

Installation Manual KQ Series 3 ton to 5 ton

R-454B, 60 Hertz



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General

KQ units are single package air conditioners with optional gas heating designed for outdoor installation on a rooftop or slab and for non-residential use.

These units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power, gas supply (where applicable), and duct connections.

Certifications

Tested in accordance with:




GoTemp Pro App

BHC Residential & Light Commercial LLC believes in empowering our customers with up-to-date, unit-specific information. Download the GoTemp Pro app, a powerful-comprehensive app designed for contractors on the jobsite, available now in the App Store for iOS and Google Play for Android. Use the App to scan the unique QR code on the unit rating plate for easy access to product information and resources such as nomenclature, technical guide, installation manual, wiring diagrams, parts list, product registration, warranty and much more. Simplify your tasks, save time, and stay ahead with the most comprehensive app built for professionals.

GoTemp Pro integrates functionality previously provided by CWa and MAP, allowing you to utilize the on-board communication card or simply plug in the CWCVT to enable Bluetooth connectivity.



Safety considerations

 This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention the signal words **DANGER, WARNING** or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury**.

WARNING indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury**.

CAUTION indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.

CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state and national codes including, but not limited to building, electrical, and mechanical codes.

WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

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

WHAT TO DO IF YOU SMELL GAS:

- a. Do not try to light any appliance.
- b. Do not touch any electrical switch; do not use any phone in your building.
- c. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- d. If you cannot reach your gas supplier, call the fire department. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WARNING

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage. Improper servicing could result in dangerous operation, serious injury, death or property damage.

- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. The installation must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or the National Gas and Propane Installation Code, CSA B149.1. Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

Inspection

As soon as a unit is received, inspect it for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state and national codes including, but not limited to, building, electrical, and mechanical codes. The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 psig.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 psig.

Pressures greater than 1/2 psig will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 psig, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig

Reference

Additional information is available in the following reference forms:

- Technical Guide - KX/KQ/ZL/KY04-14 6481619
- General Installation - KQ04-06 6480728
- Economizer Accessory -
 - Vertical Flow Dry Bulb Economizer Field Installed
 - Horizontal Flow Dry Bulb Economizer Field Installed
- Power Exhaust -
 - Vertical Flow Dry Bulb Economizer Field Installed
 - Horizontal Flow Dry Bulb Economizer Field Installed

Renewal parts

Contact your local Ducted Systems parts distribution center for authorized replacement parts.

Approvals

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with a forced air furnace.

2. For outdoor installation only.
3. For installation on combustible material and can be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B, or Class C roof covering materials.
4. For use with natural gas.

 **CAUTION**

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

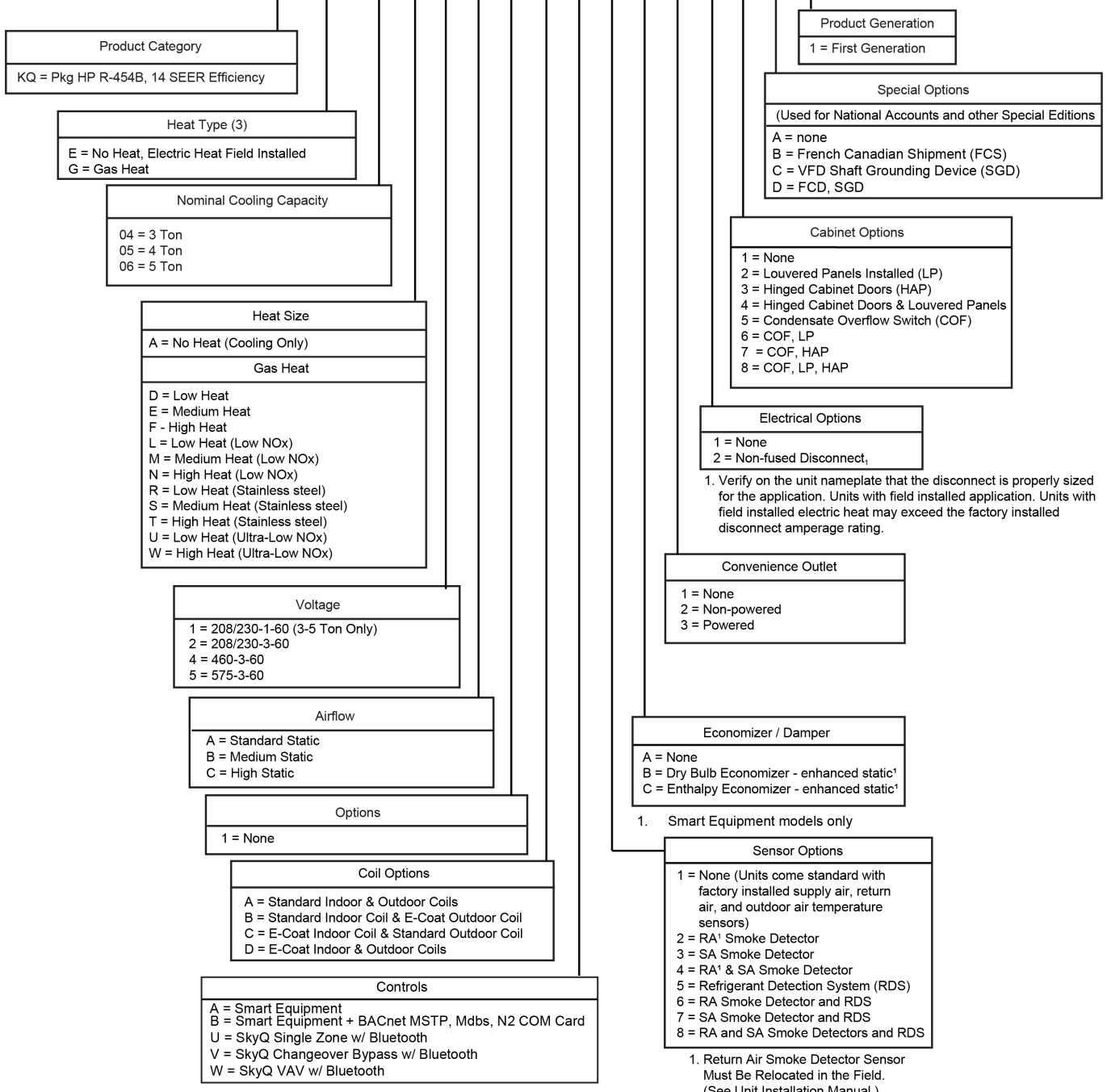
 **WARNING**

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

Nomenclature

3-5 Ton Model Number Nomenclature

KQ G 04 D 2 A 1 A E 1 A 1 1 1 A 1



Installation

Installation safety information

This is an outdoor combination heating and cooling unit. Read the following instructions before installing the unit.

- ① **Note:** The installer must provide the consumer with these instructions and direct them to retain the information for future reference.
- Refer to the unit rating plate for the approved type of gas for this product.
- Only install the unit in a location and position specified in [Location](#).
- If you install the unit at an elevation greater than 2,000 ft, also install the appropriate high altitude accessory kit for this model.
- Always install the furnace to operate within its intended temperature-rise range, with the duct system, and within the allowable external static pressure range, as specified on the unit name or rating plate. See .
- Do not use this equipment for temporary heating of buildings or structures under construction.
- If the unit will be operated using propane gas, install the appropriate propane accessory kit for this model with the unit.
- Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks when checking all the connections, as specified in [Installation safety information](#), [Gas connection](#), and [Post start checklist](#).

WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

Preceding installation

1. Remove the two screws that hold the brackets in the forklift slots on the side of the unit.

Figure 1: Unit shipping bracket



| | |
|---|----------------|
| A | Bracket screws |
| B | Bracket |

2. Turn each bracket toward the ground. The protective plywood covering drops to the ground.
3. Remove the protective covering from the condenser coil before to operation.

Figure 2: Protective condenser covering



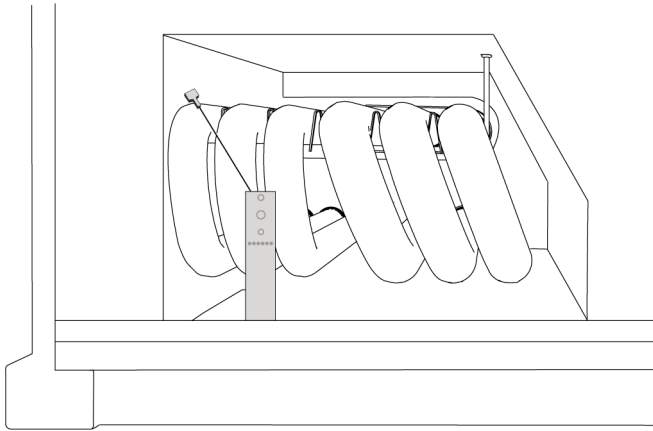
4. If a factory option convenience outlet is installed, you must install the weatherproof outlet cover in the field. The cover is located behind the filter access panel.
 - a. Remove the shipping label that covers the convenience outlet.
 - b. Follow the instructions on the back of the cover box.
 - c. Attach the cover to the unit with the four screws provided.

CAUTION

208/230-3-60 and units with factory installed Powered Convenience Outlet Option are wired for 230 V power supply. Change tap on transformer for 208-3-60 operation. See the unit wiring diagram.

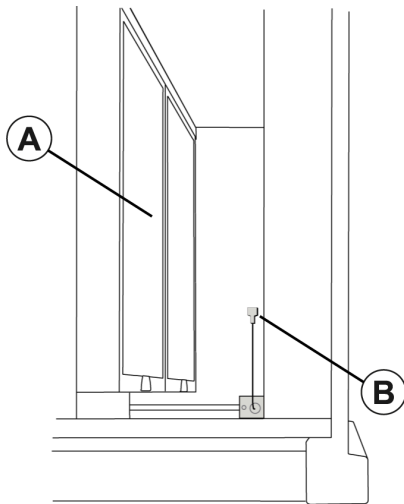
5. For gas heating models equipped with Smart Equipment control, you must move the supply air temperature (SAT) sensor to the working position to ensure proper SAT readings. The SAT sensor is shipped in the supply air compartment.
 - a. Move the SAT sensor to the inside of the supply air duct. See item A in [Figure 5](#).
 - b. Use the excess wire available to its full length to drop or mount the SAT sensor in the duct. Avoid close contact with the gas heat exchanger.
 - c. Use the shipping bracket to hold the SAT sensor in the supply air stream. See [Figure 3](#) for the factory SAT sensor location and [Figure 5](#) for the sensor relocation.

Figure 3: Supply air temperature sensor



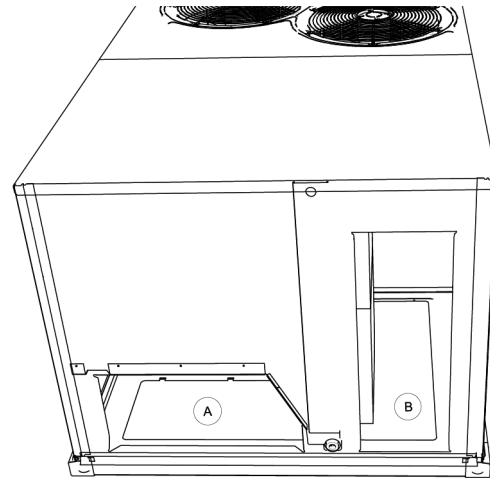
6. For units equipped with an economizer or motorized OD air damper, you must move the return air temperature (RAT) sensor to the working position to ensure proper RAT readings. See item B in [Figure 5](#)
 - a. Move the RAT sensor to the inside of the return air duct verifying that the sensor is at least 6 in. below the unit duct opening. The sensor must read the return air temperature not mixed return air and outdoor air temperatures.
 - b. Use the excess wire available to its full length to drop or mount the RAT sensor in the duct.
 - c. You can use the shipping bracket to hold the RAT sensor in the return air stream. See [Figure 4](#) for the factory RAT sensor location and [Figure 5](#) for the sensor relocation.

Figure 4: Factory-mounted return air temperature sensor



| | |
|---|-------------------------|
| A | Filter rack and filters |
| B | RAT sensor |

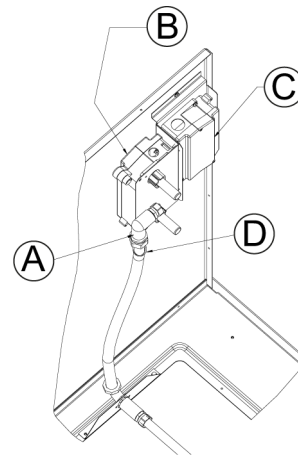
Figure 5: Supply and return air ducts



| | |
|---|-----------------|
| A | Supply air duct |
| B | Return air duct |

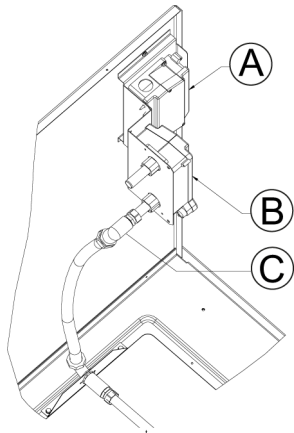
7. If an optional return air smoke detector is installed, you must move the return air sensor from the factory-shipped position (upside down) to the working position (right side up). Then slide the flex tube over the stub and tighten, see [Figure 7](#).

Figure 6: Return air smoke detector - shipped position



| | | | |
|---|----------------------------------|---|------------|
| A | Flex tube secured to the bracket | C | Controller |
| B | Return air sensor | D | Wire tie |

Figure 7: Return air smoke detector - working position



| | | | |
|---|-------------------|---|-----------------------------------|
| A | Controller | C | Flex tube in the working position |
| B | Return air sensor | | |

Limitations

These units must be installed in accordance with the following codes and regulations:

In U.S.A. and Canada:

- Gas-Fired Central Furnace Standard , ANSI Z21.47 - CSA 2.3 - Latest Edition

In U.S.A.:

- National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
- National Fuel Gas Code, ANSI Z223.1 - Latest Edition
- Local building codes, and
- Local gas utility requirements

In Canada:

- Canadian Electrical Code, CSA C22.1
- Installation Codes, CSA - B149.1.
- Local plumbing and waste water codes, and
- Other applicable local codes.

Refer to unit application data found in this document.

After installation, gas fired units must be adjusted to obtain a temperature rise within the range specified on the unit rating plate.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer’s and/or customer’s expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

Do not use this furnace for temporary heating of buildings or structures under construction.

Table 1: KQ04-06 unit limitations

| Model | Size (tons) | Unit voltage | SCCR (kVA) | Unit limitations | | |
|-------|-------------|--------------|------------|------------------|-----|-----------------|
| | | | | Applied voltage | | Outdoor DB temp |
| | | | | Min | Max | Max (°F) |
| KQ | 04 (3) | 208/230-1-60 | 5 | 187 | 252 | 125 |
| | | 208/230-3-60 | 5 | 187 | 252 | 125 |
| | | 460-3-60 | 5 | 432 | 504 | 125 |
| | | 575-3-60 | 5 | 540 | 630 | 125 |
| KQ | 05 (4) | 208/230-1-60 | 5 | 187 | 252 | 125 |
| | | 208/230-3-60 | 5 | 187 | 252 | 125 |
| | | 460-3-60 | 5 | 432 | 504 | 125 |
| | | 575-3-60 | 5 | 540 | 630 | 125 |
| KQ | 06 (5) | 208/230-1-60 | 5 | 187 | 252 | 125 |
| | | 208/230-3-60 | 5 | 187 | 252 | 125 |
| | | 460-3-60 | 5 | 432 | 504 | 125 |
| | | 575-3-60 | 5 | 540 | 630 | 125 |

Location

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only*.
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 in. The length and width should be at least 6 in. greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options or accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/2 in. across the entire width and length of unit.

WARNING

Excessive exposure of this furnace to contaminated combustion air will result in safety and performance related problems. Typical contaminants include: permanent wave solution, chlorinated waxes and cleaners, chlorine based swimming pool chemicals, water softening chemicals, de-icing salts or chemicals, carbon tetrachloride, Halogen type refrigerants, cleaning solvents (e.g. perchloroethylene), printing inks, paint removers, varnishes, hydrochloric acid, cements and glues, anti-static fabric softeners for clothes dryers, masonry acid washing materials.

Clearances

All units require particular clearances for proper operation and service. Installer must make provisions for adequate combustion and ventilation air in accordance with section 5.3 of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 – Latest Edition (in U.S.A.), or Sections 7.2, 7.3, or 7.4 of Gas Installation Codes, CSA-B149.1 (in Canada) - Latest Edition, and/or applicable provisions of the local building codes. Refer to [Table 4](#) for clearances required for combustible construction, servicing, and proper unit operation.



WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

Rigging and handling

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.



CAUTION

If a unit is to be installed on a roof curb other than a Ducted Systems roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.



CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units can be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 60 INCHES.



CAUTION

All panels must be secured in place when the unit is lifted.
The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

KQ04-06 unit weights

Figure 8: Unit 4 point load weight

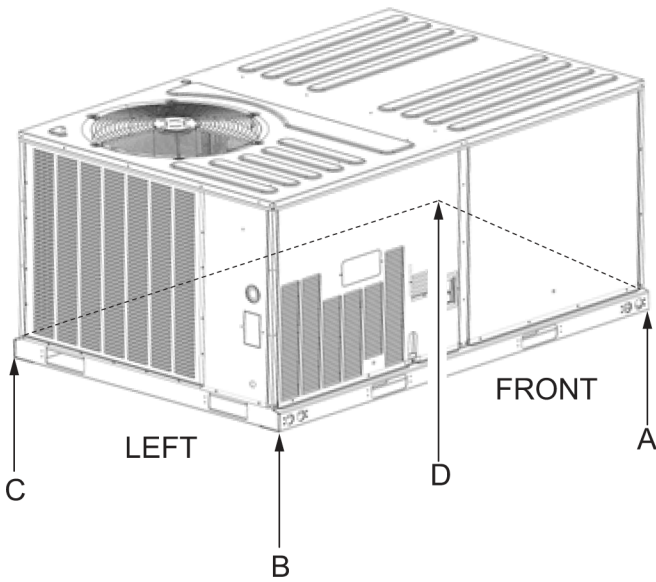


Figure 9: Unit 6 point load weight

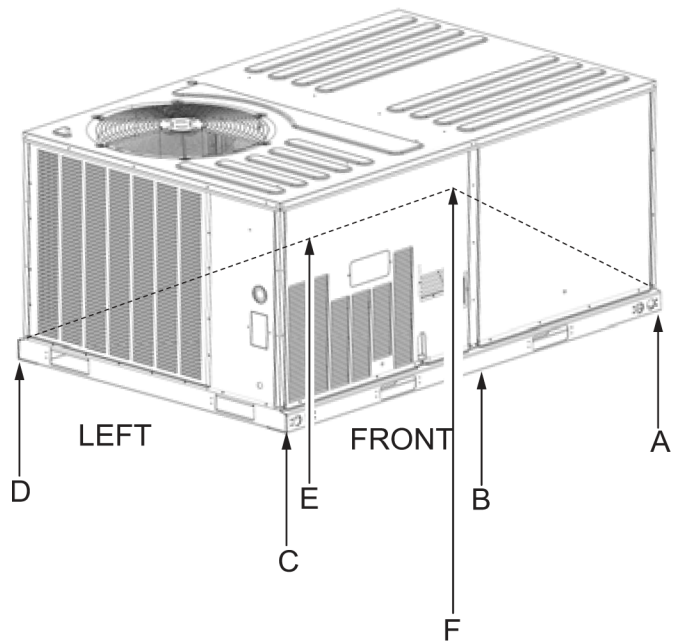


Figure 10: Center of gravity

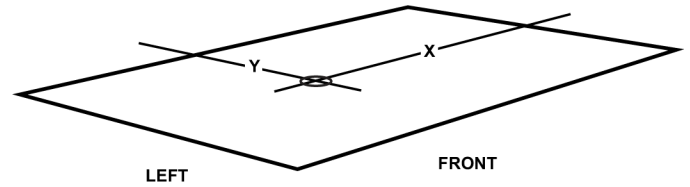


Table 2: KQ04-06 corner weights

| Model | Size (Tons) | Weight (lb) | | Center of Gravity | | 4 Point Load Location (lbs.) | | | | 6 Point Load Location (lbs.) | | | | | |
|-------|-------------|-------------|-----------|-------------------|----|------------------------------|-----|-----|-----|------------------------------|-----|-----|----|----|----|
| | | Shipping | Operating | X | Y | A | B | C | D | A | B | C | D | E | F |
| KQE | 04 (3) | 484 | 469 | 37 | 26 | 123 | 120 | 112 | 115 | 82 | 81 | 80 | 74 | 75 | 77 |
| KQE | 05 (4) | 503 | 498 | 36 | 25 | 129 | 123 | 120 | 126 | 87 | 84 | 82 | 79 | 82 | 84 |
| KQE | 06 (5) | 590 | 561 | 36 | 24 | 140 | 134 | 140 | 147 | 94 | 91 | 89 | 93 | 96 | 99 |
| KQG | 04 (3) | 530 | 515 | 35 | 27 | 145 | 132 | 113 | 125 | 98 | 92 | 87 | 74 | 79 | 84 |
| KQG | 05 (4) | 557 | 552 | 36 | 27 | 154 | 144 | 123 | 131 | 104 | 99 | 95 | 81 | 85 | 89 |
| KQG | 06 (5) | 639 | 610 | 36 | 26 | 165 | 157 | 141 | 147 | 111 | 107 | 104 | 93 | 96 | 99 |

Table 3: KQ04-06 unit accessory weights

| Unit Accessory | Weights (lb) |
|---|--------------|
| Vertical Flow Dry Bulb Economizer Small Footprint | 55 |
| Horizontal Flow Dry Bulb Economizer Small Footprint Short | 74 |
| Horizontal Flow Dry Bulb Economizer Small Footprint Tall | 76 |
| Power Exhaust Vert Flow Small Footprint | 55 |
| Power Exhaust Horiz Flow Small Footprint | 40 |
| Hail Guard Kit Small Short Factory Installed | 18 |
| Hail Guard Kit Small Tall Factory Installed | 23 |
| Flue Extension Kit (1FE0414) | 15 |
| Flue Extension Kit (1FE0415) | 17 |

Table 3: KQ04-06 unit accessory weights

| Unit Accessory | Weights (lb) |
|-----------------------------------|--------------|
| Curb Rigid 14 in. Small Footprint | 94 |
| Curb Rigid 24 in. Small Footprint | 148 |

Figure 11: KQ04-05 unit dimensions

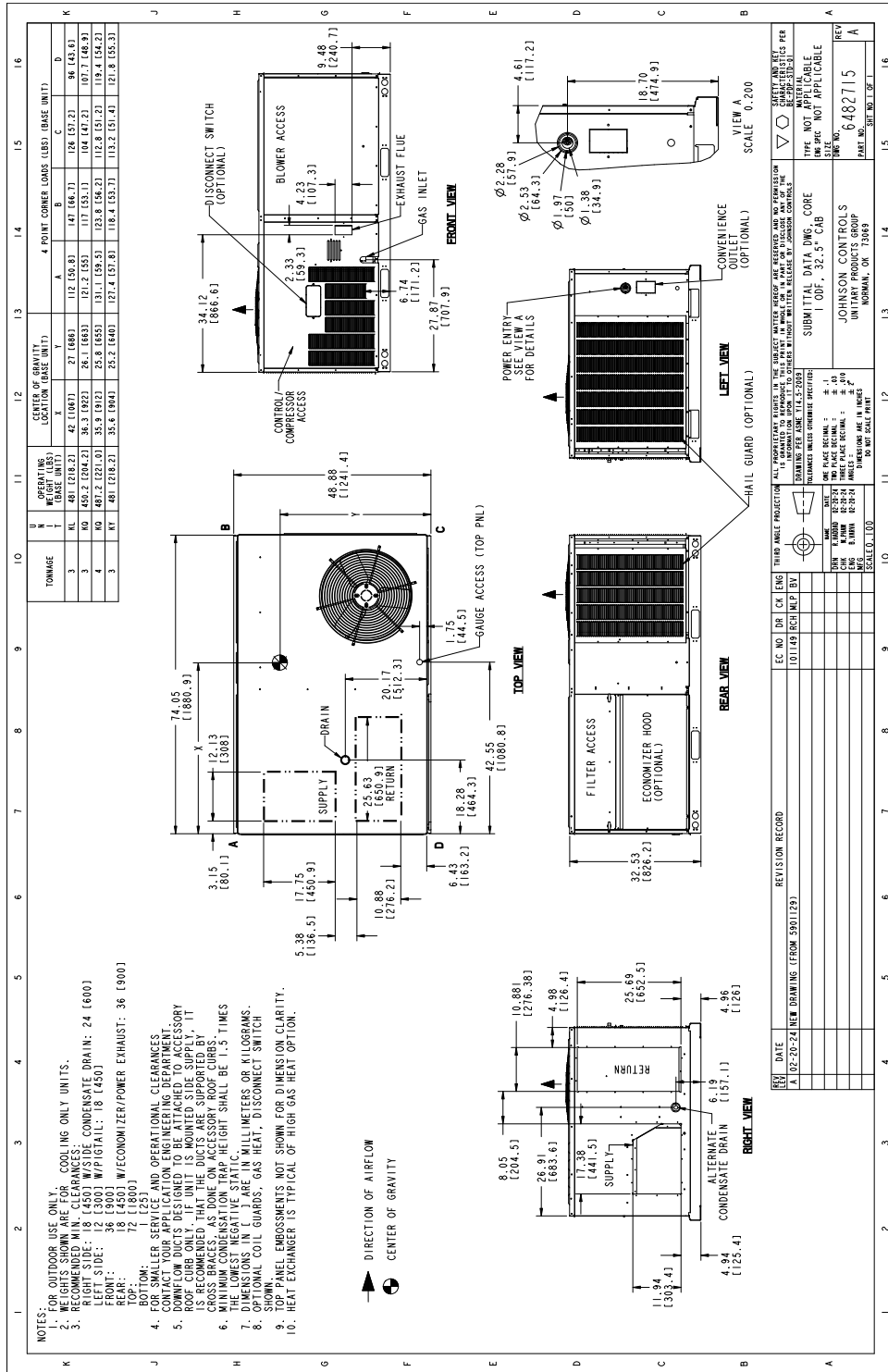


Figure 12: KQ06 unit dimensions

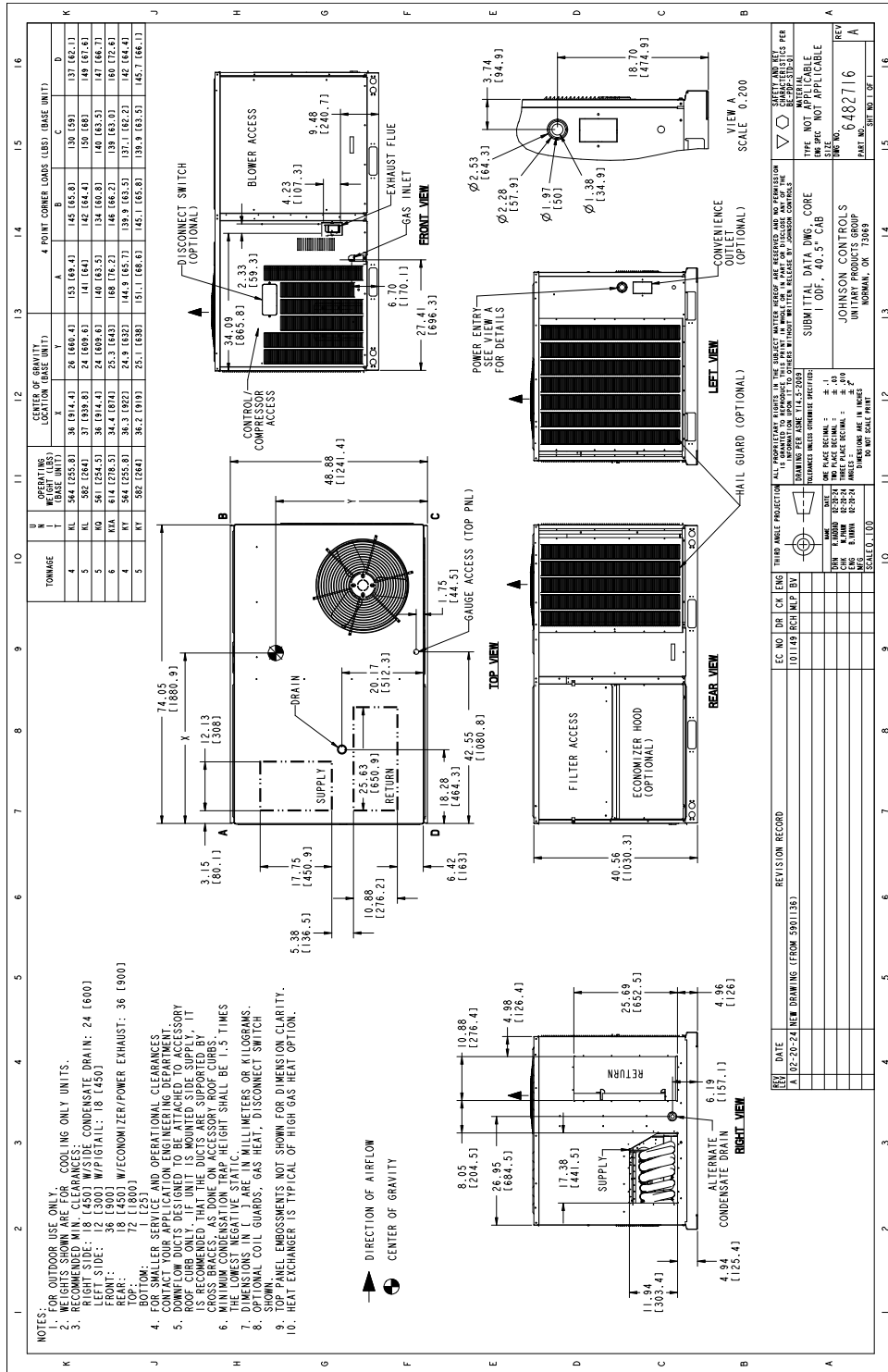
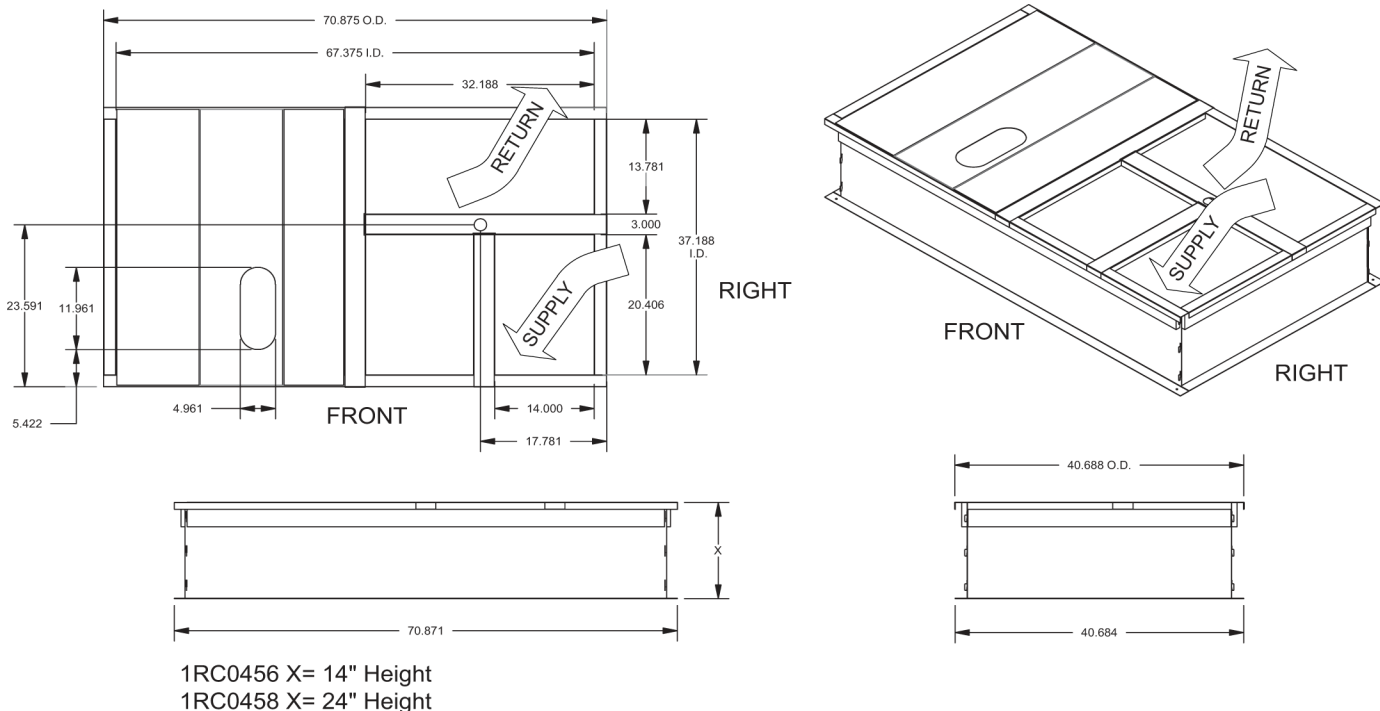


Table 4: KQ04-06 unit clearances

| Direction | Distance (in.) | Direction | Distance (in.) |
|-------------------------------|--|----------------------------------|----------------|
| ¹ Top ¹ | 72 | Right | 18 |
| Front | 36 | Left | 12 |
| Rear | ^{2, 3} 18 ² /36 ³ | ⁴ Bottom ⁴ | 1 |

- Units must be installed outdoors. Over hanging structure or shrubs should not obscure condenser air discharge outlet.
- Units without economizer or power exhaust.
- Units equipped with an Economizer or Power Exhaust. Flue products must not be discharged within 10 Feet of the rear of the unit.
- Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

Figure 13: 1RC0456, 1RC0458 roof curb dimensions



Notes:

- Sides, ends and cross support are 18-G90. Deck pans, R/A & S/A supports are 20-G90.
- Full perimeter wood nailer.
- Insulated deck pans.

Table 5: Unit models used with 1RC0456, 1RC0458 roof curb

- KQ04
- KQ05
- KQ06

Note: If utilities are required through the base of the unit or through the roof curb the following field installed accessories can be purchased through your dealer or contractor:

- 1TB0401 - Thru the base electrical and thru the curb gas
- 1TB0403 - Thru the base electrical and gas

Ductwork

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

Use a closed return duct system. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.


The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to [Figure 11](#) and [Figure 12](#) for bottom and side air duct openings.

Duct covers

Units are shipped with the side duct openings covered and a covering over the bottom of the unit. For side duct application, remove the side duct covers and install over the bottom duct openings. The panels removed from the side duct connections are designed to be reused by securing each panel to its respective bottom duct opening. But keep in mind that the supply and return panels are installed with the painted surface DOWN, facing the bottom duct opening. The

gasket must be removed from the insulation side of the duct cover so it is not directly exposed to the heating elements. The panels are secured by sliding them into slots in the back of the duct openings and screwing them to the base of the unit with screws (use screws removed from original panel location). Seals around duct openings must be tight.


CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. **DO NOT** insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

Figure 14: Side duct cover panels

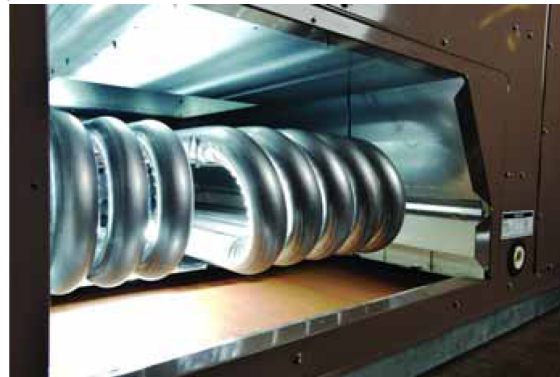


Note: Shown with duct connection cover panel as shipped.

Figure 15: Bottom return opening for side duct conversion



Figure 16: Bottom supply opening for side duct conversion

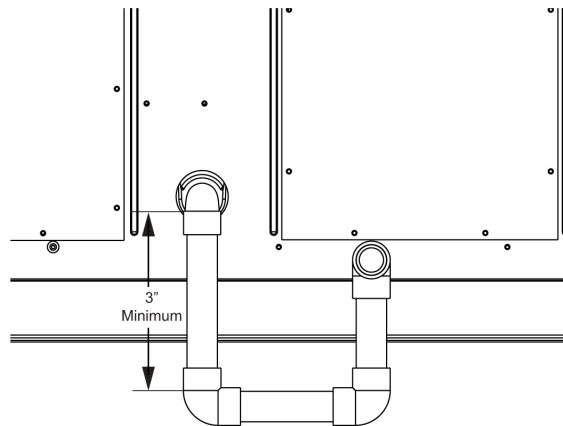


Condensate drain

A side condensate drain is provided to facilitate condensate piping. A condensate drain connection is available through the base pan for piping inside the roof curb. Trap the connection per [Figure 17](#). The trap and drain lines should be protected from freezing.

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain line from the 3/4 in. NPT female connection on the unit to an open drain.

Figure 17: Condensate drain



Compressors

The compressor used in this product is specifically designed to operate with R-454B Refrigerant and cannot be interchanged.

The compressor also uses a refrigerant oil that is extremely hygroscopic, meaning it absorbs water readily. They can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

 **CAUTION**

Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the **refrigerant** in the system. This type of oil is highly susceptible to moisture absorption.

R-454B compressor lubricants are known to cause long term damage to some synthetic roofing materials.

 **CAUTION**

Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When performing any service that may risk exposure of compressor oil to the roof, take precautions to protect roofing.

Procedures which risk oil leakage include, but are not limited to, compressor replacement, repairing refrigerant leaks, replacing refrigerant components such as filter drier, pressure switch, metering device or coil.

Units are shipped with compressor mountings which are factory-adjusted and ready for operation.

 **CAUTION**

Do not loosen compressor mounting bolts.

Filters

Two-inch filters are supplied with each unit. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. Refer to physical data tables, for the number and size of filters needed for the unit. The unit should not be operated without filters correctly installed.

Power and control wiring

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code C221, and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit rating plate and [Table 1](#).


