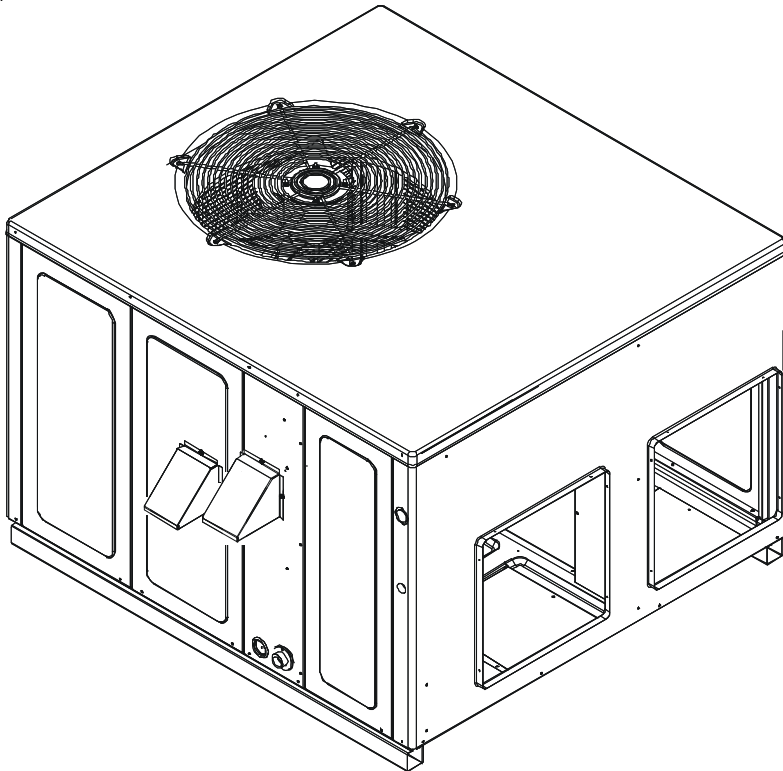


# INSTALLATION & OPERATING INSTRUCTIONS for A/GPG14 M SERIES W/R410A SINGLE PACKAGE GAS-ELECTRIC HEATING & COOLING UNIT

*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 or Technical Manual applicable to your model\* for information regarding accessories.

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

IOG-3008D  
11/2016

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[www.goodmanmfg.com](http://www.goodmanmfg.com) - or - [www.amana-hac.com](http://www.amana-hac.com)  
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## 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:

CONSUMER AFFAIRS  
GOODMAN MANUFACTURING COMPANY, L.P.  
7401 SECURITY WAY  
HOUSTON, TEXAS 77040  
(877) 254-4729

## 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.

Keep this literature in a safe place for future reference.



### 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

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

- DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

#### - WHAT TO DO IF YOU SMELL GAS:

- DO NOT TRY TO LIGHT ANY APPLIANCE.
- DO NOT TOUCH ANY ELECTRICAL SWITCH; DO NOT USE ANY PHONE IN YOUR BUILDING.
- IMMEDIATELY CALL YOUR GAS SUPPLIER FROM A NEIGHBOR'S PHONE. FOLLOW THE GAS SUPPLIER'S INSTRUCTIONS.
- IF YOU CANNOT REACH YOUR GAS SUPPLIER, CALL THE FIRE DEPARTMENT.
- INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER SERVICE AGENCY OR THE GAS SUPPLIER.



### WARNING

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



### 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 FURNACE 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

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

**DANGER**



**CARBON MONOXIDE POISONING HAZARD**


Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death. B10259-216

**DANGER PELIGRO**



**RIESGO DE INTOXICACIÓN POR MONÓXIDO DE CARBONO**

Advertencia especial para la instalación de calentadores ó manejadoras de aire en áreas cerradas como estacionamientos ó cuartos de servicio.

Los equipos ó aparatos que producen monóxido de carbono (tal como automóvil, calentador de gas, calentador de agua por medio de gas, etc) no deben ser operados en áreas cerradas debido al riesgo de envenenamiento por monóxido de carbono (CO) que resulta de las emisiones de gases de combustión. Si el equipo ó aparato se opera en dichas áreas, debe existir una adecuada ventilación directa al exterior. Esta ventilación es necesaria para evitar el peligro de envenenamiento por CO, que puede ocurrir si un dispositivo que produce monóxido de carbono sigue operando en el lugar cerrado.

Las emisiones de monóxido de carbono pueden circular a través del aparato cuando se opera en cualquier modo.

El monóxido de carbono puede causar enfermedades severas como daño cerebral permanente ó muerte. B10259-216

**DANGER**



**RISQUE D'EMPOISONNEMENT AU MONOXYDE DE CARBONE**

Advertencia especial para la instalación de calentadores ó manejadoras de aire en áreas cerradas como estacionamientos ó cuartos de servicio.

Avertissement special au sujet de l'installation d'appareils de hauffage ou de traitement d'air dans des endroits clos, tels les garages, les locaux d'entretien et les stationnements. Evitez de mettre en marche les appareils produisant du monoxyde de carbone (tels que les automobile, les appareils de chauffage autonome, etc.) dans des endroits non ventilés tels que les d'empoisonnement au monoxyde de carbone. Si vous devez faire fonctionner ces appareils dans un endroit clos, assurez-vous qu'il y ait une ventilation directe provenant de l'exterieur.

Cette ventilation est nécessaire pour éviter le danger d'intoxication au CO pouvant survenir si un appareil produisant du monoxyde de carbone continue de fonctionner au sein de la zone confinée.

Les émissions de monoxyde de carbone peuvent étre recirculées dans les endroits clos, si l'appareil de chauffage ou de traitement d'air sont en marche.

Le monoxyde de carbone peut causer des maladies graves telles que des dommages permanents au cerveau et meme la mort. B10259-216

## UNIT LOCATIONS

**WARNING**

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

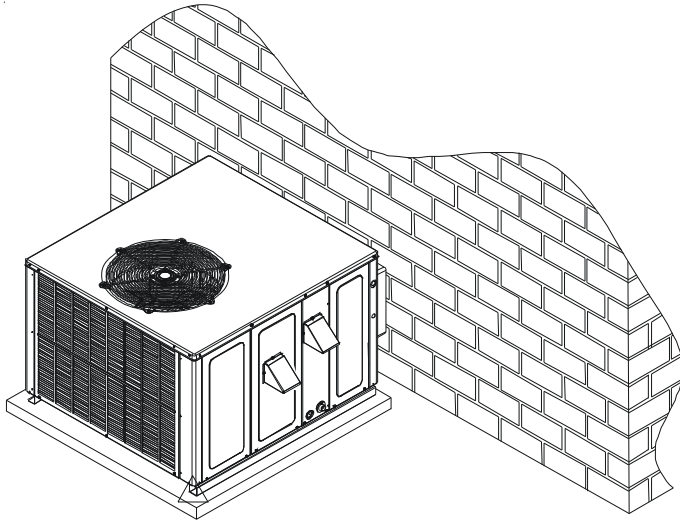
### ALL INSTALLATIONS:

- 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.

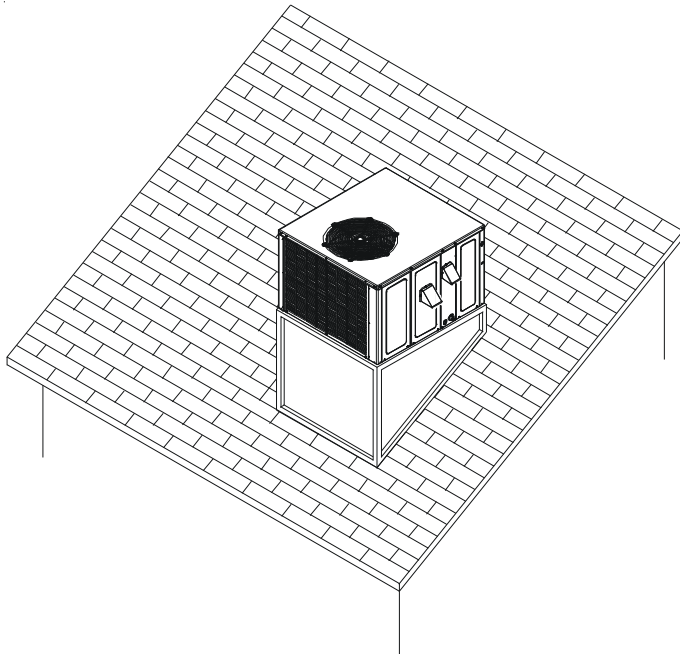


**Outside Slab Installation**

**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.

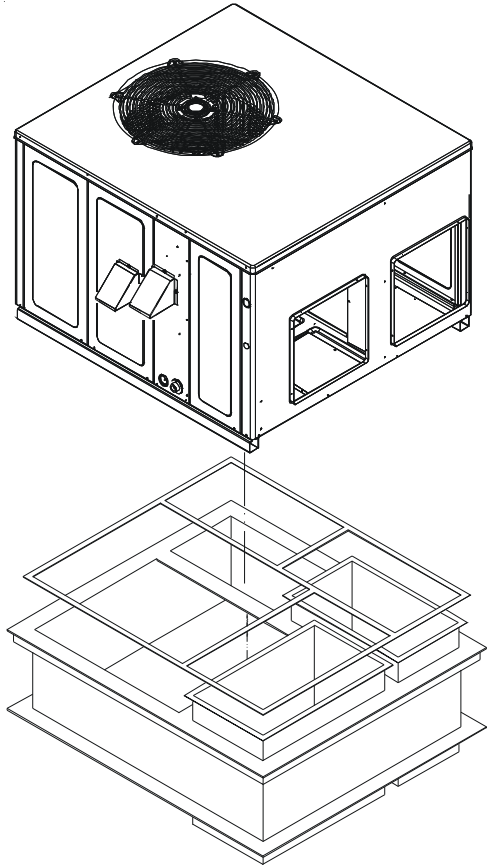


**Rooftop Installation**

- 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**

## 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.

**This unit is approved for outdoor installation ONLY.** Rated performance is achieved after 72 hours of operation. Rated performance is delivered at the specified airflow. See outdoor unit specification sheet for split system models or product specification sheet for packaged and light commercial models. Specification sheets can be found at [www.goodmanmfg.com](http://www.goodmanmfg.com) for Goodman® brand products or [www.amana-hac.com](http://www.amana-hac.com) for Amana® brand products. Within either website, please select the residential or commercial products menu and then select the submenu for the type of product to be installed, such as air conditioners or heat pumps, to access a list of product pages that each contain links to that model's specification sheet.

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 NFPA54/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  
25 West 43rd Street, 4th Floor  
New York, NY 10036

### 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 retightened. 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



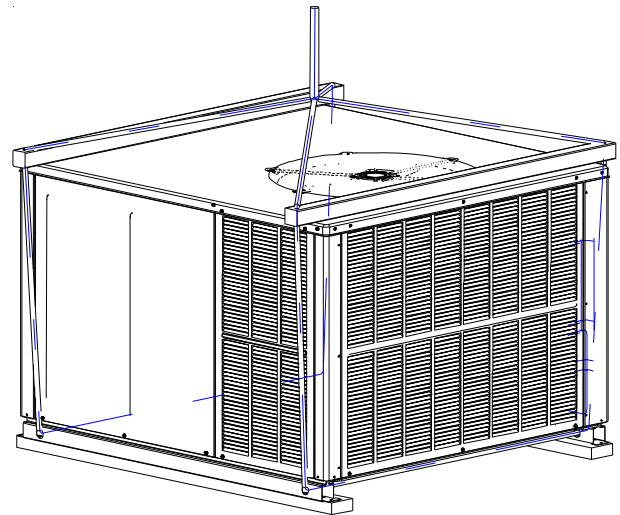
### WARNING

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:** 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 AVOID PROPERTY DAMAGE, PERSONAL INJURY OR DEATH WHEN EITHER 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 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-07, for use with single stage models, or LPM-08, for use with two-stage models. See table below.

LP Conversion Kit	Model
LPM-07	Single Stage Heating Models
LPM-08	Two-Stage Heating Models

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.

**NOTE:** Up to 2,000 feet, no changes are required; above 2,000 feet, please refer to the gas/electric package unit specification sheets for required kit(s).

### 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	Natural Gas Capacity of Pipe in Cubic Feet of Gas Per Hour (CFH)				
	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

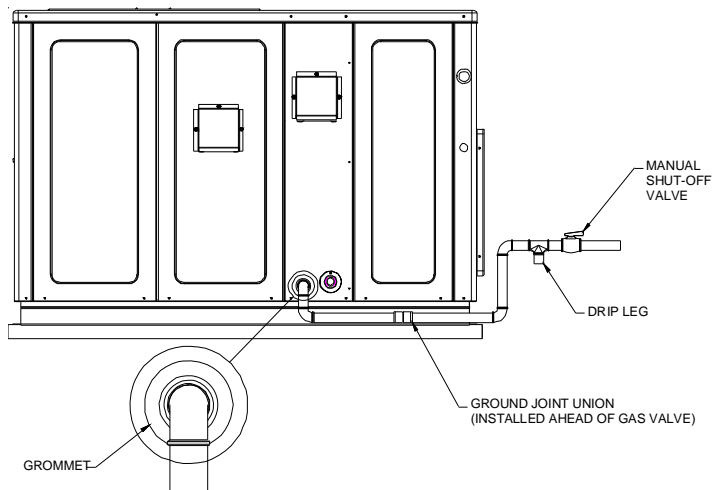
Pressure = .50 PSIG or less and Pressure Drop of 0.3" W.C. (Based on 0.60 Specific Gravity Gas)

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

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 EXCHANGE FAILURE.
- THIS UNIT AND ITS SHUT-OFF VALVE MUST BE DISCONNECTED FROM THE GAS SUPPLY DURING ANY PRESSURE TESTING OF THAT SYSTEM AT TEST 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.

