Carrier

WeatherMaker®
50KCQ 04-06 Single Package Rooftop Unit
Heat Pump/Electric Heat
with Puron® (R-410A) Refrigerant

Service and Maintenance Instructions

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

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It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Before performing service or maintenance operations on unit, LOCKOUT/TAGOUT the main power switch to unit. Electrical shock and rotating equipment could cause severe injury.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

R-410A refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on R-410A refrigerant equipment.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury and/or property damage.

Never use air or gases containing oxygen for leak testing or for operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury and/or property damage.

Never use non-certified refrigerants in this product. Non-certified refrigerants could contain contaminates that could lead to unsafe operating conditions. Use ONLY refrigerants that conform to AHRI Standard 700.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in reduced unit performance or unit shutdown.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Pressing the controller's test/reset switch for longer than seven seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

UNIT ARRANGEMENT AND ACCESS

General

Figures 1 and 2 show general unit arrangement and access locations.

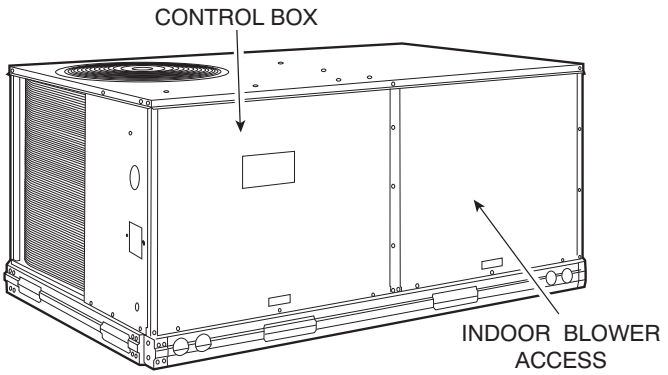


Fig. 1 — Typical Access Panel Location (Front)

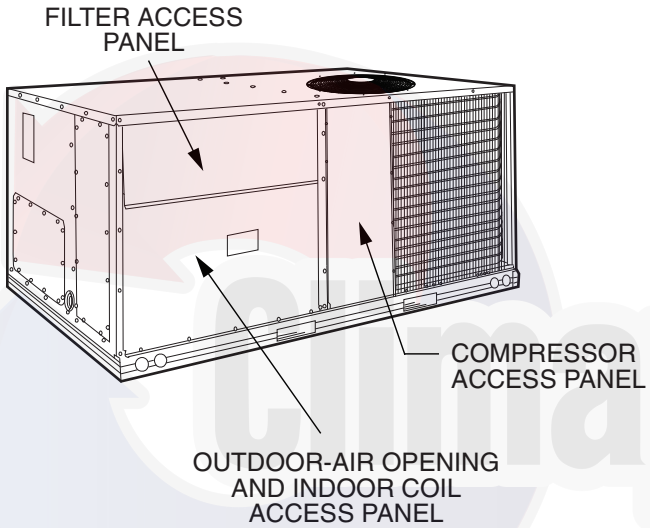


Fig. 2 — Typical Access Panel Locations (Rear)

Routine Maintenance

These items should be part of a routine maintenance program, to be checked every month or two, until a specific schedule for each can be identified for this installation:

QUARTERLY INSPECTION (AND 30 DAYS AFTER INITIAL START)

- Replace return air filter
- Clean outdoor hood inlet filters
- Check belt tension
- Check belt condition
- Inspect pulley alignment
- Check fan shaft bearing locking collar tightness
- Check outdoor coil cleanliness
- Check condensate drain

Seasonal Maintenance

The following items should be checked at the beginning of each season (or more often, if local conditions and usage patterns dictate):

AIR CONDITIONING/HEAT PUMP

- Ensure outdoor fan motor mounting bolts are tight
- Ensure compressor mounting bolts are tight
- Inspect outdoor fan blade positioning
- Ensure control box is clean
- Check control box wiring condition
- Ensure wire terminals are tight
- Check refrigerant charge level
- Ensure indoor coils are clean
- Check supply blower motor amperage

ELECTRIC HEATING

- Inspect power wire connections
- Ensure fuses are operational
- Ensure manual-reset limit switch is closed

ECONOMIZER OR OUTSIDE AIR DAMPER

- Check inlet filters condition
- Check damper travel (economizer)
- Check gear and dampers for debris and dirt

AIR FILTERS AND SCREENS

Each unit is equipped with return air filters. If the unit has an economizer, it will also have an outside air screen. If a manual outside air damper is added, it will also have an inlet air screen.