 **CAUTION**

208/230-3-60 and 208/230-1-60 units control transformers are factory wired for 230 V. Change tap on transformer for 208 V operation. See unit wiring diagram.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire. A disconnect must be used for these units. Factory installed disconnects are available. If installing a disconnect (field supplied), refer to [Figure 11](#) and [Figure 12](#) for the recommended mounting location.

 **CAUTION**

Avoid damage to internal components if drilling holes for disconnect mounting.

 **Note:** Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized correctly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and correctly fused.

 **CAUTION**

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

CAUTION

When installing equipment in a facility with a 3-phase high-leg delta power supply, care must be taken to ensure that the high-leg conductor is not attached to either of the two legs of the (single phase, direct drive) X13 or ECM motors. Failure to do so can result in the motor acting erratically or not running at all.

Check for the high leg conductor by checking voltage of each phase to ground.

Example: A or L1 phase to ground, voltage reading is 120 V. B or L2 phase to ground, voltage reading is 195 V to 208 V. C or L3 phase to ground, voltage reading is 120 V. Therefore B or L2 phase is the high Leg. The high should always be wired to the center or B or L2 tap.

Note: Check all three phase motors and compressors for proper rotation after making a change. If it is necessary to change 3 phase motor rotation, swap A or L1 and C or L3 only.

Thermostat wiring

A two-stage thermostat must be used and should be located on an inside wall approximately 56 in. above the floor where it will not be subject to drafts, sun exposure, or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to [Table 6](#) for control wire sizing and maximum length.

Table 6: Control wire sizes

| Wire size | Maximum length (ft) ¹ |
|-----------|----------------------------------|
| 20 AWG | < 150 |
| 18 AWG | 150 to 250 |
| 16 AWG | 250 to 500 |

Note:

1. From the unit to the thermostat and back to the unit.

High altitude

High altitude operation for non Ultra-Low NOx units

These units are factory equipped to operate on natural gas at elevations up to 2,000 ft. For propane gas operation or

for use at elevations from 2,000 ft to 10,000 ft, install an accessory conversion kit.

High altitude operation for Ultra-Low NOx units only

The 60,000 BTUH Ultra-Low NOx model is factory equipped to operate correctly at altitudes up to 2,000 ft above sea level with no changes. At elevations from 2,000 ft to 5,400 ft above sea level, install a high altitude kit.

The 100,000 BTUH Ultra-Low NOx model is factory equipped to operate correctly at altitudes up to 5,400 ft above sea level, without a high altitude kit.

For both models, at elevations from 2,000 feet to 5,400 feet, reduce the input rate by 2% per 1,000 ft above sea level. See [Table 7](#).

In many cases, this derate will occur automatically if the gas utility reduces the heating value of the gas. This is common in high altitude areas.

Note: It is the responsibility of the installer to:

1. Know the elevation of the installation site.
2. Know the heating value of the natural gas.
3. Check the input rate of the furnace at the time of installation.
4. Adjust the input rate, if necessary.
5. Install the appropriate high altitude conversion kit.

To adjust the gas input rate, adjust the gas valve manifold pressure within the range of 3.0" wc to 4.0" wc.

If you cannot achieve the correct input by adjusting the manifold pressure within this range, replace the gas orifice with a different size.

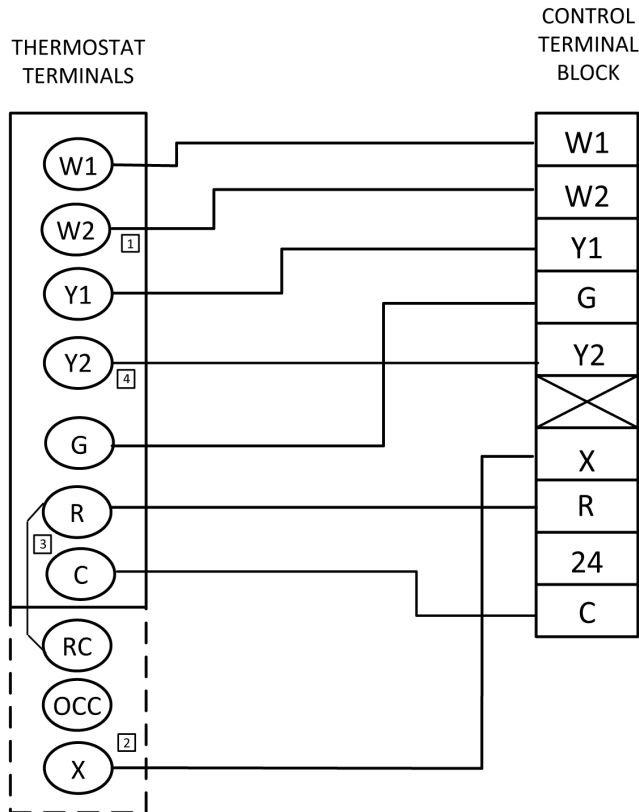
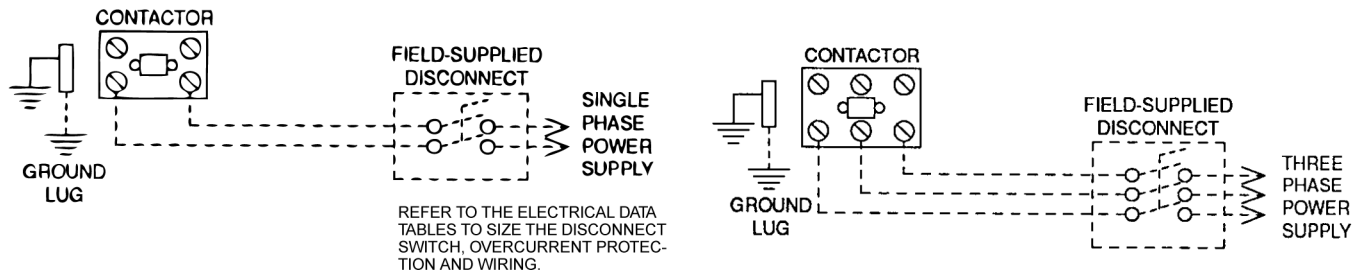
Table 7: High altitude input rate

| Elevation (ft) | 60,000 BTU models | 100,000 BTU models |
|--------------------|-------------------|--------------------|
| Sea level to 2,000 | 60,000 | 100,000 |
| 2,001 to 2,500 | 57,000 | 95,000 |
| 2,501 to 3,000 | 56,400 | 94,000 |
| 3,001 to 3,500 | 55,800 | 93,000 |
| 3,501 to 4,000 | 55,200 | 92,000 |
| 4,001 to 4,500 | 54,600 | 91,000 |
| 4,501 to 5,000 | 54,000 | 90,000 |
| 5,001 to 5,400 | 53,500 | 89,200 |
| above 5,400 | not allowed | not allowed |

Typical field power and control wiring

Typical power wiring

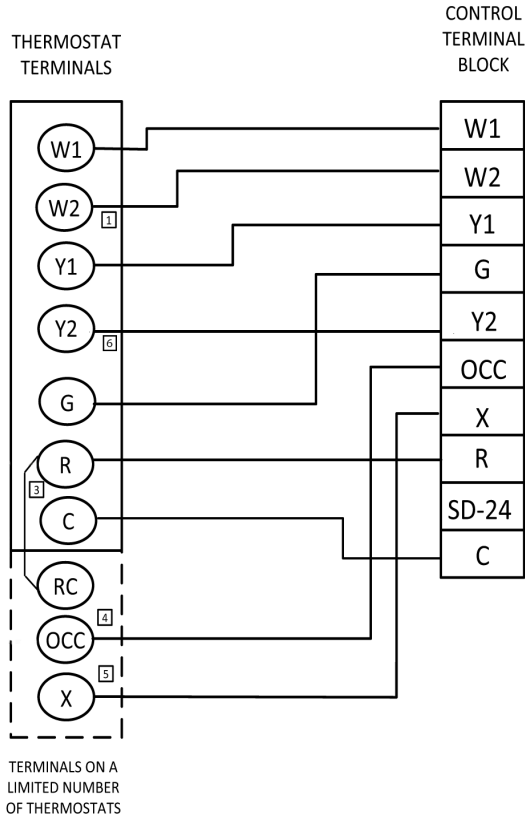
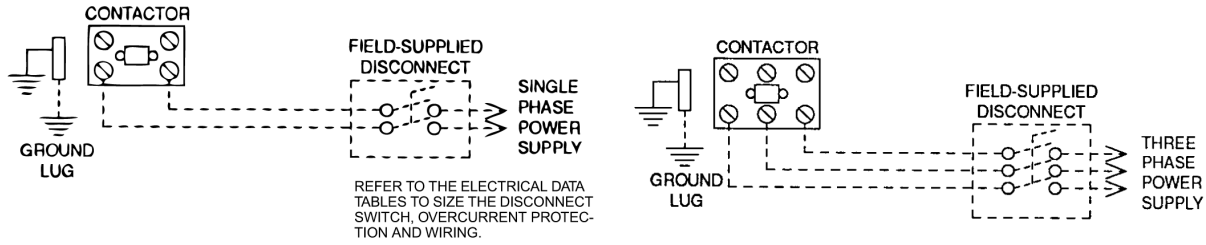
Figure 18: Everyday thermostat control (ETC) typical power wiring



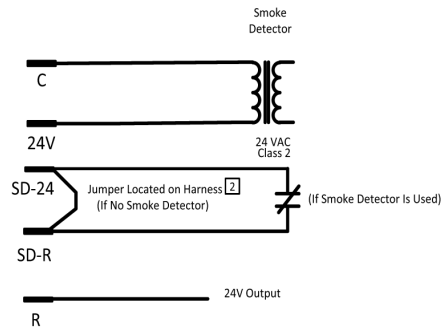
TERMINALS ON A LIMITED NUMBER OF THERMOSTATS

- 1 Second stage heating not required on single stage heating units.
- 2 X is an input to the thermostat to display Error Status conditions.
- 3 Jumper is required for any combination of R, RC, or RH.
- 4 Second stage cooling not required on single stage cooling units

Figure 19: Typical Smart Equipment control wiring



R~Occ Jumper:
 Smart Equipment Control boards come from the factory with a jumper wire between R and OCC terminals on the thermostat terminal strip. Failure to remove this jumper will place the unit into the Occupied mode no matter what the occupancy demand is from the thermostat or EMS system. To allow Thermostat or EMS control of the Occupied mode for the unit, this jumper must be removed during commissioning.



- [1] Second stage heating not required on single stage heating units.
- [2] Jumper is required if there is no Smoke Detector circuit.
- [3] Jumper is required for any combination of R, RC, or RH.
- [4] OCC is an output from the thermostat to indicate the Occupied condition.
- [5] X is an input to the thermostat to display Error Status conditions.
- [6] Second stage cooling not required on single stage cooling units.

Physical data

KQ04 to KQ06 physical data

Table 8: KQ04 physical data

| Component | | Models | | | | | | |
|---------------------------------------|-------------------------------------|---------------|-------|---------------------|---------------|-------|---------------------|--------|
| | | KQG04 | | | KQE04 | | | |
| Nominal tonnage | | 3 | | | 3 | | | |
| AHRI cooling performance | Gross capacity @ AHRI A point (BTU) | 36,000 | | | | | | 36,000 |
| | AHRI net capacity (BTU) | 35,000 | | | | | | 35,000 |
| | EER2 | 12.0 | | | | | | 12.0 |
| | SEER2 | 14.0 | | | | | | 14.0 |
| | Nominal cfm | 1,200 | | | | | | 1,200 |
| | System power (kW) | 2.9 | | | | | | 2.9 |
| | Refrigerant type | R-454B | | | | | | R-454B |
| | Refrigerant charge (lb-oz) | | | | | | | |
| | System 1 | 3-6 | | | | | | 3-6 |
| System 2 | - | | | | | | - | |
| AHRI heating performance single-phase | Heating option | L | D | — | M | E | — | - |
| | Heating model | Low (Low NOx) | Low | — | Med (LowNOx) | Med | — | - |
| | First stage heat input (kBTU) | - | - | — | - | - | — | - |
| | Second stage heat input (kBTU) | 56 | 70 | — | 90 | 112 | — | - |
| | First stage heat output (kBTU) | - | - | — | - | - | — | - |
| | Second stage heat output (kBTU) | 45 | 56 | — | 72 | 90 | — | - |
| | AFUE % | - | - | — | - | 81 | — | - |
| | FER compliant | - | - | — | - | Yes | — | - |
| | Number of burners | 2 | 2 | — | 3 | 3 | — | - |
| | Number of stages | 1 | 1 | — | 1 | 1 | — | - |
| | Temperature rise range (°F) | 10-40 | 20-50 | — | 35-65 | 50-80 | — | - |
| | Gas limit setting (°F) | 150 | 150 | — | 140 | 140 | — | - |
| Gas piping connection (in.) | 1/2 | 1/2 | — | 1/2 | 1/2 | — | - | |
| AHRI heating performance three-phase | Heating option | L | D | U | M | E | W | - |
| | Heating model | Low (Low NOx) | Low | Low (Ultra-Low Nox) | Med (Low NOx) | Med | High (Ultra-LowNox) | - |
| | First stage heat input (kBTU) | - | - | — | - | 82 | — | - |
| | Second stage heat input (kBTU) | 56 | 70 | 60 | 90 | 112 | 100 | - |
| | First stage heat output (kBTU) | - | - | — | - | 66 | — | - |
| | Second stage heat output (kBTU) | 45 | 56 | 48 | 72 | 90 | 80 | - |
| | Steady state efficiency (%) | 80 | 80 | 80 | 80 | 80 | 80 | - |
| | Number of burners | 2 | 2 | 1 | 3 | 3 | 1 | - |
| | Number of stages | 1 | 1 | 1 | 1 | 2 | 1 | - |
| | Temperature rise range (°F) | 28-46 | 35-58 | 20-50 | 44-74 | 55-78 | 45-75 | - |
| Gas limit setting (°F) | 150 | 150 | 150 | 140 | 140 | 170 | - | |
| Gas piping connection (in.) | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | - | |
| Dimensions (in.) | Length | 74.1 | | | | | | 74.1 |
| | Width | 48.9 | | | | | | 48.9 |
| | Height | 32.5 | | | | | | 32.5 |
| Operating weight (lb) | | 498 | | | | | | 450 |
| Compressors | Type | Scroll | | | | | | Scroll |
| | Quantity | 1 | | | | | | 1 |
| | Unit capacity steps (%) | 100 | | | | | | 100 |

Table 8: KQ04 physical data

| Component | | Models | | | |
|------------------------------------|------------------------|---|-------------|--------------------------------|-------------|
| | | KQG04 | | KQE04 | |
| Nominal tonnage | | 3 | | 3 | |
| Condenser coil data | Face area (sq ft) | 16.3 | | 16.3 | |
| | Rows | 1 | | 1 | |
| | Fins per in. | 23 | | 23 | |
| | Tube diameter (in./mm) | 0.63/16 | | 0.63/16 | |
| | Circuitry type | 2-pass Microchannel | | 2-pass Microchannel | |
| Evaporator coil data | Face area (sq ft) | 5.5 | | 5.5 | |
| | Rows | 2 | | 2 | |
| | Fins per in. | 15 | | 15 | |
| | Tube diameter | 0.375 | | 0.375 | |
| | Circuitry type | Intertwined | | Intertwined | |
| | Refrigerant control | TXV | | TXV | |
| Condenser fan data | Quantity of fans | 1 | | 1 | |
| | Fan diameter (in.) | 22 | | 22 | |
| | Type | Prop | | Prop | |
| | Drive type | Direct | | Direct | |
| | Quantity of motors | 1 | | 1 | |
| | Motor hp each | 1/4 | | 1/4 | |
| | Number of speeds | 1 | | 1 | |
| | rpm | 1,100 | | 1,100 | |
| Evaporator fan data - Direct drive | Airflow option | A | | A | |
| | Quantity | 1 | | 1 | |
| | Fan size (in.) | 10 x 10 | | 10 x 10 | |
| | Type | Centrifugal | | Centrifugal | |
| | Motor hp | 3/4 | | 3/4 | |
| | Motor rpm | 1,050 | | 1,050 | |
| Evaporator fan data - Belt drive | Airflow option | B | C | B | C |
| | Quantity | 1 | 1 | 1 | 1 |
| | Fan Size (in.) | 10 x 10 | 10 x 10 | 10 x 10 | 10 x 10 |
| | Type | Centrifugal | Centrifugal | Centrifugal | Centrifugal |
| | Motor sheave | 1VL34 | 1VL44 | 1VL34 | 1VL44 |
| | Blower sheave | AK46 | AK46 | AK46 | AK46 |
| | Belt | A39 | A40 | A39 | A40 |
| | Motor hp, 1-phase | 1.5 | -- | 1.5 | -- |
| | Frame size, 1-phase | 56 Hz | -- | 56 Hz | -- |
| | Motor hp, 3-phase | 2.4 | 2.4 | 2.4 | 2.4 |
| | Frame size, 3-phase | 56Y | 56Y | 56Y | 56Y |
| Motor rpm | 1,725 | 1,725 | 1,725 | 1,725 | |
| Filters | Quantity - size | 2 - (16 x 25 x 2) ¹ | | 2 - (16 x 25 x 2) ¹ | |
| i | Note: | 1. 2 in. throwaway, standard, MERV 4 (Minimum Efficiency Reporting Value) | | | |

Table 9: KQ05 physical data

| Component | | Models | | | | | | | | |
|---------------------------------------|------------------------------------|---------------------|-------|--------------------|---------------|-------|---------------------|-----------------|---------------------|--|
| | | KQG05 | | | | | | KQE05 | | |
| Nominal tonnage | | 4 | | | | | | 4 | | |
| AHRI cooling performance | Gross capacity @AHRI A point (BTU) | 50,000 | | | | | | | | |
| | AHRI net capacity (BTU) | 48,000 | | | | | | | | |
| | EER2 | 11.5 | | | | | | | | |
| | SEER2 | 14.0 | | | | | | | | |
| | Nominal cfm | 1,575 | | | | | | | | |
| | System power (kW) | 4.1 | | | | | | | | |
| | Refrigerant type | R-454B | | | | | | | | |
| | Refrigerant charge (lb-oz) | | | | | | | | | |
| | System 1 | 4-0 | | | | | | | | |
| | System 2 | - | | | | | | | | |
| AHRI heating performance single-phase | Heating option | L | D | — | M | E | — | N | F | |
| | Heating model | Low (LowNOx) | Low | — | Med (LowNOx) | Med | — | High, (Low NOx) | High | |
| | First stage heat input (kBTU) | - | - | — | - | - | — | - | - | |
| | Second stage heat input (kBTU) | 56 | 70 | — | 90 | 112 | — | 116 | 142 | |
| | First stage heat output (kBTU) | - | - | — | - | - | — | - | - | |
| | Second stage heatoutput (kBTU) | 45 | 56 | — | 72 | 90 | — | 93 | 114 | |
| | AFUE % | - | - | — | - | 81 | — | - | - | |
| | FER compliant | - | - | — | - | Yes | — | - | - | |
| | Number of burners | 2 | 2 | — | 3 | 3 | — | 3 | 3 | |
| | Number of stages | 1 | 1 | — | 1 | 1 | — | 1 | 1 | |
| | Temperature rise range (°F) | 05-35 | 15-45 | — | 25-55 | 40-70 | — | 35-65 | 45-75 | |
| | Gas limit setting (°F) | 150 | 150 | — | 140 | 140 | — | 150 | 145 | |
| | Gas piping connection (in.) | 1/2 | 1/2 | — | 1/2 | 1/2 | — | 1/2 | 1/2 | |
| AHRI heating performance three-phase | Heating option | L | D | U | M | E | W | N | F | |
| | Heating model | Low (Low NOx) | Low | Low (Ultra-LowNOx) | Med (Low NOx) | Med | High (Ultra-LowNOx) | High, (Low NOx) | High | |
| | First stage heat input (kBTU) | - | - | — | - | - | — | - | 100 | |
| | Second stage heat input (kBTU) | 56 | 70 | 60 | 90 | 112 | 100 | 118 | 145 | |
| | First stage heat output (kBTU) | - | - | — | - | - | — | - | 80 | |
| | Second stage heatoutput (kBTU) | 45 | 56 | 48 | 72 | 90 | 80 | 94 | 116 | |
| | Steady state efficiency (%) | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | |
| | Number of burners | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 | |
| | Number of stages | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | |
| | Temperature rise range (°F) | 21-35 | 26-43 | 20-50 | 33-56 | 41-69 | 30-60 | 44-73 | 49-77 | |
| | Gas limit setting (°F) | 150 | 150 | 150 | 140 | 140 | 160 | 150 | 145 | |
| Gas piping connection (in.) | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | | |
| Dimensions (in.) | Length | 74.1 | | | | | | | 74.1 | |
| | Width | 48.9 | | | | | | | 48.9 | |
| | Height | 32.5 | | | | | | | 32.5 | |
| Operating weight (lb) | | 538 | | | | | | | 487 | |
| Compressors | Type | Scroll | | | | | | | Scroll | |
| | Quantity | 1 | | | | | | | 1 | |
| | Unit capacity steps (%) | 100 | | | | | | | 100 | |
| Condenser coil data | Face area (sq ft) | 16.3 | | | | | | | 16.3 | |
| | Rows | 1 | | | | | | | 1 | |
| | Fins per in. | 23 | | | | | | | 23 | |
| | Tube diameter (in./mm) | .63/16 | | | | | | | .63/16 | |
| | Circuitry type | 2-pass Microchannel | | | | | | | 2-pass Microchannel | |

Table 9: KQ05 physical data

| Component | | Models | | | |
|------------------------------------|---|--------------------------------|-------------|--------------------------------|-------------|
| | | KQG05 | | KQE05 | |
| Nominal tonnage | | 4 | | 4 | |
| Evaporator coil data | Face area (sq ft) | 5.5 | | 5.5 | |
| | Rows | 3 | | 3 | |
| | Fins per in. | 15 | | 15 | |
| | Tube diameter | 0.375 | | 0.375 | |
| | Circuitry type | Intertwined | | Intertwined | |
| | Refrigerant control | TXV | | TXV | |
| Condenser fan data | Quantity of fans | 1 | | 1 | |
| | Fan diameter (in.) | 22 | | 22 | |
| | Type | Prop | | Prop | |
| | Drive type | Direct | | Direct | |
| | Quantity of motors | 1 | | 1 | |
| | Motor hp each | 1/4 | | 1/4 | |
| | Number of speeds | 1 | | 1 | |
| | rpm | 1,100 | | 1,100 | |
| Evaporator fan data - Direct drive | Airflow option | A | | A | |
| | Quantity | 1 | | 1 | |
| | Fan Size (in.) | 10 x 10 | | 10 x 10 | |
| | Type | Centrifugal | | Centrifugal | |
| | Motor hp | 1 | | 1 | |
| | Motor rpm | 1,050 | | 1,050 | |
| Evaporator fan data - Belt drive | Airflow option | B | C | B | C |
| | Quantity | 1 | 1 | 1 | 1 |
| | Fan size (in.) | 10 x 10 | 10 x 10 | 10 x 10 | 10 x 10 |
| | Type | Centrifugal | Centrifugal | Centrifugal | Centrifugal |
| | Motor sheave | 1VL34 | 1VL44 | 1VL34 | 1VL44 |
| | Blower sheave | AK46 | AK46 | AK46 | AK46 |
| | Belt | A39 | A40 | A39 | A40 |
| | Motor hp, 1-phase | 1.5 | -- | 1.5 | -- |
| | Frame size, 1-phase | 56 Hz | -- | 56 Hz | -- |
| | Motor hp, 3-phase | 2.4 | 2.4 | 2.4 | 2.4 |
| | Frame size, 3-phase | 56Y | 56Y | 56Y | 56Y |
| Motor rpm | 1,725 | 1,725 | 1,725 | 1,725 | |
| Filters | Quantity - size | 2 - (16 x 25 x 2) ¹ | | 2 - (16 x 25 x 2) ¹ | |
| ⓘ | Note: | | | | |
| | 1. 2 in. throwaway, standard, MERV 4 (Minimum Efficiency Reporting Value) | | | | |

Table 10: KQ06 physical data

| Component | | Models | | | | | | | | | |
|---------------------------------------|------------------------------------|---------------------|-------|--------------------|---------------|-------|---------------------|-----------------|-------|---|--|
| | | KQG06 | | | | | KQE06 | | | | |
| Nominal tonnage | | 5 | | | | | 5 | | | | |
| AHRI cooling performance | Gross capacity @AHRI A point (BTU) | 61,000 | | | | | 61,000 | | | | |
| | AHRI net capacity (BTU) | 59,000 | | | | | 59,000 | | | | |
| | EER2 | 12.0 | | | | | 12.0 | | | | |
| | SEER2 | 14.0 | | | | | 14.0 | | | | |
| | Nominal cfm | 1,800 | | | | | 1,800 | | | | |
| | System power (kW) | 4.9 | | | | | 4.9 | | | | |
| | Refrigerant type | R-454B | | | | | R-454B | | | | |
| | Refrigerant charge (lb-oz) | — | | | | | — | | | | |
| | System 1 | 4-14 | | | | | 4-14 | | | | |
| | System 2 | — | | | | | — | | | | |
| AHRI heating performance single-phase | Heating option | L | D | — | M | E | — | N | F | — | |
| | Heating model | Low (Low NOx) | Low | — | Med (Low NOx) | Med | — | High, (Low NOx) | High | — | |
| | First stage heat input (kBTU) | — | — | — | — | — | — | — | — | — | |
| | Second stage heat input (kBTU) | 56 | 70 | — | 90 | 112 | — | 116 | 142 | — | |
| | First stage heat output (kBTU) | — | — | — | — | — | — | — | — | — | |
| | Second stage heat output (kBTU) | 45 | 56 | — | 72 | 90 | — | 93 | 114 | — | |
| | AFUE % | — | — | — | — | 81 | — | — | — | — | |
| | FER compliant | — | — | — | — | Yes | — | — | — | — | |
| | Number of burners | 2 | 2 | — | 3 | 3 | — | 3 | 3 | — | |
| | Number of stages | 1 | 1 | — | 1 | 1 | — | 1 | 1 | — | |
| | Temperature rise range (°F) | 05-35 | 10-40 | — | 15-45 | 30-60 | — | 30-60 | 40-70 | — | |
| | Gas limit setting (°F) | 150 | 150 | — | 140 | 140 | — | 145 | 140 | — | |
| Gas piping connection (in.) | 1/2 | 1/2 | — | 1/2 | 1/2 | — | 1/2 | 1/2 | — | | |
| AHRI heating performance three-phase | Heating option | L | D | U | M | E | W | N | F | — | |
| | Heating model | Low (Low NOx) | Low | Low (Ultra-LowNOx) | Med (Low NOx) | Med | High (Ultra-LowNOx) | High, (Low NOx) | High | — | |
| | First stage heat input (kBTU) | — | — | — | — | — | — | — | 100 | — | |
| | Second stage heat input (kBTU) | 56 | 70 | 60 | 90 | 112 | 100 | 118 | 145 | — | |
| | First stage heat output (kBTU) | — | — | — | — | — | — | — | 80 | — | |
| | Second stage heat output (kBTU) | 45 | 56 | 48 | 72 | 90 | 80 | 94 | 116 | — | |
| | Steady state efficiency (%) | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | — | |
| | Number of burners | 2 | 2 | 1 | 3 | 3 | 1 | 3 | 3 | — | |
| | Number of stages | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | — | |
| | Temperature rise range (°F) | 17-28 | 21-35 | 10-40 | 27-44 | 33-55 | 25-55 | 35-58 | 43-72 | — | |
| | Gas limit setting (°F) | 150 | 150 | 150 | 140 | 140 | 160 | 145 | 140 | — | |
| Gas piping connection (in.) | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | — | | |
| Dimensions (in.) | Length | 74.1 | | | | | 74.1 | | | | |
| | Width | 48.9 | | | | | 48.9 | | | | |
| | Height | 40.6 | | | | | 40.6 | | | | |
| Operating weight (lb) | | 610 | | | | | 561 | | | | |
| Compressors | Type | Scroll | | | | | Scroll | | | | |
| | Quantity | 1 | | | | | 1 | | | | |
| | Unit capacity steps (%) | 100 | | | | | 100 | | | | |
| Condenser coil data | Face area (sq ft) | 21.1 | | | | | 21.1 | | | | |
| | Rows | 1 | | | | | 1 | | | | |
| | Fins per in. | 23 | | | | | 23 | | | | |
| | Tube diameter (in./mm) | .71/18 | | | | | .71/18 | | | | |
| | Circuitry type | 2-pass Microchannel | | | | | 2-pass Microchannel | | | | |

Table 10: KQ06 physical data

| Component | | Models | | | |
|------------------------------------|---------------------|--------------------------------|-------------|--------------------------------|-------------|
| | | KQG06 | | KQE06 | |
| Nominal tonnage | | 5 | | 5 | |
| Evaporator coil data | Face area (sq ft) | 7.3 | | 7.3 | |
| | Rows | 3 | | 3 | |
| | Fins per in. | 15 | | 15 | |
| | Tube diameter | 0.375 | | 0.375 | |
| | Circuitry type | Intertwined | | Intertwined | |
| | Refrigerant control | TXV | | TXV | |
| Condenser fan data | Quantity of fans | 1 | | 1 | |
| | Fan diameter (in.) | 22 | | 22 | |
| | Type | Prop | | Prop | |
| | Drive type | Direct | | Direct | |
| | Quantity of motors | 1 | | 1 | |
| | Motor hp each | 1/2 | | 1/2 | |
| | Number of speeds | 1 | | 1 | |
| | rpm | 1,085 | | 1,085 | |
| Evaporator fan data - Direct drive | Airflow option | A | | A | |
| | Quantity | 1 | | 1 | |
| | Fan size (in.) | 11 x 10 | | 11 x 10 | |
| | Type | Centrifugal | | Centrifugal | |
| | Motor hp | 1 | | 1 | |
| | Motor rpm | 1,050 | | 1,050 | |
| Evaporator fan data - Belt drive | Airflow option | B | C | B | C |
| | Quantity | 1 | 1 | 1 | 1 |
| | Fan size (in.) | 11 x 10 | 11 x 10 | 11 x 10 | 11 x 10 |
| | Type | Centrifugal | Centrifugal | Centrifugal | Centrifugal |
| | Motor sheave | 1VL34 | 1VL44 | 1VL34 | 1VL44 |
| | Blower sheave | AK46 | AK46 | AK46 | AK46 |
| | Belt | A37 | A39 | A37 | A39 |
| | Motor hp, 1-phase | 1.5 | -- | 1.5 | -- |
| | Frame size, 1-phase | 56 Hz | -- | 56 Hz | -- |
| | Motor hp, 3-phase | 2.4 | 2.9 | 2.4 | 2.9 |
| | Frame size, 3-phase | 56Y | 56 Hz | 56Y | 56 Hz |
| Motor rpm | 1,725 | 1,725 | 1,725 | 1,725 | |
| Filters | Quantity - size | 4 - (16 x 16 x 2) ¹ | | 4 - (16 x 16 x 2) ¹ | |

¹ 2 in. throwaway, standard, MERV 4 (Minimum Efficiency Reporting Value)

Electrical data

KQ04 to 06 standard indoor blower - without powered convenience outlet

Table 11: KQE04-06 standard indoor blower - without powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/ Pwr Exh (Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|-----|-----------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | | | | 1.3 | 6.6 | 1.5 | | None | - | - | - | 28.8 | 30 | 45 | 28 | 98 | 30.3 | 35 | 45 | 30 | 102 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 37.8 | 40 | 45 | 35 | 98 | 39.6 | 40 | 45 | 36 | 102 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 55.8 | 60 | 60 | 51 | 98 | 57.6 | 60 | 60 | 53 | 102 |
| | 230-1-60 | 16.7 | 93.5 | 26 | | | | 1.4 | 6 | 1.3 | | None | - | - | - | 28.3 | 30 | 40 | 28 | 99 | 29.6 | 30 | 45 | 29 | 102 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 41.4 | 45 | 45 | 38 | 99 | 43 | 45 | 45 | 40 | 102 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 62.3 | 70 | 70 | 57 | 99 | 63.9 | 70 | 70 | 59 | 102 |
| | 208-3-60 | 12.2 | 97.5 | 19 | | | | 1.3 | 6.6 | 1.1 | | None | - | - | - | 23.2 | 25 | 35 | 23 | 102 | 24.3 | 25 | 35 | 24 | 105 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 25.3 | 30 | 35 | 23 | 102 | 26.6 | 30 | 35 | 24 | 105 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 35.6 | 40 | 40 | 33 | 102 | 37 | 40 | 40 | 34 | 105 |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 49.9 | 50 | 50 | 46 | 102 | 51.3 | 60 | 60 | 47 | 105 |
| | 230-3-60 | 12.2 | 97.5 | 19 | | | | 1.4 | 6 | 1 | | None | - | - | - | 22.7 | 25 | 30 | 23 | 103 | 23.7 | 25 | 35 | 24 | 105 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 27 | 30 | 30 | 25 | 103 | 28.3 | 30 | 35 | 26 | 105 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 39.1 | 40 | 40 | 36 | 103 | 40.4 | 45 | 45 | 37 | 105 |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 55.6 | 60 | 60 | 51 | 103 | 56.9 | 60 | 60 | 52 | 105 |
| | 460-3-60 | 5.8 | 44.3 | 9 | | | | 0.8 | 3.2 | 0.5 | | None | - | - | - | 11.3 | 15 | 15 | 11 | 48 | 11.8 | 15 | 15 | 12 | 49 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 13 | 15 | 15 | 12 | 48 | 13.6 | 15 | 15 | 13 | 49 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 21.3 | 25 | 25 | 20 | 48 | 21.9 | 25 | 25 | 20 | 49 |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 25 | 25 | 25 | 23 | 48 | 25.6 | 30 | 30 | 24 | 49 |
| | 575-3-60 | 4.5 | 27.1 | 7 | | | | 0.6 | 6 | 0.4 | | None | - | - | - | 8.6 | 15 | 15 | 9 | 29 | 9 | 15 | 15 | 9 | 30 |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 14.1 | 15 | 15 | 13 | 29 | 14.6 | 15 | 15 | 13 | 30 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.6 | 20 | 20 | 18 | 29 | 20.1 | 25 | 25 | 19 | 30 |

Table 11: KQE04-06 standard indoor blower - without powered convience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh (Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|-----|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|-----|----------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | | | | 1.3 | 8.4 | 1.5 | | None | - | - | - | 34 | 35 | 50 | 33 | 107 | 35.5 | 40 | 50 | 35 | 110 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 40 | 40 | 50 | 37 | 107 | 41.9 | 45 | 50 | 39 | 110 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 58 | 60 | 60 | 53 | 107 | 59.9 | 60 | 60 | 55 | 110 |
| | 230-1-60 | 19.4 | 102 | 30 | | | | 1.4 | 7.6 | 1.3 | | None | - | - | - | 33.3 | 35 | 50 | 33 | 107 | 34.6 | 35 | 50 | 34 | 110 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 43.4 | 45 | 50 | 40 | 107 | 45 | 45 | 50 | 41 | 110 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 64.3 | 70 | 70 | 59 | 107 | 65.9 | 70 | 70 | 61 | 110 |
| | 208-3-60 | 12 | 123 | 19 | | | | 1.3 | 8.4 | 1.1 | | None | - | - | - | 24.7 | 25 | 35 | 25 | 128 | 25.8 | 30 | 35 | 26 | 130 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 27.5 | 30 | 35 | 25 | 128 | 28.9 | 30 | 35 | 27 | 130 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 37.9 | 40 | 40 | 35 | 128 | 39.3 | 40 | 40 | 36 | 130 |
| | 230-3-60 | 12 | 123 | 19 | | | | 1.4 | 7.6 | 1 | | None | - | - | - | 24 | 25 | 35 | 24 | 128 | 25 | 25 | 35 | 25 | 131 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 29 | 30 | 35 | 27 | 128 | 30.3 | 35 | 35 | 28 | 131 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 41.1 | 45 | 45 | 38 | 128 | 42.4 | 45 | 45 | 39 | 131 |
| | 460-3-60 | 6.3 | 60 | 10 | | | | 0.8 | 4 | 0.5 | | None | - | - | - | 12.7 | 15 | 15 | 13 | 64 | 13.2 | 15 | 15 | 13 | 65 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 14 | 15 | 15 | 13 | 64 | 14.6 | 15 | 15 | 13 | 65 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 22.3 | 25 | 25 | 20 | 64 | 22.9 | 25 | 25 | 21 | 65 |
| | 575-3-60 | 4.4 | 41 | 7 | | | | 0.6 | 7.6 | 0.4 | | None | - | - | - | 9.1 | 15 | 15 | 9 | 43 | 9.5 | 15 | 15 | 10 | 44 |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 14.9 | 15 | 15 | 14 | 43 | 15.4 | 20 | 20 | 14 | 44 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 20.4 | 25 | 25 | 19 | 43 | 20.9 | 25 | 25 | 19 | 44 |
| 06 (5) | 208-1-60 | 22.5 | 148 | 35 | | | | 2 | 8.4 | 1.5 | | None | - | - | - | 38.5 | 40 | 60 | 38 | 154 | 40 | 40 | 60 | 40 | 158 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 40 | 40 | 60 | 38 | 154 | 41.9 | 45 | 60 | 40 | 158 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 58 | 60 | 60 | 53 | 154 | 59.9 | 60 | 60 | 55 | 158 |
| | 230-1-60 | 22.5 | 148 | 35 | | | | 2.3 | 7.6 | 1.3 | | None | - | - | - | 38 | 40 | 60 | 37 | 155 | 39.3 | 40 | 60 | 39 | 158 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 43.4 | 45 | 60 | 40 | 155 | 45 | 45 | 60 | 41 | 158 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 64.3 | 70 | 70 | 59 | 155 | 65.9 | 70 | 70 | 61 | 158 |
| | 208-3-60 | 13.1 | 93 | 20 | | | | 2 | 8.4 | 1.1 | | None | - | - | - | 26.8 | 30 | 35 | 27 | 99 | 27.9 | 30 | 40 | 28 | 102 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 27.5 | 30 | 35 | 27 | 99 | 28.9 | 30 | 40 | 28 | 102 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 37.9 | 40 | 40 | 35 | 99 | 39.3 | 40 | 40 | 36 | 102 |
| | 230-3-60 | 13.1 | 93 | 20 | | | | 2.3 | 7.6 | 1 | | None | - | - | - | 26.3 | 30 | 35 | 26 | 100 | 27.3 | 30 | 40 | 28 | 102 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 29 | 30 | 35 | 27 | 100 | 30.3 | 35 | 40 | 28 | 102 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 41.1 | 45 | 45 | 38 | 100 | 42.4 | 45 | 45 | 39 | 102 |
| | 460-3-60 | 6.6 | 60 | 10 | | | | 1.3 | 4 | 0.5 | | None | - | - | - | 13.6 | 15 | 20 | 14 | 65 | 14.1 | 15 | 20 | 14 | 66 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 14 | 15 | 20 | 13 | 65 | 14.6 | 15 | 20 | 13 | 66 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 22.3 | 25 | 25 | 20 | 65 | 22.9 | 25 | 25 | 21 | 66 |
| | 575-3-60 | 4.8 | 41 | 8 | | | | 1 | 7.6 | 0.4 | | None | - | - | - | 10 | 15 | 15 | 10 | 44 | 10.4 | 15 | 15 | 11 | 45 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 20.4 | 25 | 25 | 19 | 44 | 20.9 | 25 | 25 | 19 | 45 |
| | | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 31.4 | 35 | 35 | 29 | 44 | 31.9 | 35 | 35 | 29 | 45 |

-
1. Minimum Circuit Ampacity.
 2. Dual element, time delay type.
 3. HACR type per NEC.