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

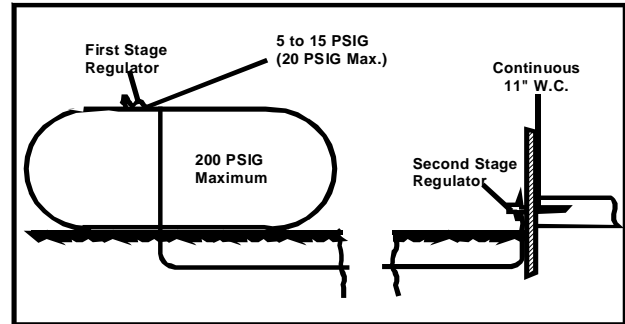
For satisfactory operation, propane gas supply pressure must be within 9.7 - 10.3 inches W.C. at the manifold with all gas appliances in operation. Maintaining proper gas pressure depends on three main factors:

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

Table 3 - Propane Gas Pipe Sizing

**WARNING**

TO PREVENT 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.

Five ton models have two stages of heating and two stages of mechanical cooling. Units which have economizers may use thermostats with two or three stages of cooling.

All other units have one stage of heating and one stage of mechanical cooling. Units which have economizers may use thermostats with one or two stages of cooling.

**WARNING**

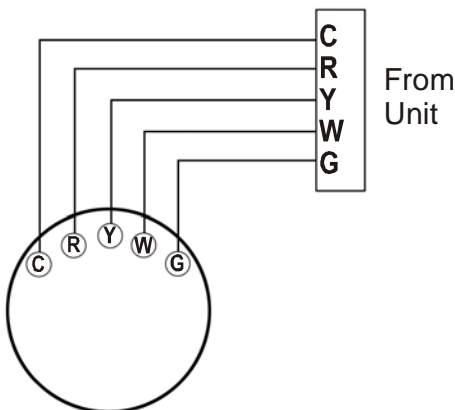
**HIGH VOLTAGE**

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



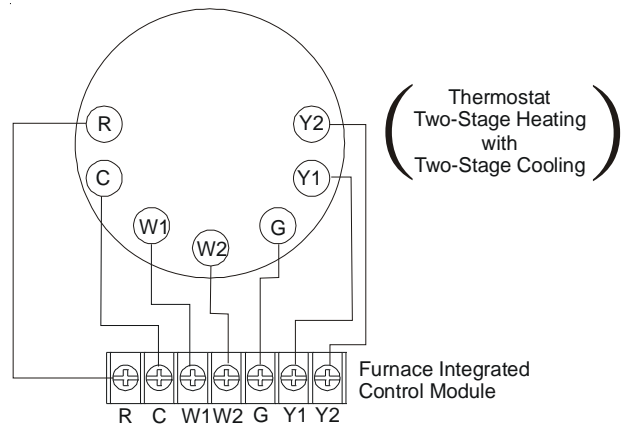
The units are designed for operation on 60 hertz current and at voltages as shown on the rating plate. All internal wiring in the unit is complete. It is necessary to bring in the power supply to the contactor as shown on the unit wiring diagram which is supplied with each unit. 24 volt wiring must be connected between the unit control panel and the room thermostat.

**Thermostat Wiring - Single Stage Models**



Single Stage Heating & Cooling Thermostat Diagram

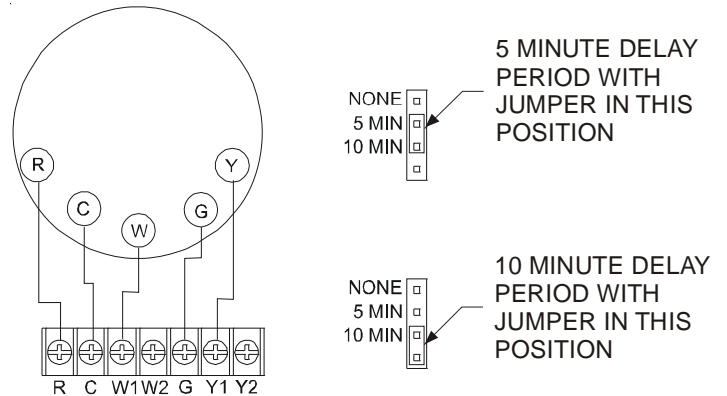
**Thermostat Wiring - Two Stage Models**



Two-Stage Heating with Two-Stage Cooling Thermostat Diagram

**SINGLE STAGE THERMOSTAT - TWO-STAGE MODELS**

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**

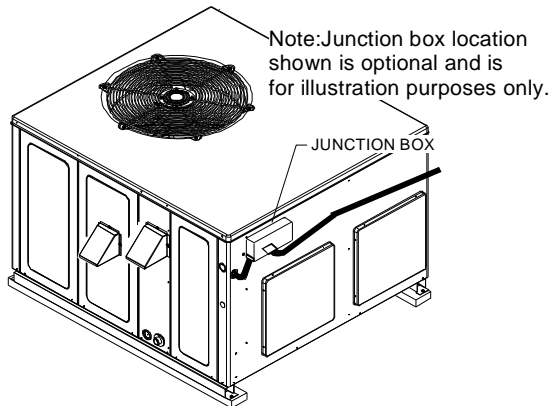
TO AVOID PROPERTY DAMAGE OR PERSONAL INJURY DUE TO FIRE, USE ONLY COPPER CONDUCTORS.

**CAUTION**

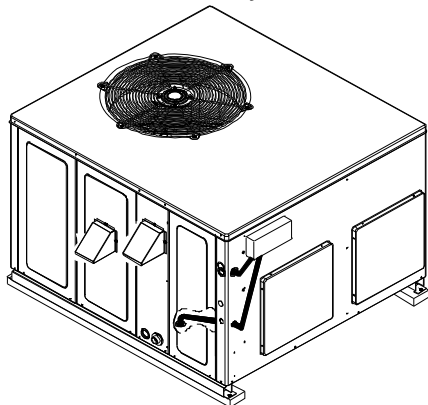
TO PREVENT IMPROPER AND DANGEROUS OPERATION DUE TO WIRING ERRORS, LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. VERIFY PROPER OPERATION AFTER SERVICING.

For unit protection, use a time delay 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.

**HEAT ANTICIPATOR SETTING**

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

**CIRCULATING AIR AND FILTERS**

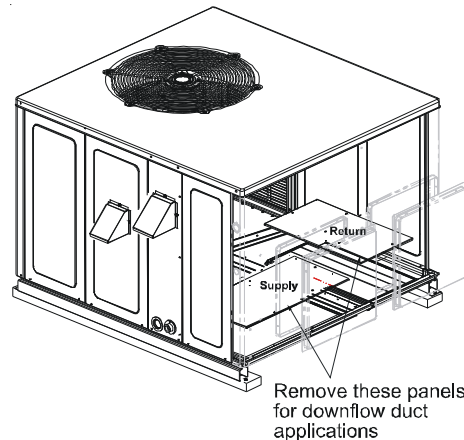
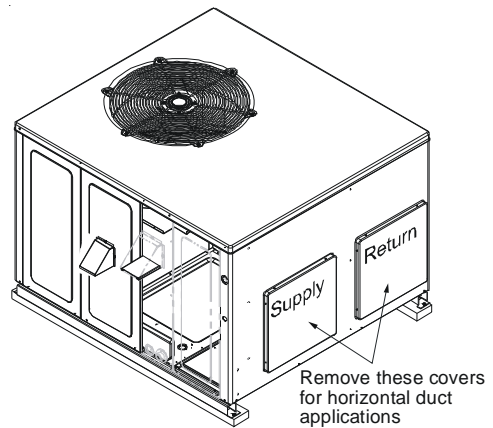
**AIRFLOW CONVERSION**

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.

For 3-phase models only, remove supply and return duct covers which are attached to the unit as shown below.



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

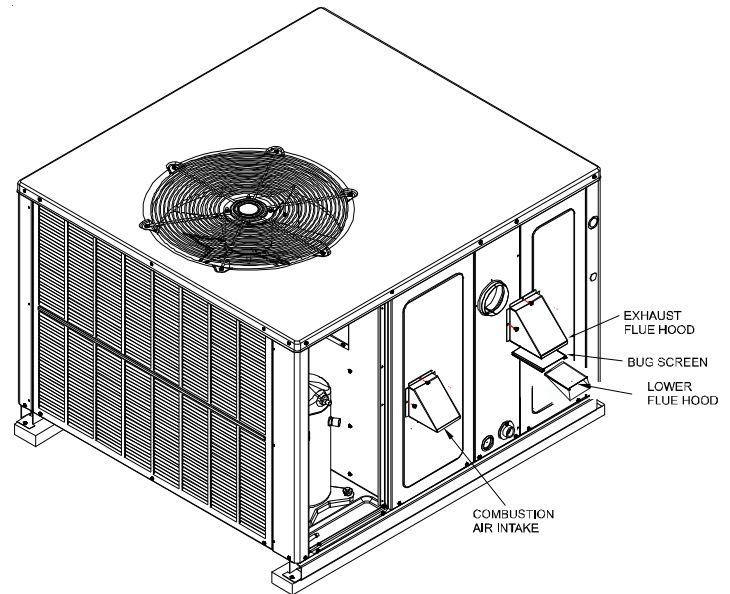
## VENTING

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

### FLUE HOOD INSTALLATION

Install the exhaust flue hood and combustion air intake hood prior to operation of the unit.

To install the flue hood cover, please refer to the installation instructions, included in the flue hood assembly package located in the blower compartment.



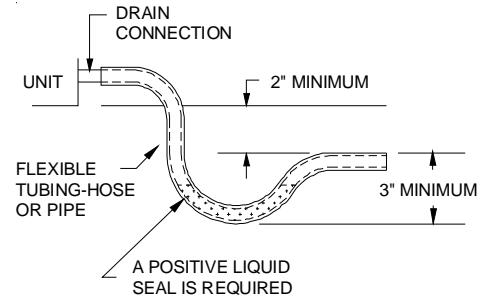
Flue Hood and Bug Screen Installation

## 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.

**NOTE:** Maximum torque is 10 in-lbs.



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 heat.
2. The induced draft blower energizes for a 15-second pre-purge.
3. The spark igniter and gas valve energizes 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. The 30-second HEAT FAN ON delay time begins after the main burners light.
6. The unit delivers heat to the conditioned space until the thermostat is satisfied.

#### Two-Stage Models:

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.

7. The gas valve de-energizes. The induced draft blower continues operation for a 29-second post-purge.

#### Two-Stage Models:

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.

8. Ignition control begins timing the HEAT FAN OFF delay. There is an adjustable HEAT FAN OFF delay of approximately 120/135/150 seconds (factory set at 150). 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.

#### Two-Stage Models:

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.

### COOLING

1. Thermostat calls for cooling. The compressor and outdoor fan are energized.

#### Two-Stage Models:

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.

2. Approximately seven seconds later, the indoor fan starts.
3. The unit will deliver cooling to the conditioned space until the thermostat is satisfied.
4. The compressor and outdoor fan will be de-energized when the thermostat opens.
5. The indoor fan continues to run for approximately 60 seconds after the thermostat is satisfied.

#### Two-Stage Models:

The fan runs at low cool speed for the off delay period. This allows additional cooling from the indoor coil to be transferred to the conditioned space. Then, the indoor fan stops.

**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. Approximately seven seconds later, the indoor fan starts.

#### Two-Stage Models:

Indoor fan is energized at low heat speed.

3. The indoor fan continues to run for approximately 60 seconds after "G" is de-energized.

#### Two-Stage Models:

The indoor fan is immediately de-energized once the thermostat "G" is de-energized.

## 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 recheck 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.

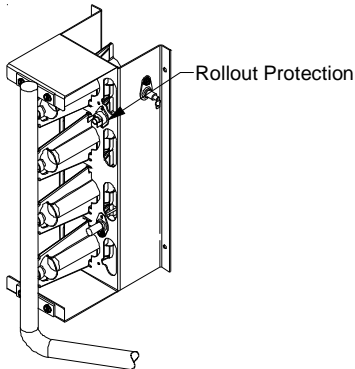
#### Rollout Protection Control

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 should 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.

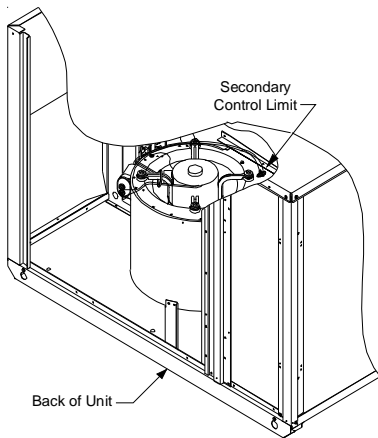


**Rollout Protection on Burner Bracket**

### **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.

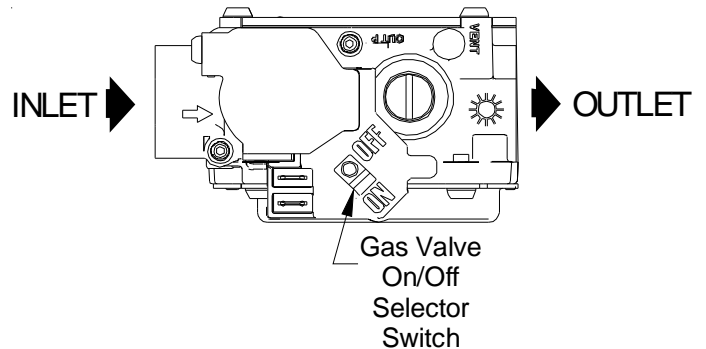


**Secondary Limit Control**

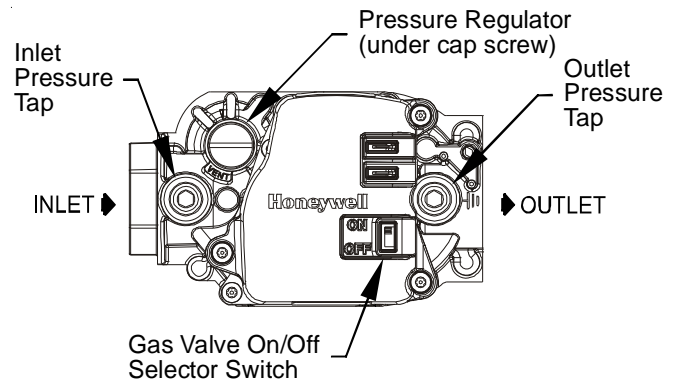
### **Pre-Operation Checks**

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.