Each of these filters and screens will need to be periodically cleaned or replaced.

RETURN-AIR FILTERS

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this CAUTION can result in premature wear and damage to equipment.

DO NOT OPERATE THE UNIT WITHOUT THE RETURN AIR FILTERS IN PLACE.

Dirt and debris can collect on heat exchangers and coils possibly resulting in a small fire. Dirt buildup on components can cause excessive current used resulting in motor failure.

Return-air filters are disposable fiberglass filters. Access to the filters is through the lift-out filter access panel located on the rear side of the unit, above the indoor coil access panel. See Fig. 2.

Removing the Return Air Filters

1. Grasp the bottom flange of the upper panel.
2. Lift up and swing the bottom out until the panel disengages and pulls out.
3. Reach inside and remove filters from the filter rack.
4. Replace filters as required with similar replacement filters of same size.

Re-installing the Access Panel

1. Slide the top of the panel up under the unit top panel.
2. Slide the bottom into the side channels.
3. Push the bottom flange down until it contacts the top of the lower panel (or economizer top).

Outside-Air Hood

Outside-air hood inlet screens are permanent aluminum-mesh type filters. Check these for cleanliness. Remove the screens when cleaning is required. Clean by washing with hot low-pressure water and soft detergent and replace all screens before restarting the unit. Observe the flow direction arrows on the side of each filter frame.

Economizer Inlet Air Screen

This air screen is retained by filter clips under the top edge of the hood. See Fig. 3.

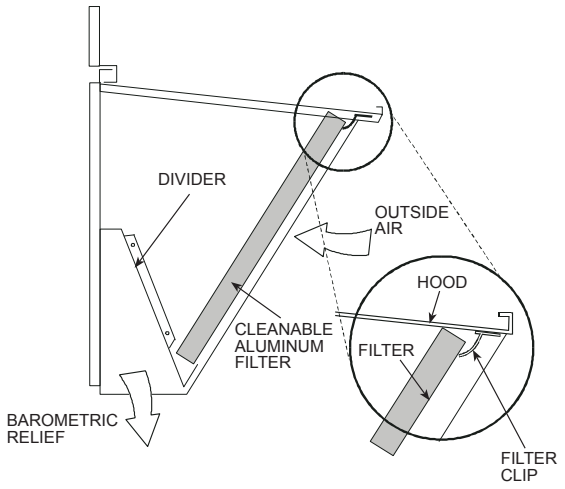


Fig. 3 — Filter Installation

To remove the filter, open the spring clips. Re-install the filter by placing the frame in its track, then closing the filter clips.

Manual Outside Air Hood Screen

The manual outside air hood screen is secured by three screws and a retainer angle across the top edge of the hood. See Fig. 4.

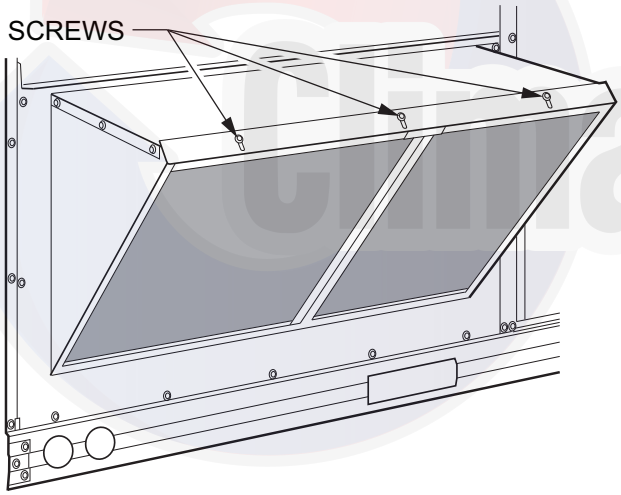


Fig. 4 — Screens Installed on Outdoor-Air Hood

Remove the screen by loosening the three screws in the top retainer and move the retainer up until the filter can be removed.

Re-install the manual outside air hood screen by placing the screen frame in its track, rotating the retainer back down. Tighten all screws.

SUPPLY FAN (BLOWER) SECTION

⚠ CAUTION

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could cause personal injury or death.

Before performing service or maintenance operations on the fan system, shut off all unit power and lockout/tag-out the unit disconnect switch. DO NOT reach into the fan section with power still applied to unit.