KQ04 to 06 standard indoor blower - with powered convenience outlet

Table 12: KQE04-06 standard indoor blower - with powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | | Max Fuse ² / Breaker ³ Size (Amps) | | Min Disconnect Rating | | MCA ¹ w/Pwr Exh (Amps) | | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Min Disconnect Rating/ Pwr Exh | | | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|-------|--------|------|------------|--|-----|--|-----|-----------------------|------|-----------------------------------|-----|---|-----|---|-----|--------------------------------|-----|-----|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | FLA | LRA | FLA | LRA | FLA | LRA | FLA | LRA | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | | | | 1.3 | 6.6 | 1.5 | 8.6 | None | - | - | - | 33.1 | 35 | 45 | 33 | 103 | 34.6 | 35 | 50 | 35 | 106 | 35 | 106 | 35 | 106 | 35 | 106 | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 43.1 | 45 | 45 | 40 | 103 | 45 | 45 | 40 | 103 | 45 | 45 | 41 | 106 | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 61.1 | 70 | 70 | 56 | 103 | 63 | 70 | 70 | 58 | 106 | | | | | | | |
| | 230-1-60 | 16.7 | 93.5 | 26 | | | | 1.4 | 6 | 1.3 | 8.6 | None | - | - | - | 32.6 | 35 | 45 | 33 | 103 | 33.9 | 35 | 50 | 34 | 106 | 35 | 106 | 35 | 106 | 35 | 106 | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 46.8 | 50 | 50 | 43 | 103 | 48.4 | 50 | 50 | 45 | 106 | | | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 67.6 | 70 | 70 | 62 | 103 | 69.3 | 70 | 70 | 64 | 106 | | | | | | | |
| | 208-3-60 | 12.2 | 97.5 | 19 | | | | 1.3 | 6.6 | 1.1 | 8.6 | None | - | - | - | 27.5 | 30 | 35 | 28 | 107 | 28.6 | 30 | 40 | 29 | 109 | 30 | 109 | 30 | 109 | 30 | 109 | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 30.6 | 35 | 35 | 28 | 107 | 32 | 35 | 40 | 29 | 109 | | | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 41 | 45 | 45 | 38 | 107 | 42.4 | 45 | 45 | 39 | 109 | | | | | | | |
| | 230-3-60 | 12.2 | 97.5 | 19 | | | | 1.4 | 6 | 1 | 8.6 | None | - | - | - | 27 | 30 | 35 | 27 | 107 | 28 | 30 | 40 | 29 | 109 | 30 | 109 | 30 | 109 | 30 | 109 | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 32.4 | 35 | 35 | 30 | 107 | 33.6 | 35 | 40 | 31 | 109 | | | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 44.5 | 45 | 45 | 41 | 107 | 45.8 | 50 | 50 | 42 | 109 | | | | | | | |
| | 460-3-60 | 5.8 | 44.3 | 9 | | | | 0.8 | 3.2 | 0.5 | 8.6 | None | - | - | - | 13.5 | 15 | 15 | 14 | 50 | 14 | 15 | 15 | 14 | 51 | 15 | 51 | 15 | 51 | 15 | 51 | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 15.7 | 20 | 20 | 14 | 50 | 16.3 | 20 | 20 | 15 | 51 | | | | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 23.9 | 25 | 25 | 22 | 50 | 24.6 | 25 | 25 | 23 | 51 | | | | | | | |
| | 575-3-60 | 4.5 | 27.1 | 7 | | | | 0.6 | 6 | 0.4 | 8.6 | None | - | - | - | 10.3 | 15 | 15 | 11 | 31 | 10.7 | 15 | 15 | 11 | 32 | 15 | 32 | 15 | 32 | 15 | 32 | |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 16.3 | 20 | 20 | 15 | 31 | 16.8 | 20 | 20 | 15 | 32 | | | | | | | |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 21.8 | 25 | 25 | 20 | 31 | 22.3 | 25 | 25 | 20 | 32 | | | | | | | |
| | 05 (4) | 208-1-60 | 19.4 | 102 | 30 | | | | 1.3 | 8.4 | 1.5 | 8.6 | None | - | - | - | 38.3 | 40 | 50 | 38 | 111 | 39.8 | 40 | 50 | 40 | 115 | 40 | 115 | 40 | 115 | 40 | 115 |
| | | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 45.4 | 50 | 50 | 42 | 111 | 47.3 | 50 | 50 | 43 | 115 | | | | | | |
| | | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 63.4 | 70 | 70 | 58 | 111 | 65.3 | 70 | 70 | 60 | 115 | | | | | | |
| | | 230-1-60 | 19.4 | 102 | 30 | | | | 1.4 | 7.6 | 1.3 | 8.6 | None | - | - | - | 37.6 | 40 | 50 | 38 | 112 | 38.9 | 40 | 50 | 39 | 114 | 40 | 114 | 40 | 114 | 40 | 114 |
| | | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 48.8 | 50 | 50 | 45 | 112 | 50.4 | 60 | 60 | 46 | 114 | | | | | | |
| | | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 69.6 | 70 | 70 | 64 | 112 | 71.3 | 80 | 80 | 66 | 114 | | | | | | |
| 208-3-60 | | 12 | 123 | 19 | | | | 1.3 | 8.4 | 1.1 | 8.6 | None | - | - | - | 29 | 30 | 40 | 30 | 132 | 30.1 | 35 | 40 | 31 | 135 | 35 | 135 | 35 | 135 | 35 | 135 | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 32.9 | 35 | 40 | 30 | 132 | 34.3 | 35 | 40 | 32 | 135 | | | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 43.3 | 45 | 45 | 40 | 132 | 44.6 | 45 | 45 | 41 | 135 | | | | | | | |
| 230-3-60 | | 12 | 123 | 19 | | | | 1.4 | 7.6 | 1 | 8.6 | None | - | - | - | 28.3 | 30 | 40 | 29 | 133 | 29.3 | 30 | 40 | 30 | 135 | 35 | 135 | 35 | 135 | 35 | 135 | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 34.4 | 35 | 40 | 32 | 133 | 35.6 | 40 | 40 | 33 | 135 | | | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 46.5 | 50 | 50 | 43 | 133 | 47.8 | 50 | 50 | 44 | 135 | | | | | | | |
| 460-3-60 | | 6.3 | 60 | 10 | | | | 0.8 | 4 | 0.5 | 8.6 | None | - | - | - | 14.9 | 15 | 20 | 15 | 66 | 15.4 | 20 | 20 | 16 | 67 | 20 | 67 | 20 | 67 | 20 | 67 | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 16.7 | 20 | 20 | 15 | 66 | 17.3 | 20 | 20 | 16 | 67 | | | | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 24.9 | 25 | 25 | 23 | 66 | 25.6 | 30 | 30 | 24 | 67 | | | | | | | |
| 575-3-60 | | 4.4 | 41 | 7 | | | | 0.6 | 7.6 | 0.4 | 8.6 | None | - | - | - | 10.9 | 15 | 15 | 11 | 45 | 11.3 | 15 | 15 | 12 | 46 | 15 | 46 | 15 | 46 | 15 | 46 | |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 17.1 | 20 | 20 | 16 | 45 | 17.6 | 20 | 20 | 16 | 46 | | | | | | | |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 22.6 | 25 | 25 | 21 | 45 | 23.1 | 25 | 25 | 21 | 46 | | | | | | | |

Table 12: KQE04-06 standard indoor blower - with powered convience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ¹ / Breaker ² Size (Amps) | Max Fuse ² / Breaker ² Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ² Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ² Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|----------|------|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|-----|---------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| | | 06 (5) | 208-1-60 | 22.5 | 148 | 35 | | | | | | | | 2 | 8.4 | | | | 1.5 | 8.6 | | | | None | - |
| 10625 | 4.9 | | | | | | | 1 | 23.6 | 45.4 | 50 | | | | | 60 | 43 | 159 | | | 47.3 | 50 | 60 | 45 | 162 |
| 11125 | 7.9 | | | | | | | 1 | 38 | 63.4 | 70 | | | | | 70 | 58 | 159 | | | 65.3 | 70 | 70 | 60 | 162 |
| 230-1-60 | 22.5 | | 148 | 35 | | | | 2.3 | 7.6 | 1.3 | 8.6 | None | - | - | - | 42.3 | 45 | 60 | 42 | 159 | 43.6 | 45 | 60 | 44 | 162 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 48.8 | 50 | 60 | 45 | 159 | 50.4 | 60 | 60 | 46 | 162 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 69.6 | 70 | 70 | 64 | 159 | 71.3 | 80 | 80 | 66 | 162 |
| 208-3-60 | 13.1 | | 93 | 20 | | | | 2 | 8.4 | 1.1 | 8.6 | None | - | - | - | 31.1 | 35 | 40 | 32 | 104 | 32.2 | 35 | 45 | 33 | 106 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 32.9 | 35 | 40 | 32 | 104 | 34.3 | 35 | 45 | 33 | 106 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 43.3 | 45 | 45 | 40 | 104 | 44.6 | 45 | 45 | 41 | 106 |
| 230-3-60 | 13.1 | | 93 | 20 | | | | 2.3 | 7.6 | 1 | 8.6 | None | - | - | - | 30.6 | 35 | 40 | 31 | 104 | 31.6 | 35 | 40 | 33 | 107 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 34.4 | 35 | 40 | 32 | 104 | 35.6 | 40 | 40 | 33 | 107 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 46.5 | 50 | 50 | 43 | 104 | 47.8 | 50 | 50 | 44 | 107 |
| 575-3-60 | 4.8 | | 41 | 8 | | | | 1 | 7.6 | 0.4 | 8.6 | None | - | - | - | 11.8 | 15 | 15 | 12 | 46 | 12.2 | 15 | 15 | 13 | 47 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 22.6 | 25 | 25 | 21 | 46 | 23.1 | 25 | 25 | 21 | 47 |
| | | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 33.6 | 35 | 35 | 31 | 46 | 34.1 | 35 | 35 | 31 | 47 |

1. Minimum Circuit Ampacity.
2. Dual element, time delay type.
3. HACR type per NEC.

KQ04 to 06 medium indoor blower - without powered convenience outlet

Table 13: KQ04 to 06 medium indoor blower - without powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | | Max Fuse ² / Breaker ³ Size (Amps) | | Min Disconnect Rating | | MCA ¹ w/Pwr Exh (Amps) | | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Min Disconnect Rating/ Pwr Exh | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|-----|--|-----|-----------------------|-----|-----------------------------------|-----|---|--|---|--|--------------------------------|--|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | FLA | LRA | FLA | LRA | FLA | LRA | FLA | LRA | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | | | | 1.3 | 7.6 | 1.5 | | None | - | - | - | 29.8 | 30 | 45 | 29 | 129 | 31.3 | 35 | 45 | 31 | 133 | | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 39 | 40 | 45 | 36 | 129 | 40.9 | 45 | 45 | 38 | 133 | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 57 | 60 | 60 | 52 | 129 | 58.9 | 60 | 60 | 54 | 133 | | | | | |
| | 230-1-60 | 16.7 | 93.5 | 26 | | | | 1.4 | 7 | 1.3 | | None | - | - | - | 29.3 | 30 | 45 | 29 | 132 | 30.6 | 35 | 45 | 30 | 135 | | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 42.6 | 45 | 45 | 39 | 132 | 44.3 | 45 | 45 | 41 | 135 | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 63.5 | 70 | 70 | 58 | 132 | 65.1 | 70 | 70 | 60 | 135 | | | | | |
| | 208-3-60 | 12.2 | 97.5 | 19 | | | | 1.3 | 5.2 | 1.1 | | None | - | - | - | 21.8 | 25 | 30 | 22 | 123 | 22.9 | 25 | 35 | 23 | 125 | | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 23.5 | 25 | 30 | 22 | 123 | 24.9 | 25 | 35 | 23 | 125 | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 33.9 | 35 | 35 | 31 | 123 | 35.3 | 40 | 40 | 32 | 125 | | | | | |
| | 230-3-60 | 12.2 | 97.5 | 19 | | | | 1.4 | 5.2 | 1 | | None | - | - | - | 21.9 | 25 | 30 | 22 | 126 | 22.9 | 25 | 35 | 23 | 128 | | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 26 | 30 | 30 | 24 | 126 | 27.3 | 30 | 35 | 25 | 128 | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 38.1 | 40 | 40 | 35 | 126 | 39.4 | 40 | 40 | 36 | 128 | | | | | |
| | 460-3-60 | 5.8 | 44.3 | 9 | | | | 0.8 | 2.6 | 0.5 | | None | - | - | - | 10.7 | 15 | 15 | 11 | 59 | 11.2 | 15 | 15 | 11 | 60 | | | | | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 12.3 | 15 | 15 | 11 | 59 | 12.9 | 15 | 15 | 12 | 60 | | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 20.5 | 25 | 25 | 19 | 59 | 21.1 | 25 | 25 | 19 | 60 | | | | | |
| | 575-3-60 | 4.5 | 27.1 | 7 | | | | 0.6 | 2 | 0.4 | | None | - | - | - | 8.2 | 15 | 15 | 8 | 39 | 8.6 | 15 | 15 | 9 | 39 | | | | | |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 13.6 | 15 | 15 | 13 | 39 | 14.1 | 15 | 15 | 13 | 39 | | | | | |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.1 | 20 | 20 | 18 | 39 | 19.6 | 20 | 20 | 18 | 39 | | | | | |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | | | | 1.3 | 7.6 | 1.5 | | None | - | - | - | 33.2 | 35 | 50 | 33 | 138 | 34.7 | 35 | 50 | 34 | 141 | | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 39 | 40 | 50 | 36 | 138 | 40.9 | 45 | 50 | 38 | 141 | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 57 | 60 | 60 | 52 | 138 | 58.9 | 60 | 60 | 54 | 141 | | | | | |
| | 230-1-60 | 19.4 | 102 | 30 | | | | 1.4 | 7 | 1.3 | | None | - | - | - | 32.7 | 35 | 50 | 32 | 141 | 34 | 35 | 50 | 33 | 144 | | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 42.6 | 45 | 50 | 39 | 141 | 44.3 | 45 | 50 | 41 | 144 | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 63.5 | 70 | 70 | 58 | 141 | 65.1 | 70 | 70 | 60 | 144 | | | | | |
| | 208-3-60 | 12 | 123 | 19 | | | | 1.3 | 5.2 | 1.1 | | None | - | - | - | 21.5 | 25 | 30 | 21 | 148 | 22.6 | 25 | 30 | 23 | 151 | | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 23.5 | 25 | 30 | 22 | 148 | 24.9 | 25 | 30 | 23 | 151 | | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 33.9 | 35 | 35 | 31 | 148 | 35.3 | 40 | 40 | 32 | 151 | | | | | |
| | 230-3-60 | 12 | 123 | 19 | | | | 1.4 | 5.2 | 1 | | None | - | - | - | 21.6 | 25 | 30 | 21 | 151 | 22.6 | 25 | 30 | 23 | 154 | | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 26 | 30 | 30 | 24 | 151 | 27.3 | 30 | 30 | 25 | 154 | | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 38.1 | 40 | 40 | 35 | 151 | 39.4 | 40 | 40 | 36 | 154 | | | | | |
| | 460-3-60 | 6.3 | 60 | 10 | | | | 0.8 | 2.6 | 0.5 | | None | - | - | - | 11.3 | 15 | 15 | 11 | 74 | 11.8 | 15 | 15 | 12 | 75 | | | | | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 12.3 | 15 | 15 | 11 | 74 | 12.9 | 15 | 15 | 12 | 75 | | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 20.5 | 25 | 25 | 19 | 74 | 21.1 | 25 | 25 | 19 | 75 | | | | | |
| | 575-3-60 | 4.4 | 41 | 7 | | | | 0.6 | 2 | 0.4 | | None | - | - | - | 8.1 | 15 | 15 | 8 | 52 | 8.5 | 15 | 15 | 9 | 53 | | | | | |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 13.6 | 15 | 15 | 13 | 52 | 14.1 | 15 | 15 | 13 | 53 | | | | | |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.1 | 20 | 20 | 18 | 52 | 19.6 | 20 | 20 | 18 | 53 | | | | | |

Table 13: KQ04 to 06 medium indoor blower - without powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|-----|--------|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|-----|------|------------|--|--|-----------------------|-----|---------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | FLA | LRA | FLA | LRA | | | | | | | | | | |
| | | Model | kW | Stages | Amps | FLA | LRA | | | | | FLA | LRA | | | | | | | | | | | | |
| 06 (5) | 208-1-60 | 22.5 | 148 | 35 | | | | 2 | 7.6 | 1.5 | | None | - | - | - | 37.7 | 40 | 60 | 37 | 185 | 39.2 | 40 | 60 | 39 | 189 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 39 | 40 | 60 | 37 | 185 | 40.9 | 45 | 60 | 39 | 189 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 57 | 60 | 60 | 52 | 185 | 58.9 | 60 | 60 | 54 | 189 |
| | 230-1-60 | 22.5 | 148 | 35 | | | | 2.3 | 7 | 1.3 | | None | - | - | - | 37.4 | 40 | 50 | 37 | 188 | 38.7 | 40 | 60 | 38 | 191 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 42.6 | 45 | 50 | 39 | 188 | 44.3 | 45 | 60 | 41 | 191 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 63.5 | 70 | 70 | 58 | 188 | 65.1 | 70 | 70 | 60 | 191 |
| | 208-3-60 | 13.1 | 93 | 20 | | | | 2 | 5.2 | 1.1 | | None | - | - | - | 23.6 | 25 | 35 | 23 | 120 | 24.7 | 25 | 35 | 25 | 122 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 23.6 | 25 | 35 | 23 | 120 | 24.9 | 25 | 35 | 25 | 122 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 33.9 | 35 | 35 | 31 | 120 | 35.3 | 40 | 40 | 32 | 122 |
| | 230-3-60 | 13.1 | 93 | 20 | | | | 2.3 | 5.2 | 1 | | None | - | - | - | 23.9 | 25 | 35 | 24 | 123 | 24.9 | 25 | 35 | 25 | 125 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 26 | 30 | 35 | 24 | 123 | 27.3 | 30 | 35 | 25 | 125 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 38.1 | 40 | 40 | 35 | 123 | 39.4 | 40 | 40 | 36 | 125 |
| | 575-3-60 | 4.8 | 41 | 8 | | | | 1 | 2 | 0.4 | | None | - | - | - | 9 | 15 | 15 | 9 | 53 | 9.4 | 15 | 15 | 9 | 54 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.1 | 20 | 20 | 18 | 53 | 19.6 | 20 | 20 | 18 | 54 |
| | | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 30.1 | 35 | 35 | 28 | 53 | 30.6 | 35 | 35 | 28 | 54 |
| | 460-3-60 | 6.6 | 60 | 10 | | | | 1.3 | 2.6 | 0.5 | | None | - | - | - | 12.2 | 15 | 15 | 12 | 75 | 12.7 | 15 | 15 | 13 | 77 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 12.3 | 15 | 15 | 11 | 75 | 12.9 | 15 | 15 | 12 | 77 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 20.5 | 25 | 25 | 19 | 75 | 21.1 | 25 | 25 | 19 | 77 |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 24.3 | 25 | 25 | 22 | 75 | 24.9 | 25 | 25 | 23 | 77 |

KQ04 to 06 medium indoor blower - with powered convenience outlet

Table 14: KQ04 to 06 medium indoor blower - with powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | | Max Fuse ² / Breaker ³ Size (Amps) | | Min Disconnect Rating | | MCA ¹ w/Pwr Exh(Amps) | | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Min Disconnect Rating/ Pwr Exh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|-----|--|-----|-----------------------|------|----------------------------------|-----|---|-------|---|-----|--------------------------------|------|------|----|----|-----|------|------|----|----|-----|-------|-------|------|------|------|------|----|----|-----|------|------|----|----|-----|-------|-------|----|------|------|------|----|----|-----|------|------|----|----|-----|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | FLA | LRA | FLA | LRA | FLA | LRA | FLA | LRA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | | | | 1.3 | 7.6 | 1.5 | 8.6 | None | - | - | - | 34.1 | 35 | 50 | 34 | 134 | 35.6 | 40 | 50 | 36 | 137 | 10625 | 4.9 | 1 | 23.6 | 44.4 | 45 | 50 | 41 | 134 | 46.3 | 50 | 50 | 43 | 137 | 11125 | 7.9 | 1 | 38 | 62.4 | 70 | 70 | 57 | 134 | 64.3 | 70 | 70 | 59 | 137 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | None | - | - | - | 33.6 | 35 | 50 | 34 | 137 | 34.9 | 35 | 50 | 35 | 139 | 10625 | 6.5 | 1 | 27.1 | 48 | 50 | 50 | 44 | 137 | 49.6 | 50 | 50 | 46 | 139 | 11125 | 10.5 | 1 | 43.8 | 68.9 | 70 | 70 | 63 | 137 | 70.5 | 80 | 80 | 65 | 139 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | None | - | - | - | 26.1 | 30 | 35 | 26 | 127 | 27.2 | 30 | 35 | 28 | 130 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 127 | 30.3 | 35 | 35 | 28 | 130 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 127 | 40.6 | 45 | 45 | 37 | 130 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 127 | 54.9 | 60 | 60 | 50 | 130 | |
| | 230-1-60 | 16.7 | 93.5 | 26 | | | | 1.4 | 7 | 1.3 | 8.6 | None | - | - | - | 33.6 | 35 | 50 | 34 | 137 | 34.9 | 35 | 50 | 35 | 139 | 10625 | 6.5 | 1 | 27.1 | 48 | 50 | 50 | 44 | 137 | 49.6 | 50 | 50 | 46 | 139 | 11125 | 10.5 | 1 | 43.8 | 68.9 | 70 | 70 | 63 | 137 | 70.5 | 80 | 80 | 65 | 139 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | None | - | - | - | 26.1 | 30 | 35 | 26 | 127 | 27.2 | 30 | 35 | 28 | 130 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 127 | 30.3 | 35 | 35 | 28 | 130 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 127 | 40.6 | 45 | 45 | 37 | 130 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 127 | 54.9 | 60 | 60 | 50 | 130 | |
| | | | | | | | | | | | | None | - | - | - | 26.2 | 30 | 35 | 27 | 130 | 27.2 | 30 | 35 | 28 | 132 | 10625 | 6.5 | 1 | 15.6 | 31.4 | 35 | 35 | 29 | 130 | 32.6 | 35 | 35 | 30 | 132 | 11125 | 10.5 | 1 | 25.3 | 43.5 | 45 | 45 | 40 | 130 | 44.8 | 45 | 45 | 41 | 132 | 11625 | 16 | 1 | 38.5 | 60 | 60 | 60 | 55 | 130 | 61.3 | 70 | 70 | 56 | 132 | |
| | 460-3-60 | 5.8 | 44.3 | 9 | | | | 0.8 | 2.6 | 0.5 | 8.6 | None | - | - | - | 12.9 | 15 | 15 | 13 | 61 | 13.4 | 15 | 15 | 14 | 62 | 10646 | 6 | 1 | 7.2 | 14.9 | 15 | 15 | 14 | 61 | 15.6 | 20 | 20 | 14 | 62 | 11146 | 12 | 1 | 13.8 | 23.2 | 25 | 25 | 21 | 61 | 23.8 | 25 | 25 | 22 | 62 | 11446 | 14 | 1 | 16.8 | 26.9 | 30 | 30 | 25 | 61 | 27.6 | 30 | 30 | 25 | 62 | |
| | | | | | | | | | | | | None | - | - | - | 9.9 | 15 | 15 | 10 | 40 | 10.3 | 15 | 15 | 11 | 41 | 11058 | 9.2 | 1 | 8.9 | 15.8 | 20 | 20 | 15 | 40 | 16.3 | 20 | 20 | 15 | 41 | 11458 | 14 | 1 | 13.3 | 21.3 | 25 | 25 | 20 | 40 | 21.8 | 25 | 25 | 20 | 41 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | None | - | - | - | 37.5 | 40 | 50 | 37 | 142 | 39 | 40 | 50 | 39 | 146 | 10625 | 4.9 | 1 | 23.6 | 44.4 | 45 | 50 | 41 | 142 | 46.3 | 50 | 50 | 43 | 146 | 11125 | 7.9 | 1 | 38 | 62.4 | 70 | 70 | 57 | 142 | 64.3 | 70 | 70 | 59 | 146 | | | | | | | | | | | | | | | |
| | 05 (4) | 208-1-60 | 19.4 | 102 | 30 | | | | 1.3 | 7.6 | 1.5 | 8.6 | None | - | - | - | 37.5 | 40 | 50 | 37 | 142 | 39 | 40 | 50 | 39 | 146 | 10625 | 4.9 | 1 | 23.6 | 44.4 | 45 | 50 | 41 | 142 | 46.3 | 50 | 50 | 43 | 146 | 11125 | 7.9 | 1 | 38 | 62.4 | 70 | 70 | 57 | 142 | 64.3 | 70 | 70 | 59 | 146 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | None | - | - | - | 37 | 40 | 50 | 37 | 145 | 38.3 | 40 | 50 | 38 | 148 | 10625 | 6.5 | 1 | 27.1 | 48 | 50 | 50 | 44 | 145 | 49.6 | 50 | 50 | 46 | 148 | 11125 | 10.5 | 1 | 43.8 | 68.9 | 70 | 70 | 63 | 145 | 70.5 | 80 | 80 | 65 | 148 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | None | - | - | - | 25.8 | 30 | 35 | 26 | 153 | 26.9 | 30 | 35 | 27 | 155 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 153 | 30.3 | 35 | 35 | 28 | 155 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 153 | 40.6 | 45 | 45 | 37 | 155 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 153 | 54.9 | 60 | 60 | 50 | 155 |
| | | 230-1-60 | 19.4 | 102 | 30 | | | | 1.4 | 7 | 1.3 | 8.6 | None | - | - | - | 37 | 40 | 50 | 37 | 145 | 38.3 | 40 | 50 | 38 | 148 | 10625 | 6.5 | 1 | 27.1 | 48 | 50 | 50 | 44 | 145 | 49.6 | 50 | 50 | 46 | 148 | 11125 | 10.5 | 1 | 43.8 | 68.9 | 70 | 70 | 63 | 145 | 70.5 | 80 | 80 | 65 | 148 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | None | - | - | - | 25.8 | 30 | 35 | 26 | 153 | 26.9 | 30 | 35 | 27 | 155 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 153 | 30.3 | 35 | 35 | 28 | 155 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 153 | 40.6 | 45 | 45 | 37 | 155 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 153 | 54.9 | 60 | 60 | 50 | 155 |
| | | | | | | | | | | | | | None | - | - | - | 25.9 | 30 | 35 | 26 | 156 | 26.9 | 30 | 35 | 27 | 158 | 10625 | 6.5 | 1 | 15.6 | 31.4 | 35 | 35 | 29 | 156 | 32.6 | 35 | 35 | 30 | 158 | 11125 | 10.5 | 1 | 25.3 | 43.5 | 45 | 45 | 40 | 156 | 44.8 | 45 | 45 | 41 | 158 | 11625 | 16 | 1 | 38.5 | 60 | 60 | 60 | 55 | 156 | 61.3 | 70 | 70 | 56 | 158 |
| | | 460-3-60 | 6.3 | 60 | 10 | | | | 0.8 | 2.6 | 0.5 | 8.6 | None | - | - | - | 13.5 | 15 | 15 | 14 | 76 | 14 | 15 | 15 | 14 | 78 | 10646 | 6 | 1 | 7.2 | 14.9 | 15 | 15 | 14 | 76 | 15.6 | 20 | 20 | 14 | 78 | 11146 | 12 | 1 | 13.8 | 23.2 | 25 | 25 | 21 | 76 | 23.8 | 25 | 25 | 22 | 78 | 11446 | 14 | 1 | 16.8 | 26.9 | 30 | 30 | 25 | 76 | 27.6 | 30 | 30 | 25 | 78 |
| | | | | | | | | | | | | | None | - | - | - | 9.8 | 15 | 15 | 10 | 54 | 10.2 | 15 | 15 | 10 | 55 | 11058 | 9.2 | 1 | 8.9 | 15.8 | 20 | 20 | 15 | 54 | 16.3 | 20 | 20 | 15 | 55 | 11458 | 14 | 1 | 13.3 | 21.3 | 25 | 25 | 20 | 54 | 21.8 | 25 | 25 | 20 | 55 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | None | - | - | - | 37.5 | 40 | 50 | 37 | 142 | 39 | 40 | 50 | 39 | 146 | 10625 | 4.9 | 1 | 23.6 | 44.4 | 45 | 50 | 41 | 142 | 46.3 | 50 | 50 | 43 | 146 | 11125 | 7.9 | 1 | 38 | 62.4 | 70 | 70 | 57 | 142 | 64.3 | 70 | 70 | 59 | 146 | | | | | | | | | | | | | | |

Table 14: KQ04 to 06 medium indoor blower - with powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|-----|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|-----|---------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-1-60 | 22.5 | 148 | 35 | | | | 2 | 7.6 | 1.5 | 8.6 | None | - | - | - | 42 | 45 | 60 | 42 | 190 | 43.5 | 45 | 60 | 44 | 193 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 44.4 | 45 | 60 | 42 | 190 | 46.3 | 50 | 60 | 44 | 193 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 38 | 62.4 | 70 | 70 | 57 | 190 | 64.3 | 70 | 70 | 59 | 193 |
| | 230-1-60 | 22.5 | 148 | 35 | | | | 2.3 | 7 | 1.3 | 8.6 | None | - | - | - | 41.7 | 45 | 60 | 42 | 193 | 43 | 45 | 60 | 43 | 196 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 48 | 50 | 60 | 44 | 193 | 49.6 | 50 | 60 | 46 | 196 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 68.9 | 70 | 70 | 63 | 193 | 70.5 | 80 | 80 | 65 | 196 |
| | 208-3-60 | 13.1 | 93 | 20 | | | | 2 | 5.2 | 1.1 | 8.6 | None | - | - | - | 27.9 | 30 | 40 | 28 | 124 | 29 | 30 | 40 | 30 | 127 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 40 | 28 | 124 | 30.3 | 35 | 40 | 30 | 127 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 124 | 40.6 | 45 | 45 | 37 | 127 |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 124 | 54.9 | 60 | 60 | 50 | 127 |
| | 230-3-60 | 13.1 | 93 | 20 | | | | 2.3 | 5.2 | 1 | 8.6 | None | - | - | - | 28.2 | 30 | 40 | 29 | 127 | 29.2 | 30 | 40 | 30 | 130 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 31.4 | 35 | 40 | 29 | 127 | 32.6 | 35 | 40 | 30 | 130 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 43.5 | 45 | 45 | 40 | 127 | 44.8 | 45 | 45 | 41 | 130 |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 60 | 60 | 60 | 55 | 127 | 61.3 | 70 | 70 | 56 | 130 |
| | 460-3-60 | 6.6 | 60 | 10 | | | | 1.3 | 2.6 | 0.5 | 8.6 | None | - | - | - | 14.4 | 15 | 20 | 15 | 78 | 14.9 | 15 | 20 | 15 | 79 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 14.9 | 15 | 20 | 14 | 78 | 15.6 | 20 | 20 | 14 | 79 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 23.2 | 25 | 25 | 21 | 78 | 23.8 | 25 | 25 | 22 | 79 |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 26.9 | 30 | 30 | 25 | 78 | 27.6 | 30 | 30 | 25 | 79 |
| | 575-3-60 | 4.8 | 41 | 8 | | | | 1 | 2 | 0.4 | 8.6 | None | - | - | - | 10.7 | 15 | 15 | 11 | 55 | 11.1 | 15 | 15 | 11 | 56 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 21.3 | 25 | 25 | 20 | 55 | 21.8 | 25 | 25 | 20 | 56 |
| | | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 32.3 | 35 | 35 | 30 | 55 | 32.8 | 35 | 35 | 30 | 56 |

KQ04 to 06 high indoor blower - without powered convenience outlet

Table 15: KQ04 to 06 high indoor blower - without powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | | Max Fuse ² / Breaker ³ Size (Amps) | | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Min Disconnect Rating/ Pwr Exh | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|-----|--|------|-----------------------|-----|---------------------|---|-----|---|--|--------------------------------|--|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | FLA | LRA | FLA | LRA | FLA | LRA | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 (3) | 208-3-60 | 12.2 | 97.5 | 19 | | | | 1.3 | 5.2 | 1.1 | | None | - | - | - | 21.8 | 25 | 30 | 22 | 123 | 22.9 | 25 | 35 | 23 | 125 | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 23.5 | 25 | 30 | 22 | 123 | 24.9 | 25 | 35 | 23 | 125 | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 33.9 | 35 | 35 | 31 | 123 | 35.3 | 40 | 40 | 32 | 125 | | | | |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 48.1 | 50 | 50 | 44 | 123 | 49.5 | 50 | 50 | 46 | 125 | | | | |
| | 230-3-60 | 12.2 | 97.5 | 19 | | | | 1.4 | 5.2 | 1 | | None | - | - | - | 21.9 | 25 | 30 | 22 | 126 | 22.9 | 25 | 35 | 23 | 128 | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 26 | 30 | 30 | 24 | 126 | 27.3 | 30 | 35 | 25 | 128 | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 38.1 | 40 | 40 | 35 | 126 | 39.4 | 40 | 40 | 36 | 128 | | | | |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 54.6 | 60 | 60 | 50 | 126 | 55.9 | 60 | 60 | 51 | 128 | | | | |
| | 460-3-60 | 5.8 | 44.3 | 9 | | | | 0.8 | 2.6 | 0.5 | | None | - | - | - | 10.7 | 15 | 15 | 11 | 59 | 11.2 | 15 | 15 | 11 | 60 | | | | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 12.3 | 15 | 15 | 11 | 59 | 12.9 | 15 | 15 | 12 | 60 | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 20.5 | 25 | 25 | 19 | 59 | 21.1 | 25 | 25 | 19 | 60 | | | | |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 24.3 | 25 | 25 | 22 | 59 | 24.9 | 25 | 25 | 23 | 60 | | | | |
| 575-3-60 | 4.5 | 27.1 | 7 | | | | 0.6 | 2 | 0.4 | | None | - | - | - | 8.2 | 15 | 15 | 8 | 39 | 8.6 | 15 | 15 | 9 | 39 | | | | | |
| | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 13.6 | 15 | 15 | 13 | 39 | 14.1 | 15 | 15 | 13 | 39 | | | | | |
| | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.1 | 20 | 20 | 18 | 39 | 19.6 | 20 | 20 | 18 | 39 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05 (4) | 208-3-60 | 12 | 123 | 19 | | | | 1.3 | 5.2 | 1.1 | | None | - | - | - | 21.5 | 25 | 30 | 21 | 148 | 22.6 | 25 | 30 | 23 | 151 | | | | |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 23.5 | 25 | 30 | 22 | 148 | 24.9 | 25 | 30 | 23 | 151 | | | | |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 33.9 | 35 | 35 | 31 | 148 | 35.3 | 40 | 40 | 32 | 151 | | | | |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 48.1 | 50 | 50 | 44 | 148 | 49.5 | 50 | 50 | 46 | 151 | | | | |
| | 230-3-60 | 12 | 123 | 19 | | | | 1.4 | 5.2 | 1 | | None | - | - | - | 21.6 | 25 | 30 | 21 | 151 | 22.6 | 25 | 30 | 23 | 154 | | | | |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 26 | 30 | 30 | 24 | 151 | 27.3 | 30 | 30 | 25 | 154 | | | | |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 38.1 | 40 | 40 | 35 | 151 | 39.4 | 40 | 40 | 36 | 154 | | | | |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 54.6 | 60 | 60 | 50 | 151 | 55.9 | 60 | 60 | 51 | 154 | | | | |
| | 460-3-60 | 6.3 | 60 | 10 | | | | 0.8 | 2.6 | 0.5 | | None | - | - | - | 11.3 | 15 | 15 | 11 | 74 | 11.8 | 15 | 15 | 12 | 75 | | | | |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 12.3 | 15 | 15 | 11 | 74 | 12.9 | 15 | 15 | 12 | 75 | | | | |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 20.5 | 25 | 25 | 19 | 74 | 21.1 | 25 | 25 | 19 | 75 | | | | |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 24.3 | 25 | 25 | 22 | 74 | 24.9 | 25 | 25 | 23 | 75 | | | | |
| | 575-3-60 | 4.4 | 41 | 7 | | | | 0.6 | 2 | 0.4 | | None | - | - | - | 8.1 | 15 | 15 | 8 | 52 | 8.5 | 15 | 15 | 9 | 53 | | | | |
| | | | | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 13.6 | 15 | 15 | 13 | 52 | 14.1 | 15 | 15 | 13 | 53 | | | | |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 19.1 | 20 | 20 | 18 | 52 | 19.6 | 20 | 20 | 18 | 53 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 15: KQ04 to 06 high indoor blower - without powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|-----|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|-----|---------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-3-60 | 13.1 | 93 | 20 | | | | 2 | 7.5 | 1.1 | | None | - | - | - | 25.9 | 30 | 35 | 26 | 146 | 27 | 30 | 40 | 27 | 149 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 26.4 | 30 | 35 | 26 | 146 | 27.8 | 30 | 40 | 27 | 149 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 36.8 | 40 | 40 | 34 | 146 | 38.1 | 40 | 40 | 35 | 149 |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 51 | 60 | 60 | 47 | 146 | 52.4 | 60 | 60 | 48 | 149 |
| | 230-3-60 | 13.1 | 93 | 20 | | | | 2.3 | 7.5 | 1 | | None | - | - | - | 26.2 | 30 | 35 | 26 | 153 | 27.2 | 30 | 40 | 27 | 155 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 28.9 | 30 | 35 | 27 | 153 | 30.1 | 35 | 40 | 28 | 155 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 41 | 45 | 45 | 38 | 153 | 42.3 | 45 | 45 | 39 | 155 |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 57.5 | 60 | 60 | 53 | 153 | 58.8 | 60 | 60 | 54 | 155 |
| | 460-3-60 | 6.6 | 60 | 10 | | | | 1.3 | 3.4 | 0.5 | | None | - | - | - | 13 | 15 | 15 | 13 | 90 | 13.5 | 15 | 15 | 14 | 92 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 13.3 | 15 | 15 | 12 | 90 | 13.9 | 15 | 15 | 13 | 92 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 21.5 | 25 | 25 | 20 | 90 | 22.1 | 25 | 25 | 20 | 92 |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 25.3 | 30 | 30 | 23 | 90 | 25.9 | 30 | 30 | 24 | 92 |
| | 575-3-60 | 4.8 | 41 | 8 | | | | 1 | 2.8 | 0.4 | | None | - | - | - | 9.8 | 15 | 15 | 10 | 65 | 10.2 | 15 | 15 | 10 | 66 |
| | | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 20.1 | 25 | 25 | 19 | 65 | 20.6 | 25 | 25 | 19 | 66 |
| | | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 31.1 | 35 | 35 | 29 | 65 | 31.6 | 35 | 35 | 29 | 66 |