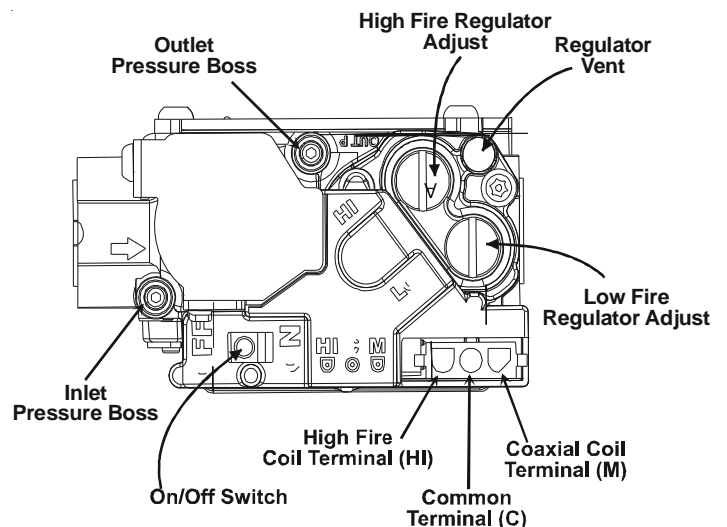
6. Move the gas control valve switch to the OFF position. Do not force.
7. Wait five minutes to clear out any gas.
8. Smell for gas, including near the ground. This is important because some types of gas are heavier than air. If you have waited five minutes and you do smell gas, immediately follow the warnings on page 3 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 36G22**



**Honeywell Model VR8215 (Single-Stage)**



**White-Rodgers Model 36G54**

## Gas Supply And Manifold Check

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

## GAS SUPPLY PRESSURE MEASUREMENT

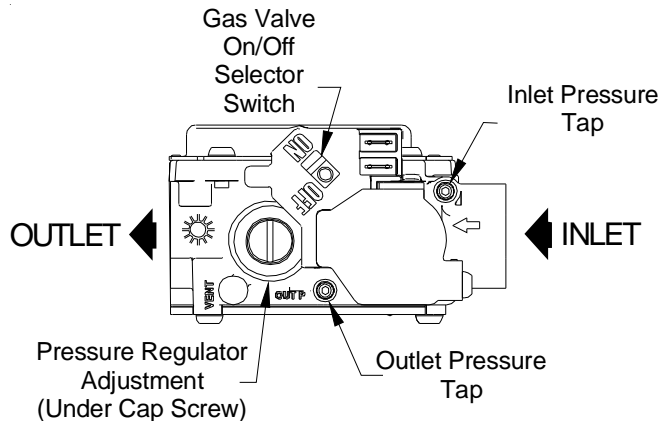
### CAUTION

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

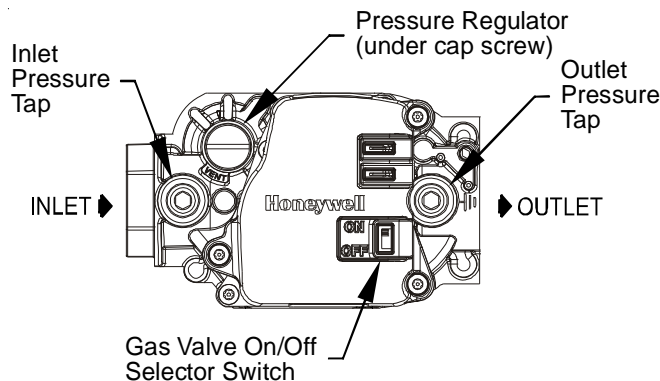
### WARNING

**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.

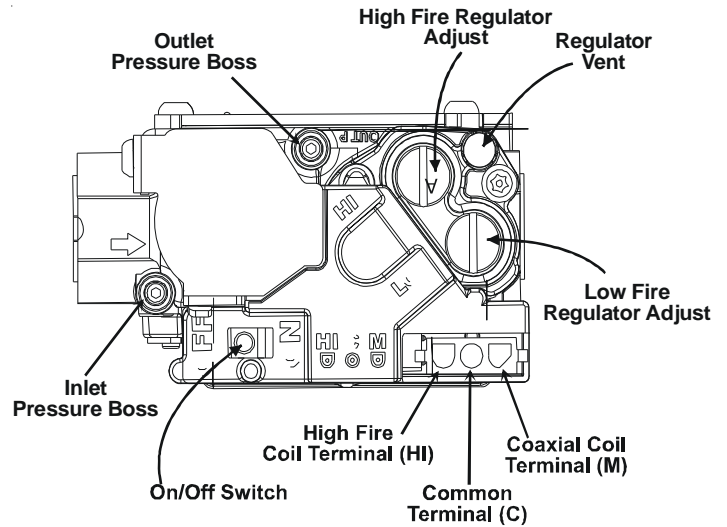
The line pressure supplied to the gas valve must be within the range specified in the *Inlet Gas Supply Pressure* table. The supply pressure can be measured at the gas valve inlet pressure tap or at a hose fitting installed in the gas piping drip leg. The supply pressure must be measured with the unit OFF. To measure inlet pressure, use the following procedure.



White-Rodgers Model 36G22



Honeywell Model VR8215 (Single-Stage)



White-Rodgers Model 36G54

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. Inlet pressure tap connections:
  - a. Honeywell VR8215 Valve:  
Remove the inlet pressure boss plug. Install an 1/8" NPT hose barb fitting into the outlet pressure tap.
  - b. White-Rodgers 36G22 or 36G54 valve:  
Back inlet pressure test screw (inlet pressure boss) out one turn (counterclockwise, not more than one turn).
4. Attach a hose and manometer to the outlet pressure barb fitting (Honeywell valve) or inlet pressure boss (White-Rodgers valve).
5. Turn ON the gas supply.
6. Turn On power and close thermostat "R" and "W" contacts, or "R" and "W1" + "W2" for two-stage models, to provide a call for heat.
7. Using a leak detection solution or soap suds, check for leaks at outlet pressure boss plug (Honeywell valve) or screw (White-Rodgers valve). Bubbles forming indicate a leak. SHUT OFF GAS AND REPAIR ALL LEAKS IMMEDIATELY!
8. Measure the gas supply pressure with burners firing. Adjust supply pressure using the *Inlet Gas Supply Pressure* table shown below. If supply pressure reading differs from the table, make necessary adjustments to pressure regulator, gas piping size, etc., and/or consult with local gas utility.

Inlet Gas Supply Pressure	
Natural Gas	Minimum:5.0" W.C. Maximum :10.0" W.C.
Propane Gas	Minimum:11.0" W.C. Maximum :13.0" W.C.

9. Turn OFF all electrical power and gas supply to the system.
10. Remove the manometer hose from the hose barb fitting or inlet pressure boss.
11. Replace inlet pressure tap:
  - a. Honeywell VR8215 valve:  
Remove the 1/8" NPT hose barb fitting from the inlet pressure tap. Replace the inlet pressure boss plug and seal with a high quality thread sealer.
  - b. White-Rodgers 36G22 or 36G54 valve:  
Turn inlet pressure test screw in to seal pressure port (clockwise, 7 in-lb minimum).

12. Retest for leaks. If bubbles form, SHUT DOWN GAS AND REPAIR LEAKS IMMEDIATELY.
13. Turn ON electrical power and gas supply to the system.
14. Turn valve switch ON.

## GAS MANIFOLD PRESSURE MEASUREMENT AND ADJUSTMENT

### CAUTION

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

### 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.



This valve is shipped from the factory with the regulator preset (see control label).

Consult the appliance rating plate to ensure burner manifold pressure is as specified. If another outlet pressure is required, follow these steps.

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. Outlet pressure tap connections:
  - a. Honeywell VR8215 valve:  
Remove the outlet pressure boss plug. Install an 1/8" NPT hose barb fitting into the outlet pressure tap.
  - b. White-Rodgers 36G22 or 36G54 valve:  
Back outlet pressure test screw (outlet pressure boss) out one turn (counterclockwise, not more than one turn).
4. Attach a hose and manometer to the outlet pressure barb fitting (Honeywell valve) or outlet pressure boss (White-Rodgers valve).
5. Turn ON the gas supply.
6. Turn ON power and place unit into a heating cycle.

**Single Stage Models** (Honeywell VR8215 and White-Rodgers 36G22 valves): Close thermostat "R" and "W" contacts.

**Two-Stage Models** (White-Rodgers 36G54 valve): Close thermostat contacts "R" and "W1" contacts for low heat stage heating ONLY; do not energize high stage heat.

7. Using a leak detection solution or soap suds, check for leaks at outlet pressure boss plug (Honeywell valve) or screw (White-Rodgers valve). Bubbles forming indicate a leak. SHUT OFF GAS AND REPAIR ALL LEAKS IMMEDIATELY!
8. Measure the gas manifold pressure with burners firing. Adjust manifold pressure using the *Manifold Gas Pressure* table shown below.
9. Regulator adjustment:

**Single Stage Models** (Honeywell VR8215 and White-Rodgers 36G22 valves):

Remove regulator cover screw from the outlet pressure regulator and turn screw clockwise to increase pressure or counterclockwise to decrease pressure. Replace regulator cover screw.

**Two-Stage Models** (White-Rodgers 36G54 valve):

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 the "R", "W1", and "W2" contacts for high stage heat. Remove regulator cover screw from the HI outlet pressure regulator adjust tower and turn screw clockwise to increase pressure or counterclockwise to decrease pressure.

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

10. Turn OFF all electrical power and gas supply to the system.
11. Remove the manometer hose from the hose barb fitting or outlet pressure boss.
12. Replace outlet pressure tap:
  - a. Honeywell VR8215 valve:  
Remove the 1/8" NPT hose barb fitting from the outlet pressure tap. Replace the outlet pressure boss plug and seal with a high quality thread sealer.
  - b. White-Rodgers 36G22 or 36G54 valve: Turn outlet pressure test screw in to seal pressure port (clockwise, 7 in-lb minimum).
13. Turn ON electrical power and gas supply to the system.
14. Close thermostat contacts to provide a call for heat.
15. Retest for leaks. If bubbles form, SHUT OFF GAS AND REPAIR ALL LEAKS IMMEDIATELY!

### **Gas Input (Natural Gas Only) Check**

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

1. Turn off gas supply to all other appliances except the unit.
  2. 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.
  3. INPUT=GAS HTG VALUE x 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 x 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.
4. 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.

1. 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.
2. 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.

All models are equipped with EEM motors. EEM motors are constant torque motors with very low power consumption. This motor is energized by 24V. Adjust the CFM for the unit by changing the 24V low voltage leads to the speed terminal block on the motor.

#### Single Stage Models:

- |                    |                     |
|--------------------|---------------------|
| Heating-White Lead | Cooling-Yellow Lead |
| T1 - Low Speed     | T4 - Low Speed      |
| T2 - Medium Speed  | T5 - High Speed     |
| T3 - High Speed    |                     |

#### Two-Stage Models:

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.

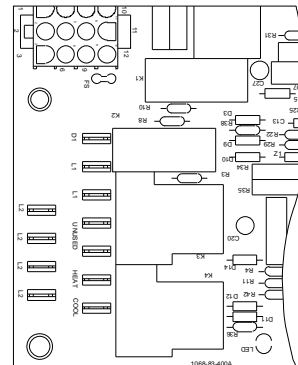
### Limit Check

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

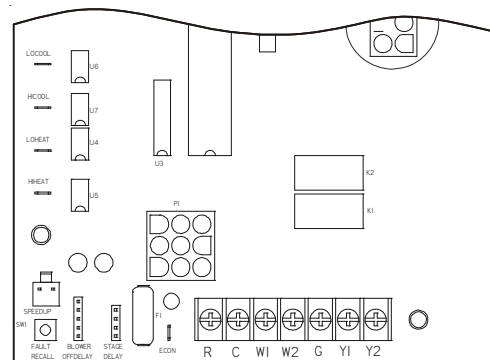
1. After several minutes the main burners must go OFF. Blower will continue to run.
2. Remove air restrictions and main burners will relight after a cool down period of a few minutes.

Adjust the thermostat setting below room temperature.

1. Main burners must go OFF.
2. Circulating Air Blower will continue to run for 120, 135 or 150 seconds, (single stage models) or 90, 120, 150, or 180 seconds (two-stage models), depending on the setting.



**Control Board (Single Stage)**



**Control Board (Two-Stage)**

**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. ALL COMPRESSOR PROTECTION DEVICES RESET AUTOMATICALLY, ENERGIZING THE CONTACTOR AND OUTDOOR FAN.

### Refrigerant Charge Check

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 AHRI test conditions (generally between .15 -.28 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.

After superheat is adjusted it is recommended to check unit sub-cooling at the condenser coil liquid line out. For charge adjustments, see superheat and sub-cooling charts shown for each model.

### Cooling Refrigerant Charging (Models with TXV)

Check unit charge before putting the cooling section into full operation. 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. 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 sub-cooling, range shown on chart, when necessary, adjust expansion valve stem for superheat setting.

### 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.

**NOTE:** The expansion valve will not need adjustment for most applications. Ensure system superheat is set within range listed on chart.

Design superheat & subcooling @ 95 °F outdoor ambient temperature		
Models #	Superheat ± 2°F	Subcooling ± 3°F
*PG1424***M	12	11
*PG1430***M	5	15
*PG1436***M	6	11
*PG1442***M	10	12
*PG1448***M	4	12
*PG1461***M	11	11

### 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 (Two-Stage Models ONLY)

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, 15 second inter-purge

cycle is completed, and ignition is reattempted. 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 for four (4) consecutive ignition attempts (five attempts total) before locking out.

The diagnostic fault code is 1 flash for a lockout due to failed ignition attempts or flame dropouts. 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 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 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.

- *Check 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.

- *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:** 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 fault code is two 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 LED code for this fault is three (3) flashes.

### **Open Thermal Protection Device**

If the primary 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 recloses. The diagnostic fault code for an open limit is four (4) flashes.

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.

