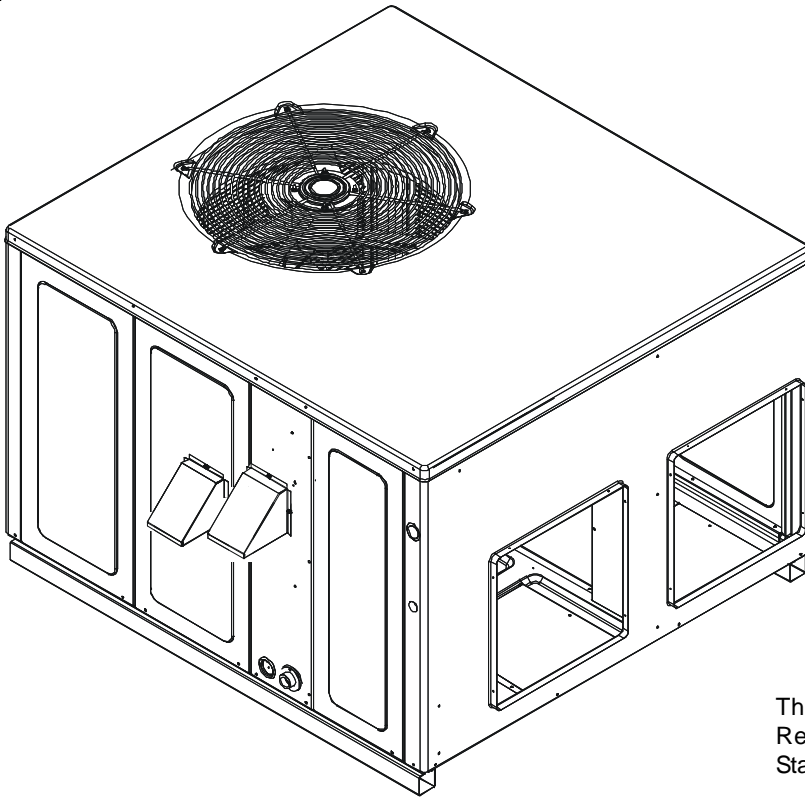


INSTALLATION INSTRUCTIONS FOR SINGLE PACKAGE GAS-ELECTRIC HEATING & COOLING UNITS GPG 15 SEER "M" SERIES

Affix this manual and Users Information Manual adjacent to the unit.



This Forced Air Central Unit Design Complies With Requirements Embodied in The American National Standard / National Standard of Canada Shown Below.

ANSI Z21.47•CSA-2.3 Central Furnaces



RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.

ATTENTION INSTALLING PERSONNEL

Prior to installation, thoroughly familiarize yourself with this Installation Manual. Observe all safety warnings. During installation or repair, caution is to be observed.

It is your responsibility to install the product safely and to educate the customer on its safe use.

These installation instructions cover the **outdoor** installation of single package gas electric heating and cooling units. See the Specification Sheet applicable to your model* for information regarding accessories.

*NOTE: Please contact your distributor or our website for the applicable Specification Sheet referred to in this manual.

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INDEX

REPLACEMENT PARTS	4
ORDERING PARTS	4
SAFETY INSTRUCTIONS	4
UNIT LOCATION	5
ALL INSTALLATIONS:	5
GROUND LEVEL INSTALLATIONS ONLY:	5
ROOFTOP INSTALLATIONS ONLY:	5
ROOF CURB INSTALLATIONS ONLY:	6
GENERAL INFORMATION	6
TRANSPORTATION DAMAGE	6
RIGGING DETAILS	6
GAS PIPING	7
HIGH ALTITUDE DERATE (U.S. INSTALLATIONS ONLY)	7
PIPING	7
GAS PIPING CHECKS	8
PROPANE GAS INSTALLATIONS	8
TANKS AND PIPING	8
ELECTRICAL WIRING	9
THERMOSTAT LOCATION	9
SINGLE STAGE THERMOSTAT	9
UNIT VOLTAGE	10
HEAT ANTICIPATOR SETTING	10
CIRCULATING AIR AND FILTERS	10
AIRFLOW CONVERSION	10
DUCTWORK	10
FILTERS	11
VENTING	11
INSTALLATION - FLUE HOOD EXHAUST	11
INSTALLATION - COMBUSTION AIR INTAKE HOOD	11
CONDENSATE DRAIN	11
CONDENSATE DRAIN CONNECTION	11
NORMAL SEQUENCES OF OPERATION	12
HEATING	12
COOLING	12
FAN ONLY	12
STARTUP, ADJUSTMENTS, AND CHECKS	12
HEATING STARTUP	12
COOLING STARTUP	15
TROUBLESHOOTING	15
IGNITION CONTROL ERROR CODES	15
FAULT RECALL	15
ABNORMAL OPERATION - HEATING	16
INTERNAL CONTROL FAILURE	16
EXTERNAL LOCKOUT	16
PRESSURE SWITCH STUCK OPEN	16
PRESSURE SWITCH STUCK CLOSED	16
OPEN THERMAL PROTECTION DEVICE	16
PRIMARY LIMIT	16
AUXILIARY/SECONDARY LIMIT	16
ROLLOUT LIMIT	16
FLAME DETECTED WITH GAS VALVE CLOSED	16
LOW FLAME SIGNAL	16
ABNORMAL OPERATION - COOLING	17
SHORT CYCLE COMPRESSOR DELAY	17
HIGH PRESSURE SWITCH/LOSS OF CHARGE SWITCH	17

INDEX

MAINTENANCE	17
FILTER REPLACEMENT OR CLEANING	17
CABINET FINISH MAINTENANCE	17
CLEAN OUTSIDE COIL (QUALIFIED SERVICER ONLY)	17
CONDENSER, EVAPORATOR, AND INDUCED DRAFT MOTORS	17
FLAME SENSOR (QUALIFIED SERVICER ONLY)	17
FLUE PASSAGES (QUALIFIED SERVICER ONLY)	17
CLEANING FLUE PASSAGES (QUALIFIED SERVICER ONLY)	17
MAIN BURNER FLAME (QUALIFIED SERVICER ONLY)	18
CLEANING BURNERS	18
ACCESSORIES AND FUNCTIONAL PARTS	18
SHEET METAL ACCESSORIES	18
FUNCTIONAL PARTS	18
GENERAL INFORMATION	18
APPENDIX	19
IGNITION CONTROL DIAGNOSTIC INDICATOR CHART	21
HEATING TIMING CHART	21
COOLING TIMING CHART	21
UNIT DIMENSIONS	22
GPG15****41AA WIRING DIAGRAM	23
MINIMUM CLEARANCES	25
RECOMMENDED FILTER SIZES	25
BLOWER PERFORMANCE DATA	26

REPLACEMENT PARTS

ORDERING PARTS

When reporting shortages or damages, or ordering repair parts, give the complete unit model and serial numbers as stamped on the unit's nameplate.

Replacement parts for this appliance are available through your contractor or local distributor. For the location of your nearest distributor, consult the white business pages, the yellow page section of the local telephone book or contact:

SERVICE PARTS DEPARTMENT
GOODMAN MANUFACTURING COMPANY, L.P.
5151 SAN FELIPE, SUITE 500
HOUSTON, TEXAS 77056
(713) 861 – 2500

SAFETY INSTRUCTIONS

TO THE INSTALLER

Before installing this unit, please read this manual to familiarize yourself on the specific items which must be adhered to, including maximum external static pressure to unit, air temperature rise, minimum or maximum CFM and motor speed connections.

TO THE OWNER

A warranty certificate is provided with the unit. Read the warranty carefully and note what is covered. Keep the warranty certificate in a safe place so you can find it when necessary.

Keep this literature in a safe place for future reference.

WARNING

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

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

WARNING

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

WARNING

DO NOT CONNECT TO OR USE ANY DEVICE THAT IS NOT DESIGN CERTIFIED BY GOODMAN FOR USE WITH THIS UNIT. SERIOUS PROPERTY DAMAGE, PERSONAL INJURY, REDUCED UNIT PERFORMANCE AND/OR HAZARDOUS CONDITIONS MAY RESULT FROM THE USE OF SUCH NON-APPROVED DEVICES.

WARNING

THIS PRODUCT CONTAINS OR PRODUCES A CHEMICAL OR CHEMICALS WHICH MAY CAUSE SERIOUS ILLNESS OR DEATH AND WHICH ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

WARNING

HEATING UNIT SHOULD NOT BE UTILIZED WITHOUT REASONABLE, ROUTINE, INSPECTION, MAINTENANCE AND SUPERVISION. IF THE BUILDING IN WHICH ANY SUCH DEVICE IS LOCATED WILL BE VACANT, CARE SHOULD BE TAKEN THAT SUCH DEVICE IS ROUTINELY INSPECTED, MAINTAINED AND MONITORED. IN THE EVENT THAT THE BUILDING MAYBE EXPOSED TO FREEZING TEMPERATURES AND WILL BE VACANT, ALL WATER-BEARING PIPES SHOULD BE DRAINED, THE BUILDING SHOULD BE PROPERLY WINTERIZED, AND THE WATER SOURCE CLOSED. IN THE EVENT THAT THE BUILDING MAY BE EXPOSED TO FREEZING TEMPERATURES AND WILL BE VACANT, ANY HYDRONIC COIL UNITS SHOULD BE DRAINED AS WELL AND, IN SUCH CASE, ALTERNATIVE HEAT SOURCES SHOULD BE UTILIZED.

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DO NOT USE THIS UNIT IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE UNIT AND TO REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL HAVING BEEN UNDER WATER.

WARNING

THIS UNIT MUST NOT BE USED AS A "CONSTRUCTION HEATER" DURING THE FINISHING PHASES OF CONSTRUCTION ON A NEW STRUCTURE. THIS TYPE OF USE MAY RESULT IN PREMATURE FAILURE OF THE UNIT DUE TO EXTREMELY LOW RETURN AIR TEMPERATURES AND EXPOSURE TO CORROSIVE OR VERY DIRTY ATMOSPHERES.

WARNING

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





WARNING

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

WARNING

INSTALLATION AND REPAIR OF THIS UNIT SHOULD BE PERFORMED ONLY BY INDIVIDUALS MEETING THE REQUIREMENTS OF AN "ENTRY LEVEL TECHNICIAN" AS SPECIFIED BY THE AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI). ATTEMPTING TO INSTALL OR REPAIR THIS UNIT WITHOUT SUCH A BACKGROUND MAY RESULT IN PRODUCT DAMAGE, PERSONAL INJURY OR DEATH.



 DANGER PELIGRO

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

UNIT LOCATION

 WARNING
TO PREVENT POSSIBLE EQUIPMENT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, THE FOLLOWING BULLET POINTS MUST BE OBSERVED WHEN INSTALLING THE UNIT.

IMPORTANT NOTE: Remove wood shipping rails prior to installation of the unit.

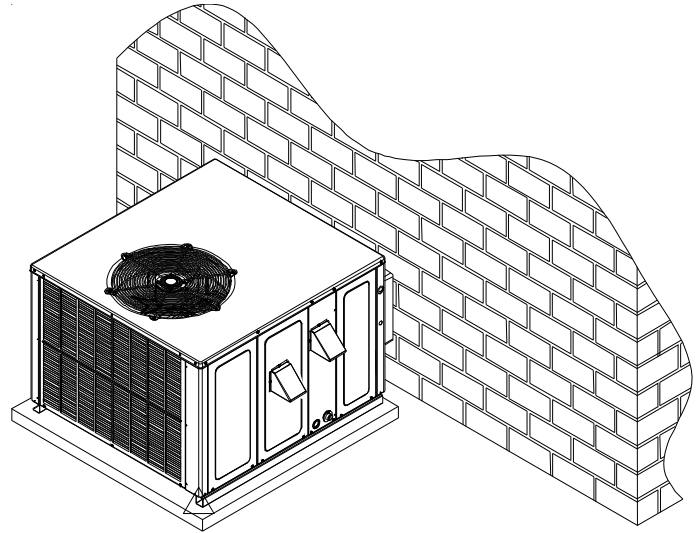
ALL INSTALLATIONS:

- For proper flame pattern within the heat exchanger and proper condensate drainage, the unit must be mounted level.
- The flue outlet hood must be at least 12 inches from any opening through which flue gases could enter a building, and at least three feet above any forced air inlet located within ten feet. The economizer/manual fresh air intake/motorized fresh air intake and combustion air inlet mounted on the unit are not affected by this restriction.
- To avoid possible corrosion of the heat exchanger, do not locate the unit in an area where the outdoor air (i.e. combustion air for the unit) will be frequently contaminated by compounds containing chlorine or fluorine. Common sources of such compounds include swimming pool chemicals and chlorine bleaches, paint stripper, adhesives, paints, varnishes, sealers, waxes (which are not yet dried) and solvents used during construction and remodeling. Various commercial and industrial processes may also be sources of chlorine/fluorine compounds.

- To avoid possible illness or death of the building occupants, do NOT locate outside air intake device (economizer, manual fresh air intake, motorized fresh air intake) too close to an exhaust outlet, gas vent termination, or plumbing vent outlet. For specific distances required, consult local codes.
- Allow minimum clearances from the enclosure for fire protection, proper operation, and service access (see appendix). These clearances must be permanently maintained.
- The combustion air inlet and flue outlet hoods on the unit must never be obstructed. If used, do not allow the economizer/manual fresh air damper/ motorized fresh air damper to become blocked by snow or debris. In some climates or locations, it may be necessary to elevate the unit to avoid these problems.
- When the unit is heating, the temperature of the return air entering the unit must be between 50° F and 100° F.

GROUND LEVEL INSTALLATIONS ONLY:

- When the unit is installed on the ground adjacent to the building, a level concrete (or equal) base is recommended. Prepare a base that is 3" larger than the package unit footprint and a minimum of 3" thick.
- The base should also be located where no runoff of water from higher ground can collect in the unit.



