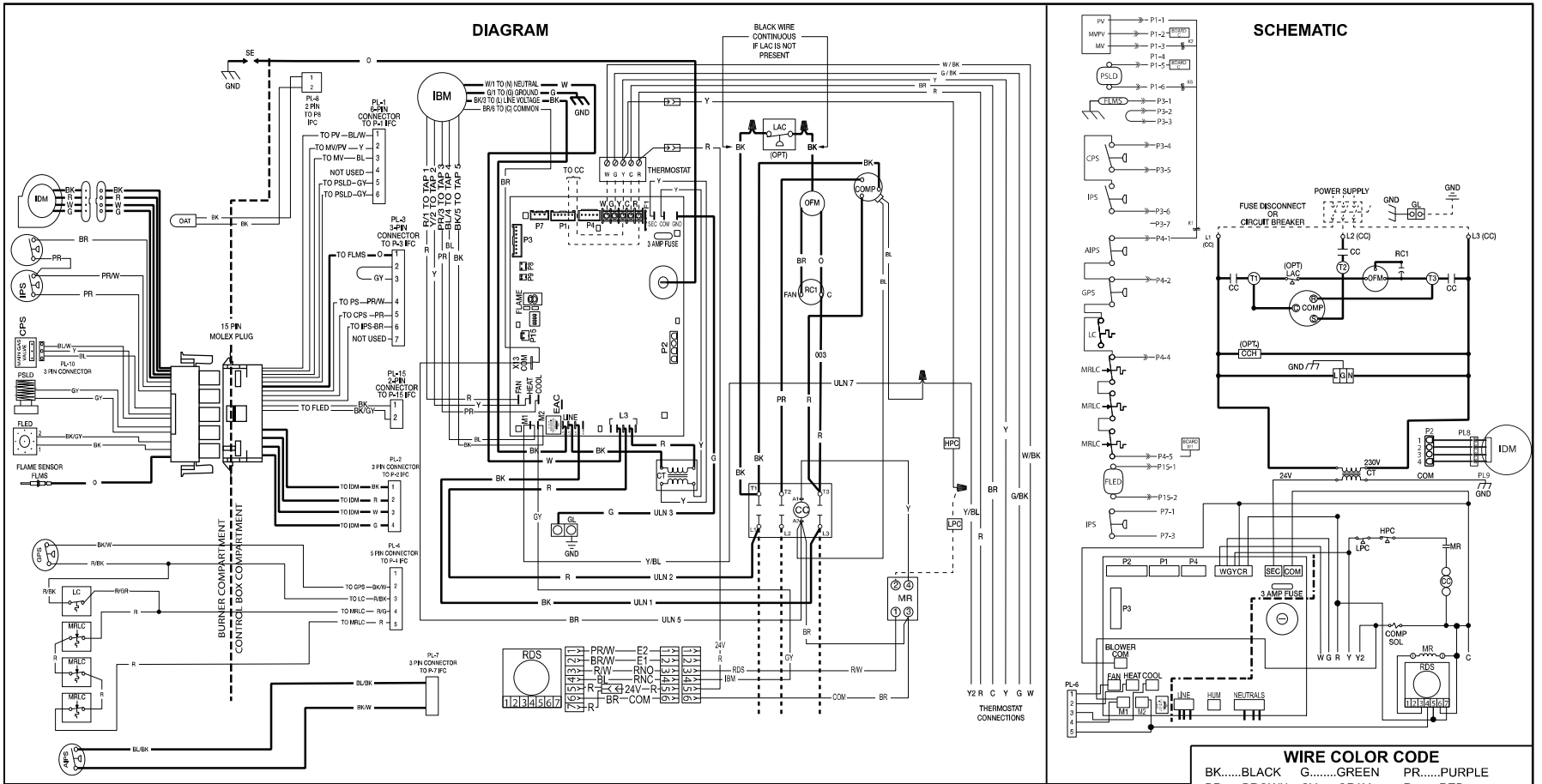
BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 1-STG COOL, RDS, 208/230V 3PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.:	
MODELED BY: MAB	DATE: 7/22/2024	119165	
PART NO.: 90-110320-13		REV: 00	

FIGURE 32



WIRE COLOR CODE

BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

LOW VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ, RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.
7. HPC CONTINUOUS TO MR, WHEN LPC NOT PRESENT.

COMPONENT CODES

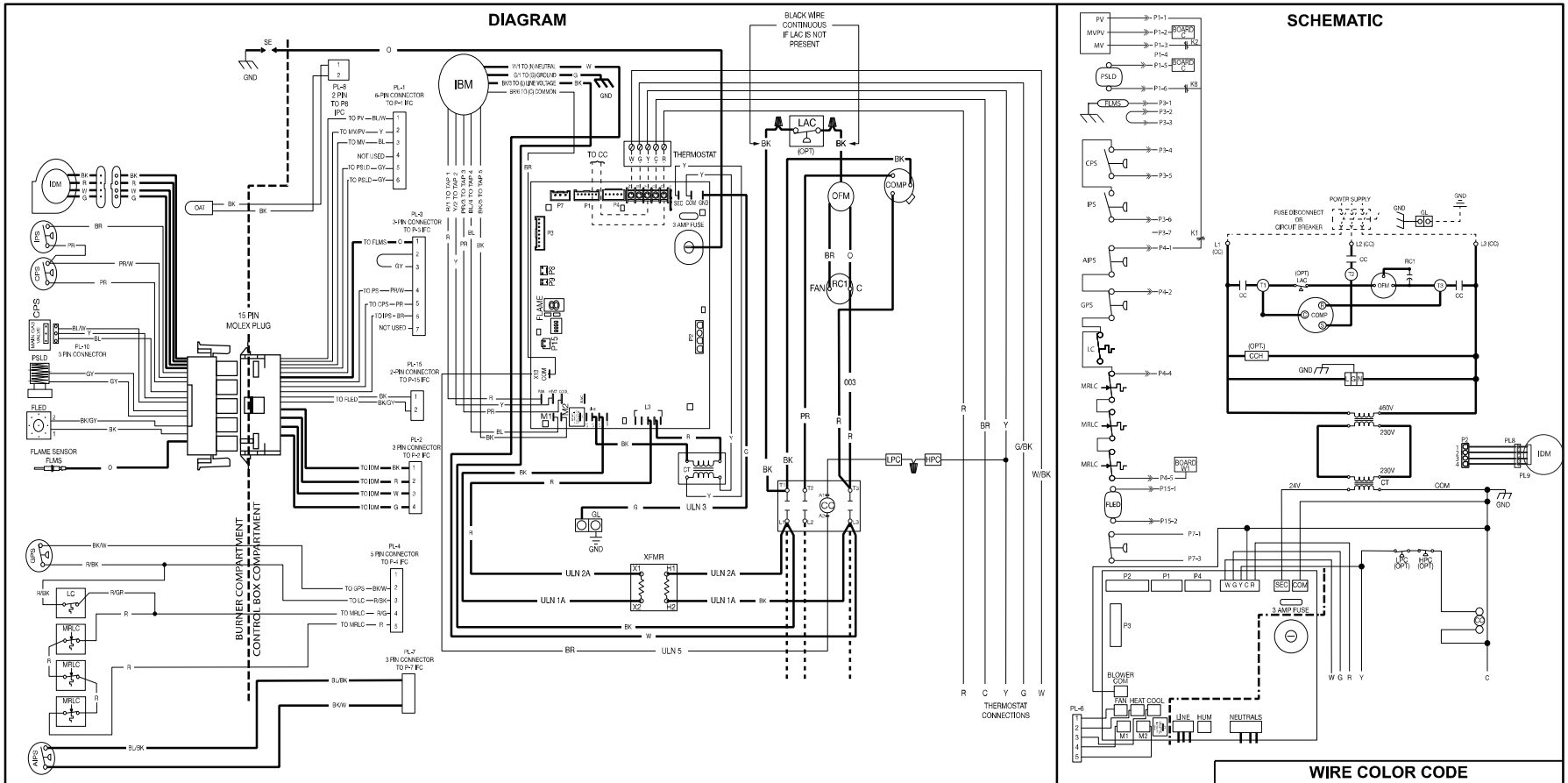
AIPS	AIR INLET PRESSURE SWITCH
BLWR	BLOWER RELAY
C	COMMON
CC	COOLING CONTACTOR
CCH	CRANKCASE HEATER
CT	CONTROL TRANSFORMER
CPS	COMBUSTION PRESSURE SWITCH
EAC	ELECTRONIC AIR CLEANER OUTPUT
FLED	FLAME LED
FLMS	FLAME SENSOR
FR	FAN RELAY
FU	FUSE
GL	GROUND LUG
GND	GROUND
GPS	GAS PRESSURE SWITCH
HALC	HEAT ASSISTED LIMIT CONTROL
HCR	HEAT/COOL RELAY
HPC	HIGH PRESSURE CONTROL
HUM	HUMIDIFIER OUTPUT
IBM	INDOOR BLOWER MOTOR
IDM	INDUCED DRAFT MOTOR
IFC	INTEGRATED FURNACE CONTROL
IPS	IGNITION PRESSURE SWITCH
LAC	LOW AMBIENT COOLING
LPC	LOW PRESSURE CONTROL
LC	LIMIT CONTROL
M	MAIN
MGV	MAIN GAS VALVE
MVPV	MAIN VALVE PILOT VALVE
MRLC	MANUAL RESET LIMIT CONTROL
MR	MITIGATION RELAY
NEU	NEUTRAL
OAT	OUTDOOR AIR TEMPERATURE SENSOR
OFM	OUTDOOR FAN MOTOR
PL	PLUG
PS	PRESSURE SWITCH
PSLD	PILOT SOLENOID
PV	PILOT VALVE
RC	RUN CAPACITOR
RDS	REFRIGERANT DETECTION SYSTEM
SE	SPARK ELECTRODE
⏚	WIRE NUT

