# Installation Manual: Core WQE, 3 ton to 5 ton, Heat Pump

## R-454B, 60 Hertz



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## General

WQ units are single package heat pumps 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 and duct connections.

### Certifications

### 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**

Improper 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 or service agency.

**⚠ WARNING**

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, deathor 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. Be sure to follow all other applicable safety precautions and codes that apply.

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, it should be inspected 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.

## Reference

Additional information is available in the following reference forms:

- *Technical Guide, WQ04-06*
- *General Installation, WQ04-06*
- Economizer Option or Accessory:
  *Vertical Flow Dry Bulb Economizer Factory installed Option or Field Installed accessory*
  *Horizontal Flow Dry Bulb Economizer Field Installed accessory*
- Power Exhaust Accessory:
  *Vertical or Horizontal Flow Field Installed*

## Renewal parts

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

## Approvals

Design certified by CSA as follows:

- For use as a heat pump unit.
- For outdoor installation only.
- For installation on combustible material.

**⚠ CAUTION**

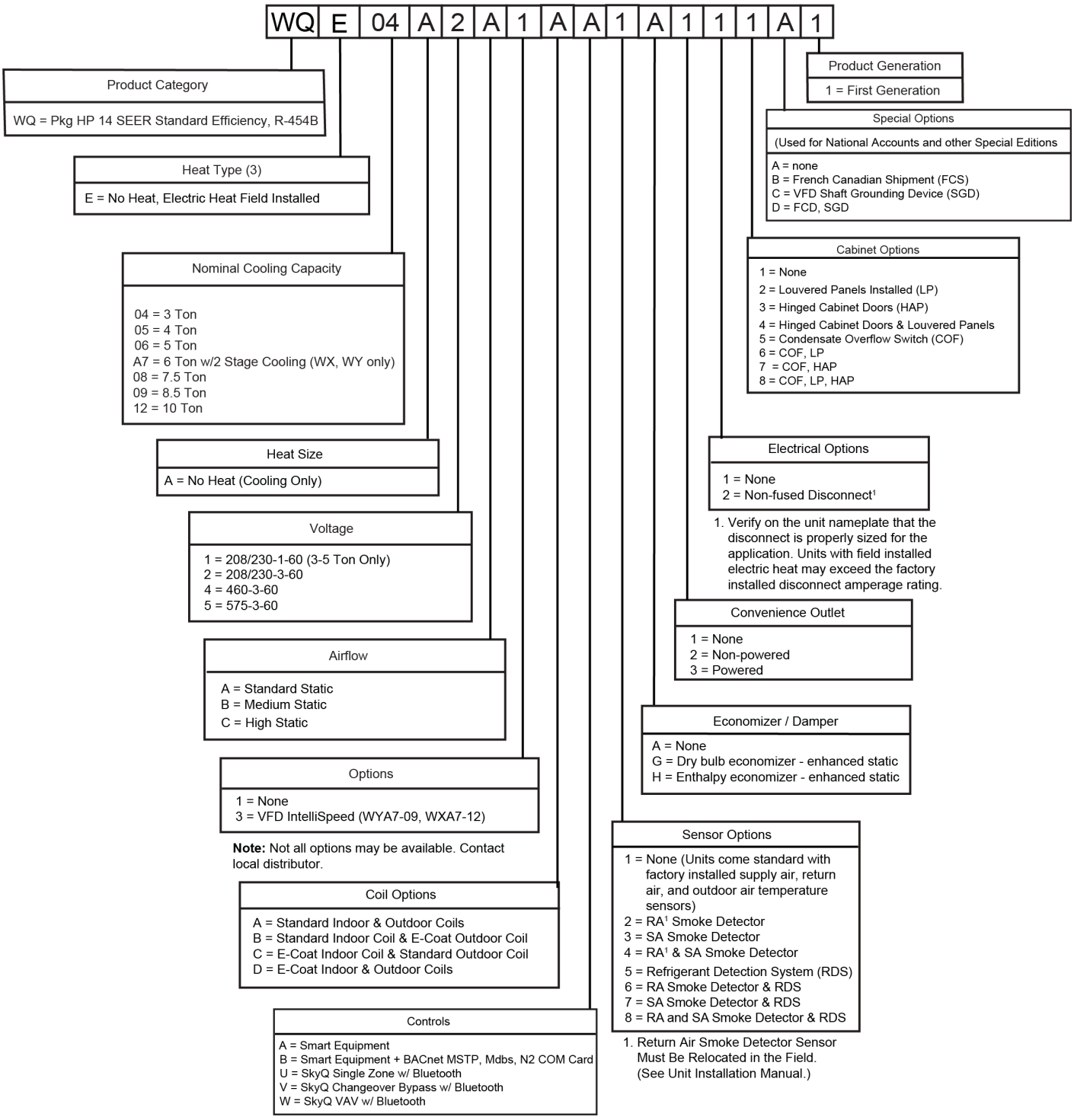
This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

**⚠ WARNING**

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

## Nomenclature

### 3 to 5 Ton Model Number Nomenclature



# Installation

## Installation safety information

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Install this unit only in a location and position as specified in the location section of the manual.
2. This equipment is not to be used for temporary heating of buildings or structures under construction.

## Preceding installation

1. Remove the two screws that hold the brackets in the fork-lift slots on the side of the unit.

**Figure 1: Unit shipping bracket**




| Callout | Component |
|---|---|
| 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 prior to operation.

**Figure 2: Protective condenser covering**



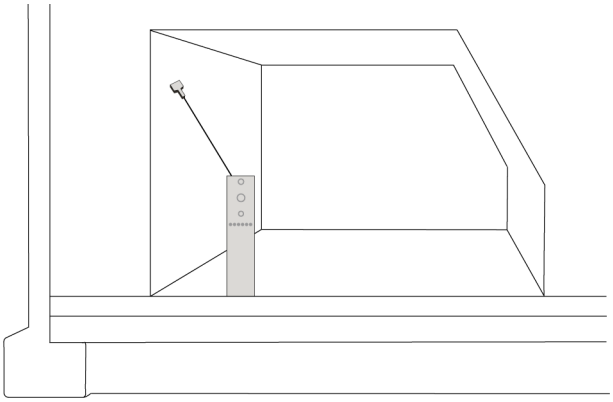
4. If a factory option convenience outlet is installed, you must install the weatherproof outlet cover in the field. The cover is located behind the filter access panel.
   a. Remove the shipping label that covers the convenience outlet.
   b. Follow the instructions on the back of the cover box.
   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 230v power supply. Change tap on transformer for 208-3-60 operation. See unit wiring diagram.

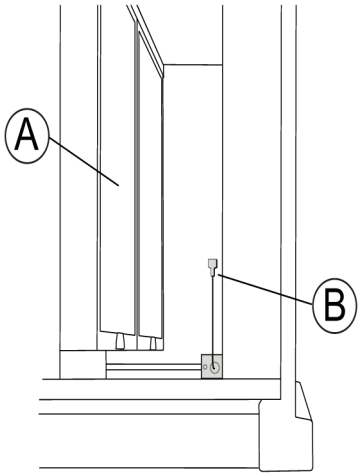
5. For gas heating models, you must move the supply air temperature (SAT) sensor to the working position to ensure proper SAT readings. The SAT sensor is shipped in the supply air compartment.
   a. Move the SAT sensor to the inside of the supply air duct. See item A in Figure 5.
   b. Use the excess wire available to its full length to drop or mount the SAT sensor in the duct.
   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**



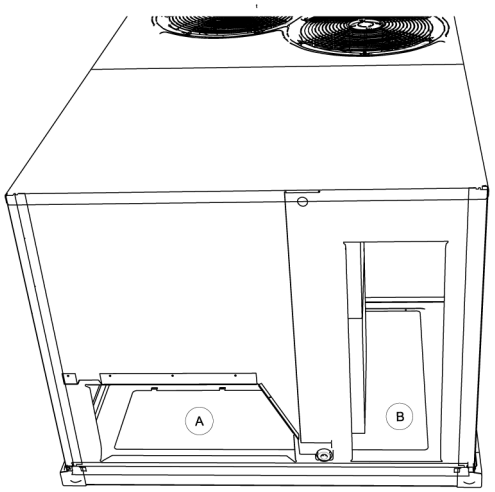
6. For units equipped with an economizer or motorized OD air damper, you must move the return air temperature (RAT) sensor to the working position to ensure proper RAT readings. See item B in Figure 5
   a. Move the RAT sensor to the inside of the return air duct verifying that the sensor is at least 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**




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

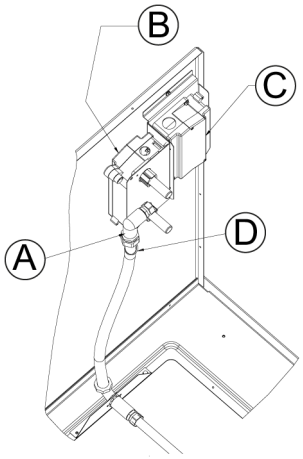
**Figure 5: Supply and return air ducts**




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

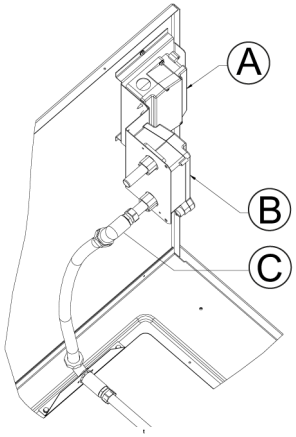
7. If an optional return air smoke detector is installed, you must move the return air sensor from the factory shipped position (upside down) to the working position (right side up). Then slide the flex tube over the stub and tighten, see Figure 7

**Figure 6: Return air smoke detector - shipped position**




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

**Figure 7: Return air smoke detector - working position**




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

## Limitations

These units must be installed in accordance with the following:

In U.S.A.:

- National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
- Local building codes, and
- Local utility requirements

In Canada:

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

See the unit application data found in this document.

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).

This unit is not to be used for temporary heating of buildings or structures under construction.

## Unit limitations

**Table 1: WQ04-06 unit limitations**

| Model | Size (ton) | Unit voltage | SCCR (kVA) | Unit limitations | | |
|---|---|---|---|---|---|---|
| | | | | Applied voltage | | Outdoor DB Temp |
| | | | | Min | Max | Max (°F) |
| WQ | 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 |
| WQ | 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 |
| WQ | 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/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.

## Clearances

All units require particular clearances for proper operation and service. Installer must make provisions for adequate ventilation air. See unit clearances for clearances required for servicing and proper unit operation.

**WARNING**

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, outdoor coil face or 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 may 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 in.**

**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.

## WQE04 to 06 unit weights

**Figure 8: Unit 4 point load weight**

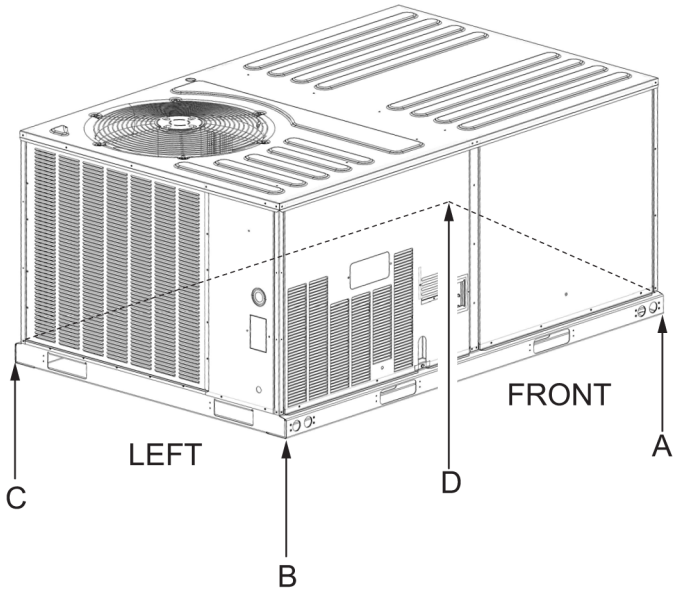



**Figure 9: Unit 6 point load weight**

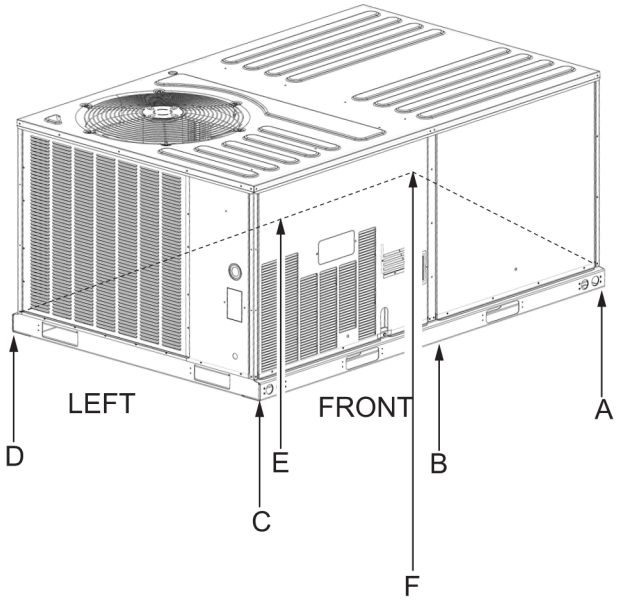



**Figure 10: Center of gravity**

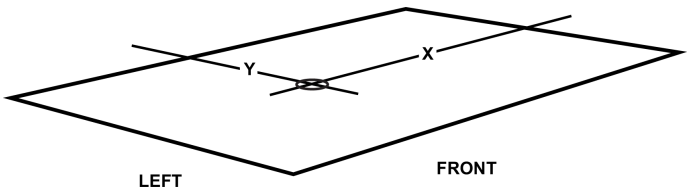



**Table 2: WQE04-06 corner weights**

| Size (ton) | Model | Weight (lb) | | Center of gravity | | 4 point load location (lb) | | | | 6 point load location (lb) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Shipping | Operating | X | Y | A | B | C | D | A | B | C | D | E | F |
| 04 (3) | WQE | 542 | 529 | 38.0 | 24.4 | 127 | 135 | 137 | 130 | 84 | 87 | 91 | 92 | 89 | 86 |
| 05 (4) | WQE | 641 | 628 | 35.0 | 24.5 | 164 | 148 | 150 | 166 | 111 | 104 | 97 | 98 | 105 | 113 |
| 06 (5) | WQE | 640 | 627 | 34.7 | 24.4 | 165 | 146 | 149 | 168 | 112 | 103 | 95 | 97 | 105 | 114 |

**Table 3: WQ04 to 06 unit accessory weights**

| Unit accessory | Weights (lb) |
|---|---|
| Vertical flow dry bulb economizer small footprint | 55 |
| Vertical flow dry bulb economizer large footprint | 60 |
| Horizontal flow dry bulb economizer small footprint short | 74 |
| Horizontal flow dry bulb economizer small footprint tall | 76 |
| Horizontal flow dry bulb economizer large footprint short | 79 |
| Horizontal flow dry bulb economizer large footprint tall | 82 |
| Power exhaust vert flow small footprint | 55 |
| Power exhaust vert flow large footprint | 75 |
| Power exhaust horiz flow small footprint | 40 |
| Power exhaust horiz flow large footprint | 80 |
| Hail guard kit small short factory installed | 18 |
| Hail guard kit small tall factory installed | 23 |
| Hail guard kit large short factory installed | 36 |
| Hail guard kit large tall factory installed | 44 |
| Curb rigid 14 in. small footprint | 94 |
| Curb rigid 14 in. large footprint | 126 |
| Curb rigid 24 in. small footprint | 148 |
| Curb rigid 24 in. large footprint | 222 |

# WQE04 to 06 unit dimensions

**Figure 11: WQE04**

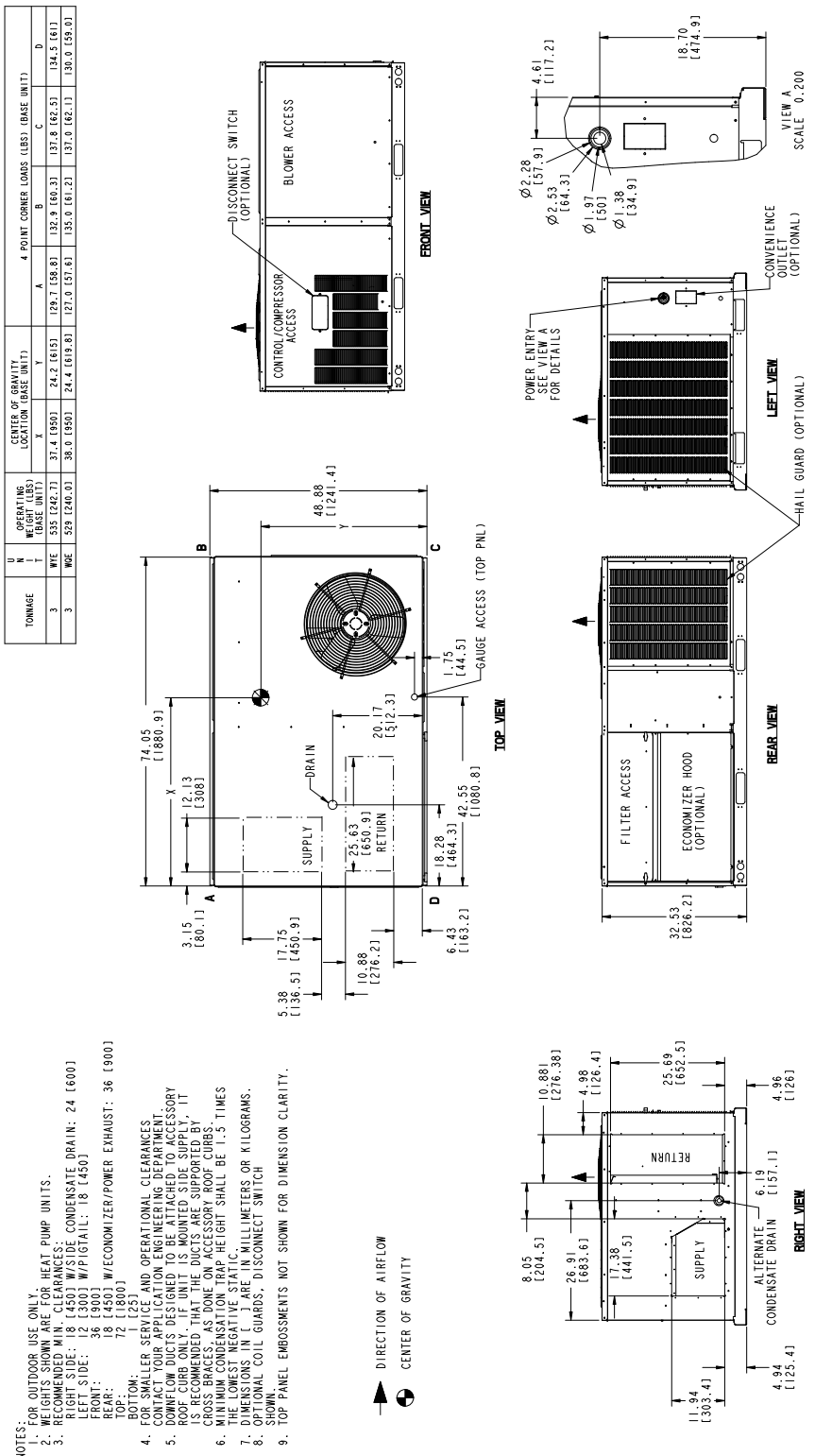
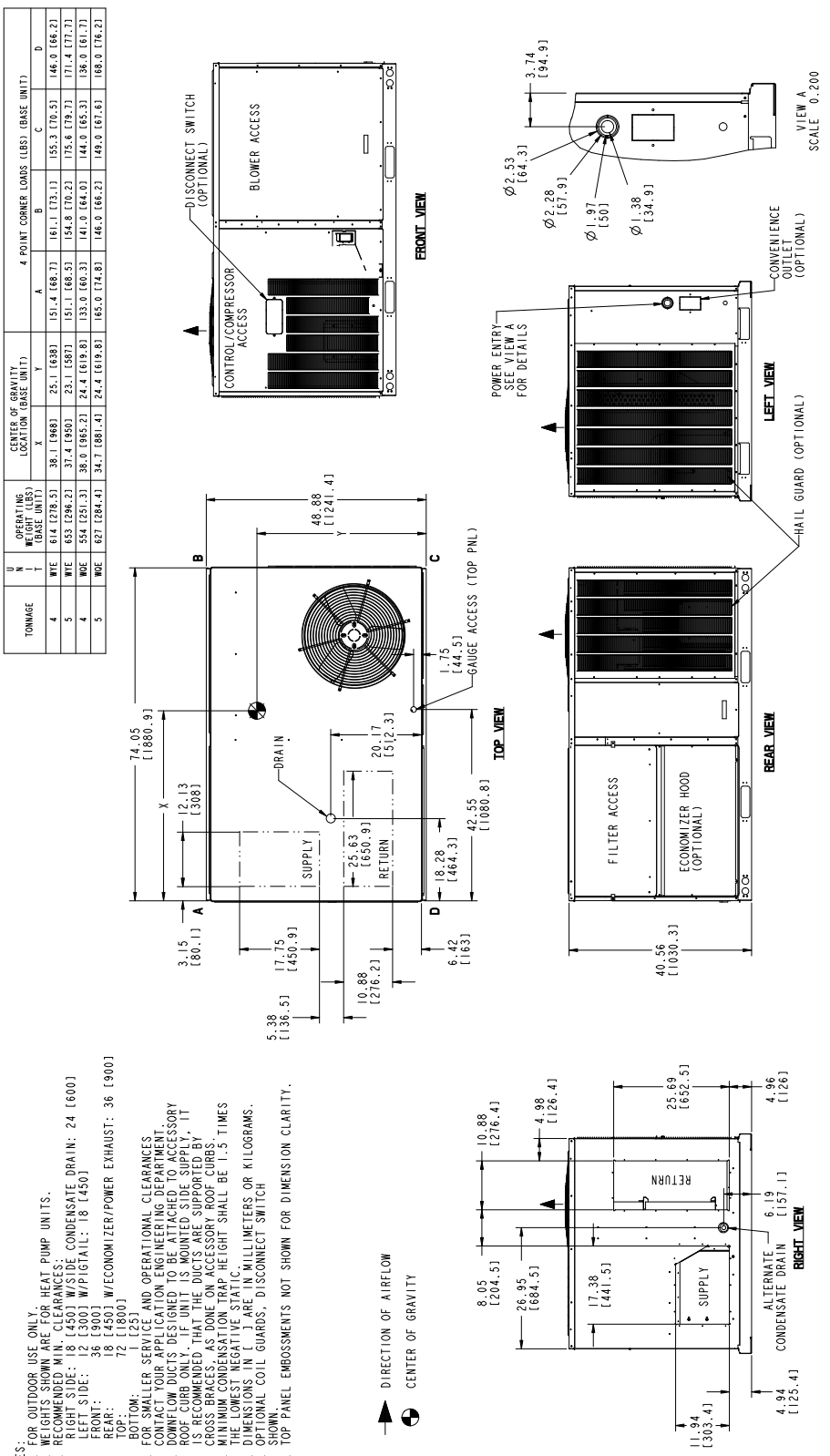