KQ04 to 06 high indoor blower - with powered convenience outlet

Table 16: KQ04 to 06 high indoor blower - with powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | | Max Fuse ² / Breaker ³ Size (Amps) | | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | | Min Disconnect Rating/ Pwr Exh | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|----------------------|--------------|------|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|-----|--|-----|-----------------------|------|---------------------|---|-----|---|-------|--------------------------------|------|------|------|----|----|-----|------|------|----|----|-----|-------|-------|------|------|------|------|----|----|-----|------|------|----|----|-----|-------|-------|----|------|------|------|----|----|-----|------|------|----|----|-----|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | FLA | LRA | FLA | LRA | FLA | LRA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 (3) | 208-3-60 | 12.2 | 97.5 | 19 | | | | 1.3 | 5.2 | 1.1 | 8.6 | None | - | - | - | 26.1 | 30 | 35 | 26 | 127 | 27.2 | 30 | 35 | 28 | 130 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 127 | 30.3 | 35 | 35 | 28 | 130 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 127 | 40.6 | 45 | 45 | 37 | 130 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 127 | 54.9 | 60 | 60 | 50 | 130 | |
| | | | | | | | | | | | | None | - | - | - | 26.2 | 30 | 35 | 27 | 130 | 27.2 | 30 | 35 | 28 | 132 | 10625 | 6.5 | 1 | 15.6 | 31.4 | 35 | 35 | 29 | 130 | 32.6 | 35 | 35 | 30 | 132 | 11125 | 10.5 | 1 | 25.3 | 43.5 | 45 | 45 | 40 | 130 | 44.8 | 45 | 45 | 41 | 132 | 11625 | 16 | 1 | 38.5 | 60 | 60 | 60 | 55 | 130 | 61.3 | 70 | 70 | 56 | 132 | |
| | | | | | | | | | | | | None | - | - | - | 12.9 | 15 | 15 | 13 | 61 | 13.4 | 15 | 15 | 14 | 62 | 10646 | 6 | 1 | 7.2 | 14.9 | 15 | 15 | 14 | 61 | 15.6 | 20 | 20 | 14 | 62 | 11146 | 12 | 1 | 13.8 | 23.2 | 25 | 25 | 21 | 61 | 23.8 | 25 | 25 | 22 | 62 | 11446 | 14 | 1 | 16.8 | 26.9 | 30 | 30 | 25 | 61 | 27.6 | 30 | 30 | 25 | 62 | |
| | | | | | | | | | | | | None | - | - | - | 9.9 | 15 | 15 | 10 | 40 | 10.3 | 15 | 15 | 11 | 41 | 11058 | 9.2 | 1 | 8.9 | 15.8 | 20 | 20 | 15 | 40 | 16.3 | 20 | 20 | 15 | 41 | 11458 | 14 | 1 | 13.3 | 21.3 | 25 | 25 | 20 | 40 | 21.8 | 25 | 25 | 20 | 41 | | | | | | | | | | | | | | | |
| | 05 (4) | 208-3-60 | 12 | 123 | 19 | | | | 1.3 | 5.2 | 1.1 | 8.6 | None | - | - | - | 25.8 | 30 | 35 | 26 | 153 | 26.9 | 30 | 35 | 27 | 155 | 10625 | 4.9 | 1 | 13.6 | 28.9 | 30 | 35 | 27 | 153 | 30.3 | 35 | 35 | 28 | 155 | 11125 | 7.9 | 1 | 21.9 | 39.3 | 40 | 40 | 36 | 153 | 40.6 | 45 | 45 | 37 | 155 | 11625 | 12 | 1 | 33.3 | 53.5 | 60 | 60 | 49 | 153 | 54.9 | 60 | 60 | 50 | 155 |
| | | | | | | | | | | | | | None | - | - | - | 25.9 | 30 | 35 | 26 | 156 | 26.9 | 30 | 35 | 27 | 158 | 10625 | 6.5 | 1 | 15.6 | 31.4 | 35 | 35 | 29 | 156 | 32.6 | 35 | 35 | 30 | 158 | 11125 | 10.5 | 1 | 25.3 | 43.5 | 45 | 45 | 40 | 156 | 44.8 | 45 | 45 | 41 | 158 | 11625 | 16 | 1 | 38.5 | 60 | 60 | 60 | 55 | 156 | 61.3 | 70 | 70 | 56 | 158 |
| | | | | | | | | | | | | | None | - | - | - | 13.5 | 15 | 15 | 14 | 76 | 14 | 15 | 15 | 14 | 78 | 10646 | 6 | 1 | 7.2 | 14.9 | 15 | 15 | 14 | 76 | 15.6 | 20 | 20 | 14 | 78 | 11146 | 12 | 1 | 13.8 | 23.2 | 25 | 25 | 21 | 76 | 23.8 | 25 | 25 | 22 | 78 | 11446 | 14 | 1 | 16.8 | 26.9 | 30 | 30 | 25 | 76 | 27.6 | 30 | 30 | 25 | 78 |
| | | | | | | | | | | | | | None | - | - | - | 9.8 | 15 | 15 | 10 | 54 | 10.2 | 15 | 15 | 10 | 55 | 11058 | 9.2 | 1 | 8.9 | 15.8 | 20 | 20 | 15 | 54 | 16.3 | 20 | 20 | 15 | 55 | 11458 | 14 | 1 | 13.3 | 21.3 | 25 | 25 | 20 | 54 | 21.8 | 25 | 25 | 20 | 55 | | | | | | | | | | | | | | |

Table 16: KQ04 to 06 high indoor blower - with powered convenience outlet

| Size (Tons) | Nominal Unit Voltage | Compressor 1 | | | Compressor 2 | | | OD Fan Motors (each) | Supply Blower Motor | Pwr Exh Motor | Pwr Conv Outlet | Electric Heat Option Field Installed Kit 2EK045* | | | | MCA (Amps) | Min Fuse ² / Breaker ³ Size (Amps) | Max Fuse ² / Breaker ³ Size (Amps) | Min Disconnect Rating | | MCA w/Pwr Exh(Amps) | Min Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Max Fuse ² / Breaker ³ Size w/ Pwr Exh (Amps) | Min Disconnect Rating / Pwr Exh | |
|-------------|----------------------|--------------|-----|-----|--------------|-----|-----|----------------------|---------------------|---------------|-----------------|---|------|--------|------|------------|--|--|-----------------------|------|---------------------|---|---|---------------------------------|-----|
| | | RLA | LRA | MCC | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-3-60 | 13.1 | 93 | 20 | | | | 2 | 7.5 | 1.1 | 8.6 | None | - | - | - | 30.2 | 35 | 40 | 31 | 150 | 31.3 | 35 | 40 | 32 | 153 |
| | | | | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 31.8 | 35 | 40 | 31 | 150 | 33.1 | 35 | 40 | 32 | 153 |
| | | | | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 42.1 | 45 | 45 | 39 | 150 | 43.5 | 45 | 45 | 40 | 153 |
| | | | | | | | | | | | | 11625 | 12 | 1 | 33.3 | 56.4 | 60 | 60 | 52 | 150 | 57.8 | 60 | 60 | 53 | 153 |
| | 230-3-60 | 13.1 | 93 | 20 | | | | 2.3 | 7.5 | 1 | 8.6 | None | - | - | - | 30.5 | 35 | 40 | 31 | 157 | 31.5 | 35 | 40 | 32 | 160 |
| | | | | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 34.3 | 35 | 40 | 32 | 157 | 35.5 | 40 | 40 | 33 | 160 |
| | | | | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 46.4 | 50 | 50 | 43 | 157 | 47.6 | 50 | 50 | 44 | 160 |
| | | | | | | | | | | | | 11625 | 16 | 1 | 38.5 | 62.9 | 70 | 70 | 58 | 157 | 64.1 | 70 | 70 | 59 | 160 |
| | 460-3-60 | 6.6 | 60 | 10 | | | | 1.3 | 3.4 | 0.5 | 8.6 | None | - | - | - | 15.2 | 20 | 20 | 16 | 93 | 15.7 | 20 | 20 | 16 | 94 |
| | | | | | | | | | | | | 10646 | 6 | 1 | 7.2 | 15.9 | 20 | 20 | 15 | 93 | 16.6 | 20 | 20 | 15 | 94 |
| | | | | | | | | | | | | 11146 | 12 | 1 | 13.8 | 24.2 | 25 | 25 | 22 | 93 | 24.8 | 25 | 25 | 23 | 94 |
| | | | | | | | | | | | | 11446 | 14 | 1 | 16.8 | 27.9 | 30 | 30 | 26 | 93 | 28.6 | 30 | 30 | 26 | 94 |
| 575-3-60 | 4.8 | 41 | 8 | | | | 1 | 2.8 | 0.4 | 8.6 | None | - | - | - | 11.5 | 15 | 15 | 12 | 67 | 11.9 | 15 | 15 | 12 | 68 | |
| | | | | | | | | | | | 11458 | 14 | 1 | 13.3 | 22.3 | 25 | 25 | 20 | 67 | 22.8 | 25 | 25 | 21 | 68 | |
| | | | | | | | | | | | 12358 | 23 | 1 | 22.1 | 33.3 | 35 | 35 | 31 | 67 | 33.8 | 35 | 35 | 31 | 68 | |

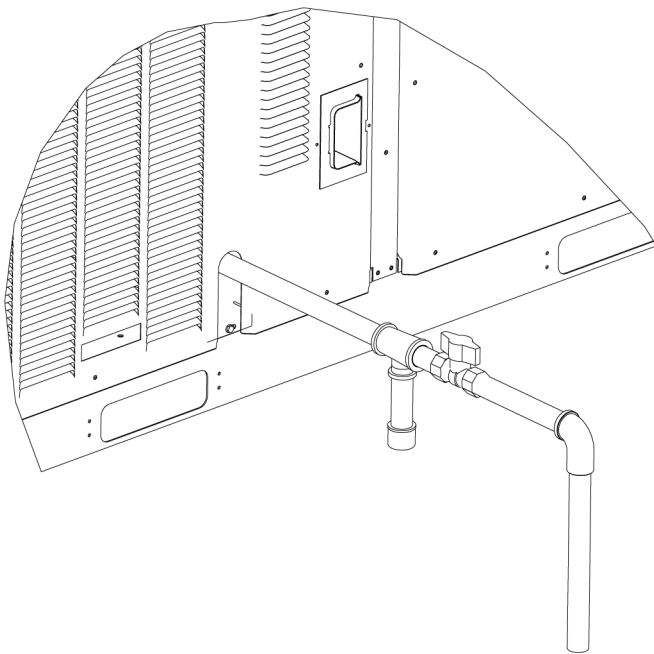
Optional gas heat

These gas-fired heaters have aluminized-steel or optional stainless steel, tubular heat exchangers with spark ignition.

Gas piping

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of run. "National Fuel Gas Code" Z223.1 (in U.S.A.) or the current Gas Installation Codes CSA-B149.1 (in Canada) should be followed in all cases unless superseded by local codes or gas utility requirements. Refer to the Pipe sizing [Table 17](#). The heating value of the gas may differ with locality. The value should be checked with the local gas utility.

Figure 20: Side entry gas piping



Note: Routing of gas piping must not interfere with the flue or heat compartment access.

Table 17: Gas pipe sizing - capacity of pipe

| Length of Pipe (ft) | Nominal iron pipe size | | |
|---------------------|------------------------|-------|-----------|
| | 3/4 in. | 1 in. | 1 1/4 in. |
| 10 | 278 | 520 | 1050 |
| 20 | 190 | 350 | 730 |
| 30 | 152 | 285 | 590 |
| 40 | 130 | 245 | 500 |
| 50 | 115 | 215 | 440 |
| 60 | 105 | 195 | 400 |
| 70 | 96 | 180 | 370 |
| 80 | 90 | 170 | 350 |
| 90 | 84 | 160 | 320 |
| 100 | 79 | 150 | 305 |

Note: Maximum capacity of pipe in cubic feet of gas per hour based upon a pressure drop of 0.3 in. W.C. and 0.6 specific gravity gas.

Note: There may be a local gas utility requirement specifying a minimum diameter for gas piping. Units require either a 1/2 in. or 3/4 in. pipe connection at the entrance fitting. Line should not be sized smaller than the entrance fitting size.

Table 18: Gas heat supply air

| Model (size) | Gas heat description | Opt. | Supply air (CFM) | |
|--------------|----------------------|------|------------------|------|
| | | | Heating | |
| | | | Min | Max |
| KQ04 (3) | Low, NOx | L | 900 | 1480 |
| | Low | D | 890 | 1480 |
| | Med, NOx | M | 900 | 1520 |
| | Med | E | 1060 | 1510 |
| | Low, ULN | U | 900 | 1500 |
| | High, ULN | W | 1050 | 1500 |
| KQ05 (4) | Low, NOx | L | 1190 | 1980 |
| | Low | D | 1210 | 1990 |
| | Med, NOx | M | 1190 | 2020 |
| | Med | E | 1200 | 2020 |
| | High, NOx | N | 1200 | 1990 |
| | High | F | 1390 | 2190 |
| | Low, ULN | U | 1200 | 2000 |
| | High, ULN | W | 1200 | 2000 |
| KQ06 (5) | Low, NOx | L | 1480 | 2440 |
| | Low | D | 1480 | 2470 |
| | Med, NOx | M | 1520 | 2470 |
| | Med | E | 1510 | 2510 |
| | High, NOx | N | 1510 | 2500 |
| | High | F | 1490 | 2500 |
| | Low, ULN | U | 1500 | 2500 |
| | High, ULN | W | 1500 | 2500 |

Gas connection

The gas supply line can be routed within the space and roof curb, exiting through the unit's basepan. Refer to [Figure 11](#) and [Figure 12](#) for the gas piping inlet location. Typical supply piping arrangements are shown in [Figure 20](#). All pipe nipples, fittings, and the gas cock are field supplied.

Gas piping recommendations:

1. A drip leg and a ground joint union must be installed in the gas piping.
2. Where required by local codes, a manual shut-off valve must be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance.

 **WARNING**

Natural gas may contain some propane. Propane is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe. Shellac based compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clydes's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out loose particles. Before initial start-up, be sure that all gas lines external to the unit have been purged of air.
5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under [Limitations](#).
6. A 1/8 in. NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the unit.
7. After the gas connections have been completed, open the main shut-off valve admitting *normal gas pressure* to the mains. *Check all joints for leaks with soap solution or other material suitable for the purpose. NEVER USE A FLAME.*

 **WARNING**

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

 **CAUTION**

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 psig.

Pressures greater than 1/2 psig will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 psig, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig.

 **WARNING**

Threaded joints should be coated with a sealing compound that is resistant to the action of liquefied petroleum gases. **Do not use Teflon tape.**

Check all connections for leaks when piping is completed using a soap solution. **NEVER USE A FLAME.**

 **WARNING**

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

Combustion air and flue exhaust

Venting slots in the heating compartment access panel remove the need for a combustion air hood. The gas heat flue exhaust is routed from the unit through a field installed exhaust hood with screen. See [Figure 21](#) for location of hood within the unit and [Figure 22](#) for installation of the hood. If necessary, a flue exhaust extension can be installed at the point of installation.

Figure 21: Flue exhaust hood shipping location



Figure 22: Flue exhaust hood installed



Options and accessories

Economizer

The Economizer can be a factory-installed option or a field-installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Economizer accessories include complete instructions for installation.

There are two Economizer options. Each of the following options are specific to footprint and unit voltage:

1. Vertical Flow application with barometric relief standard.
2. Horizontal Flow application with barometric relief standard.

Power Exhaust

The Power Exhaust is a field installed accessory. Field installed Power Exhaust accessories include complete instructions for installation.

There are two field installed Power Exhaust accessories:

1. Down Flow application.
2. Horizontal Flow application that requires the purchase of a barometric relief hood.

Table 19: Supply air limitations

| Model (size) | Supply Air (CFM) | |
|--------------|------------------|---------|
| | Minimum | Maximum |
| KQ04 (3) | 900 | 1500 |
| KQ05 (4) | 1200 | 2000 |
| KQ06 (5) | 1500 | 2500 |

Rain hood

All of the hood components, including the mist eliminators, the gasketing and the hardware for assembling, are packaged and located between the condenser coil section and the main unit cabinet, if the unit has factory installed options. If field installed accessories are being installed all parts necessary for the installation comes in the accessory.

Condensate overflow switch

Factory- or field-installed option.

Mounted to the unit drain pan, the condensate overflow switch is a float switch that monitors the level of water in the drain pan to shut down unit operation and prevent drain pan overflow within the unit.

VFD Shaft Grounding Device

Factory- or field-installed option.

Available on units with a VFD, the shaft grounding device helps prevent electrical bearing fluting damage to the blower motor shaft by safely diverting harmful shaft voltages and bearing currents to ground, increasing the motor longevity.

Blower phasing

KQ units are correctly phased at the factory. Check for correct blower rotation. If the blower rotates in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the phasing of the **Field Line Connection at the factory or field supplied disconnect** to obtain proper rotation.

 **CAUTION**

When installing equipment in a facility with a 3 phase high-leg delta power supply, care must be taken to ensure that the high-leg conductor is not attached to either of the two legs of the (single phase, direct drive) X13 or ECM motors. Failure to do so can result in the motor acting erratically or not running at all.

Check for the high leg conductor by checking voltage of each phase to ground.

Example: A or L1 phase to ground, voltage reading is 120V. B or L2 phase to ground, voltage reading is 195 V to 208 V. C or L3 phase to ground, voltage reading is 120 V. Therefore B or L2 phase is the high Leg. The high should always be wired to the center or B or L2 tap.

Note: Check all three phase motors and compressors for proper rotation after making a change. If it is necessary to change 3 phase motor rotation, swap A or L1 and C or L3 only.

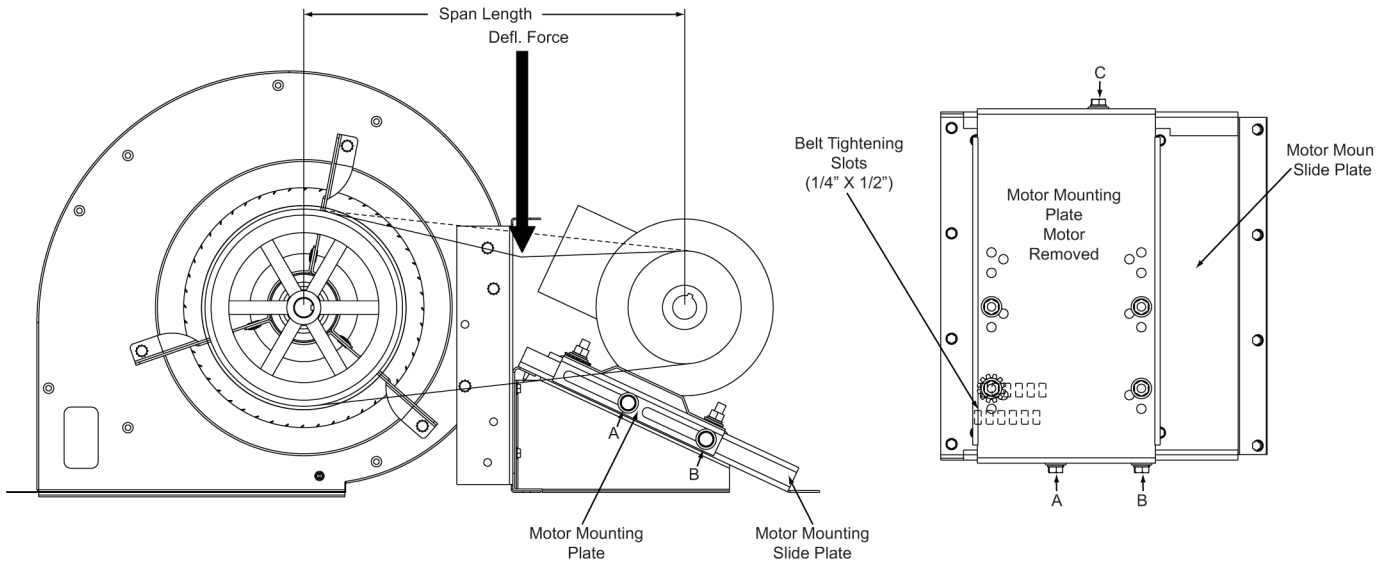
Blower rotation

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased. See [Blower phasing](#).

Belt tension

The tension on the belt should be adjusted as shown in [Figure 23](#).

Figure 23: Belt adjustment



CAUTION

Procedure for adjusting belt tension:

1. Loosen the three nuts (A and B on side and C on back) of motor mount slide plate.
2. Adjust tension by placing a flat heat screwdriver into the belt tightening slots (1/4 in. x 1/2 in.) in the motor mount slide plate and applying pressure against the motor mounting plate. See [Figure 23](#).
3. Tighten the three loosened nuts (A, B, and C).
4. Determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. Use belt tension checker to apply a perpendicular force to the belt at the midpoint of the span as shown. Deflection distance of 4 mm (5/32 in.) is obtained.
5. After adjustments are completed re-tighten nuts (A, B, and C).

Altitude and temperature correction for CFM, static pressure and power.

The information below should be used to assist in application of product when being applied at altitudes at or exceeding 1000 ft above sea level.

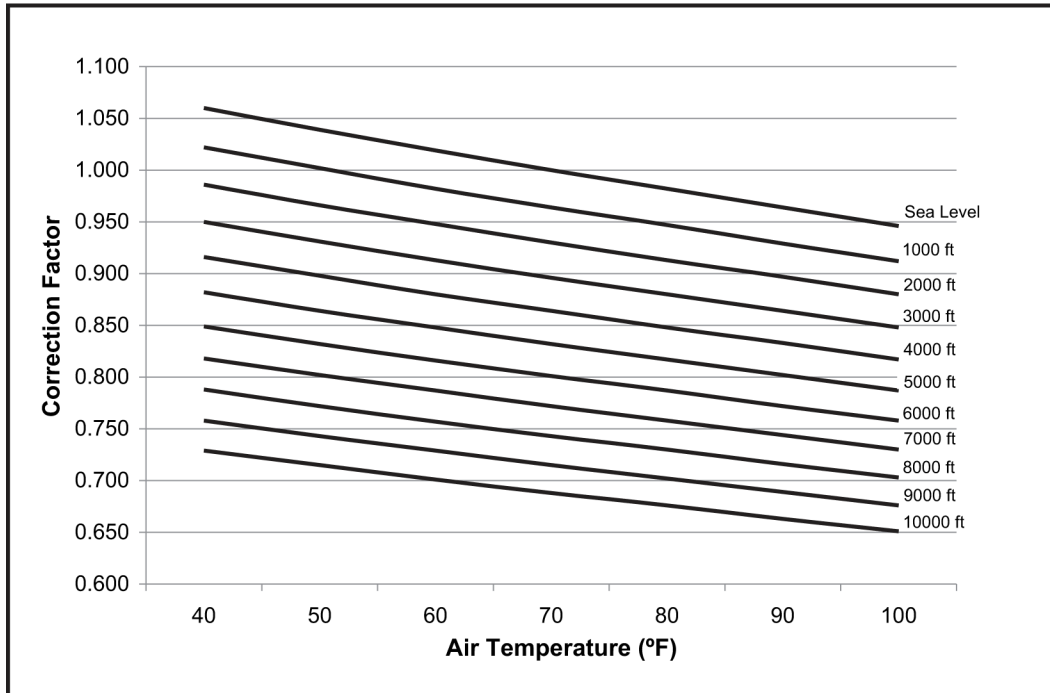
The air flow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to use the indoor blower tables for high altitude applications, certain corrections are necessary.

A centrifugal fan is a constant volume device. This means that, if the rpm remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure will be generated and less power will be required than a similar application at sea level. Air density correction factors are shown in [Table 20](#) and [Figure 24](#).

Table 20: Altitude/temperature correction factors

| Air temp. | Altitude (Ft.) | | | | | | | | | | |
|-----------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
| 40 | 1.060 | 1.022 | 0.986 | 0.950 | 0.916 | 0.882 | 0.849 | 0.818 | 0.788 | 0.758 | 0.729 |
| 50 | 1.039 | 1.002 | 0.966 | 0.931 | 0.898 | 0.864 | 0.832 | 0.802 | 0.772 | 0.743 | 0.715 |
| 60 | 1.019 | 0.982 | 0.948 | 0.913 | 0.880 | 0.848 | 0.816 | 0.787 | 0.757 | 0.729 | 0.701 |
| 70 | 1.000 | 0.964 | 0.930 | 0.896 | 0.864 | 0.832 | 0.801 | 0.772 | 0.743 | 0.715 | 0.688 |
| 80 | 0.982 | 0.947 | 0.913 | 0.880 | 0.848 | 0.817 | 0.787 | 0.758 | 0.730 | 0.702 | 0.676 |
| 90 | 0.964 | 0.929 | 0.897 | 0.864 | 0.833 | 0.802 | 0.772 | 0.744 | 0.716 | 0.689 | 0.663 |
| 100 | 0.946 | 0.912 | 0.880 | 0.848 | 0.817 | 0.787 | 0.758 | 0.730 | 0.703 | 0.676 | 0.651 |

Figure 24: Altitude/temperature correction factors



The examples below will assist in determining the airflow performance of the product at altitude.

Example 1: What are the corrected CFM, static pressure, and BHP at an elevation of 5,000 ft. if the blower performance data is 1,400 CFM, 0.6 IWC and 0.67 BHP?

Solution: At an elevation of 5,000 ft. the indoor blower will still deliver 1,400 CFM if the rpm is unchanged. However, [Table 24](#) must be used to determine the static pressure and BHP. Since no temperature data is given, we will assume an air temperature of 70°F. [Table 20](#) shows the correction factor to be 0.832.

Corrected static pressure = $0.6 \times 0.832 = 0.499$ IWC

Corrected BHP = $0.67 \times 0.832 = 0.56$

Example 2: A system, located at 5,000 feet of elevation, is to deliver 1,400 CFM at a static pressure of 1.5 in. Use the unit blower tables to select the blower speed and the BHP requirement.

Solution: As in the example above, no temperature information is given, so 70°F is assumed.

The 1.5 in. static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea level conditions.

Sea level static pressure = $1.5 / .832 = 1.80$ in.

Enter the blower table at 1,400 sCFM and static pressure of 1.80 in. The RPM listed will be the same RPM needed at 5,000 ft.

Suppose that the corresponding BHP listed in the table is 0.7. This value must be corrected for elevation.

BHP at 5,000 ft. = $0.7 \times .832 = 0.58$

Drive Selection

1. Determine side or bottom supply duct Application.

2. Determine desired airflow.
3. Calculate or measure the amount of external static pressure.
 - Add or deduct any additional static resistance from [Supply air drive adjustment](#).
4. Using the operating point determined from Steps 1, 2 & 3, locate this point on the appropriate supply air blower performance table. Linear interpolation may be necessary.
5. Noting the RPM and BHP from Step 4, locate the appropriate motor and, or drive.
6. Review the BHP compared to the motor options available. Select the appropriate motor and, or drive.
7. Review the RPM range for the motor options available. Select the appropriate drive if multiple drives are available for the chosen motor.
8. Determine turns open to obtain the desired operation point.

Example

1. 1600 CFM, bottom supply
2. 1.2 iwg
3. Using the airflow performance table below, the following data point was located: 1359 RPM & 1.11 BHP.
4. Using the RPM selection table below, Model KQ and Size 05 (4 tons) is found.
5. 1359 RPM is within the range of the 2.4 HP, High Static drives.
6. Using the 2.4 HP motor and High Static drive, 2 1/2 turns open will achieve 1359 RPM.

Airflow performance

Example supply air blower performance

Table 21: KQ05 (4.0 ton) bottom duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1200 | 908 | 0.34 | 994 | 0.45 | 1072 | 0.55 | 1145 | 0.64 | 1214 | 0.74 | 1283 | 0.83 | 1352 | 0.92 | 1424 | 1.01 | 1502 | 1.11 | 1586 | 1.20 |
| 1300 | 921 | 0.40 | 1007 | 0.51 | 1085 | 0.61 | 1158 | 0.70 | 1227 | 0.80 | 1296 | 0.89 | 1365 | 0.98 | 1437 | 1.07 | 1514 | 1.17 | 1599 | 1.26 |
| 1400 | 938 | 0.47 | 1023 | 0.58 | 1101 | 0.68 | 1174 | 0.77 | 1244 | 0.86 | 1312 | 0.96 | 1382 | 1.05 | 1454 | 1.14 | 1531 | 1.23 | 1616 | 1.33 |
| 1500 | 959 | 0.55 | 1044 | 0.65 | 1122 | 0.75 | 1195 | 0.85 | 1265 | 0.94 | 1333 | 1.03 | 1403 | 1.12 | 1475 | 1.21 | 1552 | 1.31 | 1637 | 1.41 |
| 1600 | 985 | 0.63 | 1070 | 0.73 | 1148 | 0.83 | 1221 | 0.93 | 1290 | 1.02 | 1359 | 1.11 | 1428 | 1.20 | 1500 | 1.29 | 1578 | 1.39 | -- | -- |
| 1700 | 1015 | 0.71 | 1100 | 0.82 | 1179 | 0.92 | 1251 | 1.01 | 1321 | 1.11 | 1389 | 1.20 | 1459 | 1.29 | 1531 | 1.38 | 1608 | 1.48 | -- | -- |
| 1800 | 1050 | 0.81 | 1136 | 0.91 | 1214 | 1.01 | 1287 | 1.11 | 1356 | 1.20 | 1425 | 1.29 | 1494 | 1.39 | 1566 | 1.48 | 1644 | 1.57 | -- | -- |
| 1900 | 1091 | 0.91 | 1176 | 1.02 | 1254 | 1.12 | 1327 | 1.21 | 1397 | 1.31 | 1465 | 1.40 | 1534 | 1.49 | 1607 | 1.58 | -- | -- | -- | -- |
| 2000 | 1136 | 1.02 | 1222 | 1.13 | 1300 | 1.23 | 1372 | 1.32 | 1442 | 1.42 | 1510 | 1.51 | 1580 | 1.60 | -- | -- | -- | -- | -- | -- |
| | Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | Field supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | -- Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See Table 23 for additional applications. **Note:** See Table 22 to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

Table 22: Example RPM selection

| Model | Size (tons) | Airflow option | Phase | Max BHP | Blower sheave | Motor sheave | 6 turns open | 5 turns open | 4 turns open | 3 turns open | 2 turns open | 1 turns open | Fully closed |
|-------|-------------|----------------|--------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| KQ | 05 (4) | Std. | Direct drive | | | | | | | | | | |
| | | Med. | 1 | 1.5 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | Med. | 3 | 2.4 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | H. static | 3 | 2.4 | AK46 | 1VL44 | N/A | 1167 | 1250 | 1333 | 1417 | 1500 | 1593 |

Table 23: Example additional static resistance

| Model | Size tons | CFM | Cooling only ¹ | Economizer ^{2,3} | 4 in. Filter ² | Electric heat kW ² | | | |
|-------|-----------|------|---------------------------|---------------------------|---------------------------|-------------------------------|-------------|------------|------|
| | | | | | | 6/6.5 | 9.2/10.5/11 | 13.8/14/16 | 23 |
| KQ | 05 (4.0) | 1200 | 0.07 | 0.06 | --- | 0.01 | 0.01 | 0.02 | 0.03 |
| | | 1300 | 0.10 | 0.07 | --- | 0.01 | 0.01 | 0.03 | 0.03 |
| | | 1400 | 0.12 | 0.08 | --- | 0.02 | 0.02 | 0.03 | 0.04 |
| | | 1500 | 0.14 | 0.08 | --- | 0.02 | 0.02 | 0.04 | 0.04 |
| | | 1600 | 0.16 | 0.09 | --- | 0.02 | 0.02 | 0.04 | 0.05 |
| | | 1700 | 0.18 | 0.10 | --- | 0.03 | 0.03 | 0.05 | 0.05 |
| | | 1800 | 0.22 | 0.11 | --- | 0.03 | 0.03 | 0.05 | 0.06 |
| | | 1900 | 0.25 | 0.12 | --- | 0.04 | 0.04 | 0.06 | 0.07 |
| | | 2000 | 0.28 | 0.13 | --- | 0.04 | 0.04 | 0.07 | 0.08 |

KQ04-06 side duct application (belt drive)

Table 24: KQ04 (3.0 ton) side duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 900 | n/a | n/a | 877 | 0.25 | 965 | 0.34 | 1050 | 0.44 | 1133 | 0.54 | 1213 | 0.64 | 1292 | 0.74 | 1371 | 0.83 | 1450 | 0.92 | 1531 | 1.01 |
| 1000 | 795 | 0.21 | 887 | 0.29 | 976 | 0.38 | 1061 | 0.48 | 1143 | 0.58 | 1224 | 0.68 | 1303 | 0.78 | 1382 | 0.87 | 1461 | 0.96 | 1541 | 1.05 |
| 1100 | 806 | 0.25 | 899 | 0.34 | 988 | 0.43 | 1073 | 0.53 | 1155 | 0.63 | 1236 | 0.73 | 1315 | 0.83 | 1394 | 0.92 | 1473 | 1.01 | 1553 | 1.09 |
| 1200 | 820 | 0.31 | 913 | 0.39 | 1002 | 0.48 | 1087 | 0.58 | 1169 | 0.68 | 1249 | 0.78 | 1329 | 0.88 | 1407 | 0.97 | 1487 | 1.06 | 1567 | 1.15 |
| 1300 | 836 | 0.37 | 929 | 0.45 | 1018 | 0.54 | 1103 | 0.64 | 1185 | 0.74 | 1265 | 0.84 | 1345 | 0.94 | 1423 | 1.03 | 1503 | 1.12 | 1583 | 1.21 |

Table 24: KQ04 (3.0 ton) side duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1400 | 855 | 0.43 | 948 | 0.52 | 1036 | 0.61 | 1121 | 0.70 | 1204 | 0.80 | 1284 | 0.90 | 1363 | 1.00 | 1442 | 1.10 | 1521 | 1.19 | -- | -- |
| 1500 | 876 | 0.50 | 969 | 0.58 | 1058 | 0.68 | 1143 | 0.77 | 1225 | 0.87 | 1305 | 0.97 | 1385 | 1.07 | 1464 | 1.17 | 1543 | 1.26 | -- | -- |
| | Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| -- | Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See [Table 23](#) for additional applications. **Note:** See [Table 22](#) to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

Table 25: KQ05 (4.0 ton) side duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1200 | 893 | 0.37 | 976 | 0.46 | 1054 | 0.56 | 1128 | 0.66 | 1199 | 0.75 | 1268 | 0.85 | 1336 | 0.94 | 1404 | 1.03 | 1474 | 1.12 | 1545 | 1.20 |
| 1300 | 910 | 0.43 | 993 | 0.52 | 1071 | 0.62 | 1144 | 0.72 | 1216 | 0.81 | 1285 | 0.91 | 1353 | 1.00 | 1421 | 1.09 | 1491 | 1.18 | 1562 | 1.26 |
| 1400 | 931 | 0.49 | 1014 | 0.59 | 1092 | 0.69 | 1166 | 0.78 | 1237 | 0.88 | 1306 | 0.97 | 1374 | 1.06 | 1442 | 1.15 | 1512 | 1.24 | 1583 | 1.33 |
| 1500 | 956 | 0.56 | 1039 | 0.66 | 1117 | 0.76 | 1191 | 0.85 | 1262 | 0.95 | 1331 | 1.04 | 1399 | 1.14 | 1467 | 1.23 | 1537 | 1.31 | 1608 | 1.40 |
| 1600 | 985 | 0.64 | 1067 | 0.74 | 1145 | 0.83 | 1219 | 0.93 | 1290 | 1.03 | 1359 | 1.12 | 1428 | 1.21 | 1496 | 1.30 | 1565 | 1.39 | 1637 | 1.47 |
| 1700 | 1016 | 0.73 | 1099 | 0.82 | 1177 | 0.92 | 1251 | 1.02 | 1322 | 1.11 | 1391 | 1.21 | 1459 | 1.30 | 1528 | 1.39 | 1597 | 1.48 | -- | -- |
| 1800 | 1051 | 0.82 | 1134 | 0.92 | 1212 | 1.02 | 1286 | 1.11 | 1357 | 1.21 | 1426 | 1.30 | 1494 | 1.40 | 1562 | 1.49 | 1632 | 1.57 | -- | -- |
| 1900 | 1088 | 0.93 | 1171 | 1.02 | 1249 | 1.12 | 1323 | 1.22 | 1394 | 1.31 | 1463 | 1.41 | 1532 | 1.50 | 1600 | 1.59 | -- | -- | -- | -- |
| 2000 | 1128 | 1.04 | 1211 | 1.14 | 1289 | 1.23 | 1363 | 1.33 | 1434 | 1.43 | 1503 | 1.52 | 1571 | 1.61 | 1640 | 1.70 | -- | -- | -- | -- |
| | Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | Field supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| -- | Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See [Table 23](#) for additional applications. **Note:** See [Table 22](#) to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