Outside Slab Installation

ROOFTOP INSTALLATIONS ONLY:

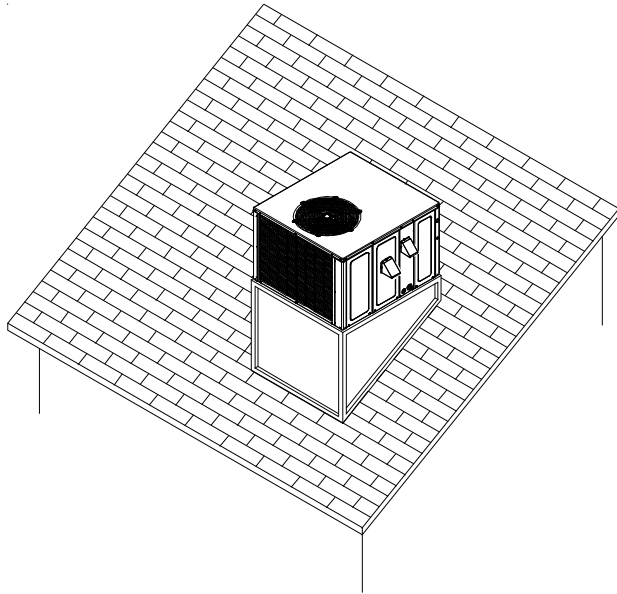
NOTE: To ensure proper condensate drainage, unit must be installed in a level position.

- To avoid possible property damage or personal injury, the roof must have sufficient structural strength to carry the weight of the unit(s) and snow or water loads as required by local codes. Consult a structural engineer to determine the weight capabilities of the roof.

GENERAL INFORMATION

WARNING

TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH, DUE TO FIRE, EXPLOSIONS, SMOKE, SOOT, CONDENSATION, ELECTRIC SHOCK OR CARBON MONOXIDE, THIS UNIT MUST BE PROPERLY INSTALLED, REPAIRED, OPERATED, AND MAINTAINED.

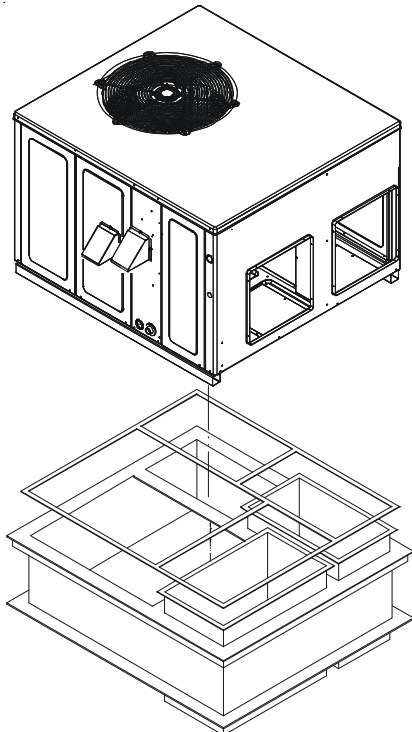


Rooftop Installation

- The unit may be installed directly on wood floors or on Class A, Class B, or Class C roof covering material.
- To avoid possible personal injury, a safe, flat surface for service personnel should be provided.

ROOF CURB INSTALLATIONS ONLY:

- Sufficient structural support must be determined prior to locating and mounting the curb and package unit.
- Ductwork must be constructed using industry guidelines. The duct work must be placed into the roof curb before mounting the package unit.
- Curb insulation, cant strips, flashing and general roofing material are furnished by the contractor.



Roof Curb Installation

This unit is approved for outdoor installation ONLY. To assure that your unit operates safely and efficiently, it must be installed, operated, and maintained in accordance with these installation and operating instructions, all local building codes and ordinances, or in their absence, with the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1 and National Standard of Canada CAN/CSA B149 Installation Codes.

The heating and cooling capacities of the unit should be greater than or equal to the design heating and cooling loads of the area to be conditioned. The loads should be calculated by an approved method or in accordance with A.S.H.R.A.E. Guide or Manual J - Load Calculations published by the Air Conditioning Contractors of America.

Obtain from:

American National Standards Institute
1430 Broadway
New York, NY 10018

TRANSPORTATION DAMAGE

Check the carton upon arrival for external damage. If damage is found, a request for inspection by carrier agent should be made in writing immediately.

Carefully inspect the unit for damage including damage to the cabinetry. Any bolts or screws which may have loosened in transit must be re-tightened. In the event of damage, the receiver should:

1. Make notation on delivery receipt of any visible damage to shipment or container.
2. Notify carrier promptly and request an inspection.
3. In case of concealed damage, carrier should be notified as soon as possible-preferably within 5 days.
4. File the claim with the following supporting documents:
 - a. Original Bill of Lading, certified copy, or indemnity bond.
 - b. Original paid freight bill or indemnity in lieu thereof.
 - c. Original invoice or certified copy thereof, showing trade and other discounts or reductions.
 - d. Copy of the inspection report issued by carrier representative at the time damage is reported to the carrier. The carrier is responsible for making prompt inspection of damage and for a thorough investigation of each claim. The distributor or manufacturer will not accept claims from dealers for transportation damage.

NOTE: When inspecting the unit for transportation damage, remove all packaging materials. Recycle or dispose of the packaging material according to local codes.

RIGGING DETAILS

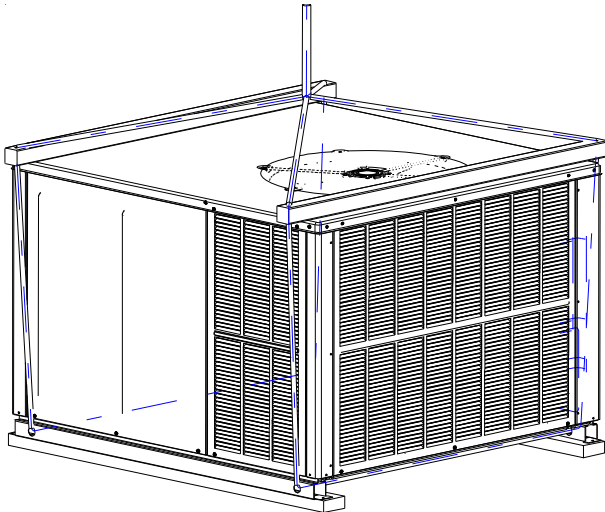
WARNING

TO PREVENT PROPERTY DAMAGE, THE UNIT SHOULD REMAIN IN AN UPRIGHT POSITION DURING ALL RIGGING AND MOVING OPERATIONS. TO FACILITATE LIFTING AND MOVING WHEN A CRANE IS USED, PLACE THE UNIT IN AN ADEQUATE CABLE SLING.

IMPORTANT NOTE: If using bottom discharge with roof curb, ductwork should be attached to the curb prior to installing the unit. Ductwork dimensions are shown in roof curb installation instructions.

Refer to the Roof Curb Installation Instructions for proper curb installation. Curbing must be installed in compliance with the National Roofing Contractors Association Manual.

Lower unit carefully onto roof mounting curb. While rigging unit, center of gravity will cause condenser end to be lower than supply air end.



Rigging

GAS PIPING

IMPORTANT NOTE: This unit is factory set to operate on natural gas at the altitudes shown on the rating plate.



WARNING

TO PREVENT PROPERTY DAMAGE, PERSONAL INJURY OR DEATH WHEN USING PROPANE GAS ALONE OR AT HIGHER ALTITUDES, OBTAIN AND INSTALL THE PROPER CONVERSION KIT(S). FAILURE TO DO SO CAN RESULT IN UNSATISFACTORY OPERATION AND/OR EQUIPMENT DAMAGE. HIGH ALTITUDE KITS ARE FOR THE U.S. INSTALLATIONS ONLY AND ARE NOT APPROVED FOR USE IN CANADA.

The rating plate is stamped with the model number, type of gas and gas input rating. Make sure the unit is equipped to operate on the type of gas available. Conversion to LP gas is permitted with the use of the factory authorized conversion kit LPM-05.

INLET GAS PRESSURE

Natural	Min. 5.0" W.C., Max. 10.0" W.C.
Propane	Min. 11.0" W.C., Max. 13.0" W.C.

Inlet Gas Pressure Must Not Exceed the Maximum Value Shown in Table Above.

The minimum supply pressure should not vary from that shown in the table above because this could prevent the unit from having dependable ignition. In addition, gas input to the burners must not exceed the rated input shown on the rating plate. Overfiring of the unit could result in premature heat exchanger failure.

HIGH ALTITUDE DERATE (U.S. INSTALLATIONS ONLY)

IMPORTANT NOTE: The gas/electric units naturally derate with altitude. Do not attempt to increase the firing rate by changing orifices or increasing the manifold pressure. This can cause poor combustion and equipment failure. At all altitudes, the manifold pressure must be within 0.3 inches W.C. of that listed on the nameplate for the fuel used. At all altitudes and with either fuel, the air temperature rise must be within the range listed on the unit nameplate.

Refer to the Installation Manual provided with the LP kit for conversion from natural gas to propane gas and for altitude adjustments.

Use HA02 for installations above 2000'.

PIPING

IMPORTANT NOTE: To avoid possible unsatisfactory operation or equipment damage due to under firing of equipment, do not undersize the natural/propane gas piping from the meter/tank to the unit. When sizing a trunk line, include all appliances on that line that could be operated simultaneously.

The rating plate is stamped with the model number, type of gas and gas input rating. Make sure the unit is equipped to operate on the type of gas available. The gas line installation must comply with local codes, or in the absence of local codes, with the latest edition of the National Fuel Gas Code NFPA 54/ANSI Z223.1.

Natural Gas Connection

Length of Pipe in Feet	Nominal Black Pipe Size (inches)				
	1/2	3/4	1	1 1/4	1 1/2
10	132	278	520	1050	1600
20	92	190	350	730	1100
30	73	152	285	590	980
40	63	130	245	500	760
50	56	115	215	440	670
60	50	105	195	400	610
70	46	96	180	370	560
80	43	90	170	350	530
90	40	84	160	320	490
100	38	79	150	305	460

Pressure = .50 PSIG or less and Pressure Drop of 0.3" W.C. (Based on 0.60 Specific Gravity Gas)

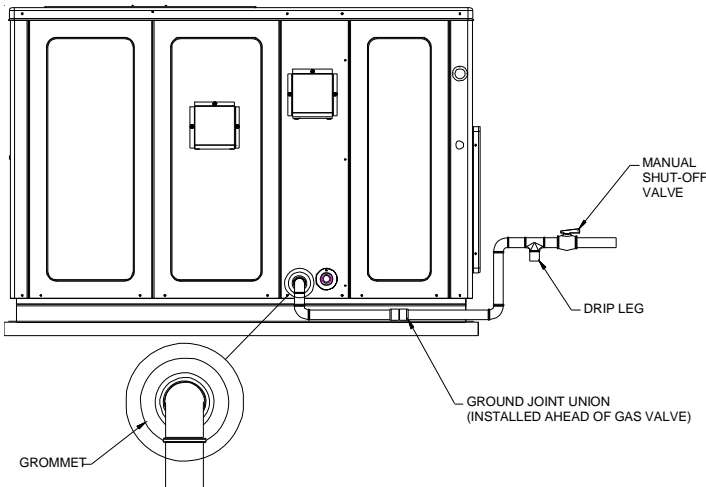
$$CFH = \frac{BTUH \text{ Furnace Input}}{\text{Heating Value of Gas (BTU/Cubic Foot)}}$$

Refer to the Proper Piping Practice drawing for the general layout at the unit. The following rules apply:

1. Use black iron pipe and fittings for the supply piping. The use of a flex connector and/or copper piping is permitted as long as it is in agreement with local codes.
2. Use pipe joint compound on male threads only. Pipe joint compound must be resistant to the action of the fuel used.
3. Use ground joint unions.
4. Install a drip leg to trap dirt and moisture before it can enter the gas valve. The drip leg must be a minimum of three inches long.
5. Use two pipe wrenches when making connection to the gas valve to keep it from turning.
6. Install a manual shut-off valve in a convenient location (within six feet of unit) between the meter and the unit.
7. Tighten all joints securely.
8. The unit must be connected to the building piping by one of the following methods:
 - Rigid metallic pipe and fittings
 - Semirigid metallic tubing and metallic fittings

(Aluminum alloy tubing must not be used in exterior locations)

- Listed gas appliance connectors used in accordance with the terms of their listing that are completely in the same room as the equipment
- In the prior two methods above the connector or tubing must be protected from physical and thermal damage. Aluminum alloy tubing and connectors must be coated to protect against external corrosion when in contact with masonry, plaster or insulation or are subject to repeated wettings by liquids (water - not rain water, detergents or sewage)



Proper Piping Practice

NOTE: The unit gas supply entrance is factory sealed with plugs. Keep plugs in place until gas supply is ready to be installed. Once ready, replace the plugs with the supplied grommets and install gas supply line.

GAS PIPING CHECKS

CAUTION

TO PREVENT PROPERTY DAMAGE OR PERSONAL INJURY DUE TO FIRE, THE FOLLOWING INSTRUCTIONS MUST BE PERFORMED REGARDING GAS CONNECTIONS AND PRESSURE TESTING:

- **THE UNIT AND ITS GAS CONNECTIONS MUST BE LEAK TESTED BEFORE PLACING IN OPERATION. BECAUSE OF THE DANGER OF EXPLOSION OR FIRE, NEVER USE A MATCH OR OPEN FLAME TO TEST FOR LEAKS. NEVER EXCEED SPECIFIED PRESSURES FOR TESTING. HIGHER PRESSURE MAY DAMAGE GAS VALVE AND CAUSE OVERFIRING WHICH MAY RESULT IN PREMATURE HEAT EXCHANGER FAILURE.**
- **THIS UNIT AND ITS SHUT-OFF VALVE MUST BE DISCONNECTED FROM THE GAS SUPPLY DURING ANY PRESSURE TESTING OF THAT SYSTEM AT PRESSURES IN EXCESS OF 1/2 PSIG (3.48 kPA).**
- **THIS UNIT MUST BE ISOLATED FROM THE GAS SUPPLY SYSTEM BY CLOSING ITS MANUAL SHUT-OFF VALVE DURING ANY PRESSURE TESTING OF THE GAS SUPPLY PIPING SYSTEM AT TEST PRESSURES EQUAL TO OR LESS THAN 1/2 PSIG (3.48 kPA).**

WARNING

TO AVOID PROPERTY DAMAGE OR PERSONAL INJURY, BE SURE THERE IS NO OPEN FLAME IN THE VICINITY DURING AIR BLEEDING.

There will be air in the gas supply line after testing for leaks on a new installation. Therefore, the air must be bled from the line by loosening the ground joint union until pure gas is expelled. Tighten union and wait for five minutes until all gas has been dissipated in the air. Be certain there is no open flame in the vicinity during air bleeding procedure. The unit is

placed in operation by closing the main electrical disconnect switch for the unit.

PROPANE GAS INSTALLATIONS

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE OR EXPLOSION CAUSED BY A PROPANE GAS LEAK, INSTALL A GAS DETECTING WARNING DEVICE. SINCE RUST CAN REDUCE THE LEVEL OF ODORANT IN PROPANE GAS, A GAS DETECTING WARNING DEVICE IS THE ONLY RELIABLE WAY TO DETECT A PROPANE GAS LEAK. CONTACT A LOCAL PROPANE GAS SUPPLIER ABOUT INSTALLING A GAS DETECTING WARNING DEVICE.