**Figure 12: WQE05 - 06**



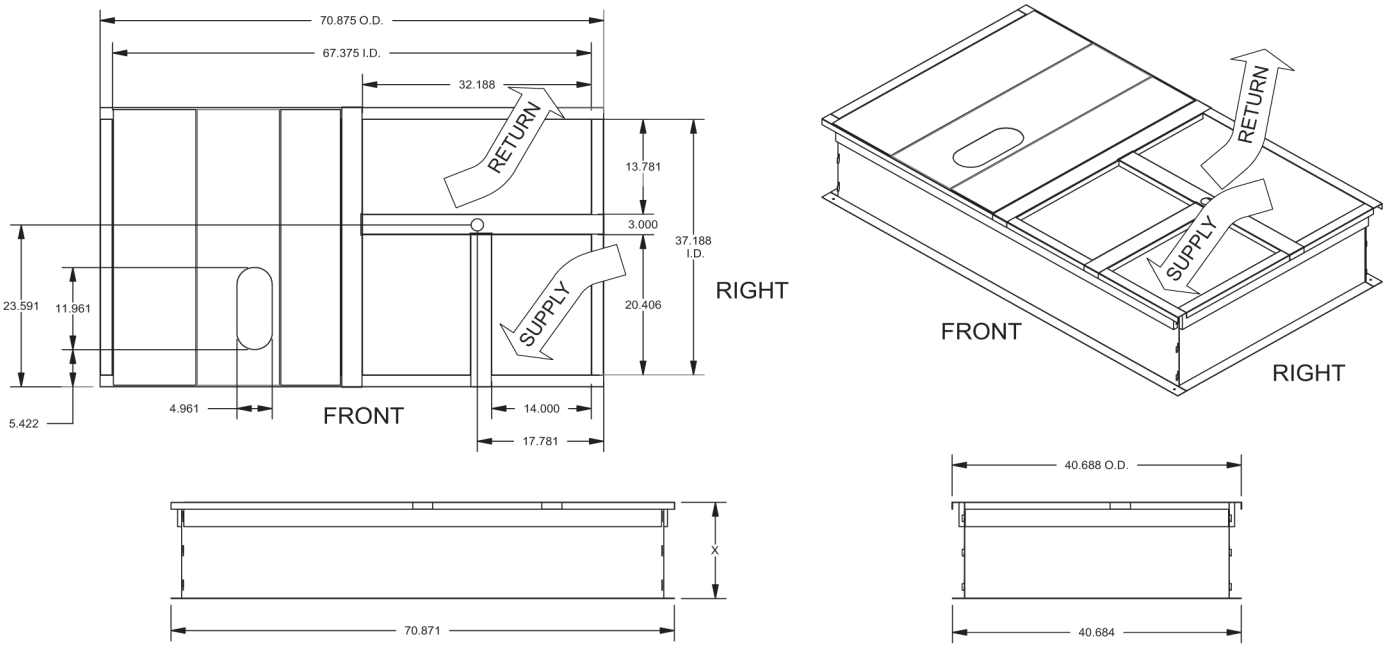
## WQE04 to 06 roof curb dimensions

### Table 4: WQE04 to 06 unit clearances

| Direction | Distance (in.) | Direction | Distance (in.) |
|---|---|---|---|
| Top[1] | 72 | Right | 18 |
| Front | 36 | Left | 12 |
| Rear | 18[2] /36[3] | Bottom[4] | 1 |

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

### 1RC0456, 1RC0458 roof curb dimensions




1RC0456 X= 14" Height
1RC0458 X= 24" Height

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

### Unit models used with 1RC0456, 1RC0458 roof curb

- WQE04
- WQE05
- WQE06

**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: through the base electrical
- 1TB0402: through the base electrical
- 1TB0403: through the base electrical
- 1TB0404: through the base electrical

## Ductwork

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

A closed return duct system should be used. 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.

See 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 13: Side duct cover panels**

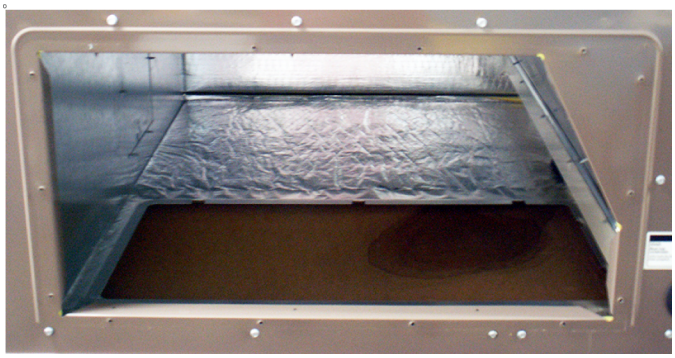



ⓘ **Note:** Shown with duct connection cover panel as shipped.

**Figure 14: Bottom return opening for side duct conversion**



**Figure 15: Bottom supply opening for side duct conversion**

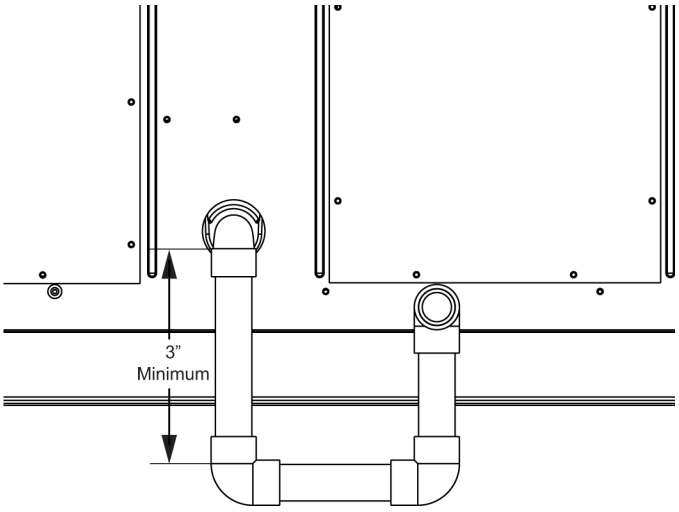


## Condensate drain

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 16. 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 inch NPT female connection on the unit to an open drain.

**Figure 16: 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.

## Refrigerant Detection System (RDS)

Units with the optional factory installed RDS come with the refrigerant detection sensor capable of detecting a refrigerant leak, according to *UL60335-2-40 4th edition*, with an accuracy of +/- 5% LFL across operating range, with response time <15 seconds.

For units without a factory installed economizer, the RDS sensor comes mounted to the lower section of the filter rack assembly and the sensor does not need to be moved or relocated for operation.

For units with a factory installed economizer, see Mounting the RDS sensor on units with a factory installed economizer.

### Mounting the RDS sensor on units with a factory installed economizer

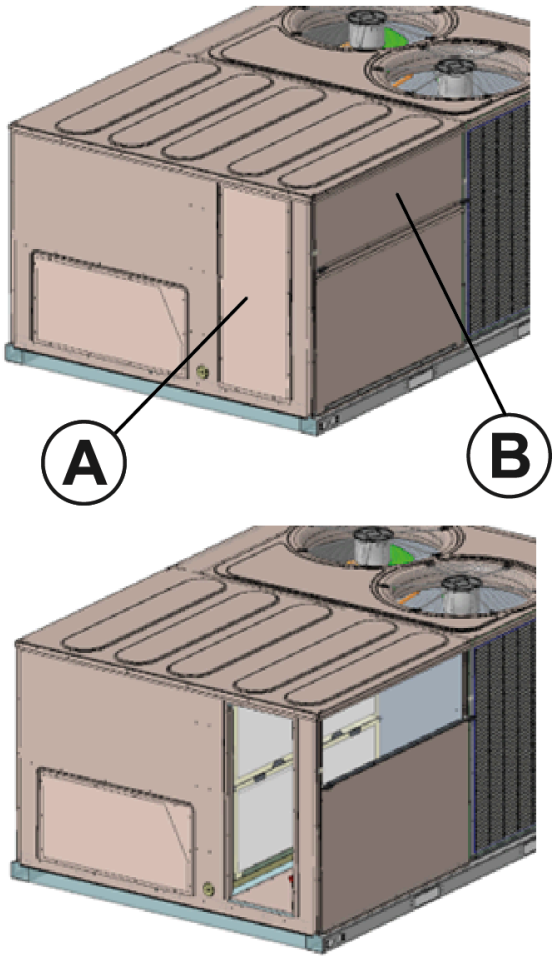
**Before you begin:**

Units with a factory installed economizer come with the RDS sensor temporarily mounted on the support plate of the economizer hood kit sub-assembly box.

You must remove the RDS sensor assembly from the temporary location and secure it to the correct location, as described in the following instructions.

1. Remove or open the return duct cover and top return access panels as shown in Figure 17.

**Figure 17: Panel locations**

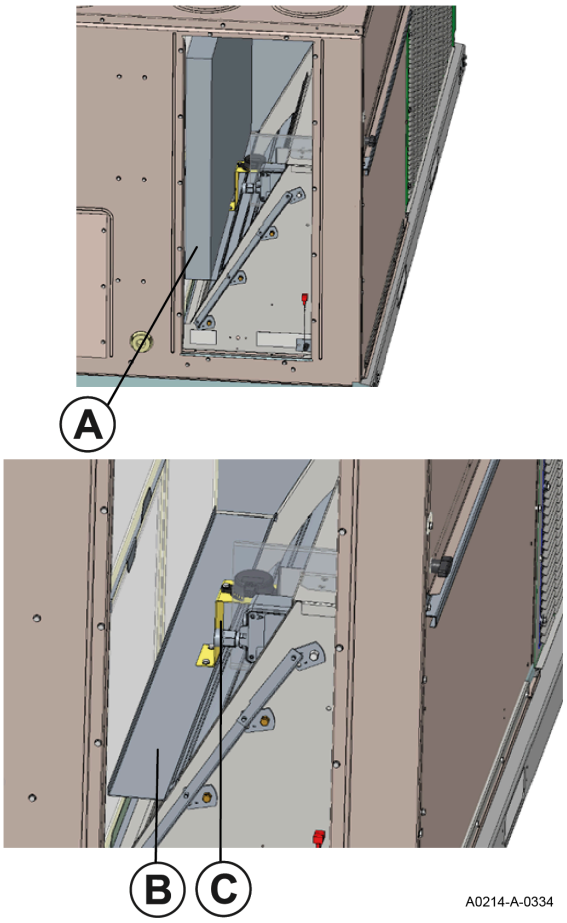



A0213-A-0334

| Callout | Component |
|---|---|
| A | Return duct cover |
| B | Top return access panel |

2. Remove the economizer hood kit box and support plate from the unit.

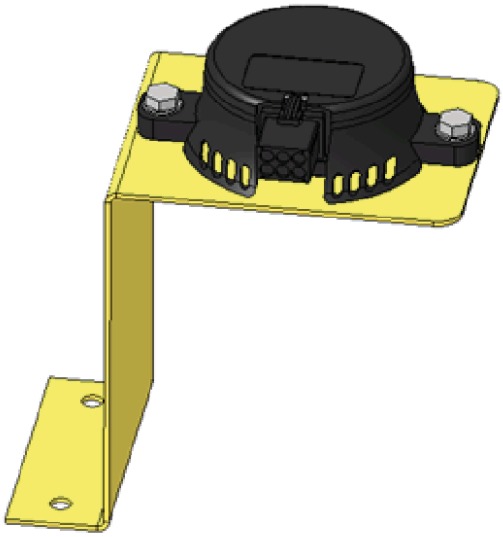
**Figure 18: Economizer hood kit box and support plate location**




A0214-A-0334

| Callout | Component |
|---|---|
| A | Economizer hood kit box |
| B | Support plate for hood kit box |
| C | RDS sensor assembly |

**Figure 19: RDS sensor bracket assembly**



A0215-A-0334

3. Remove the two Hex No. 10, ½ in. screws that attach the RDS sensor bracket assembly to the support plate.

ⓘ **Note:** Retain the screws for use in subsequent steps.

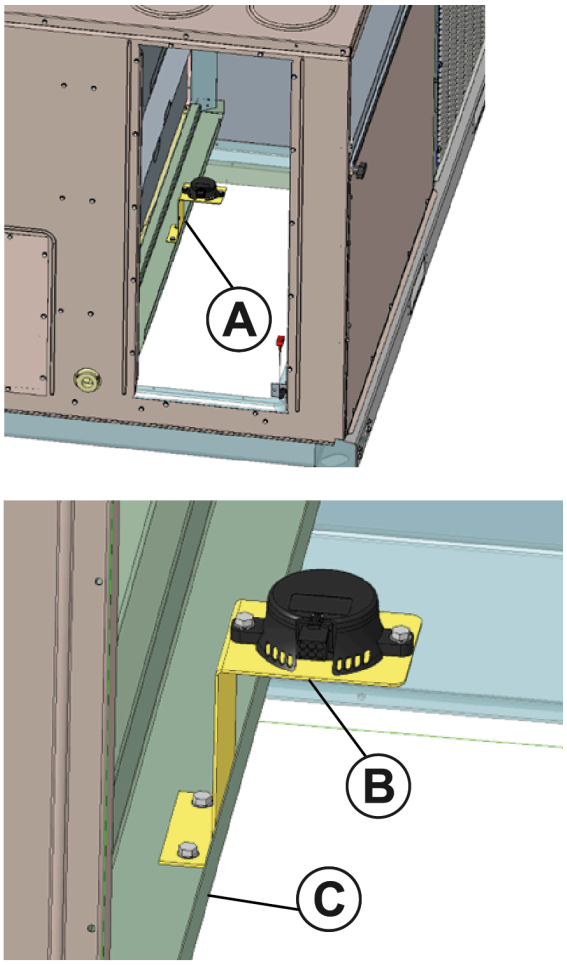
4. Remove the filters from the filter rack assembly to access the RDS mounting location in the bottom piece of the filter rack assembly

ⓘ **Note:** Retain the filters to reinstall in subsequent steps.

5. Using the two Hex No. 10, ½ in. screws that were removed in Step 3, attach the RDS sensor bracket assembly to the bottom of the filter rack assembly in the location shown in Figure 20

ⓘ **Note:** The unit economizer will be present, but is not shown in all figures.

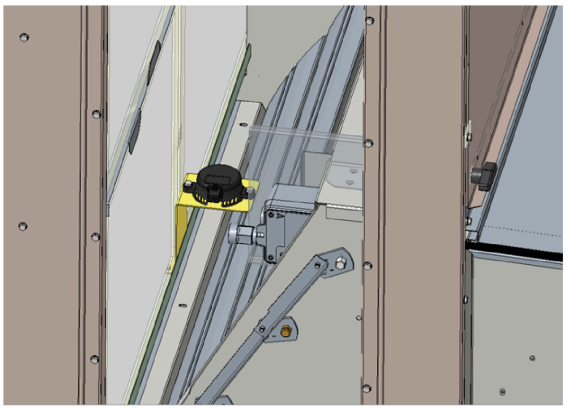
**Figure 20: RDS sensor bracket assembly mounting location**




A0216-A-0334

| Callout | Component |
|---|---|
| A | RDS mounting location |
| B | RDS sensor bracket assembly |
| C | Filter rack bottom piece |

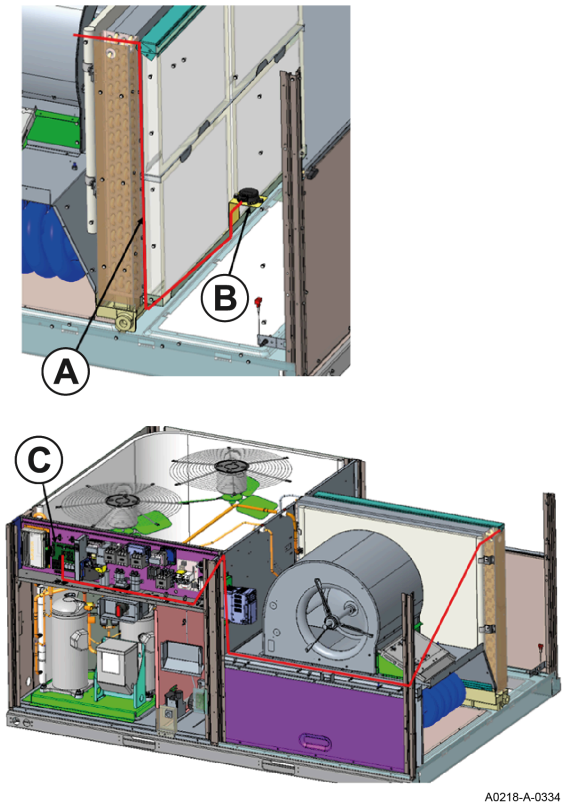
**Figure 21: RDS sensor bracket assembly mounting with economizer**



A0217-A-0334

6. If it is not already in place, route the RDS wiring harness from the RDS sensor to the main unit control board following the path shown in Figure 22.
7. Connect the wiring harness to the unit control board according to the unit wiring diagram.

**Figure 22: RDS harness routing**




| Callout | Component |
|---|---|
| A | RDS harness in red |
| B | RDS |
| C | UCB |

8. Reinstall the filters removed in Step 4.
9. Reinstall the external panels removed in Step 1.

## Filters

2 in. 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 properly 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 in Unit limitations.

**⚠ CAUTION**

208/230-3-60 and 208/230-1-60 units control transformers are factory wired for 230v. Change tap on transformer for 208v 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 utilized for these units. Factory installed disconnects are available. If installing a disconnect (field supplied), see WQE04 to 06 unit weights 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 properly 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 properly 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 120V. B or L2 phase to ground, voltage readingis 195 to 208V. C or L3 phase to ground, voltage reading is 120V. Therefore B or L2 phase is the high Leg. The high should always be wired to the center or B or L2 tap.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. 8 color-coded, insulated wires should be used to connect the thermostat to the unit. See Table 5 for control wire sizing and maximum length.