Table 26: KQ06 (5.0 ton) side duct

| CFM | ¹Available external static pressure - IWG¹ | | | | | | | | | | | | | | | | | | | |
|---|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1500 | 806 | 0.35 | 885 | 0.47 | 961 | 0.60 | 1034 | 0.73 | 1104 | 0.86 | 1170 | 1.00 | 1233 | 1.13 | 1292 | 1.26 | 1346 | 1.39 | 1396 | 1.52 |
| 1600 | 825 | 0.44 | 904 | 0.56 | 980 | 0.68 | 1053 | 0.81 | 1123 | 0.95 | 1189 | 1.08 | 1252 | 1.22 | 1311 | 1.35 | 1365 | 1.48 | 1415 | 1.61 |
| 1700 | 846 | 0.52 | 925 | 0.64 | 1001 | 0.76 | 1074 | 0.89 | 1144 | 1.03 | 1210 | 1.16 | 1273 | 1.30 | 1332 | 1.43 | 1386 | 1.56 | 1436 | 1.69 |
| 1800 | 869 | 0.60 | 947 | 0.72 | 1023 | 0.84 | 1096 | 0.97 | 1166 | 1.11 | 1233 | 1.24 | 1295 | 1.38 | 1354 | 1.51 | 1409 | 1.64 | 1459 | 1.77 |
| 1900 | 892 | 0.68 | 971 | 0.80 | 1047 | 0.93 | 1120 | 1.06 | 1190 | 1.19 | 1256 | 1.32 | 1319 | 1.46 | 1378 | 1.59 | 1432 | 1.72 | 1482 | 1.85 |
| 2000 | 916 | 0.77 | 995 | 0.89 | 1071 | 1.01 | 1144 | 1.14 | 1214 | 1.28 | 1280 | 1.41 | 1343 | 1.55 | 1402 | 1.68 | 1456 | 1.81 | 1506 | 1.94 |
| 2100 | 941 | 0.86 | 1019 | 0.98 | 1095 | 1.11 | 1168 | 1.24 | 1238 | 1.37 | 1305 | 1.50 | 1367 | 1.64 | 1426 | 1.77 | 1481 | 1.90 | 1531 | 2.03 |
| 2200 | 966 | 0.96 | 1044 | 1.08 | 1120 | 1.21 | 1193 | 1.34 | 1263 | 1.47 | 1329 | 1.61 | 1392 | 1.74 | 1451 | 1.87 | 1505 | 2.01 | 1555 | 2.13 |
| 2300 | 990 | 1.07 | 1069 | 1.19 | 1145 | 1.32 | 1218 | 1.45 | 1287 | 1.58 | 1354 | 1.72 | 1417 | 1.85 | 1476 | 1.98 | 1530 | 2.11 | 1580 | 2.24 |
| 2400 | 1015 | 1.19 | 1093 | 1.31 | 1169 | 1.44 | 1242 | 1.57 | 1312 | 1.70 | 1379 | 1.83 | 1441 | 1.97 | 1500 | 2.10 | 1555 | 2.23 | -- | -- |
| 2500 | 1039 | 1.32 | 1118 | 1.44 | 1193 | 1.56 | 1266 | 1.69 | 1336 | 1.83 | 1403 | 1.96 | 1466 | 2.10 | 1524 | 2.23 | 1579 | 2.36 | -- | -- |
| Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | | |
| High static option with motor rated at 2.9-hp | | | | | | | | | | | | | | | | | | | | |
| -- Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | | |

1 Blower performance includes gas heat exchangers and 2 in. filters. See Table 23 for additional applications. **Note:** See Table 22 to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

KQ04-06 side duct application (direct drive)

Table 27: KQ04-06 side duct (cooling)

| Unit (ton) | Motor speed | Available external static | | | | | | | | | | | | | | |
|------------|-------------|---------------------------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|
| | | 0.2 | | | 0.4 | | | 0.6 | | | 0.8 | | | 1.0 | | |
| | | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM |
| KQ04 (3) | 1 (LOW) | 1147 | 152 | 659 | 988 | 181 | 787 | 901 | 203 | 891 | 800 | 226 | 987 | 682 | 247 | 1071 |
| | 2 (MED/LOW) | 1214 | 175 | 683 | 1094 | 206 | 810 | 965 | 232 | 896 | 898 | 258 | 1003 | 794 | 276 | 1084 |
| | 3 (MED) | 1402 | 234 | 735 | 1324 | 264 | 835 | 1161 | 302 | 947 | 1074 | 329 | 1034 | 986 | 351 | 1114 |
| | 4 (MED/HI) | 1570 | 310 | 791 | 1512 | 348 | 884 | 1429 | 381 | 977 | 1253 | 420 | 1079 | 1130 | 423 | 1148 |
| | 5 (HI) | 1825 | 448 | 866 | 1769 | 487 | 946 | 1705 | 521 | 1023 | 1610 | 559 | 1107 | 1229 | 472 | 1159 |
| KQ05 (4) | 1 (LOW) | 1412 | 261 | 793 | 1322 | 290 | 884 | 1244 | 321 | 966 | 1109 | 347 | 1059 | 1035 | 369 | 1131 |
| | 2 (MED/LOW) | 1521 | 313 | 831 | 1461 | 349 | 920 | 1382 | 374 | 989 | 1283 | 400 | 1072 | 1166 | 426 | 1150 |
| | 3 (MED) | 1636 | 376 | 874 | 1574 | 413 | 959 | 1487 | 441 | 1034 | 1413 | 465 | 1099 | 1184 | 446 | 1164 |
| | 4 (MED/HI) | 1813 | 484 | 937 | 1747 | 522 | 1013 | 1668 | 552 | 1088 | 1581 | 565 | 1141 | 1212 | 458 | 1170 |
| | 5 (HI) | 2351 | 920 | 1111 | 2129 | 819 | 1138 | 1912 | 718 | 1153 | 1678 | 622 | 1164 | 1378 | 513 | 1176 |
| KQ06 (5) | 1 (LOW) | 1692 | 345 | 727 | 1583 | 374 | 797 | 1482 | 403 | 866 | 1380 | 437 | 939 | 1262 | 462 | 1000 |
| | 2 (MED/LOW) | 1849 | 438 | 779 | 1755 | 468 | 843 | 1667 | 495 | 902 | 1552 | 530 | 971 | 1439 | 558 | 1033 |
| | 3 (MED) | 1989 | 532 | 818 | 1904 | 564 | 877 | 1828 | 598 | 935 | 1738 | 628 | 994 | 1633 | 664 | 1058 |
| | 4 (MED/HI) | 2159 | 673 | 876 | 2087 | 713 | 931 | 2010 | 729 | 985 | 1933 | 778 | 1035 | 1859 | 812 | 1091 |
| | 5 (HI) | 2349 | 852 | 928 | 2270 | 887 | 978 | 2195 | 922 | 1028 | 2118 | 947 | 1075 | 1973 | 914 | 1109 |

Table 28: KQ04-06 side duct (gas heat)

| Unit (ton) | Motor speed | Available external static | | | | | | | | | | | | | | |
|------------|-------------|---------------------------|-------|-----|------|-------|------|------|-------|------|------|-------|------|------|-------|------|
| | | 0.2 | | | 0.4 | | | 0.6 | | | 0.8 | | | 1.0 | | |
| | | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM |
| KQ04 (3) | 1 (LOW) | 1094 | 165 | 715 | 956 | 187 | 828 | 851 | 213 | 932 | 752 | 237 | 1026 | 638 | 253 | 1100 |
| | 2 (MED/LOW) | 1180 | 189 | 735 | 1064 | 216 | 842 | 940 | 242 | 945 | 849 | 263 | 1029 | 748 | 286 | 1116 |
| | 3 (MED) | 1353 | 251 | 790 | 1271 | 280 | 883 | 1138 | 310 | 979 | 1036 | 338 | 1068 | 958 | 362 | 1144 |
| | 4 (MED/HI) | 1517 | 340 | 863 | 1450 | 374 | 940 | 1364 | 398 | 1021 | 1232 | 434 | 1114 | 1022 | 393 | 1163 |
| | 5 (HI) | 1763 | 490 | 953 | 1690 | 520 | 1020 | 1619 | 549 | 1086 | 1442 | 525 | 1140 | 1070 | 413 | 1168 |

Table 28: KQ04-06 side duct (gas heat)

| Unit (ton) | Motor speed | Available external static | | | | | | | | | | | | | | |
|------------|-------------|---------------------------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|
| | | 0.2 | | | 0.4 | | | 0.6 | | | 0.8 | | | 1.0 | | |
| | | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM |
| KQ05 (4) | 1 (LOW) | 1356 | 285 | 870 | 1280 | 308 | 939 | 1185 | 332 | 1019 | 1074 | 364 | 1113 | 850 | 343 | 1179 |
| | 2 (MED/LOW) | 1459 | 349 | 920 | 1390 | 371 | 985 | 1306 | 393 | 1050 | 1195 | 421 | 1133 | 862 | 350 | 1182 |
| | 3 (MED) | 1553 | 412 | 973 | 1475 | 442 | 1039 | 1415 | 462 | 1092 | 1289 | 469 | 1155 | 880 | 357 | 1182 |
| | 4 (MED/HI) | 1718 | 530 | 1040 | 1645 | 562 | 1102 | 1534 | 555 | 1147 | 1377 | 510 | 1165 | 961 | 390 | 1183 |
| | 5 (HI) | 1955 | 737 | 1146 | 1780 | 665 | 1156 | 1587 | 599 | 1168 | 1407 | 529 | 1175 | 902 | 366 | 1186 |
| KQ06 (5) | 1 (LOW) | 1570 | 372 | 791 | 1463 | 399 | 855 | 1358 | 425 | 918 | 1260 | 456 | 983 | 1161 | 481 | 1044 |
| | 2 (MED/LOW) | 1740 | 468 | 845 | 1638 | 496 | 903 | 1543 | 529 | 965 | 1454 | 553 | 1015 | 1360 | 578 | 1070 |
| | 3 (MED) | 1882 | 569 | 889 | 1786 | 601 | 947 | 1687 | 629 | 1002 | 1587 | 660 | 1053 | 1487 | 680 | 1105 |
| | 4 (MED/HI) | 2052 | 732 | 955 | 1967 | 749 | 999 | 1883 | 778 | 1049 | 1788 | 808 | 1099 | 1621 | 778 | 1130 |
| | 5 (HI) | 2227 | 905 | 1004 | 2138 | 937 | 1051 | 2038 | 947 | 1091 | 1869 | 887 | 1118 | 1662 | 811 | 1137 |

KQ04-06 bottom duct application (belt drive)

Table 29: KQ04 (3.0 ton) bottom duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 900 | 792 | 0.14 | 879 | 0.25 | 968 | 0.37 | 1055 | 0.49 | 1141 | 0.61 | 1226 | 0.73 | 1308 | 0.84 | 1388 | 0.93 | 1466 | 1.01 | 1541 | 1.06 |
| 1000 | 804 | 0.18 | 893 | 0.29 | 981 | 0.41 | 1069 | 0.53 | 1155 | 0.66 | 1239 | 0.77 | 1322 | 0.88 | 1402 | 0.98 | 1480 | 1.05 | 1554 | 1.10 |
| 1100 | 819 | 0.23 | 909 | 0.34 | 997 | 0.46 | 1084 | 0.58 | 1171 | 0.71 | 1255 | 0.82 | 1337 | 0.93 | 1418 | 1.03 | 1495 | 1.10 | 1570 | 1.15 |
| 1200 | 837 | 0.29 | 926 | 0.40 | 1015 | 0.52 | 1102 | 0.64 | 1188 | 0.76 | 1273 | 0.88 | 1355 | 0.99 | 1435 | 1.08 | 1513 | 1.16 | 1588 | 1.21 |
| 1300 | 857 | 0.36 | 946 | 0.46 | 1035 | 0.58 | 1122 | 0.70 | 1208 | 0.83 | 1293 | 0.94 | 1375 | 1.05 | 1455 | 1.15 | 1533 | 1.22 | -- | -- |
| 1400 | 880 | 0.43 | 969 | 0.53 | 1058 | 0.65 | 1145 | 0.77 | 1231 | 0.90 | 1315 | 1.02 | 1398 | 1.12 | 1478 | 1.22 | 1556 | 1.29 | -- | -- |
| 1500 | 905 | 0.50 | 994 | 0.61 | 1082 | 0.73 | 1170 | 0.85 | 1256 | 0.97 | 1340 | 1.09 | 1423 | 1.20 | 1503 | 1.30 | 1581 | 1.37 | -- | -- |
| | Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | -- Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See Table 23 for additional applications. **Note:** See Table 22 to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

Table 30: KQ05 (4.0 ton) bottom duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1200 | 908 | 0.34 | 994 | 0.45 | 1072 | 0.55 | 1145 | 0.64 | 1214 | 0.74 | 1283 | 0.83 | 1352 | 0.92 | 1424 | 1.01 | 1502 | 1.11 | 1586 | 1.20 |
| 1300 | 921 | 0.40 | 1007 | 0.51 | 1085 | 0.61 | 1158 | 0.70 | 1227 | 0.80 | 1296 | 0.89 | 1365 | 0.98 | 1437 | 1.07 | 1514 | 1.17 | 1599 | 1.26 |
| 1400 | 938 | 0.47 | 1023 | 0.58 | 1101 | 0.68 | 1174 | 0.77 | 1244 | 0.86 | 1312 | 0.96 | 1382 | 1.05 | 1454 | 1.14 | 1531 | 1.23 | 1616 | 1.33 |
| 1500 | 959 | 0.55 | 1044 | 0.65 | 1122 | 0.75 | 1195 | 0.85 | 1265 | 0.94 | 1333 | 1.03 | 1403 | 1.12 | 1475 | 1.21 | 1552 | 1.31 | 1637 | 1.41 |
| 1600 | 985 | 0.63 | 1070 | 0.73 | 1148 | 0.83 | 1221 | 0.93 | 1290 | 1.02 | 1359 | 1.11 | 1428 | 1.20 | 1500 | 1.29 | 1578 | 1.39 | -- | -- |
| 1700 | 1015 | 0.71 | 1100 | 0.82 | 1179 | 0.92 | 1251 | 1.01 | 1321 | 1.11 | 1389 | 1.20 | 1459 | 1.29 | 1531 | 1.38 | 1608 | 1.48 | -- | -- |
| 1800 | 1050 | 0.81 | 1136 | 0.91 | 1214 | 1.01 | 1287 | 1.11 | 1356 | 1.20 | 1425 | 1.29 | 1494 | 1.39 | 1566 | 1.48 | 1644 | 1.57 | -- | -- |
| 1900 | 1091 | 0.91 | 1176 | 1.02 | 1254 | 1.12 | 1327 | 1.21 | 1397 | 1.31 | 1465 | 1.40 | 1534 | 1.49 | 1607 | 1.58 | -- | -- | -- | -- |
| 2000 | 1136 | 1.02 | 1222 | 1.13 | 1300 | 1.23 | 1372 | 1.32 | 1442 | 1.42 | 1510 | 1.51 | 1580 | 1.60 | -- | -- | -- | -- | -- | -- |
| | Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | Field supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | |
| | -- Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See Table 23 for additional applications. **Note:** See Table 22 to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

Table 31: KQ06 (5.0 ton) bottom duct

| CFM | ¹ Available external static pressure - IWG ¹ | | | | | | | | | | | | | | | | | | | |
|---|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 0.2 | | 0.4 | | 0.6 | | 0.8 | | 1.0 | | 1.2 | | 1.4 | | 1.6 | | 1.8 | | 2.0 | |
| | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP | RPM | BHP |
| 1500 | 846 | 0.34 | 914 | 0.48 | 983 | 0.62 | 1052 | 0.75 | 1120 | 0.89 | 1188 | 1.02 | 1254 | 1.16 | 1318 | 1.29 | 1378 | 1.43 | 1435 | 1.56 |
| 1600 | 868 | 0.41 | 936 | 0.55 | 1004 | 0.68 | 1073 | 0.82 | 1142 | 0.95 | 1210 | 1.09 | 1276 | 1.23 | 1339 | 1.36 | 1400 | 1.50 | 1457 | 1.63 |
| 1700 | 889 | 0.49 | 957 | 0.62 | 1026 | 0.76 | 1095 | 0.90 | 1164 | 1.03 | 1231 | 1.17 | 1297 | 1.30 | 1361 | 1.44 | 1422 | 1.57 | 1479 | 1.71 |
| 1800 | 911 | 0.57 | 979 | 0.71 | 1048 | 0.85 | 1117 | 0.98 | 1186 | 1.12 | 1253 | 1.25 | 1319 | 1.39 | 1383 | 1.53 | 1443 | 1.66 | 1501 | 1.79 |
| 1900 | 934 | 0.67 | 1002 | 0.81 | 1071 | 0.94 | 1140 | 1.08 | 1208 | 1.21 | 1276 | 1.35 | 1342 | 1.48 | 1405 | 1.62 | 1466 | 1.75 | 1523 | 1.89 |
| 2000 | 958 | 0.77 | 1026 | 0.91 | 1094 | 1.04 | 1164 | 1.18 | 1232 | 1.32 | 1300 | 1.45 | 1366 | 1.59 | 1429 | 1.72 | 1490 | 1.86 | 1547 | 1.99 |
| 2100 | 983 | 0.88 | 1051 | 1.02 | 1120 | 1.15 | 1189 | 1.29 | 1258 | 1.42 | 1325 | 1.56 | 1391 | 1.69 | 1455 | 1.83 | 1516 | 1.96 | 1573 | 2.10 |
| 2200 | 1010 | 0.99 | 1078 | 1.13 | 1147 | 1.26 | 1216 | 1.40 | 1285 | 1.54 | 1352 | 1.67 | 1418 | 1.81 | 1482 | 1.94 | 1543 | 2.08 | -- | -- |
| 2300 | 1039 | 1.11 | 1107 | 1.25 | 1176 | 1.38 | 1245 | 1.52 | 1314 | 1.65 | 1381 | 1.79 | 1447 | 1.93 | 1511 | 2.06 | 1572 | 2.20 | -- | -- |
| 2400 | 1070 | 1.23 | 1138 | 1.37 | 1207 | 1.50 | 1276 | 1.64 | 1345 | 1.78 | 1412 | 1.91 | 1478 | 2.05 | 1542 | 2.18 | -- | -- | -- | -- |
| 2500 | 1103 | 1.36 | 1171 | 1.49 | 1240 | 1.63 | 1309 | 1.77 | 1378 | 1.90 | 1445 | 2.04 | 1511 | 2.17 | 1575 | 2.31 | -- | -- | -- | -- |
| Medium static option with motor rated at 2.4-hp | | | | | | | | | | | | | | | | | | | | |
| High static option with motor rated at 2.9-hp | | | | | | | | | | | | | | | | | | | | |
| -- Exceeds recommended blower speed | | | | | | | | | | | | | | | | | | | | |

¹ Blower performance includes gas heat exchangers and 2 in. filters. See Table 23 for additional applications. **Note:** See Table 22 to determine desired motor sheave setting and to determine the maximum continuous BHP. kW = 0.929 x BHP

KQ04-06 bottom duct application (direct drive)

Table 32: KQ04-06 bottom duct (cooling)

| Unit (ton) | Motor speed | Available external static | | | | | | | | | | | | | | |
|------------|-------------|---------------------------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|
| | | 0.2 | | | 0.4 | | | 0.6 | | | 0.8 | | | 1.0 | | |
| | | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM |
| KQ04 (3) | 1 (LOW) | 1086 | 165 | 721 | 929 | 192 | 837 | 861 | 211 | 927 | 769 | 235 | 1023 | 636 | 253 | 1108 |
| | 2 (MED/LOW) | 1171 | 192 | 745 | 1035 | 221 | 856 | 946 | 241 | 944 | 868 | 267 | 1037 | 771 | 290 | 1119 |
| | 3 (MED) | 1328 | 257 | 806 | 1255 | 280 | 890 | 1106 | 316 | 993 | 1038 | 336 | 1068 | 944 | 354 | 1148 |
| | 4 (MED/HI) | 1509 | 340 | 867 | 1449 | 376 | 953 | 1309 | 407 | 1046 | 1210 | 436 | 1121 | 1002 | 387 | 1162 |
| | 5 (HI) | 1740 | 490 | 959 | 1683 | 522 | 1033 | 1618 | 555 | 1101 | 1315 | 500 | 1149 | 1037 | 404 | 1168 |
| KQ05 (4) | 1 (LOW) | 1330 | 284 | 863 | 1261 | 302 | 929 | 1172 | 329 | 1006 | 1053 | 353 | 1088 | 970 | 376 | 1162 |
| | 2 (MED/LOW) | 1458 | 349 | 917 | 1385 | 372 | 981 | 1307 | 395 | 1047 | 1174 | 421 | 1129 | 1023 | 398 | 1170 |
| | 3 (MED) | 1553 | 414 | 965 | 1477 | 440 | 1033 | 1427 | 461 | 1086 | 1334 | 480 | 1148 | 1017 | 400 | 1175 |
| | 4 (MED/HI) | 1714 | 532 | 1041 | 1638 | 563 | 1107 | 1555 | 563 | 1143 | 1374 | 503 | 1161 | 1033 | 406 | 1176 |
| | 5 (HI) | 1935 | 740 | 1150 | 1768 | 667 | 1160 | 1610 | 610 | 1167 | 1421 | 536 | 1175 | 1061 | 421 | 1183 |
| KQ06 (5) | 1 (LOW) | 1600 | 355 | 759 | 1518 | 390 | 831 | 1437 | 418 | 897 | 1324 | 445 | 961 | 1224 | 469 | 1020 |
| | 2 (MED/LOW) | 1760 | 449 | 811 | 1676 | 486 | 879 | 1587 | 514 | 938 | 1497 | 547 | 999 | 1414 | 574 | 1057 |
| | 3 (MED) | 1898 | 554 | 859 | 1809 | 587 | 921 | 1735 | 619 | 977 | 1641 | 647 | 1035 | 1549 | 675 | 1088 |
| | 4 (MED/HI) | 2072 | 708 | 923 | 1991 | 741 | 977 | 1917 | 775 | 1029 | 1836 | 802 | 1079 | 1702 | 794 | 1122 |
| | 5 (HI) | 2228 | 884 | 980 | 2151 | 919 | 1031 | 2072 | 944 | 1077 | 1945 | 914 | 1109 | 1731 | 822 | 1131 |

Table 33: KQ04-06 bottom duct (gas heat)

| Unit (ton) | Motor speed | Available external static | | | | | | | | | | | | | | |
|------------|-------------|---------------------------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|
| | | 0.2 | | | 0.4 | | | 0.6 | | | 0.8 | | | 1.0 | | |
| | | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM | CFM | WATTS | RPM |
| KQ04 (3) | 1 (LOW) | 1047 | 167 | 733 | 903 | 195 | 854 | 808 | 220 | 956 | 693 | 238 | 1042 | 567 | 254 | 1115 |
| | 2 (MED/LOW) | 1122 | 197 | 769 | 995 | 225 | 876 | 899 | 252 | 979 | 804 | 276 | 1065 | 682 | 294 | 1143 |
| | 3 (MED) | 1275 | 262 | 829 | 1197 | 291 | 916 | 1058 | 324 | 1025 | 963 | 350 | 1108 | 792 | 334 | 1165 |
| | 4 (MED/HI) | 1461 | 353 | 895 | 1391 | 381 | 972 | 1279 | 415 | 1064 | 1123 | 432 | 1146 | 854 | 355 | 1169 |
| | 5 (HI) | 1674 | 506 | 993 | 1620 | 538 | 1061 | 1533 | 555 | 1123 | 1179 | 463 | 1161 | 885 | 369 | 1176 |
| KQ05 (4) | 1 (LOW) | 1301 | 300 | 911 | 1211 | 324 | 986 | 1112 | 349 | 1062 | 1007 | 371 | 1144 | 738 | 318 | 1184 |
| | 2 (MED/LOW) | 1408 | 366 | 970 | 1331 | 390 | 1041 | 1232 | 416 | 1117 | 1061 | 401 | 1169 | 693 | 306 | 1184 |
| | 3 (MED) | 1496 | 436 | 1019 | 1425 | 459 | 1079 | 1331 | 482 | 1146 | 1083 | 415 | 1171 | 717 | 316 | 1184 |
| | 4 (MED/HI) | 1641 | 553 | 1091 | 1566 | 566 | 1138 | 1392 | 520 | 1160 | 1104 | 429 | 1176 | 738 | 321 | 1185 |
| | 5 (HI) | 1779 | 680 | 1160 | 1630 | 621 | 1167 | 1428 | 547 | 1174 | 1144 | 447 | 1184 | 761 | 332 | 1191 |
| KQ06 (5) | 1 (LOW) | 1572 | 373 | 802 | 1466 | 402 | 868 | 1378 | 434 | 935 | 1264 | 461 | 999 | 1183 | 484 | 1055 |
| | 2 (MED/LOW) | 1718 | 475 | 859 | 1632 | 508 | 920 | 1531 | 535 | 980 | 1438 | 562 | 1036 | 1344 | 592 | 1094 |
| | 3 (MED) | 1868 | 578 | 908 | 1777 | 606 | 961 | 1687 | 639 | 1019 | 1591 | 666 | 1074 | 1474 | 678 | 1122 |
| | 4 (MED/HI) | 2019 | 740 | 976 | 1944 | 770 | 1023 | 1859 | 797 | 1070 | 1743 | 796 | 1114 | 1528 | 728 | 1139 |
| | 5 (HI) | 2182 | 927 | 1035 | 2089 | 949 | 1080 | 1961 | 918 | 1109 | 1808 | 854 | 1128 | 1552 | 737 | 1144 |

RPM selection

Table 34: RPM selection

| Model | Size (tons) | Airflow option | Motor phase | Max BHP | Blower sheave | Motor sheave | 6 turns open | 5 turns open | 4 turns open | 3 turns open | 2 turns open | 1 turns open | Fully closed |
|-------|-------------|----------------|-------------|---------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| KQ | 04 (3) | Std. | | | | | Direct drive | | | | | | |
| | | Med. | 1 | 1.5 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | Med. | 3 | 2.4 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | H. Static | 3 | 2.4 | AK46 | 1VL44 | N/A | 1167 | 1250 | 1333 | 1417 | 1500 | 1593 |
| KQ | 05 (4) | Std. | | | | | Direct Drive | | | | | | |
| | | Med. | 1 | 1.5 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | Med. | 3 | 2.4 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | H. Static | 3 | 2.4 | AK46 | 1VL44 | N/A | 1167 | 1250 | 1333 | 1417 | 1500 | 1593 |
| KQ | 06 (5) | Std. | | | | | Direct Drive | | | | | | |
| | | Med. | 1 | 1.5 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | Med. | 3 | 2.4 | AK46 | 1VL34 | N/A | 792 | 875 | 958 | 1042 | 1125 | 1208 |
| | | H. Static | 3 | 2.9 | AK46 | 1VL44 | N/A | 1167 | 1250 | 1333 | 1417 | 1500 | 1593 |

Table 35: Indoor blower specifications

| Model | Size (tons) | Airflow option | Motor | | | | | | Motor sheave | | | Blower sheave | | | Belt |
|-------|-------------|----------------|--------------|-----|------|------|------|-------|------------------|------------|-------|------------------|------------|-------|------|
| | | | Phase | HP | RPM | Eff. | SF | Frame | Datum dia. (in.) | Bore (in.) | Model | Datum dia. (in.) | Bore (in.) | Model | |
| KQ | 04 (3) | Std. | Direct drive | | | | | | | | | | | | |
| | | Med. | 1 | 1.5 | 1725 | 0.79 | 1.15 | 56HZ | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A39 |
| | | Med. | 3 | 2.4 | 1725 | 0.80 | 1.15 | 56Y | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A39 |
| | | H. Static | 3 | 2.4 | 1725 | 0.80 | 1.15 | 56Y | 2.8 - 3.8 | 5/8 | 1VL44 | 4.2 | 3/4 | AK46 | A40 |
| KQ | 05 (4) | Std. | Direct drive | | | | | | | | | | | | |
| | | Med. | 1 | 1.5 | 1725 | 0.79 | 1.15 | 56HZ | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A39 |
| | | Med. | 3 | 2.4 | 1725 | 0.80 | 1.15 | 56Y | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A39 |
| | | H. Static | 3 | 2.4 | 1725 | 0.80 | 1.15 | 56Y | 2.8 - 3.8 | 5/8 | 1VL44 | 4.2 | 3/4 | AK46 | A40 |
| KQ | 06 (5) | Std. | Direct drive | | | | | | | | | | | | |
| | | Med. | 1 | 1.5 | 1725 | 0.79 | 1.15 | 56HZ | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A37 |
| | | Med. | 3 | 2.4 | 1725 | 0.80 | 1.15 | 56Y | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A37 |
| | | H. Static | 3 | 2.9 | 1725 | 0.81 | 1.15 | 56Y | 2.8 - 3.8 | 7/8 | 1VL44 | 4.2 | 3/4 | AK46 | A39 |

Supply air drive adjustment

CAUTION

Before making any blower speed changes review the installation for any installation errors, leaks or undesirable systems effects that can result in loss of airflow.

Even small changes in blower speed can result in substantial changes in static pressure and BHP. BHP and AMP draw of the blower motor will increase by the cube of the blower speed. Static pressure will increase by the square of the blower speed. Only qualified personnel should make blower speed changes, strictly adhering to the fan laws.

At unit start-up, the measured CFM may be higher or lower than the required CFM. To achieve the required CFM, the speed of the drive may have adjusted by changing the datum diameter (DD) of the variable pitch motor sheave as described below:

$$\left(\frac{\text{Required CFM}}{\text{Measured CFM}} \right) \cdot \text{Existing DD} = \text{New DD}$$

Use the following tables and the DD calculated according to the above equation to adjust the motor variable pitch sheave.

EXAMPLE NEW DATUM DIAMETER

A 4 ton unit was selected to deliver 1,600 CFM with a 1VL34 motor sheave, but the unit is delivering 1,350 CFM. The variable pitch motor sheave is set at 4 turns open.

Use the equation to determine the required DD for the new motor sheave,

$$\left(\frac{1,600 \text{ CFM}}{1,350 \text{ CFM}} \right) \cdot 2.1 \text{ in.} = 2.48 \text{ in.}$$

Use [Table 36](#) to locate the DD nearest to 2.48 in. Close the sheave to 2 turn open.

EXAMPLE NEW BHP

$$= (\text{Speed increase})^3 \cdot \text{Original BHP} = \text{New BHP}$$

$$= (\text{Speed increase})^3 \cdot \text{BHP at 1,350 CFM}$$

EXAMPLE NEW MOTOR AMPS

$$= (\text{Speed increase})^3 \cdot \text{Original Amps} = \text{New Amps}$$

$$= (\text{Speed increase})^3 \cdot \text{Amps at 1,350 CFM}$$

Table 36: Motor sheave datum diameters

| 1VL34 | | 1VL44 | |
|------------|----------------|------------|----------------|
| Turns open | Datum diameter | Turns open | Datum diameter |
| 0 | 2.9 | 0 | 3.8 |
| 1/2 | 2.8 | 1/2 | 3.7 |
| 1 | 2.7 | 1 | 3.6 |
| 1-1/2 | 2.6 | 1-1/2 | 3.5 |
| 2 | 2.5 | 2 | 3.4 |
| 2-1/2 | 2.4 | 2-1/2 | 3.3 |
| 3 | 2.3 | 3 | 3.2 |
| 3-1/2 | 2.2 | 3-1/2 | 3.1 |
| 4 | 2.1 | 4 | 3.0 |
| 4-1/2 | 2.0 | 4-1/2 | 2.9 |
| 5 | 1.9 | 5 | 2.8 |
| 5-1/2 | - | 5-1/2 | - |
| 6 | - | 6 | - |

CAUTION

Belt drive blower systems MUST be adjusted to the specific static and CFM requirements for the application. The belt drive blowers are NOT set at the factory for any specific static or CFM. Adjustments of the blower speed and belt tension are REQUIRED. Verify proper sheave alignment; tighten blower pulley and motor sheave set screws after these adjustments. Re-checking set screws and belt tension after 10 to 12 hrs. run time is recommended.

Table 37: Additional static resistance - KQ04-06

| Model | Size (ton) | CFM | Cooling only ¹ | Economizer ^{2,3} | Electric heat kW ² | | | |
|-------|-----------------------------|------|---------------------------|---------------------------|-------------------------------|-------------|------------|------|
| | | | | | 6/6.5 | 9.2/10.5/11 | 13.8/14/16 | 23 |
| KQ | 04 (3.0), 05 (4.0) | 900 | 0.04 | 0.03 | 0.00 | 0.00 | 0.01 | 0.01 |
| | | 1000 | 0.05 | 0.03 | 0.00 | 0.00 | 0.02 | 0.02 |
| | | 1100 | 0.06 | 0.03 | 0.01 | 0.01 | 0.02 | 0.03 |
| | | 1200 | 0.07 | 0.04 | 0.01 | 0.01 | 0.02 | 0.03 |
| | | 1300 | 0.10 | 0.04 | 0.01 | 0.01 | 0.03 | 0.03 |
| | | 1400 | 0.12 | 0.04 | 0.02 | 0.02 | 0.03 | 0.04 |
| | | 1500 | 0.14 | 0.04 | 0.02 | 0.02 | 0.04 | 0.04 |
| | | 1600 | 0.16 | 0.05 | 0.02 | 0.02 | 0.04 | 0.05 |
| | | 1700 | 0.18 | 0.05 | 0.03 | 0.03 | 0.05 | 0.05 |
| | | 1800 | 0.22 | 0.06 | 0.03 | 0.03 | 0.05 | 0.06 |
| | | 1900 | 0.25 | 0.06 | 0.04 | 0.04 | 0.06 | 0.07 |
| | | 2000 | 0.28 | 0.06 | 0.04 | 0.04 | 0.07 | 0.08 |
| | | 2100 | 0.33 | 0.07 | 0.05 | 0.05 | 0.07 | 0.08 |
| | | 2200 | 0.36 | 0.07 | 0.06 | 0.06 | 0.08 | 0.09 |
| | | 2300 | 0.41 | 0.07 | 0.06 | 0.06 | 0.09 | 0.10 |
| | 2400 | 0.45 | 0.08 | 0.07 | 0.07 | 0.10 | 0.11 | |
| | 2500 | 0.50 | 0.08 | 0.08 | 0.08 | 0.11 | 0.12 | |
| | 06 (5.0) | 1800 | 0.23 | 0.09 | 0.03 | 0.03 | 0.05 | 0.06 |
| | | 2000 | 0.28 | 0.11 | 0.04 | 0.04 | 0.07 | 0.08 |
| | | 2200 | 0.32 | 0.13 | 0.06 | 0.06 | 0.08 | 0.09 |
| 2400 | | 0.37 | 0.15 | 0.07 | 0.07 | 0.10 | 0.11 | |

Note:

1. Add these values to the available static resistance in the respective blower performance tables.
2. Deduct these values from the available external static pressure shown in the respective blower performance tables.
3. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Everyday Thermostat Control (ETC)

The ETC board focuses on providing the quickest field install, start-up, and service possible.

Figure 25: ETC board component location

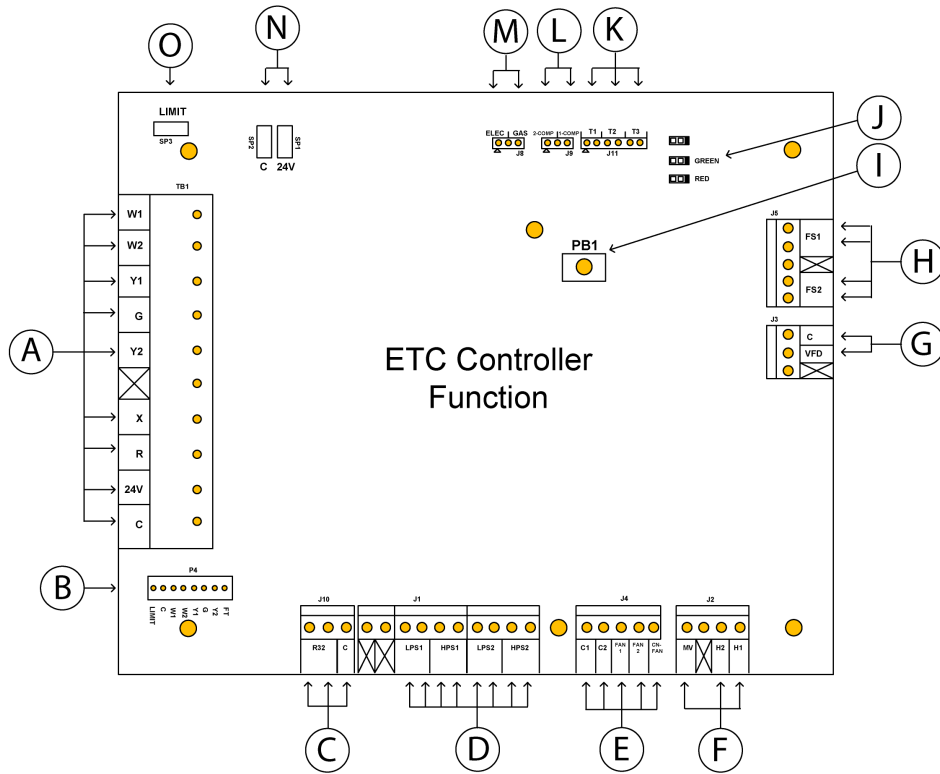


Table 38: ETC board components

| Location | Label | Description | Function and comments |
|----------|-------|-----------------------|-------------------------------------|
| A | W1 | Thermostat connection | First stage heat command |
| | W2 | Thermostat connection | Second stage heat command |
| | Y1 | Thermostat connection | First stage cool command |
| | G | Thermostat connection | Indoor fan command |
| | Y2 | Thermostat connection | Second stage cool command |
| | X | Thermostat connection | Alarm indication (24 VAC rectified) |
| | R | Thermostat connection | 24 VAC connection |
| | 24V | Thermostat connection | No connection |
| | C | Thermostat connection | 24 VAC common |
| B | P4 | For internal use only | |
| C | J10 | No connection | (For future use) |

Table 38: ETC board components

| Location | Label | Description | Function and comments |
|----------|--------|-------------------------|---|
| D | LPS1 | Low pressure switch 1 | If a unit is calling for compressor operation and after the stabilization period expires, LPS1 detects an open contact, the compressor will stop and the anti-short cycle delay will start. |
| | HPS1 | High pressure switch 1 | If a unit is calling for compressor operation and HPS1 detects an open contact, the unit compressor will stop and the anti-short cycle delay will start. |
| | LPS2 | Low pressure switch 2 | If a unit is calling for compressor operation and after the stabilization period expires, LPS2 detects an open contact, the compressor will stop and the anti-short cycle delay will start.(For units with 2-stages of refrigeration) |
| | HPS2 | High pressure switch 2 | If a unit is calling for compressor operation and HPS2 detects an open contact, the unit compressor will stop and the anti-short cycle delay will start.(For units with 2-stages of refrigeration) |
| E | C1 | 1 contactor | Output to compressor |
| | C2 | 2 contactor | Output to compressor (2 stage units only) |
| | FAN 1 | Fan contactor | Output to indoor fan |
| | FAN 2 | No connection | |
| | CN-FAN | Condenser fan contactor | Output to condenser fan contactor |
| F | MV | Gas valve input | (Gas units only) |
| | H2 | H2 output | Stage 2 gas/electric heat |
| | H1 | H1 output | Stage 1 gas/electric heat |
| G | VFD | VFD Output | For use with Intellispeed Option H1 |
| | C | | |
| H | FS1 | Evaporator freeze stat | For low evaporator temperature - Set for 26°F |
| | FS2 | Evaporator freeze stat | For low evaporator temperature - Set for 26°F (only used for dual compressor operation) |
| I | PB1 | Push button reset | Clears alarms and the stored alarms in memory |
| J | LED | LED operation | See the fault code table |
| K | T1 | Heat-off-fan-delay | 60 seconds (default) |
| | T2 | Heat-off-fan-delay | 90 seconds |
| | T3 | Heat-off-fan-delay | 120 seconds |
| L | 2COMP | Compressor selection | 2-stage compressor (default) |
| | 1COMP | Compressor selection | 1-stage compressor |
| M | ELEC | Electric heat | Jumper selection for electric heat |
| | GAS | Gas heat | Jumper selection for gas heat |
| N | C | 24 VAC power | |
| | 24 V | 24 VAC power | |
| O | LIMIT | Limit switch | Shall be interlocked to the fan relay. (When power is interrupted from this input, the fan will be forced on by software) |

Everyday Thermostat Control operation

Compressors are controlled by the Y1 through Y2 thermostat inputs.