### **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 for 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 (Two-Stage Models ONLY)**

Under some conditions, the fuel or air supply can create a nearly invisible coating on the flame sensor. This coating acts as an insulator causing a drop in the flame 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

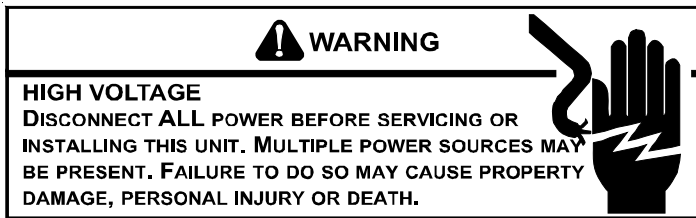
The automatic ignition control has a built-in feature that prevents damage to the compressor in short cycling situations. In the event of intermittent power losses or intermittent thermostat operation, the ignition control will delay output to the compressor contactor for three minutes from the time power is restored. (Compressor is off a total of three minutes). The diagnostic 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 (Two-Stage Models ONLY)

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



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.

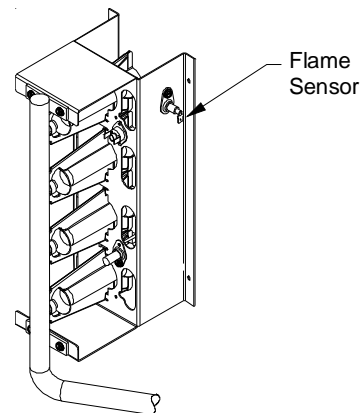
### CONDENSER, EVAPORATOR, AND INDUCED DRAFT MOTORS

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.

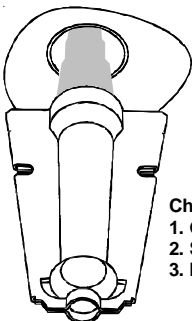
### CLEANING FLUE PASSAGES (QUALIFIED SERVICER ONLY)

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.

- 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:
- Good adjustment
  - Stable, soft and blue
  - Not curling, floating, or lifting off.

Burner Flame



### WARNING

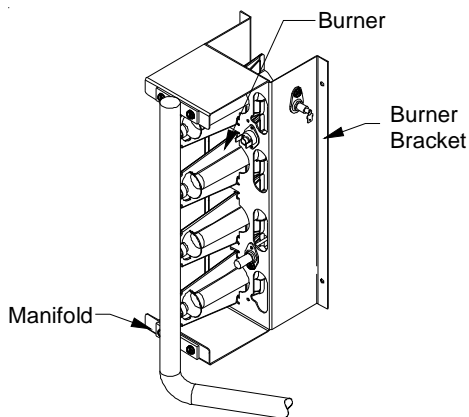
TO AVOID PERSONAL INJURY OR DEATH DUE TO ELECTRIC SHOCK, DO NOT REMOVE ANY INTERNAL COMPARTMENT COVERS OR ATTEMPT ANY ADJUSTMENT. CONTACT A QUALIFIED SERVICER AT ONCE IF AN ABNORMAL FLAME SHOULD DEVELOP.

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

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



Manifold Assembly

- Remove the burners.
- Use a bottle brush to clean burner insert and inside of the burners.

- Replace burners and manifold, inspect the burner assembly for proper seating of burners in retention slots.
- 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 Roll-out 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
Contactors	Pressure Switch Hose
Gas Manifold	Thermostatic Expansion Valve
Evaporator Coil	Transformer

Functional Parts List

### GENERAL INFORMATION

- 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.
- Although only functional parts are shown, all sheet metal parts, doors, etc. may be ordered by description.
- Parts are available from your distributor.

**BLOWER PERFORMANCE DATA - SINGLE PHASE**

<b>*PG1424040M41** - Rise Range: 25° - 55°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	695	62	44	820	93	37	1,050	167	29	850	100	1,095	198
0.2	650	71	47	785	100	39	1,010	180	30	800	106	1,060	202
0.3	605	77	51	745	108	41	970	186	32	765	116	1,025	214
0.4	565	89	54	700	117	44	935	192	33	730	125	985	217
0.5	480	99	X	665	127	46	890	203	35	680	131	945	227
0.6	415	106	X	575	138	53	850	208	36	610	141	905	233
0.7	365	110	X	510	146	X	815	216	38	550	153	865	237
0.8	320	119	X	455	155	X	755	222	41	490	159	825	246

<b>*PG1424060M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	695	62	X	820	93	56	1,050	167	44	850	100	1,095	198
0.2	650	71	X	785	100	59	1,010	180	46	800	106	1,060	202
0.3	605	77	X	745	108	X	970	186	48	765	116	1,025	214
0.4	565	89	X	700	117	X	935	192	49	730	125	985	217
0.5	480	99	X	665	127	X	890	203	52	680	131	945	227
0.6	415	106	X	575	138	X	850	208	54	610	141	905	233
0.7	365	110	X	510	146	X	815	216	57	550	153	865	237
0.8	320	119	X	455	155	X	755	222	X	490	159	825	246

<b>*PG1430040M41** - Rise Range: 25° - 55°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	680	61	45	840	103	37	1,035	174	30	1,035	174	1,225	276
0.2	640	72	48	795	109	39	995	184	31	995	184	1,185	275
0.3	605	80	51	750	117	41	960	192	32	960	192	1,150	289
0.4	555	89	X	710	126	43	925	205	33	925	205	1,115	296
0.5	490	93	X	660	132	47	875	200	35	875	200	1,085	303
0.6	455	107	X	615	138	50	840	217	37	840	217	1,045	312
0.7	395	109	X	570	150	54	795	222	39	795	222	1,000	315
0.8	350	119	X	515	157	X	755	226	41	755	226	960	320

<b>*PG1430060M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	680	61	X	840	103	55	1,035	174	45	1,035	174	1,225	276
0.2	640	72	X	795	109	58	995	184	46	995	184	1,185	275
0.3	605	80	X	750	117	X	960	192	48	960	192	1,150	289
0.4	555	89	X	710	126	X	925	205	50	925	205	1,115	296
0.5	490	93	X	660	132	X	875	200	53	875	200	1,085	303
0.6	455	107	X	615	138	X	840	217	55	840	217	1,045	312
0.7	395	109	X	570	150	X	795	222	58	795	222	1,000	315
0.8	350	119	X	515	157	X	755	226	X	755	226	960	320

X= Heating Temperature Rise 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 - SINGLE PHASE**

<b>*PG1436040M41** - Rise Range: 25° - 55°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	745	76	41	1,115	206	28	1,265	285	X	1,305	311	1,440	426
0.2	690	84	45	1,075	215	29	1,230	290	X	1,265	320	1,390	428
0.3	635	91	48	1,030	221	30	1,175	300	26	1,225	325	1,365	440
0.4	570	98	54	985	233	31	1,140	303	27	1,180	334	1,335	440
0.5	505	107	X	940	234	33	1,100	311	28	1,140	338	1,295	456
0.6	450	115	X	895	242	34	1,055	319	29	1,095	349	1,255	456
0.7	395	118	X	845	248	36	1,010	326	30	1,050	350	1,220	465
0.8	345	126	X	785	252	39	960	335	32	1,010	357	1,180	468
<b>*PG1436060M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	745	76	X	1,115	206	41	1,265	285	36	1,305	311	1,440	426
0.2	690	84	X	1,075	215	43	1,230	290	37	1,265	320	1,390	428
0.3	635	91	X	1,030	221	45	1,175	300	39	1,225	325	1,365	440
0.4	570	98	X	985	233	47	1,140	303	40	1,180	334	1,335	440
0.5	505	107	X	940	234	49	1,100	311	42	1,140	338	1,295	456
0.6	450	115	X	895	242	52	1,055	319	44	1,095	349	1,255	456
0.7	395	118	X	845	248	55	1,010	326	46	1,050	350	1,220	465
0.8	345	126	X	785	252	59	960	335	48	1,010	357	1,180	468
<b>*PG1436080M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	745	76	X	1,115	206	55	1,265	285	49	1,305	311	1,440	426
0.2	690	84	X	1,075	215	57	1,230	290	50	1,265	320	1,390	428
0.3	635	91	X	1,030	221	60	1,175	300	52	1,225	325	1,365	440
0.4	570	98	X	985	233	X	1,140	303	54	1,180	334	1,335	440
0.5	505	107	X	940	234	X	1,100	311	56	1,140	338	1,295	456
0.6	450	115	X	895	242	X	1,055	319	58	1,095	349	1,255	456
0.7	395	118	X	845	248	X	1,010	326	X	1,050	350	1,220	465
0.8	345	126	X	785	252	X	960	335	X	1,010	357	1,180	468
<b>*PG1442060M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	830	99	56	1,185	228	39	1,335	317	35	1,335	320	1,630	556
0.2	785	106	59	1,140	232	40	1,300	325	35	1,305	331	1,595	561
0.3	730	116	X	1,100	247	42	1,265	331	36	1,265	343	1,555	566
0.4	675	122	X	1,060	253	44	1,215	338	38	1,225	343	1,520	571
0.5	630	129	X	1,020	258	45	1,170	346	39	1,190	343	1,485	568
0.6	575	138	X	975	267	47	1,135	351	41	1,135	351	1,450	576
0.7	520	144	X	900	274	51	1,085	354	42	1,095	358	1,410	579
0.8	440	150	X	855	282	54	1,025	361	45	1,040	367	1,370	590
<b>*PG1442080M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	830	99	X	1,185	228	52	1,335	317	46	1,335	320	1,630	556
0.2	785	106	X	1,140	232	54	1,300	325	47	1,305	331	1,595	561
0.3	730	116	X	1,100	247	56	1,265	331	49	1,265	343	1,555	566
0.4	675	122	X	1,060	253	58	1,215	338	51	1,225	343	1,520	571
0.5	630	129	X	1,020	258	X	1,170	346	53	1,190	343	1,485	568
0.6	575	138	X	975	267	X	1,135	351	54	1,135	351	1,450	576
0.7	520	144	X	900	274	X	1,085	354	57	1,095	358	1,410	579
0.8	440	150	X	855	282	X	1,025	361	60	1,040	367	1,370	590

X = Heating Temperature Rise 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 - SINGLE PHASE**

<b>*PG1448060M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	1,055	156	44	1,380	298	33	1,415	327	33	1,570	447	1,780	647
0.2	1,000	166	46	1,320	312	35	1,360	335	34	1,520	452	1,740	658
0.3	940	173	49	1,270	318	36	1,305	343	35	1,480	468	1,695	661
0.4	880	181	52	1,220	327	38	1,260	353	37	1,425	479	1,640	679
0.5	825	189	56	1,160	336	40	1,200	359	38	1,380	479	1,595	675
0.6	760	204	X	1,115	342	41	1,150	371	40	1,335	485	1,550	693
0.7	705	207	X	1,060	347	44	1,110	375	42	1,285	491	1,505	690
0.8	625	210	X	1,000	361	46	1,060	381	44	1,235	501	1,465	696

<b>*PG1448080M41** - Rise Range: 30° - 60°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	1,055	156	58	1,380	298	45	1,415	327	43	1,570	447	1,780	647
0.2	1,000	166	X	1,320	312	47	1,360	335	45	1,520	452	1,740	658
0.3	940	173	X	1,270	318	48	1,305	343	47	1,480	468	1,695	661
0.4	880	181	X	1,220	327	50	1,260	353	49	1,425	479	1,640	679
0.5	825	189	X	1,160	336	53	1,200	359	51	1,380	479	1,595	675
0.6	760	204	X	1,115	342	55	1,150	371	53	1,335	485	1,550	693
0.7	705	207	X	1,060	347	58	1,110	375	55	1,285	491	1,505	690
0.8	625	210	X	1,000	361	X	1,060	381	58	1,235	501	1,465	696

<b>*PG1448100M41** - Rise Range: 35° - 65°</b>													
E.S.P.	T1 HEATING SPEED			T2 HEATING SPEED			T3 HEATING SPEED			T4 COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS
0.1	1,055	156	X	1,380	298	56	1,570	327	49	1,570	447	1,780	647
0.2	1,000	166	X	1,320	312	58	1,520	335	51	1,520	452	1,740	658
0.3	940	173	X	1,270	318	61	1,480	343	52	1,480	468	1,695	661
0.4	880	181	X	1,220	327	63	1,425	353	54	1,425	479	1,640	679
0.5	825	189	X	1,160	336	X	1,380	359	56	1,380	479	1,595	675
0.6	760	204	X	1,115	342	X	1,335	371	58	1,335	485	1,550	693
0.7	705	207	X	1,060	347	X	1,285	375	60	1,285	491	1,505	690
0.8	625	210	X	1,000	361	X	1,235	381	62	1,235	501	1,465	696

X = Heating Temperature Rise 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 - SINGLE PHASE**

<b>*PG1461080M41** - Rise Range: 30° - 60°</b>												
E.S.P.	T1 LOW STAGE HEATING SPEED			T2 HIGH STAGE HEATING SPEED			T3 LOW STAGE HEATING SPEED		T4 HIGH STAGE COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS	CFM	WATTS
0.1	1,285	252	36	1,370	297	45	1,340	276	1,780	620	1,940	844
0.2	1,235	259	37	1,330	304	46	1,270	279	1,745	646	1,910	834
0.3	1,180	272	39	1,280	314	48	1,235	292	1,700	640	1,880	840
0.4	1,130	272	41	1,220	321	50	1,175	296	1,655	638	1,825	857
0.5	1,085	280	42	1,180	341	52	1,135	308	1,610	656	1,790	865
0.6	1,035	294	45	1,135	339	54	1,085	318	1,560	659	1,735	867
0.7	975	297	47	1,085	347	57	1,040	328	1,520	664	1,700	877
0.8	910	319	51	1,035	359	59	975	337	1,475	675	1,660	886