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 2-STG COO
RDS, 208/230V 3PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.: 119165
MODELED BY: MAB	DATE: 7/22/2024	
PART NO.: 90-110320-14		REV: 00

FIGURE 33



WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

LOW VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ. RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.

COMPONENT CODES

AIPS	AIR INLET PRESSURE SWITCH	IDM	INDUCED DRAFT MOTOR
BLWR	BLOWER RELAY	IFC	INTEGRATED FURNACE CONTROL
C	COMMON	IPS	IGNITION PRESSURE SWITCH
CC	COOLING CONTACTOR	LAC	LOW AMBIENT COOLING
CCH	CRANKCASE HEATER	LPC	LOW PRESSURE CONTROL
CT	CONTROL TRANSFORMER	LC	LIMIT CONTROL
CPS	COMBUSTION PRESSURE SWITCH	M	MAIN
EAC	ELECTRONIC AIR CLEANER OUTPUT	MGV	MAIN GAS VALVE
FLED	FLAME LED	MVPV	MAIN VALVE PILOT VALVE
FLMS	FLAME SENSOR	MRLC	MANUAL RESET LIMIT CONTROL
FR	FAN RELAY	NEU	NEUTRAL
FU	FUSE	OAT	OUTDOOR AIR TEMPERATURE SENSOR
GND	GROUND	OFM	OUTDOOR FAN MOTOR
GPS	GAS PRESSURE SWITCH	PL	PLUG
HALC	HEAT ASSISTED LIMIT CONTROL	PS	PRESSURE SWITCH
HCR	HEAT/COOL RELAY	PSLD	PILOT SOLENOID
HPC	HIGH PRESSURE CONTROL	PV	PILOT VALVE
HUM	HUMIDIFIER OUTPUT	RC	RUN CAPACITOR
IBM	INDOOR BLOWER MOTOR	SE	SPARK ELECTRODE
			WIRE NUT

WIRE COLOR CODE

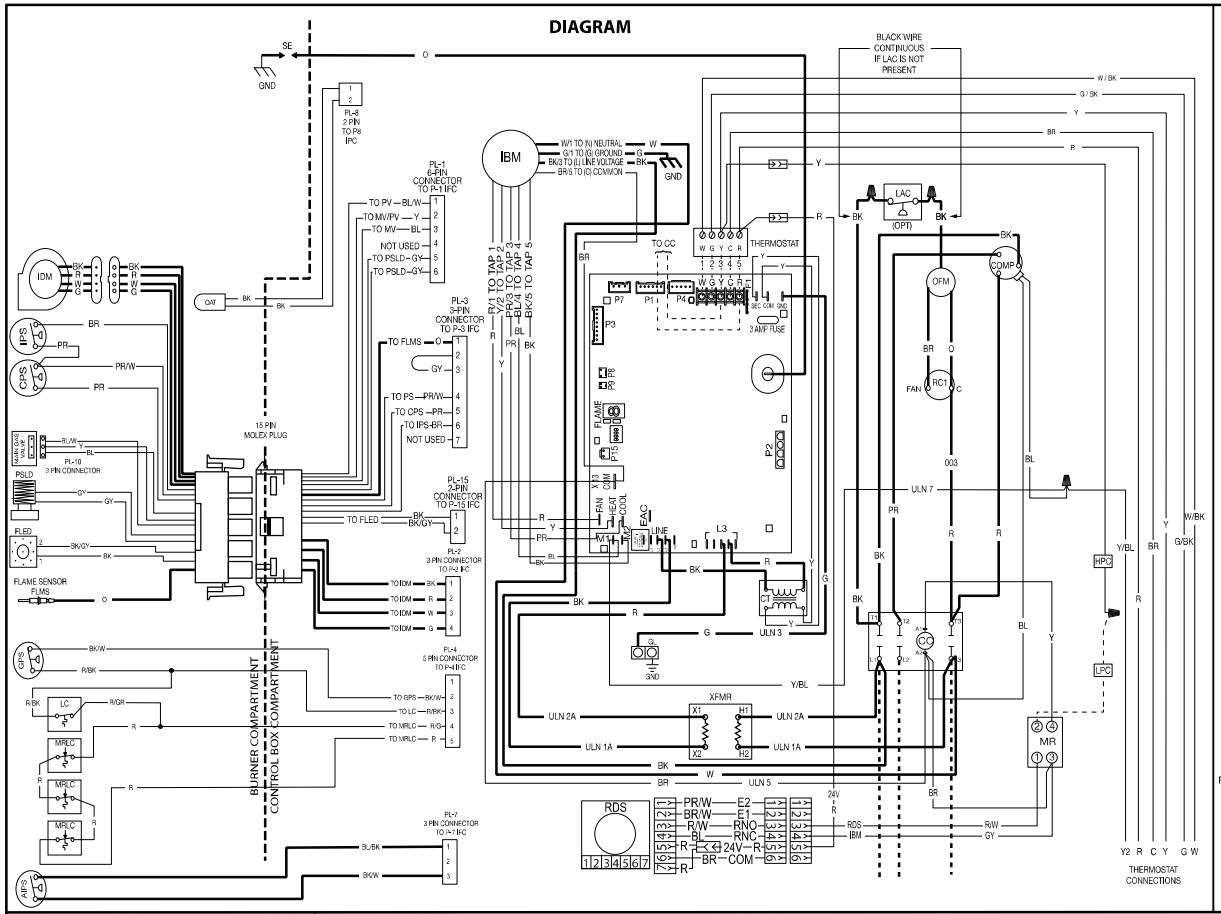
BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 1-STG COOL, 460V 3PH