Single Stage cooling configuration

- When Y1 is energized the CN-FAN, FAN1, and C1 outputs will energize, and the indoor fan VFD will run at 67% speed. When Y2 is energized, FAN2 output 2 will energize and the VFD will run at 100% (but only if C1 is “on”).

Gas heat unit configuration

- When W1 is energized FAN1, FAN2, and H1 outputs will energize, and the indoor fan VFD will run at 100%. When W2 is energized, H2 output will energize.

Note: A 30 second fan on delay will start once the Gas Valve input (MV) is energized. If MV input is energized without a call for heat (W1/W2), Fan will enable.

Electric heat unit configuration

- When W1 is energized FAN1, FAN2, and H1 outputs will energize, and the indoor fan VFD will run at 100%. When W2 is energized, H2 output will energize.

Table 39: Supply fan speed

| Control type | Fan output |
|------------------------|---|
| Single Stage cool (Y1) | 7.3 VDC to 7.4 VDC (67%), 10 VDC (100%) ¹ /> |
| Two Stage cool (Y1,Y2) | 7.3 VDC to 7.4 VDC (67%), 10 VDC (100%) |
| Single Stage heat (W1) | 10 VDC (100%) |
| Two Stage heat (W1,W2) | 10 VDC (100%) |
| Fan only | 6 VDC (50%) |

¹ 10VDC signal is provided with FAN2 output only when Y2 is energized

VFD operation

- The VFD output is a 2 VDC to 10VDC signal with a minimum off time between fan cycles of 10 seconds, and a minimum on time for fan cycles of 30 seconds.

Supply fan only operation

- The Fan is controlled by the G Thermostat input, and has lowest priority for sequences within the ETC board. When the G input is energized with a call for fan on the ETC, 24 VAC will be applied to FAN1 output, and 6 VDC will be applied to VFD output to produce 50% fan speed.

Table 40: Fault codes

| SR. no. | Condition | Red LED | Green LED |
|---------|-------------------------------|-------------|-------------|
| 1 | Power failure | Off | Off |
| 2 | Control Failure | ON | Off |
| 3 | Blackout condition | 7 pulses | Off |
| 4 | Brownout condition | 6 pulses | Off |
| 5 | Limit switch fault | 8 pulses | Off |
| 6 | Dual HPS faults | 3 pulses | 3 pulses |
| 7 | HPS1 fault | Off | 3 pulses |
| 8 | HPS2 fault | 3 pulses | Off |
| 9 | Dual LPS faults | 4 pulses | 4 pulses |
| 10 | LPS1 fault | Off | 4 pulses |
| 11 | LPS2 fault | 4 pulses | Off |
| 12 | Dual FS fault | 5 pulses | 5 pulses |
| 13 | FS1 fault | Off | 5 pulses |
| 14 | FS2 fault | 5 pulses | Off |
| 15 | GV false proof | 9 pulses | Off |
| 16 | GV lost proof | 10 pulses | Off |
| 17 | 2nd stage in ASCD (heat/cool) | Rapid flash | On |
| 18 | 2nd stage on (heat/cool) | On | On |
| 19 | 1st stage in ASCD (heat/cool) | Off | Rapid flash |

Table 40: Fault codes

| SR. no. | Condition | Red LED | Green LED |
|---------|--------------------------|-------------|----------------|
| 20 | 1st stage On (heat/cool) | Off | On |
| 21 | Fan only (No heat/cool) | Off | Fast heartbeat |
| 22 | No alarms in memory | 2 pulses | 2 pulses |
| 23 | Normal idle | Off | Slow heartbeat |
| 24 | Factory test mode | Rapid flash | Rapid flash |

Push Button

Hold down for:

- 0 to 2 seconds: 5 most recent error codes in the history will flash on the LEDs
- 2 to 5 seconds: clear anti-short cycle timers and reset any active lockouts
- More than 5 seconds: clear all fault history

Operation

Compressor operation

Compressor operation details include:

- Compressors are controlled by the Y1 through Y2 thermostat inputs. If the Lead/Lag function is turned OFF, a Y1 input energizes the C1 output when the compressor number 1 anti-short cycle delay is at 0 and all refrigerant safety devices are closed (Default 5 minutes).
- The FAN output for indoor fan operation energizes with any cooling output after the Indoor Fan Cool On Delay expires.
- When the thermostat cooling inputs are lost **and** the minimum runtime expires, the compressor outputs stage off (Default 3 minutes).
- A 30 second interstage delay occurs when multiple stages are requested.

Note: A Y2 input without a Y1 input energizes a C1 first and then C2 30 seconds later.

Cooling sequence of operation

The factory unit control board (UCB) refers to either the Everyday Thermostat Control (ETC) board, or the Smart Equipment control board. Both the ETC and the Smart Equipment control boards operate in similar fashion, and are described below. When a difference in operation between the ETC and Smart Equipment board exists, a description of both operations will be described.

With a demand for first stage cooling either from a thermostat or space sensor, the low-voltage control circuit to C1 and G is completed. For first stage cooling, the compressor is energized and the 1st stage operates. The UCB will energize the VFD equipped blower motor at low speed as set in the Smart Equipment control. When the thermostat calls for the second stage of cooling, the low-voltage control

circuit to C2 is completed. The control board energizes the 2nd stage of the compressor. If there is an initial call for both stages of cooling, the UCB will delay energizing the 2nd stage of the compressor by 30 seconds in order to avoid a power rush. Once the thermostat has been satisfied, it will de-energize C1 and C2. If the compressor has satisfied the minimum run time (3 min default), the compressors and condenser fans are de-energized. Otherwise, the unit operates until the minimum run has been completed. Upon the compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling. The call is passed to the unit control board (UCB), which then determines whether the requested operation is available and, if so, which components to energize.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

Continuous blower

By setting the room thermostat fan switch to ON, the supply air blower will operate continuously.

Intermittent blower

With the room thermostat fan switch set to AUTO and the system switch set to either the AUTO or HEAT settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a minimum off delay of 10 seconds.

No outdoor air options

When the thermostat calls for cooling, the low-voltage control circuit from R to Y1 and G is completed. The compressor and condenser fan motor are energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

Once the thermostat has been satisfied, it will de-energize Y1. If the compressor has satisfied its minimum run time, the compressor and condenser fan de-energize. Otherwise, the unit operates the cooling system until the minimum run time for the compressor has been completed. After the compressor de-energizes, the blower is stopped following the elapse of the fan off delay for cooling.

To be available on the ETC and Smart Equipment controller, a compressor must not be locked-out due to a high or low-pressure switch or freestat trip. Additionally on the Smart Equipment controller, the Evaporator Low Limit sensor (EC1) detecting a temperature below 26°F and the anti-short cycle delay (ASCD) must have elapsed.

Economizer with single enthalpy sensor for ETC, and economizer with dry bulb sensor for Smart Equipment

When the room thermostat calls for cooling, the low voltage control circuit from R to G and Y1 is completed. The UCB energizes the blower motor (if the fan switch on the room

thermostat is set in the AUTO position) and drives the economizer dampers from fully closed to their minimum position.

If the enthalpy sensor for the ETC, or dry bulb temperature sensor for Smart Equipment reads outdoor air is below the setpoint for their respective controller, Y1 will energize the economizer. The dampers will then modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air is above the enthalpy setpoint for ETC or dry bulb temperature setpoint for Smart Equipment, Y1 energizes the compressor and condenser fan motor only.

Once the thermostat has been satisfied, it will de-energize Y1. If the compressor has satisfied its minimum run time, the compressor and condenser fan are de-energized. Otherwise, the unit operates the cooling system until the minimum run times for the compressor has been completed. After the compressor de-energizes, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continuous fan operation the economizer damper goes to the min. position.

Economizer with dual enthalpy sensors

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

Economizer with power exhaust

A unit equipped with an economizer (dry bulb single or dual enthalpy) and a power exhaust operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan set point on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the R to G connection provides minimum position but does not provide power exhaust operation.

Motorized outdoor air dampers

This system operation is the same as the units with no outdoor air options with one exception. When the R to G circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When the R to G circuit is opened, the damper spring returns fully closed.

Refrigerant Detection System (RDS) Optional

The A2L sensor is used to detect R454B refrigerant. When R454B refrigerant leak is detected, it is considered an alarm condition. When an A2L alarm is detected, the unit will shut down any cooling and heating outputs and the supply fan will turn on (if not already on) at 30%. Heating and cooling will remain off and the supply fan will remain on as long as the A2L sensor is in the alarm condition, plus an additional

5 minutes after the sensor returns to the normal condition. If the alarm happens three times within two hours, the unit will lockout and will require a reset (ResetLO) to go back to normal operation.

Cooling operation errors

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

High-pressure limit switch

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the compressor, initiate the ASCD (Anti-short cycle delay), and stop the condenser fan.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code on the ETC or send error message to the LCD Smart Equipment Control.

Low-pressure limit switch

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the compressor and flash a code on the ETC or send error message to the LCD Smart Equipment Control.

Freezestat (ETC only)

During cooling operation, if a freezestat opens, the UCB will de-energize the compressor, initiate the ASCD, and stop the condenser fan. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code on the ETC.

Evaporator low limit (Smart Equipment control only)

During cooling operation, if the **Evaporator low limit sensor (EC1)** (located on the suction line at the evaporator coil.) detects a temperature below 26°F (default), the UCB will de-energize the compressor, initiate the ASCD, and stop the

condenser fan. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should the evaporator low limit sensor (**EC1**) detect a temperature below 26°F three times within two hours of operation, the UCB will lock-out the associated compressor and flash an error message.

Low ambient cooling (Smart Equipment control only)

To determine when to operate in low ambient mode, the UCB has an **outdoor air temperature sensor (OAT)** with a low ambient setpoint at 45°F (default). When the **OAT Sensor** senses a temperature below the low ambient setpoint and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The off cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, an **Evaporator low limit sensor (EC1)** temperature below 26°F will de-energize the compressor. If the call for cooling is still present at the end of the ASCD and the evaporator temperature (**EC1**) is above 26°F, the unit will resume operation

Safety controls

The unit control boards monitor the following inputs for each cooling system:

1. For the ETC, a suction line freezestat will protect against low evaporator temperatures due to a low airflow or a low return air temperature (opens at 26 ± 5°F and resets at 38 ± 5°F). For Smart Equipment an evaporator low limit sensor (**EC1**) (located on the suction line at the evaporator coil) will protect against low evaporator temperatures due to a low airflow or a low return air temperature, set at 26°F.
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 625 ± 25 psig).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 50 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

Compressor protection

In addition to the external pressure switches, the compressor also has inherent (internal) protection. If there

is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An **Anti-Short Cycle Delay (ASCD)** is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

Smart Equipment economizer board details

Flash codes or error messages

The UCB will initiate a flash code on the ETC, or send an error message to the LCD Display on Smart Equipment associated with errors within the system.

Reset

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freestat lockouts.

Figure 26: SE-ECO1001-1 economizer controller



Table 41: Smart Equipment economizer board details

| Board Label | Cover Label | Description | Function and comments |
|---|-------------|--|--|
| Directional orientation: viewed with the center text of the cover label upright | | | |
| ANALOG INPUTS Terminal at left on upper edge of economizer board | | | |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for economizer actuator position feedback | Connects through circuit trace to 24 V- IN pin COM |
| IN2 | ECOFB | 0 VDC to 10 VDC positive input from Economizer actuator position Feedback | EconDampPos parameter reports input status (0-100%). Used to meet Cali. Title 24 requirements for economizer actuator position feedback |
| R | 24 V~ | 24 VAC hot supplied for economizer actuator position feedback | Connects through circuit trace to 24 V- IN pin HOT |
| C | COM | Mixed Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | MAT parameter reports input status (°F/°C), 3.65 VDC reading MAT (+) to COM (-) with open circuit. Read-only use in current control revision. |
| IN1 | MAT | | |
| LEDs at left on upper edge of economizer board | | | |
| POWER | POWER | Green UCB power indicator | Lit indicates 24 VAC is present at 24 V- IN COM and HOT pins |
| FAULT | FAULT | Red networking error and firmware error indicator | 1/10th second on/off flashing indicates a networking error (polarity, addressing, etc.) or a firmware error (likely correctable with re-loading from USB flash drive) |
| SA BUS | SA BUS | Green UCB SA bus communication transmission indicator | Lit/flickering indicates UCB-to-economizer board SA bus communication is currently active, off indicates the economizer board is awaiting SA bus communication |
| ¹SA BUS¹ Pin connections at left on upper edge of economizer board | | | |
| C | COM | Common for SA BUS power and communication circuits | EconCtrlr parameter reports UCB-to-economizer board SA bus communication status. Negative of the SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection & diagnostics board |
| - | - | Communication for SA BUS devices | EconCtrlr parameter reports UCB-to-economizer board SA BUS communication status. Positive of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V lower than +) SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection and diagnostics board |
| + | + | Communication for SA BUS devices | EconCtrlr parameter reports UCB-to-economizer board SA BUS communication status. Positive of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V higher than -) SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection and diagnostics board |
| ANALOG OUTPUTS Pin at center on upper edge of economizer board | | | |
| J4 | EX VFD | 2 VDC to 10 VDC positive output for the modulating power Exhaust fan Variable Frequency Drive/discharge damper modulating power exhaust actuator | ExFanVFD parameter reports output status (0-100%) when ExFType selection is Variable Frequency Fan; EAD-O parameter reports output status (0-100%) when ExFType selection is Modulating Damper. Used to ramp the power exhaust fan VFD/ position the discharge damper actuator. |
| | COM | 24 VAC common/0 VDC to 10 VDC negative for the power exhaust variable frequency drive/discharge damper modulating power exhaust actuator | Connects through circuit trace to 24 V- IN pin COM |
| | 24 V~ | 24 VAC hot supplied for the discharge damper modulating power exhaust actuator and economizer actuator | Connects through circuit trace to 24 V- IN pin HOT |
| | ECON | 2 VDC to 10 VDC output for the Economizer actuator | Econ parameter reports output status (0-100%). Used to position the economizer actuator for minimum position, free cooling, demand ventilation, cooling economizer loading and purge functions |
| | COM | 24 VAC common/0 VDC to 10 VDC negative for economizer actuator | Connects through circuit trace to 24 V- IN pin COM |
| BINARY OUTPUTS Pin at right on upper edge of economizer board | | | |
| J3 | 24 V~ | 24 VAC hot supplied for an incremental (floating control) economizer actuator | Connects through circuit trace to 24 V- IN pin HOT |
| | ACT-A | 24 VAC hot outputs to position an incremental (floating control) economizer actuator | Unused in current control revision |
| | ACT-B | 24 VAC return | Unused in current control revision |
| | COM | 24 VAC common for an incremental (floating control) economizer actuator | Connects through circuit trace to 24 V- IN pin COM |
| | EX-FAN | 24 VAC hot output to energize power exhaust fan contactor coil/VFD enable relay coil | ExFan parameter reports output status (Off-On) when ExFType selection is Non-Modulating, Modulating Damper or Variable Frequency Fan. Used to turn on/enable the power exhaust fan motor. |
| | COM | 24 VAC common/0 VDC to 10 VDC negative for economizer actuator | Connects through circuit trace to 24 V- IN pin COM |
| 24V- IN Pin connections at right on upper edge of economizer board | | | |

Table 41: Smart Equipment economizer board details

| Board Label | Cover Label | Description | Function and comments |
|---|-------------|--|--|
| C | COM | 24 VAC transformer Common referenced to cabinet ground | 24 VAC common connection to power the economizer board. Connects through circuit traces to C/COM terminals and pins distributed on the economizer board. |
| R | HOT | 24 VAC transformer HOT | 24 VAC hot connection to power the economizer board. Connects through circuit traces to R/24 V~ terminals and pins distributed on the economizer board. |
| ANALOG INPUTS Terminal on lower edge of economizer board | | | |
| R | 24 V~ | 24 VAC hot supplied for the outdoor air humidity sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN3 | OAH | 0 VDC to 10 VDC positive input from the Outdoor Air Humidity sensor | OAH parameter reports input status (0-100%H). Used in outdoor air enthalpy calculation for dual enthalpy economizer free cooling changeover. |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for the outdoor air humidity sensor | Connects through circuit trace to 24 V~ IN pin COM |
| R | 24 V~ | 24 VAC hot supplied for the supply air humidity sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN4 | SAH | 0 VDC to 10 VDC positive input from the Supply Air Humidity sensor | SAH parameter reports input status (0-100%H). Unused in current control revision. |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for the supply air humidity sensor | Connects through circuit trace to 24 V~ IN pin COM |
| R | 24 V~ | 24 VAC hot supplied for the indoor air quality sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN5 | IAQ | 0 VDC to 10 VDC positive input from the Indoor Air Quality sensor | IAQRange parameter sets the CO2 parts per million measured by the indoor air quality sensor when it outputs 10 VDC; IAQ parameter reports input status (0-5000ppm). Used for demand ventilation functions if the NetIAQ parameter indicates ?Unrel. |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for the indoor air quality sensor | Connects through circuit trace to 24 V~ IN pin COM |
| R | 24 V~ | 24 VAC hot supplied for the outdoor air quality sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN6 | OAQ | 0 VDC to 10 VDC positive input from the Outdoor Air Quality sensor | OAQRange parameter sets the CO2 parts per million measured by the outdoor air quality sensor when it outputs 10 VDC; OAQ parameter reports input status (0-5000ppm). Used for demand ventilation function when DVent-Mode selection is Diff between IAQ and OAQ and the NetOAQ parameter indicates ?Unrel. |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for the outdoor air quality sensor | Connects through circuit trace to 24 V~ IN pin COM |
| R | 24 V~ | 24 VAC hot supplied for the air monitoring station sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN7 | FR AIR | 0 VDC to 10 VDC positive input from the air monitoring station sensor | MOA-Range parameter sets the cubic feet per minute/liters per second measured by the air monitoring station sensor when it outputs 10 VDC; Fr Air parameter reports input status (0-50000CFM/23595lps). Used for economizer minimum position reset in speed-controlled indoor blower applications. |
| C | COM | 24 VAC common/0 VDC to 10 VDC negative for the air monitoring station sensor | Connects through circuit trace to 24 V~ IN pin COM |
| R | 24 V~ | 24 VAC hot supplied for the building pressure sensor | Connects through circuit trace to 24 V~ IN pin HOT |
| IN8 | BLDG PRES | 0 VDC to 5 VDC positive input from the Building Pressure sensor | BldgPres parameter reports input status (-.250-.250"/w/-0.62-.062kPa). Used for modulating power exhaust functions when ExFType selection is Modulating Damper or Variable Frequency Fan. |
| C | COM | 24 VAC common/0 VDC to 5 VDC negative for the building pressure sensor | Connects through circuit trace to 24 V~ IN pin COM |
| BINARY INPUTS at right on lower edge of economizer board | | | |
| IN9 | PURGE | 24 VAC hot input from the PURGE dry contact | Purge parameter reports input status (False with 0 VAC input-True with 24 VAC input). When Purge status is True, heating and cooling operation is prevented, the indoor blower and power exhaust fan operate, the economizer actuator is positioned to 100%. |
| | 24 V~ | 24 VAC hot supplied for the purge dry contact | Connects through circuit trace to 24 V~ IN pin HOT |
| IN10 | EX VFD FLT | 24 VAC hot input from the power Exhaust Variable Frequency Drive Fault contact | ExFanVFDFlt parameter reports input status (Normal with 0 VAC input-Alarm with 24 VAC input) when ExFType selection is Variable Frequency Fan. When ExFanVFDFlt status is Alarm, EX-FAN fan output is prevented. |
| | 24 V~ | 24 VAC hot supplied for the power exhaust variable frequency drive fault contact | Connects through circuit trace to 24 V~ IN pin HOT |

1 When wiring unit and other devices using the SA Bus and FC Bus, see Table "Cable for FC Buses and SA Buses in Order of Preference".

Indoor air quality AQ

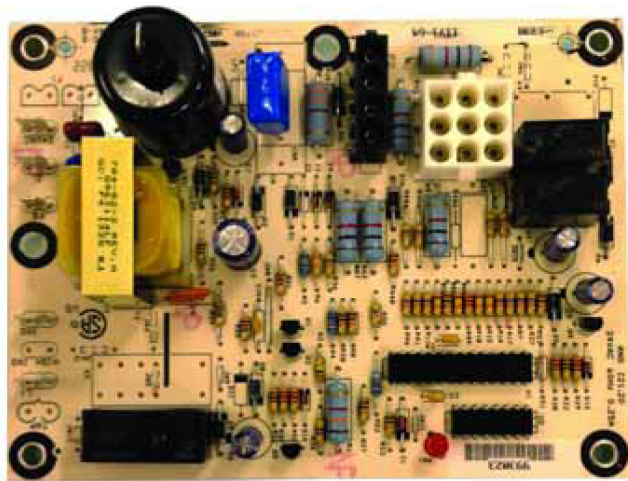
Indoor air quality (indoor sensor input): Terminal AQ accepts a +2 VDC to +10 VDC signal with respect to the (AQ1) terminal. When the signal is below its set point, the actuator is allowed

to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds its set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 VDC to 10 VDC signal, with 2 VDC corresponding to full closed and

10 VDC corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds its set point (Demand Control Ventilation Set Point) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO₂ Space Sensor Kit Part # 2AQ04700524B
- Optional CO₂ Sensor Kit Part # 2AQ04700624C

Figure 27: Ignition control board



Gas heating operation

1. Heating stages are controlled by the W1 through W2 thermostat inputs. A W1 or W2 input energizes a H1 or H1/H2 output.
2. When the pre-ignition process is complete the ignition module energizes the gas valve and provides a 24 V input to the MV terminal on the UCB.
3. The FAN ON HEAT DELAY timer starts as soon as 24 V is present on MV terminal. When the timer expires the FAN output for the indoor fan operation energizes. If 24 V is not received on the MV terminal within 5 minutes, an alarm appears.
4. When the thermostat heat inputs are lost **and** the 120 second Minimum Heat Run Timers have expired, heating outputs stage off. The FAN OFF HEAT DELAY timer starts when 24 V is removed from the MV terminal. When the timer expires, the FAN output for the indoor fan operation de-energizes.

- ① **Note:** If 24 V is lost on the MV terminal during the same heat cycle, an alarm appears and the fan output energizes **and** remains On until 24 V is present again on the MV terminal.

- ① **Note:** If 24 V is present on the MV terminal without a call for heat, an alarm appears and the fan output energizes. If this condition occurs for 6 minutes an alarm appears, and remains, until the alarm condition is cleared.

5. At any time, if 24 V is lost on the LIMIT terminal, the FAN output for indoor fan operation is energized. If 24 V is lost on the LIMIT input 3 times in 1 hour, an alarm appears and the FAN output is energized. The heating H1 and H2 outputs are de-energized until the alarm is cleared.

Gas heat ignition control board function (non Ultra-Low NOx models only)

Ignition control board on standby

The ignition control board (ICB) has all outputs de-energized and monitors the thermostat and flame sense. The ICB resets ignition trial and flame loss counters. The ICB begins a call for heat when W1 is energized at the unit control board (UCB). The ICB ignores W2 until ignition has been established.

Call for heat

The ICB checks to see if the pressure switch is open. If the pressure switch is closed, the ICB flashes 3 on the LED and waits indefinitely for it to open. When the pressure switch is sensed as open, the ICB begins pressure switch proving period. If the call for heat is lost, the ICB goes back to Standby.

Pressure switch proving

The ICB energizes the induced draft motor and waits for the low pressure switch to close. When the low pressure switch closes, the control begins pre-purge period. If the call for heat is lost, the control de-energizes the inducer without post-purge and returns to standby.

If the low pressure switch does not close within 10 seconds of inducer energizing, the control flashes 2 on the LED. If the pressure switch does not close within 5 minutes of inducer energizing, the control shuts off the inducer for 30 seconds, then energizes the inducer for another 5 minute try to close the pressure switch. This cycle continues indefinitely until either the pressure switch is proved closed, or the call for heat ends.

Pre-purge

The ICB monitors the low pressure switch and ensures it remains closed during pre-purge. If the pressure switch opens, the control goes back to pressure switch proving mode. The control waits for a 15 second pre-purge period, then begins the ignition trial.

Ignition trial period

The ICB energizes the main gas valve, second stage gas valve and spark outputs for a 10 second Ignition trial. The control de-energizes the spark when flame is sensed and enters a flame stabilization period.

If flame is not established within the ignition trial period, the control de-energizes the spark and gas valve and checks for maximum number of ignition trials. The ICB has a maximum number of 3 ignition trials. If the control has attempted the maximum number of ignition trials within the same call for heat without flame, the control will lockout flashing 4 on the LED. If the control has attempted less than maximum ignition trials, it begins an inter-purge period before attempting another ignition trial.

If the call for heat is lost during an ignition trial period, the control immediately de-energizes spark and gas. The control runs the inducer motor through a post purge period before de-energizing.

If the pressure switch is lost during an ignition trial period, the control immediately de-energizes spark and gas. The control begins pressure switch proving before an inter-purge and re-ignition attempt.

Flame stabilization period

If a flame is detected during the Ignition Trial Period, the ICB then enters the flame stabilization period. If a flame is not detected in 2 seconds, the main valve is de-energized and a retry operation begins. The flame stabilization period lasts 10 seconds. flame detection must be lost for 2 seconds during flame stabilization for the main valve to be de-energized. When the flame stabilization period has ended, a loss of flame detection for 3 to 4 seconds will result in the main valve being de-energized.

If flame is lost during the flame stabilization period, the control counts it as a flame loss and retries ignition or locks out as described in Low heat section.

Main burner operation

High heat warm-up

Two stage models run high heat for the first 30 seconds following flame stabilization period regardless of W2 demand. If W2 is not energized at the end of this 30 second period the control de-energizes the high gas output. If W2 is energized the control remains on high heat.

Low heat

The ICB keeps the main gas valve and induced draft motor energized while continuously monitoring the call for heat, low pressure switch, and flame status.

If the call for heat (W1) is lost, the control de-energizes the gas valve and begins post purge.

If low pressure switch opens, the control de-energizes the gas valve and begins pressure switch proving mode.

If flame is lost, the control de-energizes the gas valve within 2 second and counts the flame loss. If flame has been lost more than 5 times within the same call for heat, the control locks out flashing 5 on the LED. If flame has been lost less than 5 times, the control attempts re-ignition after a 30 second inter-purge period.

High heat

The ICB recognizes a call for 2nd stage heat when W2 is energized. The control energizes the high gas output. If the call for 2nd stage heat goes away and the 1st stage call remains, the control de-energizes the high gas valve and returns to low heat operation.

Response to loss of W1, low pressure switch, and flame are identical to low heat operation.

Post purge

The ICB runs the induced draft motor for a 5 second post-purge period, then de-energizes the inducer. If a call for heat occurs during post-purge, the control finishes the post-purge, drops inducer out to re-prove open pressure switch before continuing with the heat cycle.

Lockout

While in lockout, the ICB keeps the main gas valve and induced draft motor de-energized.

Lockouts due to failed ignition or flame losses can be reset by removing the call for heat (W1) for more than 1 second, but less than 20 seconds, or by removing power from the control for over 0.25 seconds. The control will automatically reset lockout after 60 minutes.

Lockouts due to detected internal control faults will reset after 60 minutes or power interruption.

High temperature limit switch

If the high temperature limit switch is open the control will run the inducer, de-energize the gas valve, and flash "6" on the LED. When the high temperature switch closes, the control will restart the ignition sequence beginning with pre-purge.

If the high temperature limit is open for more than 6 minutes continuously during a call for heat, it is assumed that the main blower has failed and the control shall enter a hard lockout and flash a "9" on the LED. During the hard lockout, the control will continue to run the inducer as long as the limit switch is open. If the limit switch recloses in this hard lockout condition, the inducer will run a post purge and then shutdown. The control shall remain locked out until power is removed and shall not reset automatically.

Roll-out switch

If the roll-out switch opens for more than 0.25 seconds, the ICB will run the inducer for a post-purge period, immediately de-energize the gas valve, and flash 7 on the LED.

If the roll-out switch closes, the control shall remain locked out until power removed or W is removed. Rollout switch lockout shall not reset automatically.

Power interruptions

Power interruptions less than 0.80 seconds shall not cause the ICB to interrupt the heat sequence. Power interruptions over 0.250 seconds will cause the control reset lockout and ignition trial counters. Power interruptions of any duration

shall not cause lockout or any operation requiring manual intervention.

Flame present with gas off

If flame is sensed for longer than 2 seconds during a period when the gas valve should be closed, the ICB will enter lockout. The control will turn on the inducer blower while the flame is present.

Welded gas valve relay response

If either or both Main and 2nd Stage Gas valve outputs are sensed to be off for more than 1 second when commanded to be **ON**, the ICB shuts off all outputs and enters lockout. If the Main valve output is sensed to be energized for more than 1 second when commanded to be off, the control de-energizes the induced draft motor (if flame is not present) to attempt to open the pressure switch to de-energize the gas valve. If the Main gas valve is still sensed as energized after the inducer has been off for 15 seconds, the control re-energizes the inducer to attempt to vent the unburned gas. In either case, the control locks out.

Gas heat ignition control board function (Ultra-Low NOx)

Ignition control board on standby

The ignition control board (ICB) has all outputs deenergized and monitors the thermostat and flame sense. The ICB begins a call for heat when W1 is energized at the unit control board (UCB).

Call for heat

When a thermostat call for heat is detected, the ICB first verifies that the blocked burner inlet switch, the main limit switch, and the auxiliary limit switch are all closed.

Combustion air proving

To prove proper combustion airflow, the ICB operates the inducer to verify that the pressure sensor null (zero) reading and span reading are within specifications. If the system is operating correctly, this should take only a few seconds. Following the pressure sensor check, the draft inducer is set to the pre-purge pressure setting. Inducer pressure setpoint values are pre-programmed in the ICB in the factory. The ICB automatically increases or decreases the induced draft motor speed while monitoring the inducer pressure indicated by the pressure sensor until the correct setpoint inducer pressure value is registered. When the correct setpoint inducer pressure value is registered, the ICB begins the pre-purge period.

Pre-purge

The ICB monitors the pressure sensor and ensures that the pressure remains at the factory-programmed pre-purge inducer setpoint pressure by increasing or decreasing the induced draft motor speed. When the pre-purge period is complete, the ICB begins the ignition trial.

Ignition trial period

After the pre-purge period ends and the ignition trial begins, the ICB reduces the induced draft motor speed to operate at the factory-programmed light-off pressure and energizes spark output. The gas valve opens to supply gas to the burner after spark output is energized. The ICB de-energizes spark when the flame is sensed and the ICB enters a flame stabilization period.

When the flame is established, the ICB adjusts the induced draft motor speed to operate at the factory-programmed run pressure for the remainder of the heating cycle.

Main burner operation

The ICB keeps the main gas valve and induced draft motor energized while continuously monitoring the call for heat, pressure switch, limit switch and flame status.

If the call for heat (W) is removed, the ICB de-energizes the gas valve and begins the post-purge period and heat blower off delay.

Post purge

After a call for heat has been satisfied, the ICB runs the induced draft motor for a 30-second post-purge period. If a call for heat occurs during the post-purge period, the ICB finishes the post-purge period, and begins the next ignition sequence immediately afterward.

Ignition failures

The ICB has a built-in 60-minute soft lockout for repeated failures during the same heating call. During a lockout, the LED on the ICB emits 1 red flash, and the ICB keeps the main gas valve and induced draft motor de-energized.

Lockouts due to repeated failures can be reset by removing the call for heat or turning off power to the ICB and turning on power to the ICB again. The ICB automatically resets after 60 minutes.

High temperature limit switches

Any time the high-temperature limit switch or auxiliary limit switch opens and has been open for less than 5 minutes, the ICB runs the indoor blower motor on heat speed, runs the inducer, and de-energizes the gas valve, and the LED on the ICB emits 4 red flashes.

If either high-temperature limit switch opens and remains open for more than 5 minutes, the ICB de-energizes the inducer and continues to operate the indoor blower motor on heat speed, and the LED on the ICB emits 10 red flashes.

Any time the high-temperature limit switch is open for more than 5 minutes, this results in a hard lockout. You must turn off the power to the unit and turn on the power to the unit again to reset the ICB.

The auxiliary limit switch is a manual-reset switch that must be reset by pressing the button on the switch.

Burner inlet pressure switch

If the combustion air entering the burner is restricted, the burner inlet pressure switch opens and safely shuts down the unit. If the burner inlet pressure switch is open, the LED on the ICB emits 6 red flashes.

Power interruptions

Power interruptions of any duration do not cause a lockout or any operation requiring manual intervention.

Flame present with gas off

If the flame is sensed during a period when the gas valve should be closed, the ICB enters a five-minute hard lockout and the LED on the ICB emits 5 red flashes. The ICB energizes the inducer blower. After five minutes, the control continues to monitor the flame sense input and resumes normal operation when flame is no longer sensed.

Gas valve fault

If the main valve output is sensed as energized when commanded to be off, the LED on the ICB emits 8 red flashes, and the ICB de-energizes the induced draft motor (if the flame is not present) to attempt to de-energize the gas valve. The ICB enters a one-hour hard lockout. After one hour, the control continues to monitor the gas valve circuit and resumes normal operation when the fault condition no longer exists.

Diagnostic fault code storage and retrieval

The ICB in the furnace has memory that stores up to five error codes to allow a service technician to diagnose problems more easily. This memory is retained even if power to the furnace is lost. If more than five error codes have occurred since the last reset, only the five most recent error codes are stored.

ⓘ Note: This feature must only be used by a qualified service technician.

To retrieve error codes:

1. Terminate any call for heating, cooling, or continuous fan operation. You can only retrieve error codes if there are no active thermostat signals.
2. Press the **LAST ERROR** button. The LED on the ICB flashes the error codes that are in memory, starting with the most recent. There is a 2-second pause between each error code. When the error codes have all been displayed, the LED resumes the normal slow green flash sequence after a 5-second pause.

Or

If there are no error codes in memory, the LED on the ICB emits 1 green flash.

3. To repeat the series of error codes, press the **LAST ERROR** button again

To clear the memory: Press and hold the **LAST ERROR** button for more than 5 seconds.

The LED on the ICB emits a rapid green flash when the memory is cleared, then resumes the normal slow green flash sequence after a 5-second pause.

Cooling start-up

Prestart check list

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.
 - If blower rotation is in the wrong direction. Refer to the Phasing Section in general information section.Check blower drive belt tension.
6. Check the unit supply air (CFM).
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

Cooling operating instructions

1. Turn unit electrical power on.
 - ⓘ Note:** Before each cooling season, the crankcase heaters where equipment must be energized at least 10 hours before the system is put into operation.
2. Set the room thermostat setting to lower than the room temperature.
3. First stage compressors will energize after the built-in time delay (5 minutes).

Post start check list

1. Verify proper system pressures.

2. Measure the temperature drop across the evaporator coil.

Gas heat start-up

Pre-start check list

Complete the following checks before starting the unit:

1. Check the type of gas being supplied. Be sure that it is the same as listed on the unit nameplate.
 - ⓘ **Note:** Ultra-Low NOx (ULN) models are not approved for use with propane gas.
2. If the unit is installed at an elevation greater than 2,000 ft, confirm that the appropriate high altitude kit (if required) is installed and that the input rate is correct for the given elevation.
3. Make sure that the vent outlet and combustion air inlet are free of any debris or obstruction.

Gas heat operating instructions

CAUTION

This furnace is equipped with an automatic re-ignition system. DO NOT attempt to manually light the pilot.