IMPORTANT NOTE: Propane gas conversion kits must be installed to convert units to propane gas. Refer to the gas piping section for the correct LP kit for conversion.

All propane gas equipment must conform to the safety standards of the National Board of Fire Underwriters (See NBFU Manual 58).

For satisfactory operation, propane gas supply pressure must be within 9.7 - 10.3 inches W.C. at the manifold with all gas appliances in operation. Maintaining proper gas pressure depends on three main factors:

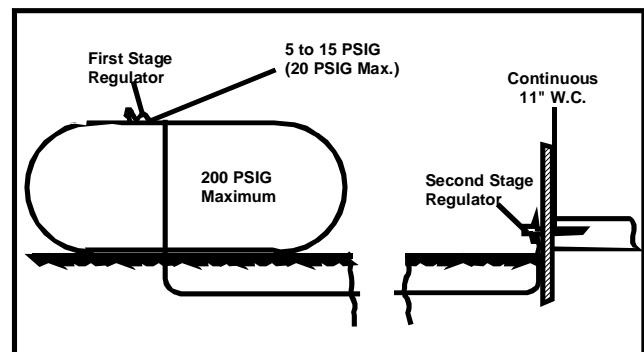
1. Vaporization rate, which depends on (a) temperature of the liquid, and (b) wetted surface area of the container or containers.
2. Proper pressure regulation.
3. Pressure drop in lines between regulators, and between second stage regulator and the appliance. Pipe size required will depend on length of pipe run and total load of all appliances.

TANKS AND PIPING

Complete information regarding tank sizing for vaporization, recommended regulator settings and pipe sizing is available from most regulator manufacturers and propane gas suppliers.

Since propane gas will quickly dissolve white lead or most standard commercial compounds, special pipe dope must be used. Shellac base compounds resistant to the actions of liquefied petroleum gases such as Gasolac®, Stalactic®, Clyde's® or John Crane® are satisfactory.

See below for typical propane gas piping.



Typical Propane Gas Piping

Sizing Between First and Second Stage Regulator
 Maximum Propane Capacities listed are based on 1 PSIG Pressure Drop at 10
 PSIG Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L					NOMINAL PIPE SIZE, SCHEDULE 40	
	3/8"	1/2"	5/8"	3/4"	7/8"	1/2"	3/4"
30	309	700	1,303	2,205	3,394	1,843	3,854
40	265	599	1,115	1,887	2,904	1,577	3,298
50	235	531	988	1,672	2,574	1,398	2,923
60	213	481	896	1,515	2,332	1,267	2,649
70	196	446	824	1,394	2,146	1,165	2,437
80	182	412	767	1,297	1,996	1,084	2,267
90	171	386	719	1,217	1,873	1,017	2,127
100	161	365	679	1,149	1,769	961	2,009
150	130	293	546	923	1,421	772	1,613
200	111	251	467	790	1,216	660	1,381
250	90	222	414	700	1,078	585	1,224
300	89	201	378	634	976	530	1,109
350	82	185	345	584	898	488	1,020
400	76	172	321	543	836	454	949

To convert to Capacities at 15 PSIG Settings -- Multiply by 1.130
 To convert to Capacities at 5 PSIG Settings -- Multiply by 0.879

Sizing Between Single or Second Stage Regulator and Appliance*
 Maximum Propane Capacities Listed are Based on 1/2" W.C. Pressure Drop at
 11" W.C. Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L					NOMINAL PIPE SIZE, SCHEDULE 40				
	3/8"	1/2"	5/8"	3/4"	7/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"
10	49	110	206	348	539	291	608	1,146	2,353	3,525
20	34	76	141	239	368	200	418	788	1,617	2,423
30	27	61	114	192	296	161	336	632	1,299	1,946
40	23	52	97	164	253	137	284	541	1,111	1,665
50	20	46	86	146	224	122	255	480	985	1,476
60	19	42	78	132	203	110	231	436	892	1,337
80	16	36	67	113	174	94	198	372	764	1,144
100	14	32	59	100	154	84	175	330	677	1,014
125	12	28	52	89	137	74	155	292	600	899
150	11	26	48	80	124	67	141	265	544	815
200	10	22	41	69	106	58	120	227	465	697
250	9	19	36	61	94	51	107	201	412	618
300	8	18	33	55	85	46	97	182	374	560
350	7	16	30	51	78	43	89	167	344	515
400	7	15	28	47	73	40	83	156	320	479

*DATA IN ACCORDANCE WITH NFPA PAMPHLET NO. 54

Propane Gas Pipe Sizing

WARNING

TO AVOID PROPERTY DAMAGE OR SERIOUS PERSONAL INJURY DUE TO FIRE OR EXPLOSION CAUSED BY A PROPANE GAS LEAK, INSTALL A GAS DETECTING WARNING DEVICE.

IF THE PROPANE GAS UNIT IS INSTALLED IN AN EXCAVATED AREA OR A CONFINED SPACE, A WARNING DEVICE IS REQUIRED DUE TO:

- PROPANE GAS IS HEAVIER THAN AIR AND ANY LEAKING GAS CAN SETTLE IN ANY LOW AREAS OR CONFINED SPACES.
- PROPANE GAS ODORANT MAY FADE, MAKING THE GAS UNDETECTABLE EXCEPT WITH A WARNING DEVICE.

ELECTRICAL WIRING

THERMOSTAT LOCATION

Mount the thermostat approximately five feet above the floor, in an area that has an inside, vibration-free wall and has good air circulation.

Movement of air must not be obstructed by furniture, door, draperies, etc. The thermostat must not be mounted where it will be affected by drafts, hot or cold water pipes or air ducts in walls, radiant heat from fireplace, lamps, the sun, television, etc. Consult the Instruction Sheet packaged with thermostat for mounting instructions.

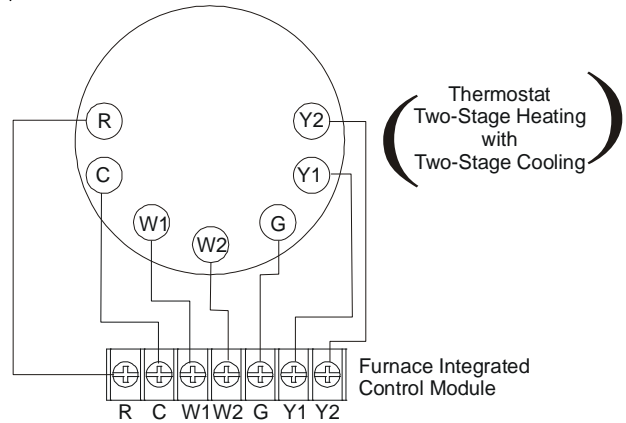
NOTE: *PG1524, *PG1530, *PG1537, and *PG1542 units have one stage of mechanical cooling and two stages of heat. All other units have two stages of heating and two stages of

mechanical cooling. Units which will have economizers may use thermostats with two or three stages of cooling. All units can use single stage or multi-stage thermostats. Refer to figures later in this section for wiring.

WARNING

TO AVOID PERSONAL INJURY, ELECTRICAL SHOCK OR DEATH, DISCONNECT ELECTRICAL POWER BEFORE SERVICING OR CHANGING ANY ELECTRICAL WIRING.

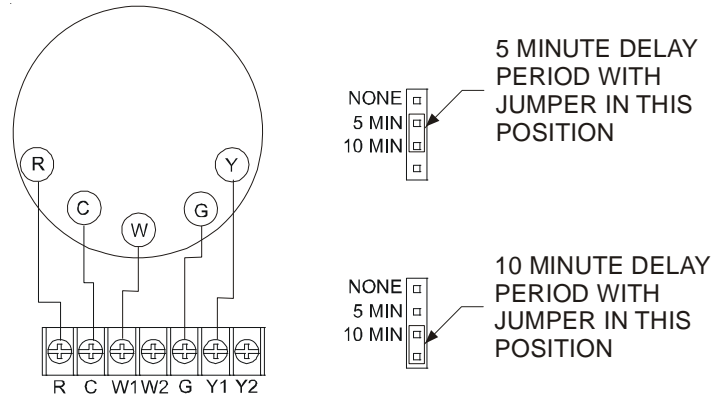
The units are designed for operation on 60 hertz current and at voltages as shown on the rating plate. All internal wiring in the unit is complete. It is necessary to bring in the power supply to the contactor as shown on the unit wiring diagram which is supplied with each unit. The low voltage wiring must be connected between the unit control panel and the room thermostat.



Two-Stage Heating with Two-Stage Cooling Thermostat Diagram

SINGLE STAGE THERMOSTAT

To use a single stage thermostat, move jumper located to the left of the terminal strip labeled "Stage Delay" from NONE to "5" or "10" minutes. This selection will cause the control to run on low stage for the selected time (5 or 10 minutes) then shift to HIGH STAGE. This option controls both cooling and heating modes. If the jumper is not moved, only low-stage cool and low-stage heat will operate.



Two-Stage Heating (timed) and Two-Stage Cooling (timed) with Single Stage Thermostat Diagram

Refer to the unit wiring diagram for electrical connections. When installed, the unit must be electrically grounded in accordance with local codes or in the absence of local codes, with the National Electrical Code, ANSI/NFPA No. 70, and/or the CSA C22.1 Electrical Code. Ensure low voltage connections are waterproof.



WARNING

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



CAUTION

TO AVOID PROPERTY DAMAGE OR PERSONAL INJURY DUE TO FIRE, USE ONLY COPPER CONDUCTORS.

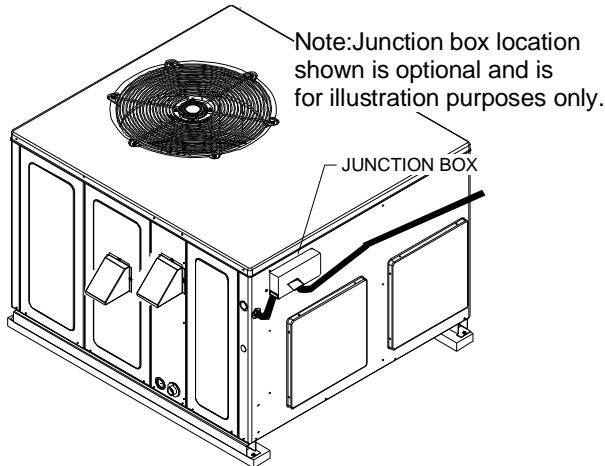


WARNING

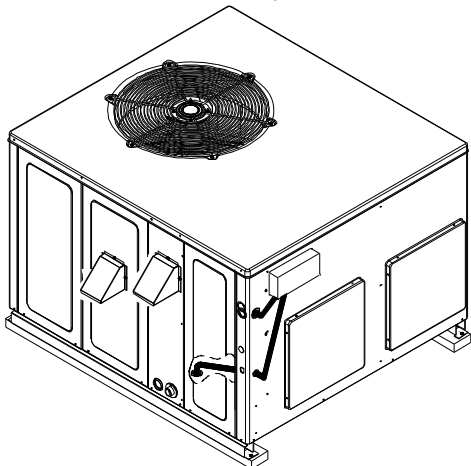
TO PREVENT IMPROPER AND DANGEROUS OPERATION DUE TO WIRING ERRORS, LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. VERIFY PROPER OPERATION AFTER SERVICING.

For unit protection, use a fuse or HACR circuit breaker that is in excess of the circuit ampacity, but less than or equal to the maximum overcurrent protection device. DO NOT EXCEED THE MAXIMUM OVERCURRENT DEVICE SIZE SHOWN ON UNIT DATA PLATE.

All line voltage connections must be made through weatherproof fittings. All exterior power supply and ground wiring must be in approved weatherproof conduit. Low voltage wiring from the unit control panel to the thermostat requires coded cable. See below for ground level and rooftop wiring.



Electrical Power Directly To Junction Box



Electrical Power Routed Through Bottom of Unit
Typical Electrical Wiring Unit Voltage

UNIT VOLTAGE

The unit transformer is factory connected for 230V operation. If the unit is to operate on 208V, reconnect the transformer primary lead as shown on the unit wiring diagram. The induced draft blower on some models is equipped with a low speed 230V lead (blue) and a low speed 208V lead (black). If equipped, connect the induced draft blower low speed 208V lead (black) in place of the low speed 230V lead (blue). Place the unused 230V lead on the "PARK" terminal located on ignition control.

HEAT ANTICIPATOR SETTING

The heat anticipator is to be set by measuring the load (amperage) at the "R" circuit. Follow the instructions provided with the thermostat for more details.

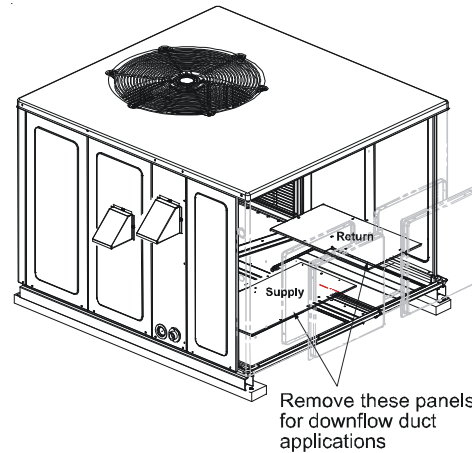
CIRCULATING AIR AND FILTERS

AIRFLOW CONVERSION

Units can easily be converted from horizontal to down-discharge airflow delivery. In down-discharge or high static installations, the installer should measure the total external static and review the blower performance charts before performing the installation. In some installations it will be necessary to change the blower speed to provide proper air flow.

Horizontal Air Flow

Single phase models are shipped without horizontal duct covers. If needed, these kits may be ordered through Goodman's Service Parts department.



Duct Cover Installation

Down Discharge Applications

Cut insulation around bottom openings and remove panels from the bottom of the unit, saving the screws holding the panels in place.

NOTE: Single phase models require installation of horizontal duct kit #20464501PDGK (medium chassis) and #20464502PDGK (large chassis).

DUCTWORK

Duct systems and register sizes must be properly designed for the C.F.M. and external static pressure rating of the unit. Ductwork should be designed in accordance with the recommended methods of Air Conditioning Contractors of America Manual D (Residential) or Manual Q (Commercial).

All ductwork exposed to the outdoors must include a weatherproof barrier and adequate insulation.