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.:	119165
MODELED BY: MAB	DATE: 7/22/2024		
PART NO.: 90-110320-15		REV: 00	

FIGURE 34



WIRE COLOR CODE

BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION - - - - - - -
-FIELD INSTALLED . . . . . .

LOW VOLTAGE
-FACTORY STANDARD ——————
-FACTORY OPTION – – – – – – –
-FIELD INSTALLED . . . . . .
REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)
WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODE AS APPLICABLE.

NOTES

1. MAIN UNIT TRANSFORMER PRIMARY LEADS: 60 HZ. RED-COMMON BLUE-208V BLACK-230V INTERCHANGE BLACK & BLUE LEADS FOR 208V TRANSFORMER OPERATION.
2. MOTORS & COMPRESSOR THERMALLY PROTECTED.
3. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
4. CONNECT FIELD WIRING IN GROUNDED RAINTIGHT CONDUIT TO 60 HZ FUSED DISCONNECT.
5. LOW VOLTAGE CIRCUIT IS N.E.C. CLASS 2 WITH A CLASS 2 TRANSFORMER 24 VOLT, 50/60 HERTZ SUPPLIED.
6. REPLACEMENT FUSES MUST BE SAME TYPE & SIZE AS ORIGINAL.
7. HPC CONTINUOUS TO MR, WHEN LPC NOT PRESENT.

COMPONENT CODES

AIPS	AIR INLET PRESSURE SWITCH
BLWR	BLOWER RELAY
C	COMMON
CC	COOLING CONTACTOR
CCH	CRANKCASE HEATER
CT	CONTROL TRANSFORMER
CPS	COMBUSTION PRESSURE SWITCH
EAC	ELECTRONIC AIR CLEANER OUTPUT
FLED	FLAME LED
FLMS	FLAME SENSOR
FR	FAN RELAY
FU	FUSE
GL	GROUND LUG
GND	GROUND
GPS	GAS PRESSURE SWITCH
HALC	HEAT ASSISTED LIMIT CONTROL
HCR	HEAT/COOL RELAY
HPC	HIGH PRESSURE CONTROL
HUM	HUMIDIFIER OUTPUT
IBM	INDOOR BLOWER MOTOR
IDM	INDUCED DRAFT MOTOR
IFC	INTEGRATED FURNACE CONTROL
IPS	IGNITION PRESSURE SWITCH
LAC	LOW AMBIENT COOLING
LPC	LOW PRESSURE CONTROL
LC	LIMIT CONTROL
M	MAIN
MGV	MAIN GAS VALVE
MVPV	MAIN VALVE PILOT VALVE
MRLC	MANUAL RESET LIMIT CONTROL
MR	MITIGATION RELAY
NEU	NEUTRAL
OAT	OUTDOOR AIR TEMPERATURE SENSOR
OFM	OUTDOOR FAN MOTOR
PL	PLUG
PS	PRESSURE SWITCH
PSLD	PILOT SOLENOID
PV	PILOT VALVE
RC	RUN CAPACITOR
RDS	REFRIGERANT DETECTION SYSTEM
SE	SPARK ELECTRODE
⚠	WIRE NUT

WIRING DIAGRAM/SCHEMATIC

GE ULN NON COMM 1-STG GAS, CT, 2-STG COOL, RDS, 460V 3PH

APPROVED:		CHECKED:	ORIGINAL RELEASE NO.: 119165
MODELED BY: MAB	DATE: 7/24/2024		
PART NO.: 90-110320-16		REV: 00	

XVII. TROUBLE SHOOTING AND FAULT CODES

Refer to fault codes for determining cause of unit problems.

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

FAULT CODE DISPLAYED AT SEVEN-SEGMENT DISPLAY OF CONTROL	DUAL FAULTS DISPLAYED
	The method for display and two-digit fault is to display the first digit (most significant) digit for one second immediately followed by the second digit - which is also displayed for a duration of one second. A 1/2 second pause is then displayed. Cycle repeats until the fault is cleared. Each fault is flashe (displayed) a minimum of two times even if the fault condition has cleared before the fault can be displayed twice.
	A. The first two-digit fault will be displayed once as described above
	B. The upper-most horizontal segment of the seven segment display is energized for 1/2 second
	C. The second two-digit fault is displayed once as described above
	D. The upper-most horizontal segment of the seven segment display is energized for 1/2 second again

NORMAL OPERATION CODES

0	STANDBY MODE
	DESCRIPTION: This code is displayed anytime there is no fault present and no thermostat call present. The furnace is idle
C	COOLING OR HEATPUMP OPERATION
	DESCRIPTION: This code is displayed anytime there is a call for cooling from he outdoor condenser or heat pump
F	CONTINUOUS FAN MODE
	DESCRIPTION: This code is displayed anytime there is a call for continuous fan from the thermostat
H	GAS HEAT MODE
	DESCRIPTION: This code is displayed anytime there is a call for gas heat
CL	CALIBRATION MODE
	DESCRIPTION: This code is displayed at initial heat call following power up and every 100 cycle after that to calibrate the inducer speed

FAULT CODES

10	ONE-HOUR LOCKOUT
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function.
	DESCRIPTION: This fault is displayed under the following conditions:
	1. When a failed ignition has occurred four times in a row, the control enters one-hour lockout and fault codes "**10**" and "**11**" will be displayed alternately at the seven-segment display. See fault code **11** for a description on expected operation, causes and solutions for this fault code.
	2. While the control has entered a one-hour lockout after declaring a dead blower after the main limit control has been open more than 150 seconds, the fault code "**61**" (Non-operational blower) and "**10**" (soft lockout) will be displayed alternately at the seven-segment display. Note: the dead blower fault and associated one-hour lockout will occur up to four times in the one heat call. Upon declaring this fault for the fourth time in one heat call, the control will enter hard lockout requiring manual reset of power furnace. See fault code 61 for a description on expected operation, causes and solutions for this fault code.
	3. When IFC is in soft lockout and fault "**93**" is active, the fault code "**93**" is to be displayed alternately with the fault code "10" at the furnace seven-segment display. See fault code **93** for a description on expected operation, causes and solutions for this fault code.
	4. When flame is lost five times in a row, the control enters one-hour lockout and fault code "10" and "13" will be displayed alternately at the IFC seven-segment display. See fault code **13** for a description on expected operation, causes and solutions for this fault code.
	5. While the control is in one-hour lockout due to an unexpected flame, the fault code **"14"** (unexpected flame) and "**10**" (soft lockout0 will be displayed alternately at the furnace seven-segment display. See fault code **14** for description on expected operation, causes and solutions for this fault code.