Supply Fan (Direct-Drive)

For unit sizes 04, 05 and 06, a direct-drive forward-curved centrifugal blower wheel is an available option. The motor has taps to provide the servicer with the selection of one of five motor torque/speed ranges to best match wheel performance with attached duct system. See Fig. 5 (50KCQ Direct-Drive Fan Assembly) and Fig. 6 (ECM Motor Connectors).

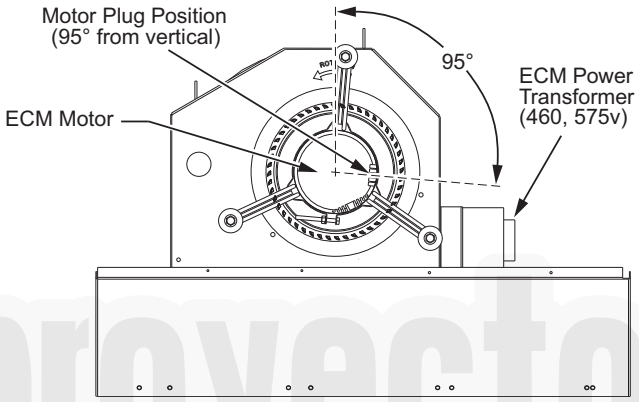


Fig. 5 — 50KCQ Direct-Drive Supply Fan Assembly

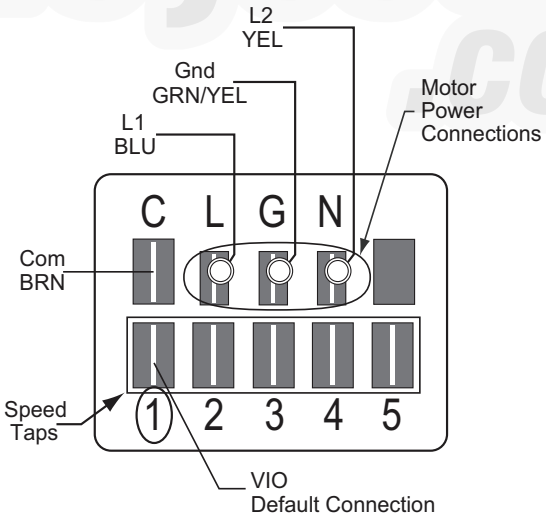
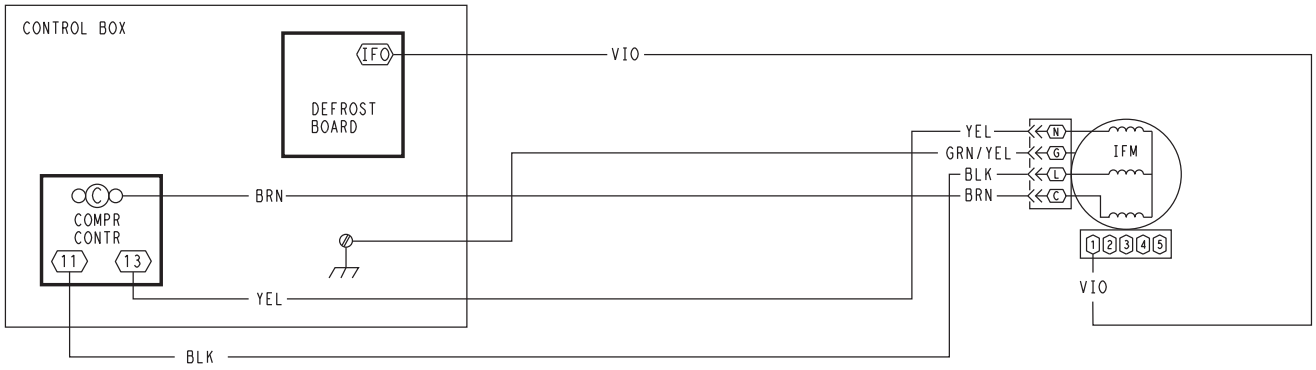
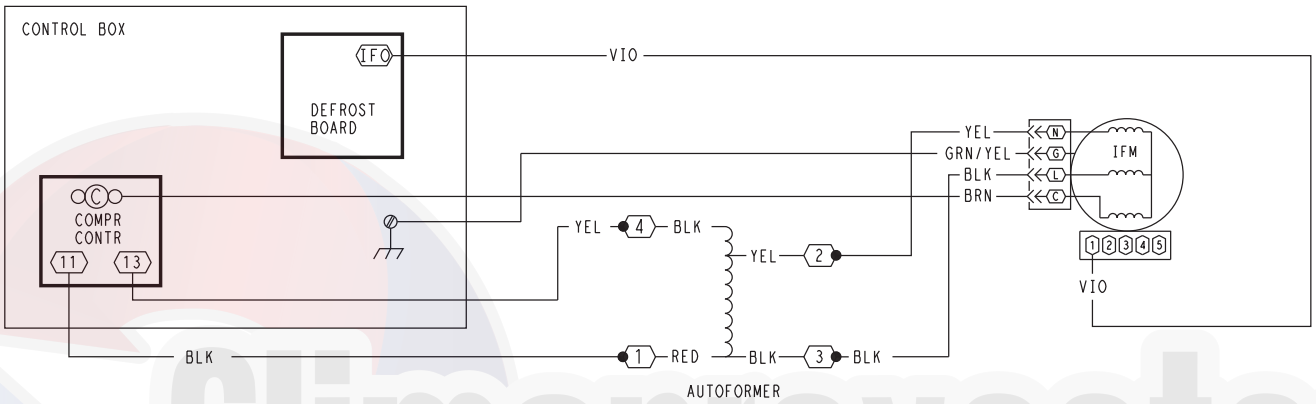


