# INSTALLATION INSTRUCTIONS

PFAS

## QGA036 3-Ton
## QGA048 4-Ton
## QGA060 5-Ton

**GAS AND COOLING PACKAGED UNITS**

508713-02
09/2026

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**⚠ WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

**⚠ CAUTION**

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

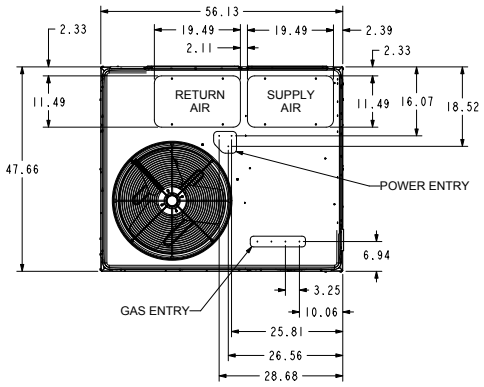
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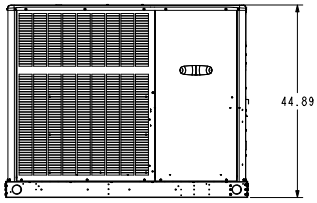
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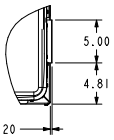
## Dimensions in. (mm)

TOP VIEW

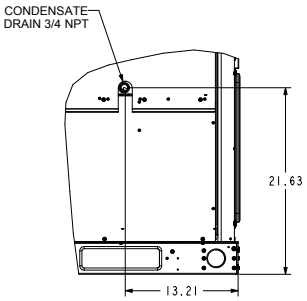



SIDE VIEWS

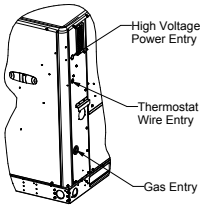


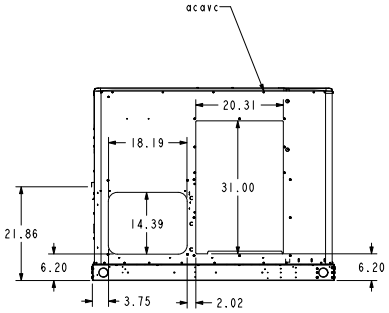



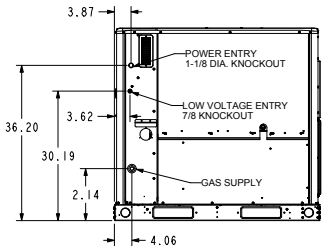

TYPICAL VENT HOOD



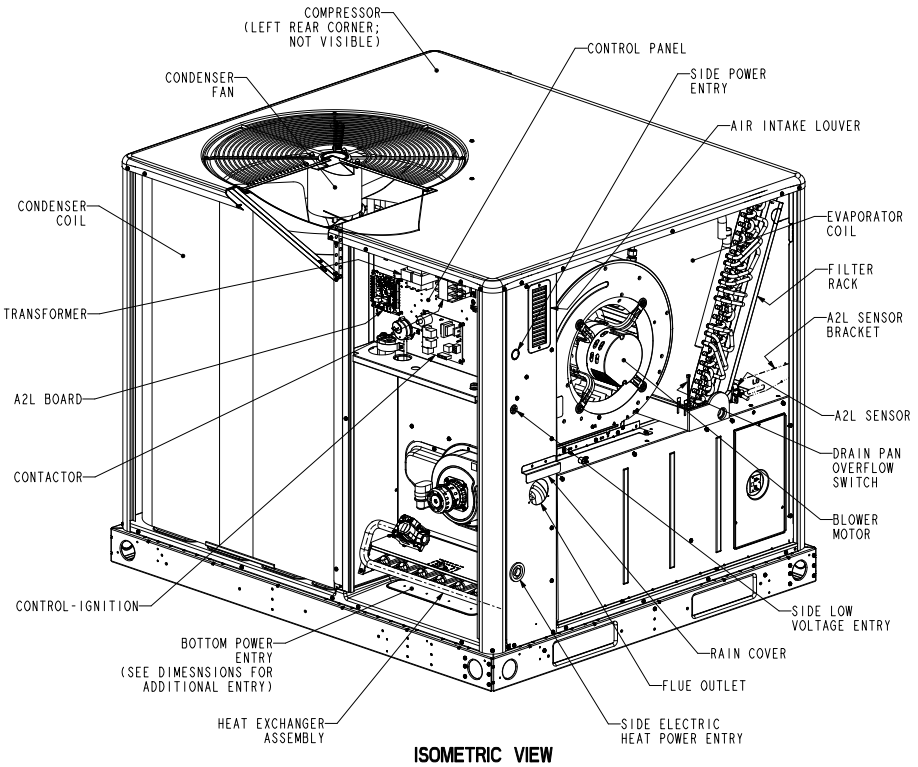

TYPICAL DRAIN LOCATION




## Parts Arrangement




**ISOMETRIC VIEW**

## Shipping and Packing List

**Package 1 of 1 contains:**

1 - Assembled unit

Check unit for shipping damage. Receiving party should contact last carrier immediately if shipping damage is found.

## General

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation. This unit is designed for use with R-454B refrigerant only.

The QGA units are gas/electric packaged units available in Three cooling capacities and five gas heating inputs.

## Requirements

See FIGURE 1 for unit clearances.

### ⚠ NOTICE

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil, causing the rubber to swell. Bubbles in the rubber roofing material can cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.

### ⚠ WARNING



Electric shock hazard and danger of explosion. Can cause injury, death or product or property damage. Turn off gas and electrical power to unit before performing any maintenance or servicing operations on the unit. Follow lighting instructions attached to unit when putting unit back into operation and after service or maintenance.

### ⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

### ⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

### ⚠ WARNING

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure they do not play with the appliance.

### ⚠ CAUTION

Leak Detection System installed. Unit must be powered except for service.

### ⚠ CAUTION

Servicing shall be performed only as recommended by the manufacturer.

### ⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

### ⚠ WARNING

Ducts connected to an appliance shall not contain a potential ignition source.

### ⚠ WARNING

For appliances using A2L refrigerants connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

### ⚠ WARNING

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor.

## ⚠ WARNING

Auxiliary devices which may be a potential ignition source shall not be installed in the duct work. Examples of such potential ignition sources are hot surfaces with a temperature exceeding 1,292 F (700°C) and electric switching devices.

## ⚠ WARNING

For duct connected appliances, false ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

## ⚠ CAUTION

Any service personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants.

## ⚠ IMPORTANT

Verify cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

## ⚠ IMPORTANT

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATING SYSTEM grounded (to earth) prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak tested on completion of charging, but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

## ⚠ IMPORTANT

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

# ⚠ IMPORTANT

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, procedures such as safely remove refrigerant following local and national regulations, purging the circuit with inert gas, evacuating (optional for A2L), purging with inert gas (optional for A2L), or opening the circuit by cutting or brazing be adhered to. The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants.

This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

**TABLE 1. Minimum conditioned area**

| | | | | | | |
|---|---|---|---|---|---|---|
| **ETIPR.... 101873-02** | **Charge (lb)** | <4 | 4 | 6 | 8 | 10 |
| | **Charge (kg)** | <1.8 | 1.8 | 2.7 | 3.6 | 4.5 |
| **Minimum Conditioned Area ($ft^2$)** | | N/A* | 60 | 90 | 120 | 150 |
| **Minimum Conditioned Area ($m^2$)** | | N/A* | 8.4 | 27.9 | 11.2 | 14.0 |

* Units with refrigerant charge below 4 lb.(1.8 kg) do not require a minimum conditioned room area.

-Units supply duct must be connected via air dust system to one or more rooms, totaling minimum conditioned area.

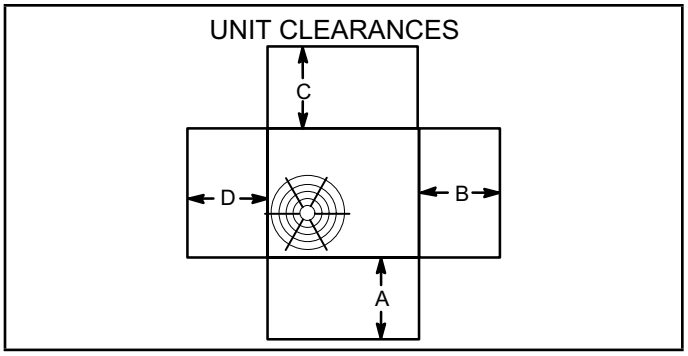



**FIGURE 1**

| [1] Unit Clearance | A in. | B in. | C in. | D in. | Top Clearance |
|---|---|---|---|---|---|
| Service Clearance | 24 | 24 | 0 | 24 | 48 |
| Clearance to Combustibles | 0 | 12 | 0 | 0 | 0 |

*Clearance to combustibles below the unit flue is 10 inches since the flue points down.

NOTE - Entire perimeter of unit base requires support when elevated above mounting surface.

[1] **Service Clearance** - Required for removal of serviceable parts.

**Clearance to Combustibles** - Required clearance to combustible material (gas units).

Minimum Operation Clearance - Required clearance for proper unit operation. Location

1 - Unit is designed for outdoor installation only. Unit must be installed so all electrical components are protected from water.

2 - Condenser coils must have an unlimited supply of air.

3 - For ground level installation, use a level prefabricated pad or use a level concrete slab. Do not tie the slab to the building foundation.

4 - Maintain level within a tolerance of 1/4” maximum across the entire length or width of the unit.

# ⚠ CAUTION

Unit levelness is critical for proper float switch operation.

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.

- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

## Unit Support

In the U.S., units may be installed on combustible floors made from wood or class A, B, or C roof covering material.

In Canada, units may be installed on combustible floors.

*NOTE - Securely fasten roof curb to roof per local codes.*

**⚠ CAUTION**

To reduce the likelihood of supply / return air bypass and promote a proper seal with the rooftop unit, duct work / duct drops / diffuser assemblies must be supported independently to the building structure.

**A - Downflow Discharge Application**

**Roof Mounting with ACURB85**

1 - The ACURB85 roof mounting curb must be installed, flashed and sealed in accordance with the instructions provided with the curb.

2 - The ACURB85 roof mounting curb should be square and level to 1/16” per linear foot (5mm per linear meter) in any direction.

3 - Duct must be attached to the roof mounting curb and not to the unit; supply and return plenums must be installed before setting the unit.

4 - Prior to setting the unit on the roof curb, remove the shipping bracket located underneath the unit. Remove the two screws in the base rail (located on the front and rear of the unit). The four screws and the bracket can be discarded. See FIGURE 2.

5 - Be sure that all required clearances are observed (see Clearances section).

**Installer’s Roof Mounting Curb**

Many types of roof curbs can be used to install the unit depending upon different roof structures. Items to keep in mind when using the building curb or supports are:

1 - The base is fully enclosed and not insulated, so an enclosed, insulated curb is required.

2 - The curbs or supports must be constructed with non-combustible materials and should be square and level to 1/16” per linear foot (5mm per linear meter) in any direction.

3 - Curb or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum curb height is 14” (356mm).

4 - Duct must be attached to the roof mounting curb and not to the unit. Supply and return plenums must be installed before setting the unit.

5 - Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

**B - Horizontal Discharge Applications**

1 - Specified installation clearances must be maintained when installing units. Refer to FIGURE 1.

2 - Top of support slab should be approximately 4” (102mm) above the finished grade and located so no run-off water from higher ground can collect around the unit.

3 - Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

## Duct Connection

All exterior ducts, joints and openings in roof or building walls must be insulated and weather-proofed with flashing and sealing compounds in accordance with applicable codes. Any duct passing through an unconditioned space must be insulated.

The duct system should be designed and sized according to the methods in the Air Conditioning Contractors of America (ACCA) manual that is most appropriate to the installation application.

A closed return air duct system shall be used. This shall not preclude use of economizers or outdoor fresh air intake.

It is recommended that supply and return air duct connections at the unit be made with flexible joints. The supply and return air duct systems should be designed for the CFM and static requirements of the job. They should not be sized by matching the dimensions of the duct connections on the unit. The unit is shipped capable of either horizontal flow (side duct connections) or down flow (bottom duct connections). Duct attachment screws are intended to go into the duct panel. Duct to unit connections must be sealed and weather-proofed.

## ⚠ CAUTION

In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.

## Rigging Unit For Lifting

Rig unit for lifting by attaching four cables to holes in unit base rail. See FIGURE 2.

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation.

1 - Connect rigging to the unit base rails using both holes in each corner.

2 - All panels must be in place for rigging.