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

11	FAILED IGNITION
	STATUS: Up to three failed ignitions will not constitute
	DESCRIPTION: This fault ts displayed at the furnace control after the first failed ignition attempt. it continues to be displayed until unsuccessful ignition or the furnace control has failed to ignite four consecutive times. After four attempts, the status of the fault is elevated to "10" and the furnace control (or I.F.C.) reacts as described under description for the fault code "10".
	EXPECTED OPERATION: After the ailed ignition attempt, the fault ("11") is displayed and under the inducer will complete a post-urge followed by a second ignition attempt. This cycle will be repeated until gas heat is established or until the fourth failed ignition attempt. After the fourth attempt, the furnace control (IFC) will proceed to one-hour lockout.
	CAUSE: there can be several causes for a failed ignition attempt(s). The most common are: (1) The flame sense rod is unable to sense flame. It may need cleaning not may not be properly connected. (2) The gas valve may be turned off. (3) The igniter is not working properly. It may not be properly connected or th spark location may not be correct. (4) The furnace control may not be working properly and may need to be replaced. (5) Pilot circuit may be malfunctioning.
	SOLUTION: The solution will depend on the cause. Solution to noted causes (1) through (5) above are: (1) Clean or replace th flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). Make sure furnace ground is properly connected. (2) Turn the valve on. (3) replace or reposition the igniter or check all connections and wire between the igniter and the furnace control (or I.F.C.) (4) Replace the furnace control. (5) Check the solenoid valve and the pilot valve to determine if the pilot circuits are opening .
12	LOW FLAME SENSE
	STATUS: the status of this fault is non-critical and furnace operation will continue as normal in heating (and all other) model(s). If flame sens is low, the furnace control (or I.F.C.) may soon no longer be able to properly sense the flame and all other status of the problem may be elevated to the level of fault code "13" or fault "11" (if flame cannot be sensed at all).
	DESCRIPTION: The flame sense current from the flame sense rod at the furnace control (or I.F.C.) is weak or marginal at best.
	EXPECTED OPERATION: All operation (including gas heat) will proceed as normal with only the fault code ("12") displayed at the furnace control (I.F.C.).
	CAUSE: (1) The most common cause or low flame sense during heat operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. (2) Another cause for low flame may be an improperly mounted or poorly grounded flame sensor.
	SOLUTION: (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). (2) Reinstall or replace flame sensors and check wiring and connections. Also, make sure the furnace if properly grounded.

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

13	FAILED IGNITION
	STATUS: Flame loss is not a critical fault. Subsequent ignition attempts will follow and normal operation should resume. However, a lost flame can often be followed by failed ignition attempts then a one-hour lockout. Once the status has reached one-hour lockout, the fault condition is critical (although attempts at ignition will be made again after the hour lockout)
	DESCRIPTION: After a successful ignition trial, the flame (which was properly sensed) is no longer sensed. This can happen any time after successful ignition while a valid heat call is present.
	EXPECTED OPERATION: When flame is lost, the fault code ("13") is immediately displayed ar the IFC SSD's. The IBM (Indoor Blower Motor) is energized (if it was not already) at the correct speed (based on the demand from the thermostat) and completes blower off delay. The IDM (Induced Draft Motor) remains energized at the most recent speed (based on the demand from the thermostat or as required from ignition cycle) for post-purge. After both the post-purge and blower off delay are complete, the fault code ("13") is removed and a new attempt at ignition is made after a 2 minute cool down period. Often, the new ignition attempt will fail and operation will proceed as though a failed ignition has occurred from that point and will lock out (see fault code "10 & 11")
	CAUSE: (1) The most common cause for low flame sense during hear operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. (2) Another cause for low flame maybe an improperly mounted or poorly grounded flame sensor (3) Flame pattern may be unstable
	SOLUTION: The solution will depend on the cause. Solution to noted causes (1) through (5) above are: (1) Clean or replace the igniter/flame sense assembly or check all connections and wire between the rod and the furnace control (or I.F.C.) (2) Reinstall or replace igniter/flame sense assemble and check wiring and connections. Also make sure the furnace is properly grounded. (3) Check that all burner assembly components are properly installed. Check for good seals between the igniter/flame sensor assembly and the combustion chamber.
14	UNEXPECTED FLAME
	STATUS: This is an extremely critical fault and should rarely (if ever) be seen in the field. The furnace will not operate with this fault present.
	DESCRIPTION: This fault indicates flame is present when it should not be. Flame is seen to be present when the gas valve and pilot valve is supposed to be off.
	EXPECTED OPERATION: When unexpected flame is sensed, the IBM (Indoor Blower Motor) is energized at maximum heat speed and IDM (Induced Draft Motor) is energized at high speed. Both will remain energized until the fault is cleared. Response to any thermostat call is not permitted until the fault is cleared. Note that the gas valve circuit should not have been energized when the unexpected flame was sensed. When the condition causing the fault is cleared, the IDM will complete post-purge and the IBM will complete blower off-delay. The control will then enter a one-hour lockout and display the fault code "10" (one-hour lockout) and "14" (unexpected flame) alternately for the duration of the one-hour lockout. Operation is returned to normal after the lockout period.
	CAUSE: (1) Field mis-wiring of 24VAC to the gas valve main solenoid (2) Fault gas valve and/or pilot valve may be stuck in the "OPEN" position (3) Faulty furnace control (signal improperly sensed when it should not be sensed at all)
	SOLUTION: (1) Wire properly (2) Replace gas valve or prior solenoid and necessary (3) Replace furnace control