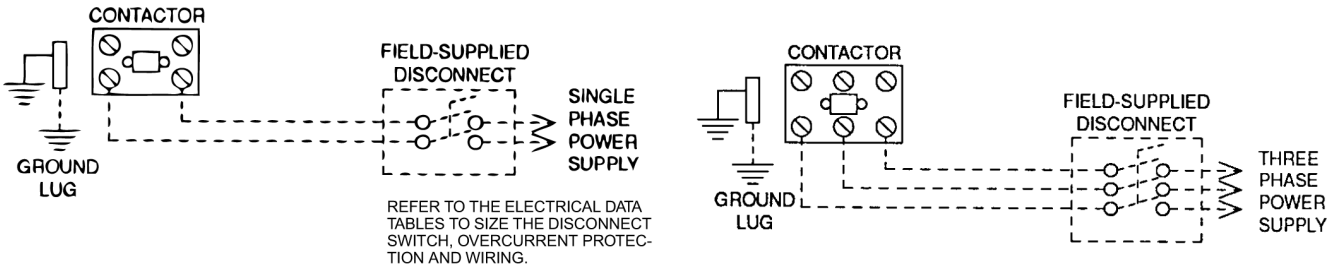
**Table 5: Control wire sizes**

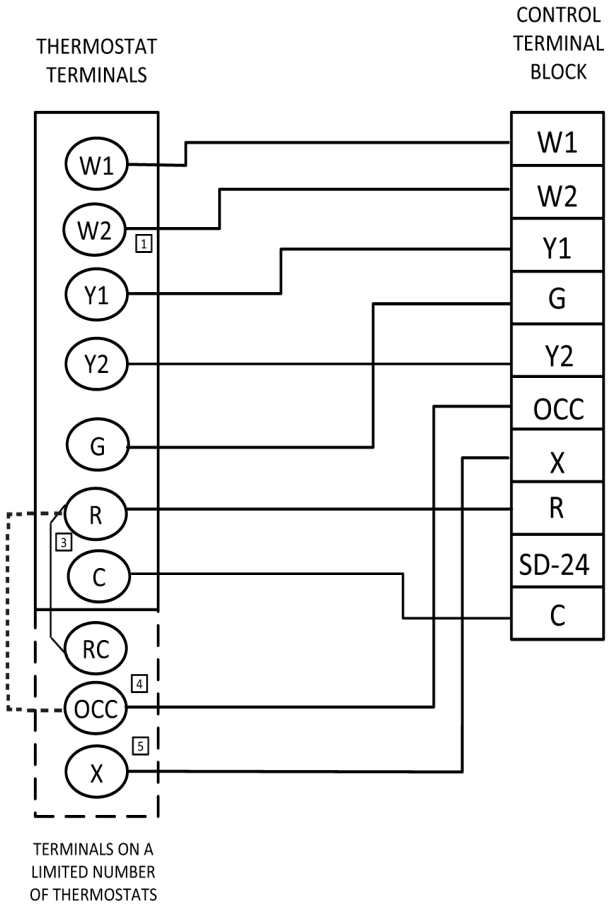
| Wire size | Maximum length |
|---|---|
| 18 AWG | 150 ft[1] |
| From the unit to the thermostat and back to the unit. | |

## Typical field power and control wiring

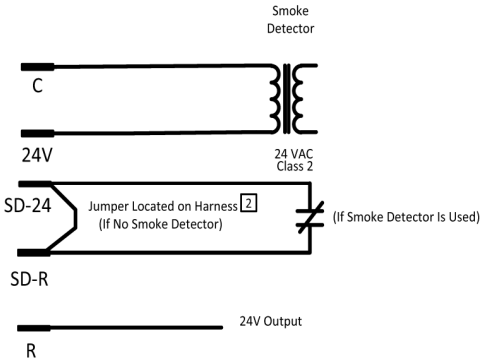
### Typical power wiring

**Figure 23: 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.

## Physical data

## WQE physical data

### Table 6: WQE04 to 06

| Component | Models | | |
|---|---|---|---|
| | WQE04 | WQE05 | WQE06 |
| **Nominal tonnage** | **3** | **4** | **5** |
| **AHRI cooling performance** | | | |
| Gross capacity @ AHRI A point (Btu) | 36,500 | 49,500 | 58,500 |
| AHRI net capacity (MBH) | 35,600 | 48,000 | 57,000 |
| EER2 | 12.2 | 12.2 | 11.8 |
| SEER2 | 14.0 | 14.0 | 14.0 |
| CFM | 1,240 | 1,550 | 1,550 |
| System power (kW) | 2.9 | 3.9 | 4.8 |
| Refrigerant type | R-454B | R-454B | R-454B |
| **Refrigerant charge (lb-oz)** | | | |
| System 1 | 9-2 | 11-14 | 12-4 |
| System 2 | — | — | — |
| **ARI heating performance** | | | |
| 47ºF capacity rating (MBH) | 34,500 | 45,600 | 53,000 |
| System power (kW) / COP2 | 2.9 / 3.5 | 3.8 / 3.5 | 4.4 / 3.5 |
| 17ºF capacity rating (MBH) | 19,500 | 24,600 | 29,000 |
| System power (kW) / COP2 | 2.7 / 2.1 | 3.4 / 2.15 | 3.9 / 2.15 |
| HSPF2 (Btu/Watts-hr) | 6.7 | 6.7 | 6.7 |
| **Dimensions (in.)** | | | |
| Length | 74.1 | 74.1 | 74.1 |
| Width | 48.9 | 48.9 | 48.9 |
| Height | 32.5 | 40.6 | 40.6 |
| Operating weight (lb) | 529 | 554 | 627 |
| **Compressors** | | | |
| Type | Scroll | Scroll | Scroll |
| Quantity | 1 | 1 | 1 |
| **Outdoor coil data** | | | |
| Face area (sq ft) | 15.1 | 19.4 | 19.4 |
| Rows | 2 | 2 | 2 |
| Fins per in. | 17 | 17 | 17 |
| Tube diameter | 0.375 | 0.375 | 0.375 |
| Circuitry type | Split-face | Split-face | Split-face |
| Refrigerant control | TXV | TXV | TXV |
| Indoor coil data | | | |
| Face area (sq ft) | 5.5 | 7.3 | 7.3 |
| Rows | 4 | 3 | 4 |
| Fins per in. | 15 | 15 | 15 |
| Tube diameter | 0.375 | 0.375 | 0.375 |
| Circuitry type | Intertwined | Intertwined | Intertwined |
| Refrigerant control | TXV | TXV | TXV |
| **Outdoor fan data** | | | |
| Quantity | 1 | 1 | 1 |
| Fan diameter (in.) | 22 | 22 | 22 |
| Type | Prop | Prop | Prop |
| Drive type | Direct drive | Direct drive | Direct drive |
| No. speeds | 1 | 1 | 1 |
| Number of motors | 1 | 1 | 1 |
| Motor HP each | 1/2 | 1/2 | 1/2 |
| RPM | 1100 | 1085 | 1100 |
| Total CFM | 3600 | 4000 | 4300 |
| **Belt drive indoor fan data** | | | |

## Table 6: WQE04 to 06

| Component | Models | | | | | |
|---|---|---|---|---|---|---|
| | WQE04 | | WQE05 | | WQE06 | |
| **Nominal tonnage** | **3** | | **4** | | **5** | |
| Quantity | 1 | | 1 | | 1 | |
| Fan diameter (in.) | 10 x 10 | | 10 x 10 | | 11 x 10 | |
| Type | Centrifugal | | Centrifugal | | Centrifugal | |
| Motor sheave | 1VL34 | 1VL44 | 1VL34 | 1VL44 | 1VL34 | 1VL44 |
| Blower sheave | AK46 | AK46 | AK46 | AK46 | AK46 | AK46 |
| Belt | A39 | A40 | A39 | A40 | A37 | A39 |
| Motor HP each, single-phase | 1.5 | — | 1.5 | — | 1.5 | — |
| Motor HP each, three-phase | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.9 |
| RPM | 1725 | | 1725 | | 1750 | |
| Frame size | 56Y | | 56Y | | 56HZ | |
| **Direct drive indoor fan data** | | | | | | |
| Quantity | 1 | | 1 | | 1 | |
| Fan size (in.) | 10 x 10 | | 10 x 10 | | 11 x 10 | |
| Type | Centrifugal | | Centrifugal | | Centrifugal | |
| Motor HP each | 3/4 | | 1 | | 1 | |
| RPM | 1050 | | 1050 | | 1050 | |
| **Filters** | | | | | | |
| Quantity - size | 2 - (16 x 25 x 2)[1] | | 4 - (16 x 16 x 2)[1] | | 4 - (16 x 16 x 2)[1] | |

**Note:**

1. 2 in. Throwaway, Standard, MERV 4 (Minimum Efficiency Reporting Value)

## Electrical data

**Note:** This note applies to all electrical data tables.

- MCA = Minimum circuit ampacity.
- Max fuse = Dual element, time delay type.
- Breaker size = HACR type per NEC.
- Minimum disconnect rating = Non-fused disconnect, verify on the unit nameplate that the disconnect is properly sized for the application. Units with field-installed electric heat kits may exceed the factory-installed disconnect amperage rating.

### WQE electrical data

**Table 7: WQE04 to 06 standard indoor blower without powered convenience outlet**

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCAw/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | 2 | 6.6 | 1.5 | — | None | — | — | — | 29.5 | 30 | 45 | 29 | 100 | 31 | 35 | 45 | 31 | 103 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 59 | 60 | 60 | 56 | 124 | 60.5 | 70 | 70 | 58 | 127 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 77 | 80 | 80 | 73 | 138 | 78.5 | 80 | 80 | 75 | 141 |
| | 230-1-60 | 16.7 | 93.5 | 26 | 2.3 | 6 | 1.3 | — | None | — | — | — | 29.2 | 30 | 45 | 29 | 100 | 30.5 | 35 | 45 | 30 | 103 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 63.1 | 70 | 70 | 60 | 128 | 64.4 | 70 | 70 | 61 | 130 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 84 | 90 | 90 | 79 | 144 | 85.3 | 90 | 90 | 81 | 147 |
| | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 6.6 | 1.1 | — | None | — | — | — | 23.9 | 25 | 35 | 24 | 104 | 25 | 25 | 35 | 25 | 106 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 40.9 | 45 | 45 | 40 | 118 | 42 | 45 | 50 | 41 | 120 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 51.3 | 60 | 60 | 49 | 126 | 52.4 | 60 | 60 | 50 | 128 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 65.5 | 70 | 70 | 62 | 137 | 66.6 | 70 | 70 | 63 | 140 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 6 | 1 | — | None | — | — | — | 23.6 | 25 | 35 | 24 | 104 | 24.6 | 25 | 35 | 25 | 107 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 43.1 | 45 | 50 | 42 | 120 | 44.1 | 45 | 50 | 43 | 122 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 55.2 | 60 | 60 | 53 | 130 | 56.2 | 60 | 60 | 54 | 132 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 71.7 | 80 | 80 | 68 | 143 | 72.7 | 80 | 80 | 69 | 145 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 3.2 | 0.5 | — | None | — | — | — | 11.8 | 15 | 15 | 12 | 49 | 12.3 | 15 | 15 | 12 | 50 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 20.8 | 25 | 25 | 20 | 56 | 21.3 | 25 | 25 | 21 | 58 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 29.1 | 30 | 30 | 28 | 63 | 29.6 | 30 | 30 | 28 | 64 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 32.8 | 35 | 35 | 31 | 66 | 33.3 | 35 | 35 | 32 | 67 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 6 | 0.4 | — | None | — | — | — | 9 | 15 | 15 | 9 | 30 | 9.4 | 15 | 15 | 10 | 31 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 20.1 | 25 | 25 | 19 | 39 | 20.5 | 25 | 25 | 20 | 40 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 25.6 | 30 | 30 | 24 | 44 | 26 | 30 | 30 | 25 | 44 |

## Table 7: WQE04 to 06 standard indoor blower without powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCAw/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | 2 | 8.4 | 1.5 | — | None | — | — | — | 34.7 | 35 | 50 | 34 | 108 | 36.2 | 40 | 50 | 36 | 112 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 64.2 | 70 | 70 | 61 | 132 | 65.7 | 70 | 70 | 63 | 135 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 82.2 | 90 | 90 | 78 | 146 | 83.7 | 90 | 90 | 80 | 150 |
| | 230-1-60 | 19.4 | 102 | 30 | 2.3 | 7.6 | 1.3 | — | None | — | — | — | 34.2 | 35 | 50 | 34 | 109 | 35.5 | 40 | 50 | 35 | 112 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 68.1 | 70 | 80 | 65 | 136 | 69.4 | 70 | 80 | 66 | 139 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 89 | 90 | 90 | 84 | 153 | 90.3 | 100 | 100 | 86 | 156 |
| | 208-3-60 | 12 | 123 | 19 | 2 | 8.4 | 1.1 | — | None | — | — | — | 25.4 | 30 | 35 | 26 | 129 | 26.5 | 30 | 35 | 27 | 132 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 42.4 | 45 | 50 | 41 | 143 | 43.5 | 45 | 50 | 43 | 146 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 52.8 | 60 | 60 | 51 | 151 | 53.9 | 60 | 60 | 52 | 154 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 67 | 70 | 70 | 64 | 163 | 68.1 | 70 | 70 | 65 | 165 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 7.6 | 1 | — | None | — | — | — | 24.9 | 25 | 35 | 25 | 130 | 25.9 | 30 | 35 | 26 | 132 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 44.4 | 45 | 50 | 43 | 146 | 45.4 | 50 | 50 | 44 | 148 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 56.5 | 60 | 60 | 54 | 155 | 57.5 | 60 | 60 | 55 | 158 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 73 | 80 | 80 | 69 | 168 | 74 | 80 | 80 | 71 | 171 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 4 | 0.5 | — | None | — | — | — | 13.2 | 15 | 15 | 13 | 65 | 13.7 | 15 | 15 | 14 | 66 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 22.2 | 25 | 25 | 22 | 72 | 22.7 | 25 | 25 | 22 | 73 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 30.5 | 35 | 35 | 29 | 79 | 31 | 35 | 35 | 30 | 80 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.2 | 35 | 35 | 33 | 82 | 34.7 | 35 | 35 | 33 | 83 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 7.6 | 0.4 | — | None | — | — | — | 9.5 | 15 | 15 | 10 | 44 | 9.9 | 15 | 15 | 10 | 45 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 20.6 | 25 | 25 | 20 | 53 | 21 | 25 | 25 | 20 | 54 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.1 | 30 | 30 | 25 | 57 | 26.5 | 30 | 30 | 25 | 58 |
| 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 | 68 | 70 | 80 | 65 | 178 | 69.5 | 70 | 80 | 67 | 181 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 86 | 90 | 90 | 82 | 192 | 87.5 | 90 | 100 | 83 | 196 |
| | 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 | 71.9 | 80 | 80 | 68 | 182 | 73.2 | 80 | 80 | 70 | 185 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 92.8 | 100 | 100 | 88 | 199 | 94.1 | 100 | 100 | 89 | 202 |
| | 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 | 43.8 | 45 | 50 | 43 | 113 | 44.9 | 45 | 50 | 44 | 116 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 54.2 | 60 | 60 | 52 | 121 | 55.3 | 60 | 60 | 53 | 124 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.4 | 70 | 70 | 65 | 133 | 69.5 | 70 | 70 | 67 | 135 |
| | 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 | 45.8 | 50 | 50 | 44 | 116 | 46.8 | 50 | 50 | 46 | 118 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 57.9 | 60 | 60 | 56 | 125 | 58.9 | 60 | 60 | 57 | 128 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 74.4 | 80 | 80 | 71 | 138 | 75.4 | 80 | 80 | 72 | 141 |
| | 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 | 22.6 | 25 | 25 | 22 | 72 | 23.1 | 25 | 25 | 23 | 73 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 30.9 | 35 | 35 | 30 | 79 | 31.4 | 35 | 35 | 30 | 80 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.6 | 35 | 35 | 33 | 82 | 35.1 | 40 | 40 | 34 | 83 |
| | 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 | 13.8 | 1 | 13.3 | 26.6 | 30 | 30 | 25 | 57 | 27 | 30 | 30 | 26 | 58 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 37.6 | 40 | 40 | 36 | 66 | 38 | 40 | 40 | 36 | 67 |

## Table 8: WQE04-06 standard indoor blower with powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | 2 | 6.6 | 1.5 | 8.6 | None | — | — | — | 33.8 | 35 | 50 | 34 | 104 | 35.3 | 40 | 50 | 36 | 108 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 63.3 | 70 | 70 | 61 | 128 | 64.8 | 70 | 70 | 63 | 131 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 81.3 | 90 | 90 | 78 | 142 | 82.8 | 90 | 90 | 79 | 146 |
| | 230-1-60 | 16.7 | 93.5 | 26 | 2.3 | 6 | 1.3 | 8.6 | None | — | — | — | 33.5 | 35 | 50 | 34 | 105 | 34.8 | 35 | 50 | 35 | 108 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 67.4 | 70 | 70 | 65 | 132 | 68.7 | 70 | 70 | 66 | 135 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 88.3 | 90 | 90 | 84 | 149 | 89.6 | 90 | 90 | 86 | 151 |
| | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 6.6 | 1.1 | 8.6 | None | — | — | — | 28.2 | 30 | 40 | 29 | 108 | 29.3 | 30 | 40 | 30 | 111 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 45.2 | 50 | 50 | 45 | 122 | 46.3 | 50 | 50 | 46 | 124 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 55.6 | 60 | 60 | 54 | 130 | 56.7 | 60 | 60 | 55 | 133 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 69.8 | 70 | 70 | 67 | 142 | 70.9 | 80 | 80 | 68 | 144 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 6 | 1 | 8.6 | None | — | — | — | 27.9 | 30 | 40 | 29 | 109 | 28.9 | 30 | 40 | 30 | 111 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 47.4 | 50 | 50 | 46 | 124 | 48.4 | 50 | 50 | 48 | 127 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 59.5 | 60 | 60 | 58 | 134 | 60.5 | 70 | 70 | 59 | 136 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 76 | 80 | 80 | 73 | 147 | 77 | 80 | 80 | 74 | 150 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 3.2 | 0.5 | 8.6 | None | — | — | — | 14 | 15 | 15 | 14 | 51 | 14.5 | 15 | 15 | 15 | 52 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 23 | 25 | 25 | 23 | 59 | 23.5 | 25 | 25 | 23 | 60 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 31.3 | 35 | 35 | 30 | 65 | 31.8 | 35 | 35 | 31 | 66 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 35 | 35 | 35 | 34 | 68 | 35.5 | 40 | 40 | 34 | 69 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 6 | 0.4 | 8.6 | None | — | — | — | 10.7 | 15 | 15 | 11 | 32 | 11.1 | 15 | 15 | 12 | 33 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 21.8 | 25 | 25 | 21 | 41 | 22.2 | 25 | 25 | 22 | 42 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 27.3 | 30 | 30 | 26 | 45 | 27.7 | 30 | 30 | 27 | 46 |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | 2 | 8.4 | 1.5 | 8.6 | None | — | — | — | 39 | 40 | 50 | 39 | 113 | 40.5 | 45 | 50 | 41 | 116 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 68.5 | 70 | 80 | 66 | 136 | 70 | 70 | 80 | 68 | 140 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 86.5 | 90 | 90 | 83 | 151 | 88 | 90 | 90 | 85 | 154 |
| | 230-1-60 | 19.4 | 102 | 30 | 2.3 | 7.6 | 1.3 | 8.6 | None | — | — | — | 38.5 | 40 | 50 | 39 | 113 | 39.8 | 40 | 50 | 40 | 116 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 72.4 | 80 | 80 | 70 | 140 | 73.7 | 80 | 80 | 71 | 143 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 93.3 | 100 | 100 | 89 | 157 | 94.6 | 100 | 100 | 91 | 160 |
| | 208-3-60 | 12 | 123 | 19 | 2 | 8.4 | 1.1 | 8.6 | None | — | — | — | 29.7 | 30 | 40 | 31 | 134 | 30.8 | 35 | 40 | 32 | 136 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 46.7 | 50 | 50 | 46 | 147 | 47.8 | 50 | 50 | 48 | 150 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 57.1 | 60 | 60 | 56 | 156 | 58.2 | 60 | 60 | 57 | 158 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 71.3 | 80 | 80 | 69 | 167 | 72.4 | 80 | 80 | 70 | 170 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 7.6 | 1 | 8.6 | None | — | — | — | 29.2 | 30 | 40 | 30 | 134 | 30.2 | 35 | 40 | 31 | 137 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 48.7 | 50 | 50 | 48 | 150 | 49.7 | 50 | 50 | 49 | 152 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 60.8 | 70 | 70 | 59 | 160 | 61.8 | 70 | 70 | 60 | 162 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 77.3 | 80 | 80 | 74 | 173 | 78.3 | 80 | 80 | 76 | 175 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 4 | 0.5 | 8.6 | None | — | — | — | 15.4 | 20 | 20 | 16 | 67 | 15.9 | 20 | 20 | 16 | 68 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 24.4 | 25 | 25 | 24 | 74 | 24.9 | 25 | 25 | 25 | 75 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 32.7 | 35 | 35 | 32 | 81 | 33.2 | 35 | 35 | 32 | 82 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 36.4 | 40 | 40 | 35 | 84 | 36.9 | 40 | 40 | 36 | 85 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 7.6 | 0.4 | 8.6 | None | — | — | — | 11.3 | 15 | 15 | 12 | 46 | 11.7 | 15 | 15 | 12 | 47 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 22.4 | 25 | 25 | 22 | 55 | 22.8 | 25 | 25 | 22 | 56 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 27.9 | 30 | 30 | 27 | 59 | 28.3 | 30 | 30 | 27 | 60 |