Lighting the main burners

1. Turn OFF electric power to unit.
2. Turn room thermostat to lowest setting.
3. Turn gas valve switch to ON position (See [Figure 29](#) and [Figure 30](#)).
4. Turn ON electric power to unit.
5. If thermostat set temperature is above room temperature, the main burners will ignite.

Post start checklist

After the entire control circuit has been energized and the heating section is operating, make the following checks:

1. Check for gas leaks in the unit piping as well as the supply piping.

WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

2. Check for correct manifold gas pressures. See [Checking gas heat input](#).
3. Check the supply gas pressure. It must be within the limits shown on the rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 10.5 in. or the operating pressure drop below 4.5 in. for natural gas units. If gas pressure is outside these limits, contact the local gas utility or propane supplier for corrective action.

Shut down

1. Set the thermostat to the lowest temperature setting.
2. Turn OFF all electric power to unit.
3. Open gas heat access panel.
4. Turn gas valve switch to OFF position (See [Figure 29](#) and [Figure 30](#)).

Checking gas heat input

Single stage gas heat

This unit has a single stage of gas heat. The intended input for each furnace is shown in [Table 43](#). The table applies to units operating on 60 Hz power only.

To determine the rate of gas flow (Single Stage), complete the following steps:

1. Turn off all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for heat.
3. Measure the time needed for one revolution of the hand on the lowest increment dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.
4. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour. (See example below).
5. If necessary, adjust the regulator as discussed in the section [Manifold gas pressure adjustment](#). **Be sure not to over-fire the furnace.** If in doubt, it is better to leave the furnace slightly under-fired. Repeat Steps 1-5.

Two stage gas heat

This unit has two stages of gas heat. First stage input is considered the minimum input for the furnace. The intended input for each furnace is shown in [Table 43](#). The table applies to units operating on 60 Hz power only.

To determine the rate of gas flow (Second Stage), complete the following steps:

1. Turn off all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for Second stage (100% input) heat.
3. Measure the time needed for one revolution of the hand on the lowest increment dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.
4. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour. See example below.
5. If necessary, adjust the high pressure regulator as discussed in the section [Manifold gas pressure adjustment](#). **Be sure not to over-fire the furnace on second stage.** If in doubt, it is better to leave the second stage of the furnace slightly under-fired. Repeat Steps 1-5.

To determine the rate of gas flow (First Stage), complete the following steps:

1. Turn off all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for first stage heat.
3. Even when the thermostat is calling for first stage heat, the unit will light on second stage and will run on second stage for 1 minute. Allow this one-minute time period to expire and be certain the unit is running on first stage.
4. Measure the time needed for one revolution of the hand on the lowest increment dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.
5. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour. See example below.
6. If necessary, adjust the low pressure regulator as discussed in the section [Manifold gas pressure adjustment](#). **Be sure not to under-fire the furnace on first stage.** If in doubt, it is better to leave the first stage of the furnace slightly over-fired (Refer to [Table 43](#) for input value). Repeat Steps 1-6.

Table 42: Gas rate cubic feet per hour

| Seconds for one rev. | Size of test dial | |
|----------------------|-------------------|-----------|
| | 1/2 cu. ft. | 1 cu. ft. |
| 10 | 180 | 360 |
| 12 | 150 | 300 |

Table 42: Gas rate cubic feet per hour

| Seconds for one rev. | Size of test dial | |
|----------------------|-------------------|-----------|
| | 1/2 cu. ft. | 1 cu. ft. |
| 14 | 129 | 257 |
| 16 | 113 | 225 |
| 18 | 100 | 200 |
| 20 | 90 | 180 |
| 22 | 82 | 164 |
| 24 | 75 | 150 |
| 26 | 69 | 138 |
| 28 | 64 | 129 |
| 30 | 60 | 120 |
| 32 | 56 | 113 |
| 34 | 53 | 106 |
| 36 | 50 | 100 |
| 38 | 47 | 95 |
| 40 | 45 | 90 |
| 42 | 43 | 86 |
| 44 | 41 | 82 |
| 46 | 39 | 78 |
| 48 | 37 | 75 |
| 50 | 36 | 72 |
| 52 | 35 | 69 |
| 54 | 34 | 67 |
| 56 | 32 | 64 |
| 58 | 31 | 62 |
| 60 | 30 | 60 |

ⓘ Note: To find the Btu input, multiply the number of cubic feet of gas consumed per hour by the Btu content of the gas in your particular locality (contact your gas company for this information as it varies widely from area to area).

EXAMPLE

By actual measurement, it takes 19 seconds for the hand on a 1 cubic foot dial to make a revolution with a 200,000 Btuh furnace running. To determine rotations per minute, divide 60 by 19 = 3.16. To calculate rotations per hour, multiply 3.16 • 60 = 189.6. Multiply 189.6 • 1 (0.5 if using a 1/2 cubic foot dial) = 189.6. Multiply 189.6 • (the Btu rating of the gas). For this example, assume the gas has a Btu rating of 1050 Btu/ft³. The result of 199,000 Btuh is within 2% of the 200,000 Btuh rating of the furnace.

Manifold gas pressure adjustment

Single stage

This gas furnace has one stage of gas heat. Therefore, the gas valve has one adjustment screw located under a cover screw on the valve. See [Figure 29](#).

Manifold pressure adjustment procedure.

1. Turn off all power to the unit.

2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.
3. Remove cover screw covering the pressure adjustment screw.
4. Turn on power to the unit.
5. Set thermostat to call for heat and start furnace.
6. If necessary, using a screwdriver, turn the adjustment screw clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.
7. Once pressure has been checked, replace the plastic cap covering the pressure adjustment screw.

Two stage

This gas furnace has two heat stages. Therefore, the gas valve has two adjustment screws located under two cover screws. The second stage adjustment screw is adjacent to the HI marking on the valve and the first stage adjustment screw is located adjacent to the LO marking on the valve. See [Figure 30](#).

Manifold pressure adjustment procedure.

Adjust second stage (Refer to [Table 43](#) for input value) pressure first, then adjust first stage (Refer to [Table 43](#) for input value) pressure.

1. Turn off all power to the unit.
2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.
3. Remove cover screws covering HI and LO pressure adjustment screws.
4. Turn on power to the unit.
5. Set thermostat to call for second stage heat and start furnace.
6. If necessary, using a screwdriver, turn the second stage adjustment screw (adjacent to the HI marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.
7. After the high manifold pressure has been checked, adjust the thermostat to call for first stage heat.
8. If necessary, using a screwdriver, turn the first stage adjustment screw (adjacent to the LO marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.
9. Once pressure has been checked, replace the cover screws covering the HI and LO pressure adjustment screws.

Table 43: Gas heat stages

| Model (size) | Gas heat description | Opt. | # of burner tubes | 1st Stage input (Mbh) | 2nd Stage input (Mbh) | Total input (Mbh) |
|--------------------------|----------------------|------|-------------------|-----------------------|-----------------------|-------------------|
| KQ04 (3) Single Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | - | 112 | 112 |
| KQ04 (3) Three Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | 82 | 112 | 112 |
| | Low, ULN | U | 3 | - | 60 | 60 |
| | High, ULN | W | 5 | - | 100 | 100 |
| KQ05 (4) Single Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | - | 112 | 112 |
| | High, NOx | N | 3 | - | 116 | 116 |
| | High | F | 3 | - | 142 | 142 |
| KQ05 (4) Three Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | - | 112 | 112 |
| | High, NOx | N | 3 | - | 118 | 118 |
| | High | F | 3 | 100 | 145 | 145 |
| | Low, ULN | U | 3 | - | 60 | 60 |
| | High, ULN | W | 5 | - | 100 | 100 |
| KQ06 (5) Single Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | - | 112 | 112 |
| | High, NOx | N | 3 | - | 116 | 116 |
| | High | F | 3 | - | 142 | 142 |
| KQ06 (5) Three Phase | Low, NOx | L | 2 | - | 56 | 56 |
| | Low | D | 2 | - | 70 | 70 |
| | Med, NOx | M | 3 | - | 90 | 90 |
| | Med | E | 3 | - | 112 | 112 |
| | High, NOx | N | 3 | - | 118 | 118 |
| | High | F | 3 | 100 | 145 | 145 |
| | Low, ULN | U | 3 | - | 60 | 60 |
| | High, ULN | W | 5 | - | 100 | 100 |

Adjustment of temperature rise

The temperature rise (the difference of temperature between the return air and the heated air from the furnace) must lie within the range shown on the unit rating plate and the data in the Physical data section.

After the temperature rise has been determined, the CFM can be calculated as follows:

$$\text{CFM} = \text{Btu Input} \cdot \frac{0.8}{(1.08 \cdot \Delta^{\circ}\text{F})}$$

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and

the heated air in the ducts (about 6 ft from the furnace) where they will not be affected by radiant heat. Increase the blower CFM to decrease the temperature rise, decrease the blower CFM to increase the rise. See Supply air drive adjustment.

Note: Each gas heat exchanger size has a minimum allowable CFM. Below this CFM, the limit will open.

Burners/orifices inspection/servicing (non Ultra-Low NOx models only)

Before checking or changing burners or orifices, CLOSE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL POWER TO THE UNIT.

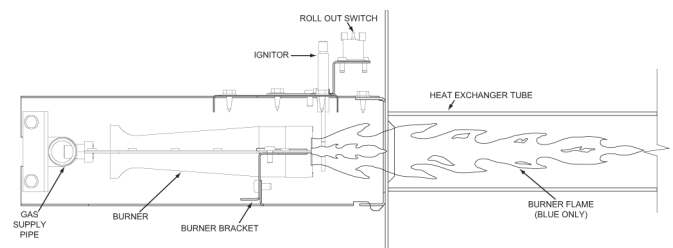
Note: Burners in ULN (Ultra-Low NOx) models are permanently welded into a single assembly and may not be disassembled for service.

1. Open the union fitting just upstream of the unit gas valve and downstream from the main manual shut-off valve in the gas supply line.
2. Remove the screws holding each end of the manifold to the manifold supports.
3. Disconnect wiring to the gas valve. Remove the manifold and gas valve assembly. Orifices can now be inspected and/or replaced.
To service burners, complete Step 4.
4. Remove the heat shield on top of the manifold supports. Burners are now accessible for inspection and/or replacement.

Note: Reverse the above procedure to replace the assemblies.

Make sure that burners are level and seat at the rear of the gas orifice.

Figure 28: Typical flame



Note: Installation of this furnace at altitudes above 2000 ft (610 m) shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.

Figure 29: 3 ton through 5 ton, 1/2 in. single stage gas valve

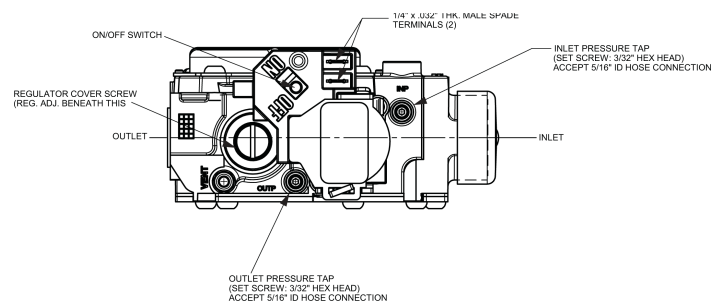
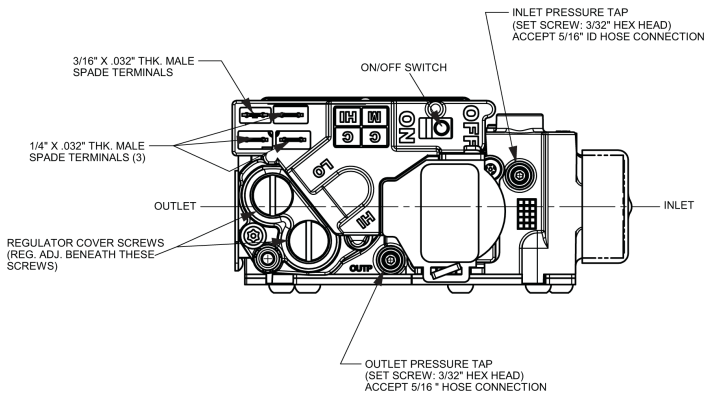


Figure 30: 3 ton through 5 ton, 1/2 in. two stage gas valve



Start up for units equipped for FER

This section applies to single phase gas heat only.

Direct drive

Direct drive FER units come from the factory with the following three leads that lead to the indoor motor.

- A yellow cooling lead
- A red heating lead
- A white, fan only lead

Each lead is put on a different tap on the motor and provides different speeds. The leads are set on default taps from the factory. See the wiring diagrams for details on factory default speeds. During installation, you may need to move the leads to different taps depending on the airflow and static requirements of the application.

- ⓘ Note:** During installation, the tap chosen for the heating speed must produce a temperature rise that lies within the rise range stated on the rating plate and the physical data tables.

Troubleshooting

WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits.** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals. When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

CAUTION

Label all wires before disconnection when servicing controls. Wiring errors can cause improper and dangerous operation, which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

WARNING

The furnace may shut down on a high temperature condition during the procedure. If this occurs, the UCB energize the supply air blower motor until the high temperature limit has reset. Caution should be used at all times as the supply air blower may energize regardless of the room thermostat fan switch position.

Table 44: Everyday thermostat controls fault codesx

| SR. No. | Condition | Red LED | Green LED |
|---------|--------------------|----------|-----------|
| 1 | POWER FAILURE | OFF | OFF |
| 2 | CONTROL FAILURE | ON | OFF |
| 3 | BLACKOUT CONDITION | 7 PULSES | OFF |
| 4 | BROWNOUT CONDITION | 6 PULSES | OFF |
| 5 | LIMIT SWITCH FAULT | 8 PULSES | OFF |
| 6 | DUAL HPS FAULTS | 3 PULSES | 3 PULSES |
| 7 | HPS1 FAULT | OFF | 3 PULSES |
| 8 | HPS2 FAULT | 3 PULSES | OFF |
| 9 | DUAL LPS FAULTS | 4 PULSES | 4 PULSES |
| 10 | LPS1 FAULT | OFF | 4 PULSES |
| 11 | LPS2 FAULT | 4 PULSES | OFF |
| 12 | DUAL FS FAULT | 5 PULSES | 5 PULSES |
| 13 | FS1 FAULT | OFF | 5 PULSES |
| 14 | FS2 FAULT | 5 PULSES | OFF |

Table 44: Everyday thermostat controls fault codesx

| SR. No. | Condition | Red LED | Green LED |
|---------|-------------------------------|-------------|----------------|
| 15 | GV FALSE PROOF | 9 PULSES | OFF |
| 16 | GV LOST PROOF | 10 PULSES | OFF |
| 17 | 2ND STAGE IN ASCD (HEAT/COOL) | RAPID FLASH | ON |
| 18 | 2ND STAGE ON (HEAT/COOL) | ON | ON |
| 19 | 1ST STAGE IN ASCD (HEAT/COOL) | OFF | RAPID FLASH |
| 20 | 1ST STAGE ON (HEAT/COOL) | OFF | ON |
| 21 | FAN ONLY (NO HEAT/COOL) | OFF | FAST HEARTBEAT |
| 22 | NO ALARMS IN MEMORY | 2 PULSES | 2 PULSES |
| 23 | NORMAL IDLE | OFF | SLOW HEARTBEAT |
| 24 | FACTORY TEST MODE | RAPID FLASH | RAPID FLASH |

Table 45: Flash codes for the gas heat ignition control board (non Ultra-Low NOx models only)

| Flash_code | Description | Technician corrective action | Ignition control response to flash code | Method for reset |
|------------|---|---|---|--|
| Heartbeat | <i>Normal Operation</i> - no status or error information currently needs to be displayed | None. | All functions available to respond to heating demand. | None. |
| Steady Off | a. <i>No Power to the Control</i> - Less than 18 VAC is present at the ignition control's R (P2-2 pin) and C (P2-1 pin) connections | Verify line voltage is present at the primary of the 75 VA transformer, verify 24 VAC is present at the secondary of the 75 VA transformer. Verify 24 VAC is present from the UCB's C to SD terminals indicating the 3.2A control circuit breaker and phase monitor contacts are closed. Verify 24 VAC is present at the ignition control's R (P2-2 pin) and C (P2-1 pin) connections indicating the unit to ignition control wiring is intact. | The output relay contacts open so inducer and gas valve operation is not permitted. | a. Restoration of 24 VAC power to the ignition control. |
| | b. The ignition control has catastrophic damage that will not allow the LED display (it is likely that there will be visible physical evidence of the damage) | | | b. None. |
| Steady On | The Ignition Control's Microprocessor Has Not Passed its Self-check | Cycle power to the control to eliminate the possibility that transient voltage conditions such as surges, brownouts, etc. have not created a false indication. If the steady on LED indication repeats, the control will need to be replaced and potential causes for failure, such as excessive voltage, RF interference, etc. should be investigated. | The output relay contacts open so inducer and gas valve operation is not permitted. | Cycling 24 VAC power to the ignition control or expiration of the 60 minute watchdog timer. |
| 2 Flashes | <i>The Induced Draft Pressure Switch Did Not Close</i> - 24 VAC was not received to the ignition control's pressure switch input (P1-8 pin) within 10 seconds of the ignition control energizing the induced draft motor or 24 VAC was later lost to the control's pressure switch input while the ignition control energized the induced draft motor | Verify that the induced draft motor is operable, the ignition control's L1 to IND contacts are not open, the induced draft blower wheel is intact and there are no blockages in the combustion air / induced draft path. Verify that the induced draft pressure switch sensing tubing is intact. With an incline manometer, digital manometer or Magnehelic® gauge teed into the pressure switch sensing line verify that the negative pressure exceeds the setting listed on the induced draft pressure switch label and the switch's contacts correctly close at the setting listed | Gas valve operation is not permitted/ends when the induced draft pressure switch input is not present. The ignition control's L1 to IND output relay contact will cycle closed for 5 minutes/ open for 30 seconds until 24 VAC is received to the pressure switch input or the heating demand ends. | Closure of the pressure switch (24 VAC input to P1-8 pin), cycling first stage heat input or cycling 24 VAC power to the ignition control. |
| 3 Flashes | <i>The Induced Draft Pressure Switch is Stuck Closed</i> - 24 VAC is received to the control's pressure switch input (P1-8 pin) at the same time as 24 VAC to initiate heating operation is received at the control's W1 input (P2-3 pin) | Verify that the induced draft pressure switch contacts are not stuck or welded closed. Verify that the ignition control's L1 to IND contacts are not stuck or welded closed causing the induced draft motor to run continuously. Verify that the wiring from the ignition control's P1-3 pin through the induced draft pressure switch to the ignition control's pressure switch input (P1-8 pin) is not shorted. | The output relay contacts open so inducer and gas valve operation is not permitted. | Opening of the pressure switch (loss of 24 VAC input to P1-8 pin) then cycling first stage heat input or cycling 24 VAC power to the ignition control. |

Table 45: Flash codes for the gas heat ignition control board (non Ultra-Low NOx models only)

| Flash_code | Description | Technician corrective action | Ignition control response to flash code | Method for reset |
|------------|---|---|---|---|
| 4 Flashes | <i>Flame Could Not Be Established</i> - A flame signal of 0.2µa or greater could not be established in three consecutive attempts for ignition at the initiation of the heating cycle | Verify that the unit has proper electrical grounding. Verify the 24 VAC common and ignition control cabinet ground references are intact. Monitor the flame signal. Verify that combustion air openings are without blockages and that the unit has proper clearance to the structure and adjacent units. Verify that the burners are clean and without blockages that could interfere with gas flow. Verify that the ignitor sparks with an ≈1/8 in. gap to the crossover area of the left burner. Verify that the flame sensor is intact and positioned with an ≈1/8 in. gap to the right burner. Verify that the gas lines have been purged of air and provide proper gas inlet pressure. Verify that the gas valve is opening and adjusted to provide proper manifold pressure. Verify that the wiring to the gas valve is intact. Verify that there is no wind, rain or snow entering the heat compartment to interfere with ignition or the burners. Verify that there are no conditioned air leaks or heat exchanger breaches to interfere with ignition or the burners. | Immediately after the third ignition trial: the gas valve output relay contact opens so gas valve operation is not permitted, following a 5 second inducer post purge the induced draft output relay contact opens so inducer operation is not permitted. | Cycling first stage heat input, cycling 24 VAC power to the ignition control or expiration of the 60 minute watchdog timer. |
| 5 Flashes | <i>Flame Loss</i> - After being established during ignition trials, flame signal dropped below 0.2µa five times during one heating cycle | Verify that the unit has proper electrical grounding. Verify the 24 VAC common and ignition control cabinet ground references are intact. Monitor the flame signal. Verify that combustion air openings are without blockages and that the unit has proper clearance to the structure and adjacent units. Verify that the burners are clean and without blockages that could interfere with gas flow. Verify that the flame sensor is intact and positioned with an ≈1/8 in. gap to the right burner. Verify that the gas lines have been purged of air and provide proper gas inlet pressure. Verify that the gas valve provides proper manifold pressure. Verify that the wiring to the gas valve is intact. Verify that there is no wind, rain or snow entering the heat compartment to interfere with ignition or the burners. Verify that there are no conditioned air leaks or heat exchanger breaches to interfere with ignition or the burners. | Immediately after the fifth flame loss: the gas valve output relay contact opens so gas valve operation is not permitted, following a 5 second inducer post purge the induced draft output relay contact opens so inducer operation is not permitted. | Cycling first stage heat input, cycling 24 VAC power to the ignition control or expiration of the 60 minute watchdog timer. |
| 6 Flashes | <i>Open Limit</i> - 24 VAC has been lost to the control's limit switch input (P1-9 pin) or 24 VAC has been lost to the control's limit switch input (P1-9 pin) for a duration of 6 minutes or less with 24 VAC present at the control's W1 input (P2-3 pin) | Verify proper gas manifold pressure. Correct the inadequate indoor airflow condition. Verify filters, indoor coil and blower wheel are clean. Verify that the blower belt is correctly maintained and adjusted; the blower motor fuses are intact, contactor and motor are operable and wheel has the correct rotation. Verify that the ducting is not restrictive. Verify indoor air volume is at least the minimum required for the heat section by using the Airflow Measurement Charts in the Technical Training Manual or other method such as temperature rise, balometer, etc. Verify heating mode blower on/off delays are correct for the heat type and provide adequate heat section cooling at the termination of the heating cycle. Verify wiring for main and auxiliary limit switches is intact. | The gas valve output relay contact opens so gas valve operation is not permitted, the induced draft output relay contact closes to operate the inducer. | Closure of the limit switch(es) (24 VAC input to P1-9 pin) |
| 7 Flashes | <i>Open Rollout</i> - 24 VAC has been lost to the control's rollout switch input (P1-6 pin) | Verify that combustion air openings are without blockages and that the unit has proper clearance to the structure and adjacent units. Verify that the burners are clean and without blockages that could interfere with gas flow. Verify that the ignitor sparks with an ≈1/8 in. gap to the crossover area of the left burner. Verify that the gas lines provide proper gas inlet pressure. Verify that the gas valve is adjusted to provide proper manifold pressure. Verify that there is no wind, rain or snow entering the heat compartment to interfere with ignition or the burners. Verify that there are no conditioned air leaks or heat exchanger breaches to interfere with ignition or the burners. Verify wiring for the rollout switch is intact. | The gas valve output relay contact opens so gas valve operation is not permitted, following a 5 second inducer post purge the induced draft output relay contact opens so inducer operation is not permitted. | Closure of the rollout switch (24 VAC input to P1-6 pin) then cycling first stage heat input or cycling 24 VAC power to the ignition control. |
| 8 Flashes | <i>The Gas Valve Failed To Shut Off</i> - flame has been sensed for longer than 2 seconds when the first stage gas valve output is off | Verify that the gas valve is not slow to shut off, leaks by or otherwise does not completely shut off gas flow when de-energized. Verify the gas valve wiring to is intact and not shorted in a manner that would incorrectly allow 24 VAC from another circuit to be applied to the gas valve. | The gas valve output relay contact opens so gas valve operation is not permitted, the induced draft output relay closes to operate the inducer. | Cycling 24 VAC power to the ignition control. |
| 9 Flashes | <i>Indoor Airflow Failure Open Limit</i> - 24 VAC has been lost to the control's limit switch input (P1-9 pin) for a duration of more than 6 minutes with 24 VAC present at the control's W1 input (P2-3 pin) | Correct the no/extremely low indoor airflow condition. Verify filters, indoor coil and blower wheel are clean. Verify that the blower belt is intact, correctly maintained and adjusted; the blower motor fuses are intact, contactor and motor are operable and wheel has the correct rotation. Verify that the ducting is without blockages. Verify indoor air volume is at least the minimum required for the heat section by using the Airflow Measurement Charts in the Technical Training Manual or other method such as temperature rise, balometer, etc. Verify wiring for main and auxiliary limit switches is intact. Verify main and auxiliary limit switches are not failed in an open position. | The gas valve output relay contact opens so gas valve operation is not permitted, the induced draft output relay contact closes to operate the inducer. | Cycling 24 VAC power to the ignition control. |

Table 45: Flash codes for the gas heat ignition control board (non Ultra-Low NOx models only)

| Flash_code | Description | Technician corrective action | Ignition control response to flash code | Method for reset |
|------------|--|--|--|---|
| 10 Flashes | a. <i>Gas Valve Miss-wire</i> - 24 VAC has been present for longer than 1 second at the first stage and/or second stage gas valve output (P1-7 pin and/or P1-4 pin) when the gas valve is commanded off by the ignition control | Verify gas valve wiring from the ignition control to the gas valve is intact and not shorted in a manner that would incorrectly allow 24 VAC from another circuit to be applied to the control's P1-7 and/or P1-4 gas valve output pins. Verify the control's gas valve output relay contacts for first stage (P1-8 to P1-7) and second stage (P1-7 to P1-4) are not shorted or fail to close when commanded on. | Initially, the output relay contacts open. Then, if 24 VAC remains present at the P1-7 pin after 15 seconds, the induced draft output relay contact closes to operate the inducer. | Cycling 24 VAC power to the ignition control. |
| | b. <i>Ignition Control Gas Valve Relay Contact Failed to Close</i> - 24 VAC has not been sensed for longer than 1 second at the first stage and/or second stage gas valve output (P1-7 pin and/or P1-4 pin) when the gas valve is commanded on by the ignition control | | | |

Table 46: Flash codes for the gas heat ignition control board (Ultra-Low NOx models only)

| Flash code | Description | Technician corrective action | Ignition control response to flash code | Method for reset |
|-----------------------|---|---|---|--|
| Red-amber-green flash | Normal power-up of the control board (ICB) | None required - normal operation | N/A | N/A |
| Steady on green | Normal operation with no thermostat calls. | None required - normal operation | N/A | N/A |
| Rapid green flash | ICB error history has been cleared | None required - normal operation | N/A | N/A |
| steady on green LED | Normal operation with a call for heating operation | None required - normal operation | N/A | N/A |
| Steady on red LED | Control fault is detected. Control faults include relay failures, memory failures, or other hardware failures detected during power-up self-test or during other continuous operating checks. | Turn off power to the unit and turn on power to the unit again to verify that a power surge or brownout has not caused a false error indication. If the fault code returns, replace the ICB. | No heating operation. The control locks out for a minimum of one hour and remains in lockout until the fault condition is corrected. | Replace ICB |
| 1 red flash | System lockout due to too many failed ignition attempts. | Verify that gas supply is turned ON. Check that gas valve is turned ON. Check igniter, gas valve and flame sensor wires. Verify that the unit is properly grounded. Check the flame sense current using a microammeter. Verify that the spark igniter is clean and has a proper 1/8" spark gap. | Immediately after the third ignition retry, there is an inducer post purge and the ICB goes into a soft lockout. Unit will start a new ignition sequence every 60 minutes, if there is still a call for heat. | Cycling the call for heat or cycling power to the unit will reset the lockout and cause the unit to retry for ignition. |
| 2 red flashes | Indicates a pressure sensor null error. The pressure sensor is sensing pressure when the draft inducer is not running and there should not be any pressure. | Check for a faulty pressure sensor or miswiring | No heating operation until the condition is corrected. The ICB enters a five minute lockout. After the lockout timer has expired, the control resumes normal operation. | Cycling the thermostat call for heat or cycling power to the unit will cause the ICB to re-start the ignition sequence |
| 3 red flashes | Indicates a pressure sensor span error. The pressure sensor is not sensing the correct pressure. | Check for faulty inducer, broken or leaking pressure sensor hose, disconnected pressure sensor hose or wires, faulty pressure sensor, water in pressure sensor hose | No heating operation until the condition is corrected. The ICB enters a five minute lockout. After the lockout timer has expired, the control resumes normal operation. | Cycling the thermostat call for heat or cycling power to the unit will cause the ICB to re-start the ignition sequence |
| 4 red flashes | Indicates the high-temperature limit switch is open and has been open for less than five minutes, or auxiliary limit switch is open | Check for dirty filter, incorrectly-sized duct system, duct system blockage, incorrect blower speed setting, incorrect firing rate, loose or disconnected wire from limit switch, faulty blower motor, disconnected blower motor wire. Verify that the blower wheel is rotating in the right direction. | The ICB shuts off the gas valve, runs the draft inducer and runs the indoor blower. If the high-temperature limit switch opens five times within a single call for heat, the ICB enters a 60-minute soft lockout. | Prior to lockout, closure of the limit switch circuit will cause the ICB to try for ignition. If in lockout, the call for heat or the 24 VAC power must be cycled. |

Table 46: Flash codes for the gas heat ignition control board (Ultra-Low NOx models only)

| Flash code | Description | Technician corrective action | Ignition control response to flash code | Method for reset |
|----------------|--|--|---|--|
| 5 red flashes | Indicates the flame is present with the gas valve off. The ICB has sensed a flame during a period when the gas valve is not supposed to be open. | Check for gas valve miswiring, bad gas valve not closing fully | ICB goes into lockout, opens the gas valve relay circuit and runs the draft inducer. The initial lockout time is five minutes. After five minutes, the ICB continues to monitor the flame sense and will resume normal operation when flame is no longer sensed. | Correct gas valve miswiring or gas leak-through condition. Reset hard lockout by cycling power to the unit. |
| 6 red flashes | Indicates the burner inlet pressure switch is open. | Check for blockage in the inlet air elbow on the burner box. If no blockage is obvious in the inlet elbow, the burner assembly may be restricted internally and may need to be replaced. | The ICB opens the gas valve, runs the draft inducer and enters a five-minute lockout. If the switch is closed after five minutes have elapsed, the control resumes normal operation. The control will enter a one hour lockout state if the blocked burner switch fails to close within five minutes. | Cycling the thermostat call for heat or cycling power to the unit will cause the ICB to re-start the ignition sequence |
| 8 red flashes | The control senses voltage present in the gas valve circuit when the gas valve should be de-energized. | Check for miswiring of the gas valve or a shorted gas valve wire. This condition can also be caused by a hardware failure on the ICB. | The ICB opens the gas valve, runs the draft inducer and enters a one-hour hard lockout. After that time, the control continues to monitor the gas valve circuit and resumes normal operation when shorted condition no longer exists. | Cycling power to the unit will cause the ICB to re-start the ignition sequence |
| 10 red flashes | The high-temperature limit switch or auxiliary limit switch has been open for more than 5 minutes. | Check for disconnected wire from blower motor, bad blower motor, damaged blower wheel, broken blower drive belt, open manual reset auxiliary limit switch. | No heating operation is allowed. The draft inducer and main blower operate during the lockout. | This is a hard lockout condition and must be reset by cycling main power to the unit. Auxiliary limit switch located on the blower housing is a manual-reset limit. If it is open, the switch must be reset before operation can resume. |
| 1 amber flash | Indicates low flame current. The flame current sensed by the flame sensor has dropped below the normal level. The furnace continues to operate, but if the flame current continues to drop, the burner will shut down. | Check for a dirty or damaged flame sensor. | LED on ICB will continue to emit one amber flash code as long as the flame sense signal remains below the threshold. | After servicing the flame sensor, turn power back on to the unit and initiate a call for heat. |
| 2 amber flash | Indicates ID plug failure. If this error occurs, it means the ICB is unable to detect the ID plug. The ID plug is used to transmit model-specific information to the ICB. The furnace will not operate correctly without the correct ID plug installed. | Confirm that ID plug is correctly installed on ICB. Replace broken ID plug if necessary. | No heating operation is allowed until the ID plug problem is corrected and the main power is cycled. | After ID plug is connected or replaced, turn on main power and initiate a call for heat |
| 3 amber flash | Indicates the ICB fuse is open. The low-voltage fuse on the ICB has opened or is missing. | Check for short circuits in the 24 VAC circuits. Replace fuse. | No heating operation is allowed until the fuse problem is corrected. | After overload condition is corrected and fuse has been replaced, turn on main power and initiate a call for heat |
| Soft lockout | A control lockout resulting from an external fault sensed by the ICB, such as successive unsuccessful ignition attempts, or a limit trip. Once in lockout, the ICB will not allow heating mode operation and will be prevented from beginning an ignition attempt in response to any call for heat for a pre-determined period of time before attempting another trial for ignition. During lockout the unit will still respond to a call for cooling. | | | To reset a soft lockout, remove and restart the call for heat at the thermostat. |
| Hard lockout | When a fault code indicating a potentially hazardous condition for users occurs, this results in a hard lockout. This includes the occurrence of repeated fault codes during a call for heat. During a hard lockout, the unit will respond to calls for cooling or fan operation, but ignores calls for heat. | | | To reset a hard lockout, you must cycle high-voltage power to the ICB. |

Charging tables

Table 47: KQ04 charging table

| Air flow indoor Db/Wb | Outdoor DB ° F | Suction P psig | Suction temp. ° F | Liquid P psig | Liquid temp. ° F | Delta T Db ° F | Compr. amps |
|-----------------------|----------------|----------------|-------------------|---------------|------------------|----------------|-------------|
| 300 Cfm/Ton 80/62 | 75 | 125 | 59 | 259 | 79 | -25 | 7.8 |
| | 85 | 124 | 58 | 303 | 88 | -26 | 9.0 |
| | 95 | 122 | 58 | 347 | 97 | -26 | 10.2 |
| 300 Cfm/Ton 80/67 | 75 | 125 | 60 | 259 | 79 | -25 | 7.8 |
| | 85 | 127 | 60 | 304 | 88 | -24 | 9.1 |
| | 95 | 129 | 61 | 350 | 97 | -23 | 10.3 |
| 300 Cfm/Ton 80/72 | 75 | 125 | 60 | 259 | 79 | -25 | 7.8 |
| | 85 | 130 | 62 | 306 | 88 | -22 | 9.1 |
| | 95 | 136 | 65 | 353 | 97 | -19 | 10.4 |
| 300 Cfm/Ton 75/62 | 75 | 120 | 57 | 258 | 78 | -23 | 7.8 |
| | 85 | 120 | 57 | 302 | 87 | -22 | 9.0 |
| | 95 | 121 | 57 | 347 | 96 | -22 | 10.3 |
| 400 Cfm/Ton 80/62 | 75 | 128 | 60 | 260 | 79 | -23 | 7.8 |
| | 85 | 129 | 60 | 304 | 88 | -23 | 9.0 |
| | 95 | 130 | 61 | 349 | 98 | -23 | 10.2 |
| 400 Cfm/Ton 80/67 | 75 | 130 | 61 | 260 | 79 | -22 | 7.8 |
| | 85 | 132 | 62 | 306 | 88 | -22 | 9.0 |
| | 95 | 134 | 63 | 351 | 98 | -21 | 10.3 |
| 400 Cfm/Ton 80/72 | 75 | 132 | 62 | 261 | 79 | -22 | 7.8 |
| | 85 | 135 | 63 | 307 | 88 | -20 | 9.0 |
| | 95 | 138 | 64 | 352 | 98 | -18 | 10.3 |
| 400 Cfm/Ton 75/62 | 75 | 124 | 58 | 259 | 79 | -20 | 7.8 |
| | 85 | 125 | 59 | 304 | 88 | -20 | 9.0 |
| | 95 | 127 | 59 | 349 | 97 | -19 | 10.3 |

Table 48: KQ05 charging table

| Air flow indoor Db/Wb | Outdoor DB ° F | Suction P psig | Suction temp. ° F | Liquid P psig | Liquid temp. ° F | Delta T Db ° F | Compr. amps |
|-----------------------|----------------|----------------|-------------------|---------------|------------------|----------------|-------------|
| 300 Cfm/Ton 80/62 | 75 | 129 | 63 | 273 | 85 | -26 | 11.6 |
| | 85 | 128 | 60 | 319 | 94 | -27 | 13.4 |
| | 95 | 126 | 58 | 365 | 103 | -28 | 15.2 |
| 300 Cfm/Ton 80/67 | 75 | 129 | 62 | 274 | 86 | -26 | 11.7 |
| | 85 | 132 | 61 | 321 | 95 | -25 | 13.6 |
| | 95 | 135 | 61 | 369 | 104 | -24 | 15.4 |
| 300 Cfm/Ton 80/72 | 75 | 128 | 61 | 276 | 87 | -26 | 11.8 |
| | 85 | 136 | 63 | 324 | 96 | -23 | 13.7 |
| | 95 | 144 | 64 | 372 | 105 | -20 | 15.6 |
| 300 Cfm/Ton 75/62 | 75 | 124 | 59 | 272 | 84 | -24 | 11.7 |
| | 85 | 124 | 58 | 319 | 93 | -23 | 13.4 |
| | 95 | 124 | 57 | 365 | 102 | -23 | 15.2 |
| 400 Cfm/Ton 80/62 | 75 | 133 | 65 | 276 | 86 | -23 | 11.8 |
| | 85 | 134 | 64 | 323 | 95 | -23 | 13.6 |
| | 95 | 135 | 62 | 371 | 104 | -23 | 15.4 |
| 400 Cfm/Ton 80/67 | 75 | 134 | 65 | 278 | 85 | -23 | 11.9 |
| | 85 | 137 | 64 | 325 | 95 | -22 | 13.7 |
| | 95 | 140 | 64 | 373 | 105 | -21 | 15.6 |
| 400 Cfm/Ton 80/72 | 75 | 135 | 64 | 280 | 85 | -23 | 12.0 |
| | 85 | 139 | 65 | 327 | 95 | -21 | 13.8 |
| | 95 | 144 | 65 | 375 | 105 | -19 | 15.7 |
| 400 Cfm/Ton 75/62 | 75 | 128 | 62 | 276 | 84 | -21 | 11.9 |
| | 85 | 130 | 61 | 323 | 93 | -20 | 13.7 |
| | 95 | 131 | 60 | 371 | 103 | -20 | 15.4 |

Table 49: KQ06 charging table

| Air flow indoor Db/Wb | Outdoor DB ° F | Suction P psig | Suction temp. ° F | Liquid P psig | Liquid temp. ° F | Delta T Db ° F | Compr. amps |
|-----------------------|----------------|----------------|-------------------|---------------|------------------|----------------|-------------|
| 300 Cfm/Ton 80/62 | 75 | 129 | 61 | 264 | 82 | -26 | 13.3 |
| | 85 | 127 | 59 | 308 | 90 | -26 | 15.1 |
| | 95 | 126 | 57 | 353 | 99 | -27 | 17.0 |
| 300 Cfm/Ton 80/67 | 75 | 129 | 61 | 263 | 81 | -26 | 12.9 |
| | 85 | 132 | 59 | 309 | 91 | -25 | 15.0 |
| | 95 | 134 | 58 | 355 | 100 | -24 | 17.1 |
| 300 Cfm/Ton 80/72 | 75 | 129 | 61 | 263 | 81 | -26 | 12.5 |
| | 85 | 136 | 60 | 311 | 92 | -23 | 14.8 |
| | 95 | 143 | 59 | 358 | 102 | -20 | 17.2 |
| 300 Cfm/Ton 75/62 | 75 | 123 | 57 | 262 | 81 | -23 | 13.1 |
| | 85 | 124 | 56 | 308 | 89 | -23 | 15.0 |
| | 95 | 124 | 55 | 353 | 98 | -23 | 17.0 |
| 400 Cfm/Ton 80/62 | 75 | 133 | 63 | 266 | 82 | -23 | 13.6 |
| | 85 | 134 | 62 | 311 | 91 | -23 | 15.5 |
| | 95 | 135 | 60 | 355 | 100 | -23 | 17.4 |
| 400 Cfm/Ton 80/67 | 75 | 134 | 64 | 267 | 81 | -22 | 13.5 |
| | 85 | 137 | 62 | 312 | 91 | -22 | 15.5 |
| | 95 | 140 | 60 | 357 | 101 | -21 | 17.5 |
| 400 Cfm/Ton 80/72 | 75 | 135 | 64 | 269 | 80 | -22 | 13.3 |
| | 85 | 140 | 62 | 314 | 91 | -20 | 15.4 |
| | 95 | 145 | 61 | 359 | 101 | -19 | 17.5 |
| 400 Cfm/Ton 75/62 | 75 | 128 | 60 | 265 | 81 | -20 | 13.5 |
| | 85 | 129 | 59 | 311 | 90 | -20 | 15.5 |
| | 95 | 131 | 58 | 356 | 99 | -20 | 17.4 |

Smart Equipment Control Board Navigation components

You need the following components to access the control points in the Smart Equipment control.