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

22	FAILED IGNITION
	STATUS: This is critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function
	DESCRIPTION: The main limit auxiliary limit has opened or is sensed to be opened. This normally means that the temperature inside the heat exchanger area or blower area has gone above a certain predetermined critical value and heating operation is not permitted until the limit cools to within normal parameters.
	EXPECTED OPERATION: When either of these limits open, the IBM (Indoor Blower Motor) will be energized at maximum heat speed. The gas valve circuit is de-energized (if it was energized) until the fault is cleared and the IDM (Induced Draft Motor) is energized at high speed and remains energized until the fault has cleared (limit has closed back). Response to thermostat cooling and fan calls will take place as normal. When the fault is cleared, the IBM will remain energized for the blower off-delay period. If the limit control was opened for less than 150 seconds (2m:30sec), operation will proceed as normal after the post-purge, blower off delay, and the 2 minute cool down period. However, if the limit is opened for more than 150 seconds, the control will declare a dead (non-functional) blower and proceed to a one-hour lockout and will alternately display fault codes “10” (one-hour lockout) and “61” (dead blower) at the furnace seven-segment display. Operation will proceed as described under fault code “61”.
	CAUSE: (1) No airflow (2) Insufficient airflow (3) Faulty limit control (4) Loose or faulty wiring (5) Dead (non-functional) blower (6) Input too high
	SOLUTION: (1) Check for proper blower operation. Is the blower turning during heat (or any other) mode? If not, a blower motor fault should also be present. Check the wiring to the motor then check the motor. It may need replacing. (2) Check ductwork and filters. Determine the static pressure and make sure it is not above the published values for the furnace. Check the rate and outlet air temperature and verify they are correct. Also, perform the calibration cycle again (if the SA sensor is installed(by cycling power to the furnace. (3) Replace the limit control (4) Check wiring and connections. Replace and/or repairs as necessary. (5) See Fault Code 61 for description, causes, operation and solutions. (6) Insure properly sized burner orifices are installed. Check the manifold pressure and compare to the nameplate values. Adjust as needed.
26	LINE AND NEUTRAL REVERSED OR POOR GROUND
	STATUS: This is a critical fault. The furnace will not operate in gas heat or any other modes.
	DESCRIPTION: This fault code is an indication that line voltage and neutral are reversed to the furnace control or may also be an indication of a grounding issue. No operation is allowed to proceed until the problem is corrected.
	EXPECTED OPERATION: No heating or cooling operation will take place.
	CAUSE: (1) Line and neutral to the furnace have been interchanged at the furnace. (2) Line voltage and neutral have been interchanged at the disconnect or at the breaker box. (3) Furnace control cannot properly sense ground.
	SOLUTION: (1) Check voltage with meter and reverse line and neutral if necessary in the junction box of the furnace. (2) Check voltage with meter and reverse line and neutral if necessary at the breaker box. (3) Check ground wire inside furnace cabinet is attached to sheet metal, verify ground to furnace cabinet and at breaker box
33	MANUAL RESET OVER-TEMPERATURE SWITCH OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function.
	DESCRIPTION: The Manually Reset Limit Control (M.R.L.C.) is also known by the name over temperature switch. There can be several on any given furnace. When one or more of these limits open, they must be manually pushed back to the closed position (hence the name; Manually Reset) to force the acknowledgement of a critical fault. This fault occurs when the burner box has exceeded normal operating temperature.
	EXPECTED OPERATION: When the MRLC (Manually Reset Limit Control) circuit has been opened, the IBM (Indoor Blower Motor) is energized at heating speed. The gas valve circuit is de-energized (if it was energized) and the IDM (Induced Draft

33	Motor) is energized at high speed. Response to thermostat cooling calls will take place as normal with IBM energizing at the higher of the two blower speeds (heat or cool) when a call for cooling is also present. When the fault is cleared, the IDM will remain energized for post-purge and the IBM will remain energized for the user-selected blower off-<lelay period.
	CAUSE: (1) Blocked airflow through either the combustion air inlet or venturi inlet (2) Loose or faulty wiring. (3) Furnace has exceeded normal operating temperature (4) Broken or Cracked refractory
	SOLUTION: (1) Check for obstructions in combustion venting or venturi inlet. Clean filter if equipped. (2) Check wiring and connections. Replace and/or repair as necessary. (3) Check Rate and BTU/hour usage of furnace (4) Replace burner assembly
34	INDUCED DRAFT MOTOR OVERCURRENT
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes, but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: This fault indicates that the inducer is not working properly. Note: This fault may be seen under normal operating conditions if power is lost and returned quickly (within 30 seconds) while operating in gas heating mode.
	EXPECTED OPERATION: The fault is displayed when too much or too little current is detected on the inducer circuit.
	CAUSE: (1) Power outage (2) Bad wiring to inducer (3) Bad inducer (4) Bad IFC
	SOLUTION: (1) Reset power to unit and clear fault (2) Check wiring and connections between inducer and IFC. Correct or replace as necessary. (3) Replace . inducer . (4) Replace IFC
42	FLAME LED NOT DETECTED
	STATUS: This is a non critical fault. The furance will operate in all operations even if this fault is displayed
	DESCRIPTION: This fault indicates that flame LED board in the burner compartment is not working
	EXPECTED OPERATION: This fault is displayed when there is no power being drawn from the circuit
	CAUSE: (1) Flame LED board is unplugged. (2) Flame LED board has malfunctione
	SOLUTION: (1) Check wiring connections to the flame indicator board. (2) Replace the flame indicator board.
43	IGNITION PRESSURE SWITCH CLOSED WHEN SHOULD BE OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function
	DESCRIPTION: The ignition pressure switch should not be closed when the inducer is not running. If it is this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. Before any heat cycle can begin the pressure switch is tested to make sure that it is open. The switch is ignored except in gas heating modes.
	EXPECTED OPERATION: There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call before pre-purge or calibration begins.
	CAUSE: (1) Faulty switch (2) Pressure switch physically bypassed in the field (3) Loose or faulty wiring (4) Abnormal! hi h ne alive ressure resent on vents stem without inducer runnin .

43 (Cont.)	**SOLUTION:** (1) Replace ignition pressure switch. (2) Remove bypass and restore correct operation. Determine reason for bypass and correct issue. Notify homeowner and proper authorities of illegal tampering if necessary. (3) Check wiring and connections. Replace and/or repair as necessary. (4) Check for ro er ventin and terminations as defined in the National Fuel Gas Code. NFPA 54
54	AMBIENT AIR SENSOR TEMPERATURE SENSOR FAILURE
	STATUS: This is a non critical fault. The furnace will operate in gas heat modes and all other modes (e.g. cooling) should function.
	DESCRIPTION: The ambient sensor is to monitor outdoor conditions and adjust calibration of the furnace to external conditions.
	EXPECTED OPERATION: If the unit detects the ambient air sensor short or not plugged in the unit will display the fault 54 but the unit will continue to run. The fault is not stored in the memory and will calibrate at the default intervals of every 100 cycles or being re-energized after a loss of power.
	CAUSE: (1) Faulty switch. (2) Sensor removed or unplugged. (3) Loose or faulty wiring.
	SOLUTION: (1) Replace sensor. (2) Plug sensor into the IFC. (3) Check wiring and connections. Replace and/or repair as necessary.
55	COMBUSTION PRESSURE SWITCH CLOSED WHEN SHOULD BE OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: The combustion pressure switch should not be closed when the inducer is not running. If it is this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. Before any heat cycle can begin the pressure switch is tested to make sure that it is open. The switch is ignored except in gas heating modes.
	EXPECTED OPERATION: There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call before pre-purge or calibration begins.
	CAUSE: (1) Faulty switch. (2) Pressure switch physically bypassed in the field. (3) Loose or faulty wiring. (4) Abnormally high negative pressure resent on vents stem without inducer running
	SOLUTION: (1) Replace combustion pressure switch. (2) Remove bypass and restore correct operation. Determine reason for bypass and correct issue. Notify homeowner and proper authorities of illegal tampering if necessary. (3) Check wiring and connections. Replace and/or repair as necessary. (4) Check for proper venting and terminations as defined in the National Fuel Gas Code (NFPA 54)
56	IGNITION PRESSURE SWITCH OPEN WHEN SHOULD BE CLOSED
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: This fault indicates that the pressure switch is open when the inducer is energized. This fault can be displayed any time during the heat call and only after the pre-purge.
	EXPECTED OPERATION: (1) DISPLAYED BEFORE HEAT IS ESTABLISHED: The IBM {Indoor Blower Motor) will not be energized. The fault code will not be displayed until the IDM (Induced Draft Motor) has been energized for a minimum of ten seconds. The IDM will remain energized at the high speed {high speed is default pre-purge speed) for a period of five minutes after the beginning of the pre-purge attempt. After five minutes, the IDM is de-energized and second attempt at pre-purge is made (as long as the heat call is still present). This cycle is repeated indefinitely until either the pressure switch closes or the heat call is lost. (2) DISPLAYED AFTER HEAT IS ESTABLISHED-in steady-state heating mode, it will wait a minimum of 2 seconds before de-energizing the gas valve relay and shutting down the unit. It will perform a 2 minute cool down period before proceeding with pressure switch proving if the heat call is not satisfied.