## Table 8: WQE04-06 standard indoor blower with powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 | — | — | — | 42.8 | 45 | 60 | 43 | 159 | 44.3 | 45 | 60 | 45 | 162 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 72.3 | 80 | 80 | 70 | 182 | 73.8 | 80 | 90 | 72 | 186 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 90.3 | 100 | 100 | 86 | 197 | 91.8 | 100 | 100 | 88 | 200 |
| | 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 | 76.2 | 80 | 90 | 73 | 186 | 77.5 | 80 | 90 | 75 | 189 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 97.1 | 100 | 100 | 93 | 203 | 98.4 | 100 | 100 | 94 | 206 |
| | 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 | 48.1 | 50 | 50 | 48 | 117 | 49.2 | 50 | 50 | 49 | 120 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 58.5 | 60 | 60 | 57 | 126 | 59.6 | 60 | 60 | 58 | 128 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 72.7 | 80 | 80 | 70 | 137 | 73.8 | 80 | 80 | 72 | 140 |
| | 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 | 50.1 | 60 | 60 | 49 | 120 | 51.1 | 60 | 60 | 50 | 122 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 62.2 | 70 | 70 | 60 | 130 | 63.2 | 70 | 70 | 62 | 132 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 78.7 | 80 | 80 | 76 | 143 | 79.7 | 80 | 80 | 77 | 145 |
| | 460-3-60 | 6.6 | 60 | 10 | 1.3 | 4 | 0.5 | 8.6 | None | — | — | — | 15.8 | 20 | 20 | 16 | 67 | 16.3 | 20 | 20 | 17 | 68 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 24.8 | 25 | 25 | 24 | 74 | 25.3 | 30 | 30 | 25 | 75 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 33.1 | 35 | 35 | 32 | 81 | 33.6 | 35 | 35 | 33 | 82 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 36.8 | 40 | 40 | 36 | 84 | 37.3 | 40 | 40 | 36 | 85 |
| | 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 | 13.8 | 1 | 13.3 | 28.4 | 30 | 30 | 27 | 59 | 28.8 | 30 | 30 | 28 | 60 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 39.4 | 40 | 40 | 38 | 68 | 39.8 | 40 | 40 | 38 | 69 |

## Table 9: WQE04-06 medium indoor blower without powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | 2 | 7.6 | 1.5 | — | None | — | — | — | 30.5 | 35 | 45 | 30 | 131 | 32 | 35 | 45 | 32 | 134 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 60 | 60 | 70 | 57 | 155 | 61.5 | 70 | 70 | 59 | 158 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 78 | 80 | 80 | 74 | 169 | 79.5 | 80 | 80 | 76 | 172 |
| | 230-1-60 | 16.7 | 93.5 | 26 | 2.3 | 7 | 1.3 | — | None | — | — | — | 30.2 | 35 | 45 | 30 | 134 | 31.5 | 35 | 45 | 31 | 137 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 64.1 | 70 | 70 | 61 | 161 | 65.4 | 70 | 70 | 63 | 164 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 85 | 90 | 90 | 80 | 178 | 86.3 | 90 | 90 | 82 | 181 |
| | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 5.2 | 1.1 | — | None | — | — | — | 22.5 | 25 | 30 | 22 | 124 | 23.6 | 25 | 35 | 24 | 127 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 39.5 | 40 | 45 | 38 | 138 | 40.6 | 45 | 45 | 39 | 140 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 49.9 | 50 | 50 | 47 | 146 | 51 | 60 | 60 | 49 | 149 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 64.1 | 70 | 70 | 61 | 158 | 65.2 | 70 | 70 | 62 | 160 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 5.2 | 1 | — | None | — | — | — | 22.8 | 25 | 30 | 23 | 127 | 23.8 | 25 | 35 | 24 | 130 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 42.3 | 45 | 50 | 41 | 143 | 43.3 | 45 | 50 | 42 | 145 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 54.4 | 60 | 60 | 52 | 153 | 55.4 | 60 | 60 | 53 | 155 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 70.9 | 80 | 80 | 67 | 166 | 71.9 | 80 | 80 | 68 | 168 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 2.6 | 0.5 | — | None | — | — | — | 11.2 | 15 | 15 | 11 | 60 | 11.7 | 15 | 15 | 12 | 61 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 20.2 | 25 | 25 | 19 | 67 | 20.7 | 25 | 25 | 20 | 68 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 28.5 | 30 | 30 | 27 | 74 | 29 | 30 | 30 | 28 | 75 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 32.2 | 35 | 35 | 30 | 77 | 32.7 | 35 | 35 | 31 | 78 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 2 | 0.4 | — | None | — | — | — | 8.6 | 15 | 15 | 9 | 39 | 9 | 15 | 15 | 9 | 40 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 19.7 | 20 | 20 | 19 | 48 | 20.1 | 25 | 25 | 19 | 49 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 25.2 | 30 | 30 | 24 | 53 | 25.6 | 30 | 30 | 24 | 54 |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | 2 | 7.6 | 1.5 | — | None | — | — | — | 33.9 | 35 | 50 | 33 | 139 | 35.4 | 40 | 50 | 35 | 143 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 63.4 | 70 | 70 | 60 | 163 | 64.9 | 70 | 70 | 62 | 166 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 81.4 | 90 | 90 | 77 | 177 | 82.9 | 90 | 90 | 79 | 181 |
| | 230-1-60 | 19.4 | 102 | 30 | 2.3 | 7 | 1.3 | — | None | — | — | — | 33.6 | 35 | 50 | 33 | 142 | 34.9 | 35 | 50 | 35 | 145 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 67.5 | 70 | 80 | 64 | 170 | 68.8 | 70 | 80 | 66 | 172 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 88.4 | 90 | 90 | 83 | 186 | 89.7 | 90 | 90 | 85 | 189 |
| | 208-3-60 | 12 | 123 | 19 | 2 | 5.2 | 1.1 | — | None | — | — | — | 22.2 | 25 | 30 | 22 | 150 | 23.3 | 25 | 35 | 23 | 152 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 39.2 | 40 | 45 | 38 | 163 | 40.3 | 45 | 45 | 39 | 166 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 49.6 | 50 | 50 | 47 | 172 | 50.7 | 60 | 60 | 49 | 174 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 63.8 | 70 | 70 | 60 | 183 | 64.9 | 70 | 70 | 62 | 186 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 5.2 | 1 | — | None | — | — | — | 22.5 | 25 | 30 | 22 | 153 | 23.5 | 25 | 35 | 24 | 155 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 42 | 45 | 50 | 40 | 169 | 43 | 45 | 50 | 42 | 171 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 54.1 | 60 | 60 | 52 | 178 | 55.1 | 60 | 60 | 53 | 181 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 70.6 | 80 | 80 | 67 | 191 | 71.6 | 80 | 80 | 68 | 194 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 2.6 | 0.5 | — | None | — | — | — | 11.8 | 15 | 15 | 12 | 75 | 12.3 | 15 | 15 | 12 | 77 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 20.8 | 25 | 25 | 20 | 83 | 21.3 | 25 | 25 | 21 | 84 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 29.1 | 30 | 30 | 28 | 89 | 29.6 | 30 | 30 | 28 | 90 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 32.8 | 35 | 35 | 31 | 92 | 33.3 | 35 | 35 | 32 | 93 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 2 | 0.4 | — | None | — | — | — | 8.5 | 15 | 15 | 9 | 53 | 8.9 | 15 | 15 | 9 | 54 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 19.6 | 20 | 20 | 19 | 62 | 20 | 20 | 20 | 19 | 63 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 25.1 | 30 | 30 | 24 | 67 | 25.5 | 30 | 30 | 24 | 68 |

## Table 9: WQE04-06 medium indoor blower without powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-1-60 | 22.5 | 148 | 35 | 2 | 6.8 | 1.5 | — | None | — | — | — | 36.9 | 40 | 50 | 36 | 185 | 38.4 | 40 | 60 | 38 | 188 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 66.4 | 70 | 80 | 63 | 209 | 67.9 | 70 | 80 | 65 | 212 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 84.4 | 90 | 90 | 80 | 223 | 85.9 | 90 | 90 | 81 | 226 |
| | 230-1-60 | 22.5 | 148 | 35 | 2.3 | 6.2 | 1.3 | — | None | — | — | — | 36.6 | 40 | 50 | 36 | 186 | 37.9 | 40 | 60 | 37 | 189 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 70.5 | 80 | 80 | 67 | 213 | 71.8 | 80 | 80 | 68 | 216 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 91.4 | 100 | 100 | 86 | 230 | 92.7 | 100 | 100 | 88 | 233 |
| | 208-3-60 | 13.1 | 93 | 20 | 2 | 7 | 1.1 | — | None | — | — | — | 25.4 | 30 | 35 | 25 | 158 | 26.5 | 30 | 35 | 27 | 160 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 42.4 | 45 | 50 | 41 | 171 | 43.5 | 45 | 50 | 42 | 174 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 52.8 | 60 | 60 | 51 | 179 | 53.9 | 60 | 60 | 52 | 182 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 67 | 70 | 70 | 64 | 191 | 68.1 | 70 | 70 | 65 | 193 |
| | 230-3-60 | 13.1 | 93 | 20 | 2.3 | 7.2 | 1 | — | None | — | — | — | 25.9 | 30 | 35 | 26 | 160 | 26.9 | 30 | 35 | 27 | 162 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 45.4 | 50 | 50 | 44 | 175 | 46.4 | 50 | 50 | 45 | 178 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 57.5 | 60 | 60 | 55 | 185 | 58.5 | 60 | 60 | 56 | 187 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 74 | 80 | 80 | 70 | 198 | 75 | 80 | 80 | 71 | 201 |
| | 460-3-60 | 6.6 | 60 | 10 | 1.3 | 3.6 | 0.5 | — | None | — | — | — | 13.2 | 15 | 15 | 13 | 94 | 13.7 | 15 | 15 | 14 | 95 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 22.2 | 25 | 25 | 22 | 101 | 22.7 | 25 | 25 | 22 | 102 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 30.5 | 35 | 35 | 29 | 108 | 31 | 35 | 35 | 30 | 109 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.2 | 35 | 35 | 33 | 111 | 34.7 | 35 | 35 | 33 | 112 |
| | 575-3-60 | 4.8 | 41 | 8 | 1 | 2.5 | 0.4 | — | None | — | — | — | 9.5 | 15 | 15 | 10 | 61 | 9.9 | 15 | 15 | 10 | 62 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.1 | 30 | 30 | 25 | 74 | 26.5 | 30 | 30 | 25 | 75 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 37.1 | 40 | 40 | 35 | 83 | 37.5 | 40 | 40 | 35 | 84 |

## Table 10: WQE04-06 medium indoor blower with powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-1-60 | 16.7 | 93.5 | 26 | 2 | 7.6 | 1.5 | 8.6 | None | — | — | — | 34.8 | 35 | 50 | 35 | 135 | 36.3 | 40 | 50 | 37 | 139 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 64.3 | 70 | 70 | 62 | 159 | 65.8 | 70 | 70 | 64 | 162 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 82.3 | 90 | 90 | 79 | 173 | 83.8 | 90 | 90 | 81 | 177 |
| | 230-1-60 | 16.7 | 93.5 | 26 | 2.3 | 7 | 1.3 | 8.6 | None | — | — | — | 34.5 | 35 | 50 | 35 | 138 | 35.8 | 40 | 50 | 36 | 141 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 68.4 | 70 | 70 | 66 | 165 | 69.7 | 70 | 70 | 68 | 168 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 89.3 | 90 | 90 | 85 | 182 | 90.6 | 100 | 100 | 87 | 185 |
| | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 5.2 | 1.1 | 8.6 | None | — | — | — | 26.8 | 30 | 35 | 27 | 129 | 27.9 | 30 | 40 | 29 | 131 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 43.8 | 45 | 50 | 43 | 142 | 44.9 | 45 | 50 | 44 | 145 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 54.2 | 60 | 60 | 52 | 151 | 55.3 | 60 | 60 | 54 | 153 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.4 | 70 | 70 | 66 | 162 | 69.5 | 70 | 70 | 67 | 164 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 5.2 | 1 | 8.6 | None | — | — | — | 27.1 | 30 | 35 | 28 | 132 | 28.1 | 30 | 40 | 29 | 134 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 46.6 | 50 | 50 | 46 | 147 | 47.6 | 50 | 50 | 47 | 150 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 58.7 | 60 | 60 | 57 | 157 | 59.7 | 60 | 60 | 58 | 159 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 75.2 | 80 | 80 | 72 | 170 | 76.2 | 80 | 80 | 73 | 173 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 2.6 | 0.5 | 8.6 | None | — | — | — | 13.4 | 15 | 15 | 14 | 62 | 13.9 | 15 | 15 | 14 | 63 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 22.4 | 25 | 25 | 22 | 69 | 22.9 | 25 | 25 | 23 | 70 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 30.7 | 35 | 35 | 30 | 76 | 31.2 | 35 | 35 | 30 | 77 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.4 | 35 | 35 | 33 | 79 | 34.9 | 35 | 35 | 34 | 80 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 2 | 0.4 | 8.6 | None | — | — | — | 10.3 | 15 | 15 | 11 | 41 | 10.7 | 15 | 15 | 11 | 42 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 21.4 | 25 | 25 | 21 | 50 | 21.8 | 25 | 25 | 21 | 51 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.9 | 30 | 30 | 26 | 54 | 27.3 | 30 | 30 | 26 | 55 |
| 05 (4) | 208-1-60 | 19.4 | 102 | 30 | 2 | 7.6 | 1.5 | 8.6 | None | — | — | — | 38.2 | 40 | 50 | 38 | 144 | 39.7 | 40 | 50 | 40 | 147 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 67.7 | 70 | 80 | 65 | 167 | 69.2 | 70 | 80 | 67 | 171 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 85.7 | 90 | 90 | 82 | 182 | 87.2 | 90 | 90 | 84 | 185 |
| | 230-1-60 | 19.4 | 102 | 30 | 2.3 | 7 | 1.3 | 8.6 | None | — | — | — | 37.9 | 40 | 50 | 38 | 147 | 39.2 | 40 | 50 | 39 | 150 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 71.8 | 80 | 80 | 69 | 174 | 73.1 | 80 | 80 | 71 | 177 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 92.7 | 100 | 100 | 88 | 191 | 94 | 100 | 100 | 90 | 193 |
| | 208-3-60 | 12 | 123 | 19 | 2 | 5.2 | 1.1 | 8.6 | None | — | — | — | 26.5 | 30 | 35 | 27 | 154 | 27.6 | 30 | 35 | 28 | 157 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 43.5 | 45 | 50 | 43 | 168 | 44.6 | 45 | 50 | 44 | 170 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 53.9 | 60 | 60 | 52 | 176 | 55 | 60 | 60 | 53 | 179 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.1 | 70 | 70 | 65 | 187 | 69.2 | 70 | 70 | 67 | 190 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 5.2 | 1 | 8.6 | None | — | — | — | 26.8 | 30 | 35 | 27 | 157 | 27.8 | 30 | 35 | 29 | 160 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 46.3 | 50 | 50 | 45 | 173 | 47.3 | 50 | 50 | 46 | 175 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 58.4 | 60 | 60 | 56 | 183 | 59.4 | 60 | 60 | 58 | 185 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 74.9 | 80 | 80 | 72 | 196 | 75.9 | 80 | 80 | 73 | 198 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 2.6 | 0.5 | 8.6 | None | — | — | — | 14 | 15 | 20 | 14 | 78 | 14.5 | 15 | 20 | 15 | 79 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 23 | 25 | 25 | 23 | 85 | 23.5 | 25 | 25 | 23 | 86 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 31.3 | 35 | 35 | 30 | 91 | 31.8 | 35 | 35 | 31 | 92 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 35 | 35 | 35 | 34 | 94 | 35.5 | 40 | 40 | 34 | 95 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 2 | 0.4 | 8.6 | None | — | — | — | 10.2 | 15 | 15 | 10 | 55 | 10.6 | 15 | 15 | 11 | 56 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 21.3 | 25 | 25 | 21 | 64 | 21.7 | 25 | 25 | 21 | 65 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.8 | 30 | 30 | 26 | 68 | 27.2 | 30 | 30 | 26 | 69 |

## Table 10: WQE04-06 medium indoor blower with powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-1-60 | 22.5 | 148 | 35 | 2 | 6.8 | 1.5 | 8.6 | None | — | — | — | 41.2 | 45 | 60 | 41 | 189 | 42.7 | 45 | 60 | 43 | 193 |
| | | | | | | | | | 10625 | 4.9 | 1 | 23.6 | 70.7 | 80 | 80 | 68 | 213 | 72.2 | 80 | 80 | 70 | 216 |
| | | | | | | | | | 11125 | 7.9 | 1 | 38 | 88.7 | 90 | 100 | 85 | 227 | 90.2 | 100 | 100 | 86 | 231 |
| | 230-1-60 | 22.5 | 148 | 35 | 2.3 | 6.2 | 1.3 | 8.6 | None | — | — | — | 40.9 | 45 | 60 | 41 | 190 | 42.2 | 45 | 60 | 42 | 193 |
| | | | | | | | | | 10625 | 6.5 | 1 | 27.1 | 74.8 | 80 | 90 | 72 | 217 | 76.1 | 80 | 90 | 73 | 220 |
| | | | | | | | | | 11125 | 10.5 | 1 | 43.8 | 95.7 | 100 | 100 | 91 | 234 | 97 | 100 | 100 | 92 | 237 |
| | 208-3-60 | 13.1 | 93 | 20 | 2 | 7 | 1.1 | 8.6 | None | — | — | — | 29.7 | 30 | 40 | 30 | 162 | 30.8 | 35 | 40 | 32 | 164 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 46.7 | 50 | 50 | 46 | 175 | 47.8 | 50 | 50 | 47 | 178 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 57.1 | 60 | 60 | 56 | 184 | 58.2 | 60 | 60 | 57 | 186 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 71.3 | 80 | 80 | 69 | 195 | 72.4 | 80 | 80 | 70 | 198 |
| | 230-3-60 | 13.1 | 93 | 20 | 2.3 | 7.2 | 1 | 8.6 | None | — | — | — | 30.2 | 35 | 40 | 31 | 164 | 31.2 | 35 | 40 | 32 | 166 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 49.7 | 50 | 50 | 49 | 180 | 50.7 | 60 | 60 | 50 | 182 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 61.8 | 70 | 70 | 60 | 189 | 62.8 | 70 | 70 | 61 | 192 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 78.3 | 80 | 80 | 75 | 203 | 79.3 | 80 | 80 | 76 | 205 |
| | 460-3-60 | 6.6 | 60 | 10 | 1.3 | 3.6 | 0.5 | 8.6 | None | — | — | — | 15.4 | 20 | 20 | 16 | 96 | 15.9 | 20 | 20 | 16 | 97 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 24.4 | 25 | 25 | 24 | 103 | 24.9 | 25 | 25 | 25 | 104 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 32.7 | 35 | 35 | 32 | 110 | 33.2 | 35 | 35 | 32 | 111 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 36.4 | 40 | 40 | 35 | 113 | 36.9 | 40 | 40 | 36 | 114 |
| | 575-3-60 | 4.8 | 41 | 8 | 1 | 2.5 | 0.4 | 8.6 | None | — | — | — | 11.2 | 15 | 15 | 12 | 63 | 11.6 | 15 | 15 | 12 | 64 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 27.8 | 30 | 30 | 27 | 76 | 28.2 | 30 | 30 | 27 | 77 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 38.8 | 40 | 40 | 37 | 85 | 39.2 | 40 | 40 | 37 | 86 |