3 - Place field-provided spreaders in place. Spreaders must be of adequate strength and length (must exceed unit dimension by 6 inches). Units may also be moved or lifted with a forklift. **The lengths of the forks of the forklift must be a minimum of 42 inches.**

*CAUTION - Before lifting a unit, make sure that the weight is distributed equally on the cables so that it will lift evenly.*

## Unpacking

Locate the four stacking brackets at each corner of the top panel. Remove the screws that secure these brackets. All screws must be re-installed. The stacking brackets can be discarded. Remove the bag and remaining packaging material, which can be discarded. Locate the four plastic fork slot bumpers on the base rails. Remove the fasteners and bumpers and discard.

## Downflow Air Discharge

Unit is shipped with panels covering the horizontal and downflow supply and return air openings (four covers).

1 - Before setting the unit on a roof curb, see “Roof Mounting” section for instructions on removing the shipping bracket underneath the unit.

2 - Remove and retain the horizontal supply and return duct covers.

3 - Remove the four screws securing the downflow duct covers inside the unit. Remove and discard the covers.

4 - Remove screws located between the supply and return air openings that attach the blower deck to the base, and discard these screws. These screws can interfere with bottom duct connections or roof curb seals.

5 - Install the duct system onto the unit.

6 - Replace the retained horizontal supply and return duct covers.

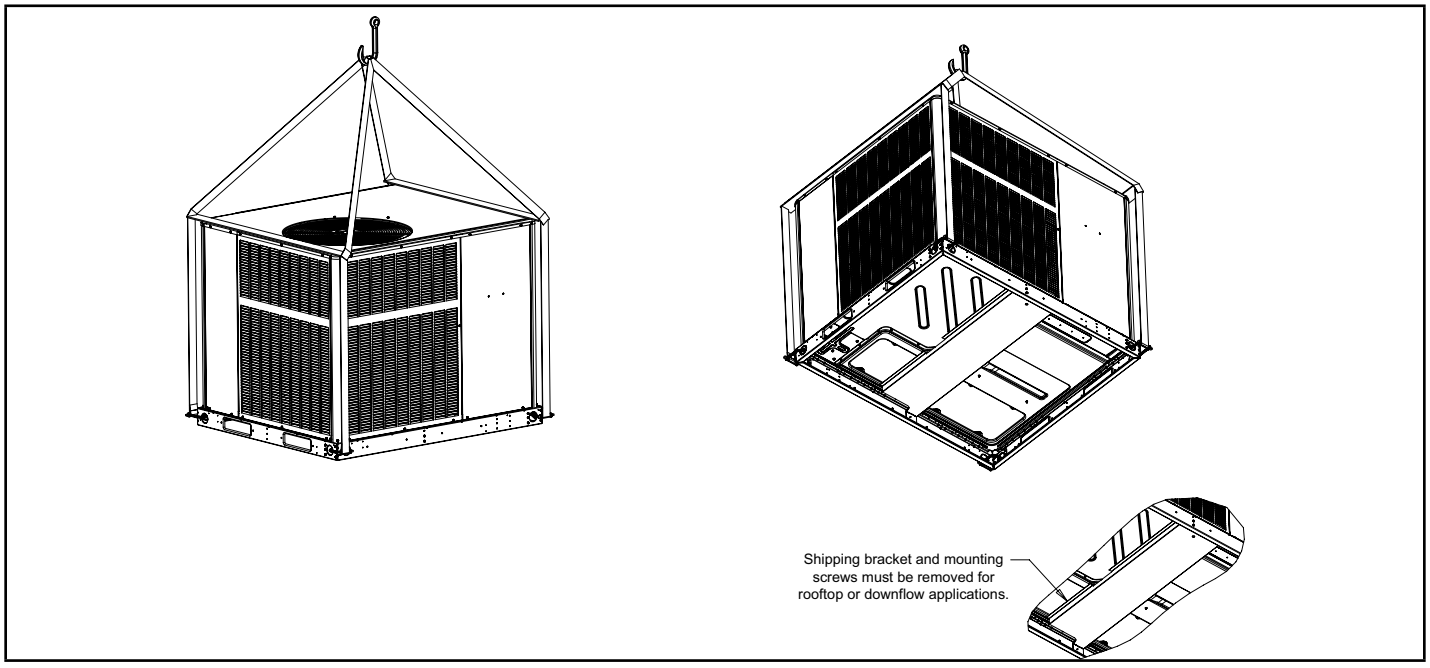



**FIGURE 2**

**Field-Installed Economizer (Downflow)**

1 - Before setting the unit on a roof curb, see “Roof Mounting” section for instructions on removing the shipping bracket underneath the unit.

2 - Remove the horizontal supply and return duct covers.

3 - Remove the four screws securing the downflow duct covers inside the unit. Remove and discard the covers.

4 - Remove the screws securing the bottom covers, and discard the bottom covers (supply and return).

5 - Remove screws located between the supply and return air openings that attach the blower deck to the base, and discard these screws. These screws can interfere with bottom duct connections or roof curb seals.

6 - Remove the close-out panel from the left-hand side of the return duct opening.

7 - Remove the return air panel above the return duct opening.

8 - Install the economizer into the unit rear panel. Wire and set up following the instructions that accompany the economizer.

9 - Return air duct must be field-supported.

10 - Unused covers and panels can be discarded.

## Horizontal Air Discharge

Unit is shipped with panels covering the horizontal and downflow supply and return air openings. See FIGURE 3.

**Field-Installed Economizer (Horizontal)**

1 - Remove the horizontal duct covers over the supply and return duct openings. Covers can be discarded.

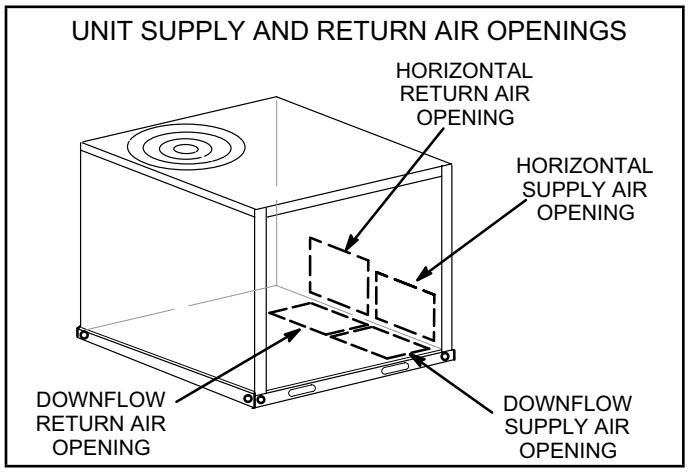



**FIGURE 3**

2 - Remove the close-out panel from the left-hand side of the return duct opening.

3 - Remove the return air panel above the return duct opening.

4 - Remove the lower (relief) hood from the economizer.

5 - Install the economizer into the unit rear panel. Wire and set up following the instructions that accompany the economizer.

6 - Install return air duct to the economizer at the former location of the relief hood.

7 - Cut a 20” wide X 14” high opening in the return air duct and install the economizer relief hood. See FIGURE 4.

8 - Return air duct must be field-supported.

9 - Unused covers and panels can be discarded.

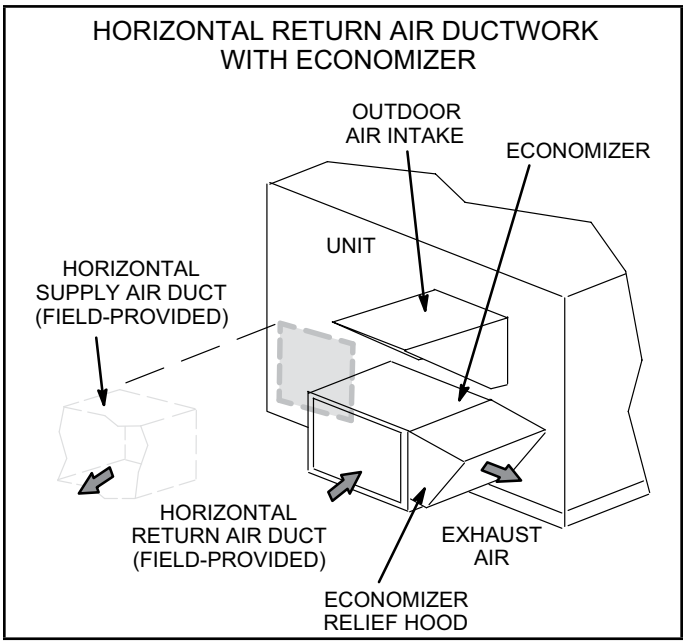



**FIGURE 4**

## Condensate Drains

This package unit is equipped with a 3/4” FPT coupling for condensate line connection. Plumbing must conform to local codes. Use a sealing compound on male pipe threads.

**Do not** operate unit without a drain trap. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will prevent positive drainage without a proper trap. **The condensate drain line must be properly trapped, routed to a suitable drain and primed prior to unit commissioning.**

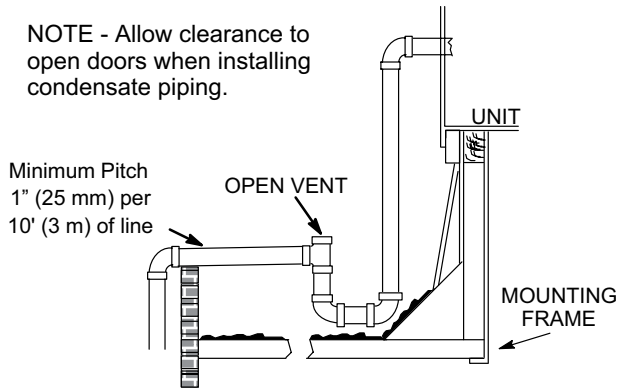
*NOTE - Install drain lines and trap so they do not block service access to the unit.*

See FIGURE 5 for proper drain arrangement. The drain line must pitch to an open drain or pump to prevent clogging of the line. Seal around the drain connection with suitable material to prevent air leakage into the return air system.

To prime trap, pour several quarts of water into drain, enough to fill drain trap and line.

*CAUTION - Drain lines should be hand-tightened only. Do not use tools to tighten fitting into drain.*

CONDENSATE SIDE DRAIN CONNECTION




Trap must be deep enough to offset maximum static difference (generally, 3 inches (76 mm) minimum). In addition, the drain line must be supported if longer than 10 feet. Trap must be primed at start-up.

**FIGURE 5**

## Connect Gas Piping

Before connecting field-provided piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5” w.c. (.12kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. Operating pressures at the unit gas connection must be as shown in TABLE 2.

**TABLE 2**

**OPERATING PRESSURE at GAS CONNECTION - in. w.c.**

| Natural Gas | | LP / Propane Gas | |
|---|---|---|---|
| Min. | Max. | Min. | Max. |
| 4.5 | 10.5 | 11 | 13 |

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8” N.P.T. plugged tap is located on gas valve for test gauge connection. Refer to Heating Start-Up section for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve. Piping must be installed according to allow the door to open properly.

Compounds used on threaded joints of gas piping shall be resistant to the action of liquefied petroleum gases.

The gas supply line is routed through the gas entry location on the side of the unit. See FIGURE 6. A grommet is provided in the instruction bag and should be used to seal gas supply line to gas entry of control compartment.

An optional bottom-entry gas kit is available for these units. See the instructions in that kit for proper installation details.

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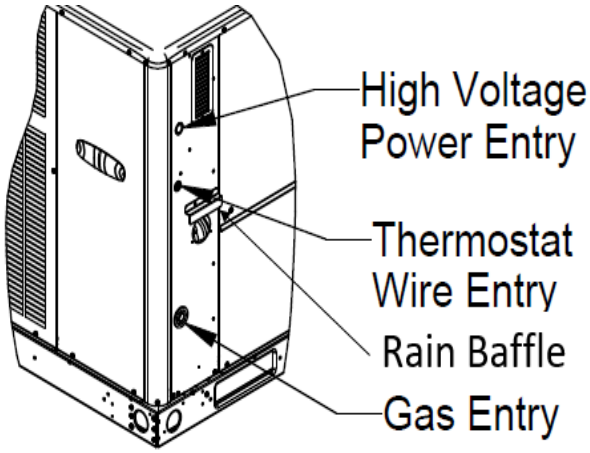



**FIGURE 6**

## Pressure Test Gas Piping

**When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See FIGURE 7.**

*NOTE - Codes may require that manual main shut-off valve and union (furnished by installer) be installed in gas line external to unit. Union must be of the ground joint type.*

After all connections have been made, check all piping connections for gas leaks. Also check existing unit gas connections up to the gas valve; loosening may occur during installation. Use a leak detection solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.