A duct system should be installed in accordance with Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Ventilating Systems. Pamphlets No. 90A and 90B.

The supply duct from the unit through a wall may be installed without clearance. However, minimum unit clearances as shown in the appendix must be maintained. The supply duct should be provided with an access panel large enough to inspect the air chamber downstream of the heat exchanger. A cover should be tightly attached to prevent air leaks.

For duct flange dimensions on the unit refer to the Unit Dimension illustration in the appendix.

For down-discharge applications, the ductwork should be attached to the roof curb prior to installing the unit. Ductwork dimensions are shown in the roof curb installation manual.

If desired, supply and return duct connections to the unit may be made with flexible connections to reduce possible unit operating sound transmission.

FILTERS

CAUTION

TO PREVENT PROPERTY DAMAGE DUE TO FIRE AND LOSS OF EQUIPMENT EFFICIENCY OR EQUIPMENT DAMAGE DUE TO DUST AND LINT BUILD-UP ON INTERNAL PARTS, NEVER OPERATE THE UNIT WITHOUT AN AIR FILTER INSTALLED IN THE RETURN AIR SYSTEM.

Even though a return air filter is not supplied with this unit, there must be a means of filtering all return air. All units may be externally filtered.

Refer to the unit filter size chart in the appendix for filter size information.

Filters installed external to the unit should be sized in accordance with their manufacturer recommendations. A throwaway filter must be sized for a maximum face velocity of 300 feet per minute.

Filter Installation

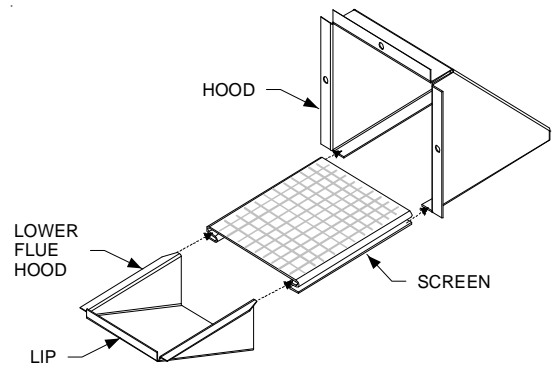
IMPORTANT NOTE: When installing a filter, the air flow arrows on the filter must point toward the circulator blower.

VENTING

NOTE: Venting is self-contained. Do not modify or block.

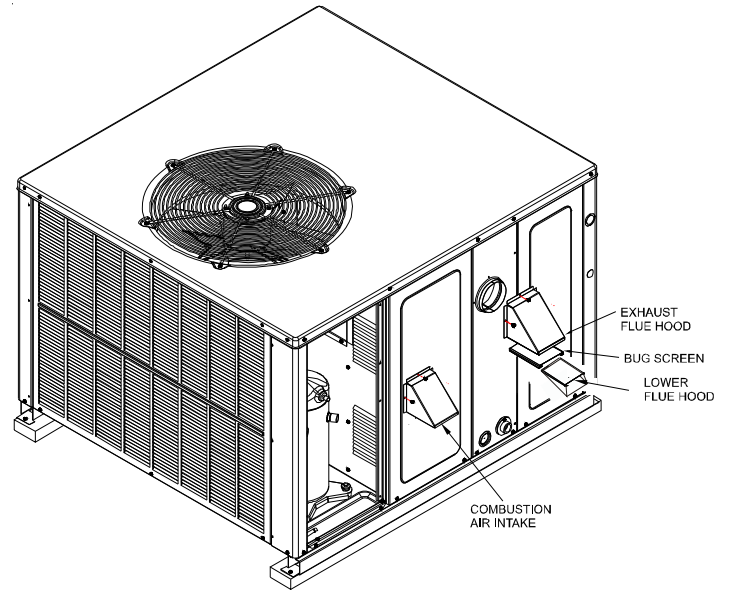
INSTALLATION - FLUE HOOD EXHAUST

1. Locate the flue hood assembly box from the blower compartment.
2. Slide screen over flanges on the lower flue hood.
3. Slide screen into hood.
4. Using the three screws provided, attach the hood (with the opening facing down) over the flue exhaust opening in the utility panel.



INSTALLATION - COMBUSTION AIR INTAKE HOOD

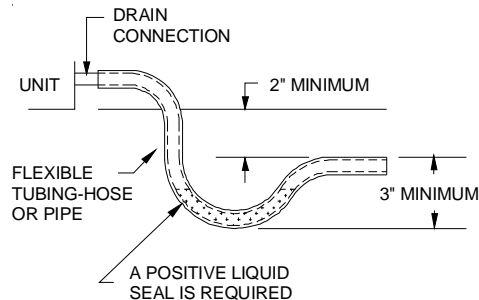
1. Locate the second hood.
2. Using the three screws provided, attach the hood (with the opening facing down) to the heat exchanger access door.



CONDENSATE DRAIN

CONDENSATE DRAIN CONNECTION

A 3/4" NPT drain connection is supplied for condensate piping. An external trap must be installed for proper condensate drainage.



Drain Connection

NORMAL SEQUENCES OF OPERATION

HEATING

This unit is equipped with an ignition control that automatically lights the main burner. DO NOT attempt to light the main burners by any other method.

1. Thermostat calls for low or high stage heating.
2. Induced draft blower energizes for 15-second pre-purge.
3. The spark igniter and low and high stage gas valve are energized for 7 seconds. **NOTE:** The igniter produces a very intense electrical spark that ignites the gas.
4. Main burners light and control detects presence of flame.
5. If the call is for low stage heat, the induced draft blower switches to low speed and the high stage gas valve closes 5 seconds after the main burners light. If call is for high stage heat, induced draft blower remains at high speed and high stage gas valve remains open.

NOTE: If a single stage thermostat is used, the control will step to low stage after the main burners light and remain at low stage for 5 or 10 minutes, depending on jumper position. If the call for HEAT remains after the transition delay time expires, the control will transition from low stage to high stage.

6. The 30-second HEAT FAN ON delay time begins after the main burners light.
7. The unit delivers heat to the conditioned space until the thermostat is satisfied.
8. Gas valve(s) de-energizes. The induced draft blower continues operation for a 30-second post-purge.
9. Induced draft blower remains at low speed (or switches from high to low if operating at high stage heat) for the 30-second post purge.
10. Ignition control begins timing the HEAT FAN OFF delay. There is an adjustable HEAT FAN OFF delay of approximately 90/120/150/180 seconds (factory set at 150). If the unit is operating at high stage when the call for heat is removed, the blower will operate for 30 seconds at high heat speed then switch to low heat speed for the remainder of the selected HEAT FAN OFF delay.

NOTE: After the HEAT FAN OFF delay time has elapsed, the blower will de-energize. This allows any additional heat in the heat exchanger to be transferred to the conditioned space.

COOLING

1. Thermostat calls for low or high stage cooling.
2. If the thermostat call is for low stage cooling, the compressor and outdoor fan are energized at low stage. If the thermostat call is for high stage cooling, the compressor and outdoor fan are energized at high stage.
3. The indoor blower will energize approximately 6 seconds later.
4. The unit delivers cooling to the conditioned space until the thermostat is satisfied.
5. The compressor and outdoor fan will be de-energized when the thermostat opens.
6. The indoor blower continues to run at low cool speed for approximately 60 seconds after the thermostat is satisfied. This allows additional cooling from the indoor coil to be transferred to the conditioned space. Then, the indoor blower is de-energized.

NOTE: A 180-second anti-short cycle is integral to the control and prevents recycling of the compressor.

FAN ONLY

1. Thermostat calls for FAN ONLY by energizing "G".
2. The indoor blower is immediately energized at the low heat speed.
3. The indoor blower is immediately de-energized once thermostat call for FAN is removed.

STARTUP, ADJUSTMENTS, AND CHECKS

HEATING STARTUP

This unit is equipped with an electronic ignition device to automatically light the main burners. It also has a power vent blower to exhaust combustion products.

On new installations, or if a major component has been replaced, the operation of the unit must be checked.

Check unit operation as outlined in the following instructions. If any sparking, odors, or unusual sounds are encountered, shut off electrical power and check for wiring errors, or obstructions in or near the blower motors. **Duct covers must be removed before operating unit.**

Heat Anticipator Setting

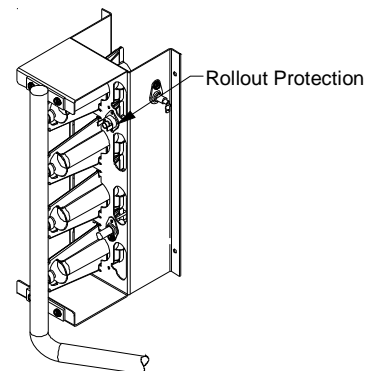
Set the heat anticipator on the room thermostat to 0.4 amps to obtain the proper number of heating cycles per hour and to prevent the room temperature from overshooting the room thermostat setting.

Rollout Protection Control

The rollout protection device opens, cutting power to the gas valve, if the flames from the burners are not properly drawn into the heat exchanger. The rollout protection device is located on the burner bracket. The reason for elevated temperatures at the control must be determined and repaired prior to resetting this manual reset control.

WARNING

TO AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH DUE TO FIRE OR EXPLOSION, A QUALIFIED SERVICER MUST INVESTIGATE THE REASON FOR THE ROLLOUT PROTECTION DEVICE TO OPEN BEFORE MANUALLY RESETTING THE ROLLOUT PROTECTION DEVICE.

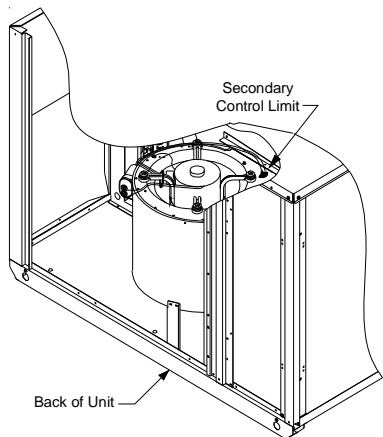


Rollout Protection on Burner Bracket

Secondary Limit Control

The secondary limit control is located on the top of the blower scroll assembly. This control opens when elevated temperatures are sensed. Elevated temperatures at the control are normally caused by blower failure. The reason for the opening should be determined and repaired prior to resetting.

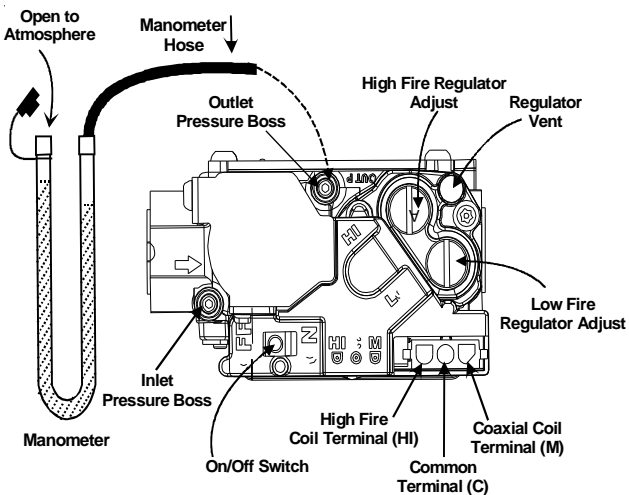
If the power to the unit is interrupted during the heating cycle, it may cause the secondary limit to trip. Once the blower compartment temperature drops below the limit reset temperature, the limit will automatically reset.



Secondary Limit Control

Pre-Operation Checks

1. Close the manual gas valve external to the unit.
2. Turn off the electrical power supply to the unit.
3. Set the room thermostat to its lowest possible setting.
4. Remove the heat exchanger door on the side of the unit by removing screws.
5. This unit is equipped with an ignition device which automatically lights the main burner. DO NOT try to light burner by any other method.
6. Move the gas control valve switch to the OFF position. Do not force.
7. Wait five minutes to clear out any gas.
8. Smell for gas, including near the ground. This is important because some types of gas are heavier than air. If you have waited five minutes and you do smell gas, immediately follow the warnings on page 4 of this manual. If having waited for five minutes and no gas smell is noted, move the gas control valve switch to the ON position.
9. Replace the heat exchanger door on the side of the unit.
10. Open the manual gas valve external to the unit.
11. Turn on the electrical power supply to the unit.
12. Set the thermostat to desired setting.



White-Rodgers Model 36G54 connected to Manometer

Gas Supply And Manifold Check

Gas supply pressure and manifold pressure with the burners operating must be as specified on the rating plate.

Gas Inlet Pressure Check

Gas inlet pressure must be checked and adjusted in accordance to the type of fuel being consumed.

With Power And Gas Off:

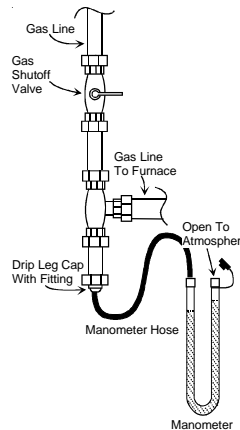
1. Connect a water manometer or adequate gauge to the inlet pressure tap of the gas valve.
Inlet gas pressure can also be measured by removing the cap from the dripleg and installing a predrilled cap with a hose fitting.

With Power And Gas On:

2. Put unit into heating cycle and turn on all other gas consuming appliances.

INLET GAS PRESSURE	
Natural	Min. 5.0" W.C., Max. 10.0" W.C.
Propane	Min. 11.0" W.C., Max. 13.0" W.C.

NOTE: Inlet Gas Pressure Must Not Exceed the Maximum Value Shown. If operating pressures differ from above, make necessary pressure regulator adjustments, check piping size, etc., and/or consult with local utility.



**Measuring Inlet Gas Pressure
Alternate Method**

Manifold Pressure Check

1. Turn OFF gas to furnace at the manual gas shutoff valve external to the furnace.
2. Turn off all electrical power to the system.
3. Back outlet pressure test screw (inlet/outlet pressure boss) out one turn (counterclockwise, not more than one turn).
4. Attach a hose and manometer to the outlet pressure boss of the valve.
5. Turn ON the gas supply.
6. Turn on power and energize main (M) solenoid. Do not energize the HI solenoid.
7. Measure gas manifold pressure with burners firing. Adjust manifold pressure using the Manifold Gas Pressure table shown below.

Manifold Gas Pressure			
Gas		Range	Nominal
Natural	Low Stage	1.6 - 2.2" w.c.	2.0" w.c.
	High Stage	3.2 - 3.8" w.c.	3.5" w.c.
Propane	Low Stage	5.7 - 6.3" w.c.	6.0" w.c.
	High Stage	9.7 - 10.3" w.c.	10.0" w.c.