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

56 (Cont.)	**CAUSE:** (1) Blockage in the exhaust vent. (2) Faulty or disconnected inducer. (3) Faulty control board (inducer drive circuitry). (4) Loose or faulty wiring. (5) Disconnected, blocked, split or cut pressure switch hoses. Fault ressure switch. (6) Faulty pressure switch.
	SOLUTION: (1) Check the vent system for blockage and proper termination and repair as necessary. (2) Repair or replace inducer and/or inducer wiring and/or electrical connections. (3) Replace control board. (4) Check wiring and connections. Replace and/or repair as necessary. (5) Replace hoses as necessary. (6) Replace the pressure switch
57	COMBUSTION PRESSURE SWITCH OPEN WHEN SHOULD BE CLOSED
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: This fault indicates that the pressure switch is open when the inducer is energized. This fault can be displayed any time during the heat call and only after the pre-purge or 2 minute cool down period.
	EXPECTED OPERATION: (1) I DISPLAYED BEFORE HEAT IS ESTABLISHED: The IBM (Indoor Blower Motor) will not be energized. The fault code will not be displayed until the IDM (Induced Draft Motor) has been energized for a minimum of ten seconds. The IDM will remain energized at the high speed {high speed is default pre-purge speed) for a period of five minutes after the beginning of the pre-purge attempt. After five minutes, the IDM is de-energized and second attempt at pre-purge is made (as long as the heat call is still present). This cycle is repeated indefinitely until either the pressure switch closes or the heat call is lost. (2) DISPLAYED AFTER HEAT IS ESTABLISHED-in steady-state heating mode, it will wait a minimum of 2 seconds before de-energizing the gas valve relay and shutting down the unit. It will perform a 2 minute cool down period before proceeding with pressure switch proving if the heat call is not satisfied.
	CAUSE: (1) Blockage in the exhaust vent. (2) Faulty or disconnected inducer. (3) Faulty control board (inducer drive circuitry). (4) Loose or faulty wiring. (5) Disconnected, blocked, split or cut pressure switch hoses. (6) Faulty pressure switch
	SOLUTION: (1) Check the vent system for blockage and proper termination and repair as necessary. (2) Repair or replace inducer and/or inducer wiring and/or electrical connections. (3) Replace control board. (4) Check wiring and connections. Replace and/or repair as necessary. (5) Replace hoses as necessary. (6) Replace the pressure switch
58	WATER SENSOR JUMPER NOT ATTACHED
	STATUS: This is a critical fault experienced by the furnace. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if a call is present.
	DESCRIPTION: The IFC cannot detect electrical continuity between pins 2 and 3 of connector P3 of the furnace control. The IFC looks for continuity between these pins to determine if the water sensors (2) are present in the circuit. When both sensors are present and properly connected and wiring is not damaged, there should be electrical continuity between these pins. 80+ Furnaces do not have these water sensors and will be jumped between pins 2 and 3 of Plug 3 (PL3).
	EXPECTED OPERATION: No gas heating operation can proceed and the fault is displayed. All other modes (e.g. cooling) of operation should operate as normal.
	CAUSE: (1) Connection of P4 at the IFC is not properly made.
	SOLUTION: (1) Repair or replace wiring. Replace IFC

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

61	BLOWER FAULT-DEAD BLOWER
	STATUS: This is a critical fault. The furnace will not operate in any mode.
	DESCRIPTION: The blower has failed critically or there is a critical motor fault - such as thermal limit trip that prevents the blower motor from running.
	EXPECTED OPERATION: If the furnace was in heating operation when this fault occurred, blower operation will immediately stop and the furnace will shut down normally with post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. This fault may be displayed in heating mode after the main limit control has been opened for more than 150 seconds (2m:30sec) each time. If this happens 4 times consecutively the IFC determines that the motor and/or blower is not functional and enters a hard lockout condition requiring repair of the blower/motor and manual reset of power to the furnace.
	CAUSE: (1) The motor has tripped on thermal limit because of a restriction or bearing failure. (2) Wiring to the motor has become compromised. (3) The blower wheel has become damaged or is not properly attached to the motor shaft. (4) The motor has failed catastrophically.
	SOLUTION: (1) Remove obstruction or replace motor. (2) Inspect and replace or repair wiring or connectors to the motor as necessary. (3) Replace the blower wheel and/or attach the blower wheel to the motor shaft properly. (4) Replace the motor
71	INDUCER CIRCUITRY FAULT
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes, but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: This fault indicates that there is no communications with the motor processor.
	EXPECTED OPERATION: The fault is displayed when too much or too little current is detected on the inducer circuit.
	CAUSE: (1) Failed inducer communication circuitry on IFC. (2) Internal Control Fault
	SOLUTION: (1) Cycle power and, if problem persists, replace the IFC (2) Cycle power and, if problem persists, replace the IFC
74	GAS INLET PRESSURE SWITCH OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: The inlet gas pressure has dropped below a point where the furnace normally operates during a call for heat
	EXPECTED OPERATION: Gas inlet pressure switch is to ensure proper gas supply pressure to the furnace. If the Gas Pressure switch is open when a call for heat is present, the control will de-energize the gas valve, de-energize induced draft motor {after post purge), energize indoor blower on heat speed, and set fault code “74”. When the Gas Pressure switch re closes or call for heat is lost, the control runs the indoor blower through the selected fan off delay. The control will start/ re-start the heat cycle after the blower off delay and 2 minute cool down period are completed if the call for heat is still present.
	CAUSE: (1) The gas line valve to the furnace is not on. (2) Undersized gas line. (3) Gas line pressure is too low.
	SOLUTION: (1) Check the gas line valve and verify gas is flowing to the unit. (2) Gas line is too small. (3) Regular needs adjusted or too many gas appliances running at one time