**⚠ CAUTION**

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

## ⚠ WARNING



Danger of explosion. Can cause injury or product or property damage. Do not use matches, candles, flame or other sources of ignition to check for leaks.

***NOTE - In case emergency shut down is required, turn off the main manual shut-off valve and disconnect main power to unit. These devices should be properly labeled by the installer.***

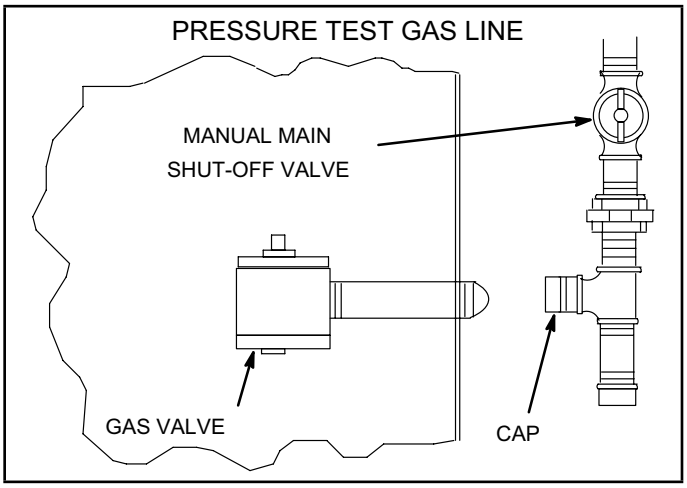



**FIGURE 7**

***NOTE - LP/Propane Units, Tanks, and Piping.***

Units are shipped equipped for use with natural gas, but can be converted to LP/propane in the field by an approved licensed technician. If conversion is required, use the approved conversion kit.

When converting a low-NOx unit to propane, the NOx inserts must be removed.

All LP/propane gas equipment must conform to the safety standards of the National Fire Protection Association.

For satisfactory operation, LP/propane gas pressure must be a minimum of 11" w.c. at the unit under full load.

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

## ⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and must extend outside the cabinet. The flexible connector can then be added between the black iron pipe and the gas supply line.

## Install Rain baffle

The unit is shipped with the rain baffle inside the control compartment. Locate the rain baffle and attach to side of utility panel with screws provided in the instruction bag. See FIGURE 6.

## High Altitude Derate

The input rate shown on the rating plate is for elevations up to 2000 feet. For elevations from 2001 to 4500 feet, the input rate is reduced by 5%. For elevations above 4500 feet, refer to the National Fuel Gas Code Z223.1 (latest edition) or the Canadian Installation Codes CAN/CGA-B149.1 & B149.2 for further details.

To check this pressure:

1 - Slide the gas valve switch to the "OFF" position (see FIGURE 9).

2 - Remove plug on valve marked "OUTLET PRESSURE".

3 - Install a water manometer.

4 - Slide the gas valve switch to the "ON" position and initiate a call for heat. If manifold pressure must be adjusted, remove cap from pressure regulator and turn adjustment screw clockwise to increase pressure or counterclockwise to reduce pressure.

5 - After checking pressure, turn gas off, remove manometer fitting, and replace pipe plug and regulator cap.

6 - Put furnace in operation and check plug for leaks using soapy solution.

***NOTE - This is the only permissible derate for these units.***

## Electrical Connections

All wiring should be done in accordance with the National Electrical Code, ANSI/NFPA No. 70 (latest edition); Canadian Electrical Code Part 1, CSA 22.2 60335-1 & 60335-2-40 (latest edition); or local codes where they prevail. Use wiring with a temperature limitation of 75°C minimum. Run the 208, 230, or 460 volt, 60 hertz electric power supply through a fused disconnect switch to the control box of the unit and connect as shown in the wiring diagram located on the inside of the control access panel.

Power supply to the unit must be N.E.C. Class 1, and must comply with all applicable codes. A disconnect switch should be field provided for the unit; follow local codes to determine what type of switch to use. The switch must be separate from all other circuits. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram. Electrical wiring must be sized to carry minimum circuit ampacity marked on the unit. Use copper conductors only. Each unit must be wired with a separate branch circuit and be properly fused.

An optional bottom-entry power kit is available for these units. See the instructions in that kit for proper installation details.

## THERMOSTAT WIRING

### A - Thermostat Location

Room thermostat mounts vertically on a standard 2” X 4” handy box or on any non-conductive flat surface.

Locate thermostat approximately 5 feet (1524mm) above the floor in an area with good air circulation at average temperature. Avoid locating the room thermostat where it might be affected by:

- Drafts or dead spots behind doors and in corners
- Hot or cold air from ducts
- Radiant heat from sun or appliances
- Concealed pipes and chimneys

### B - Control Wiring

1 - Route thermostat cable or wires from subbase to control panel (refer to unit dimensions to locate bottom and side power entry).

***IMPORTANT - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring.***

Use18 AWG wire for all applications using remotely installed thermostats.

2 - Install thermostat assembly in accordance with instructions provided with thermostat.

3 - Connect thermostat wiring to leads in control panel. Wire as shown in FIGURE 8.

4 - Four wires are required for cooling.

5 - A thermostat capable of two-stage cooling is required when economizers are installed.

### C - Heat Anticipator

**The heat anticipator setting is 0.75 amp.** It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter “ON” cycles and may result in the lowering of the temperature within the conditioned space.

***IMPORTANT - Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may allow unit to operate but not with proper response to room demand.***

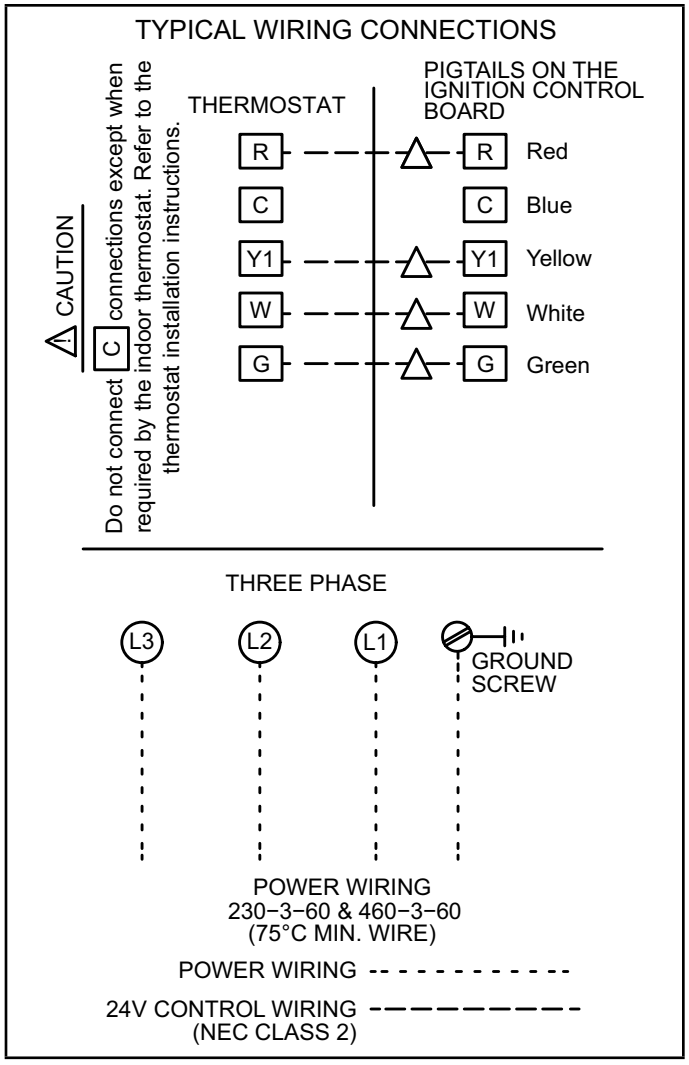



**FIGURE 8**

## Blower Operation and Adjustments

Units are equipped with direct drive blowers.

**⚠ IMPORTANT**

Three phase scroll compressors must be phased sequentially for correct compressor and blower rotation. Follow “COOLING START-UP” section of installation instructions to ensure proper compressor and blower operation.

Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand. The following steps apply to applications using a typical thermostat.

1 - Blower operation is manually set at the thermostat subbase fan switch. With fan switch in **ON** position, blowers will operate continuously.

2 - With fan switch in **AUTO** position, the blowers will cycle with demand. Blowers and entire unit will be off when system switch is in **OFF** position.

## BLOWER DATA

**QGA036S4D**

| Model No. | | External Static (in. w.g.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1.0** |
| Tap 1 (Fan Only) | CFM | 897 | 816 | 734 | 629 | 549 | 486 | 411 | 342 | --- | --- |
| | RPM | 471 | 520 | 573 | 632 | 677 | 723 | 762 | 790 | --- | --- |
| | Watts | 89 | 95 | 103 | 111 | 117 | 123 | 129 | 132 | --- | --- |
| Tap 2 (Low Cooling) | CFM | 1444 | 1390 | 1336 | 1283 | 1226 | 1166 | 1106 | 1042 | 975 | 895 |
| | RPM | 686 | 713 | 740 | 768 | 797 | 829 | 861 | 897 | 938 | 979 |
| | Watts | 261 | 270 | 278 | 287 | 296 | 305 | 315 | 326 | 339 | 352 |
| Tap 3 (High Cooling) | CFM | 1616 | 1567 | 1523 | 1476 | 1432 | 1391 | 1347 | 1309 | 1256 | 1204 |
| | RPM | 734 | 762 | 789 | 816 | 847 | 876 | 903 | 934 | 965 | 1000 |
| | Watts | 355 | 366 | 375 | 386 | 398 | 409 | 420 | 431 | 444 | 457 |
| Tap 4 (54k Heat Exchanger) | CFM | 1058 | 1008 | 958 | 905 | 856 | 802 | 749 | 700 | 650 | 598 |
| | RPM | 654 | 683 | 712 | 742 | 779 | 810 | 842 | 872 | 902 | 934 |
| | Watts | 164 | 169 | 175 | 182 | 188 | 195 | 201 | 208 | 213 | 221 |
| Tap 5 (54k Heat Exchanger) | CFM | 1318 | 1276 | 1235 | 1202 | 1157 | 1116 | 1072 | 1028 | 985 | 945 |
| | RPM | 786 | 813 | 836 | 860 | 886 | 910 | 939 | 968 | 995 | 1022 |
| | Watts | 293 | 302 | 309 | 317 | 324 | 332 | 341 | 350 | 358 | 367 |
| Tap 4 (72k Heat Exchanger) | CFM | 1120 | 1063 | 1003 | 938 | 871 | 799 | 725 | 670 | 614 | 554 |
| | RPM | 588 | 621 | 643 | 681 | 714 | 721 | 758 | 775 | 794 | 817 |
| | Watts | 136 | 143 | 151 | 158 | 166 | 176 | 184 | 191 | 198 | 205 |
| Tap 5 (72k Heat Exchanger) | CFM | 1394 | 1344 | 1296 | 1247 | 1205 | 1152 | 1097 | 1043 | 984 | 913 |
| | RPM | 600 | 640 | 693 | 740 | 798 | 830 | 872 | 930 | 960 | 1012 |
| | Watts | 237 | 246 | 255 | 264 | 273 | 282 | 293 | 302 | 314 | 325 |
| Tap 4 (90k Heat Exchanger) | CFM | 1600 | 1556 | 1511 | 1468 | 1425 | 1382 | 1339 | 1295 | 1247 | 1207 |
| | RPM | 767 | 796 | 820 | 847 | 874 | 902 | 927 | 955 | 983 | 1010 |
| | Watts | 357 | 367 | 376 | 387 | 396 | 406 | 416 | 427 | 436 | 448 |
| Tap 5 (90k Heat Exchanger) | CFM | 1918 | 1878 | 1840 | 1805 | 1767 | 1733 | 1694 | 1660 | 1625 | 1586 |
| | RPM | 893 | 917 | 937 | 958 | 982 | 1002 | 1028 | 1050 | 1074 | 1095 |
| | Watts | 597 | 609 | 620 | 631 | 643 | 652 | 667 | 679 | 693 | 701 |

NOTE - All air data is measured external to unit without air filters.