- Remove regulator cover screw from the low (LO) outlet pressure regulator adjust tower and turn screw clockwise to increase pressure, or counterclockwise to decrease pressure.
- Energize main (M) solenoid as well as the HI terminal.
- Remove regulator cover screw from the HI outlet pressure regulator adjust tower and turn screw clockwise to increase pressure, or counterclockwise to decrease pressure.
- Turn off all electrical power and gas supply to the system.
- Remove manometer hose from outlet pressure boss.
- Turn outlet pressure test screw in to seal pressure port (clockwise, 7 in-lb minimum).
- Turn on electrical power and gas supply to the system.
- Turn on system power and energize valve.
- Using a leak detection solution or soap suds, check for leaks at pressure boss screw. Bubbles forming indicate a leak. SHUT OFF GAS AND FIX ALL LEAKS IMMEDIATELY.

NOTE: For gas to gas conversion, consult your dealer for appropriate conversion.

Gas Input (Natural Gas Only) Check

To measure the gas input use a gas meter and proceed as follows:

- Turn off gas supply to all other appliances except the unit.
- With the unit operating, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the seconds as is. This gives the seconds per cubic foot of gas being delivered to the unit.
- $INPUT = GAS\ HTG\ VALUE \times 3600 / SEC.\ PER\ CUBIC\ FOOT$

Example: Natural gas with a heating value of 1000 BTU per cubic foot and 34 seconds per cubic foot as determined by Step 2, then:

$Input = 1000 \times 3600 / 34 = 106,000$ BTU per Hour. **NOTE:** BTU content of the gas should be obtained from the gas supplier. This measured input must not be greater than shown on the unit rating plate.

- Relight all other appliances turned off in step 1. Be sure all pilot burners are operating.

Main Burner Flame Check

Flames should be stable, soft and blue (dust may cause orange tips but they must not be yellow) and extending directly outward from the burner without curling, floating or lifting off.

Temperature Rise Check

Check the temperature rise through the unit by placing thermometers in supply and return air registers as close to the unit as possible. Thermometers must not be able to sample temperature directly from the unit heat exchangers, or false readings could be obtained.

- All registers must be open; all duct dampers must be in their final (fully or partially open) position and the unit operated for 15 minutes before taking readings.
- The temperature rise must be within the range specified on the rating plate.

NOTE: Air temperature rise is the temperature difference between supply and return air.

With a properly designed system, the proper amount of temperature rise will normally be obtained when the unit is operated at rated input with the recommended blower speed. If the correct amount of temperature rise is not obtained, it may be necessary to change the blower speed. A higher blower speed will lower the temperature rise. A slower blower speed will increase the temperature rise.

NOTE: Blower speed MUST be set to give the correct air temperature rise through the unit as marked on the rating plate.

External Static Pressure Check

The total external static pressure must be checked on this unit to determine if the airflow is proper.

Blower Speed Adjustments



WARNING

TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, REMOVE ELECTRICAL POWER FROM THE UNIT BEFORE CHANGING SPEED TAPS ON THE BLOWER MOTOR.

Refer to the wiring diagram in the appendix to verify speed tap settings.

Depending upon the model, blower speeds are changed at the indoor blower. The ignition control board has four blower speeds: LOW HEAT, HI HEAT, LOW COOL and HIGH COOL.

NOTE: FAN ONLY energizes at LOW HEAT speed.

The *PG15 models are equipped with X-13 motors. X-13 motors are constant torque motors with very low power consumption. This motor is energized by 24VAC. Adjust the CFM for the unit by changing the 24VAC leads to the speed terminal block on the motor.

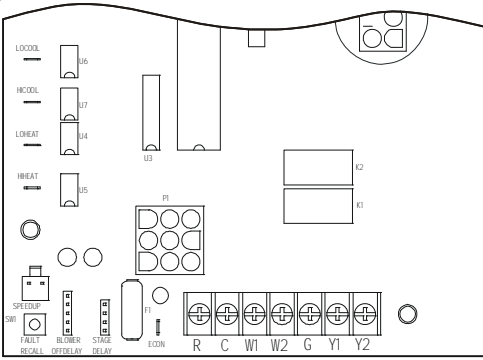
HEATING			COOLING		
Speed Tap	Definition	Lead Color	Speed Tap	Definition	Lead Color
T1	Low Speed Heat	White	T3	Low Speed Cool	Purple
T2	High Speed Heat	Brown	T4	High Speed Cool	Yellow
			T5	High Speed Cool Hi-Static	

NOTE: Heating airflow must be adjusted to provide the temperature rise shown on rating plate. A higher speed tap may not provide more airflow. Blower speeds are programmed to deliver adequate airflow at rated external static pressure (ESP). Refer to airflow table provided in the *Appendix* for details.

Limit Check

Check limit control operation after 15 minutes of operation by blocking the return air grille(s).

- After several minutes the main burners must go OFF. Blower will continue to run.
- Remove air restrictions and main burners will relight after a cool down period of a few minutes. Adjust the thermostat setting below room temperature.
 - Main burners must go OFF.
 - Circulating Air Blower will continue to run for 90, 120, 150 or 180 seconds, depending on the setting.



Control Board (Top)

NOTE: If necessary, adjust fan OFF delay settings to obtain satisfactory comfort level.

WARNING

THIS UNIT MUST NOT BE USED AS A "CONSTRUCTION HEATER" DURING THE FINISHING PHASES OF CONSTRUCTION ON A NEW STRUCTURE. THIS TYPE OF USE MAY RESULT IN PREMATURE FAILURE OF THE UNIT DUE TO EXTREMELY LOW RETURN AIR TEMPERATURES AND EXPOSURE TO CORROSIVE OR VERY DIRTY ATMOSPHERES.

Unit Shutdown

1. Set the thermostat to lowest setting.
2. Turn off the electrical power supply to the unit.
3. Remove the heat exchanger door on the side of the unit by removing screws.
4. Move the gas control valve switch to the OFF position. Do not force.
5. Close manual gas shutoff valve external to the unit.
6. Replace the heat exchanger door on the unit.
7. If cooling and/or air circulation will be desired, turn ON the electrical power.

COOLING STARTUP

NOTE: Check all manual reset limit controls in heating circuit if cooling mode does not operate.

Compressor Protection Devices

The compressor includes components which are designed to protect the compressor against abnormal operating conditions.

WARNING

TO PREVENT PERSONAL INJURY OR DEATH, ALWAYS DISCONNECT ELECTRICAL POWER BEFORE INSPECTING OR SERVICING THE UNIT. NOTE: ALL COMPRESSOR PROTECTION DEVICES RESET AUTOMATICALLY, ENERGIZING THE CONTACTOR AND OUTDOOR FAN.

Refrigerant Charge Check (Units with Fixed Orifice Devices)

After completing airflow measurements and adjustments the unit's refrigerant charge must be checked. The unit comes factory charged, but this charge is based on 325 CFM per ton and minimum ESP per ARI test conditions (generally between .15-.25 ESP). When air quantity or ESP is different than above, the refrigerant charge must be adjusted to the proper amount. All package units with fixed orifice devices are charged using the super heat method at the compressor suction line.

For charging in the warmer months, $8 \pm 3^{\circ}\text{F}$ superheat at the compressor is required at conditions 95°F outdoor ambient (dry bulb temperature), 80°F dry bulb / 67°F wet bulb indoor ambient, approximately 50% humidity. This superheat varies when conditions vary from the conditions described.

After superheat is adjusted it is recommended to check unit sub-cooling at the condenser coil liquid line out. In most operating conditions 10 - 15°F of sub-cooling is adequate.

Cooling Refrigerant Charging (Models with TXV)

Check unit charge before putting the cooling section into full operation. The unit is factory charged with R-410A for nominal air flow and static pressure conditions. The unit has a thermostatic expansion valve metering device. To ensure the unit is properly charged for the intended application, check the unit refrigerant sub-cooling at the condenser. The refrigerant sub-cooling is a function of outdoor ambient temperature and return air temperature of the conditioned space. It is the installing contractors responsibility to ensure the proper refrigerant sub-cooling at the condenser is adjusted for each application. For example, 10°F refrigerant sub-cooling level is adequate for a 95°F outdoor ambient temperature and for a 78-80°F indoor return air temperature. As the outdoor ambient temperature rises the sub-cooling decreases and as the outdoor ambient temperature lowers, the sub-cooling increases. **NOTE:** Proper sub-cooling adjustment optimizes cooling performance. Models equipped with thermostatic expansion valve, charge the system to 10 degrees of sub-cooling, when necessary, adjust expansion valve stem for superheat setting.

NOTE: The expansion valve will not need adjustment for most applications. Ensure system superheat is set between 12-15 degrees after final adjustment.

Superheat Adjustment

To adjust superheat, remove the control box cover and locate the expansion valve on the liquid line of the evaporator. Unscrew the cover from the expansion valve, locate the adjustment screw, and turn it clockwise (in) to increase superheat or counterclockwise (out) to decrease superheat. Replace adjustment cap. Wait a minimum of 10 minutes between adjustments to allow time for the TXV and pressures to stabilize.

Cooling Operation

NOTE: Mechanical cooling cannot be reliably provided at ambient temperatures below 50° F.

1. Turn on the electrical power supply to the unit.
2. Place the room thermostat selector switch in the COOL position (or AUTO if available, and if automatic changeover from cooling to heating is desired).
3. Set the room thermostat to the desired temperature.

TROUBLESHOOTING

IGNITION CONTROL ERROR CODES

The following presents probable causes of questionable unit operation. Refer to *Diagnostic Indicator Chart* for an interpretation of the signal and to this section for an explanation.

Remove the control box access panel and note the number of diagnostic LED flashes. Refer to *Diagnostic Indicator Chart* for an interpretation of the signal and to this section for an explanation.

FAULT RECALL

The ignition control is equipped with a momentary push-button switch that can be used to display on the diagnostic LED the last five faults detected by the control. The control must be in Standby Mode (no thermostat inputs) to use the feature. Depress the push-button switch for approximately 2

seconds. **NOTE: Do not hold for longer than 4 seconds. Holding the button for 4 seconds or higher will erase the memory!** Release the switch when the LED is turned off. The diagnostic LED will then display the flash codes associated with the last five detected faults. The order of display is the most recent fault to the least recent fault.

ABNORMAL OPERATION - HEATING

INTERNAL CONTROL FAILURE

If the integrated ignition control in this unit encounters an internal fault, it will go into a "hard" lockout and turn off the diagnostic LED. If diagnostic LED indicates an internal fault, check power supply to unit for proper voltage, check all fuses, circuit breakers and wiring. Disconnect electric power for five seconds. If LED remains off after restoring power, replace control.

EXTERNAL LOCKOUT

An external lockout occurs if the integrated ignition control determines that a measurable combustion cannot be established within three (3) consecutive ignition attempts. If flame is not established within the seven (7) second trial for ignition, the gas valve is de-energized, 30 second inter-purge cycle is completed, and ignition is re-attempted. The control will repeat this routine three times if a measurable combustion is not established. The control will then shut off the induced draft blower and go into a lockout state.

If flame is established but lost, the control will energize the circulator blower at the heat speed and then begin a new ignition sequence. If flame is established then lost on subsequent attempts, the control will recycle the ignition sequence.

The diagnostic fault code is 1 flash for a lockout due to failed ignition attempts. The integrated control will automatically reset after one hour, or it can be reset by removing the thermostat signal or disconnecting the electrical power supply for over five seconds. If the diagnostic red LED indicates an external lockout, perform the following checks:

- *Check the supply and manifold pressures*
- *Check the gas orifices for debris*
- *Check gas valve for proper operation*
- *Check flame sensor*

A drop in flame signal can be caused by nearly invisible coating on the sensor. Remove the sensor and carefully clean with steel wool.

- *Check wiring*
Check wiring for opens/shorts and miswiring.

IMPORTANT NOTE: If you have to frequently reset your gas/electric package unit, it means that a problem exists that should be corrected. Contact a qualified servicer for further information.

PRESSURE SWITCH STUCK OPEN

A pressure switch stuck open can be caused by a faulty pressure switch, faulty wiring, a disconnected or damaged hose, a blocked or restricted flue, or a faulty induced draft blower.

If the control senses an open pressure switch during the pre-purge cycle, the induced draft blower only will be energized. If the pressure switch opens after ignition has begun the gas valve is de-energized, the circulator blower heat off cycle begins, and the induced draft blower remains on. The diagnostic LED (red) code is two (2) flashes.

PRESSURE SWITCH STUCK CLOSED

A stuck closed pressure switch can be caused by a faulty pressure switch or faulty wiring. If the control encounters a pressure switch stuck closed, the induced draft blower remains off. The diagnostic red LED code for this fault is three (3) flashes.

OPEN THERMAL PROTECTION DEVICE

If a limit switch opens, the gas valve is immediately de-energized, the induced draft and air circulating blowers are energized. The induced draft and air circulator blowers remain energized until the limit switch re-closes. The diagnostic LED (red) code for an open limit is four (4) flashes.

PRIMARY LIMIT

A primary limit will open due to excessive supply air temperatures. This can be caused by a dirty filter, excessive duct static, insufficient air flow, or a faulty limit. Check filters, total external duct static, blower motor, blower motor speed tap (see wiring diagram), and limit. This limit will automatically reset once the temperature falls below a preset level.

AUXILIARY/SECONDARY LIMIT

A dirty filter, excessive duct static, insufficient air flow, a faulty limit, or a failed circulator blower can cause this limit to open. Check filters, total external duct static, circulator blower motor, blower motor speed tap (see wiring diagram), and limit. An interruption in electrical power during a heating cycle may also cause the auxiliary limit to open. The automatic reset secondary limit is located on top of the circulator blower assembly.

ROLLOUT LIMIT

If the burner flames are not properly drawn into the heat exchanger, the flame rollout protection device will open. Possible causes are restricted or blocked flue passages, blocked or cracked heat exchanger, a failed induced draft blower, or insufficient combustion air. The rollout protection device is a manual reset limit located on the burner bracket. The cause of the flame rollout must be determined and corrected before resetting the limit.

FLAME DETECTED WITH GAS VALVE CLOSED

If flame is detected with the gas valve de-energized, the combustion and air circulator blowers are energized. The diagnostic fault code is five (5) flashes (red LED) for this condition. The flame diagnostic LED (amber) will flash (2) times to indicate this condition. The control can be reset by removing the power supply to the unit or it will automatically reset after one hour. Miswiring is the probable cause for this fault.