<b>*PG1461100M41** - Rise Range: 35° - 65°</b>												
E.S.P.	T1 LOW STAGE HEATING SPEED			T2 HIGH STAGE HEATING SPEED			T3 LOW STAGE HEATING SPEED		T4 HIGH STAGE COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS	CFM	WATTS
0.1	1,175	169	49	1,485	311	52	1,340	276	1,780	620	1,940	844
0.2	1,115	178	52	1,425	317	54	1,270	279	1,745	646	1,910	834
0.3	1,045	183	55	1,385	331	55	1,235	292	1,700	640	1,880	840
0.4	985	194	59	1,350	341	57	1,175	296	1,655	638	1,825	857
0.5	905	199	64	1,295	351	59	1,135	308	1,610	656	1,790	865
0.6	840	215	X	1,235	359	62	1,085	318	1,560	659	1,735	867
0.7	770	218	X	1,180	371	X	1,040	328	1,520	664	1,700	877
0.8	700	229	X	1,125	386	X	975	337	1,475	675	1,660	886

<b>*PG1461120M41** - Rise Range: 35° - 65°</b>												
E.S.P.	T1 LOW STAGE HEATING SPEED			T2 HIGH STAGE HEATING SPEED			T3 LOW STAGE HEATING SPEED		T4 HIGH STAGE COOLING SPEED		T5 COOLING SPEED	
	CFM	WATTS	RISE	CFM	WATTS	RISE	CFM	WATTS	CFM	WATTS	CFM	WATTS
0.1	1,345	281	51	1,745	558	53	1,340	276	1,780	620	1,940	844
0.2	1,300	286	53	1,705	567	54	1,270	279	1,745	646	1,910	834
0.3	1,255	295	55	1,660	572	56	1,235	292	1,700	640	1,880	840
0.4	1,205	308	57	1,620	582	57	1,175	296	1,655	638	1,825	857
0.5	1,165	322	59	1,580	589	58	1,135	308	1,610	656	1,790	865
0.6	1,110	335	62	1,535	604	60	1,085	318	1,560	659	1,735	867
0.7	1,055	334	X	1,485	613	62	1,040	328	1,520	664	1,700	877
0.8	1,010	346	X	1,435	606	64	975	337	1,475	675	1,660	886

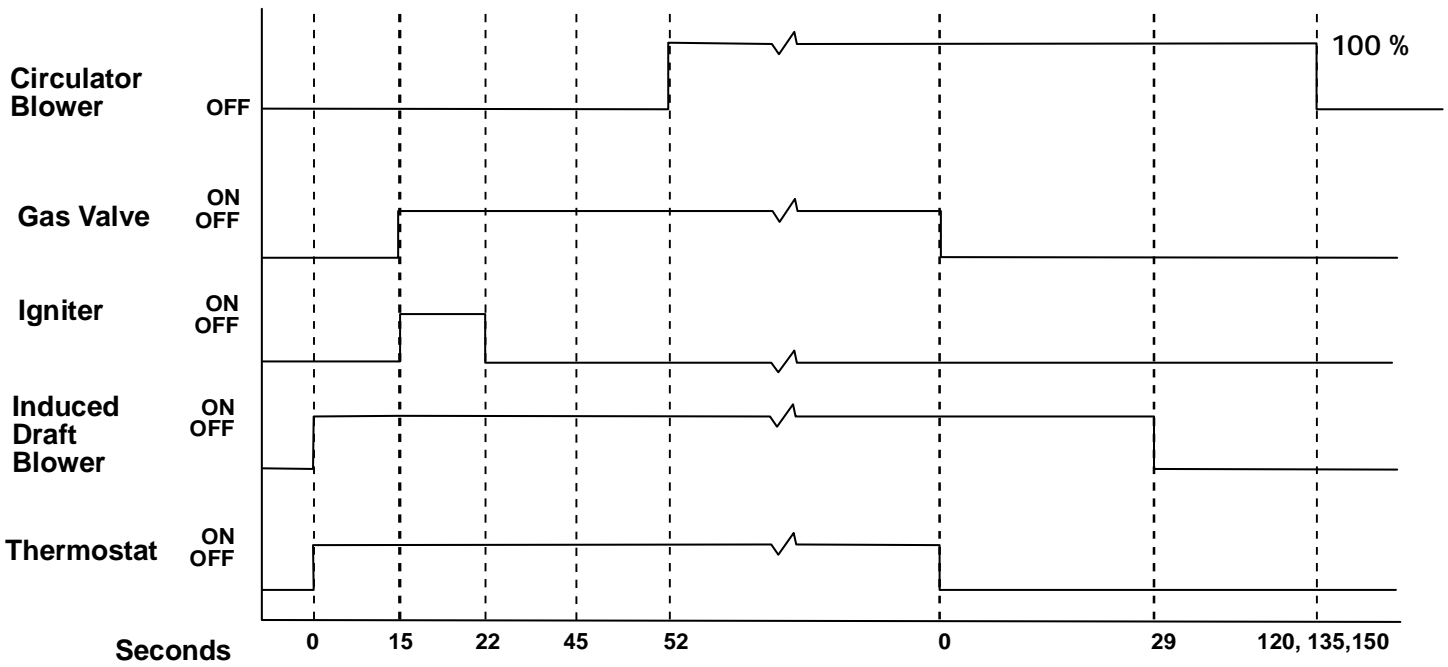
X = Heating Temperature Rise Not Recommended.

**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.

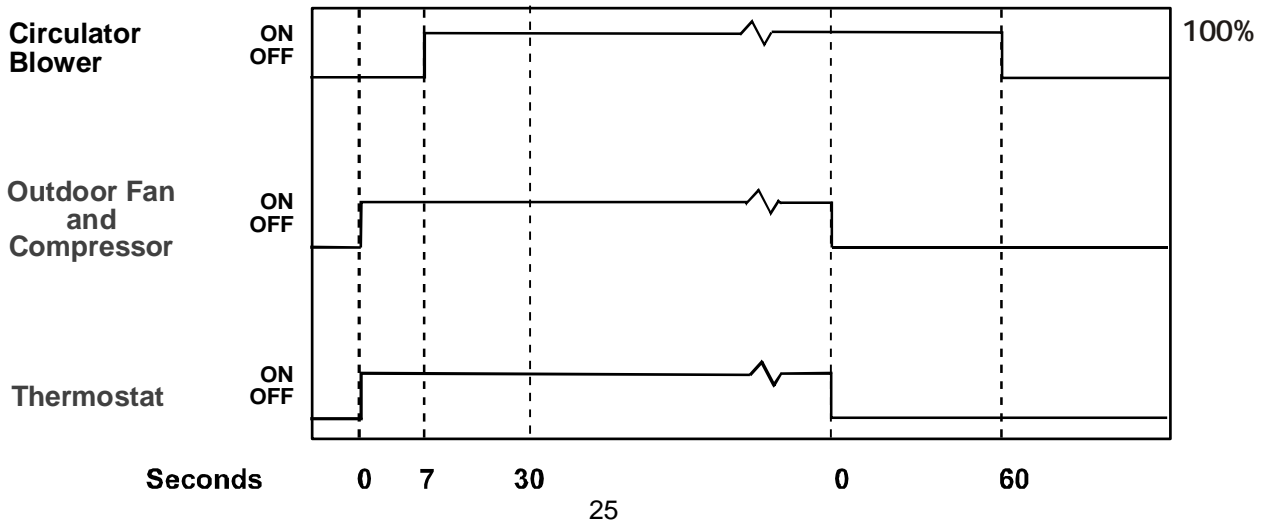
# IGNITION CONTROL DIAGNOSTIC INDICATOR CHART (SINGLE STAGE MODELS ONLY)

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)

## HEATING TIMING CHART



## COOLING TIMING CHART



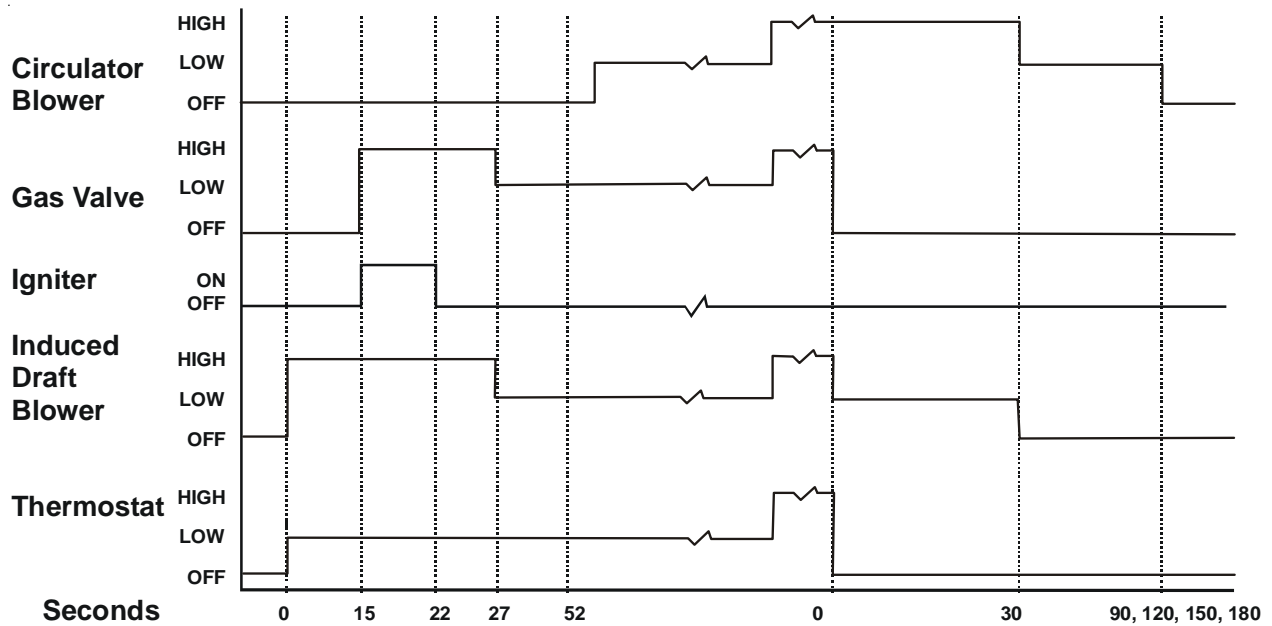
# IGNITION CONTROL DIAGNOSTIC INDICATOR CHART (TWO-STAGE MODELS ONLY)

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)

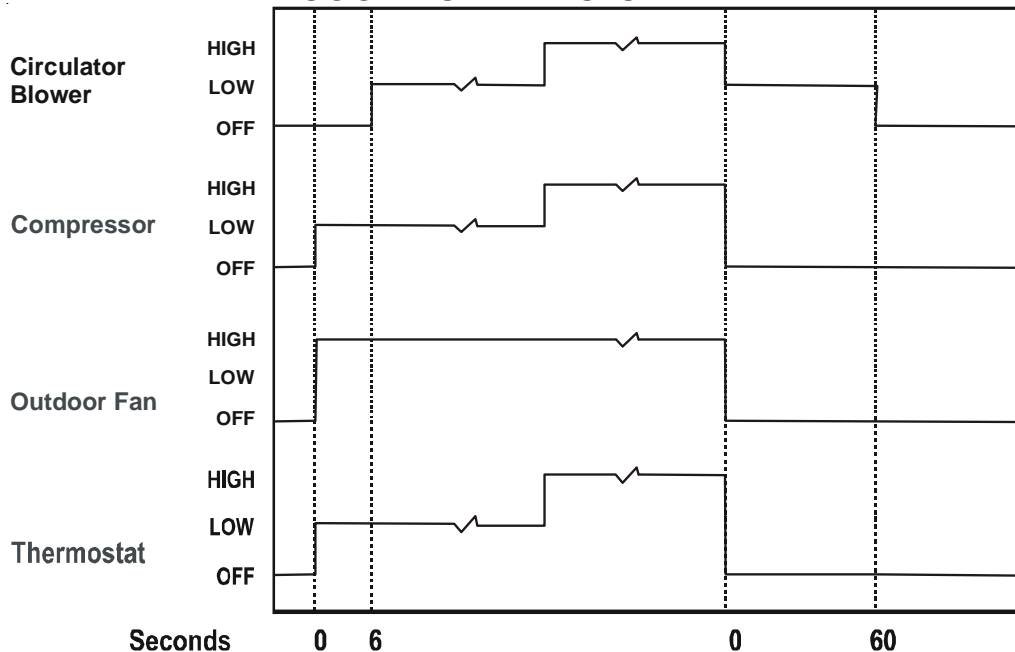
  

Amber Light Signal	Refer to Abnormal Heating or Cooling Operation Sections of this Manual
Off	No Flame Present
On	Normal Flame
1 Flash	Low Flame Current
2 Flashes	Flame Detected with Gas Valve De-energized.