Fig. 6 — ECM Motor Connectors



208/230, 460-v Units



575-v Units

Fig. 7 — ECM Unit Wiring

ECM MOTOR

The direct-drive motor is an X13 Electronically Commutated Motor (ECM). An ECM motor contains electronic circuitry used to convert single-phase line AC voltage into 3-phase DC voltage to power the motor circuit. The motor circuit is a DC brushless design with a permanent magnet rotor. On the X13 ECM motor design, the electronic circuitry is integral to the motor assembly and cannot be serviced or replaced separately.

208/230-v units use a 230-v motor, 460-v units use a 460-v motor and 575-v units use a 460-v motor with an autotransformer. Motor power voltage is connected to motor terminals L and N (see Fig. 6 and Fig. 7); ground is connected at terminal G. The motor power voltage is ALWAYS present; it is not switched off by a motor contactor.

Motor operation is initiated by the presence of a 24-v control signal to one of the five motor communications terminals. When the 24-v signal is removed, the motor will stop. The motor control signal is switched by the defrost board's IFO output.

Evaluating motor speed

The X13 ECM Motor uses a constant torque motor design. The motor speed is adjusted by the motor control circuitry to maintain the programmed shaft torque. Consequently there is no specific speed value assigned to each control tap setting. At the Position 5 tap, the motor speed is approximately 1050 RPM (17.5 r/s), but varies depending on fan wheel loading.

Selecting speed tap

The five communication terminals are each programmed to provide a different motor torque output. See Table 1. Factory default tap selection is Position 1 for lowest torque/speed operation.

Table 1 — 50KCQ Motor Tap Programming (percent of full-load torque)

UNIT SIZE	TAP 1	TAP 2	TAP 3	TAP 4	TAP 5
04	29	33	41	48	100
05	46	49	57	67	100
06	49	55	79	90	100

Factory Default: Tap 1 (VIO).

Selecting another speed:

1. Disconnect main power to the unit. Apply lockout/tag-out procedures.
2. Remove the default motor signal lead (VIO) from terminal 1 at the motor communications terminal.
3. Reconnect the motor signal lead to the desired speed (terminals 1 through 5).
4. Connect main power to the unit.

Motor "rocking" on start-up

When the motor first starts, the rotor (and attached wheel) will "rock" back and forth as the motor tests for rotational direction. Once the correct rotational direction is determined by the motor circuitry, the motor will ramp up to the specified speed. The "rocking" is a normal operating characteristic of ECM motors.

Troubleshooting the ECM motor

Troubleshooting the X13 ECM requires a voltmeter.

1. Disconnect main power to the unit.
2. Remove the motor power plug (including the control BRN lead) and VIO control signal lead at the motor terminals.
3. Restore main unit power.

4. Check for proper line voltage at motor power leads BLK (at L terminal) and YEL (at N terminal).

Table 2 — Motor Test Volts

UNIT VOLTAGE	MOTOR VOLTAGE	MIN-MAX VOLTS
208/230	230	187-253
460	460	414-506
575	460	414-506

5. Using a jumper wire from unit control terminals R to G, engage motor operation. Check for 24-v output at the defrost board terminal IFO.
6. Check for proper control signal voltages of 22-v to 28-v at motor signal leads VIO and BRN.
7. Disconnect unit main power. Apply lockout/tag-out procedures.
8. Reconnect motor power and control signal leads at the motor terminals.
9. Restore unit main power.
10. The motor should start and run. If the motor does not start, remove the motor assembly. Replace the motor with one that has the same part number. Do not substitute with an alternate design motor as the torque/ speed programming will not be the same as that on an original factory motor.