LOW FLAME SIGNAL

Under some conditions, the fuel or air supply can create a nearly invisible coating on the flame sensor. This coating acts as an insulator causing a drop in the flame signal. If the flame signal drops below a predetermined value, the ignition control will display an error code of (1) flash on the amber diagnostic LED. The unit will continue to operate until the control can no longer detect flame.

ABNORMAL OPERATION - COOLING

SHORT CYCLE COMPRESSOR DELAY

The automatic ignition control has a built-in feature that prevents damage to the compressor in short cycling situations. In the event of intermittent power losses or intermittent thermostat operation, the ignition control will delay output to the compressor contactor for three minutes from the time power is restored or thermostat call for cooling is restored. (Compressor is off a total of three minutes). The diagnostic red LED will flash six (6) times to indicate the compressor contactor output is being delayed.

NOTE: Some electronic thermostats also have a built-in compressor short cycle timer that may be longer than the three minute delay given above. If you are using an electronic thermostat and the compressor has not started after three minutes, wait an additional five minutes to allow the thermostat to complete its short cycle delay time.

HIGH PRESSURE SWITCH/LOSS OF CHARGE SWITCH

Some models include a high pressure cutout switch and/or a loss of charge cutout switch. The high pressure cutout switch protects the refrigeration system from excessive operating pressures. The loss of charge cutout switch protects the refrigeration system from very low operating pressures due to a loss of refrigerant. Compressor operation will be disabled if either of these devices opens. If either device opens, the diagnostic red LED will flash (9) times to indicate that a refrigeration system pressure switch is open.

MAINTENANCE



WARNING

HIGH VOLTAGE!

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



Have the gas heating section of the unit checked at least once a year before the heating season begins, to be sure that the combustion air inlet and flue outlet hoods are not blocked by debris, which would prevent adequate combustion air and a properly operating vent system.

FILTER REPLACEMENT OR CLEANING

A return air filter is not supplied with this unit; however, there must be a means of filtering all of the return air. The filter(s) may be located in the return air duct(s), or return air filter grille(s). Consult with your installing dealer for the actual location of the return air filter(s) for your unit.

Dirty filters are the most common cause of inadequate heating or cooling performance. Filter inspection should be made at least every two months; more often if necessary because of local conditions and usage.

Dirty throwaway filters should be discarded and replaced with a new, clean filter. Dirty permanent filters should be washed with water, thoroughly dried and sprayed with a filter adhesive before being reinstalled. (Filter adhesives may be found at many hardware stores.) Permanent filters should last several years. However, should one become torn or uncleanable, it should be replaced.

CABINET FINISH MAINTENANCE

Use a fine grade automotive wax on the cabinet finish to maintain the finish's original high luster. This is especially

important in installations with extended periods of direct sunlight.

CLEAN OUTSIDE COIL (QUALIFIED SERVICER ONLY)

The coil with the outside air flowing over it should be inspected annually and cleaned as frequently as necessary to keep the finned areas free of lint, hair and debris.

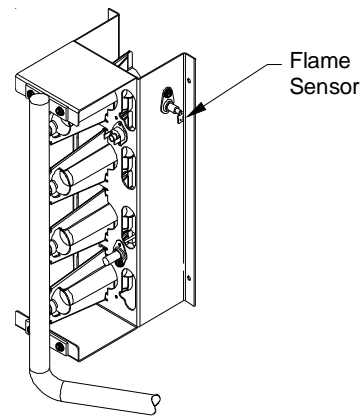
CONDENSER, EVAPORATOR, AND INDUCED DRAFT MOTORS

Bearings on the air circulating blower motor, condenser motor and the combustion fan motor are permanently lubricated. No additional oiling is required.

FLAME SENSOR (QUALIFIED SERVICER ONLY)

A drop in the flame current can be caused by a nearly invisible coating on the flame sensor. This coating, created by the fuel or combustion air supply, can be removed by carefully cleaning the flame sensor with steel wool.

NOTE: After cleaning, the microamp signal should be stable and in the range of 4 - 6 microamps DC.



Flame Sensor

FLUE PASSAGES (QUALIFIED SERVICER ONLY)

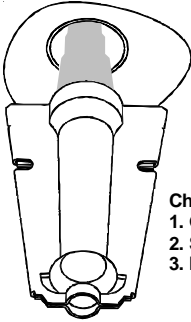
At the start of each heating season, inspect and, if necessary, clean the unit flue passage.

CLEANING FLUE PASSAGES (QUALIFIED SERVICER ONLY)

1. Shut off electric power and gas supply to the unit.
2. Remove burner assembly by disconnecting the gas line and removing the manifold bracket from the partition panel.
3. Remove the flue from the induced draft blower and the collector box cover from the partition panel.
4. The primary heat exchanger tubes can be cleaned using a round wire brush attached to a length of high grade stainless steel cable, such as drain cleanout cable. Attach a variable speed reversible drill to the other end of the spring cable. Slowly rotate the cable with the drill and insert it into one of the primary heat exchanger tubes. While reversing the drill, work the cable in and out several times to obtain sufficient cleaning. Use a large cable for the large tube, and then repeat the operation with a small cable for the smaller tube. Repeat for each tube.
5. When all heat exchanger tubes have been cleaned, replace the parts in the reverse order in which they were removed.
6. To reduce the chances of repeated fouling of the heat exchanger, perform the steps listed in "Startup, Adjustments, and Checks".

MAIN BURNER FLAME (QUALIFIED SERVICER ONLY)

Flames should be stable, soft and blue (dust may cause orange tips but must not be yellow). The flames must extend directly outward from the burner without curling, floating or lifting off.



- Check the burner flames for:
1. Good adjustment
 2. Stable, soft and blue
 3. Not curling, floating, or lifting off.

Burner Flame

WARNING

TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, DO NOT REMOVE ANY INTERNAL COMPARTMENT COVERS OR ATTEMPT ANY ADJUSTMENT. CONTACT A QUALIFIED SERVICER AT ONCE IF AN ABNORMAL FLAME SHOULD DEVELOP.

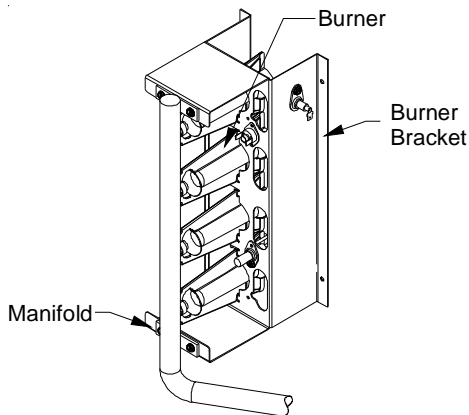
At least once a year, prior to or during the heating season, make a visual check of the burner flames.

NOTE: This will involve removing and reinstalling the heat exchanger door on the unit, which is held by two screws. If you are uncertain about your ability to do this, contact a qualified servicer.

If a strong wind is blowing, it may alter the airflow pattern within the unit enough that an inspection of the burner flames is not possible.

CLEANING BURNERS

1. Shut off electric power and gas supply to the unit.
2. Remove the screws securing the manifold to the burner retention bracket. Remove the manifold and rotate each burner counterclockwise to remove.



Manifold Assembly

3. Remove the burners.
4. Use a bottle brush to clean burner insert and inside of the burners.
5. Replace burners and manifold, inspect the burner assembly for proper seating of burners in retention slots.
6. Reconnect electrical power and gas supply.

CAUTION

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

CAUTION

ALWAYS VERIFY PROPER OPERATION AFTER SERVICING.

For further information on the yearly inspection, consult the User Manual. It is recommended that a qualified servicer inspect and service the unit at least once each year.

Turn the unit on at the thermostat. Wait a few minutes, since any dislodged dust will alter the normal flame appearance. Flames should be predominantly blue and directed into the tubes. They should not be yellow. They should extend directly outward from the burner ports without curling downward, floating or lifting off the ports.

ACCESSORIES AND FUNCTIONAL PARTS

SHEET METAL ACCESSORIES

Additional accessories can be purchased to fit specific application needs. Parts and instructions are available from your distributor.

FUNCTIONAL PARTS

FUNCTIONAL PARTS	
Auxiliary Limit Switch	Flame Rollout Switch
Blower Housing	Flame Sensor
Circulator Blower Motor	Gas Orifice
Blower Wheel	Gas Valve
Burner	Heat Exchanger
Capacitor	High Limit Switch
Compressor	Igniter
Condenser Coil	Ignition Control
Condenser Fan Blade	Induced Draft Blower
Condenser Fan Motor	Pressure Switch
Contactator	Pressure Switch Hose
Gas Manifold	Thermostatic Expansion Valve
Evaporator Coil	Transformer

Functional Parts List

GENERAL INFORMATION

1. Refer to the description in Functional Parts List when ordering any of the listed functional parts. Be sure to provide the unit model and serial numbers with the order.
2. Although only functional parts are shown, all sheet metal parts, doors, etc. may be ordered by description.
3. Parts are available from your distributor.

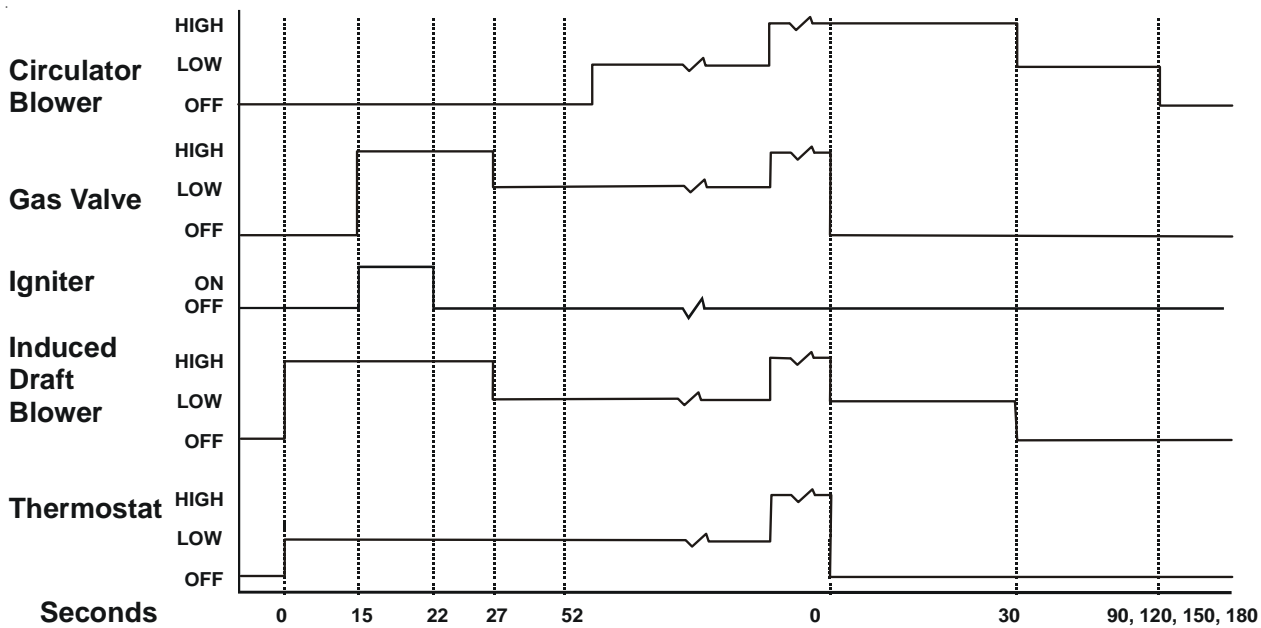
APPENDIX

IGNITION CONTROL DIAGNOSTIC INDICATOR CHART

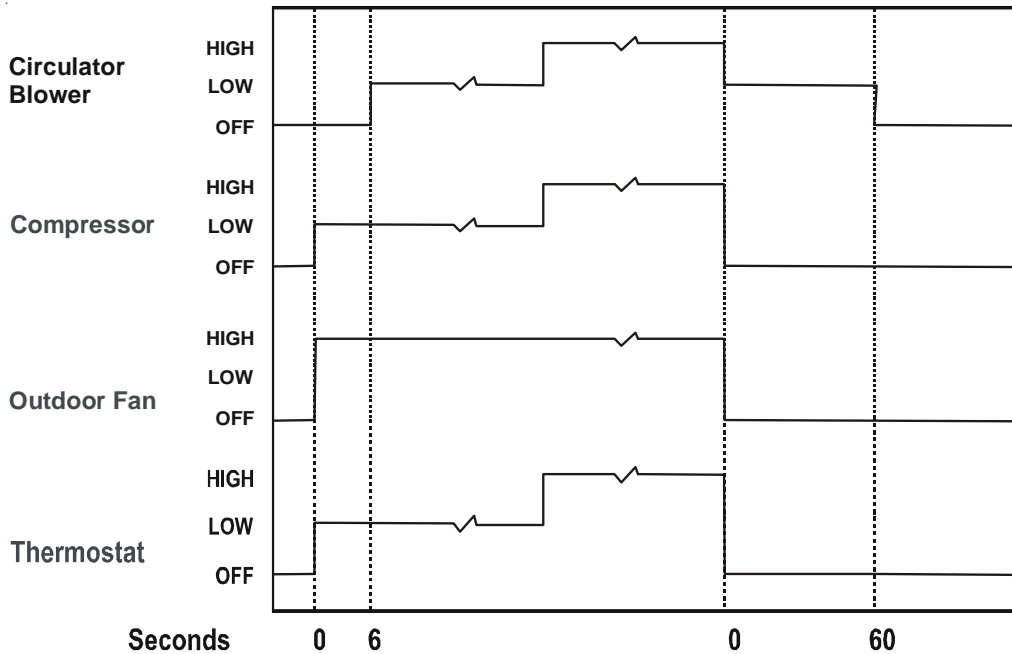
Red Light Signal	Refer to Abnormal Heating or Cooling Operation Sections of this Manual
Off	Internal Control Failure
1 Flash	External Lockout
2 Flashes	Pressure Switch Stuck Open
3 Flashes	Pressure Switch Stuck Closed
4 Flashes	Thermal Protection Device Open
5 Flashes	Flame Detected with Gas Valve Closed
6 Flashes	Short Cycle Compressor Delay (Cooling Only)
7 Flashes	Limit Opened Five (5) Times Within The Same Call For Heat
8 Flashes	Indoor/Outdoor Thermostat Open (Cooling Only; Devices Not present On All Models)
9 Flashes	High Pressure/Loss of Charge Switch Open (Cooling Only; Devices Not Present On All Models)

Amber Light Signal	Refer to Abnormal Heating or Cooling Operation Sections of this Manual
Off	No Flame Present
On	Normal Flame
1 Flash	Low Flame Current
2 Flashes	Flame Detected with Gas Valve De-energized.