## BLOWER DATA

**QGA048S4D**

| Model No. | | External Static (in. w.g.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1.0** |
| Tap 1 (Fan Only) | CFM | 1225 | 1098 | 1036 | 968 | 903 | 831 | 724 | 658 | 604 | 555 |
| | RPM | 582 | 593 | 629 | 669 | 710 | 754 | 807 | 840 | 873 | 905 |
| | Watts | 180 | 167 | 174 | 182 | 190 | 198 | 210 | 216 | 224 | 229 |
| Tap 2 (Low Cooling) | CFM | 1791 | 1745 | 1695 | 1644 | 1592 | 1544 | 1495 | 1444 | 1395 | 1339 |
| | RPM | 832 | 854 | 878 | 900 | 923 | 945 | 968 | 992 | 1019 | 1046 |
| | Watts | 458 | 467 | 477 | 485 | 495 | 506 | 515 | 526 | 539 | 549 |
| Tap 3 (High Cooling) | CFM | 1951 | 1909 | 1867 | 1828 | 1787 | 1749 | 1712 | 1672 | 1635 | 1595 |
| | RPM | 849 | 873 | 894 | 918 | 940 | 961 | 984 | 1008 | 1029 | 1053 |
| | Watts | 586 | 598 | 609 | 622 | 633 | 645 | 657 | 670 | 681 | 693 |
| Tap 4 (90k Heat Exchanger) | CFM | 1545 | 1497 | 1452 | 1403 | 1356 | 1309 | 1256 | 1209 | 1159 | 1108 |
| | RPM | 732 | 759 | 787 | 816 | 843 | 871 | 903 | 934 | 962 | 995 |
| | Watts | 299 | 310 | 320 | 329 | 341 | 349 | 359 | 371 | 380 | 391 |
| Tap 5 (90k Heat Exchanger) | CFM | 1836 | 1794 | 1752 | 1711 | 1674 | 1632 | 1592 | 1553 | 1511 | 1465 |
| | RPM | 843 | 864 | 890 | 913 | 936 | 960 | 985 | 1009 | 1033 | 1062 |
| | Watts | 476 | 487 | 500 | 509 | 521 | 532 | 544 | 555 | 566 | 581 |
| Tap 4 (108k Heat Exchanger) | CFM | 1568 | 1515 | 1467 | 1417 | 1369 | 1324 | 1273 | 1226 | 1172 | 1117 |
| | RPM | 709 | 739 | 769 | 797 | 827 | 857 | 887 | 921 | 953 | 988 |
| | Watts | 292 | 302 | 313 | 323 | 334 | 343 | 354 | 366 | 377 | 390 |
| Tap 5 (108k Heat Exchanger) | CFM | 1939 | 1893 | 1851 | 1809 | 1769 | 1726 | 1687 | 1652 | 1612 | 1572 |
| | RPM | 843 | 867 | 891 | 917 | 941 | 969 | 993 | 1015 | 1041 | 1065 |
| | Watts | 515 | 526 | 540 | 553 | 566 | 579 | 592 | 604 | 617 | 630 |
| Tap 4 (126k Heat Exchanger) | CFM | 1651 | 1597 | 1553 | 1505 | 1461 | 1416 | 1369 | 1316 | 1264 | 1221 |
| | RPM | 746 | 776 | 803 | 831 | 857 | 887 | 914 | 944 | 977 | 1007 |
| | Watts | 338 | 350 | 360 | 371 | 381 | 392 | 403 | 415 | 426 | 437 |
| Tap 5 (126k Heat Exchanger) | CFM | 1943 | 1899 | 1855 | 1816 | 1773 | 1733 | 1692 | 1655 | 1616 | 1576 |
| | RPM | 857 | 880 | 904 | 928 | 953 | 977 | 1001 | 1025 | 1048 | 1073 |
| | Watts | 528 | 540 | 552 | 565 | 578 | 590 | 603 | 615 | 629 | 641 |

NOTE - All air data is measured external to unit without air filters.

## BLOWER DATA

**QGA060S4D**

| Model No. | | External Static (in. w.g.) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **0.1** | **0.2** | **0.3** | **0.4** | **0.5** | **0.6** | **0.7** | **0.8** | **0.9** | **1.0** |
| Tap 1 (Fan Only) | CFM | 1374 | 1314 | 1263 | 1208 | 1151 | 1094 | 1030 | 965 | 884 | 787 |
| | RPM | 631 | 659 | 691 | 722 | 758 | 793 | 834 | 874 | 918 | 966 |
| | Watts | 221 | 228 | 236 | 244 | 254 | 263 | 274 | 284 | 296 | 309 |
| Tap 2 (Low Cooling) | CFM | 1937 | 1893 | 1851 | 1805 | 1763 | 1720 | 1677 | 1635 | 1596 | 1554 |
| | RPM | 831 | 851 | 873 | 892 | 919 | 942 | 966 | 991 | 1018 | 1043 |
| | Watts | 523 | 532 | 543 | 553 | 565 | 577 | 589 | 601 | 613 | 626 |
| Tap 3 (High Cooling) | CFM | 2281 | 2258 | 2214 | 2180 | 2139 | 2110 | 2069 | 2023 | 1954 | 1882 |
| | RPM | 967 | 986 | 1004 | 1020 | 1038 | 1055 | 1073 | 1090 | 1103 | 1114 |
| | Watts | 851 | 862 | 874 | 884 | 896 | 907 | 916 | 917 | 901 | 880 |
| Tap 4 (90k Heat Exchanger) | CFM | 1469 | 1410 | 1356 | 1304 | 1247 | 1196 | 1138 | 1079 | 1020 | 947 |
| | RPM | 642 | 678 | 711 | 739 | 776 | 809 | 845 | 880 | 919 | 957 |
| | Watts | 207 | 217 | 226 | 234 | 244 | 253 | 263 | 273 | 283 | 293 |
| Tap 5 (90k Heat Exchanger) | CFM | 1838 | 1792 | 1744 | 1699 | 1654 | 1612 | 1568 | 1519 | 1474 | 1430 |
| | RPM | 769 | 796 | 822 | 850 | 872 | 899 | 928 | 958 | 982 | 1011 |
| | Watts | 375 | 382 | 392 | 404 | 414 | 424 | 437 | 449 | 460 | 471 |
| Tap 4 (108k Heat Exchanger) | CFM | 1648 | 1595 | 1546 | 1493 | 1447 | 1398 | 1352 | 1305 | 1256 | 1211 |
| | RPM | 729 | 759 | 786 | 813 | 843 | 870 | 897 | 927 | 960 | 993 |
| | Watts | 298 | 309 | 318 | 328 | 338 | 347 | 357 | 367 | 379 | 390 |
| Tap 5 (108k Heat Exchanger) | CFM | 2033 | 1990 | 1946 | 1904 | 1862 | 1821 | 1781 | 1743 | 1705 | 1665 |
| | RPM | 868 | 893 | 914 | 940 | 961 | 986 | 1006 | 1030 | 1051 | 1075 |
| | Watts | 525 | 540 | 550 | 562 | 573 | 585 | 596 | 608 | 619 | 633 |
| Tap 4 (126k Heat Exchanger) | CFM | 1639 | 1584 | 1539 | 1492 | 1446 | 1399 | 1355 | 1308 | 1258 | 1210 |
| | RPM | 737 | 766 | 795 | 825 | 853 | 881 | 909 | 941 | 970 | 1005 |
| | Watts | 301 | 311 | 322 | 332 | 342 | 353 | 362 | 373 | 383 | 394 |
| Tap 5 (126k Heat Exchanger) | CFM | 1988 | 1945 | 1899 | 1856 | 1822 | 1785 | 1743 | 1707 | 1671 | 1636 |
| | RPM | 864 | 890 | 914 | 939 | 961 | 987 | 1011 | 1035 | 1058 | 1081 |
| | Watts | 507 | 520 | 532 | 545 | 557 | 569 | 581 | 593 | 605 | 616 |

NOTE - All air data is measured external to unit without air filters.

## BLOWER DATA

**AIR RESISTANCE DATA - in. w.g.**

| Air Volume cfm | Wet Indoor Coil | | | Optional Economizer |
|---|---|---|---|---|
| | 036, 042 | 048 | 060 | |
| 600 | 0.01 | 0.01 | --- | 0.02 |
| 700 | 0.01 | 0.01 | 0.01 | 0.03 |
| 800 | 0.01 | 0.01 | 0.01 | 0.04 |
| 900 | 0.02 | 0.01 | 0.01 | 0.05 |
| 1000 | 0.02 | 0.02 | 0.02 | 0.06 |
| 1100 | 0.02 | 0.02 | 0.02 | 0.07 |
| 1200 | 0.03 | 0.02 | 0.02 | 0.08 |
| 1300 | 0.03 | 0.03 | 0.03 | 0.10 |
| 1400 | 0.04 | 0.03 | 0.03 | 0.12 |
| 1500 | 0.05 | 0.04 | 0.03 | 0.13 |
| 1600 | 0.05 | 0.05 | 0.03 | 0.15 |
| 1700 | 0.05 | 0.05 | 0.04 | 0.18 |
| 1800 | 0.06 | 0.05 | 0.04 | 0.20 |
| 1900 | 0.06 | 0.06 | 0.04 | 0.21 |
| 2000 | 0.07 | 0.06 | 0.05 | 0.24 |

## Cooling Start-Up

### A - Operation

1 - Initiate cooling demands according to instructions provided with thermostat.

2 - When the thermostat calls for cooling, R is closed to Y (see the wiring diagrams). This action completes the low voltage control circuit, energizing the compressor, condenser fan motor, and blower motor.

3 - Unit compressors have internal protection. In the event there is an abnormal rise in the temperature of the compressor, the protector will open and cause the compressor to stop.

4 - A combustion air inducer operates for the first 10 seconds of every cooling cycle to prevent insects from nesting in the flue outlet.

#### Blower Delay – Cooling

The circulating air blower is controlled by a timing circuit in the integrated blower/ignition control. Timings are not adjustable. Blower “ON” delay is 5 seconds after the compressor starts and blower “OFF” timing is 60 seconds after the compressor shuts down.

***NOTE- - There is no blower OFF delay when there is a call for G (fan only).***

#### Continuous Fan

With the proper thermostat and sub-base, continuous blower operation is possible by closing the R to G circuit. Cooling blower delay is also functional in this mode.

5 - Units contain one refrigerant circuit or stage.

6 - Unit is charged with R-454B refrigerant. See unit rating plate for correct amount of charge.

7 - Refer to Refrigerant Charge and Check section for proper method to check refrigerant charge.

### B - Three-Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1 - Observe suction and discharge pressures and blower rotation on unit start-up.

2 - Suction pressure must drop, discharge pressure must rise and blower rotation must match rotation marking.

If pressure differential is not observed or blower rotation is not correct:

3 - Disconnect all remote electrical power supplies.

4 - Reverse any two field-installed wires connected to the line side of contactor.

5 - Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.

### C - Refrigerant Charge and Check

***WARNING-Do not exceed nameplate charge under any condition.***

This equipment is a self-contained, factory-optimized refrigerant system. The unit should not require adjustments to system charge when properly installed. If unit performance is questioned, perform the following checks.

Ensure unit is installed per manufacturers instructions and that line voltage and air flow are correct. Refer to TABLE 3 for proper performance value. The indoor metering device varies by model. When checking performance of a unit using an orifice for metering, refer to the suction superheat value to judge performance. When checking performance of a unit that uses an expansion valve for metering, refer to the subcooling value to judge system performance.

If the measured performance value varies from table value allowance, check internal seals, service panels and duct work for air leaks, as well as restrictions and blower speed settings. If unit performance remains questionable, remove system charge, evacuate to 500 microns, and weigh in refrigerant to nameplate charge. It is critical that the exact charge is re-installed. Failure to comply will compromise system performance.

If unit performance is still questionable, check for refrigerant-related problems, such as blocked coil or circuits, malfunctioning metering device or other system components.

**TABLE 3**

**COOLING SYSTEM PERFORMANCE VALUES**

| Model | Suction Superheat +/- 1 |
|---|---|
| 3 Ton | 9.5 |
| 4 Ton | 10.5 |
| 5 Ton | 10 |

Based on outdoor ambient temperature of 82°F and indoor entering air of 80°F db / 6°F wb.