REPLACING THE X-13 ECM MOTOR

Before removing the ECM belly-band mounting ring from old motor:

1. Measure the distance from base of the motor shaft to the edge of the mounting ring.
2. Remove the motor mounting band and transfer it to the replacement motor.
3. Position the mounting band at the same distance that was measured in Step 1.
4. Hand-tighten mounting bolt only. Do not tighten securely at this time.
5. Insert the motor shaft into the fan wheel hub.
6. Securely tighten the three motor mount arms to the support cushions and torque the arm mounting screws to 60 in. lbs (6.8 Nm).
7. Center the fan wheel in the fan housing. Tighten the fan wheel hub setscrew and torque to 120 in. lbs (13.6 Nm).
8. Ensure the motor terminals are located at a position below the 3 o'clock position. See Fig. 5. Tighten the motor belly-band bolt and torque to 80 in. lbs (9.0 Nm).

Supply Fan (Belt-Drive)

The belt-drive supply fan system consists of a forward-curved centrifugal blower wheel on a solid shaft with two concentric type bearings, one on each side of the blower housing. A fixed-pitch driven pulley is attached to the fan shaft and an adjustable-pitch driver pulley is on the motor. The pulleys are connected using a V-belt. See Fig. 8.

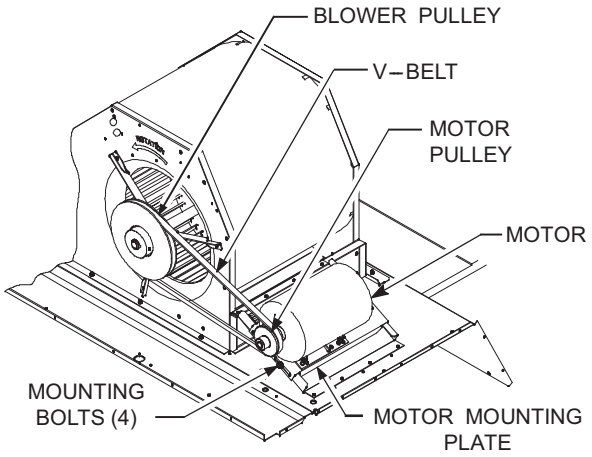


Fig. 8 — Typical Belt Drive Motor Mounting

VARIABLE FREQUENCY DRIVE (VFD)

For units equipped with a VFD factory-installed option (FIOP), refer to the following supplement: *Variable Frequency Drive (VFD) Installation, Setup and Troubleshooting*.

BELT

Check the belt condition and tension quarterly. Inspect the belt for signs of cracking, fraying or glazing along the inside surfaces. Check belt tension by using a spring-force tool, such as Browning's "Belt Tension Checker" (part number: 1302546 or equivalent tool); tension should be 6 lbs at a $^{5}/_{8}$-in. (1.6 cm) deflection when measured at the centerline of the belt span. This point is at the center of the belt when measuring the distance between the motor shaft and the blower shaft.

NOTE: Without the spring-tension tool, place a straight edge across the belt surface at the pulleys, then push down on the belt at mid-span using one finger until a $^{1}/_{2}$-in. (1.3 cm) deflection is reached. See Fig. 9.

Adjust belt tension by loosening the motor mounting plate front and rear bolts and sliding the plate toward the fan (to reduce tension) or away from fan (to increase tension). Ensure the blower shaft and the motor shaft are parallel to each other (pulleys aligned). When finished, tighten all bolts and torque to 65 to 70 in. lb (7.4 to 7.9 Nm).

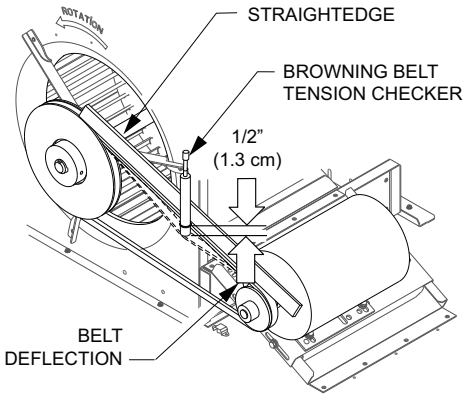


Fig. 9 — Checking Blower Motor Belt Tension

REPLACING THE BELT

NOTE: Use a belt with same section type or similar size. Do not substitute a FHP-type belt. When installing the new belt, do not use a tool (screwdriver or pry-bar) to force the belt over the pulley flanges; this will stress the belt and cause a reduction in belt life. Damage to the pulley can also occur if using a tool to force the belt over the pulley flanges.