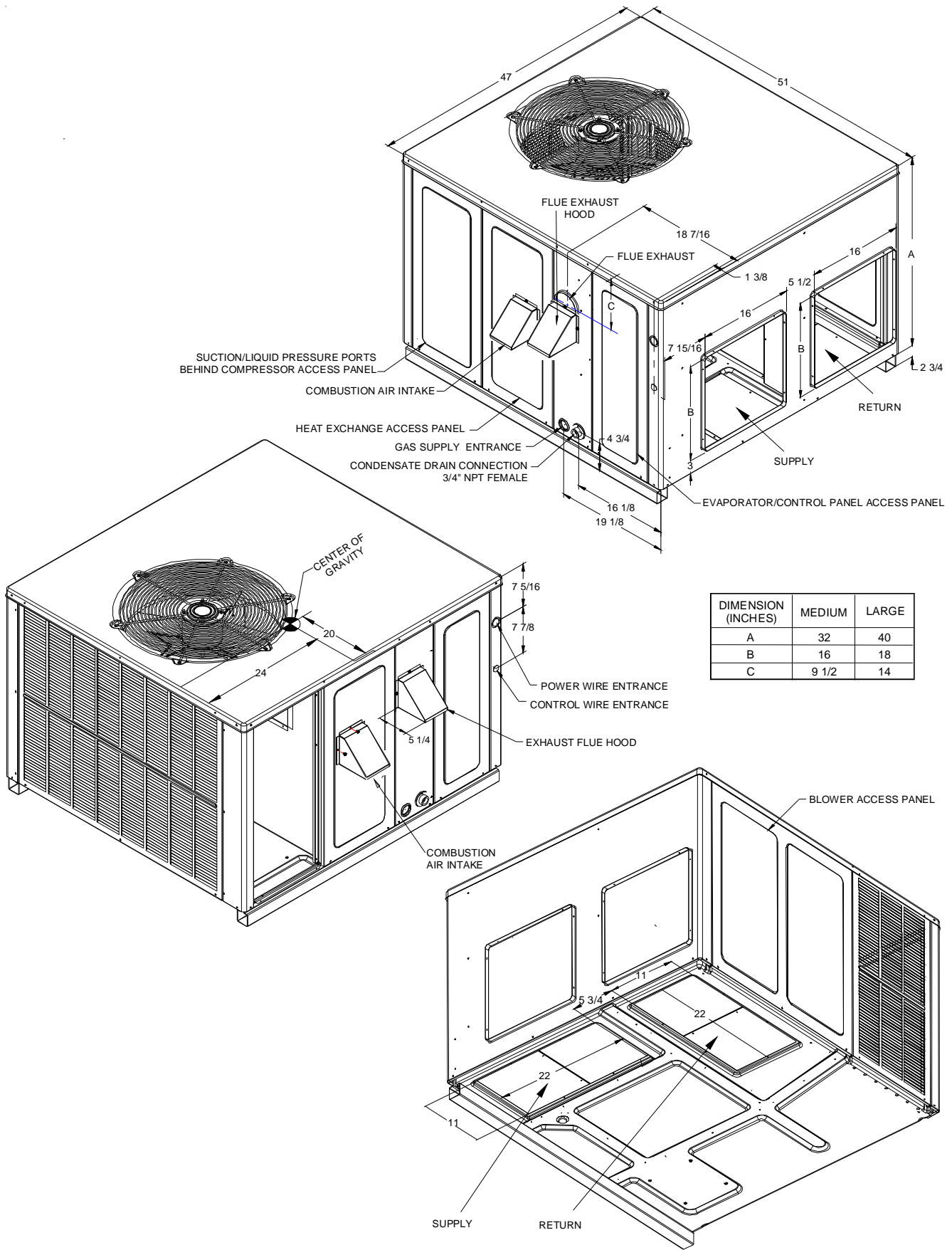
HEATING TIMING CHART



COOLING TIMING CHART



UNIT DIMENSIONS

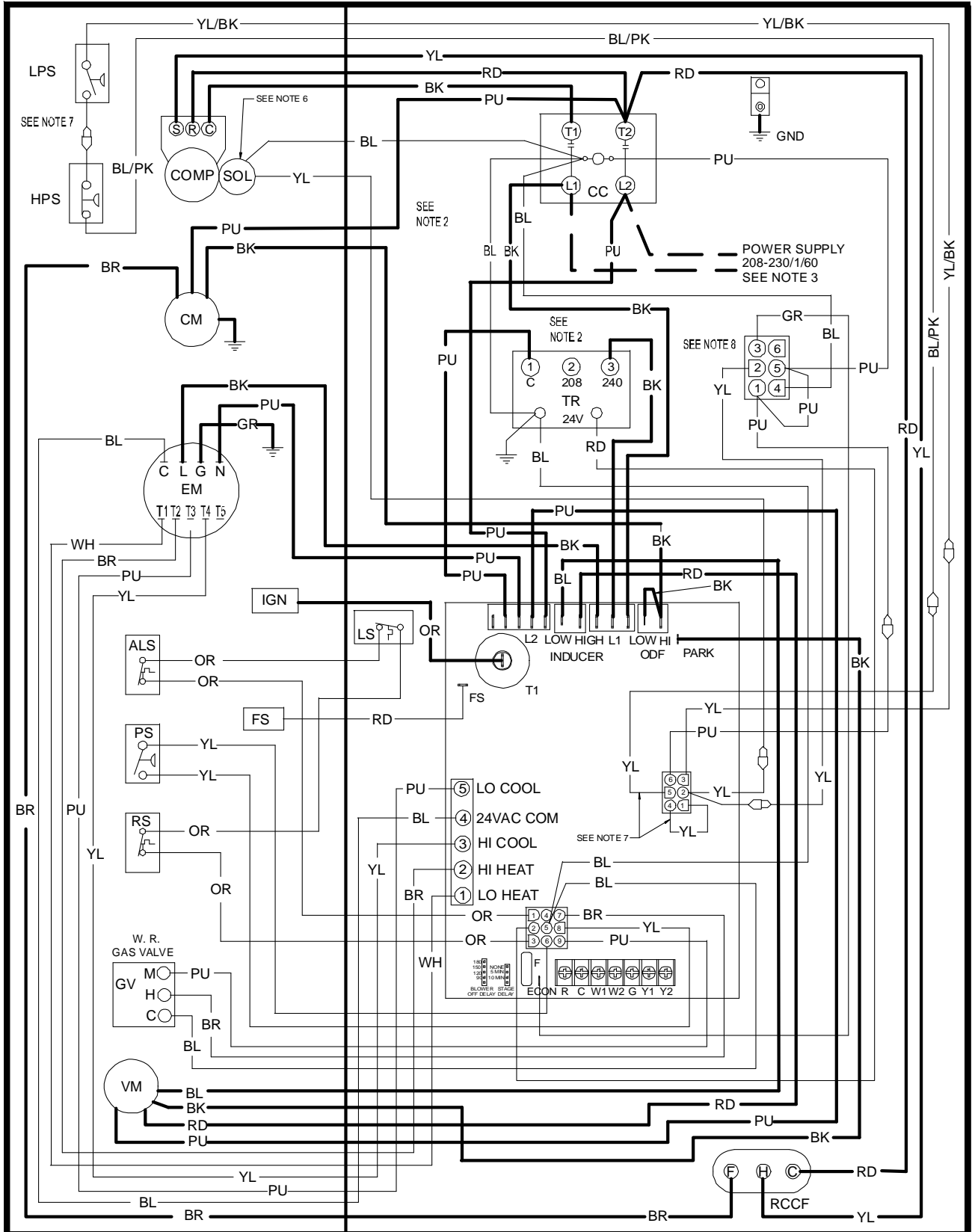


GPG15****41AA WIRING DIAGRAM



WARNING

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



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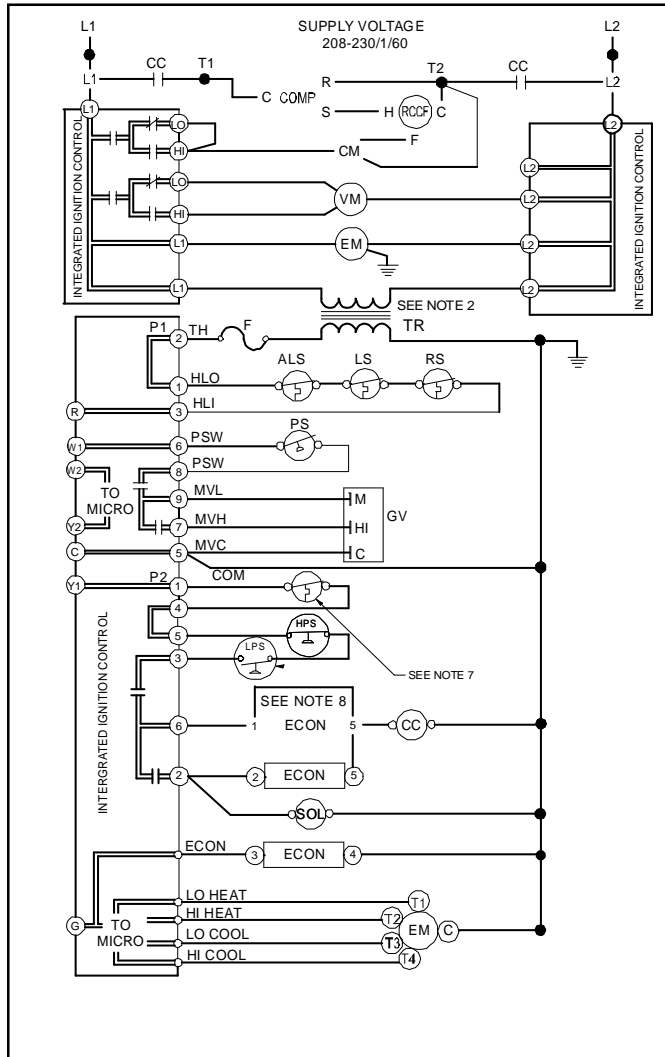
Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

GPG15****41AA WIRING DIAGRAM



WARNING

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



COMPONENT LEGEND

ALS	AUXILIARY LIMIT SWITCH
COMP	COMPRESSOR
CM	CONDENSER MOTOR
CC	CONTACTOR
ECON	ECONOMIZER
EM	EVAPORATOR MOTOR
F	FUSE
FS	FLAME SENSOR
GND	EQUIPMENT GROUND
GV	GAS VALVE
IIC	INTEGRATED IGNITION CONTROL
IGN	IGNITOR
LS	LIMIT SWITCH
PS	PRESSURE SWITCH
RCCF	RUN CAPACITOR FOR COMPRESSOR/FAN
RS	ROLL OUT SWITCH
SOL	SOLENOID (2ND STAGE COOL)
TR	TRANSFORMER
VM	VENT MOTOR

FACTORY WIRING

	LINE VOLTAGE
	LOW VOLTAGE
	OPTIONAL HIGH VOLTAGE

FIELD WIRING

	HIGH VOLTAGE
	LOW VOLTAGE

WIRE CODE

BK	BLACK
BL	BLUE
BR	BROWN
GR	GREEN
OR	ORANGE
PK	PINK
PU	PURPLE
RD	RED
WH	WHITE
YL	YELLOW

NOTES

1. REPLACEMENT WIRE MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (USE COPPER CONDUCTOR ONLY).
2. FOR 208 VOLT TRANSFORMER OPERATION MOVE BLACK WIRE FROM TERMINAL 3 TO TERMINAL 2 ON TRANSFORMER.
3. USE COPPER CONDUCTORS ONLY.
4. FOR 208V OPERATION, REMOVE BLUE LEAD FROM INDUCER LOW TERMINAL. MOVE BLACK LEAD FROM PARK TERMINAL ONTO INDUCER LOW TERMINAL. PLACE BLUE LEAD ON PARK TERMINAL.
5. USE NEC CLASS 2 WIRE FOR THERMOSTAT FIELD WIRING.
6. COMPRESSOR 2ND STAGE SOLENOID NOT PRESENT ON ALL MODELS.
7. OPTIONAL REFRIGERANT SWITCHES
8. FOR ECONOMIZER, REMOVE PLUG FROM ECONOMIZER HARNESS. CONNECT PLUG FROM ECONOMIZER TO HARNESS.