## Table 11: WQE04-06 high indoor blower without powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 5.2 | 1.1 | — | None | — | — | — | 22.5 | 25 | 30 | 22 | 124 | 23.6 | 25 | 35 | 24 | 127 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 39.5 | 40 | 45 | 38 | 138 | 40.6 | 45 | 45 | 39 | 140 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 49.9 | 50 | 50 | 47 | 146 | 51 | 60 | 60 | 49 | 149 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 64.1 | 70 | 70 | 61 | 158 | 65.2 | 70 | 70 | 62 | 160 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 5.2 | 1 | — | None | — | — | — | 22.8 | 25 | 30 | 23 | 127 | 23.8 | 25 | 35 | 24 | 130 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 42.3 | 45 | 50 | 41 | 143 | 43.3 | 45 | 50 | 42 | 145 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 54.4 | 60 | 60 | 52 | 153 | 55.4 | 60 | 60 | 53 | 155 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 70.9 | 80 | 80 | 67 | 166 | 71.9 | 80 | 80 | 68 | 168 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 2.6 | 0.5 | — | None | — | — | — | 11.2 | 15 | 15 | 11 | 60 | 11.7 | 15 | 15 | 12 | 61 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 20.2 | 25 | 25 | 19 | 67 | 20.7 | 25 | 25 | 20 | 68 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 28.5 | 30 | 30 | 27 | 74 | 29 | 30 | 30 | 28 | 75 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 32.2 | 35 | 35 | 30 | 77 | 32.7 | 35 | 35 | 31 | 78 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 2 | 0.4 | — | None | — | — | — | 8.6 | 15 | 15 | 9 | 39 | 9 | 15 | 15 | 9 | 40 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 19.7 | 20 | 20 | 19 | 48 | 20.1 | 25 | 25 | 19 | 49 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 25.2 | 30 | 30 | 24 | 53 | 25.6 | 30 | 30 | 24 | 54 |
| 05 (4) | 208-3-60 | 12 | 123 | 19 | 2 | 5.2 | 1.1 | — | None | — | — | — | 22.2 | 25 | 30 | 22 | 150 | 23.3 | 25 | 35 | 23 | 152 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 39.2 | 40 | 45 | 38 | 163 | 40.3 | 45 | 45 | 39 | 166 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 49.6 | 50 | 50 | 47 | 172 | 50.7 | 60 | 60 | 49 | 174 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 63.8 | 70 | 70 | 60 | 183 | 64.9 | 70 | 70 | 62 | 186 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 5.2 | 1 | — | None | — | — | — | 22.5 | 25 | 30 | 22 | 153 | 23.5 | 25 | 35 | 24 | 155 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 42 | 45 | 50 | 40 | 169 | 43 | 45 | 50 | 42 | 171 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 54.1 | 60 | 60 | 52 | 178 | 55.1 | 60 | 60 | 53 | 181 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 70.6 | 80 | 80 | 67 | 191 | 71.6 | 80 | 80 | 68 | 194 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 2.6 | 0.5 | — | None | — | — | — | 11.8 | 15 | 15 | 12 | 75 | 12.3 | 15 | 15 | 12 | 77 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 20.8 | 25 | 25 | 20 | 83 | 21.3 | 25 | 25 | 21 | 84 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 29.1 | 30 | 30 | 28 | 89 | 29.6 | 30 | 30 | 28 | 90 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 32.8 | 35 | 35 | 31 | 92 | 33.3 | 35 | 35 | 32 | 93 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 2 | 0.4 | — | None | — | — | — | 8.5 | 15 | 15 | 9 | 53 | 8.9 | 15 | 15 | 9 | 54 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 19.6 | 20 | 20 | 19 | 62 | 20 | 20 | 20 | 19 | 63 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 25.1 | 30 | 30 | 24 | 67 | 25.5 | 30 | 30 | 24 | 68 |

## Table 11: WQE04-06 high indoor blower without powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 06 (5) | 208-3-60 | 13.1 | 93 | 20 | 2 | 8.9 | 1.1 | — | None | — | — | — | 27.3 | 30 | 40 | 28 | 174 | 28.4 | 30 | 40 | 29 | 177 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 44.3 | 45 | 50 | 43 | 188 | 45.4 | 50 | 50 | 45 | 190 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 54.7 | 60 | 60 | 53 | 196 | 55.8 | 60 | 60 | 54 | 199 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.9 | 70 | 70 | 66 | 208 | 70 | 80 | 80 | 67 | 210 |
| | 230-3-60 | 13.1 | 93 | 20 | 2.3 | 8.2 | 1 | — | None | — | — | — | 26.9 | 30 | 35 | 27 | 177 | 27.9 | 30 | 40 | 28 | 179 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 46.4 | 50 | 50 | 45 | 193 | 47.4 | 50 | 50 | 46 | 195 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 58.5 | 60 | 60 | 56 | 202 | 59.5 | 60 | 60 | 57 | 205 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 75 | 80 | 80 | 71 | 215 | 76 | 80 | 80 | 73 | 218 |
| | 460-3-60 | 6.6 | 60 | 10 | 1.3 | 4.1 | 0.5 | — | None | — | — | — | 13.7 | 15 | 20 | 14 | 97 | 14.2 | 15 | 20 | 14 | 99 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 22.7 | 25 | 25 | 22 | 105 | 23.2 | 25 | 25 | 23 | 106 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 31 | 35 | 35 | 30 | 111 | 31.5 | 35 | 35 | 30 | 112 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.7 | 35 | 35 | 33 | 114 | 35.2 | 40 | 40 | 34 | 115 |
| | 575-3-60 | 4.8 | 41 | 8 | 1 | 3.2 | 0.4 | — | None | — | — | — | 10.2 | 15 | 15 | 10 | 69 | 10.6 | 15 | 15 | 11 | 70 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.8 | 30 | 30 | 26 | 83 | 27.2 | 30 | 30 | 26 | 84 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 37.8 | 40 | 40 | 36 | 92 | 38.2 | 40 | 40 | 36 | 92 |

## Table 12: WQE04-06 high indoor blower with powered convenience outlet

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 04 (3) | 208-3-60 | 12.2 | 97.5 | 19 | 2 | 5.2 | 1.1 | 8.6 | None | — | — | — | 26.8 | 30 | 35 | 27 | 129 | 27.9 | 30 | 40 | 29 | 131 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 43.8 | 45 | 50 | 43 | 142 | 44.9 | 45 | 50 | 44 | 145 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 54.2 | 60 | 60 | 52 | 151 | 55.3 | 60 | 60 | 54 | 153 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.4 | 70 | 70 | 66 | 162 | 69.5 | 70 | 70 | 67 | 164 |
| | 230-3-60 | 12.2 | 97.5 | 19 | 2.3 | 5.2 | 1 | 8.6 | None | — | — | — | 27.1 | 30 | 35 | 28 | 132 | 28.1 | 30 | 40 | 29 | 134 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 46.6 | 50 | 50 | 46 | 147 | 47.6 | 50 | 50 | 47 | 150 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 58.7 | 60 | 60 | 57 | 157 | 59.7 | 60 | 60 | 58 | 159 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 75.2 | 80 | 80 | 72 | 170 | 76.2 | 80 | 80 | 73 | 173 |
| | 460-3-60 | 5.8 | 44.3 | 9 | 1.3 | 2.6 | 0.5 | 8.6 | None | — | — | — | 13.4 | 15 | 15 | 14 | 62 | 13.9 | 15 | 15 | 14 | 63 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 22.4 | 25 | 25 | 22 | 69 | 22.9 | 25 | 25 | 23 | 70 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 30.7 | 35 | 35 | 30 | 76 | 31.2 | 35 | 35 | 30 | 77 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 34.4 | 35 | 35 | 33 | 79 | 34.9 | 35 | 35 | 34 | 80 |
| | 575-3-60 | 4.5 | 27.1 | 7 | 1 | 2 | 0.4 | 8.6 | None | — | — | — | 10.3 | 15 | 15 | 11 | 41 | 10.7 | 15 | 15 | 11 | 42 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 21.4 | 25 | 25 | 21 | 50 | 21.8 | 25 | 25 | 21 | 51 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.9 | 30 | 30 | 26 | 54 | 27.3 | 30 | 30 | 26 | 55 |

**Table 12: WQE04-06 high indoor blower with powered convenience outlet**

| Size (ton) | Nominal unit voltage | Compressor 1 | | | OD fan motors (each) | Supply blower motor | Pwr exh motor | Pwr conv outlet | Electric heat field-installed kit 2EK045* | | | | MCA (amps) | Min fuse /breaker size (amps) | Max fuse /breaker size (amps) | Min disconnect rating | | MCA w/pwr exh (amps) | Min fuse/breaker size w/pwr exh (amps) | Max fuse/ breaker size/pwr exh (amps) | Min disconnect rating/ pwr exh | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RLA | LRA | MCC | | | | | Model | kW | Stages | Amps | | | | FLA | LRA | | | | FLA | LRA |
| 05 (4) | 208-3-60 | 12 | 123 | 19 | 2 | 5.2 | 1.1 | 8.6 | None | — | — | — | 26.5 | 30 | 35 | 27 | 154 | 27.6 | 30 | 35 | 28 | 157 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 43.5 | 45 | 50 | 43 | 168 | 44.6 | 45 | 50 | 44 | 170 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 53.9 | 60 | 60 | 52 | 176 | 55 | 60 | 60 | 53 | 179 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 68.1 | 70 | 70 | 65 | 187 | 69.2 | 70 | 70 | 67 | 190 |
| | 230-3-60 | 12 | 123 | 19 | 2.3 | 5.2 | 1 | 8.6 | None | — | — | — | 26.8 | 30 | 35 | 27 | 157 | 27.8 | 30 | 35 | 29 | 160 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 46.3 | 50 | 50 | 45 | 173 | 47.3 | 50 | 50 | 46 | 175 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 58.4 | 60 | 60 | 56 | 183 | 59.4 | 60 | 60 | 58 | 185 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 74.9 | 80 | 80 | 72 | 196 | 75.9 | 80 | 80 | 73 | 198 |
| | 460-3-60 | 6.3 | 60 | 10 | 1.3 | 2.6 | 0.5 | 8.6 | None | — | — | — | 14 | 15 | 20 | 14 | 78 | 14.5 | 15 | 20 | 15 | 79 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 23 | 25 | 25 | 23 | 85 | 23.5 | 25 | 25 | 23 | 86 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 31.3 | 35 | 35 | 30 | 91 | 31.8 | 35 | 35 | 31 | 92 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 35 | 35 | 35 | 34 | 94 | 35.5 | 40 | 40 | 34 | 95 |
| | 575-3-60 | 4.4 | 41 | 7 | 1 | 2 | 0.4 | 8.6 | None | — | — | — | 10.2 | 15 | 15 | 10 | 55 | 10.6 | 15 | 15 | 11 | 56 |
| | | | | | | | | | 11058 | 9.2 | 1 | 8.9 | 21.3 | 25 | 25 | 21 | 64 | 21.7 | 25 | 25 | 21 | 65 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 26.8 | 30 | 30 | 26 | 68 | 27.2 | 30 | 30 | 26 | 69 |
| 06 (5) | 208-3-60 | 13.1 | 93 | 20 | 2 | 8.9 | 1.1 | 8.6 | None | — | — | — | 31.6 | 35 | 40 | 33 | 179 | 32.7 | 35 | 45 | 34 | 181 |
| | | | | | | | | | 10625 | 4.9 | 1 | 13.6 | 48.6 | 50 | 50 | 48 | 192 | 49.7 | 50 | 50 | 49 | 195 |
| | | | | | | | | | 11125 | 7.9 | 1 | 21.9 | 59 | 60 | 60 | 58 | 200 | 60.1 | 70 | 70 | 59 | 203 |
| | | | | | | | | | 11625 | 12 | 1 | 33.3 | 73.2 | 80 | 80 | 71 | 212 | 74.3 | 80 | 80 | 72 | 214 |
| | 230-3-60 | 13.1 | 93 | 20 | 2.3 | 8.2 | 1 | 8.6 | None | — | — | — | 31.2 | 35 | 40 | 32 | 181 | 32.2 | 35 | 45 | 33 | 184 |
| | | | | | | | | | 10625 | 6.5 | 1 | 15.6 | 50.7 | 60 | 60 | 50 | 197 | 51.7 | 60 | 60 | 51 | 199 |
| | | | | | | | | | 11125 | 10.5 | 1 | 25.3 | 62.8 | 70 | 70 | 61 | 207 | 63.8 | 70 | 70 | 62 | 209 |
| | | | | | | | | | 11625 | 16 | 1 | 38.5 | 79.3 | 80 | 80 | 76 | 220 | 80.3 | 90 | 90 | 78 | 222 |
| | 460-3-60 | 6.6 | 60 | 10 | 1.3 | 4.1 | 0.5 | 8.6 | None | — | — | — | 15.9 | 20 | 20 | 16 | 100 | 16.4 | 20 | 20 | 17 | 101 |
| | | | | | | | | | 10646 | 6 | 1 | 7.2 | 24.9 | 25 | 25 | 25 | 107 | 25.4 | 30 | 30 | 25 | 108 |
| | | | | | | | | | 11146 | 11.5 | 1 | 13.8 | 33.2 | 35 | 35 | 32 | 113 | 33.7 | 35 | 35 | 33 | 114 |
| | | | | | | | | | 11446 | 14 | 1 | 16.8 | 36.9 | 40 | 40 | 36 | 116 | 37.4 | 40 | 40 | 36 | 117 |
| | 575-3-60 | 4.8 | 41 | 8 | 1 | 3.2 | 0.4 | 8.6 | None | — | — | — | 11.9 | 15 | 15 | 12 | 71 | 12.3 | 15 | 15 | 13 | 72 |
| | | | | | | | | | 11458 | 13.8 | 1 | 13.3 | 28.5 | 30 | 30 | 28 | 84 | 28.9 | 30 | 30 | 28 | 85 |
| | | | | | | | | | 12358 | 23 | 1 | 22.1 | 39.5 | 40 | 40 | 38 | 93 | 39.9 | 40 | 40 | 38 | 94 |

# Operation

## Sequence of operation

For WQ units, a Y1 call for the first stage of cooling is passed to the Unit Control Board (UCB) which then determines whether the requested operation is available and if so, which components to energize. With an Y1 call for first stage cooling the UCB will determine if a first stage cooling output is valid as long as all safeties and time-delays allow a C1 output for cooling. The C1 relay on the UCB will close and send 24 volts to the compressor relay starting the first stage compressor and also energizing a relay starting the associated condenser fans. During any call for fan or cooling the FAN output on the UCB will energize the appropriate relay starting the supply fan.

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.

## Heat pump cooling

Cooling calls are handled the same way as non-heat pump cooling units, with one exception.

ⓘ **Note:** An exception to this is during cooling, the control energizes the H1 output to turn on the reversing valve.

The H1 output to the reversing valve remains energized between calls for cooling. If a heating call arises, the H1 output turns off.

## 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, a compressor must not be locked-out due to a high or low-pressure switch or 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

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 of the outdoor air is below the setpoint of the enthalpy controller (previously determined), Y1 energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the setpoint, 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 (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. 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 R454-B refrigerant. When R454-B refrigerant leak is detected, it is considered an alarm condition.

When an A2L alarm is detected, the unit shuts down any cooling and heating outputs and the supply fan turns on, if not already on, at 50%.

Heating and cooling remains off and the supply fan remains 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 sends an error message.

### 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 sends an error message.

### Evaporator low limit

During cooling operation, if the Evaporator Low Limit Sensor (EC1) (Located on the Suction Line at the Evaporator Coil.) detects a temperature below 26 Deg. 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 and the evaporator temperature (EC1) is above 39ºF, 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

To determine when to operate in low ambient mode, the UCB has an Outdoor Air Temperature Sensor (OAT) with a low ambient setpoint at 45ºF (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 26ºF 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 39ºF, the unit will resume operation.

### Safety controls

The unit control board monitors the following inputs for each cooling system:

1. An evaporator low limit sensor **(EC1)** (Located on the Suction Line at the Evaporator Coil.) to 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 650 ± 25 psig).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 7 ± 3 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.

### 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.

### Error message

The UCB will initiate a error message 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 evaporator low limit error messages.

## Heating sequence of operations

### With or without electric heat

When the thermostat calls for the first stage of heating, the low voltage control circuit is completed between R and W1. The 24vac signal is passed through the UCB to the Fan, C1 and CN-Fan output Terminals and withholds a 24vac output to the H1 terminal assuring the reversing valve cannot be energized, except during defrost. If the ASCD timer is satisfied the UCB will energize compressor contactor M1.

If the compressor alone cannot satisfy the heating requirements, a second stage call from the thermostat

completes the circuit between R and W2. This 24vac signal is passed through the UCB H2 output terminal to the electric heat section (if available). The total available kW of electric heat will be energized on a call for W2.

### Defrost initiation

Defrost control implements a temperature differential, demand defrost algorithm. The heat pump is allowed to operate in the heating mode until the combination of outdoor ambient temperature and outdoor coil temperature indicate that defrosting is necessary. When the coil temperature is maintained below the initiate point for a given ambient temperature, continuously for 4 1/2 minutes, the heat pump is put into a defrost cycle. This 4 1/2 minute timer eliminates unnecessary defrost cycles caused by refrigeration surges such as those that occur at the start of a heating cycle.

For defrost, the UCB will signal the energizing of the reversing valve and de-energizing the systems condenser fan motors. The unit's optional electric first-stage heater is also energized via a 24-volt VAC output terminal labeled H2.

### Defrost termination

The UCB terminates the defrost mode when either of the following two conditions are met;

1. The outdoor coil temperature sensor reaches 40°F, or
2. The maximum allowable defrost run time of 8 minutes.

### Interval between defrosts

A timed inhibit feature prevents the system from responding to a call for defrost less than 40 minutes after the initiation of the previous defrost. After this inhibit time has expired, temperature conditions must call for defrost continuously for 4- 1/2 minutes before another defrost cycle is initiated. A temperature inhibit feature prohibits defrost if the coil temperature is above 40°F. All defrost timing occurs only while the compressor is on.

### Forced defrost

A forced-defrost feature puts the system into a defrost cycle every 6 hours and 4 minutes to recirculate lubricants, unless the coil temperature is above 40°F. All defrost timing occurs only while the compressor is on.

For trouble shooting purposes, the defrost cycle can be manually initiated by selecting "Test Defrost" in the UCB menu.

### Selectable defrost curves

Defrost initiation will occur when the outdoor coil temperature falls below a particular threshold value, which varies depending upon the selected Defrost curve. The relative behavior of the various defrost curves is as follows;

- Above an outdoor ambient temperature of approximately 20 F, defrost initiation would occur the soonest on Curves 4 or 5, followed by Curve 3, Curve 1 and the latest on Curve 2.
- Below an outdoor ambient temperature of approximately 20 F, defrost initiation would occur the soonest on Curve 3, followed by Curves 4 or 5, Curve 1 and the latest on Curve 2.

A customer that lives in colder climates, where temperatures under 20 are normal, with higher humidity, such as Boston, may want to use a more aggressive defrost curve like Curve 3. A customer that lives in a warmer climate, such as the Southeast United States, can use a less aggressive defrost curve like Curve 2. Each customer should decide for themselves which defrost curve will be suitable for their application.

## Options/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 is specific to footprint:

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.

The Power Exhaust factory installed option is for Down Flow application only.

There are two field installed Power Exhaust accessories. Each is specific to footprint and unit voltage:

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

### 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

WQ units are properly phased at the factory. Check for proper 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 to 208V. C or L3 phase to ground, voltage reading is 120V. Therefore B or L2 phase is the high Leg. The high should always be wired to the center or B or L2 tap.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.