① **Note:** Installation and operation guides are available from your equipment dealer or distributor.

1. A local LCD on the unit control board.
2. Tools to interact with the UCB.

Choose from the following two options:

- a. • GoTemp Pro app (available for iOS or Android)



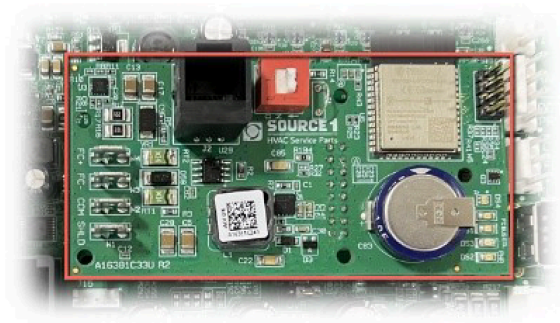
① **Note:** You can connect the GoTemp Pro app to the controller via Bluetooth through the Connected Workflow Converter (CWCVT) or directly to the UCB if the controller has a communication card.

- *CWCVT Wireless MS/TP Converter User Guide*, literature part no. 12014120

Figure 31: CWCVT (S1-TL-CWCVT-0)



Figure 32: Communication card



A0210-A-0324

- b. Mobile Access Portal (MAP) Gateway (portable)
 - Source 1 part no. S1-YK-MAP1810-0P (no longer available for purchase - We strongly recommend that the GoTemp Pro app be used for all R-454B units for best user experience.)

① **Note:** Although the MAP is no longer available for purchase, it continues to work with the UCB. The MAP does not receive firmware updates, so as additional points are added to the UCB those points will not render properly. However, the MAP will continue to work for the majority of typical applications.

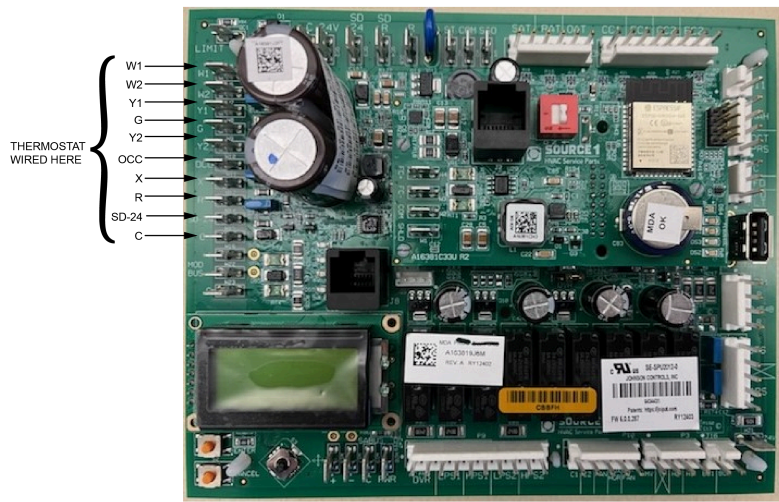
- *MAP Gateway Quick Start Guide*, part no. 24-10737-16
- *MAP Gateway Instruction*, part no. 24-10737-8

For more information on the Smart Equipment unit control board navigation, refer to the *Smart Equipment Quick Start Guide*.

① **Note:** For more in-depth sequence of operation of the Smart Equipment control, refer to the *Smart Equipment Controls Sequence of Operation Overview*, literature part no. 12011950.

Smart Equipment

Figure 33: Unit control board



A0209-B

Table 50: Smart Equipment UCB Details (Version 5 Hardware)

| Description | | Function and comments |
|--|---|--|
| Terminal directional orientation: viewed with silkscreen labels upright | | |
| Limit, 24 VAC power and shutdown connections from unit wiring harness at left on upper edge of UCB | | |
| Limit | Monitored 24 VAC input through heat section limit switches | If the voltage is absent, indicating the heat section is over-temperature, the UCB brings on the indoor blower |
| C | 24 VAC, 75 VA transformer common referenced to cabinet ground | Connects through circuit traces to thermostat connection strip C and indoor blower VFD pin C |
| 24V | 24 VAC, 75 VA transformer hot | Powers the UCB microprocessor, connects through circuit trace to the SD 24 terminal |
| SD 24 | 24 VAC hot out for factory accessory smoke detector, condensate overflow and/or user shutdown relay switching in series | Connects through circuit trace to thermostat connection strip SD-24. A wiring harness jumper plug connecting SD 24 to SD R is in place if factory accessories for unit shutdown are not used - this jumper plug must be removed if the switching of field-added external accessories for unit shutdown are wired between thermostat connection strip SD-24 and R |
| SD R | 24 VAC hot return from factory accessory smoke detector and user shutdown relay switching in series | Connects through circuit trace to the R terminal on the upper left of the board |
| R | 24 VAC hot for switched inputs to the UCB | Connects through circuit trace to the thermostat connection strip R terminal, right FAN OVR pin, right HPS1 pin, right HPS2 pin, lower DFS pin and lower APS pin |
| Terminal thermostat connection strip on left edge of UCB | | |
| W1 | 1st stage heating request, 24 VAC input switched from R | Not effective for cooling-only units |
| W2 | 2nd stage heating request, 24 VAC input switched from R | Not effective for cooling-only units or units with single-stage heat sections |
| Y1 | 1st stage cooling request, 24 VAC input switched from R | |
| Y2 | 2nd stage cooling request, 24 VAC input switched from R | Visible in the display menu when the #ClgStgs parameter is set for 2 or more, also effective for economizer free cooling supply air temperature reset when the #ClgStgs parameter is set for 1 or more |
| G | Continuous indoor blower request, 24 VAC input switched from R | |
| OCC | Occupancy request, 24 VAC input switched from R | Must have the OccMode parameter set for external to be effective |
| X | Hard lockout indicator, 24 volt output to a light thermostat LED | 24V positive half-wave rectified |
| R | 24 VAC hot for thermostat switching and power | If field-added external accessories for unit shutdown are used, 24 VAC hot return from smoke detector, condensate overflow and/or user shutdown relay switching in series |
| SD-24 | If field-added external accessories for unit shutdown are used, 24 VAC hot out for smoke detector, condensate over- flow and/or user shutdown relay switching in series | Unit wiring harness jumper plug for factory shutdown accessories must be removed if the switching of field-added external accessories for unit shutdown are wired between thermo- stat connection strip SD-24 and R |
| C | 24 VAC common for thermostat power | |
| + | Modbus Terminal + | N/A - Future |
| - | Modbus Terminal - | N/A - Future |
| C | Modbus Terminal C | N/A - Future |

Table 50: Smart Equipment UCB Details (Version 5 Hardware)

| Description | | Function and comments |
|---|--|---|
| LEDs on left edge of UCB | | |
| Power | Green UCB power indicator | Lit indicates 24 VAC is present at C and 24V terminals |
| Fault | Red hard lockout, networking error and firmware error indicator | 1/2 second on/off flashing indicates one or more alarm is currently active, 1/10th second on/off flashing indicates a networking error (polarity, addressing, etc.) or a firmware error (likely correctable with re-loading from USB flash drive) |
| SA BUS | Green UCB SA bus communication transmission indicator | Lit/flickering indicates UCB SA bus communication is currently active, off indicates the UCB is awaiting SA bus communication |
| Terminal space temperature sensor connections at center on upper edge of UCB | | |
| ST | Space Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Positive of VDC circuit (3.625 VDC reading to COM with open circuit), effective if "Thermo- stat-only Control" parameter is set OFF, space sensor override momentary shorts ST to COM to initiate/terminate temporary occupancy |
| COM | Common for ST and SSO inputs | Negative of VDC circuit for ST and SSO inputs |
| SSO | Space Sensor Offset input from 0 to 20KΩ potentiometer | Positive of VDC circuit (3.625 VDC reading to COM with open circuit), 10KΩ/2.5 VDC is 0°F offset, 0Ω/0 VDC is maximum above offset and 20KΩ/3.4 VDC is maximum below offset from active space temperature setpoint |
| Pin Temperature sensor connections at right on upper edge of UCB | | |
| SAT+ | Supply Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for operation; 3.625 VDC reading SAT+ to SAT- with open circuit. Used in heat/cool staging cutouts, free cooling operation, demand ventilation operation, comfort ventilation operation, economizer loading operation, VAV cooling operation, hydronic heat operation. |
| RAT+ | Return Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for operation; 3.625 VDC reading RAT+ to RAT- with open circuit. Used in return air enthalpy calculation. Substitutes for space temperature if no other space temperature input is present. |
| OAT+ | Outside Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for operation but may be a communicated value; 3.625 VDC reading OAT+ to OAT- with open circuit. Used in heat/cool cutouts, low ambient cooling determination, dry bulb free cooling changeover, outside air enthalpy calculation, economizer loading operation, heat pump demand defrost calculation. |
| CC1+ | #1 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for heat pump units, not required for A/C units; 3.625 VDC reading CC1+ to CC1- with open circuit. Used in heat pump demand defrost calculation. |
| EC1+ | #1 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for operation; 3.625 VDC reading EC1+ to EC1- with open circuit. Used in suction line temperature safety. |
| CC2+ | #2 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for 2-compressor heat pump units, not required for 2-compressor A/C units, not active for 1-compressor units; 3.625 VDC reading CC2+ to CC2- with open circuit. Used in heat pump demand defrost calculation. |
| EC2+ | #2 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor | Input required for operation of 2-compressor units, not active for 1-compressor units; 3.625 VDC reading EC2+ to EC2- with open circuit. Used in suction line temperature safety. |
| Pinned connections on right edge of UCB | | |
| AI1 | Analog Input 1 | Future - 0-10 VDC input |
| RAH+ | Return Air Humidity input from 0-10 VDC @ 0-100% RH sensor | Input required for reheat units, optional in all other units, may be a communicated value. Used in return air enthalpy calculation, temperature/humidity setpoint reset, reheat operation. |
| DCT PRS+ | Supply Duct Pressure input from 0-5 VDC @ 0-5 in. w.c. sensor | Input required for variable air volume units. Used in VAV indoor blower operation. |
| C | Common for the VFD output | Negative of the VDC circuit for the VFD output |
| VFD | 2-10 VDC (0-100%) output for the indoor blower Variable Frequency Drive | Output is active with indoor blower operation. For CV units: this output provides stepped IntelliSpeed control of the indoor blower VFD based on fan-only, cooling stage and heating stage outputs. For VAV units: this output provides control of the indoor blower VFD based on supply duct static pressure input and setpoint. |
| VFD FLT | 24 VAC hot input from the normally open VFD alarm contact | The VFD alarm contact switches from R within the unit wiring harness. 24 VAC input results in unit shutdown and a "VFD fault" alarm |
| J10 | Type A female Universal Serial Bus connector | Used for backup, restoration, & copying of board parameters as well as board software updating through a flash drive |
| COS | 24 VAC hot return from Condensate Overflow Switch | Optional input; switch opening will disable the control outputs to the unit compressors. Upon closure, the compressors will begun unit operation after off delay expires |
| R | 24 VAC hot out for COS | Connects through circuit trace to the R terminal |
| RDS | 24 VAC hot return from Refrigerant Detection System | Required input for RDS; when flammable refrigerant is used and RDS is required, the unit will monitor this input and enter mitigation mode if unit RDS contact opens |
| R | 24 VAC hot out for RDS | Connects through circuit trace to the R terminal |

Table 50: Smart Equipment UCB Details (Version 5 Hardware)

| Description | | Function and comments |
|--|--|--|
| DFS (upper pin) | 24 VAC hot return from Dirty Filter Switch | Optional input; switch closure for greater than 15 seconds during indoor blower operation initiates a notification alarm |
| DFS (lower pin) | 24 VAC hot out for Dirty Filter Switch | Connects through circuit trace to the R terminal |
| APS (upper pin) | 24 VAC hot return from Air Proving Switch | When this optional input is enabled: the air proving switch must close within 30 seconds of initiation of indoor blower operation and not open for greater than 10 seconds during in- door blower operation to allow heat/cool operation and prevent an "APS open" alarm; the air proving switch must open within 30 seconds of termination of indoor blower operation to prevent an "APS stuck closed" notification alarm |
| APS (lower pin) | 24 VAC hot out for Air Proving Switch | Connects through circuit trace to the R terminal |
| Terminal at lower right corner of UCB | | |
| 24V | 24 VAC hot for H1, H2, CN-FAN, AUX HGR, FAN C1 and C2 output relay contact switching | Output relay circuitry is isolated from other UCB components and the 24 VAC hot source may be from a second transformer in the unit |
| Pin heat section connections at right on lower edge of UCB | | |
| BO2 | Binary output 2 | Future |
| BO1 | Binary output 2 | Future |
| H1 | 24 VAC hot output for heat section stage 1 | Not effective for cooling-only units. Output if demand is present and permissions allow one stage or two stages of heat section operation |
| H2 | 24 VAC hot output for heat section stage 2 | Not effective for cooling-only units or units with single-stage heat sections. Output if demand is present and permissions allow two stages of heat section operation |
| MV | 24 VAC hot input confirming heat section operation | Sourced from gas valve in gas heat units or first stage heat contactor in electric heat units. Input within 5 minutes from initiation of H1 output initiates the Heat On Fan Delay timer, loss of input following the termination of H1 output initiates the Heat On Fan Delay timer, no input within 5 minutes from initiation of H1 output initiates an Ignition Failure alarm, input for longer than 5 minutes without H1 output initiates a Gas Valve Mis-wire alarm |
| Pin cooling and fan output connections at right on lower edge of UCB | | |
| CN-FAN | 24 VAC hot output for the condenser fan contactor coil | Output with either C1 or C2 output; interrupted during defrost cycle for heat pump units |
| AUX HGR | 24 VAC hot output for hot gas reheat components | Effective only for reheat units, output with reheat operation |
| FAN | 24 VAC hot output for indoor blower contactor coil/indoor blower VFD enable relay coil | Output with heat/cool operation, G input or schedule demand |
| C1 | 24 VAC hot output for compressor 1 | If demand is present and permissions allow compressor 1 operation; output with compressor cooling, comfort ventilation cooling, reheat or heat pump heating demands |
| C2 | 24 VAC hot output for compressor 2 | Not effective for one stage compressor UCBs. If demand is present and permissions allow compressor 2 operation; output with compressor cooling, comfort ventilation cooling or heat pump heating demands |
| Pin refrigerant circuit safety switch and indoor blower overload connections at center on lower edge of UCB | | |
| HPS1(right pin) | 24 VAC hot out for refrigerant circuit 1 High Pressure Switch | Connects through circuit trace to the R terminal |
| HPS1(left pin) | 24 VAC hot return from refrigerant circuit 1 High Pressure Switch | Input is only considered if C1 output is needed; input must be present to allow C1 output. Three HPS1 trips in a two hour period cause a "High Pressure Switch 1 Lockout" and C1 output is then prevented until alarm reset. Connects through circuit trace to the right LPS1 pin. |
| LPS1(right pin) | 24 VAC hot out for refrigerant circuit 1 Low Pressure Switch | Connects through circuit trace to the left HSP1 pin |
| LPS1(left pin) | 24 VAC hot return from refrigerant circuit 1 Low Pressure Switch | Input is only considered after 30 seconds of C1 output; afterwards, input must be present to allow C1 output. Three LPS1 trips in a one hour period cause a "Low Pressure Switch 1 Lockout" and C1 output is then prevented until alarm reset. |
| HPS2(right pin) | 24 VAC hot out for refrigerant circuit 2 High Pressure Switch | Not effective for one stage compressor UCBs. Connects through circuit trace to the R terminal |
| HPS2(left pin) | 24 VAC hot return from refrigerant circuit 2 High Pressure Switch | Not effective for one stage compressor UCBs. Input is only considered if C2 output is needed; input must be present to allow C1 output. Three HPS2 trips in a two hour period cause a High Pressure Switch 1 Lockout and C2 output is then prevented until alarm reset. Connects through circuit trace to the right LPS2 pin. |
| LPS2(right pin) | 24 VAC hot out for refrigerant circuit 2 Low Pressure Switch | Not effective for one stage compressor UCBs. Connects through circuit trace to the left HSP2 pin |
| LPS2(left pin) | 24 VAC hot return from refrigerant circuit 2 Low Pressure Switch | Not effective for one stage compressor UCBs. Input is only considered after 30 seconds of C2 output; afterwards, input must be present to allow C2 output. Three LPS2 trips in a one hour period cause a Low Pressure Switch 2 Lockout and C2 output is then prevented until alarm reset. |
| FAN OVR(right pin) | 24 VAC hot out for indoor blower FAN Overload relay contact/ motor protector switch | Connects through circuit trace to the R terminal |

Table 50: Smart Equipment UCB Details (Version 5 Hardware)

| Description | | Function and comments |
|--|---|---|
| FAN OVR(left pin) | 24 VAC hot return from indoor blower FAN Overload relay contact/motor protector switch | Input is only considered if FAN output is needed; input must be present to allow FAN output and unit operation. One FAN OVR trip lasting longer than 5 minutes or three FAN OVR trips in a two hour period cause a "Fan Overload Lockout" and unit operation is then prevented until alarm reset. |
| Terminal SA BUS' connections on at left on lower edge and center of UCB | | |
| PWR | Power for SA (Sensor-Actuator) BUS devices | Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the 15 VDC (reading to C) circuit for powering an optional netstat and/or Multi Touch gateway |
| C | Common for SA BUS power and communication circuits | Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Negative of the SA BUS circuits |
| - | Communication for SA BUS devices | Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts lower than +) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection & diagnostics board, netstat and/or Multi Touch gateway |
| + | Communication for SA BUS devices | Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts higher than -) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection & diagnostics board, netstat and/or Multi Touch gateway |
| J8 | 6-pin phone jack connector | Incorporates the SA BUS terminals for convenience/alternate connection of SA BUS devices, primarily used for temporary service connection of the Multi Touch gateway |
| Item Integrated user interface at lower left corner of UCB | | |
| Display | On-board, 2-line x 8-character back-lit display | On-board display, buttons and joystick allow access to UCB, economizer, 4-stage and FDD board parameters |
| ENTER | Button for display menu acknowledgment and navigation | |
| CANCEL | Button for display menu navigation and zeroing of active compressor ASCD timer | |
| JOY | 4-way joystick for display menu navigation | |
| Item USB connector at right of UCB | | |
| J15 | Factory wired SA Bus connector | |
| Optional communication sub-board at center of UCB | | |
| Terminal FC BUS' connections on left edge of the communication board | | |
| FC+ | FC (Field Connected) BUS BACnet MSTP communication | Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts higher than -) FC bus BACnet MSTP communication circuit |
| FC- | FC (Field Connected) BUS BACnet MSTP communication | Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts lower than +) FC bus BACnet MSTP communication circuit |
| COM | Common for the FC (Field Connected) BUS BACnet MSTP communication circuit | Negative of the VDC FC bus BACnet MSTP communication circuit |
| SHLD | Shield for the FC (Field Connected) BUS BACnet MSTP communication circuit | Earth ground reference of the cable to prevent interference on the FC bus BACnet MSTP communication circuit |
| Item selector in red housing at left on top edge of the communication board | | |
| EOLswitch | End of line selector switch for the FC BUS BACnet MSTP communication circuit | ON selected only for the UCB that is the terminus of the FC bus BACnet MSTP communication cable to prevent signal bounce-back |
| RJ12 | Connection to the TMR | Connection used for the wireless Transparent MS/TP Repeater (TMR) |
| LEDs on the communication board | | |
| Bluetooth (DS4) | Bluetooth signal | Solid OFF means bluetooth disabled. Flashing means the bluetooth is available for a connection. Solid ON means a connection has been made |
| N/A (DS5) | N/A - No function defined | |
| FC BUS (DS1) | Green FC bus communication transmission indicator | Lit/flickering indicates outgoing UCB FC bus communication is currently active, off indicates the UCB is awaiting incoming FC bus communication |
| EOL (DS2) | Green end of line indicator | Lit indicates the EOL switch is selected ON |
| ISO PWR (DS3) | Green communication board Isolated Power indicator | Lit indicates the UCB is supplying power to the communication sub-board |
| ① Note: | 1. When wiring the unit and other devices using the SA Bus and FC Bus, see Table 51 . | |

Table 51: Cable for FC buses and SA buses in order of preference

| Bus and Cable Type | Non-plenum applications | | Plenum applications | |
|---|--|-----------|--|-----------|
| | Part Number | O.D. | Part Number | O.D. |
| FC Bus: 22 AWG Stranded, 3-Wire Twisted Shielded Cable ¹ | Anixter: CBL-22/3-FC-PVC Belden®: B5501FE | 0.138 in. | Anixter: CBL-22/3-FC-PLN Belden: B6501FE | 0.140 in. |
| SA Bus (Terminal Block): 22 AWG Stranded, 4-Wire, 2 Twisted-Pair Shielded Cable | Anixter: CBL-22/2P-SA-PVC Belden: B5541FE | 0.209 in. | Anixter: CBL-22/2P-SA-PLN Belden: B6541FE | 0.206 in. |
| SA Bus (Modular Jack): 26 AWG Solid 6-Wire, 3 Twisted-Pair Cable ² | — | — | Anixter preassembled: CBL- NETWORK25 CBL-NETWORK50 CBL- NETWORK75 CBL-NETWORK100 | 0.15 in. |
| FC Bus: 22 AWG Stranded, 3-Wire Twisted Non-Shielded Cable | Belden: B5501UE | 0.135 in. | Belden: B6501UE | 0.131 in. |
| SA Bus (Terminal Block): 22 AWG Stranded, 4-Wire, 2 Twisted-Pair Non-Shielded Cable | Belden: B5541UE | 0.206 in. | Belden: B6541UE | 0.199 in. |
| <p>① Note:</p> <ol style="list-style-type: none"> We strongly recommend 3-wire (for FC bus) and 4-wire, 2 twisted-pair (for SA bus), 22 AWG stranded, shielded cable. A 22 gauge cable offers the best performance for various baud rates, cable distances, and number of trunk devices primarily due to lower conductor-to-conductor capacitance. Shielded cable offers better overall electrical noise immunity than non-shielded cable. Observe the shield grounding requirements. We recommend 26 AWG solid, 6-wire (3 twisted pairs) cable as the best fit for fabricating modular cables with the modular jack housing assembly. Be sure the cable you use fits the modular jack housing. The preassembled cables that are available from Anixter (Part No. CBL-NETWORKxxx) use 24 gauge wire. | | | | |

Start-up & Service Data Instruction

Commercial Package Units

3.0 To 50.0 tons

Start-up Checklist

Date: _____

Job Name: _____

Customer Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Model Number: _____ Serial Number: _____

Qualified Start-up Technician: _____ Signature: _____

HVAC Contractor: _____ Phone: _____

Address: _____

Contractor's E-mail Address: _____

Electrical Contractor: _____ Phone: _____

Distributor Name: _____ Phone: _____

Warranty Statement

BHC Residential & Light Commercial LLC is confident that this equipment will operate to the owner's satisfaction if the proper procedures are followed and checks are made at initial start-up. This confidence is supported by the 30 day dealer protection coverage portion of our standard warranty policy which states that BHC Residential & Light Commercial LLC will cover parts and labor on new equipment start-up failures that are caused by a defect in factory workmanship or material, for a period of 30 days from installation. Refer to the current standard warranty policy and warranty manual for details.

In the event that communication with BHC Residential & Light Commercial LLC is required regarding technical and/or warranty concerns, all parties to the discussion should have a copy of the equipment start-up sheet for reference. A copy of the original start-up sheet should be filed with the Technical Services Department.

The packaged unit is available in constant or variable air volume versions with a large variety of custom options and accessories available. Therefore, some variation in the startup procedure will exist depending upon the products capacity, control system, options and accessories installed.

This start-up sheet covers all startup check points common to all package equipment. In addition it covers essential startup check points for a number of common installation options. Depending upon the particular unit being started not all sections of this startup sheet will apply. Complete those sections applicable and use the notes section to record any additional information pertinent to your particular installation.

Warranty claims are to be made through the distributor from whom the equipment was purchased.

Equipment Startup

Use the local LCD or GoTemp Pro mobile application to complete the start-up.

A copy of the completed start-up sheet should be kept on file by the distributor providing the equipment and a copy sent to:

BHC Residential & Light Commercial LLC
Technical Services Department
5005 York Drive
Norman, OK 73069

1034349-UCL-L-0426

Safety Warnings

The inspections and recording of data outlined in this procedure are required for start-up of BHC Residential & Light Commercial LLC' packaged products. Industry recognized safety standards and practices must be observed at all times. General industry knowledge and experience are required to assure technician safety. It is the responsibility of the technician to assess all potential dangers and take all steps warranted to perform the work in a safe manner. By addressing those potential dangers, prior to beginning any work, the technician can perform the work in a safe manner with minimal risk of injury.

| |
|---|
| ▲WARNING |
| Lethal voltages are present during some start-up checks. Extreme caution must be used at all times. |

| |
|--|
| ▲WARNING |
| Moving parts may be exposed during some startup checks. Extreme caution must be used at all times. |

NOTE: Read and review this entire document before beginning any of the startup procedures.

Design Application Information

This information will be available from the specifying engineer who selected the equipment. If the system is a VAV system the CFM will be the airflow when the remote VAV boxes are in the

full open position and the frequency drive is operating at 60 HZ. **Do not proceed with the equipment start-up without the design CFM information.**

Design Supply Air CFM: _____ Design Return Air CFM: _____

Design Outdoor Air CFM At Minimum Position: _____

Total External Static Pressure: _____

Supply Static Pressure: _____

Return Static Pressure: _____

Design Building Static Pressure: _____

Outside Air Dilution: Economizer Position Percentage: _____ CFM: _____

Supply Gas Pressure After Regulator W/o Heat Active _____ Inches _____

ADDITIONAL APPLICATION NOTES FROM SPECIFYING ENGINEER:

Reference

| General Inspection | Completed | See Notes |
|---|--------------------------|--------------------------|
| Unit inspected for shipping, storage, or rigging damage | <input type="checkbox"/> | <input type="checkbox"/> |
| Unit installed with proper clearances | <input type="checkbox"/> | <input type="checkbox"/> |
| Unit installed within slope limitations | <input type="checkbox"/> | <input type="checkbox"/> |
| Refrigeration system checked for gross leaks (presence of oil) | <input type="checkbox"/> | <input type="checkbox"/> |
| Terminal screws and wiring connections checked for tightness | <input type="checkbox"/> | <input type="checkbox"/> |
| Filters installed correctly and clean | <input type="checkbox"/> | <input type="checkbox"/> |
| Economizer hoods installed in operating position | <input type="checkbox"/> | <input type="checkbox"/> |
| Condensate drain trapped properly, refer to Installation Manual | <input type="checkbox"/> | <input type="checkbox"/> |
| Economizer damper linkage tight | <input type="checkbox"/> | <input type="checkbox"/> |
| Gas Heat vent hood installed | <input type="checkbox"/> | <input type="checkbox"/> |
| All field wiring (power and control) complete | <input type="checkbox"/> | <input type="checkbox"/> |

| Air Moving Inspection | Completed | See Notes |
|---|--------------------------|--------------------------|
| Alignment of drive components | <input type="checkbox"/> | <input type="checkbox"/> |
| Belt tension adjusted properly | <input type="checkbox"/> | <input type="checkbox"/> |
| Blower pulleys tight on shaft, bearing set screws tight, wheel tight to shaft | <input type="checkbox"/> | <input type="checkbox"/> |
| Pressure switch or transducer tubing installed properly | <input type="checkbox"/> | <input type="checkbox"/> |

| Exhaust Inspection Powered <input type="checkbox"/> Barometric Relief <input type="checkbox"/> | Completed | See Notes |
|---|--------------------------|--------------------------|
| Check hub for tightness | <input type="checkbox"/> | <input type="checkbox"/> |
| Check fan blade for clearance | <input type="checkbox"/> | <input type="checkbox"/> |
| Check for proper rotation | <input type="checkbox"/> | <input type="checkbox"/> |
| Check for proper mounting (screen faces towards unit) | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove operation by increasing minimum setting on economizer | <input type="checkbox"/> | <input type="checkbox"/> |

| Economizer Inspection Standard <input type="checkbox"/> BAS <input type="checkbox"/> | Completed | See Notes |
|--|--------------------------|--------------------------|
| CO ₂ sensor installed Yes <input type="checkbox"/> No <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Check economizer setting (Reference Smart Equipment Control Board LCD menu location) | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove economizer open/close through Smart Equipment Board Setting | <input type="checkbox"/> | <input type="checkbox"/> |

| Reheat Mode Normal <input type="checkbox"/> or Alternate <input type="checkbox"/> Not Applicable <input type="checkbox"/> |
|--|
| Humidity Sensor (2SH0401) _____ |

Operating Measurements - Air Flow

| | | | | |
|---|--|----------------------------------|------------------------------------|-------------------------------------|
| Fan operates with proper rotation (All VFD equipped units with the optional Manual Bypass must be phased for correct blower rotation with the Bypass switch set in the LINE position) | | ID Fans <input type="checkbox"/> | Exh. Fans <input type="checkbox"/> | Cond. Fans <input type="checkbox"/> |
| Pressure drop across dry evaporator coil (At maximum design CFM) ¹ | | | | IWC |
| External Static Pressure | | | | IWC |
| Return Static Pressure | | | | IWC |
| Supply Static Pressure | | | | IWC |
| Supply Air CFM Using Dry Coil Chart | | | | CFM |
| Final Adjusted Supply Air CFM ² | | | | CFM |

- Consult the proper airflow to pressure drop table to obtain the actual airflow at the measured pressure differential.
- Was a motor pulley adjustment or change required to obtain the correct airflow?
Was it necessary to increase of decrease the airflow to meet the design conditions?
If the motor pulley size was changed, measure the outside diameters of the motor and blower pulleys and record those diameters here;

Blower Motor HP _____ FLA _____ RPM _____

Pulley Pitch Diameter _____ Turns Out _____ Final Turns Out _____

Blower Pulley Pitch Diameter _____ Fixed Sheave _____

Electrical Data

T1 - T2 _____ Volts T2 - T3 _____ Volts
Control Voltage _____ Volts T1 - T3 _____ Volts

| Device | Nameplate | Measured List All Three Amperages |
|---------------------------------|-----------|--------------------------------------|
| Supply Fan Motor ^{1,2} | AMPS | AMPS |
| Exhaust Motor (Dampers 100%) | AMPS | AMPS |
| Condenser Fan #1 | AMPS | AMPS |
| Condenser Fan #2 (if equipped) | AMPS | AMPS |
| Condenser Fan #3 (if equipped) | AMPS | AMPS |
| Condenser Fan #4 (if equipped) | AMPS | AMPS |
| Compressor #1 | AMPS | AMPS |
| Compressor #2 (if equipped) | AMPS | AMPS |
| Compressor #3 (if equipped) | AMPS | AMPS |
| Compressor #4 (if equipped) | AMPS | AMPS |

- VAV units with heat section - simulate heat call to drive VAV boxes and VFD/IGV to maximum design airflow position.
- VAV units without heat section - VAV boxes must be set to maximum design airflow position.

Refrigerant Safeties

| Action | Completed | See Notes |
|--|--------------------------|--------------------------|
| Prove Compressor Rotation (3 phase only) by gauge pressure | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove High Pressure Safety, All Systems | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Low Pressure Safety, All Systems | <input type="checkbox"/> | <input type="checkbox"/> |

Refrigerant Detection System (RDS) Safety Test

| Action | Completed | See Notes |
|--|--------------------------|--------------------------|
| Does the System have a Refrigerant Detection System (RDS) installed for R-454B? | <input type="checkbox"/> | <input type="checkbox"/> |
| Does Control Board Show any RDS alarms? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are all available RDS Sensors pulsing with a green light? | <input type="checkbox"/> | <input type="checkbox"/> |
| Caution do not continue until any RDS alarms are resolved | | |
| Prove Refrigerant Detection System Alarm Mitigation (Heating Units) – Shuts Down Active Heat Call ¹ | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Refrigerant Detection System Alarm Mitigation (Cooling Mode) – Shuts Down Active Cooling Call ¹ | <input type="checkbox"/> | <input type="checkbox"/> |

1. Complete the above steps by pulling the J1 harness off the UCB during an active call for heat/cooling

Operating Measurements - Cooling

| Stage | Discharge Pressure | Discharge Temp. | Liquid Line Temp. ¹ | Subcooling ² | Suction Pressure | Suction Temp. | Superheat |
|----------------------|--------------------|-----------------|--------------------------------|-------------------------|------------------|---------------|-----------|
| First | # | ° | ° | ° | # | ° | ° |
| Second (if equipped) | # | ° | ° | ° | # | ° | ° |
| Third (if equipped) | # | ° | ° | ° | # | ° | ° |
| Fourth (if equipped) | # | ° | ° | ° | # | ° | ° |
| Reheat 1st Stage | # | ° | ° | ° | # | ° | ° |

1. Liquid temperature should be taken before filter/drier.
2. Subtract 10 psi from discharge pressure for estimated liquid line pressure

| | | | | | | |
|-------------------------|-------|-------|-------|-------|-------|-----|
| Outside air temperature | _____ | °F db | _____ | °F wb | _____ | %RH |
| Return Air Temperature | _____ | °F db | _____ | °F wb | _____ | %RH |
| Mixed Air Temperature | _____ | °F db | _____ | °F wb | _____ | %RH |
| Supply Air Temperature | _____ | °F db | _____ | °F wb | _____ | %RH |

Operating Measurements - Gas Heating

Fuel Type: Natural Gas LP Gas

| Action | Completed | See Notes |
|-------------------------------------|--|------------------------------|
| Check for gas leaks | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Ventor Motor Operation | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Primary Safety Operation | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Auxiliary Safety Operation | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Rollout Switch Operation | <input type="checkbox"/> | <input type="checkbox"/> |
| Prove Smoke Detector Operation | <input type="checkbox"/> | <input type="checkbox"/> |
| Manifold Pressure | Stage 1 | IWC <input type="checkbox"/> |
| | Stage 2 (If Equipped) | IWC <input type="checkbox"/> |
| | Stage 3 (If Equipped) | IWC <input type="checkbox"/> |
| Supply gas pressure at full fire | | IWC <input type="checkbox"/> |
| Check temperature rise ¹ | <input type="checkbox"/> measured at full fire | °F <input type="checkbox"/> |

1. Input X Eff. (BTU output)
1.08 X Temp. Rise

Operating Measurements Electric Heating

Heater kW _____ kW Heater Voltage, Nameplate _____ Volts

Heater Model Number: _____

Serial Number: _____

| Heater | Nameplate | Measured List All Three Amperages | | |
|------------------------------|------------|-----------------------------------|-----------------------------|------------|
| Stage 1 | _____ AMPS | _____ AMPS | _____ AMPS | _____ AMPS |
| Stage 2 | _____ AMPS | _____ AMPS | _____ AMPS | _____ AMPS |
| Stage 3 | _____ AMPS | _____ AMPS | _____ AMPS | _____ AMPS |
| Stage 4 | _____ AMPS | _____ AMPS | _____ AMPS | _____ AMPS |
| Checked Heater Limit | | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| Air Moving Switch Installed? | | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |

Operating Measurements - Staging Controls

| Verify Proper Operation of Heating/Cooling Staging Controls | |
|--|--------------------------|
| Create a cooling demand at the Thermostat, BAS System or Smart Equipment Verify that cooling/economizer stages are energized. | <input type="checkbox"/> |
| Create a heating demand at the Thermostat, BAS System or Smart Equipment Verify that heating stages are energized. | <input type="checkbox"/> |
| Verify Proper Operation of the Variable Frequency Drive (If Required) | |
| Verify that motor speed modulates with duct pressure change. | <input type="checkbox"/> |