DIAGNOSTIC LED - RED	STATUS	CHECK
ON	NORMAL OPERATION	-
OFF	NO POWER OR INTERNAL CONTROL FAULT	CHECK INPUT POWER CHECK FUSE(S) REPLACE CONTROL
1 FLASH	IGNITION FAILURE	GAS FLOW GAS PRESSURE GAS VALVE FLAME SENSOR
2 FLASHES	PRESSURE SWITCH OPEN	CHECK PRESSURE SWITCH CHECK TUBING CHECK VENT MOTOR
3 FLASHES	PRESSURE SWITCH CLOSED WITHOUT INDUCER ON	CHECK PRESSURE SWITCH CHECK WIRING FOR SHORTS
4 FLASHES	OPEN LIMIT SWITCH	CHECK MAIN LIMIT SWITCH CHECK AUXILIARY LIMIT SW. CHECK ROLLOUT LIMIT SW.
5 FLASHES	FALSE FLAME DETECTED	CHECK GAS VALVE CHECK FOR SHORTS IN FLAME SENSOR WIRING
6 FLASHES	COMPR. SHORT CYCLE DELAY	3 MIN COMP. SHORT CYCLE DELAY

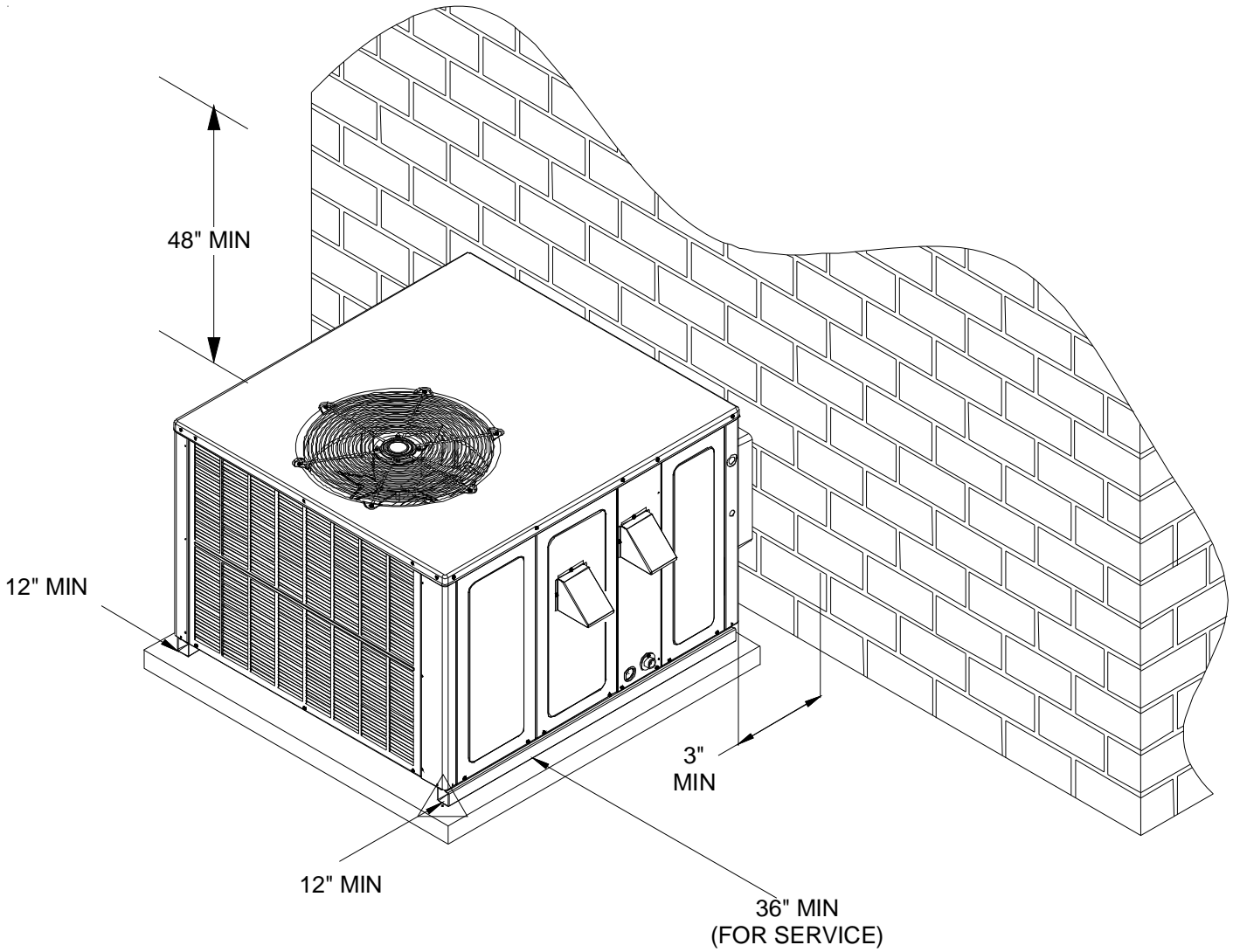
DIAGNOSTIC LED - RED	STATUS	CHECK
7 FLASHES	LIMIT OPEN 5 TIMES IN SAME CALL FOR HEAT	CHECK MAIN LIMIT SWITCH CHECK AUXILIARY LIMIT SW.
8 FLASHES	IDT/ODT OPEN	CHECK JUMPER BETWEEN 1 AND 4 ON 6-CIRCUIT CONNECTOR CHECK OPTIONAL REFRIGERANT SWITCHES
9 FLASHES	PSW/LOC OPEN	CHECK REFRIGERANT SWITCHES FOR LOSS OF CHARGE OR HIGH HEAD PRESSURE

DIAGNOSTIC LED - AMBER	STATUS	CHECK
OFF	NO FLAME PRESENT	-
ON	NORMAL FLAME PRESENT	-
1 FLASH	LOW FLAME SIGNAL	GAS FLOW GAS PRESSURE GAS VALVE FLAME SENSOR
2 FLASHES	FALSE FLAME DETECTED	CHECK GAS VALVE CHECK FOR SHORTS IN FLAME SENSOR WIRING

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

MINIMUM CLEARANCES



NOTE: Roof overhang should be no more than 36".

RECOMMENDED FILTER SIZES

UNIT	2 Ton	2 1/2 Ton	3 Ton	3 1/2 / 4 Ton	5 Ton
Min. Filter Size	(1)20 x 20 x 1	(1)20 x 25 x 1	(1)25 x 25 x 1	(2)20 x 20 x 1	(2)20 x 25 x 1

BLOWER PERFORMANCE DATA

***PG15240701A* - Rise Range: 35° - 65°**

Unit Static	T1 1st Stage Heating Speed				T2 2nd Stage Heating Speed				T3 Cooling Speed			T4 Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	742	84	0.75	52	907	134	1.18	57	857	116	1.04	907	134	1.18	1040	185	1.33
0.2	677	89	0.82	57	857	140	1.24	61	816	126	1.16	857	140	1.24	988	198	1.40
0.3	631	97	0.90	62	814	149	1.32	64	760	131	1.18	814	149	1.32	949	208	1.42
0.4	575	101	0.92	X	761	154	1.33	X	721	140	1.25	761	154	1.33	903	213	1.49
0.5	526	111	1.01	X	727	165	1.41	X	670	145	1.31	727	165	1.41	871	222	1.55
0.6	-	-	-	-	678	169	1.47	X	629	155	1.39	678	169	1.47	824	228	1.58
0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

***PG153009041A* - Rise Range: 45° -75°**

Unit Static	T1 1st Stage Heating Speed				T2 2nd Stage Heating Speed				T3 Cooling Speed			T4 Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1065	168	1.42	49	1255	257	2.10	55	1148	170	1.55	1148	170	1.55	1333	304	2.41
0.2	1003	174	1.48	52	1217	269	2.19	57	1092	176	1.66	1092	176	1.66	1293	314	2.48
0.3	961	185	1.55	54	1165	274	2.21	59	1044	184	1.72	1044	184	1.72	1237	321	2.54
0.4	913	195	1.62	57	1113	285	2.30	62	994	194	1.77	994	194	1.77	1193	333	2.71
0.5	855	202	1.69	60	1073	296	2.36	64	929	210	1.89	929	210	1.89	1158	341	2.77
0.6	814	212	1.76	63	1018	302	2.41	68	811	222	1.99	811	222	1.99	1101	345	2.78
0.7	749	218	1.82	69	991	313	2.48	70	763	224	2.03	763	224	2.03	-	-	-
0.8	713	227	1.87	72	-	-	-	-	715	236	2.07	715	236	2.07	-	-	-

***PG153609041A* - Rise Range: 45° -75°**

Unit Static	T1 1st Stage Heating Speed				T2 2nd Stage Heating Speed				T3 Cooling Speed			T4 Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1065	168	1.42	49	1255	257	2.10	55	924	120	1.08	1333	304	2.41	1418	360	2.92
0.2	1003	174	1.48	52	1217	269	2.19	57	863	128	1.14	1293	314	2.48	1375	371	3.00
0.3	961	185	1.55	54	1165	274	2.21	59	812	138	1.24	1237	321	2.54	1316	376	3.05
0.4	913	195	1.62	57	1113	285	2.30	62	745	145	1.27	1193	333	2.71	1279	387	3.13
0.5	855	202	1.69	60	1073	296	2.36	64	702	154	1.35	1158	341	2.77	1245	392	3.19
0.6	814	212	1.76	63	1018	302	2.41	68	643	159	1.37	1101	345	2.78	1193	400	3.22
0.7	749	218	1.82	69	991	313	2.48	70	601	168	1.44	-	-	-	-	-	-
0.8	713	227	1.87	72	-	-	-	-	502	173	1.52	-	-	-	-	-	-

***PG153709041A* - Rise Range: 45° -75°**

Unit Static	T1 1st Stage Heating Speed				T2 2nd Stage Heating Speed				T3 Cooling Speed			T4 Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1065	168	1.42	49	1255	257	2.10	55	1148	170	1.55	1148	170	1.55	1418	360	2.92
0.2	1003	174	1.48	52	1217	269	2.19	57	1092	176	1.66	1092	176	1.66	1375	371	3.00
0.3	961	185	1.55	54	1165	274	2.21	59	1044	184	1.72	1044	184	1.72	1316	376	3.05
0.4	913	195	1.62	57	1113	285	2.30	62	994	194	1.77	994	194	1.77	1279	387	3.13
0.5	855	202	1.69	60	1073	296	2.36	64	929	210	1.89	929	210	1.89	1245	392	3.19
0.6	814	212	1.76	63	1018	302	2.41	68	811	222	1.99	811	222	1.99	1193	400	3.22
0.7	749	218	1.82	69	991	313	2.48	70	763	224	2.03	763	224	2.03	-	-	-
0.8	713	227	1.87	72	-	-	-	-	715	236	2.07	715	236	2.07	-	-	-

X = Outside of Temperature Rise Range - Not Recommended.

NOTE: The shaded area indicates ranges in excess of maximum external static pressure allowable when heating. For satisfactory operation, external static pressure should not exceed 0.5" w.c.

BLOWER PERFORMANCE DATA

PG154211541A - Rise Range: 45° - 75°																	
Unit Static	T1 1st Stage Heating Speed				T2 2nd Stage Heating Speed				T3 Cooling Speed			T4 Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1065	168	1.42	49	1255	257	2.10	55	1335	260	1.01	1468	337	1.28	1619	431	1.64
0.2	1003	174	1.48	52	1217	269	2.19	57	1274	268	1.04	1412	349	1.33	1560	445	1.69
0.3	961	185	1.55	54	1165	274	2.21	59	1204	281	1.10	1346	359	1.37	1504	456	1.71
0.4	913	195	1.62	57	1113	285	2.30	62	1136	287	1.11	1275	363	1.40	1441	463	1.76
0.5	855	202	1.69	60	1073	296	2.36	64	1069	300	1.15	1221	370	1.44	1380	475	1.80
0.6	814	212	1.76	63	1018	302	2.41	68	1009	312	1.19	1170	386	1.47	1325	489	1.84
0.7	749	218	1.82	69	991	313	2.48	70	946	319	1.22	1105	397	1.52	1268	495	1.88
0.8	713	227	1.87	72	-	-	-	-	886	331	1.27	1042	406	1.54	1198	502	1.90

PG154811541A - Rise Range: 45° - 75°																	
Unit Static	T1 - 1st Stage Heating Speed				T2 - 2nd Stage Heating Speed				T3 - 1st Stage Cooling Speed			T4 - 2nd Stage Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1140	178	1.52	56	1417	305	2.46	61	1140	178	1.52	1616	436	3.34	1696	503	4.04
0.2	1090	188	1.57	59	1374	318	2.56	63	1090	188	1.57	1573	449	3.46	1650	517	4.15
0.3	1038	199	1.67	62	1322	327	2.68	65	1038	199	1.67	1527	462	3.59	1608	530	4.25
0.4	980	212	1.76	65	1273	338	2.72	68	980	212	1.76	1485	474	3.69	1566	543	4.39
0.5	914	220	1.79	70	1224	352	2.82	70	914	220	1.79	1443	489	3.80	1523	556	4.43
0.6	852	231	1.90	75	1176	365	2.88	73	852	231	1.90	1399	502	3.86	1480	569	4.55
0.7	806	242	1.97	X	1121	379	2.93	X	806	242	1.97	1356	513	3.99	1441	580	4.65
0.8	741	248	2.01	X	1068	391	2.98	X	741	248	2.01	1307	525	4.05	-	-	-

PG154911541A - Rise Range: 45° - 75°																	
Unit Static	T1 - 1st Stage Heating Speed				T2 - 2nd Stage Heating Speed				T3 - 1st Stage Cooling Speed			T4 - 2nd Stage Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1140	178	1.52	56	1417	305	2.46	61	1140	178	1.52	1468	337	1.28	1696	503	4.04
0.2	1090	188	1.57	59	1374	318	2.56	63	1090	188	1.57	1412	349	1.33	1650	517	4.15
0.3	1038	199	1.67	62	1322	327	2.68	65	1038	199	1.67	1346	359	1.37	1608	530	4.25
0.4	980	212	1.76	65	1273	338	2.72	68	980	212	1.76	1275	363	1.40	1566	543	4.39
0.5	914	220	1.79	70	1224	352	2.82	70	914	220	1.79	1221	370	1.44	1523	556	4.43
0.6	852	231	1.90	75	1176	365	2.88	73	852	231	1.90	1170	386	1.47	1480	569	4.55
0.7	806	242	1.97	X	1121	379	2.93	X	806	242	1.97	1105	397	1.52	1441	580	4.65
0.8	741	248	2.01	X	1068	391	2.98	X	741	248	2.01	1042	406	1.54	-	-	-

PG156014041A - Rise Range: 45° - 75°																	
Unit Static	T1 - 1st Stage Heating Speed				T2 - 2nd Stage Heating Speed				T3 - 1st Stage Cooling Speed			T4 - 2nd Stage Cooling Speed			T5 Cooling Speed		
	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	RISE	CFM	WATTS	AMPS	CFM	WATTS	AMPS	CFM	WATTS	AMPS
0.1	1773	488	3.64	X	1773	488	3.64	58	1379	246	1.95	1919	700	4.81	2115	783	5.54
0.2	1713	501	3.73	45	1713	501	3.73	61	1322	258	2.03	1862	714	4.94	2078	787	5.57
0.3	1693	509	3.78	45	1693	509	3.78	61	1268	266	2.10	1810	720	5.01	2009	802	5.67
0.4	1653	518	3.84	46	1653	518	3.84	63	1187	280	2.19	1755	734	5.07	1953	813	5.87
0.5	1597	529	3.91	48	1597	529	3.91	65	1133	287	2.23	1705	743	5.09	1933	805	5.77
0.6	1534	541	3.99	50	1534	541	3.99	68	1068	294	2.29	1647	748	5.16	-	-	-
0.7	1485	552	4.09	52	1485	552	4.09	70	1026	307	2.38	-	-	-	-	-	-
0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = Outside of Temperature Rise Range - Not Recommended.

NOTE: The shaded area indicates ranges in excess of maximum external static pressure allowable when heating. For satisfactory operation, external static pressure should not exceed 0.5" w.c.

NOTE: SPECIFICATIONS AND PERFORMANCE DATA LISTED HEREIN ARE SUBJECT TO CHANGE WITHOUT NOTICE

Quality Makes the Difference!

All of our systems are designed and manufactured with the same high quality standards regardless of size or efficiency. We have designed these units to significantly reduce the most frequent causes of product failure. They are simple to service and forgiving to operate. We use quality materials and components. Finally, every unit is run tested before it leaves the factory.

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