**TABLE 4**

**COOLING PERFORMANCE**

| 80°F DB / 67°F WB Return Air | | Air Temperature Entering Outdoor Coil, °F | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Cooling Input (1000 BTU)** | **Pressure** | **65°** | **70°** | **75°** | **80°** | **85°** | **90°** | **95°** | **100°** | **105°** | **110°** | **115°** |
| 36 | Suction +/-2 PSIG | 116 | 118 | 121 | 124 | 127 | 129 | 132 | 133 | 135 | 137 | 139 |
| 48 | | 125 | 127 | 130 | 132 | 135 | 137 | 137 | 141 | 143 | 145 | 145 |
| 60 | | 115 | 118 | 120 | 123 | 125 | 127 | 129 | 131 | 132 | 134 | 135 |
| 36 | Liquid +/-4 PSIG | 230 | 246 | 265 | 284 | 305 | 327 | 349 | 373 | 397 | 423 | 450 |
| 48 | | 244 | 263 | 283 | 304 | 326 | 348 | 369 | 395 | 420 | 447 | 475 |
| 60 | | 231 | 248 | 268 | 288 | 310 | 332 | 356 | 381 | 405 | 433 | 458 |
| 36 | Superheat +/-1 DEG F | 24 | 23 | 22 | 21 | 19 | 18 | 17 | 15 | 12 | 10 | 7 |
| 48 | | 24 | 22 | 21 | 20 | 18 | 17 | 14 | 13 | 11 | 9 | 2 |
| 60 | | 23 | 21 | 20 | 18 | 15 | 13 | 10 | 7 | 6 | 5 | 5 |

**TABLE 5 Minimum Circulation Airflow**

| Charge (oz) | 60 - 80 | 80 - 100 | 100 - 120 | 120 - 140 | 140 - 160 |
|---|---|---|---|---|---|
| Qmin (CFM) | 135 | 169 | 203 | 237 | 271 |

**D - Compressor Controls**

See unit wiring diagram to determine which controls are used on each unit. Optional controls are identified on wiring diagrams by arrows at junction points.

1 - High Pressure Switch (S4)

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise.

S4 is located in the compressor discharge line and is wired in series with the compressor contactor coil.

When discharge pressure rises to 590±10 psig (4068±69kPa), indicating a problem with the system, the switch opens. The respective compressor is de-energized but the economizer can continue to operate. Auto-reset switches close at 418±20psig (2882±138kPa).

2 - Compressor High Temperature Limit (S173)

The temperature limit switch S5 is located on the top of Interlink compressors and is wired in series with the high pressure switch S4.

## Gas Heat Start-Up

**FOR YOUR SAFETY READ BEFORE LIGHTING**

**⚠ WARNING**



Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

**⚠ WARNING**



Danger of explosion. Can cause injury or product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

**⚠ WARNING**



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

**⚠ WARNING**

**SMOKE POTENTIAL**

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

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

The gas valve may be equipped with either a gas control lever or gas control knob. Use only your hand to push the lever or turn the gas control knob. Never use tools. If the lever will not move or the knob will not push in or turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.

**⚠ WARNING**



Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

**A - Placing Unit In Operation**

**⚠ WARNING**



Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

**Gas Valve Operation**

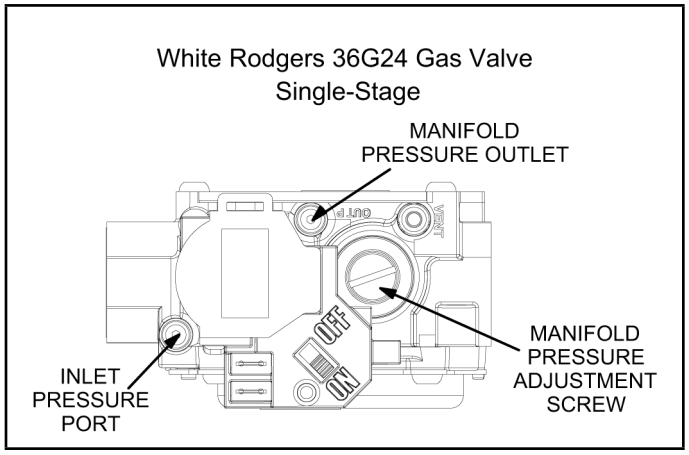



**FIGURE 9**

**To Light Main Burners**

1 - Turn off electrical power to unit.

2 - Turn the thermostat to lowest setting.

3 - Slide the gas valve switch to the “ON” position (see FIGURE 9).

4 - Turn on electrical power to the unit.

5 - Set the room thermostat to the desired temperature. (If the thermostat “set” temperature is above room temperature after the pre-purge time expires, main burners will light).

**To Shut Down Main Burners**

1 - 1- Turn off electrical power to unit.

2 - Slide the gas valve switch to the “OFF” position (see FIGURE 9).

**⚠ WARNING**



Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

## Heading Operation and Adjustments

### A - Heating Sequence of Operation

When the thermostat calls for heating, R is closed to W. The following describes the gas heating sequence of operation.

1 - A call for heat from the room thermostat starts the combustion air blower and the circulating air blower.

2 - When the speed of the combustion air blower reaches proper RPM, the pressure switch closes, initiating a re-purge period (30 seconds nominal).

3 - When the pre-purge period has expired, the ignition control energizes the main gas valve and spark electrode for a period of 10 seconds.

4 - If the flame sensor does not sense that a flame has been established in the 10-second interval, then the ignition control will de-energize the gas valve, and begins a 30 second inter-purge period, then initiates another trial for ignition.

5 - The ignition control is designed to repeat this “trial for ignition” a total of three times. If, at the end of the third trial, flame still has not been established, then the ignition control will try to light again 1 hour later. The 1-hour retry is indefinite. The ignition control can be reset by interrupting the unit power or the thermostat circuit.

6 - Once flame sense has been established, the circulating air blower is energized after a 30 second blower on delay.

7 - When the thermostat is satisfied, the combustion air blower and gas valve are de-energized. The circulation air blower will continue to run for a short period after the furnace is shut down.

### B - Safety Controls

The control circuit includes the following safety controls:

**Limit Control**

This control is located inside the heating compartment and is designed to open at abnormally high circulating air temperatures. It resets automatically. The limit control operates when a high temperature condition, caused by inadequate airflow, occurs. This closes the main gas valve.

**Pressure Switch**

If the combustion air blower should fail, the pressure switch prevents the spark electrode and gas valve from being energized.

**Flame Sensor**

If the ignition control does not receive a signal from the flame sensor indicating that the burners have established flame, the gas valve closes after the 10-second trial for ignition period.

**Rollout Switch**

The switch is located on the top of the burner box. In the event of a sustained main burner roll-out, the roll-out switch shuts off the ignition control and closes the main gas valve. To reset, push the button on top of the switch.

**Blower Delay – Heating**

- The circulating air blower “OFF” delay is 120 seconds after shutting down the burners. This delay is not adjustable.
- The circulating air blower “ON” delay is 120 seconds after “W” signal is received to allow the furnace to warm up.

### C - Ignition Control Diagnostic LEDs

**TABLE 6**

**IGNITION CONTROL HEARTBEAT LED STATUS**

| LED Status | Flashing Rate | Fault Description |
|---|---|---|
| Slow Flash | One flash per second | Normal operation: No call for heat. |
| Fast Flash | Two flashes per second | Normal operation: Call for heat. |
| 2 | Two flashes in 1 second with 1-second pause | System lockout: Failed to detect or sustain flame. |
| 3 | Three flashes in 1.5 seconds with 1-second pause. | Pressure switch senses incorrect pressure or gas valve coil is open. |
| 4 | Four flashes in 2 seconds with 1-second pause | High limit or roll-out switch open |
| 5 | Five flashes in 2.5 seconds with 1-second pause | Flame sensed and gas valve not energized. |
| Steady Off | | Internal failure: Micro-controller failure; self-check |

### D - Limit Controls

Limit controls are factory-set and are not adjustable. The primary limit is located in the heating compartment near the supply duct.

If the primary limit trips three times in the same heating cycle, heating operation will de-energize. Heating will automatically restart after one hour if a heating demand is present. To initiate heating during the one hour timed-off interval, reset the thermostat.

### E - Heating Adjustment

Main burners are factory-set and do not require adjustment.

The following manifold pressures are listed on the gas valve.

Natural Gas Units - High Fire - 3.5” w.c.

## Service

The unit should be inspected once a year by a qualified service technician.

**⚠ CAUTION**

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, the appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out.
- Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards.
- All field joints shall be accessible for inspection prior to being covered or enclosed.
- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance. The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS as applicable:

1 - The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.

2 - The ventilation machinery and outlets are operating adequately and are not obstructed.

3 - If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

4 - Markings on the equipment should be visible and legible. Markings and signs that are illegible shall be corrected.

5 - Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

- For systems containing refrigerant, all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged in a safe manner to avoid possibility of sparking, that no live electrical components and wiring are exposed while charging, recovering, or purging the system, and that there is continuity of earth bonding. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used that is reported to the owner of the equipment, so all parties are advised.

**NOTE** –Sealed electrical components shall be replaced, not repaired.

**NOTE** – Intrinsically safe components must be replaced, not repaired.

**NOTE** – All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out with work in confined spaces being avoided.

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the

sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and that 12.5 % refrigerant is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work. If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut of valves) in a part of the system remote from the leak.

- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed and, since flammability is a consideration, procedures such as safely remove refrigerant following local and national regulations, purging the circuit with inert gas, evacuating (optional for A2L), purging with inert gas (optional for A2L), or opening the circuit by cutting or brazing be adhered to. The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to be able to perform the required work. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and working area is well ventilated.

**A - Filters**

Air filters are not supplied with the unit. A field-provided air filter must always be installed ahead of the evaporator coil and must be cleaned or replaced if necessary. Dirty filters will reduce the airflow of the unit. All units are equipped with a factory-installed filter rack. Use two 20 X 20 X 1” (508 X 508 X 51mm) filters. Refer to local codes or appropriate jurisdiction for approved filters.

To change filters, remove the blower access panel and slide the filters out of the internal rack. See FIGURE 10.

Approved filters should be checked monthly and replaced when necessary. Take note of air flow direction marking on filter frame when reinstalling filters.

***NOTE - Filters must be U.L.C. certified or equivalent for use in Canada.***

An optional tool-less filter access kit is available. The kit includes two new blower panels (one smaller panel secured with screws, the other with twist latches) to provide access for filter changes without any hand tools.

**B - Lubrication**

All motors are lubricated at the factory. No further lubrication is required.

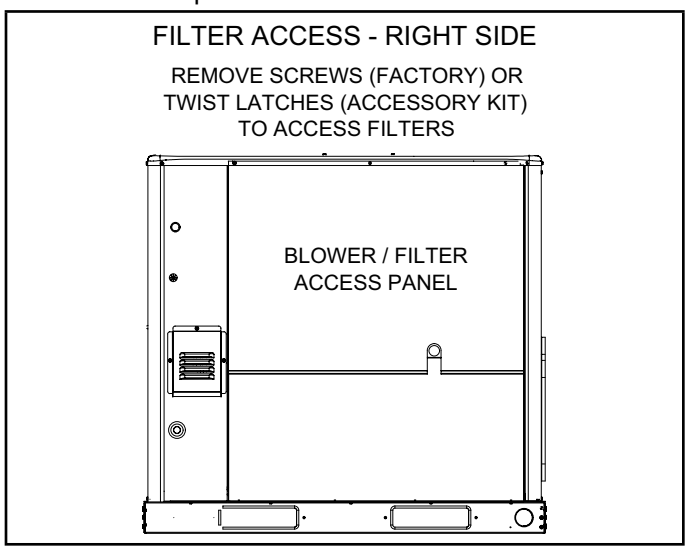



**FIGURE 10**

### C - Burner and Burner Orifices

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

To check or change burners or burner orifices:

1 - **Close the main manual gas shutoff valve and turn off all power to unit.**

2 - Remove the access panel.

3 - Disconnect the union in the gas supply line upstream of the gas valve and downstream of the manual shutoff valve.

4 - Label wires going to the gas valve, then disconnect the wires.

5 - To change orifice:
  a - Remove screws that fasten the manifold to the burner box assembly and remove the manifold.
  b - Remove the orifices, then install replacement orifices.
  c - To reassemble: Reverse above steps, making sure orifices are inserted into the orifice holders on the back end of the burners, and that burners are level and centered on each burner opening in the vest panel.

6 - To remove or service burners:
  a - Label and disconnect the wires to the roll-out switch and disconnect the ignitor and flame sensor leads at the ignition control.
  b - Remove the screws that secure the burner box assembly to the vest panel and remove the assembly from the unit.
  c - Remove the screws that fasten the burner rack and bottom shield assembly to the burner box. Burners are now accessible for removal.
  d - To Reassemble: Reverse above steps.

7 - After reassembly of all parts is complete and all wires are reconnected, open the main manual gas shutoff valve; check for and correct any gas leaks. Turn electrical power on, initiate a call for heat, and check for proper burner operation.

8 - Install access panel.

9 - Locate the ignitor. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See FIGURE 11.

10 - Replace burners and screws securing burner. See FIGURE 12.