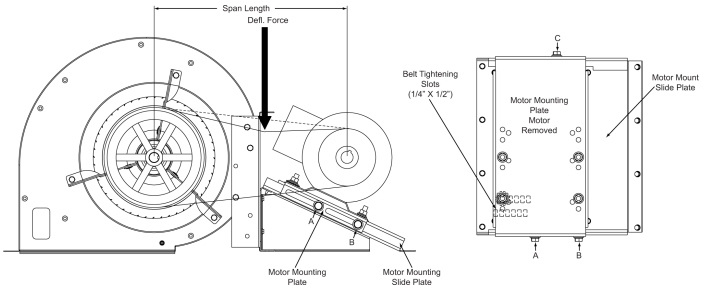
**Table 13: Supply air limitations**

| Model (size) | Supply air (CFM) | |
|---|---|---|
| | Minimum | Maximum |
| WQ04 (3) | 900 | 1500 |
| WQ05 (4) | 1200 | 2000 |
| WQ06 (5) | 1500 | 2500 |

## Belt tension

The tension on the belt should be adjusted as shown in Figure 24.

**Figure 24: Belt adjustment**




**CAUTION**

Procedure for adjusting belt tension:

Loosen the three nuts (A and B on side and C on back) of motor mount slide plate.

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 Figure 24.

Tighten the three loosened nuts (A, B and C).

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 4mm (5/32 in.) is obtained.

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 feet 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 14 and Figure 25.

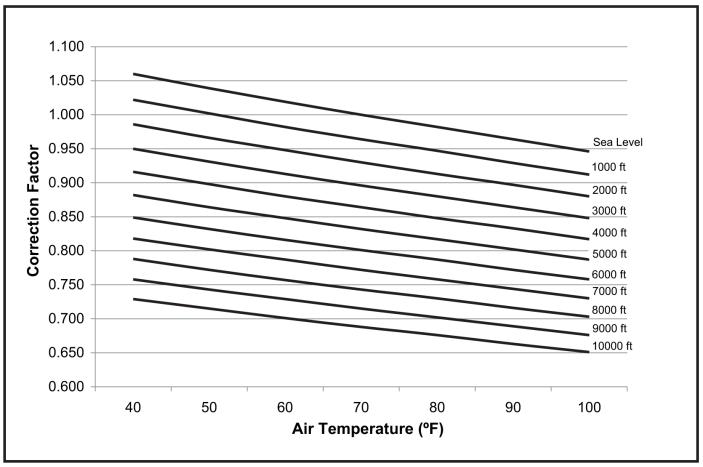
**Table 14: Altitude/temperature correction factors**

| 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 |

**Table 14: Altitude/temperature correction factors**

| Air Temp. | Altitude (ft) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
| 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 25: 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 Table 17 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 Table 14 shows the correction factor to be 0.832.

Corrected static pressure = 0.6 x 0.832 = 0.499 IWC

Corrected BHP = 0.67 x 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". 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 = 0.6 / .832 = 0.72 in.

Enter the blower table at 1,400 sCFM and static pressure of 0.72 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 x .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 the additional static resistance table.

4. Using the operating point determined from steps 1, 2 and 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
2. 1.4 iwg
3. Using the airflow performance table below, the following data point was located: 1417 RPM & 1.28 BHP.
4. Using the RPM selection table below, Model WQ and Size 05 (4-ton) is found.
5. The High Static Option is selected to achieve the required 1417 RPM.
6. Using the High Static Option, 2 turns open will achieve 1417 RPM.

## Airflow performance

### Table 15: Example supply air blower performance WQE04 (3.0 ton) bottom duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 743 | 0.14 | 852 | 0.26 | 955 | 0.37 | 1050 | 0.48 | 1140 | 0.57 | **1225** | **0.67** | **1306** | **0.77** | **1384** | **0.87** | **1460** | **0.98** | **1535** | **1.09** |
| **1000** | 757 | 0.20 | 867 | 0.33 | 969 | 0.44 | 1065 | 0.54 | 1155 | 0.64 | **1240** | **0.74** | **1321** | **0.84** | **1399** | **0.94** | **1475** | **1.04** | **1549** | **1.16** |
| **1100** | 774 | 0.27 | 884 | 0.40 | 986 | 0.51 | 1082 | 0.61 | 1172 | 0.71 | **1257** | **0.81** | **1338** | **0.91** | **1416** | **1.01** | **1492** | **1.11** | **1566** | **1.23** |
| **1200** | 793 | 0.35 | 903 | 0.47 | 1005 | 0.58 | 1101 | 0.69 | 1191 | 0.78 | **1276** | **0.88** | **1357** | **0.98** | **1435** | **1.08** | **1511** | **1.19** | **1585** | **1.30** |
| **1300** | 814 | 0.42 | 924 | 0.54 | 1026 | 0.65 | 1122 | 0.76 | **1212** | **0.86** | **1297** | **0.96** | **1378** | **1.05** | **1456** | **1.15** | **1532** | **1.26** | **1606** | **1.37** |
| **1400** | 837 | 0.49 | 947 | 0.61 | 1049 | 0.72 | 1145 | 0.83 | **1235** | **0.93** | **1320** | **1.03** | **1401** | **1.12** | **1479** | **1.23** | **1555** | **1.33** | **1629** | **1.45** |
| **1500** | 862 | 0.56 | 972 | 0.68 | 1074 | 0.79 | 1170 | 0.90 | **1260** | **1.00** | **1345** | **1.09** | **1426** | **1.19** | **1504** | **1.29** | **1580** | **1.40** | -- | -- |

**Note:** kW = 0.929 x BHP

| | |
|---|---|
| | Field-supplied AK51 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| | Medium static option with motor rated at 2.4 hp |
| **Bold** | High static option with motor rated at 2.4 hp |
| **Bold** | Field-supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| -- | Exceeds recommended blower speed |

### Table 16: Example RPM selection

| Model | Size (ton) | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WQ | 05 (4) | Std. | Direct drive | | | | | | | | | | |
| | | 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 17: Example additional static resistance

| Model | Size (ton) | CFM | Economizer | 4 in. filter | Electric heat kW | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 6/6.5 | 9.2/10.5/11 | 13.8/14/16 | 23 | — |
| WQ | 05 (4) | 1200 | 0.24 | — | 0.01 | 0.01 | 0.02 | 0.03 | — |
| | | 1300 | 0.28 | — | 0.01 | 0.01 | 0.03 | 0.03 | — |
| | | 1400 | 0.33 | — | 0.02 | 0.02 | 0.03 | 0.04 | — |
| | | 1500 | 0.44 | — | 0.02 | 0.02 | 0.04 | 0.04 | — |
| | | 1600 | 0.52 | — | 0.02 | 0.02 | 0.04 | 0.05 | — |
| | | 1700 | 0.59 | — | 0.03 | 0.03 | 0.05 | 0.05 | — |
| | | 1800 | 0.66 | — | 0.03 | 0.03 | 0.05 | 0.06 | — |
| | | 1900 | 0.74 | — | 0.04 | 0.04 | 0.06 | 0.07 | — |
| | | 2000 | 0.81 | — | 0.04 | 0.04 | 0.07 | 0.08 | — |

## WQE04 to 06 side duct application (belt drive)

### Table 18: WQE04 (3.0 ton) side duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | | | 810 | 0.27 | 922 | 0.38 | 1024 | 0.49 | 1118 | 0.59 | 1205 | 0.69 | **1285** | **0.80** | **1359** | **0.91** | **1429** | **1.03** | **1496** | **1.16** |
| **1000** | 703 | 0.19 | 826 | 0.31 | 938 | 0.43 | 1041 | 0.53 | 1135 | 0.64 | **1221** | **0.74** | **1301** | **0.85** | **1376** | **0.96** | **1446** | **1.08** | **1513** | **1.21** |
| **1100** | 721 | 0.25 | 843 | 0.37 | 956 | 0.48 | 1058 | 0.59 | 1152 | 0.69 | **1239** | **0.80** | **1319** | **0.90** | **1393** | **1.01** | **1463** | **1.13** | **1530** | **1.26** |
| **1200** | 738 | 0.31 | 861 | 0.43 | 973 | 0.54 | 1076 | 0.65 | 1170 | 0.75 | **1256** | **0.86** | **1336** | **0.96** | **1411** | **1.08** | **1481** | **1.19** | **1548** | **1.33** |
| **1300** | 756 | 0.38 | 879 | 0.50 | 991 | 0.61 | 1094 | 0.72 | 1188 | 0.82 | **1274** | **0.92** | **1354** | **1.03** | **1429** | **1.14** | **1499** | **1.26** | **1566** | **1.39** |
| **1400** | 774 | 0.45 | 897 | 0.57 | 1009 | 0.68 | 1112 | 0.79 | 1206 | 0.89 | **1292** | **1.00** | **1372** | **1.10** | **1447** | **1.21** | **1517** | **1.33** | **1584** | **1.47** |
| **1500** | 792 | 0.53 | 915 | 0.65 | 1027 | 0.76 | 1129 | 0.87 | **1223** | **0.97** | **1310** | **1.07** | **1390** | **1.18** | **1464** | **1.29** | **1535** | **1.41** | **1602** | **1.54** |

ⓘ **Note:** kW = 0.929 x BHP

| | |
|---|---|
| | Field-supplied AK51 x 3/4 in.fixed blower pulley with motor rated at 2.4 hp |
| | Medium Static Option with Motor rated at 2.4 hp |
| **Bold** | High Static Option with Motor rated at 2.4 hp |
| **Bold** | Field-supplied AK41 x 3/4 in.fixed blower pulley with motor rated at 2.4 hp |

### Table 19: WQE05 (4.0 ton) side duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 759 | 0.28 | 860 | 0.38 | 957 | 0.49 | 1050 | 0.62 | 1139 | 0.76 | **1224** | **0.89** | **1306** | **1.03** | **1383** | **1.15** | **1457** | **1.26** | **1527** | **1.36** |
| **1300** | 777 | 0.34 | 878 | 0.44 | 975 | 0.55 | 1068 | 0.68 | 1157 | 0.81 | **1242** | **0.95** | **1324** | **1.08** | **1401** | **1.21** | **1475** | **1.32** | **1545** | **1.42** |
| **1400** | 796 | 0.40 | 897 | 0.50 | 995 | 0.61 | 1088 | 0.74 | 1177 | 0.88 | **1262** | **1.01** | **1343** | **1.15** | **1420** | **1.27** | **1494** | **1.38** | **1564** | **1.48** |
| **1500** | 816 | 0.46 | 918 | 0.56 | 1015 | 0.68 | 1108 | 0.81 | 1197 | 0.94 | **1282** | **1.08** | **1363** | **1.21** | **1440** | **1.34** | **1514** | **1.45** | **1584** | **1.54** |
| **1600** | 837 | 0.53 | 938 | 0.63 | 1035 | 0.75 | 1129 | 0.88 | **1218** | **1.01** | **1303** | **1.15** | **1384** | **1.28** | **1461** | **1.41** | **1535** | **1.52** | **1605** | **1.61** |
| **1700** | 858 | 0.61 | 960 | 0.71 | 1057 | 0.83 | 1150 | 0.95 | **1239** | **1.09** | **1324** | **1.22** | **1405** | **1.36** | **1482** | **1.48** | **1556** | **1.60** | **1626** | **1.69** |
| **1800** | 880 | 0.69 | 981 | 0.79 | 1078 | 0.91 | 1171 | 1.04 | **1260** | **1.17** | **1345** | **1.31** | **1427** | **1.44** | **1504** | **1.57** | **1578** | **1.68** | **1648** | **1.77** |
| **1900** | 902 | 0.78 | 1003 | 0.88 | 1100 | 1.00 | 1193 | 1.12 | **1282** | **1.26** | **1367** | **1.40** | **1448** | **1.53** | **1526** | **1.65** | **1599** | **1.77** | -- | -- |
| **2000** | 924 | 0.88 | 1025 | 0.98 | 1122 | 1.09 | **1215** | **1.22** | **1304** | **1.35** | **1389** | **1.49** | **1470** | **1.62** | **1548** | **1.75** | **1621** | **1.86** | -- | -- |

ⓘ **Note:** kW = 0.929 x BHP

| | |
|---|---|
| | Field-supplied AK51 x 3/4 in.fixed blower pulley with motor rated at 2.4 hp |
| | Medium static option with motor rated at 2.4 hp |
| **Bold** | High static option with motor rated at 2.4 hp |
| **Bold** | Field-supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| -- | Exceeds recommended blower speed |

### Table 20: WQE06 (5.0 ton) side duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 770 | 0.40 | 836 | 0.50 | 901 | 0.60 | 964 | 0.69 | 1025 | 0.79 | 1084 | 0.89 | 1142 | 0.98 | 1197 | 1.07 | **1250** | **1.15** | **1300** | **1.23** |
| **1600** | 779 | 0.45 | 845 | 0.54 | 910 | 0.64 | 973 | 0.74 | 1034 | 0.83 | 1093 | 0.93 | 1151 | 1.02 | 1206 | 1.11 | **1259** | **1.20** | **1309** | **1.27** |
| **1700** | 791 | 0.50 | 857 | 0.60 | 922 | 0.69 | 985 | 0.79 | 1046 | 0.89 | 1105 | 0.98 | 1162 | 1.07 | **1218** | **1.16** | **1271** | **1.25** | **1321** | **1.33** |
| **1800** | 805 | 0.56 | 872 | 0.66 | 936 | 0.75 | 999 | 0.85 | 1060 | 0.95 | 1120 | 1.04 | 1177 | 1.13 | **1232** | **1.22** | **1285** | **1.31** | **1335** | **1.39** |
| **1900** | 822 | 0.63 | 888 | 0.72 | 953 | 0.82 | 1016 | 0.92 | 1077 | 1.01 | 1136 | 1.11 | 1194 | 1.20 | **1249** | **1.29** | **1302** | **1.38** | **1352** | **1.46** |
| **2000** | 841 | 0.70 | 907 | 0.80 | 972 | 0.89 | 1035 | 0.99 | 1096 | 1.09 | 1155 | 1.18 | **1212** | **1.27** | **1268** | **1.36** | **1321** | **1.45** | **1371** | **1.53** |
| **2100** | 862 | 0.78 | 928 | 0.87 | 993 | 0.97 | 1056 | 1.07 | 1117 | 1.16 | 1176 | 1.26 | **1233** | **1.35** | **1289** | **1.44** | **1341** | **1.53** | **1392** | **1.61** |
| **2200** | 885 | 0.86 | 951 | 0.96 | 1016 | 1.05 | 1079 | 1.15 | 1140 | 1.25 | 1199 | 1.34 | **1256** | **1.43** | **1311** | **1.52** | **1364** | **1.61** | **1415** | **1.69** |
| **2300** | 910 | 0.95 | 976 | 1.04 | 1040 | 1.14 | 1103 | 1.23 | 1165 | 1.33 | **1224** | **1.43** | **1281** | **1.52** | **1336** | **1.61** | **1389** | **1.69** | **1440** | **1.77** |
| **2400** | 936 | 1.03 | 1002 | 1.13 | 1067 | 1.23 | 1130 | 1.32 | 1191 | 1.42 | **1250** | **1.52** | **1307** | **1.61** | **1362** | **1.70** | **1415** | **1.78** | **1466** | **1.86** |
| **2500** | 964 | 1.13 | 1030 | 1.22 | 1095 | 1.32 | 1158 | 1.41 | **1219** | **1.51** | **1278** | **1.61** | **1335** | **1.70** | **1390** | **1.79** | **1443** | **1.87** | **1494** | **1.95** |

## Table 20: WQE06 (5.0 ton) side duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |
| ⓘ **Note:** kW = 0.857 x BHP | | | | | | | | | | | | | | | | | | | | |
| | Field-supplied AK51 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp | | | | | | | | | | | | | | | | | | | |
| | Medium static option with motor rated at 2.4 hp | | | | | | | | | | | | | | | | | | | |
| **Bold** | High static option with motor rated at 2.9 hp | | | | | | | | | | | | | | | | | | | |

## WQE04 to 06 bottom duct application (belt drive)

### Table 21: WQE04 (3.0 ton) bottom duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 743 | 0.14 | 852 | 0.26 | 955 | 0.37 | 1050 | 0.48 | 1140 | 0.57 | **1225** | **0.67** | **1306** | **0.77** | **1384** | **0.87** | **1460** | **0.98** | **1535** | **1.09** |
| **1000** | 757 | 0.20 | 867 | 0.33 | 969 | 0.44 | 1065 | 0.54 | 1155 | 0.64 | **1240** | **0.74** | **1321** | **0.84** | **1399** | **0.94** | **1475** | **1.04** | **1549** | **1.16** |
| **1100** | 774 | 0.27 | 884 | 0.40 | 986 | 0.51 | 1082 | 0.61 | 1172 | 0.71 | **1257** | **0.81** | **1338** | **0.91** | **1416** | **1.01** | **1492** | **1.11** | **1566** | **1.23** |
| **1200** | 793 | 0.35 | 903 | 0.47 | 1005 | 0.58 | 1101 | 0.69 | 1191 | 0.78 | **1276** | **0.88** | **1357** | **0.98** | **1435** | **1.08** | **1511** | **1.19** | **1585** | **1.30** |
| **1300** | 814 | 0.42 | 924 | 0.54 | 1026 | 0.65 | 1122 | 0.76 | **1212** | **0.86** | **1297** | **0.96** | **1378** | **1.05** | **1456** | **1.15** | **1532** | **1.26** | **1606** | **1.37** |
| **1400** | 837 | 0.49 | 947 | 0.61 | 1049 | 0.72 | 1145 | 0.83 | **1235** | **0.93** | **1320** | **1.03** | **1401** | **1.12** | **1479** | **1.23** | **1555** | **1.33** | **1629** | **1.45** |
| **1500** | 862 | 0.56 | 972 | 0.68 | 1074 | 0.79 | 1170 | 0.90 | **1260** | **1.00** | **1345** | **1.09** | **1426** | **1.19** | **1504** | **1.29** | **1580** | **1.40** | -- | -- |

ⓘ **Note:** kW = 0.929 x BHP

| | |
|---|---|
| | Field-supplied AK51 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| | Medium static option with motor rated at 2.4 hp |
| **Bold** | High static option with motor rated at 2.4 hp |
| **Bold** | Field-supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| -- | Exceeds recommended blower speed |

### Table 22: WQE05 (4.0 ton) bottom duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 801 | 0.25 | 903 | 0.38 | 999 | 0.51 | 1089 | 0.63 | 1173 | 0.76 | 1252 | 0.88 | 1327 | 1.00 | 1396 | 1.11 | 1461 | 1.22 | 1521 | 1.33 |
| **1300** | 822 | 0.31 | 924 | 0.44 | 1020 | 0.57 | 1110 | 0.69 | 1194 | 0.82 | 1273 | 0.94 | 1348 | 1.06 | 1417 | 1.17 | 1482 | 1.28 | 1542 | 1.39 |
| **1400** | 844 | 0.38 | 946 | 0.51 | 1042 | 0.64 | 1132 | 0.76 | 1216 | 0.89 | 1295 | 1.01 | 1370 | 1.13 | 1439 | 1.24 | 1504 | 1.35 | 1564 | 1.46 |
| **1500** | 867 | 0.46 | 969 | 0.59 | 1065 | 0.71 | 1155 | 0.84 | 1239 | 0.96 | 1319 | 1.08 | 1393 | 1.20 | 1462 | 1.32 | 1527 | 1.43 | 1587 | 1.53 |
| **1600** | 891 | 0.54 | 993 | 0.67 | 1089 | 0.79 | 1179 | 0.92 | 1264 | 1.04 | 1343 | 1.16 | 1417 | 1.28 | 1486 | 1.40 | 1551 | 1.51 | **1612** | **1.61** |
| **1700** | 917 | 0.63 | 1019 | 0.75 | 1115 | 0.88 | 1205 | 1.01 | 1289 | 1.13 | 1368 | 1.25 | 1442 | 1.37 | 1512 | 1.48 | 1577 | 1.60 | **1637** | **1.70** |
| **1800** | 943 | 0.72 | 1045 | 0.85 | 1141 | 0.97 | 1231 | 1.10 | 1316 | 1.22 | 1395 | 1.34 | 1469 | 1.46 | 1538 | 1.58 | **1603** | **1.69** | -- | -- |
| **1900** | 971 | 0.81 | 1073 | 0.94 | 1169 | 1.07 | 1259 | 1.19 | 1344 | 1.32 | 1423 | 1.44 | 1497 | 1.56 | 1566 | 1.67 | **1631** | **1.78** | -- | -- |
| **2000** | 1000 | 0.92 | 1102 | 1.04 | 1198 | 1.17 | 1288 | 1.29 | 1372 | 1.42 | 1452 | 1.54 | 1526 | 1.66 | 1595 | 1.77 | -- | -- | -- | -- |