Use the following steps to replace the V-belt. See Fig. 8.

1. Loosen the front and rear motor mounting plate bolts.

2. Push the motor and its mounting plate towards the blower housing as close as possible to reduce the center distance between fan shaft and motor shaft.
3. Remove the belt by gently lifting the old belt over one of the pulleys.
4. Install the new belt by gently sliding the belt over pulleys, then sliding the motor and plate away from the fan housing until proper tension is achieved.
5. Check the alignment of the pulleys and adjust if necessary.
6. Tighten all bolts and torque to 65 to 70 in. lb (7.4 to 7.9 Nm).
7. Check the tension after a few hours of runtime and re-adjust as required.

⚠CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this CAUTION can result in premature wear and damage to equipment.

Do not use a screwdriver or a pry bar to place the new V-belt in the pulley groove. This can cause stress on the V-belt and the pulley resulting in premature wear on the V-belt and damage to the pulley.

ADJUSTABLE-PITCH PULLEY ON MOTOR

The motor pulley is an adjustable-pitch type that allows a servicer to implement changes in the fan wheel speed to match as-installed ductwork systems. The pulley consists of a fixed flange side that faces the motor (secured to the motor shaft) and a movable flange side that can be rotated around the fixed flange side that increases or reduces the pitch diameter of this driver pulley. See Fig. 10.

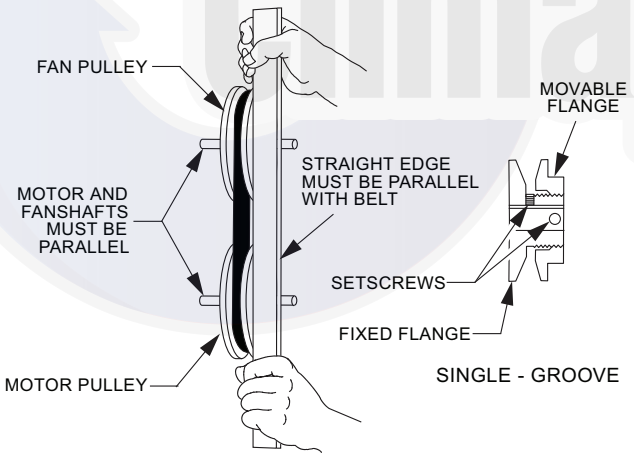


Fig. 10 — Supply-Fan Pulley Adjustment

As the pitch diameter is changed by adjusting the position of the movable flange, the centerline on this pulley shifts laterally (along the motor shaft). This creates a requirement for a realignment of the pulleys after any adjustment of the movable flange. Reset the belt tension after each realignment.

Inspect the condition of the motor pulley for signs of wear. Glazing of the belt contact surfaces and erosion on these surfaces are signs of improper belt tension and/or belt slippage. Replace pulley if wear is excessive.

CHANGING THE FAN SPEED

1. Shut off unit power supply. Use proper lockout/tag-out procedures.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 8.
3. Loosen movable pulley flange setscrew. See Fig. 10.
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed the maximum specified speed.
5. Set movable flange at nearest keyway of pulley hub. Tighten setscrew and torque to 65 to 70 in. lb (7.4 to 7.9 Nm).

ALIGNING BLOWER AND MOTOR PULLEYS

1. Loosen blower pulley setscrews.
2. Slide blower pulley along blower shaft. Make angular alignment by loosening motor mounting plate front and rear bolts.
3. Tighten blower pulley setscrews and motor mounting bolts. Torque bolts to 65 to 70 in. lb (7.4 to 7.9 Nm).
4. Recheck belt tension.

BEARINGS:

The fan system uses bearings featuring concentric split locking collars. A Torx T-25 socket head cap screw is used to tighten the locking collars. Tighten the locking collar by holding it tightly against the inner race of the bearing. Tighten the socket head cap screw. Torque cap screw to 55 to 60 in. lb (6.2 to 6.8 Nm). See Fig. 11. Check the condition of the motor pulley for signs of wear. Glazing of the belt contact surfaces and erosion on these surfaces are signs of improper belt tension and/or belt slippage. Pulley replacement can be necessary.