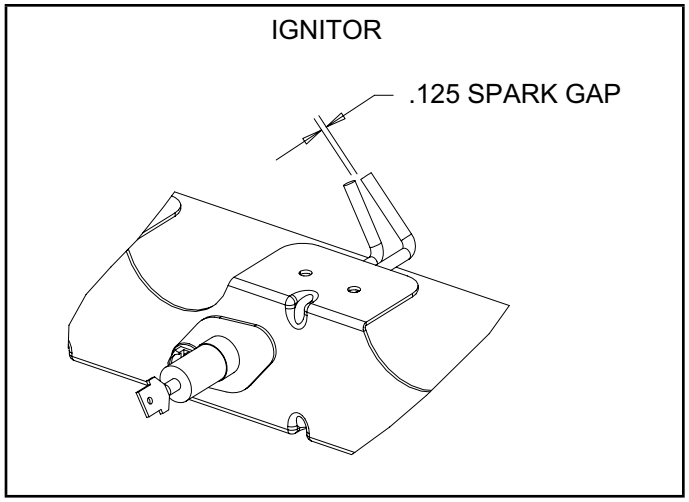



**FIGURE 11**

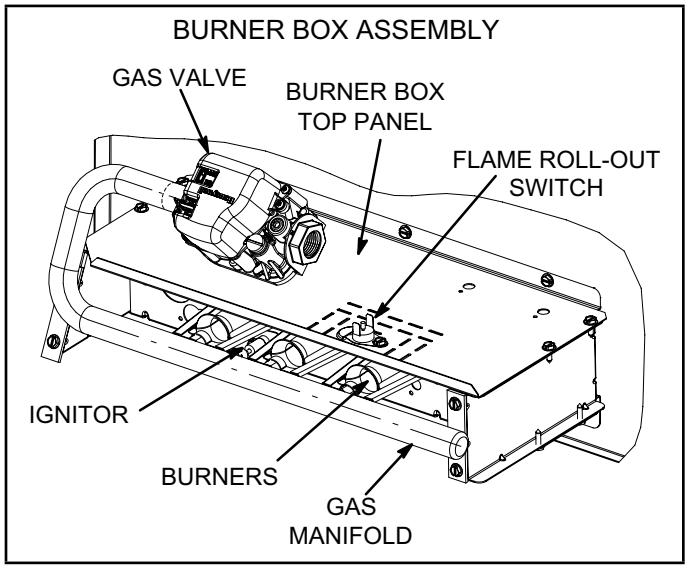



**FIGURE 12**

**⚠ WARNING**

Danger of explosion. Can cause injury or death. Do not over tighten main burner mounting screws. Snug tighten only.

### D - Combustion Air Inducer

A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

Under normal operating conditions, the combustion air inducer wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule.

Clean combustion air inducer as follows:

1 - Shut off power supply and gas to unit.

2 - Remove the control access panel located on the front right side of the unit.

3 - Remove and retain the screws securing the vent hood to the utility panel.

4 - Remove and retain the screws securing the flue choke to the outside of the utility panel.

5 - Remove and retain the screw securing the flue tube from the inducer outlet.

6 - Remove and retain screws securing combustion air inducer to flue box.

7 - Clean inducer wheel blades with a small brush and wipe off any dust from housing. Take care not to damage exposed fan blades. Clean accumulated dust from front of flue box cover.

8 - Return combustion air inducer motor, flue tube, flue choke, and vent hood to original locations and secure with retained screws. It is recommended that gaskets be replaced during reassembly.

9 - Replace the access panel.

**E - Flue Box and Heat Exchanger**

With proper combustion adjustment, the heat exchanger of a gas-fired furnace will seldom need cleaning. Sooting of a gas appliance is highly irregular and once cleaned, the cause of the sooting must be determined. If the heat exchanger should become sooted, it can be cleaned as follows:

1 - Remove the burner assembly as outlined in the Burner and Burner Orifice Instructions section.

2 - Remove the combustion blower.

3 - At the bottom of the heating section, remove the screws holding the flue collector box. Carefully remove the flue collector box without ripping the adjacent insulation.

4 - Using a wire brush on a flexible wand, brush out the inside of each heat exchanger from the burner inlet and flue outlet ends.

5 - Brush out the inside of the flue collector box.

6 - Run the wire brush down the heat exchanger tubes from the flue collector end.

7 - If soot buildup is excessive, remove the vent motor and clean the wheel and housing. Run the wire brush down the flue extension at the outlet of the vent housing.

8 - After brushing is complete, blow all brushed areas with air. Vacuum as needed.

9 - Replace parts in the reverse order they were removed in Steps 1 through 3.

10 - When replacing the flue collector box, be careful so as not to tear the adjoining insulation.

11 - Assure that all joints on the vent side of the combustion system are air tight. Apply a high temperature (+500°F) sealing compound where needed.

**F - Evaporator Coil**

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleaner. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

**G - Condenser Coil**

Clean condenser coil annually with water and inspect monthly during the cooling season.

**H - Compressor**

**⚠ IMPORTANT**

Some scroll compressors have an internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system rises above 40 psig. DO NOT REPLACE COMPRESSOR.

**I - Supply Air Blower Wheel**

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove blower access panel or to clean blower wheel.

## Approved Auxiliary Devices

| DESCRIPTION | WHERE USED | KIT NUMBER |
|---|---|---|
| Compressor Crankcase Heater 3-ph | All Tonnages | 21D21 |
| Compressor Crankcase Heater 230V 1-ph or 3-ph | All Tonnages | 11X27 |
| Compressor Timed-Off Control | All Tonnages | 47J27 |
| Freezestat | All Tonnages | 21D23 |
| Low Ambient Kit (0°F) | All Tonnages | 21D20 |
| LPG/Propane Conversion Kit | All Tonnages | 22B87 |
| Bottom Gas Entry Kit | All Tonnages | 21D34 |
| Vertical Vent Extension Kit | All Tonnages | 21J79 |
| Base Rail Openings Closure Kit | All Tonnages | 21J84 |
| Square to Round Duct Adaptor Kits (14 in. diameter) Downflow | 3 Ton | 20X82 |
| Square to Round Duct Adaptor Kits (14 in. diameter) Downflow | 4 Ton, 5 Ton | 21D26 |
| Square to Round Duct Adaptor Kits (14 in. diameter) Horizontal | 3 Ton | 21J92 |
| Square to Round Duct Adaptor Kits (14 in. diameter) Horizontal | 4 Ton, 5 Ton | 21D24 |
| Square to Round Duct Adaptor Kits (16 in. diameter) Horizontal | 4 Ton, 5 Ton | 22U78 |
| Square to Round Duct Adaptor Kits (18 in. diameter) Horizontal | 4 Ton, 5 Ton | 22U79 |
| Tool-Less Filter Access Kit | All Tonnages | 21J80 |
| Smoke Detector - Supply or Return (one sensor) | All Tonnages | 21U21 |
| Smoke Detector - Supply or Return (two sensors) | All Tonnages | 21U22 |
| Bottom Power Entry Kit | All Tonnages | 21J78 |
| Standard Economizer With Outdoor Air Hood (Not for Title 24) Downflow or Horizontal (Includes Barometric Relief Dampers and Exhaust Hood | All Tonnages | 21U15 |
| High Performance Economizer With Outdoor Air Hood (Approved for California Title 24 Building Standards / AMCA Class 1A Certified) Downflow or Horizontal (Includes Barometric Relief Dampers and Exhaust Hood | All Tonnages | 21U17 |
| Single Enthalpy Economizer Control (Standard) | All Tonnages | 21Z09 |

| | | |
|---|---|---|
| Single Enthalpy  Economizer Control (High Performance) | All Tonnages | 11G21 |
| Motorized Outdoor Air Dampers With Outdoor Air Hood | All Tonnages | 21U19 |
| Manual Outdoor Air Dampers With Outdoor Air Hood | All Tonnages | 21U20 |
| 8 in Clip Curbs | All Tonnages | 21J17 |
| 14 in Clip Curbs | All Tonnages | 21J19 |
| 18 in Clip Curbs | All Tonnages | 21J20 |
| 24 in Clip Curbs | All Tonnages | 21J25 |
| 14 in Adjustable Pitch Roof Curb (Knock Down) | All Tonnages | 21U04 |
| 14 in Adjustable Pitch Roof Curb (Welded) | All Tonnages | 22V55 |
| Strapping Kit - Hurricane (Slab Mount) | All Tonnages | 21J74 |
| Strapping Kit - Hurricane (Rail Mount) | All Tonnages | 22G53 |
| Strapping Kit - Seismic | All Tonnages | 21J75 |

## Refrigerant Detection System

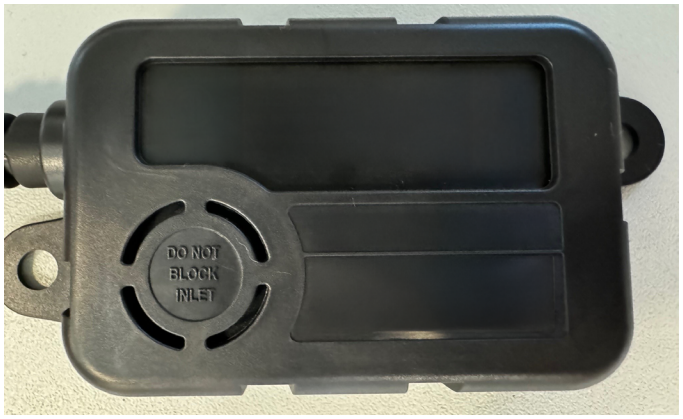



**FIGURE 13. Example of Clear, Unobstructed Sensor Inlet**

## Sensor Maintenance

It is recommended to check the state of the sensor every 6 months, at the beginning of each cooling and heating season.

- Ensure that the sensor opening is clear and free of debris.
- Check that the sensor cable is in good condition.
- DO NOT use abrasive cleaning solutions or detergents to clean sensor opening.
- DO NOT use flammable compressed air solutions to clean the sensor opening.
- DO NOT vacuum sensor inlet opening, as this could cause damage to the sensor internal components.
- Replace sensor if the opening is not clean or free of debris.
- When cleaning the evaporator coil, remove sensor from the coil. Follow recommended coil cleaning guidelines as described in installation instructions.

## Modes of Operation

The modes of operation for the RDS Non-Communicating Blower Control Board are Initializing, Normal, Leak Detected, and Fault.

**Initializing**

The RDS Non-Communicating Blower Control Board is establishing connection with the refrigerant detection sensor and is completing an initial five (5) minute purge sequence.

**Normal**

The HVAC system is functioning normally. The RDS Non-Communicating Blower Control Board has not detected a refrigerant leak.

**Leak Detected**

When the RDS Non-Communicating Blower Control Board detects a refrigerant leak:

1 - The RDS Non-Communicating Blower Control Board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.

2 - The RDS Non-Communicating Blower Control Board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.

3 - After the RDS Non-Communicating Blower Control Board determines the refrigerant levels are below the safety threshold, the blower will continue to function for an additional seven (7) minutes.

4 - After the blower sequence is complete, the HVAC system resumes normal operation.

***NOTE** – The HVAC system may not maintain a cooling or heating setpoint if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.*

**Fault**

When a fault is detected within the RDS Non-Communicating Blower Control Board, the indoor unit blower engages and remains engaged at a constant output until the fault is cleared.

## Diagnostic Codes

The RDS Non-Communicating Blower Control Board is equipped with a multicolor LED within its enclosure. The LED signals the state of the RDS Non-Communicating Blower Control Board.

See Table 7 to review the diagnostic codes.

**TABLE 7. LED Diagnostic Codes**

| State | LED Diagnostic Code | Action |
|---|---|---|
| Initializing | Flashing green[1] | Not Applicable |
| Monitoring | Solid green with blue flash[2] | Not Applicable |
| Mitigating (Leak Detected) | Flashing blue | Check coil tubes for leak. Repair the issue and restart the equipment. |
| Fault/Service | Solid blue, interrupted by issue flash code | Refer to next Table for troubleshooting steps. |

1. A rapid flash indicates the RDSC is in the process of sensor enumeration
2. A blue flash indicates the mitigation process has previously occurred.

**Red LED Diagnostic Codes**

Red diagnostic codes indicate a specific RDS Non-Communicating Blower Control Board issue. Yellow diagnostic codes indicate the sensor's position (if applicable).

**TABLE 8. Red LED Diagnostic Codes**

| Red Flash | Applies to Individual Sensor(s) | Issue | Action |
|---|---|---|---|
| 1 | Yes | Sensor indicates fault | Replace the sensor (Cat. # 26Z69) |
| 2 | No | Spare Code - Unused | Not Applicable |
| 3 | Yes | Incompatible sensor type | Replace with a compatible sensor (Cat. # 26Z69) |
| 4 | Yes | Sensor communications issue | Check sensor connection. Ensure connection is clean and tight. |
| 5 | No | R-input not available | Check for 24VAC power connection to the R terminal inputs on the RDSC. R-inputs must be energized for the RDSC to function. |
| 6 | No | Invalid configuration of sensor count | Verify the DIP switch setting is correct and matches the number of sensors being used. |

## Test Button Functionality

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button. The Test button can be used to complete several functions, depending on the mode of operation of the RDS Non-Communicating Blower Control Board.