ⓘ **Note:** kW = 0.929 x BHP

| | |
|---|---|
| | Medium static option with motor rated at 2.4 hp |
| | High static option with motor rated at 2.4 hp |
| **Bold** | Field-supplied AK41 x 3/4 in. fixed blower pulley with motor rated at 2.4 hp |
| -- | Exceeds recommended blower speed |

### Table 23: WQE06 (5.0 ton) bottom duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** | 812 | 0.36 | 869 | 0.46 | 931 | 0.55 | 997 | 0.64 | 1063 | 0.74 | 1129 | 0.84 | 1193 | 0.94 | 1253 | 1.05 | 1307 | 1.16 | 1354 | 1.27 |
| **1600** | 829 | 0.43 | 886 | 0.52 | 948 | 0.61 | 1013 | 0.71 | 1080 | 0.80 | 1146 | 0.90 | 1210 | 1.01 | 1270 | 1.11 | 1324 | 1.22 | 1370 | 1.34 |
| **1700** | 846 | 0.50 | 904 | 0.59 | 966 | 0.68 | 1031 | 0.78 | 1097 | 0.87 | 1164 | 0.97 | 1227 | 1.07 | 1287 | 1.18 | 1341 | 1.29 | 1388 | 1.41 |
| **1800** | 865 | 0.57 | 922 | 0.66 | 985 | 0.75 | 1050 | 0.85 | 1116 | 0.95 | 1182 | 1.05 | 1246 | 1.15 | 1306 | 1.25 | 1360 | 1.36 | 1407 | 1.48 |
| **1900** | 885 | 0.65 | 943 | 0.74 | 1005 | 0.83 | 1070 | 0.93 | 1136 | 1.02 | 1203 | 1.12 | 1266 | 1.23 | 1326 | 1.33 | 1380 | 1.44 | 1427 | 1.56 |
| **2000** | 907 | 0.73 | 964 | 0.82 | 1026 | 0.92 | 1092 | 1.01 | 1158 | 1.11 | 1224 | 1.21 | 1288 | 1.31 | 1348 | 1.42 | 1402 | 1.53 | 1449 | 1.64 |
| **2100** | 930 | 0.82 | 987 | 0.91 | 1049 | 1.01 | 1115 | 1.10 | 1181 | 1.20 | 1247 | 1.30 | 1311 | 1.40 | 1371 | 1.51 | 1425 | 1.62 | 1472 | 1.73 |
| **2200** | 955 | 0.92 | 1012 | 1.01 | 1074 | 1.10 | 1139 | 1.20 | 1206 | 1.29 | 1272 | 1.39 | 1336 | 1.50 | 1396 | 1.60 | 1450 | 1.71 | 1496 | 1.83 |
| **2300** | 981 | 1.02 | 1038 | 1.11 | 1101 | 1.20 | 1166 | 1.30 | 1232 | 1.39 | 1298 | 1.49 | 1362 | 1.60 | 1422 | 1.70 | 1476 | 1.81 | 1523 | 1.93 |
| **2400** | 1009 | 1.12 | 1066 | 1.22 | 1128 | 1.31 | 1194 | 1.40 | 1260 | 1.50 | 1326 | 1.60 | 1390 | 1.70 | 1450 | 1.81 | 1504 | 1.92 | 1551 | 2.03 |
| **2500** | 1038 | 1.24 | 1096 | 1.33 | 1158 | 1.42 | 1223 | 1.52 | 1290 | 1.61 | 1356 | 1.71 | 1420 | 1.82 | 1480 | 1.92 | 1534 | 2.03 | 1580 | 2.15 |

### Table 23: WQE06 (5.0 ton) bottom duct

| CFM | Available external static | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |
| ⓘ **Note:** kW = 0.857 x BHP | | | | | | | | | | | | | | | | | | | | |
| | Medium static option with motor rated at 2.4 hp | | | | | | | | | | | | | | | | | | | |
| | High static option with motor rated at 2.9 hp | | | | | | | | | | | | | | | | | | | |

## WQE04 to 06 side duct application (direct drive)

### Table 24: WQE04-06 side duct

| 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 |
| WQE04 (3) | 1 (Low) | 987 | 120 | 651 | 813 | 145 | 774 | 698 | 162 | 864 | 541 | 180 | 959 | 383 | 201 | 1047 |
| | 2 (Med/Low) | 1079 | 144 | 677 | 936 | 171 | 795 | 793 | 190 | 886 | 692 | 214 | 975 | 521 | 232 | 1063 |
| | 3 (Med) | 1153 | 166 | 701 | 1037 | 195 | 812 | 875 | 221 | 913 | 786 | 239 | 986 | 654 | 263 | 1076 |
| | 4 (Med/Hi) | 1191 | 178 | 712 | 1086 | 206 | 815 | 927 | 233 | 916 | 837 | 257 | 998 | 711 | 278 | 1083 |
| | 5 (Hi) | 1326 | 229 | 757 | 1235 | 261 | 856 | 1124 | 291 | 951 | 973 | 319 | 1035 | 896 | 336 | 1099 |
| WQE05 (4) | 1 (Low) | 1302 | 207 | 727 | 1188 | 240 | 841 | 1037 | 266 | 933 | 941 | 296 | 1022 | 882 | 318 | 1098 |
| | 2 (Med/Low) | 1421 | 247 | 757 | 1323 | 282 | 861 | 1209 | 315 | 958 | 1064 | 346 | 1043 | 993 | 368 | 1116 |
| | 3 (Med) | 1538 | 297 | 795 | 1453 | 332 | 888 | 1343 | 367 | 982 | 1216 | 396 | 1058 | 1093 | 427 | 1146 |
| | 4 (Med/Hi) | 1571 | 315 | 809 | 1496 | 352 | 898 | 1385 | 389 | 996 | 1288 | 420 | 1072 | 1135 | 444 | 1147 |
| | 5 (Hi) | 1779 | 432 | 878 | 1707 | 470 | 960 | 1615 | 511 | 1042 | 1516 | 544 | 1123 | 1165 | 468 | 1160 |
| WQE06 (5) | 1 (Low) | 1588 | 298 | 695 | 1517 | 330 | 761 | 1409 | 358 | 835 | 1273 | 393 | 913 | 1167 | 418 | 973 |
| | 2 (Med/Low) | 1756 | 395 | 760 | 1640 | 420 | 820 | 1525 | 444 | 875 | 1421 | 467 | 920 | 1305 | 496 | 1005 |
| | 3 (Med) | 1942 | 504 | 792 | 1881 | 536 | 852 | 1800 | 565 | 908 | 1714 | 605 | 969 | 1611 | 644 | 1038 |
| | 4 (Med/Hi) | 2146 | 631 | 840 | 2064 | 692 | 908 | 2001 | 713 | 954 | 1932 | 757 | 1007 | 1843 | 794 | 1065 |
| | 5 (Hi) | 2316 | 812 | 892 | 2240 | 861 | 954 | 2181 | 894 | 1000 | 2113 | 938 | 1045 | 2003 | 946 | 1093 |

## WQE04 to 06 bottom duct application (direct drive)

### Table 25: WQE04-06 bottom duct

| 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 |
| WQE04 (3) | 1 (Low) | 929 | 128 | 699 | 782 | 148 | 794 | 663 | 164 | 880 | 514 | 187 | 976 | 377 | 202 | 1053 |
| | 2 (Med/Low) | 1036 | 157 | 732 | 870 | 177 | 827 | 803 | 198 | 905 | 649 | 217 | 996 | 508 | 236 | 1074 |
| | 3 (Med) | 1106 | 181 | 760 | 956 | 204 | 849 | 878 | 225 | 928 | 755 | 245 | 1010 | 616 | 266 | 1092 |
| | 4 (Med/Hi) | 1147 | 197 | 776 | 1042 | 218 | 860 | 916 | 243 | 944 | 820 | 262 | 1017 | 671 | 286 | 1103 |
| | 5 (Hi) | 1272 | 252 | 830 | 1177 | 277 | 909 | 1037 | 304 | 986 | 975 | 323 | 1053 | 872 | 347 | 1125 |
| WQE05 (4) | 1 (Low) | 1256 | 220 | 776 | 1170 | 242 | 851 | 1077 | 266 | 931 | 988 | 298 | 1025 | 872 | 321 | 1113 |
| | 2 (Med/Low) | 1350 | 272 | 828 | 1279 | 292 | 893 | 1196 | 320 | 966 | 1105 | 347 | 1048 | 1003 | 372 | 1131 |
| | 3 (Med) | 1449 | 323 | 866 | 1380 | 350 | 937 | 1303 | 370 | 996 | 1223 | 402 | 1071 | 1133 | 428 | 1149 |
| | 4 (Med/Hi) | 1488 | 345 | 882 | 1418 | 374 | 954 | 1357 | 394 | 1006 | 1264 | 424 | 1083 | 1160 | 442 | 1155 |
| | 5 (Hi) | 1677 | 471 | 966 | 1602 | 507 | 1034 | 1543 | 525 | 1083 | 1475 | 545 | 1131 | 1209 | 465 | 1162 |
| WQE06 (5) | 1 (Low) | 1548 | 310 | 720 | 1441 | 336 | 792 | 1337 | 370 | 864 | 1213 | 397 | 928 | 1097 | 421 | 988 |
| | 2 (Med/Low) | 1686 | 395 | 745 | 1570 | 429 | 820 | 1445 | 462 | 888 | 1351 | 490 | 953 | 1235 | 522 | 1016 |
| | 3 (Med) | 1880 | 532 | 827 | 1792 | 563 | 890 | 1719 | 588 | 944 | 1632 | 629 | 1006 | 1527 | 652 | 1061 |
| | 4 (Med/Hi) | 2066 | 689 | 895 | 1999 | 712 | 942 | 1907 | 761 | 999 | 1830 | 773 | 1048 | 1734 | 809 | 1100 |
| | 5 (Hi) | 2237 | 862 | 949 | 2163 | 882 | 996 | 2097 | 929 | 1036 | 1998 | 946 | 1085 | 1815 | 883 | 1115 |

## RPM selection

### Table 26: RPM selection

| Model | Size (ton) | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WQ | 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 |
| WQ | 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 |
| WQ | 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 |

## Indoor blower specification

### Table 27: Indoor blower specifications

| Model | Size (ton) | Airflow option | Motor | | | | | | Motor sheave | | | Blower sheave | | | Belt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Phase | Max BHP | RPM | Eff. | SF | Frame | Datum Dia. (in.) | Bore (in.) | Model | Datum Dia. (in.) | Bore (in.) | Model | |
| WQ | 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 |
| WQ | 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 |

**Table 27: Indoor blower specifications**

| Model | Size (ton) | Airflow option | Motor | | | | | | Motor sheave | | | Blower sheave | | | Belt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Phase | Max BHP | RPM | Eff. | SF | Frame | Datum Dia. (in.) | Bore (in.) | Model | Datum Dia. (in.) | Bore (in.) | Model | |
| WQ | 06 (5) | Std. | Direct drive | | | | | | | | | | | | |
| | | Med. | 1 | 1.5 | 1750 | 0.83 | 1.15 | 56H | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A37 |
| | | Med. | 3 | 2.4 | 1750 | 0.87 | 1.15 | 56HZ | 1.9 - 2.9 | 5/8 | 1VL34 | 4.2 | 3/4 | AK46 | A37 |
| | | H. Static | 3 | 2.9 | 1750 | 0.87 | 1.15 | 56Z | 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:

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

Use the following tables and the DD calculated per 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,

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

Use Table Table 28 to locate the DD nearest to 2.48 in. Close the sheave to 2 turn open.

EXAMPLE NEW BHP = (Speed increase)$^3$ • Original BHP = New BHP

= (Speed increase)$^3$ • BHP at 1,350 CFM

EXAMPLE NEW MOTOR AMPS

= (Speed increase)$^3$ • Original Amps = New Amps

= (Speed increase)$^3$ • Amps at 1,350 CFM

**Table 28: Motor Sheave Datum Diameters**

| 1VL34 | | 1VL44 | | 1VP50 | |
|---|---|---|---|---|---|
| Turns Open | Datum Diameter | Turns Open | Datum Diameter | Turns Open | Datum Diameter |
| 0 | 2.9 | 0 | 3.8 | 0 | 4.4 |
| 1/2 | 2.8 | 1/2 | 3.7 | 1/2 | 4.3 |
| 1 | 2.7 | 1 | 3.6 | 1 | 4.2 |
| 1-1/2 | 2.6 | 1-1/2 | 3.5 | 1-1/2 | 4.1 |
| 2 | 2.5 | 2 | 3.4 | 2 | 4.0 |
| 2-1/2 | 2.4 | 2-1/2 | 3.3 | 2-1/2 | 3.9 |
| 3 | 2.3 | 3 | 3.2 | 3 | 3.8 |
| 3-1/2 | 2.2 | 3-1/2 | 3.1 | 3-1/2 | 3.7 |
| 4 | 2.1 | 4 | 3.0 | 4 | 3.6 |
| 4-1/2 | 2.0 | 4-1/2 | 2.9 | 4-1/2 | 3.5 |
| 5 | 1.9 | 5 | 2.8 | 5 | 3.4 |

**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 10-12 hrs. run time is recommended.

**Table 29: Additional static resistance - WQE04-06**

| Model | Size (ton) | CFM | Economizer[1,2] | Electric heat kW[2] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 6/6.5 | 9.2/ 10.5/11 | 13.8/ 14/16 | 23 | — |
| WQE | 04 (3) | 900 | 0.03 | 0.00 | 0.00 | 0.01 | 0.01 | — |
| | | 1000 | 0.03 | 0.00 | 0.00 | 0.02 | 0.02 | — |
| | | 1100 | 0.03 | 0.01 | 0.01 | 0.02 | 0.03 | — |
| | | 1200 | 0.04 | 0.01 | 0.01 | 0.02 | 0.03 | — |
| | | 1300 | 0.04 | 0.01 | 0.01 | 0.03 | 0.03 | — |
| | | 1400 | 0.04 | 0.02 | 0.02 | 0.03 | 0.04 | — |
| | | 1500 | 0.04 | 0.02 | 0.02 | 0.04 | 0.04 | — |

**Table 29: Additional static resistance - WQE04-06**

| Model | Size (ton) | CFM | Economizer[1,2] | Electric heat kW[2] | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 6/6.5 | 9.2/ 10.5/11 | 13.8/ 14/16 | 23 | — |
| WQE | 05 (4) | 1200 | 0.04 | 0.01 | 0.01 | 0.02 | 0.03 | — |
| | | 1300 | 0.05 | 0.01 | 0.01 | 0.03 | 0.03 | — |
| | | 1400 | 0.06 | 0.02 | 0.02 | 0.03 | 0.04 | — |
| | | 1500 | 0.07 | 0.02 | 0.02 | 0.04 | 0.04 | — |
| | | 1600 | 0.08 | 0.02 | 0.02 | 0.04 | 0.05 | — |
| | | 1700 | 0.09 | 0.03 | 0.03 | 0.05 | 0.05 | — |
| | | 1800 | 0.09 | 0.03 | 0.03 | 0.05 | 0.06 | — |
| | | 1900 | 0.1 | 0.04 | 0.04 | 0.06 | 0.07 | — |
| | | 2000 | 0.11 | 0.04 | 0.04 | 0.07 | 0.08 | — |
| WQE | 06 (5) | 1800 | 0.09 | 0.03 | 0.03 | 0.05 | 0.06 | — |
| | | 2000 | 0.11 | 0.04 | 0.04 | 0.07 | 0.08 | — |
| | | 2200 | 0.13 | 0.06 | 0.06 | 0.08 | 0.09 | — |
| | | 2400 | 0.15 | 0.07 | 0.07 | 0.10 | 0.11 | — |
| | | 2500 | 0.17 | 0.08 | 0.08 | 0.11 | 0.12 | — |

**Note:**

1. Deduct these values from the available external static pressure shown in the respective Blower Performance Tables.
2. 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.

# Operation

## Compressor operation

Compressor Operation details include:

1. 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).
2. The FAN output for indoor fan operation energizes with any cooling output after the Indoor Fan Cool On Delay expires.
3. When the thermostat cooling inputs are lost and the minimum runtime expires, the compressor outputs stage off (Default 3 minutes).
4. 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.

## Economizer sequences

Several functions can drive the economizer, including: minimum position, free cooling, economizer loading, and minimum outdoor air supply.

***Economizer minimum position***

The economizer minimum position is set during occupied mode when outside air is not suitable for free cooling. The position of the damper is set proportionally between the "Economizer Minimum Position and the Economizer Minimum Position Low Speed Fan" set points. On a constant volume single speed supply fan system both set-points should be set to the same value.

***Free cooling***

Four types of free cooling options are available: dry bulb changeover, single enthalpy, dual enthalpy changeover, and Auto.

## Dry bulb changeover

For dry bulb economizer operation, the outside air is suitable for free cooling if the outside air temperature is 1°F below the Economizer OAT Enable Setpoint and 1°F below the Return Air Temperature.

Free cooling is no longer available if the outside air temperature rises above either the Economizer OAT Enable setpoint or the return air temperature.

## Single enthalpy changeover

For single enthalpy economizer operation, the outside air is suitable for free cooling if the outside air enthalpy is at least 1 BTU/lb below the Economizer Outside Air Enthalpy Setpoint and the outside air temperature is no greater than the RAT plus 9°F.

If the outside air temperature rises above the RAT plus 10°F, free cooling is no longer available. The outside air temperature must drop to no greater than RAT plus 9°F to enter free cooling again.

Free cooling is no longer available if the outside air enthalpy rises above the Economizer Outside Air Enthalpy Setpoint.

## Dual enthalpy changeover

For dual enthalpy economizer operation, the outside air enthalpy must be lower than the return air enthalpy by 1 btu/lb AND the outside air temperature is no greater than the RAT plus 9°F.

## Auto

The control determines the type of free cooling changeover based on which sensors are present and reliable. Conditions include:

- Return and outside air dry bulb = dry bulb changeover
- Return and outside air dry bulb and outside air humidity = single enthalpy
- Return and outside air dry bulb and return and outside air humidity = dual enthalpy
- If either the return or outside air dry bulb sensors are unreliable, free cooling is not available

## Free cooling operation

When the control determines that the outside air is suitable, the first stage of cooling will always be free cooling.

***Thermostat***

In free cooling, with a thermostat input to Y1, the dampers modulate to control the supply air temperature to the Economizer Setpoint +/- 1°F (default 55°F).

If the thermostat provides an input to Y2 and the parameter Compressors Off in Free Cooling is turned OFF a compressor

output energizes. The economizer dampers continue to modulate to control the supply air temperature to the Economizer Setpoint.

If the supply air temperature cannot be maintained within 5°F of the economizer setpoint, the first stage compressor (C1) will be turned on.

***Sensor***

In free cooling, with a demand from the zone/return sensor for the first stage of cooling, the dampers modulate to control the supply air temperature to the Economizer Setpoint +/- 1°F.

If the economizer output is at 100% and the SAT is greater than the Economizer setpoint + 1°F, the control starts a 12-minute timer to energize a compressor output.

If at any time the economizer output drops below 100% the timer stops and resets when the economizer output returns to 100%.

Once a compressor output is turned ON, the economizer dampers continue to modulate to control the supply air temperature to the Economizer Setpoint.

At no time will a compressor output be turned ON if the economizer output is less than 100%, even if the differential between zone (or return) temperature and the current cooling setpoint is great enough to demand more than one stage of cooling.

If the economizer output goes to minimum position and the SAT is less than Economizer Setpoint -1°F, the control starts a 12-minute timer to de-energize a compressor output.

If at any time the economizer output goes above the minimum position the timer stops and resets when the economizer output returns to minimum position.

If the demand for cooling from the space/return is satisfied, the economizer output will modulate to minimum position and the compressor outputs will be de-energized as long as their minimum run timers have expired.

## Power exhaust

### Setpoints

1. Economizer Enable ON
2. Power Exhaust Enable ON
3. Modulating Power Exhaust OFF
4. Exhaust VFD Installed OFF
5. Building Pressure Sensor Enabled OFF
6. Econo Damper Position For Exh Fan ON Percent
7. Econo Damper Position For Exh Fan OFF Percent

### Inputs

No inputs are present for non-modulating power exhaust.