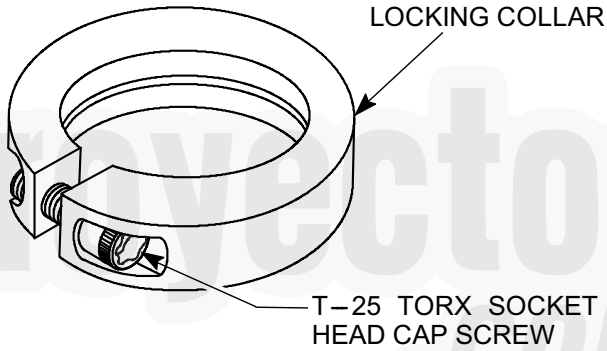


Fig. 11 — Tightening Locking Collar

MOTOR

When replacing the motor, also replace the external-tooth lock washer (star washer) under the motor mounting base; this is part of the motor grounding system. Ensure the teeth on the lock washer are in contact with the motor's painted base. Tighten motor mounting bolts and torque to 120 ± 12 in. lb (14 ± 1.4 Nm).

Change fan wheel speed by changing the fan pulley (larger pitch diameter to reduce wheel speed, smaller pitch diameter to increase wheel speed) or select a new system (both pulleys and matching belt). The horsepower rating of the belt is primarily dictated by the pitch diameter of the smaller pulley in the drive system (typically the motor pulley in these units). Do not install a replacement motor pulley with a smaller pitch diameter than was provided on the original factory pulley.

Before changing pulleys to increase fan wheel speed, check the fan performance at the target speed and airflow rate to determine new motor loading (bhp). Use the fan performance tables (pages 61 to 67) or use the Packaged Rooftop Builder software program. Confirm that the motor in this unit is capable of operating at the new operating condition. Fan shaft loading increases dramatically as wheel speed is increased.

To reduce vibration, replace the motor's adjustable pitch pulley with a fixed pitch pulley (after the final airflow balance adjustment). This will reduce the amount of vibration generated by the motor/belt-drive system.

HEAT PUMP REFRIGERATION SYSTEM

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

This system uses R-410A refrigerant, which has higher pressures than R-22 and other refrigerants. No other refrigerant may be used in this system. Gage set, hoses, and recovery system must be designed to handle R-410A refrigerant. If unsure about equipment, consult the equipment manufacturer.

Outdoor Coil

The 50KCQ outdoor coil is fabricated with round tube copper hairpins and plate fins of various materials and/or coatings (see "Appendix A - Model Number Significance" on page 58 to identify the materials provided in this unit). All unit sizes use composite-type two-row coils. Composite two-row coils are two single-row coils fabricated with a single return bend end tubesheet.

Indoor Coil

The indoor coil is traditional round-tube, plate-fin technology. Tube and fin construction is of various optional materials and coatings (see "APPENDIX A — MODEL NUMBER NOMENCLATURE" on page 58). Coils are multiple-row.

Recommended Outdoor Coil Maintenance and Cleaning

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

REMOVE SURFACE LOADED FIBERS:

Surface loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft non-metallic bristle brush can be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges can be easily bent over and damage the coating of a protected coil) when the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers and dirt must be completely removed prior to using low velocity clean water rinse.

PERIODIC CLEAN WATER RINSE:

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described in the following section is recommended.

⚠ CAUTION

PERSONAL INJURY AND UNIT DAMAGE HAZARD

Failure to follow this caution can result in personal injury or equipment damage.

Only approved cleaning is recommended.

ROUTINE CLEANING OF INDOOR COIL SURFACES:

Periodic cleaning with Totaline® Environmentally Sound Coil Cleaner is essential in extending the life of coils. This cleaner is available from Carrier Replacement Components Division (part number P902-0301 for one gallon [3.8L] container, and part number P902-0305 for a 5 gallon [19L] container). It is recommended that all coils (including standard aluminum, precoated, copper/copper or E-coated coils) be cleaned with the Totaline Environmentally Sound Coil Cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure the long life of the coil. Failure to clean the coils can result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline Environmentally Sound Coil Cleaner is non-flammable, hypoallergenic, non-bacterial and a USDA accepted biodegradable agent that will not harm the coil or surrounding components, such as electrical wiring, painted metal surfaces or insulation. Use of non-recommended coil cleaners is strongly discouraged because coil and unit durability can be affected.

Clean coil as follows:

1. Turn off unit power. Use lockout/tag-out procedures on unit power switch.
2. Remove top panel screws on outdoor coil end of unit.
3. Remove coil corner post. See Fig. 12. To hold top panel open, place coil corner post between top panel and center post. See Fig. 13.