Table 9 lists the functions of the Test button during each mode of operation.

**TABLE 9. Test Button Function**

| Mode of Operation | Press the Test Button to... |
|---|---|
| Normal | Trigger a leak detection response.<br>Verify all equipment is wired correctly into the RDSC (after installation). |
| Leak Detected | Reset the RDSC to a normal mode of operation after a previous leak has been detected and purged from the HVAC system. |
| Fault | Reset the RDSC after troubleshooting and resolving a fault condition. If the fault is not resolved, the RDSC will enter the Fault mode again. |

### Test Button - Additional Functions

Table 10 lists the additional functions of the Test Button while the RDS Non-Communicating Blower Control Board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault. Refer to “Table 7. LED Diagnostic Codes”.

**TABLE 10. Additional Button Functions**

| State | Press | Action |
|---|---|---|
| Initializing | Short | Skips remaining pre-purge after sensors are recognized by the RDSC |
| Initializing | Long | Reset control |
| Monitoring | Short | Clear purge-counter if prior mitigation has occurred; Test mitigation |
| Monitoring | Long | Reset control |
| Mitigating | Short | If testing mitigation, end test |
| Servicing | Short | Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator |
| Servicing | Long | Reset control |
| Fault | Short | Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator |
| Fault | Long | Reset control |

## Thermostat Compatibility

Thermostats that preserve memory settings are compatible with the RDS Non-Communicating Blower Control Board. Examples include:

- Battery-powered thermostats
- Analog thermostats
- Smart thermostats
- Late-model programmable thermostats
- *Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.*

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

### Compatibility Verification

Complete the following process to determine whether the thermostat is compatible with the RDS Non-Communicating Blower Control Board.

1 - Change the thermostat’s current setpoint and operating mode.

2 - Power cycle the breaker to the furnace.

***NOTE*** *– Wait five (5) minutes before supplying power to the furnace breaker.*

3 - Note whether the thermostat maintained its setpoints and operating mode.

a. If the thermostat maintained the settings, the thermostat is compatible with the RDS Non-Communicating Blower Control Board.

b. If the thermostat did not maintain its setpoint and/or operating mode, the thermostat is not compatible with the RDS Non-Communicating Blower Control Board. Recommend replacing with a compatible thermostat.

## Additional Applications

In zoned applications, all dampers will remain open when the RDS Non-Communicating Blower Control Board is in Fault or Leak Detected mode. Normal heating and cooling demands are permissible, but the blower will remain engaged until the fault condition is addressed.

**Zone HVAC System**

If the RDS Non-Communicating Blower Control Board is installed in a zone HVAC system, the RDS Non-Communicating Blower Control Board will open all zone dampers if a leak is detected.

***NOTE*** *– Proper wiring of the zone panel to the RDS Non-Communicating Blower Control Board is required for all zone dampers to open.*

After the purge sequence is complete, the zone system will resume normal operation.

**External Alarm**

(*For applications with external alarms wired directly to the RDS Non-Communicating Blower Control Board.*)

The RDS Non-Communicating Blower Control Board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the RDS Non-Communicating Blower Control Board provides a dry relay contact that is rated 3A at 30 VAC/DC.

## Start Up Test Procedure

The RDS Non-Communicating Blower Control Board is equipped with a Test/Reset button, see “Test Button Functionality” on page 27 After the RDS Non-Communicating Blower Control Board has been mounted and wired, restore power to the HVAC system. The system will then run through a purge sequence for five (5) minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

**Cooling Demand**

1 - Prompt a cooling demand at the thermostat.

2 - Press the Test button on the RDS Non-Communicating Blower Control Board.

The system then executes a leak detection response.

3 - Observe the following sequence:

a. The LED indicator flashes the sequence for leak detection (flashing blue).
b. The blower powers up.
c. The outdoor compressor powers down.

4 - Press the Test button to terminate the simulated Leak Detected mode upon test completion.

**Heating Demand**

1 - Prompt a heating demand at the thermostat.

2 - Press the Test button on the RDS Non-Communicating Blower Control Board.

The system then executes a leak detection response.

3 - Observe the following sequence:

a. The LED indicator flashes the sequence for leak detection (flashing blue).
b. The blower powers up.
c. The gas burners power down.
d. The outdoor compressor powers down.

4 - Press the Test button to terminate the simulated Leak Detected mode upon test completion.

The installation of the RDS Non-Communicating Blower Control Board is complete after both sequences are successfully completed.

## Diagnostic Codes and Troubleshooting

**TABLE 11. LED Diagnostic Codes**

| State | LED Diagnostic Code | Action Required |
|---|---|---|
| Initializing | Flashing green | None |
| Monitoring | Solid green. If a prior mitigation occurred, a blue flash interrupts the solid green LED. | None |
| Mitigating (Leak Detected) | Flashing blue | Check coil tubes for leak. Repair the issue and restart the equipment. |
| Fault/Service | Solid blue, interrupted by issue diagnostic code | Refer to next Table for troubleshooting steps. |

**TABLE 12. Red LED Diagnostic Codes / Troubleshooting**

| Red Flash | Applies to Individual Sensor(s) | Issue | Action Required |
|---|---|---|---|
| 1 | Yes | Sensor indicates fault | Replace the sensor |
| 2 | No | Spare Code - Unused | Not Applicable |
| 3 | Yes | Incompatible sensor type | Replace the sensor |
| 4 | Yes | Sensor communications issue | Check sensor connection. Ensure connection is clean and tight. |
| 5 | No | R-input not available | Check sensor connections. Ensure connection is clean and tight. |
| 6 | No | Invalid configuration of sensor count | Verify the DIP switch setting is correct and matches the number of sensors being used. |

***NOTE*** *- REFRIGERANT SENSORS for REFRIGERANT DETECTION SYSTEMS shall only be replaced with sensors specified by the appliance manufacture.*

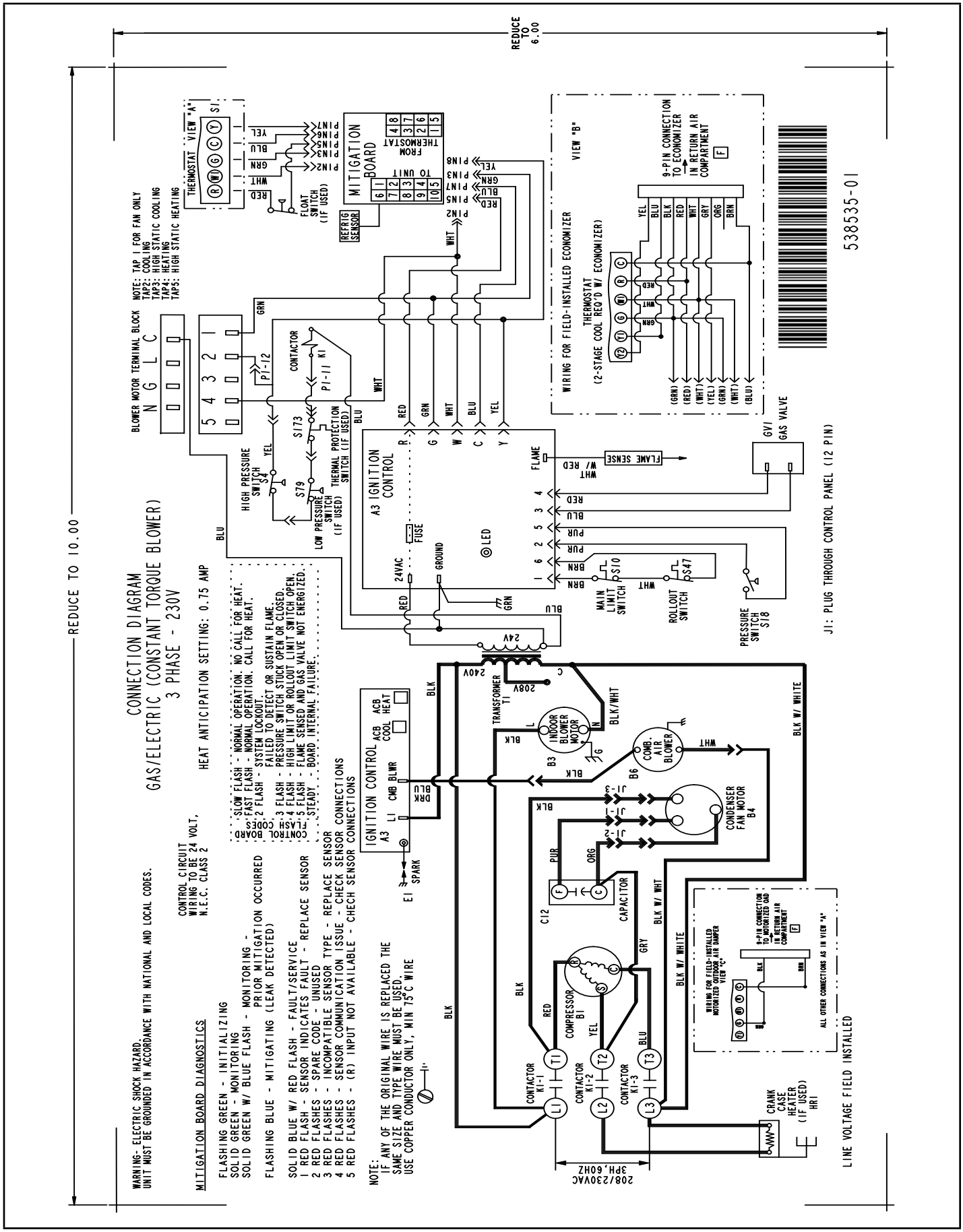

CONNECTION DIAGRAM
GAS/ELECTRIC (CONSTANT TORQUE BLOWER)
3 PHASE - 230V
HEAT ANTICIPATION SETTING: 0.75 AMP
REDUCE TO 10.00
REDUCE TO 6.00
WARNING- ELECTRIC SHOCK HAZARD.
UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.
CONTROL CIRCUIT WIRING TO BE 24 VOLT, N.E.C. CLASS 2
MITIGATION BOARD DIAGNOSTICS
FLASHING GREEN - INITIALIZING
SOLID GREEN - MONITORING
SOLID GREEN W/ BLUE FLASH - MONITORING - PRIOR MITIGATION OCCURRED
FLASHING BLUE - MITIGATING (LEAK DETECTED)
CONTROL BOARD FLASH CODES
SLOW FLASH - NORMAL OPERATION. NO CALL FOR HEAT.
FAST FLASH - NORMAL OPERATION. CALL FOR HEAT.
2 FLASH - SYSTEM LOCKOUT. FAILED TO DETECT OR SUSTAIN FLAME.
3 FLASH - PRESSURE SWITCH STUCK OPEN OR CLOSED.
4 FLASH - HIGH LIMIT OR ROLLOUT LIMIT SWITCH OPEN.
5 FLASH - FLAME SENSED AND GAS VALVE NOT ENERGIZED.
STEADY - BOARD INTERNAL FAILURE.
SOLID BLUE W/ RED FLASH - FAULT/SERVICE
1 RED FLASH - SENSOR INDICATES FAULT - REPLACE SENSOR
2 RED FLASHES - SPARE CODE - UNUSED
3 RED FLASHES - INCOMPATIBLE SENSOR TYPE - REPLACE SENSOR
4 RED FLASHES - SENSOR COMMUNICATION ISSUE - CHECK SENSOR CONNECTIONS
5 RED FLASHES - (R) INPUT NOT AVAILABLE - CHECH SENSOR CONNECTIONS
NOTE:
IF ANY OF THE ORIGINAL WIRE IS REPLACED THE SAME SIZE AND TYPE WIRE MUST BE USED.
USE COPPER CONDUCTOR ONLY, MIN 75°C WIRE
NOTE: TAP 1 FOR FAN ONLY
TAP2: COOLING
TAP3: HIGH STATIC COOLING
TAP4: HEATING
TAP5: HIGH STATIC HEATING
BLOWER MOTOR TERMINAL BLOCK
THERMOSTAT VIEW "A"
MITIGATION BOARD
FROM THERMOSTAT
TO UNIT
FLOAT SWITCH (IF USED)
REFRIG SENSOR
HIGH PRESSURE SWITCH S4
LOW PRESSURE SWITCH (IF USED) S79
THERMAL PROTECTION SWITCH (IF USED) S173
CONTACTOR K1
A3 IGNITION CONTROL
FUSE
LED
FLAME SENSE
GV1 GAS VALVE
WIRING FOR FIELD-INSTALLED ECONOMIZER
VIEW "B"
THERMOSTAT
(2-STAGE COOL REQ'D W/ ECONOMIZER)
9-PIN CONNECTION TO ECONOMIZER IN RETURN AIR COMPARTMENT
MAIN LIMIT SWITCH S10
ROLLOUT SWITCH S47
PRESSURE SWITCH S18
J1: PLUG THROUGH CONTROL PANEL (12 PIN)
538535-01
IGNITION CONTROL A3
TRANSFORMER T1
INDOOR BLOWER MOTOR B3
COMB. AIR BLOWER B6
CONDENSER FAN MOTOR B4
CAPACITOR C12
COMPRESSOR B1
CONTACTOR K1-1
CONTACTOR K1-2
CONTACTOR K1-3
CRANK CASE HEATER (IF USED) HR1
WIRING FOR FIELD-INSTALLED MOTORIZED OUTDOOR AIR DAMPER VIEW "C"
8-PIN CONNECTION TO MOTORIZED OAD IN RETURN AIR COMPARTMENT
ALL OTHER CONNECTIONS AS IN VIEW "A"
208/230VAC 3PH,60HZ
LINE VOLTAGE FIELD INSTALLED