### HEATING TIMING CHART

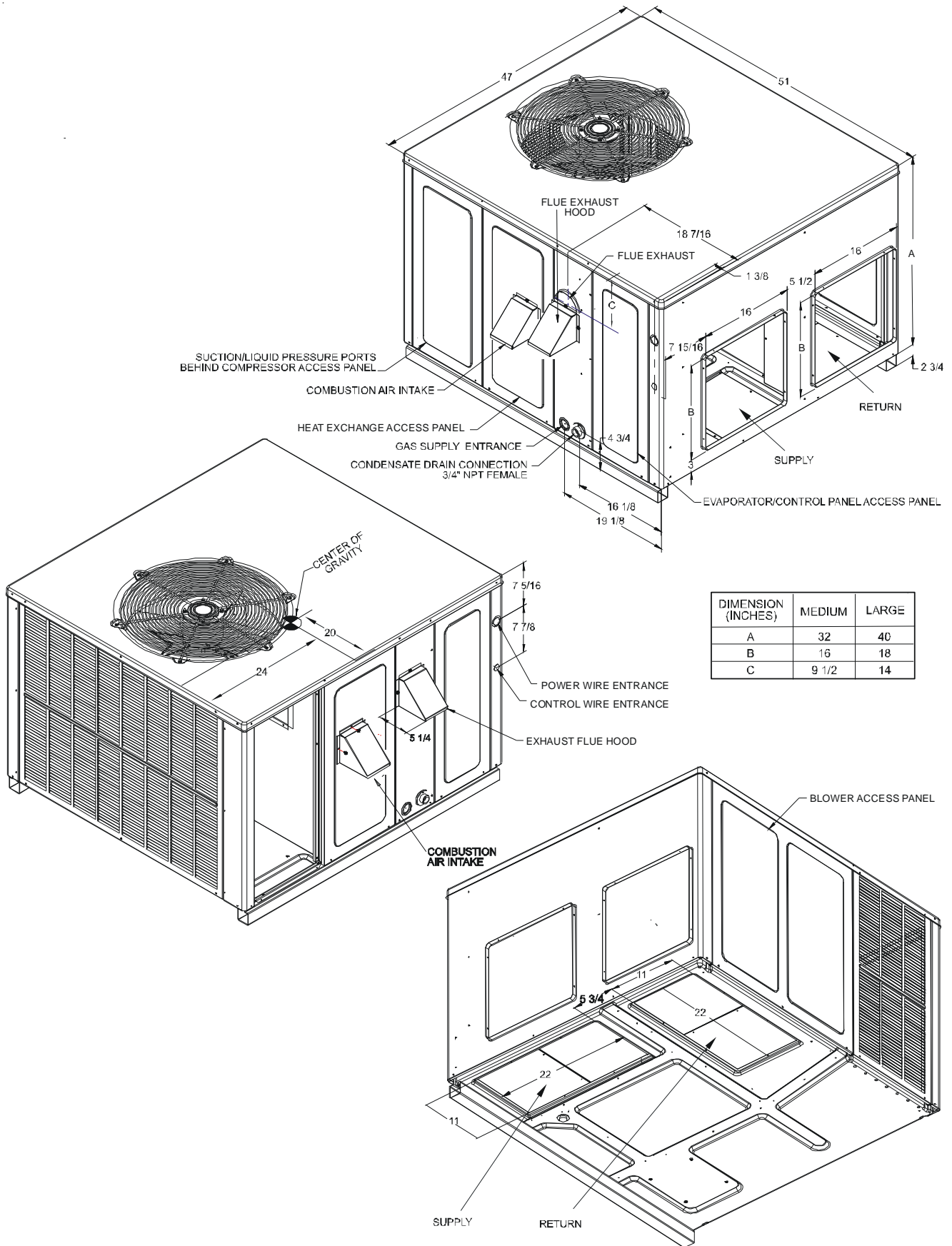


### COOLING TIMING CHART



# APPENDIX

## UNIT DIMENSIONS



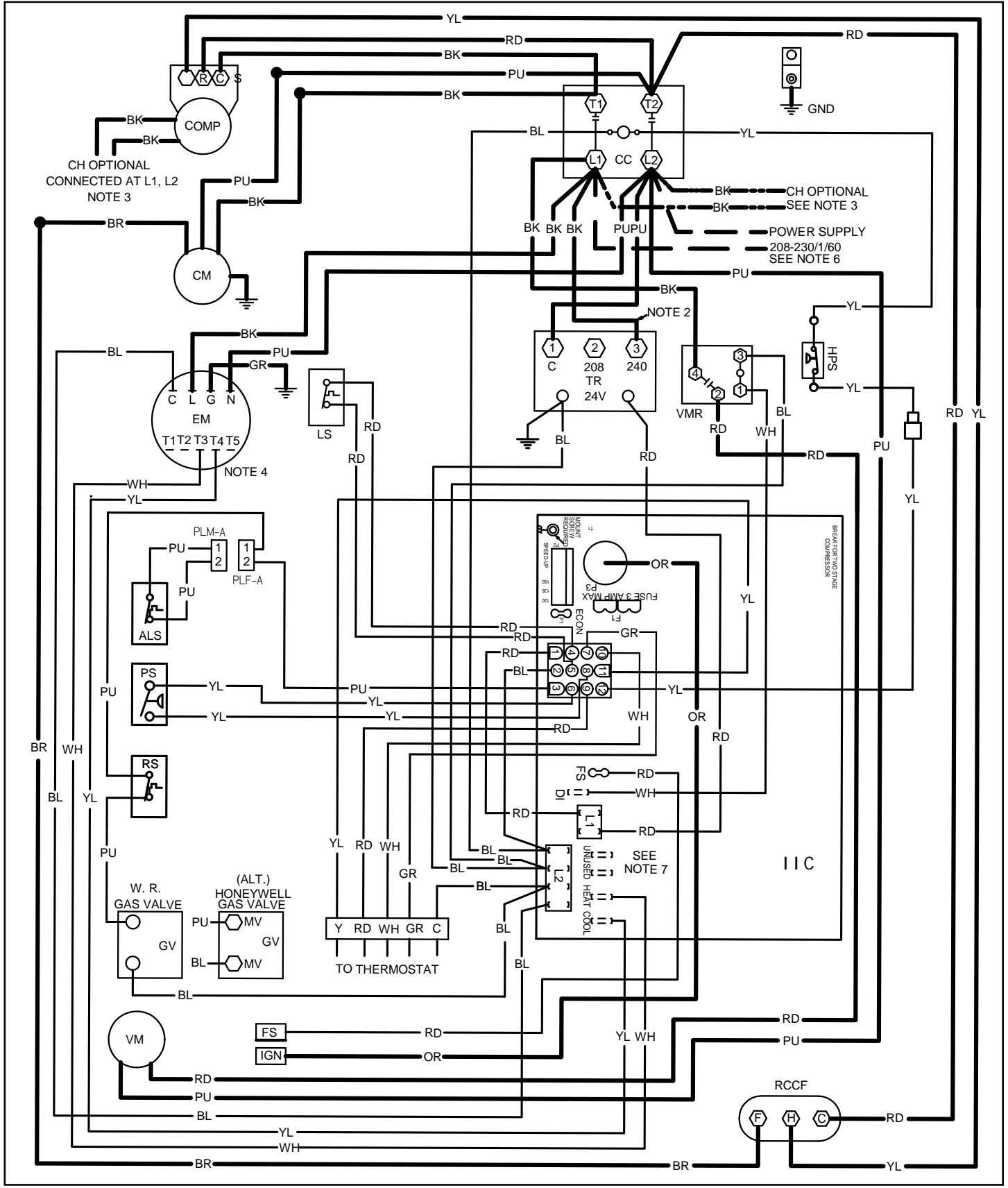
\*PG14(24, 30, 36, 42)\*\*\*M41\*\* WIRING DIAGRAM



**WARNING**

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



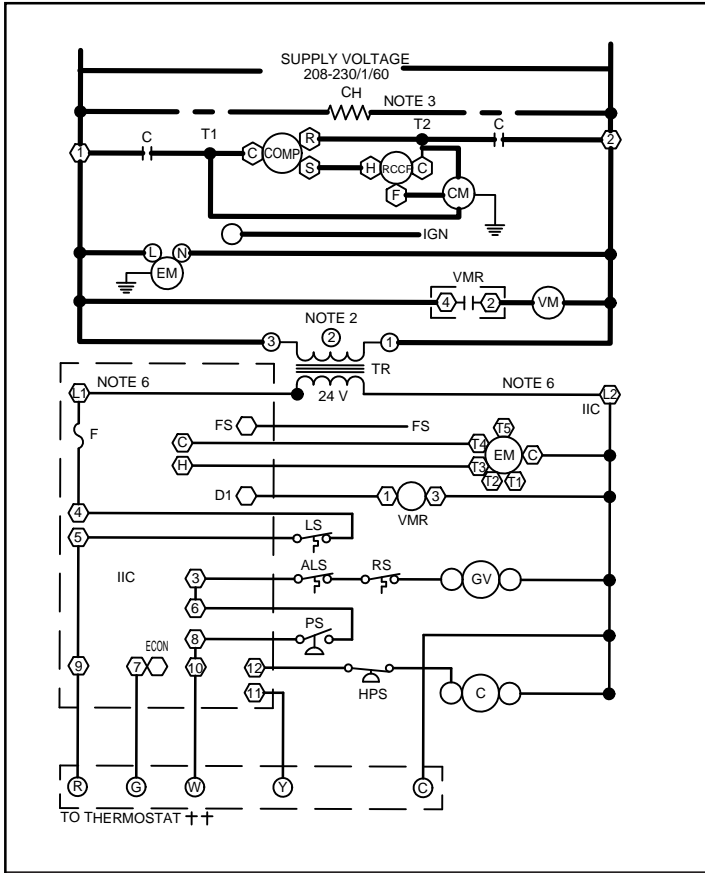


Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

**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.**



- |       |                                  |                               |
|-------|----------------------------------|-------------------------------|
| ALS   | AUXILIARY LIMIT SWITCH           | <b>WIRING</b>                 |
| C     | CONTACTOR                        |                               |
| CH    | CRANKCASE HEATER                 | — HIGH VOLTAGE                |
| CM    | CONDENSER MOTOR                  | — LOW VOLTAGE                 |
| COMP  | COMPRESSOR                       | - - - FIELD INSTALLED POWER   |
| EM    | EVAPORATOR MOTOR                 | - - - FIELD INSTALLED CONTROL |
| F     | FUSE                             | — OPTIONAL HIGH VOLTAGE       |
| FS    | FLAME SENSOR                     | - - - OPTIONAL LOW VOLTAGE    |
| GND   | EQUIPMENT GROUND                 |                               |
| GV    | GAS VALVE                        |                               |
| HPS   | HIGH PRESSURE SWITCH             |                               |
| IIC   | INTEGRATED IGNITION CONTROL      |                               |
| IGN   | IGNITOR                          |                               |
| LS    | LIMIT SWITCH                     |                               |
| PLF-A | FEMALE PLUG/CONNECTOR ALS        | <b>WIRE CODE</b>              |
| PLM-A | FEMALE PLUG/CONNECTOR ALS        | BK - BLACK                    |
| PS    | PRESSURE SWITCH                  | BR - BROWN                    |
| RCCF  | RUN CAPACITOR FOR COMPRESSOR/FAN | GR - GREEN                    |
| RS    | ROLLOUT SWITCH                   | OR - ORANGE                   |
| TR    | TRANSFORMER                      | PK - PINK                     |
| VM    | VENT MOTOR                       | PU - PURPLE                   |
| VMR   | VENT MOTOR RELAY                 | RD - RED                      |
|       |                                  | WH - WHITE                    |
|       |                                  | YL - YELLOW                   |
|       |                                  | BL/PK - BLUE/PINK             |

- NOTES:**
- REPLACEMENT WIRE MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (USE COPPER CONDUCTOR ONLY).
  - FOR 208 VOLT TRANSFORMER OPERATION MOVE BLACK WIRE FROM TERMINAL ③ TO TERMINAL ② ON TRANSFORMER.
  - CRANKCASE HEATER NOT SUPPLIED ON ALL UNITS.
  - FOR DIFFERENT THAN FACTORY SPEED TAP, CHANGE COOLING SPEED AT MOTOR T4 AND T5 TERMINALS. CHANGE HEATING SPEED AT MOTOR T1, T2 AND T3 TERMINALS.
- |                                    |                                   |
|------------------------------------|-----------------------------------|
| <b>COOLING SPEED (YELLOW WIRE)</b> | <b>HEATING SPEED (WHITE WIRE)</b> |
| T4 - LOW SPEED                     | T1 - LOW SPEED                    |
| T5 - HIGH SPEED                    | T2 - MED. SPEED                   |
|                                    | T3 - HIGH SPEED                   |

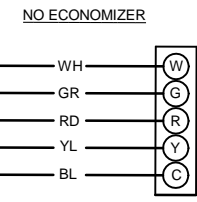
++ USE NEC CLASS 2 WIRE.

208-230/1/60

INSTALLER/SERVICEMAN  
THE STATUS LIGHT ON THE FURNACE CONTROL MAY BE USED AS A GUIDE TO TROUBLESHOOTING THIS APPLIANCE. STATUS LIGHT CODES ARE AS FOLLOWS:

STATUS LIGHT	EQUIP. STATUS	CHECK
ON	NORMAL OPERATION	-
OFF	NO POWER OR INTERNAL CONTROL FAULT	CHECK INPUT POWER CHECK FUSE ON CONTROL REPLACE CONTROL
1 BLINK	IGNITION FAILURE OR OPEN ROLLOUT SWITCH OR OPEN AUX. LIMIT SWITCH	GAS FLOW GAS PRESSURE GAS VALVE FLAME SENSOR FLAME ROLLOUT BAD SWITCH AUX. LIMIT OPEN
2 BLINKS	PRESSURE SWITCH OPEN	CHECK PRESSURE SWITCH
3 BLINKS	PRESSURE SWITCH CLOSED WITHOUT INDUCER ON	CHECK PRESSURE SWITCH
4 BLINKS	OPEN LIMIT SWITCH	MAIN LIMIT OPEN BAD SWITCH
5 BLINKS	FALSE FLAME SENSED	STICKING GAS VALVE
6 BLINKS	COMPRESSOR OUTPUT DELAY	3 MIN. COMP. ANTI-CYCLE TIMER