FAULT CODES WITH DESCRIPTIONS AND SOLUTIONS

75	VENTURI AIR INLET PRESSURE SWITCH OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode).
	DESCRIPTION: There is an obstruction at or near the inlet of the fuel and air mixing venturi.
	EXPECTED OPERATION: If the venturi air inlet pressure switch is open when a call for heat is present and the MRLC over temperature switch, gas pressure switch, and the main limit are closed. The control will de-energize the gas valve, de-energize induced draft motor after post purge, energize indoor blower on heat speed and set the fault to "75". When the switch re-closes or call for heat is lost, the control runs the indoor blower through the selected fan off delay. If the heat call remains, the control will complete the blower off delay and blower cool down before re-starting the heat cycle.
	CAUSE: (1) Dirty venturi inlet filter (2) Obstructed venturi inlet (3) Faulty Switch
	SOLUTION: (1) Clean filter (2) Remove obstruction (3) Replace switch
77	VENTURI AIR INLET PRESSURE SWITCH (AIPS) IS CLOSED WHEN IT SHOULD BE OPEN
	STATUS: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). The AIPS is verified open at the beginning of each heat call.
	DESCRIPTION: The AIPS is verified at the beginning of each heat call to ensure the switch is functional a call for heat
	EXPECTED OPERATION: The differential pressure switch monitors a blockage in the intake manifold. If the switch is closed at the beginning of the cycle the unit will not perform ignition and display code 77 on the display. The unit will continue to re-cycle until the code is cleared or the switch opens.
	CAUSE: (1) Dirty venturi inlet filter (2) Obstructed venturi inlet (3) Faulty Switch
	SOLUTION: (1) Clean filter (2) Remove obstruction (3) Replace switch
93	INTERNAL CONTROL FAULT DETECTED
	STATUS: This is a critical fault. The furnace will not operate in any mode of operation.
	DESCRIPTION: This is a severe fault that should rarely (if ever) be discovered in the field. It is an indicator of a circuitry fault or internal microprocessor fault on the furnace control (or I.F.C.) or voltage applied to the main gas valve solenoid when there should be none.
	EXPECTED OPERATION: The furnace was in heating operation when this fault occurred, the gas valve will immediately close (flame will be lost), IBM (Indoor Blower Motor) operation will immediately stop and the furnace will shut down normally (except without IBM operation) with IDM (Induced Draft Motor) post-purge at the correct speed. After the post purge no other operation will occur until this fault is cleared. However, this fault may also indicate an internal microprocessor failure. This may mean that the heat call will not end as expected and that all outputs will be de-energized and gas valve closed immediately when the fault is sensed.
	CAUSE: (1) 24VAC or similar voltage applied to the main gas valve solenoid circuit unexpectedly. (2) Furnace control software test failure - failed furnace control (or I.F.C.).
	SOLUTION: (1) Check for mis-wiring in the furnace. (2) Replace the furnace control (or I.F.C.)

FAULT CODES

DIAGNOSTICS AND FAULT CODES

All furnace controls come standard with a 7-segment diagnostic display. During standby mode with no fault codes present, the display will read "0" (zero). During normal thermostat heating, cooling or continuous fan operation, a letter will be displayed to describe the mode of operation as follows:

C = Cooling or Heat-Pump Heat Operation

CL = Calibration

F = Continuous Fan Operation

H = Gas Heating Operation

When the control senses a fault present, it will display a code to help in diagnoses. A list of normal operating codes and potential fault codes follows:

The method for displaying a two-digit fault is to display the first (most significant) digit for one second immediately followed by the second digit – which is also displayed for a duration of one second. A ½ second pause is then displayed. Cycle repeats until the fault is cleared. Each fault is flashed (displayed) a minimum of two times even if the fault condition has cleared before the fault can be displayed twice.

DUAL FAULTS DISPLAYED

In some cases when two faults are present simultaneously, both faults are displayed. These exceptions for dual faults are noted below.

Sequence of display:

A. The first two-digit fault will be displayed once as described above.

B. The upper-most horizontal segment of the seven-segment display is energized for ½ second.

C. The second two-digit fault is displayed once as described above.

D. The upper-most horizontal segment of the seven-segment display is energized for ½ again.

This cycle repeats until one fault is gone (in which case the remaining fault will be displayed as described above) or both faults are gone or otherwise as noted below:

1. When a failed ignition has occurred four times in a row, the control enters one-hour lockout and fault codes ***"10"*** and ***"11"*** will be displayed alternately as described above.
2. When flame is lost five times in a row, the control enters one-hour lockout and fault codes ***"10"*** and ***"13"*** will be displayed alternately as described above (A-D).
3. While the control is in one-hour lockout due to an unexpected flame, the fault codes ***"14"*** (unexpected flame) and ***"10"*** (soft lockout) will be displayed alternately at the seven-segment display as described above (A-D).
4. While the control has entered a one-hour lockout after declaring a dead blower after the main limit control has been open for more than 150 seconds, the fault codes ***"61"*** (Non-operational blower) and ***"10"*** (soft lockout) will be displayed alternately as described above (A-D). Note: the dead blower fault and associated one-hour lockout will occur up to four times in one heat call. Upon declaring this fault for the fourth time in one heat call, the control will enter hard lockout.
5. When the main limit has been open during a gas heat call for more than 150 seconds and has not yet re-closed, the fault codes ***"61"*** (Non-operational blower) and ***"22"*** (open limit) will be displayed alternately as described above (A-D) until the limit re-closes.

The higher priority fault code will be displayed until the condition is corrected then the lower priority fault code will display (provided the fault condition is still present).

FAULT CODES (Cont.)

DISPLAY CODES

Priority	Fault Code	Description
29	0	Standby
26	C	Call for Cool present
27	H	Call for Heat present
28	F	Call for Continuous fan present
25	CL	Inducer speed calibration running
19	10	1 Hour Lockout
21	11	Failed Ignition
23	12	Low Flame Sense
24	13	Flame Lost
7	14	Unexpected Flame
10	22	Main Limit Open
8	33	Rollout switch open
12	34	Induced Draft Motor overcurrent
30	42	Flame LED not Detected
16	43	Ignition Pressure Switch closed when should be open
32	54	Ambient Air Temperture Sensor failure
14	55	Combustion Pressure Switch closed when should be open
17	56	Ignition Pressure switch open when should be closed
15	57	Combustion Pressure Switch open when should be closed
18	58	Water sensor jumper not attached
20	61	Blower Fault
13	71	Inducer Fault
11	74	Gas Inlet Pressure switch open
9	75	Venturi Air Inlet Pressure switch open
31	77	Venturi Air Inlet Pressure switch (AIPS) is closed when it should be open
1	93	Control fault

Note 1: Multiple fault scenarios are displayed by priority. A lower number indicates a more critical fault. Most critical fault has priority=0.