**FIGURE 14**

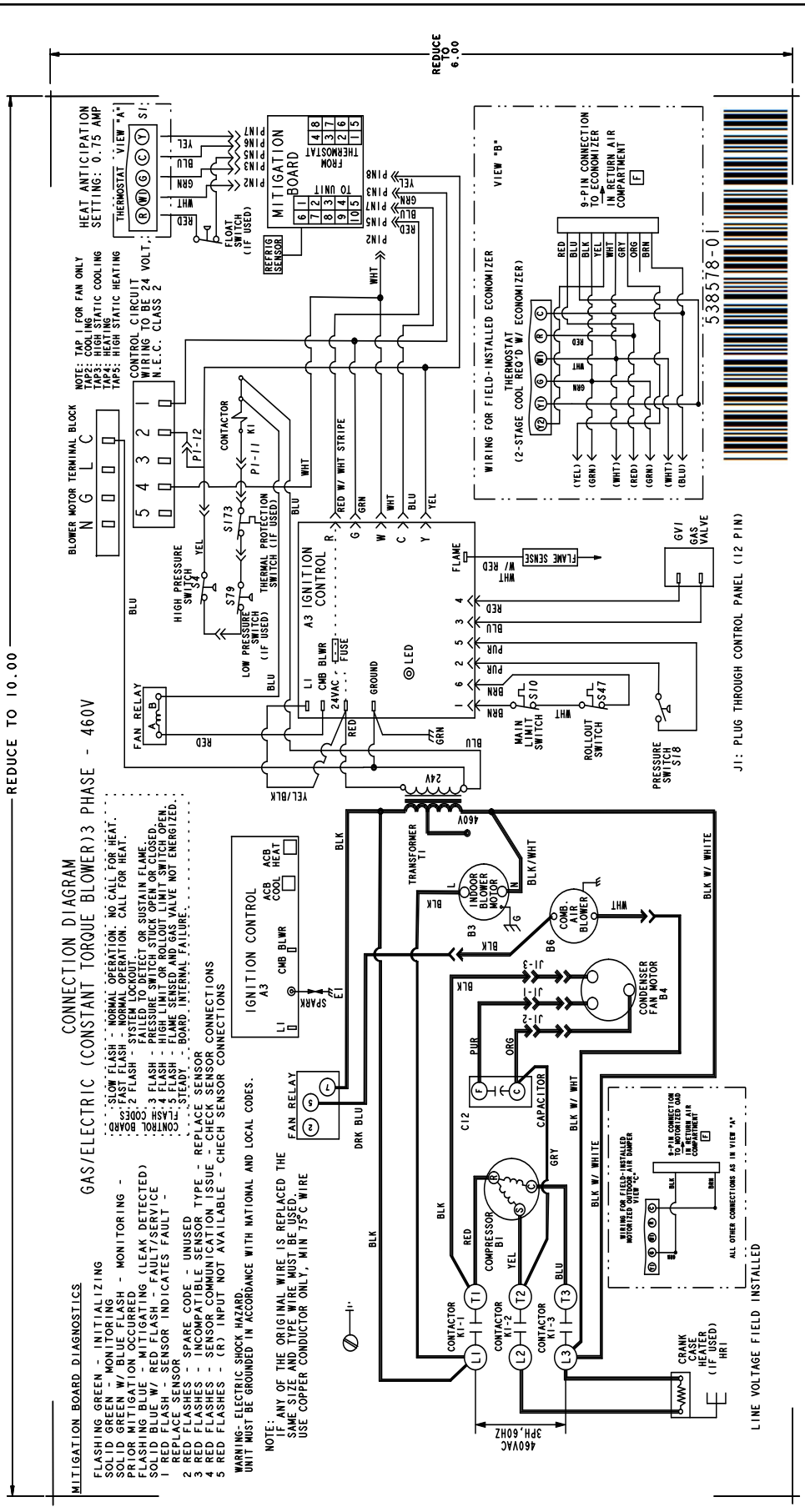

GAS/ELECTRIC (CONSTANT TORQUE BLOWER)3 PHASE - 460V
CONNECTION DIAGRAM
REDUCE TO 10.00
REDUCE TO 6.00
MITIGATION BOARD DIAGNOSTICS
FLASHING GREEN - INITIALIZING
SOLID GREEN - MONITORING - NORMAL OPERATION. NO CALL FOR HEAT.
SOLID GREEN W/ BLUE FLASH - MONITORING - NORMAL OPERATION. CALL FOR HEAT.
FLASHING BLUE - MITIGATING (LEAK DETECTED) FAILED TO DETECT OR SUSTAIN FLAME.
SOLID BLUE W/ RED FLASH - FAULT/SERVICE - HIGH LIMIT OR ROLLOUT LIMIT SWITCH OPEN.
1 RED FLASH - SENSOR INDICATES FAULT - FLAME SENSED AND GAS VALVE NOT ENERGIZED.
REPLACE SENSOR
2 RED FLASHES - SPARE CODE - UNUSED
3 RED FLASHES - INCOMPATIBLE SENSOR TYPE - REPLACE SENSOR
4 RED FLASHES - SENSOR COMMUNICATION ISSUE - CHECK SENSOR CONNECTIONS
5 RED FLASHES - (R) INPUT NOT AVAILABLE - CHECH SENSOR CONNECTIONS
CONTROL BOARD FLASH CODES
SLOW FLASH - NORMAL OPERATION. NO CALL FOR HEAT.
FAST FLASH - NORMAL OPERATION. CALL FOR HEAT.
2 FLASH - SYSTEM LOCKOUT
3 FLASH - PRESSURE SWITCH STUCK OPEN OR CLOSED.
4 FLASH - HIGH LIMIT OR ROLLOUT LIMIT SWITCH OPEN.
5 FLASH - FLAME SENSED AND GAS VALVE NOT ENERGIZED.
FLASH - BOARD INTERNAL FAILURE.
STEADY -
WARNING- ELECTRIC SHOCK HAZARD.
UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.
NOTE:
IF ANY OF THE ORIGINAL WIRE IS REPLACED THE SAME SIZE AND TYPE WIRE MUST BE USED.
USE COPPER CONDUCTOR ONLY, MIN 75°C WIRE
NOTE: TAP 1 FOR FAN ONLY
TAP2: COOLING
TAP3: HIGH STATIC COOLING
TAP4: HEATING
TAP5: HIGH STATIC HEATING
HEAT ANTICIPATION SETTING: 0.75 AMP
CONTROL CIRCUIT WIRING TO BE 24 VOLT, N.E.C. CLASS 2
THERMOSTAT VIEW "A"
FROM THERMOSTAT
TO UNIT
MITIGATION BOARD
REFRIG SENSOR
FLOAT SWITCH (IF USED)
BLOWER MOTOR TERMINAL BLOCK
N G L C
5 4 3 2 1
P1-12
CONTACTOR
P1-11 K1
S173
THERMAL PROTECTION SWITCH (IF USED)
HIGH PRESSURE SWITCH S4
S79
LOW PRESSURE SWITCH (IF USED)
FAN RELAY
A3 IGNITION CONTROL
CMB BLWR
24VAC
FUSE
GROUND
LED
FLAME
FLAME SENSE
GV1 GAS VALVE
MAIN LIMIT SWITCH PS10
ROLLOUT SWITCH PS47
PRESSURE SWITCH S18
J1: PLUG THROUGH CONTROL PANEL (12 PIN)
WIRING FOR FIELD-INSTALLED ECONOMIZER
VIEW "B"
THERMOSTAT
(2-STAGE COOL REQ'D W/ ECONOMIZER)
9-PIN CONNECTION TO ECONOMIZER IN RETURN AIR COMPARTMENT
IGNITION CONTROL
A3
ACB COOL
ACB HEAT
SPARK
E1
TRANSFORMER T1
INDOOR BLOWER MOTOR B3
COMB. AIR BLOWER B6
CONDENSER FAN MOTOR B4
CAPACITOR C12
COMPRESSOR B1
CONTACTOR K1-1
CONTACTOR K1-2
CONTACTOR K1-3
CRANK CASE HEATER (IF USED) HR1
460VAC 3PH,60HZ
WIRING FOR FIELD-INSTALLED MOTORIZED OUTDOOR AIR DAMPER VIEW "C"
ALL OTHER CONNECTIONS AS IN VIEW "A"
LINE VOLTAGE FIELD INSTALLED
5385780-01

**FIGURE 15**

## Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before starting decommissioning.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- all personal protective equipment is available and being used correctly;
- the recovery process is supervised at all times by a competent person;
- recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80% volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

**NOTE** – Equipment shall be labelled stating that is has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

## Equipment Checks

Job Name: _____

Store No. _____ Start-Up Date: _____

Address: _____

City: _____ State: _____

Start-Up Contractor: _____

Technician: _____

Model No. _____

Serial No. _____

RTU No. _____ Catalog No. _____

### Inspection and Checks

Damage? Yes ☐ No ☐ R-454B ☐

If yes, reported to: _____

_____

Verify factory and field-installed accessories.

Check electrical connections. Tighten if necessary.

Supply voltage: L1-L2 _____ L1-L3 _____ L2-L3 _____

If unit contains a 208-230/240 volt transformer:

Check primary transformer tap ☐

Transformer secondary voltage: _____

### Cooling Checks

Compressor Rotation ☐ Ambient Temp. _____ Return Air Temp. _____ Supply Air Temp. _____

| | Compressor Amps | | | Compressor Volts | | | Pressures | | Condenser Fan Amps | | | CC Heater Amps |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L1 | L2 | L3 | L1-L2 | L1-L3 | L2-L3 | Disch. | Suct. | L1 | L2 | L3 | L1 |
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

### Blower Checks

Pulley/Belt Alignment ☐ Blower Rotation ☐

Set Screws Tight ☐ Belt Tension ☐

Nameplate Amps: _____ Volts: _____

| Motor | Amps | | Volts | |
|---|---|---|---|---|
| _____ | L1 | _____ | L1-L2 | _____ |
| _____ | L1 | _____ | L1-L2 | _____ |
| _____ | L1 | _____ | L1-L2 | _____ |

### Heating Checks - Gas

Fuel type: ☐ Nat. LP ☐ Inlet Pressure (in. w.c.): _____

Return Air Temp. _____ Supply Air Temp. _____

Altitude: _____ Primary Limits Operate: ☐

| Gas Valve | Manifold Pressure | |
|---|---|---|
| | Low Fire | High Fire |
| GV1 | | |
| GV1 | | |

### Control Type

### Heating Checks - Electric

Return Air Temp. _____ Supply Air Temp. _____

Limits Operate: ☐

| | Amps | | | | | | |
|---|---|---|---|---|---|---|---|
| | L1 | L2 | L3 | | L1 | L2 | L3 |
| 1 | | | | 10 | | | |
| 2 | | | | 11 | | | |
| 3 | | | | 12 | | | |
| 4 | | | | 13 | | | |
| 5 | | | | 14 | | | |
| 6 | | | | 15 | | | |
| 7 | | | | 16 | | | |
| 8 | | | | 17 | | | |
| 9 | | | | 18 | | | |

### Accessory Checks

Economizer Operation

Min. Pos. ☐ Motor Travel full open/close ☐