### Outputs

1. 2-10 VDC from ECON on Economizer Expansion module
2. VAC from EX-FAN to energize exhaust fan on Economizer Expansion module

### Operation

Operation details include:

1. Compares economizer output to the Economizer Damper Position For Exhaust Fan On and OFF.
2. Energizes exhaust fan when economizer output is above Economizer Damper Position For Exhaust Fan On.
3. De-energizes exhaust fan when economizer output is below the Economizer Damper Position for Exhaust Fan OFF

**Figure 26: SE-ECO1001-1 Economizer controller**

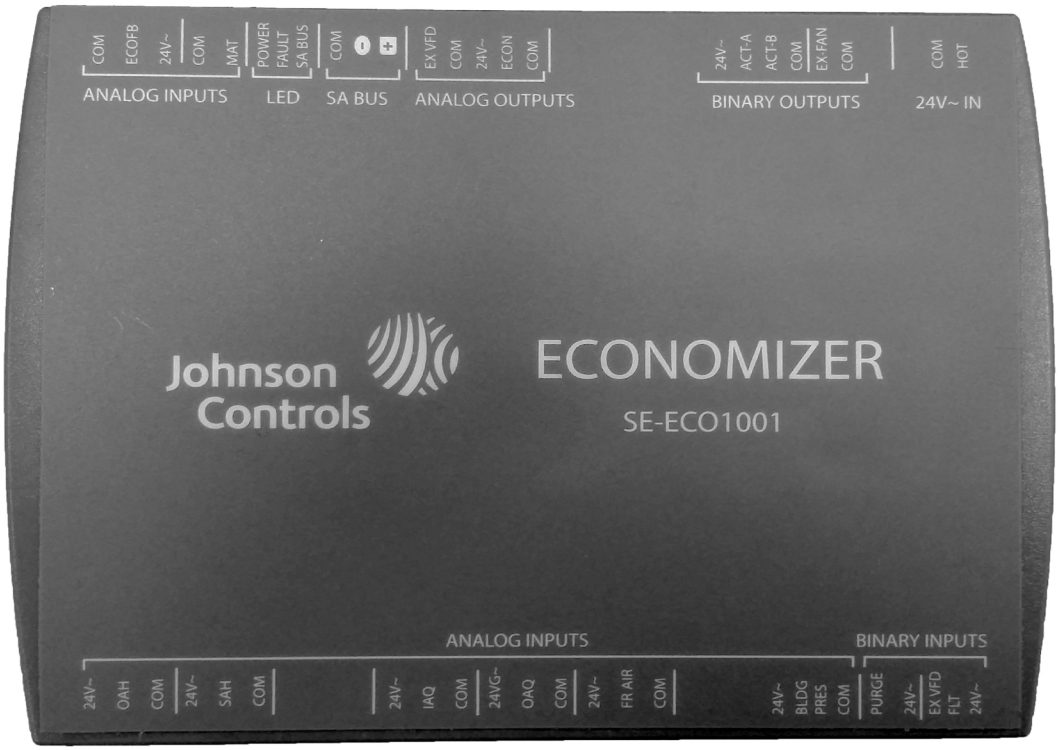



**Table 30: Smart Equipment Economizer Board details**

| Board Label | Cover Label | Description | Function & 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/0-10 VDC negative for economizer actuator position feedback | Connects through circuit trace to 24V~ IN pin COM |
| **IN2** | ECOFB | 0-10 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** | 24V~ | 24 VAC hot supplied for economizer actuator position feedback | Connects through circuit trace to 24V~ 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 24V~ 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 |
| | | **SA BUS[1] 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 to 3.5 volts reading to C; at least 0.25 volts 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 & 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 to 3.5 volts reading to C; at least 0.25 volts 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 & diagnostics board |
| | | **ANALOG OUTPUTS Pin at center on upper edge of economizer board** | |

## Table 30: Smart Equipment Economizer Board details

| Board Label | Cover Label | Description | Function & Comments |
|---|---|---|---|
| **J4** | EX VFD | 2-10 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/0-10 VDC negative for the power exhaust variable frequency drive/discharge damper modulating power exhaust actuator | Connects through circuit trace to 24V~ IN pin COM |
| | 24V~ | 24 VAC hot supplied for the discharge damper modulating power exhaust actuator and economizer actuator | Connects through circuit trace to 24V~ IN pin HOT |
| | ECON | 2-10 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/0-10 VDC negative for economizer actuator | Connects through circuit trace to 24V~ IN pin COM |
| | | **BINARY OUTPUTS Pin at right on upper edge of economizer board** | |
| **J3** | 24V~ | 24 VAC hot supplied for an incremental (floating control) economizer actuator | Connects through circuit trace to 24V~ 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 24V~ 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/0-10 VDC negative for economizer actuator | Connects through circuit trace to 24V~ IN pin COM |
| | | **24V~ IN Pin connections at right on upper edge of economizer board** | |
| **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/24V~ terminals and pins distributed on the economizer board. |
| | | **ANALOG INPUTS Terminal on lower edge of economizer board** | |
| **R** | 24V~ | 24 VAC hot supplied for the outdoor air humidity sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN3** | OAH | 0-10 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/0-10 VDC negative for the outdoor air humidity sensor | Connects through circuit trace to 24V~ IN pin COM |
| **R** | 24V~ | 24 VAC hot supplied for the supply air humidity sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN4** | SAH | 0-10 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/0-10 VDC negative for the supply air humidity sensor | Connects through circuit trace to 24V~ IN pin COM |
| **R** | 24V~ | 24 VAC hot supplied for the indoor air quality sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN5** | IAQ | 0-10 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/0-10 VDC negative for the indoor air quality sensor | Connects through circuit trace to 24V~ IN pin COM |
| **R** | 24V~ | 24 VAC hot supplied for the outdoor air quality sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN6** | OAQ | 0-10 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/0-10 VDC negative for the outdoor air quality sensor | Connects through circuit trace to 24V~ IN pin COM |
| **R** | 24V~ | 24 VAC hot supplied for the air monitoring station sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN7** | FR AIR | 0-10 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/0-10 VDC negative for the air monitoring station sensor | Connects through circuit trace to 24V~ IN pin COM |

**Table 30: Smart Equipment Economizer Board details**

| Board Label | Cover Label | Description | Function & Comments |
|---|---|---|---|
| **R** | 24V~ | 24 VAC hot supplied for the building pressure sensor | Connects through circuit trace to 24V~ IN pin HOT |
| **IN8** | BLDG PRES | 0-5 VDC positive input from the Building Pressure sensor | BldgPres parameter reports input status (-.250-.250”/w/-.062-.062kPa). Used for modulating power exhaust functions when ExFType selection is Modulating Damper or Variable Frequency Fan. |
| **C** | COM | 24 VAC common/0-5 VDC negative for the building pressure sensor | Connects through circuit trace to 24V~ 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%. |
| | 24V~ | 24 VAC hot supplied for the purge dry contact | Connects through circuit trace to 24V~ 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. |
| | 24V~ | 24 VAC hot supplied for the power exhaust variable frequency drive fault contact | Connects through circuit trace to 24V~ IN pin HOT |

1 When wiring unit and other devices using the SA Bus and FC Bus, see Table 29.

### Indoor air quality (IAQ)

Indoor Air Quality (indoor sensor input): Terminal AQ accepts a +2 to +10 VDC signal with respect to the (AQ1) terminal. When the signal is below it's set point, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 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 it's 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 $CO_2$ Space Sensor Kit Part # 2AQ04700524B
- Optional $CO_2$ Sensor Kit Part # 2AQ04700624C

## 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 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.

### Operating instructions

1. Turn unit electrical power on.

   **Note:** Prior to each cooling season, the crankcase heaters 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 (five minutes).

### Post start check list

1. Verify proper system pressures.
2. Measure the temperature drop across the evaporator coil.

## 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 prior to 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.

## Charging tables

### Table 31: WQE04 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 | 253 | 85 | -26 | 7.5 |
| | 85 | 126 | 64 | 293 | 95 | -27 | 8.7 |
| | 95 | 124 | 64 | 333 | 104 | -28 | 9.8 |
| 300 Cfm/ton 80/67 | 75 | 129 | 63 | 254 | 85 | -26 | 7.5 |
| | 85 | 131 | 65 | 295 | 95 | -25 | 8.7 |
| | 95 | 134 | 67 | 337 | 105 | -24 | 9.8 |
| 300 Cfm/ton 80/72 | 75 | 128 | 62 | 254 | 85 | -26 | 7.5 |
| | 85 | 136 | 66 | 298 | 96 | -22 | 8.7 |
| | 95 | 145 | 70 | 341 | 106 | -19 | 9.8 |
| 300 Cfm/ton 75/62 | 75 | 123 | 61 | 252 | 85 | -24 | 7.5 |
| | 85 | 123 | 62 | 292 | 95 | -23 | 8.7 |
| | 95 | 123 | 63 | 333 | 104 | -23 | 9.8 |
| 400 Cfm/ton 80/62 | 75 | 133 | 64 | 255 | 86 | -24 | 7.6 |
| | 85 | 134 | 65 | 296 | 95 | -24 | 8.7 |
| | 95 | 135 | 67 | 337 | 105 | -24 | 9.8 |
| 400 Cfm/ton 80//67 | 75 | 135 | 65 | 255 | 86 | -23 | 7.6 |
| | 85 | 138 | 66 | 297 | 96 | -22 | 8.7 |
| | 95 | 140 | 68 | 339 | 106 | -21 | 9.8 |
| 400 Cfm/ton 80/72 | 75 | 137 | 65 | 256 | 86 | -22 | 7.6 |
| | 85 | 141 | 67 | 298 | 96 | -21 | 8.7 |
| | 95 | 146 | 69 | 341 | 106 | -19 | 9.8 |
| 400 Cfm/ton 75/62 | 75 | 129 | 62 | 253 | 85 | -21 | 7.6 |
| | 85 | 130 | 64 | 294 | 95 | -21 | 8.7 |
| | 95 | 132 | 65 | 335 | 105 | -20 | 9.8 |

### Table 32: WQE05 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 | 60 | 263 | 79 | -26 | 10.3 |
| | 85 | 128 | 60 | 305 | 90 | -26 | 11.9 |
| | 95 | 126 | 59 | 346 | 100 | -27 | 13.6 |
| 300 Cfm/ton 80/67 | 75 | 126 | 63 | 262 | 79 | -25 | 10.3 |
| | 85 | 130 | 65 | 306 | 89 | -24 | 12.0 |
| | 95 | 134 | 66 | 350 | 100 | -23 | 13.7 |
| 300 Cfm/ton 80/72 | 75 | 123 | 65 | 261 | 78 | -25 | 10.3 |

### Table 32: WQE05 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 |
|---|---|---|---|---|---|---|---|
| | 85 | 133 | 70 | 308 | 89 | -22 | 12.1 |
| | 95 | 142 | 74 | 355 | 99 | -19 | 13.8 |
| 300 Cfm/ton 75/62 | 75 | 123 | 57 | 261 | 79 | -23 | 10.3 |
| | 85 | 125 | 57 | 303 | 90 | -23 | 12.0 |
| | 95 | 126 | 57 | 346 | 101 | -23 | 13.6 |
| 400 Cfm/ton 80/62 | 75 | 133 | 63 | 264 | 80 | -24 | 10.3 |
| | 85 | 134 | 63 | 306 | 90 | -24 | 11.9 |
| | 95 | 135 | 63 | 349 | 100 | -23 | 13.6 |
| 400 Cfm/ton 80//67 | 75 | 133 | 64 | 264 | 79 | -23 | 10.3 |
| | 85 | 137 | 66 | 307 | 90 | -22 | 12.0 |
| | 95 | 140 | 67 | 351 | 100 | -21 | 13.7 |
| 400 Cfm/ton 80/72 | 75 | 134 | 66 | 263 | 79 | -22 | 10.2 |
| | 85 | 139 | 69 | 308 | 90 | -20 | 12.0 |
| | 95 | 145 | 71 | 353 | 100 | -18 | 13.7 |
| 400 Cfm/ton 75/62 | 75 | 128 | 60 | 262 | 79 | -21 | 10.3 |
| | 85 | 130 | 61 | 305 | 90 | -20 | 12.0 |
| | 95 | 132 | 61 | 348 | 100 | -20 | 13.6 |

### Table 33: WQ06 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 | 130 | 63 | 272 | 83 | -26 | 13.0 |
| | 85 | 130 | 59 | 314 | 95 | -26 | 15.3 |
| | 95 | 130 | 56 | 356 | 106 | -26 | 17.5 |
| 300 Cfm/ton 80/67 | 75 | 130 | 63 | 271 | 83 | -26 | 13.0 |
| | 85 | 133 | 61 | 315 | 94 | -25 | 15.3 |
| | 95 | 136 | 60 | 359 | 105 | -23 | 17.5 |
| 300 Cfm/ton 80/72 | 75 | 129 | 63 | 270 | 83 | -26 | 13.0 |
| | 85 | 136 | 63 | 317 | 94 | -23 | 15.2 |
| | 95 | 142 | 64 | 363 | 105 | -20 | 17.5 |
| 300 Cfm/ton 75/62 | 75 | 125 | 61 | 270 | 83 | -23 | 13.0 |
| | 85 | 126 | 58 | 312 | 95 | -23 | 15.2 |
| | 95 | 128 | 55 | 355 | 106 | -22 | 17.5 |
| 400 Cfm/ton 80/62 | 75 | 135 | 66 | 273 | 84 | -23 | 13.0 |
| | 85 | 137 | 65 | 316 | 95 | -23 | 15.2 |
| | 95 | 138 | 64 | 359 | 106 | -22 | 17.5 |
| 400 Cfm/ton 80//67 | 75 | 136 | 66 | 273 | 84 | -23 | 13.0 |
| | 85 | 139 | 66 | 317 | 95 | -22 | 15.2 |
| | 95 | 141 | 66 | 362 | 105 | -21 | 17.5 |
| 400 Cfm/ton 80/72 | 75 | 137 | 66 | 272 | 84 | -22 | 12.9 |
| | 85 | 141 | 67 | 318 | 95 | -21 | 15.2 |
| | 95 | 144 | 68 | 364 | 105 | -19 | 17.5 |
| 400 Cfm/ton 75/62 | 75 | 130 | 63 | 271 | 84 | -21 | 13.0 |
| | 85 | 132 | 63 | 315 | 95 | -20 | 15.2 |
| | 95 | 134 | 62 | 358 | 106 | -19 | 17.4 |

## Smart Equipment Control Board Navigation components

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

**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)

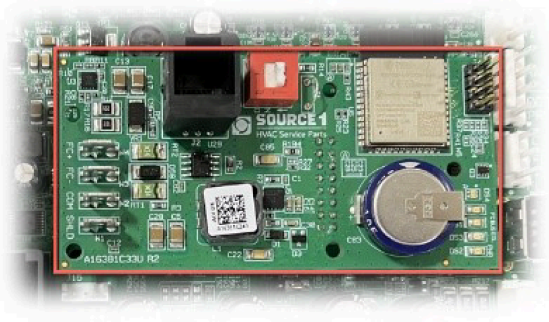
**Note:** You can connect the GoTemp Pro app to the controller via Bluetooth through the Connected Workflow Converter (CWCVT) or directly to the UCB if the controller has a communication card.

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

**Figure 27: CWCVT (S1-TL-CWCVT-0)**




**Figure 28: 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.)

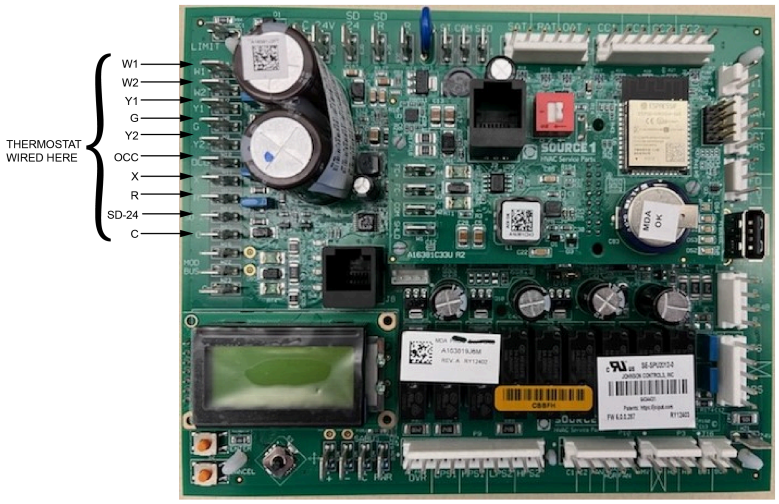
  **Note:** Although the MAP is no longer available for purchase, it continues to work with the UCB. The MAP does not receive firmware updates, so as additional points are added to the UCB those points will not render properly. However, the MAP will continue to work for the majority of typical applications.

- *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*.

**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.

### Figure 29: Unit control board




### Table 34: 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 34: 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 34: 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 34: 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[1] 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[1] 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 |

**Note:**

1. When wiring the unit and other devices using the SA Bus and FC Bus, see Table 35.

## Table 35: 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. |

**Note:**

1. 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.
2. 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 | ☐ | ☐ |
| Unit installed with proper clearances | ☐ | ☐ |
| Unit installed within slope limitations | ☐ | ☐ |
| Refrigeration system checked for gross leaks (presence of oil) | ☐ | ☐ |
| Terminal screws and wiring connections checked for tightness | ☐ | ☐ |
| Filters installed correctly and clean | ☐ | ☐ |
| Economizer hoods installed in operating position | ☐ | ☐ |
| Condensate drain trapped properly, refer to Installation Manual | ☐ | ☐ |
| Economizer damper linkage tight | ☐ | ☐ |
| Gas Heat vent hood installed | ☐ | ☐ |
| All field wiring (power and control) complete | ☐ | ☐ |

| Air Moving Inspection | Completed | See Notes |
|---|---|---|
| Alignment of drive components | ☐ | ☐ |
| Belt tension adjusted properly | ☐ | ☐ |
| Blower pulleys tight on shaft, bearing set screws tight, wheel tight to shaft | ☐ | ☐ |
| Pressure switch or transducer tubing installed properly | ☐ | ☐ |

| Exhaust Inspection Powered ☐ Barometric Relief ☐ | Completed | See Notes |
|---|---|---|
| Check hub for tightness | ☐ | ☐ |
| Check fan blade for clearance | ☐ | ☐ |
| Check for proper rotation | ☐ | ☐ |
| Check for proper mounting (screen faces towards unit) | ☐ | ☐ |
| Prove operation by increasing minimum setting on economizer | ☐ | ☐ |

| Economizer Inspection Standard ☐ BAS ☐ | Completed | See Notes |
|---|---|---|
| $CO_2$ sensor installed Yes ☐ No ☐ | ☐ | ☐ |
| Check economizer setting (Reference Smart Equipment Control Board LCD menu location) | ☐ | ☐ |
| Prove economizer open/close through Smart Equipment Board Setting | ☐ | ☐ |

| Reheat Mode Normal ☐ or Alternate ☐ Not Applicable ☐ |
|---|
| 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 ☐ Exh. Fans ☐ Cond. Fans ☐ | |
|---|---|
| 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 |

1. Consult the proper airflow to pressure drop table to obtain the actual airflow at the measured pressure differential.
2. 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 |

1. VAV units with heat section - simulate heat call to drive VAV boxes and VFD/IGV to maximum design airflow position.
2. 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 | ☐ | ☐ |
| Prove High Pressure Safety, All Systems | ☐ | ☐ |
| Prove Low Pressure Safety, All Systems | ☐ | ☐ |

## Refrigerant Detection System (RDS) Safety Test

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

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 | | ☐ | ☐ |
| Prove Ventor Motor Operation | | ☐ | ☐ |
| Prove Primary Safety Operation | | ☐ | ☐ |
| Prove Auxiliary Safety Operation | | ☐ | ☐ |
| Prove Rollout Switch Operation | | ☐ | ☐ |
| Prove Smoke Detector Operation | | ☐ | ☐ |
| Manifold Pressure | Stage 1 | IWC | ☐ |
| | Stage 2 (If Equipped) | IWC | ☐ |
| | Stage 3 (If Equipped) | IWC | ☐ |
| Supply gas pressure at full fire | | IWC | ☐ |
| Check temperature rise[1] | ☐ measured at full fire | °F | ☐ |

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 ☐ | No ☐ |
| Air Moving Switch Installed? | | | Yes ☐ | No ☐ |

## Operating Measurements - Staging Controls

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

## Final - Inspection

| | |
|---|---|
| Verify that all operational control set points have been set to desired value<br>Scroll through all setpoints and change as may be necessary to suit the occupant requirements. | ☐ |
| Verify that all option parameters are correct<br>Scroll through all option parameters and ensure that all installed options are enabled in the software and all others are disabled in the software. (Factory software settings should match the installed options) | ☐ |
| Verify that all access panels have been closed and secured | ☐ |
| Save a backup file from the unit control board onto a USB flash drive. | ☐ |

### Observed Product Deficiencies & Concerns:

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