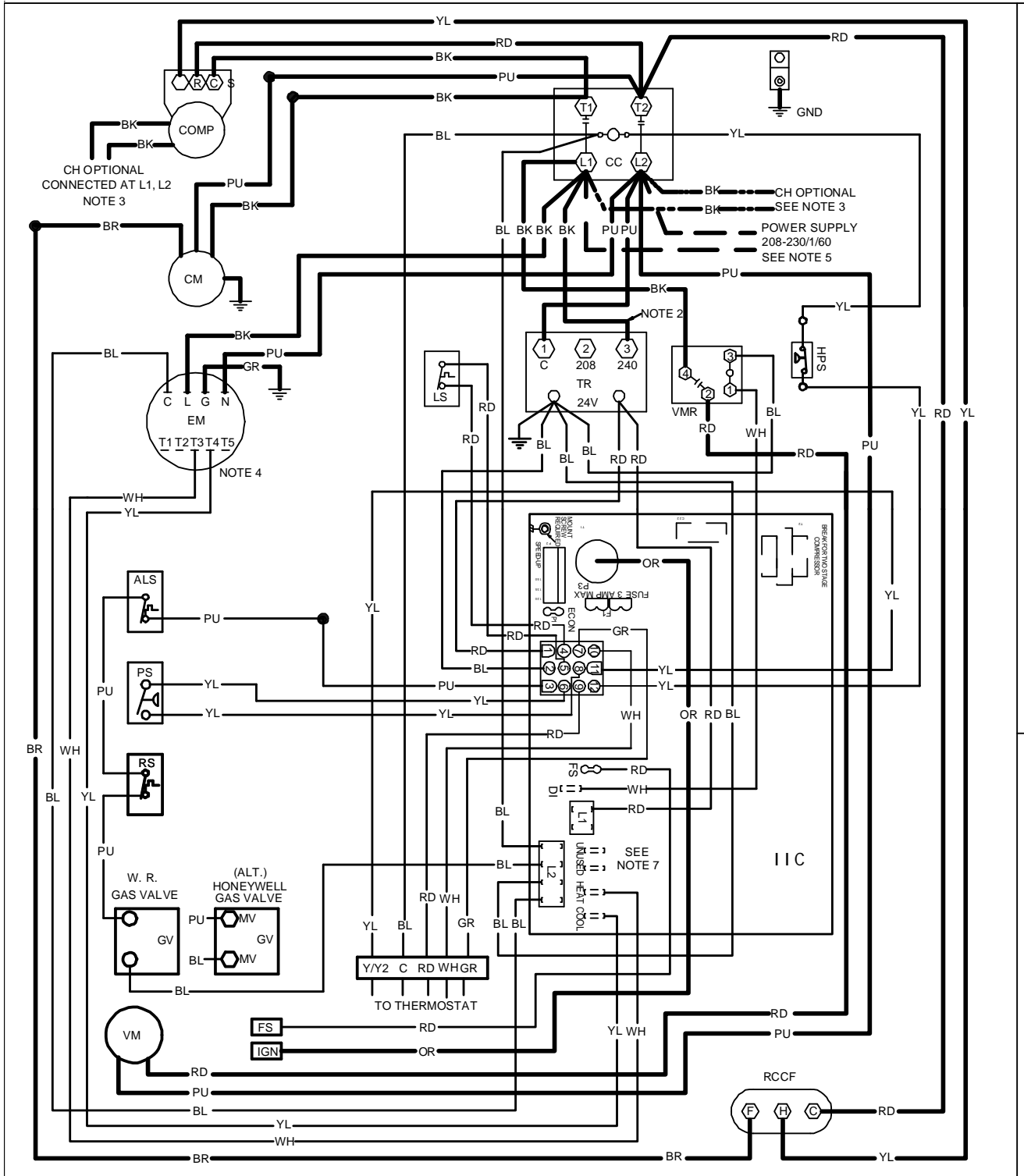
TERMOSTAT FIELD WIRING ++



0140G03340-A

PG1448\*\*\*M41\*\* WIRING DIAGRAM

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



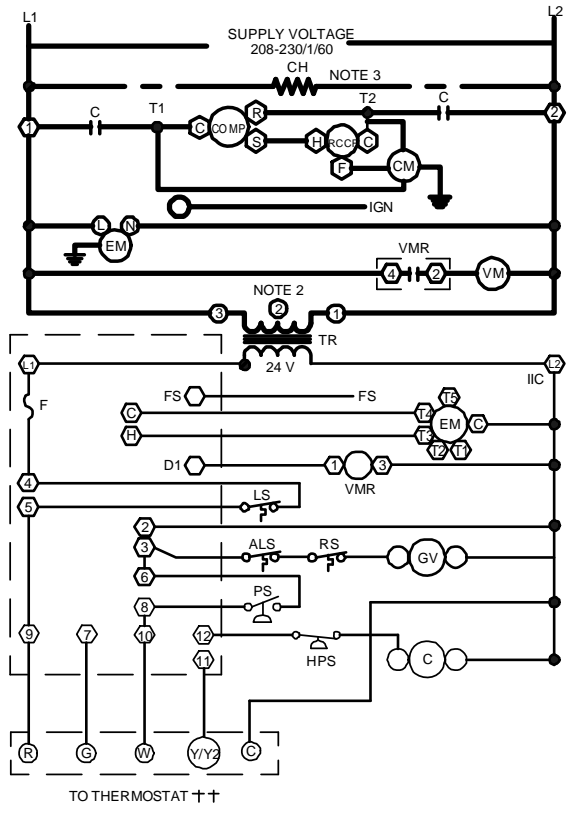
Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

\*PG1448\*\*\*M41\*\* WIRING DIAGRAM

**WARNING**

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**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.**



- COMPONENT LEGEND**
- ALS A ULLXARY LIMIT SWITCH
  - COMP COMPRESSOR
  - CM CONDENSER MOTOR
  - C CO INTACTOR
  - CH CRANKCASE HEATER
  - EM EVAPORATOR MOTOR
  - F FUSE
  - FS FLAME SENSOR
  - GND EQUIPMENT GROUND
  - GV GAS VALVE
  - HPS HIGH PRESSURE SWITCH
  - IIC INTEGRATED IGNITION CONTROL
  - IGN IGNITOR
  - LS LIMIT SWITCH
  - PS PRESSURE SWITCH
  - RCCF RUN CAPACITOR FOR COMPRESSOR/FAN
  - RS ROLLOUT SWITCH
  - TR TRANSFORMER
  - VM VEINT MOTOR
  - VMR VEINT MOTOR RELAY
- WIRING**
- HIGH VOLTAGE
  - LOW VOLTAGE
  - FIELD INSTALLED POWER
  - FIELD INSTALLED CONTROL
  - OPTIONAL HIGH VOLTAGE
  - OPTIONAL LOW VOLTAGE
- WIRE CODE**
- BK - BLACK
  - BL - BLUE
  - BR - BROWN
  - GR - GREEN
  - OR - ORANGE
  - PK - PINK
  - PU - PURPLE
  - RD - RED
  - WH - WHITE
  - YL - YELLOW
  - BL/PK - BLUE/PINK

- 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 ① TO TERMINAL ② ON TRANSFORMER.
  3. CRANKCASE HEATER NOT SUPPLIED ON ALL UNITS.
  4. FOR DIFFERENT THAN FACTORY SPEED TAP, CHANGE COOLING SPEED AT MOTOR T4 AND T5 TERMINALS. CHANGE HEATING SPEED AT MOTOR T1, T2 AND T3 TERMINALS.

- COOLING SPEED (YELLOW WIRE)**
- T4 - LOW SPEED
  - T5 - HIGH SPEED
- HEATING SPEED (WHITE WIRE)**
- T1 - LOW SPEED
  - T2 - MED. SPEED
  - T3 - HIGH SPEED

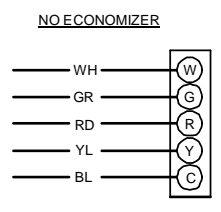
†† USE NEC CLASS 2 WIRE.

208-230/1/60

INSTALLER/SERVICEMAN  
THE STATUS LIGHT ON THE FURNACE CONTROL MAY BE USED AS A GUIDE TO TROUBLESHOOTING THIS APPLIANCE. STATUS LIGHT CODES ARE AS FOLLOWS:

STATUS LIGHT	EQUIP. STATUS	CHECK
ON	NORMAL OPERATION	-
OFF	NO POWER OR INTERNAL CONTROL FAULT	CHECK INPUT POWER CHECK FUSE ON CONTROL REPLACE CONTROL
1 BLINK	IGNITION FAILURE OR OPEN ROLLOUT SWITCH OR OPEN AUX. LIMIT SWITCH	GAS FLOW GAS PRESSURE GAS VALVE FLAME SENSOR FLAME ROLLOUT BAD SWITCH AUX. LIMIT OPEN
2 BLINKS	PRESSURE SWITCH OPEN	CHECK PRESSURE SWITCH
3 BLINKS	PRESSURE SWITCH CLOSED WITHOUT INDUCER ON	CHECK PRESSURE SWITCH
4 BLINKS	OPEN LIMIT SWITCH	MAIN LIMIT OPEN BAD SWITCH
5 BLINKS	FALSE FLAME SENSED	STICKING GAS VALVE
6 BLINKS	COMPRESSOR OUTPUT DELAY	3 MIN. COMP. ANTI-CYCLE TIMER

THERMOSTAT FIELD WIRING ††



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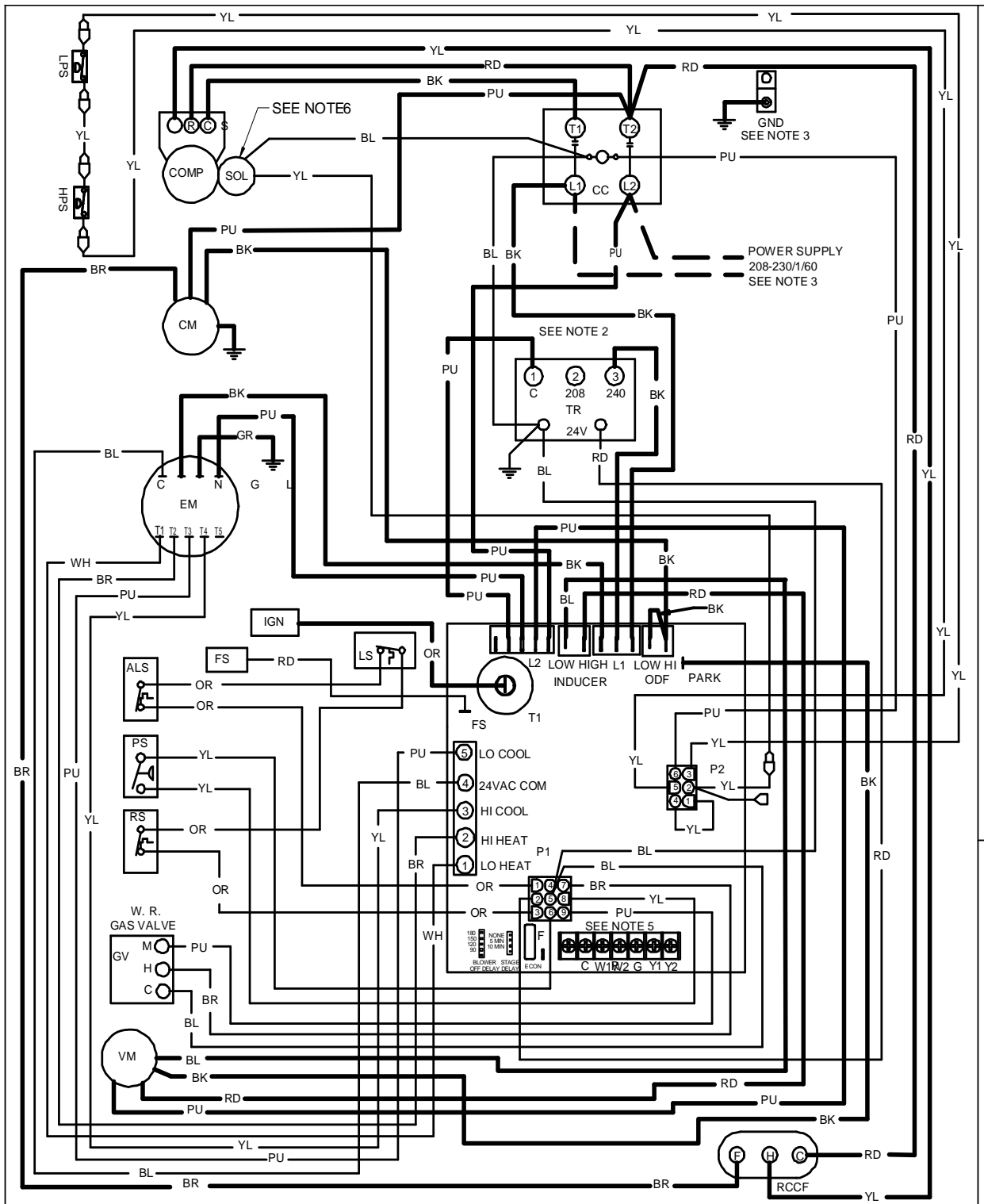
\*PG1461\*\*\*M41\*\* WIRING DIAGRAM



**WARNING**

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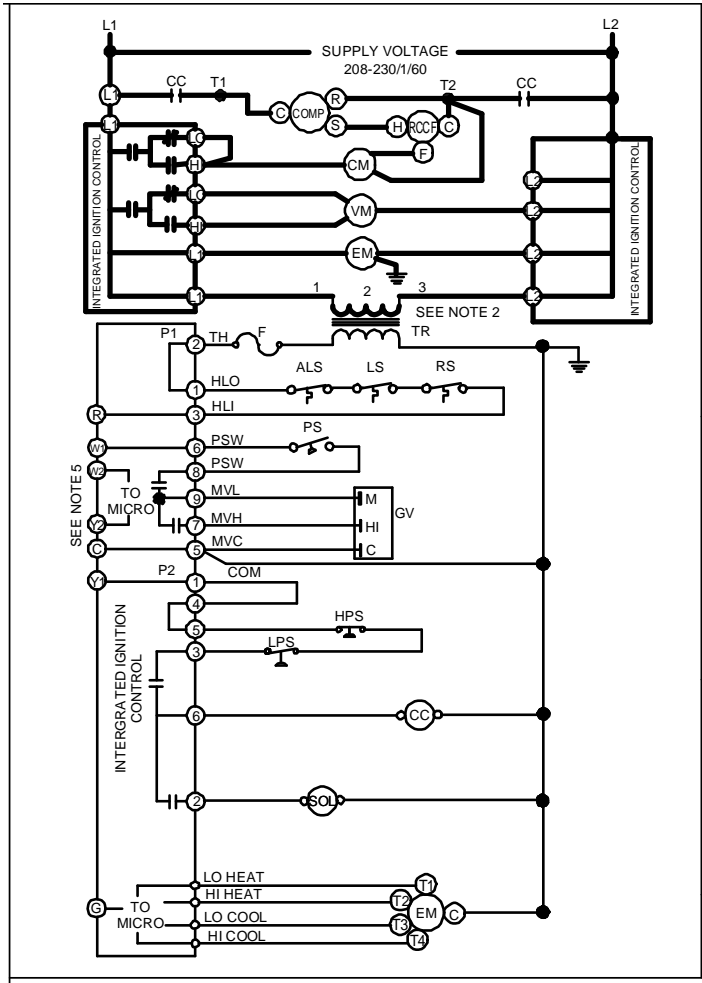


Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.