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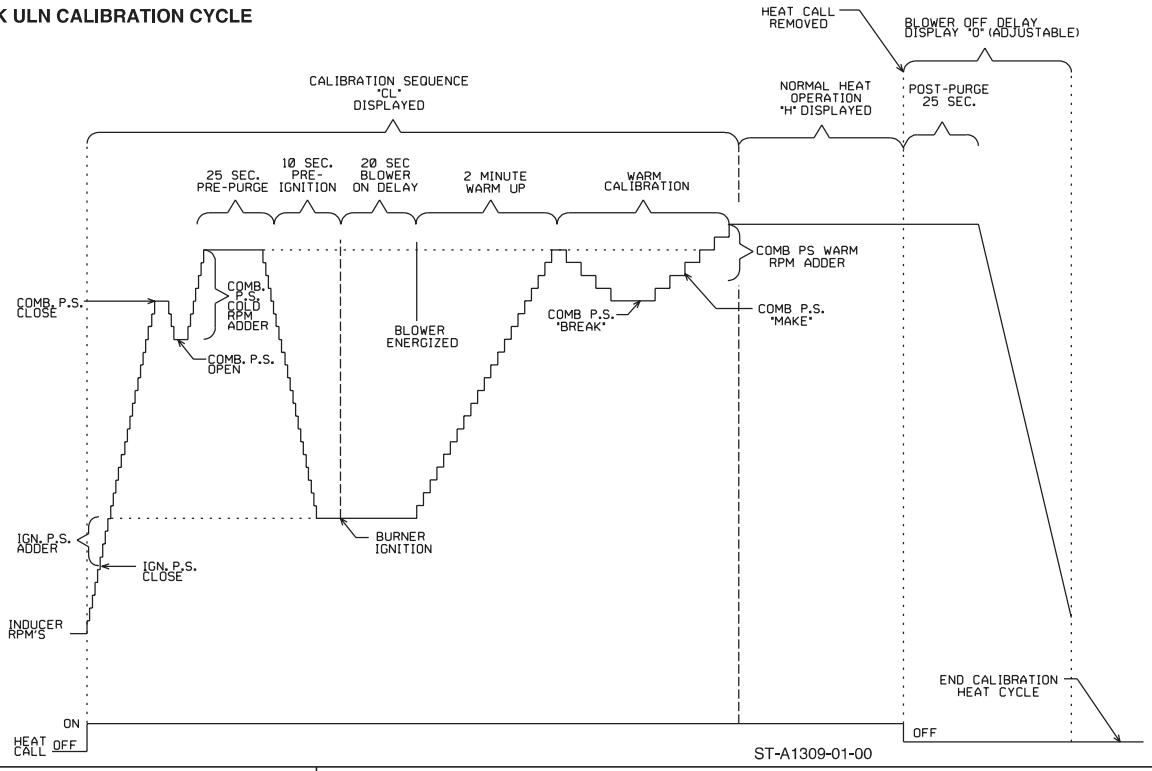
TIMING DIAGRAM

On this page are timing diagrams for heat sequences. These diagrams assume no faults are present during the heat call.

RESIPACK ULN CALIBRATION CYCLE



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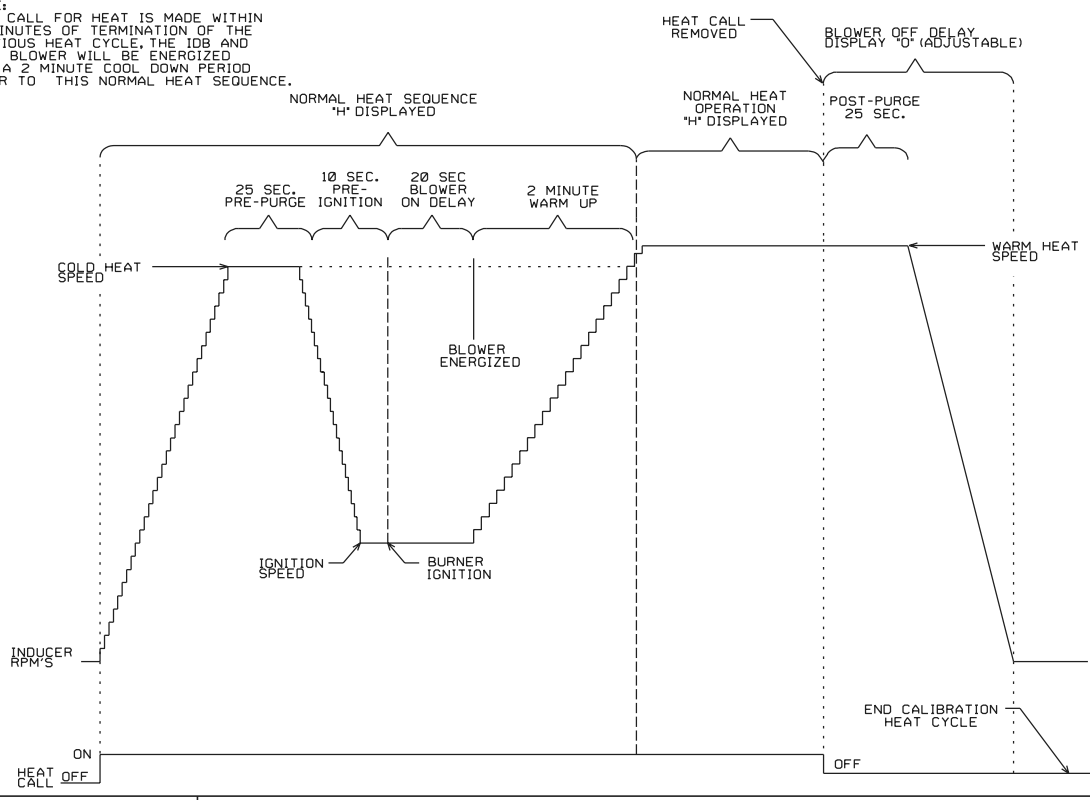
RESIPACK ULN NORMAL HEAT CYCLE

NOTE:
IF A CALL FOR HEAT IS MADE WITHIN 10 MINUTES OF TERMINATION OF THE PREVIOUS HEAT CYCLE, THE IDB AND MAIN BLOWER WILL BE ENERGIZED FOR A 2 MINUTE COOL DOWN PERIOD PRIOR TO THIS NORMAL HEAT SEQUENCE.



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1-STAGE LOCKOUT

LOCKOUT

All lockout conditions can be cleared immediately provided that the original fault causing the lockout is cleared and power to the unit is cycled off and then back on again or (soft lockout only) if a heat call is cycled off for greater than 2 seconds but less than 20 seconds.

The IFC will not initiate a heat cycle during any lockout condition. A call for compressor or continuous fan will generally be responded to but IFC will display the fault code instead of the “C” (for compressor) or “F” (for Continuous fan)

FIVE-MINUTE LOCKOUT

A five minute “soft” lockout will be initiated if the low pressure switch fails to close after 60 seconds of continuous inducer operation at the beginning of a normal heat cycle (pressure switch proving period). The seven-segment display will display the appropriate fault. Lockout will automatically be reset after five minutes.

ONE-HOUR LOCKOUT

A one hour “soft” lock out will be initiated when:

- Flame has not been detected after four ignition trials.
- Flame has been lost for five times in one heat call.
- Undesired flame has been detected. The one-hour period will commence after flame is no longer detected.
- Dead Blower has been detected (main limit circuit open for more than 150 seconds)
- When voltage has unexpectedly been detected on the gas valve circuit and voltage goes away when inducer is shut off.

The seven-segment display will alternately display *“10”* and the code number for the fault causing the lockout. Lockout will automatically be reset after one hour.

HARD LOCKOUT

Three conditions shall cause a hard lockout:

1. The control senses an unspecified internal fault. Fault code ***“93”*** is set and displayed. This lockout condition cannot be reset by cycling the heat call.
2. Voltage is detected unexpectedly on the gas valve contacts (welded relay) and will not clear by cycling the inducer. Fault code ***“93”*** is set and displayed. This lockout condition cannot be reset by cycling the heat call.
3. The furnace control will declare that the blower motor is inoperable (dead) if the main limit control has been open for more than 150 seconds. Gas heating is terminated. However, the control continues to try to operate heating for up to four attempts in case the blower motor starts working again. If a dead blower has been declared four times in one heat call, the furnace control enters a hard-lockout. Fault code ***“61”*** is set and displayed. This lockout condition **CAN** be reset by cycling the heat call.