\*PG1461\*\*\*M41\*\* WIRING DIAGRAM

WARNING

HIGH VOLTAGE!  
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<p><b>COMPONENT LEGEND</b></p> <p>ALS AUXILIARY LIMIT SWITCH          COMP COMPRESSOR          CM CONDENSER MOTOR          CC CONTACTOR          EM EVAPORATOR MOTOR          FS FLAME SENSOR          F FUSE          GND EQUIPMENT GROUND          GV GAS VALVE          HPS HIGH PRESSURE SWITCH          IIC INTEGRATED IGNITION CONTROL          IGN IGNITOR          LS LIMIT SWITCH          LPS LOW PRESSURE SWITCH          ODF OUTDOOR FAN          PS PRESSURE SWITCH          RCCF RUN CAPACITOR FOR COMPRESSOR/FAN          RS ROLLOUT SWITCH          SOL SOLENOID (2ND STAGE COOL)          TR TRANSFORMER          VM VENT MOTOR</p>	<p><b>FACTORY WIRING</b></p> <p>— LINE VOLTAGE          — LOW VOLTAGE          — OPTIONAL HIGH VOLTAGE</p> <p><b>FIELD WIRING</b></p> <p>— HIGH VOLTAGE          - - - LOW VOLTAGE</p> <p><b>WIRE CODE</b></p> <p>BK BLACK          BL BLUE          BR BROWN          GR GREEN          OR ORANGE          PS PURPLE          PU PURPLE          RD RED          WH WHITE          YL YELLOW</p>
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<p>JUNCTION </p> <p>TERMINAL </p> <p>INTERNAL TO INTEGRATED CONTROL </p> <p>PLUG CONNECTION </p> <p>SWITCH (PRESS.) </p> <p>OVERCURRENT PROT. DEVICE </p>	<p>EQUIPMENT GROUND </p> <p>FIELD GROUND </p> <p>FIELD SPLICE </p> <p>SWITCH (TEMP) </p> <p>IGNITER </p>
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- NOTES**
- REPLACEMENT WIRE MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (USE COPPER CONDUCTOR ONLY).
  - FOR 208 VOLT TRANSFORMER OPERATION MOVE BLACK WIRE FROM TERMINAL 3 TO TERMINAL 2 ON TRANSFORMER.
  - USE COPPER CONDUCTORS ONLY
  - 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.
  - USE NEC CLASS 2 WIRE FOR THERMOSTAT FIELD WIRING.
  - COMPRESSOR 2ND STAGE SOLENOID NOT PRESENT ON ALL MODELS.

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 AUXILIARY LIMIT SW. CHECK MAIN LIMIT SWITCH 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	3MIN 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

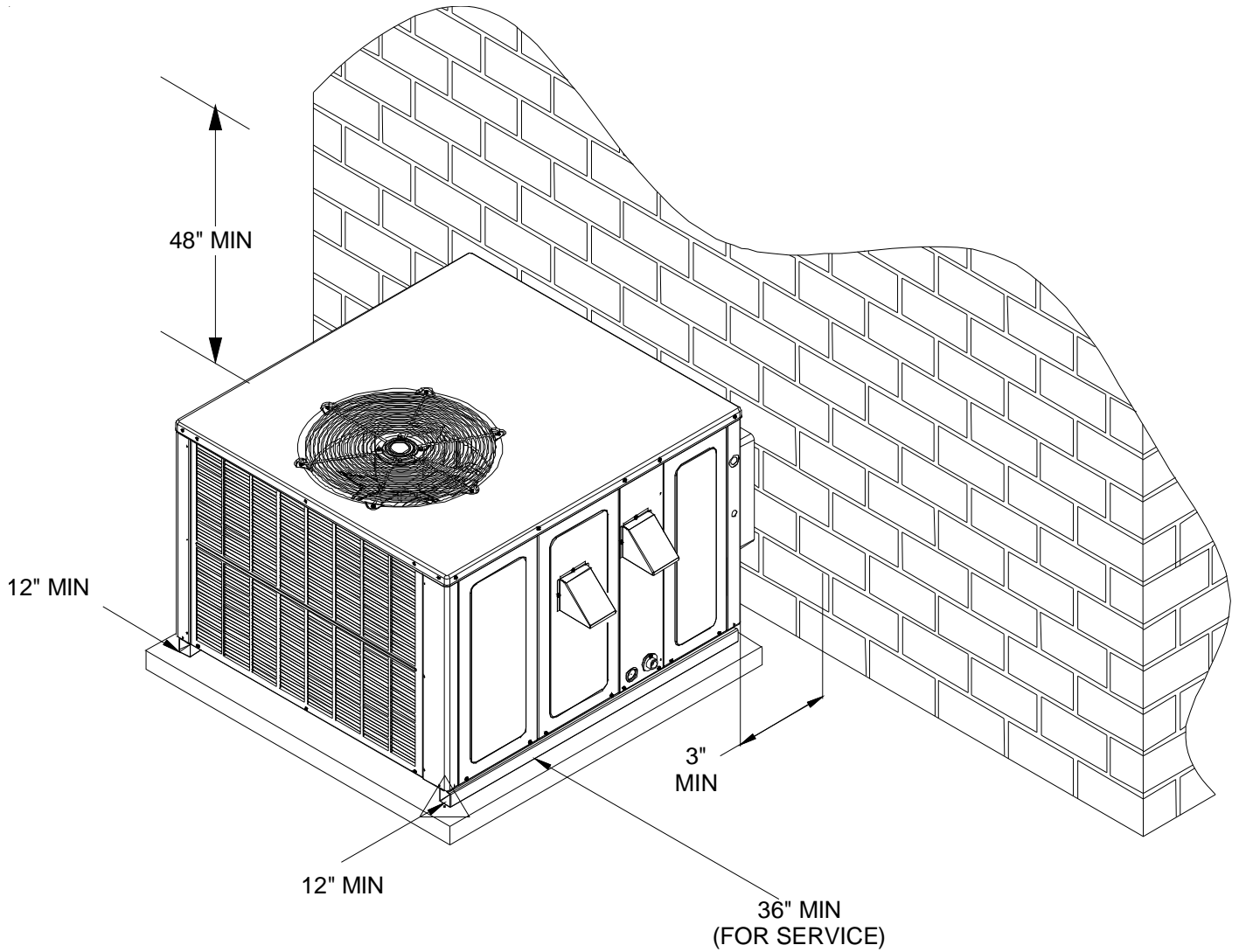
DIAGNOSTIC LED - AMBER	STATUS	CHECK
OFF	NO FLAME PRESENT	-
ON	NORMAL FLAME PRESENT	-
1 FLASH	LOW FLAME SIGNAL	GAS FLOW GAS PRESSURE GAS VALVE FLAME SENSOR
2 FLASHES	FALSE FLAME DETECTED	CHECK GAS VALVE CHECK FOR SHORTS IN FLAME SENSOR WIRING



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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".

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

## RECOMMENDED FILTER SIZES

# PACKAGE UNITS - DUAL FUEL & GAS

## HOMEOWNER'S ROUTINE MAINTENANCE RECOMMENDATIONS

We strongly recommend a bi-annual maintenance checkup be performed by a **qualified service agency** before the heating and cooling seasons begin.

### **WARNING**

#### **HIGH VOLTAGE!**

DISCONNECT ALL POWER BEFORE PERFORMING ANY SERVICE OR MAINTENANCE ON THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



### REPLACE OR CLEAN FILTER

**IMPORTANT NOTE:** Never operate unit without a filter installed as dust and lint will build up on internal parts resulting in loss of efficiency, equipment damage and possible fire.

A return air filter is not supplied with this unit; however, there must be a means of filtering the return air. An indoor air filter must be used with your comfort system. A properly maintained filter will keep the indoor coil of your comfort system clean. A dirty coil could cause poor operation and/or severe equipment damage.

The installer of your unit can tell you where your filter(s) are and how to clean or replace them.

Check your return filter(s) at least once every two months. When they are dirty, replace or clean as required. Disposable type filters should be replaced. Reusable type filters may be cleaned.

**NOTE:** Reusable type filters should be washed with warm water, dried completely and sprayed with an adhesive according to the manufacturers recommendations.

You may want to ask your dealer about high efficiency filters. High efficiency filters are available in both electronic and non-electronic types. These filters can do a better job of catching small airborne particles.

Improper filter maintenance is the most common cause of inadequate heating or cooling performance. Filters should be cleaned (permanent) or replaced (disposable) every two months or as required. When replacing a filter, it must be replaced with a filter of the same type and size and always make certain the air flow arrows on the filter point in the proper direction.

### CONDENSER, EVAPORATOR AND INDUCED DRAFT MOTORS

The bearings on the air circulating blower motor, condenser motor and the combustion fan motor are permanently lubricated and require no further lubrication.

### COMPRESSOR

The compressor motor is hermetically sealed and does not require additional oiling.

### ANNUAL INSPECTION (QUALIFIED SERVICER ONLY)

Your package unit should be inspected by a qualified installer, or service agency at least twice every year. This check should be performed before the heating and cooling seasons begin. This will ensure that adequate combustion air is being drawn and the vent system is working properly. Particular attention should be paid to the following items. Repair as necessary.

- Check physical support of the unit. Ensure it is sound without any sagging, cracks, or gaps, around the base.
- Check for obvious signs of deterioration of the unit.
- Flue Hood and Combustion Air Inlet. Check for blockage (wasp nest, etc.) and corrosion.

### FLUE HOOD (QUALIFIED SERVICER ONLY)

- Return Air Connection. Check for physical soundness and ensure that the connection is firmly sealed to the package unit casing.
- Heat exchanger. Check for corrosion and/or obstructions within the heat exchanger passageways.
- Burners. Check for proper ignition, burner flame, and flame sense.
- Wiring. Check wires for damage. Check electrical connections for tightness and/or corrosion.
- Filters. Check that filters are clean and in the proper placement in the unit or duct system.
- Louvers. Inspect air inlet louvers inside the heat exchanger compartments. Ensure the area is clean and free of dirt and debris.

### Clean Outside Coil (Qualified Servicer Only)

The outdoor coil should be inspected annually. It is important to keep the outdoor coil clean. Dirt, leaves, or debris could restrict the airflow. If cleaning of the outdoor coil becomes necessary, hire a qualified servicer. Inexperienced people could easily puncture the tubing in the coil.

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## BEFORE CALLING YOUR SERVICER

- Check the thermostat to confirm that it is properly set.
- Check the disconnect switch near the unit to confirm that it is closed.
- Check the electrical panel for tripped circuit breakers or failed fuses. Reset the circuit breakers or replace fuses as necessary.
- Check for blockage of the indoor air inlets and outlets. Confirm that they are open and have not been blocked by objects (rugs, curtains or furniture).
- Check for obstructions on the unit. Confirm that it has not been covered on the sides or the top. Remove any obstruction that can be safely removed. If the unit is covered with dirt or debris, call a qualified servicer to clean it.
- Check the filter. If it is dirty, clean or replace it.

Date: \_\_\_\_\_ Location: \_\_\_\_\_  
Model Number: \_\_\_\_\_  
Serial Number: \_\_\_\_\_  
Technician: \_\_\_\_\_ Unit #: \_\_\_\_\_

## Pre Start-Up

*(Check each item as completed)*

- Verify all packaging material has been removed.
- Remove all shipping brackets per installation instructions.
- Verify the job site voltage agrees with the unit serial plate.
- Verify condensate connection is installed per installation instructions.
- Verify proper clearance around the unit for safety, service, maintenance and proper unit operation.
- Verify proper weatherproofing of all ductwork, roof curbs and electrical connections.
- Check that the flue screen is in place.
- Check gas piping for leaks.
- Verify gas pressure to the unit is within the range specified on the serial plate.
- Check to ensure that all fans, pulleys and wheels are secure.
- Check for proper belt tension and alignment per installation instructions.
- Check refrigerant piping for rubbing and leaks. *Repair if necessary.*
- Check unit wiring to ensure it is not in contact with refrigerant piping or sharp metal edges.
- Check all electrical connections and terminals. *Tighten as needed.*
- Verify that the crankcase heaters have been energized for 24 hours.
- Verify the scroll compressor(s) are rotating in the right direction.
- Verify all accessories are installed and operating correctly.
- Check filters and replace if necessary.
- Verify the installation of the thermostat.

9/2014



# Start-up Checklist



**Start-Up**  
*(Insert the values as each item is completed.)*

## ELECTRICAL

Supply Voltage	L1 - L2	_____	L2 - L3	_____	L3 - L1	_____
Circuit 1 Compressor Amps	L1	_____	L2	_____	L3	_____
Circuit 2 Compressor Amps	L1	_____	L2	_____	L3	_____
Blower Amps	L1	_____	L2	_____	L3	_____
Condenser Fan Amps	Fan 1	_____	Fan 2	_____	Fan 3	_____

## BLOWER EXTERNAL STATIC PRESSURE

Return Air Static Pressure	_____	IN. W.C.
Supply Air Static Pressure	_____	IN. W.C.
Total External Static Pressure	_____	IN. W.C.
Blower Wheel RPM	_____	RPM

## TEMPERATURES

Outdoor Air Temperature	_____	DB	_____	WB
Return Air Temperature	_____	DB	_____	WB
Cooling Supply Air Temperature	_____	DB	_____	WB
Heating Supply Air Temperature	_____	DB		

## PRESSURES

Gas Inlet Pressure	_____	IN. W.C.		
Gas Manifold Pressure	_____	IN. W.C. (Low Fire)	_____	IN. W.C. (High Fire)
Suction Circuit 1	_____	PSIG	_____	°F
Superheat (Orifice System)			_____	°F
Suction Circuit 2	_____	PSIG	_____	°F
Superheat (Orifice System)			_____	°F
Discharge Circuit 1	_____	PSIG	_____	°F
Subcooling (TXV System)			_____	°F
Discharge Circuit 2	_____	PSIG	_____	°F
Subcooling (TXV System)			_____	°F

## (HEAT PUMP ONLY)

Suction Circuit 1	_____	PSIG	_____	°F
Suction Circuit 2	_____	PSIG	_____	°F
Discharge Circuit 1	_____	PSIG	_____	°F
Discharge Circuit 2	_____	PSIG	_____	°F

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