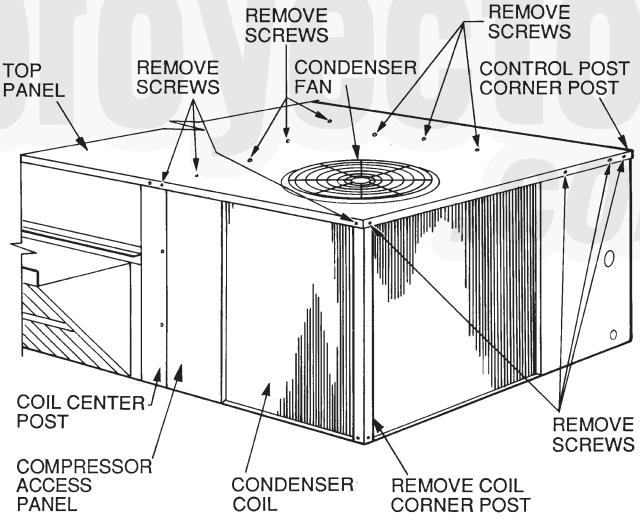


Fig. 12 — Cleaning Condenser Coil

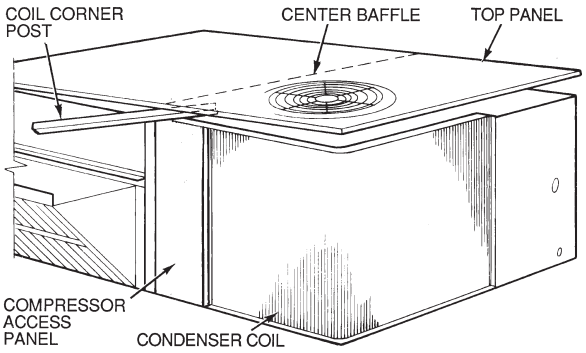


Fig. 13 — Propping Up Top Panel

4. Remove screws securing coil to compressor plate and compressor access panel.
5. Clean the outer surfaces with a stiff brush in the normal manner. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris.
6. Secure inner and outer coil rows together with a field-supplied fastener.
7. Reposition the outer coil section and remove the coil corner post from between the top panel and center post. Reinstall the coil corner post and replace all screws.

TOTALINE ENVIRONMENTALLY SOUND COIL CLEANER APPLICATION EQUIPMENT:

- 2.5 gal (9.5L) garden sprayer
- Water rinse with low velocity spray nozzle

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution can result in corrosion and damage to the unit.

Harsh chemicals, household bleach, acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline Environmentally Sound Coil Cleaner as described below.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution can result in reduced unit performance.

High velocity water from a pressure washer, garden hose, or compressed air should never be used to clean a coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop.

TOTALINE ENVIRONMENTALLY SOUND COIL CLEANER APPLICATION INSTRUCTIONS:

1. Proper protection equipment, such as approved safety glasses and gloves, is recommended during mixing and application of Totaline Environmentally Sound Coil Cleaner.
2. Remove all surface loaded fibers and debris using a vacuum cleaner or a soft non-metallic bristle brush as described above.
3. Thoroughly wet all finned surfaces with clean water using a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline Environmentally Sound Coil Cleaner in a 2.5 gal (9.5L) garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F (38°C).

NOTE: Do NOT USE water in excess of 130°F (54°C), as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline Environmentally Sound Coil Cleaner solution to all coil surfaces including finned area, tube sheets and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes.
10. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
11. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

CLEANING THE INDOOR COIL:

1. Turn unit power off. Use proper lockout/tag-out procedures.
2. Remove indoor coil access panel.
3. If economizer or two-position damper is installed, remove economizer by disconnecting the Molex[1] plug and removing mounting screws.
4. Slide filters out of unit.
5. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material. Flush condensate pan after completion.
6. Re-install economizer and filters.
7. Reconnect wiring.
8. Replace access panels.

REFRIGERATION SYSTEM COMPONENTS:

Each heat pump refrigeration system includes a compressor, accumulator, reversing valve, dual-function outdoor coil with vapor header check valve, cooling liquid line with a filter drier and a check valve, dual-function indoor coil with a vapor header check valve, and heating liquid line with a check valve and a strainer. Unit sizes A04-06 have a single compressor-circuit. See Fig. 14 for typical unit piping schematic. Dual-function outdoor and indoor coils are designed to provide parallel coil circuits during evaporator-function operation and converging coil circuits during the condenser-function operation.

1. Molex is a registered trademark of Molex, Inc.

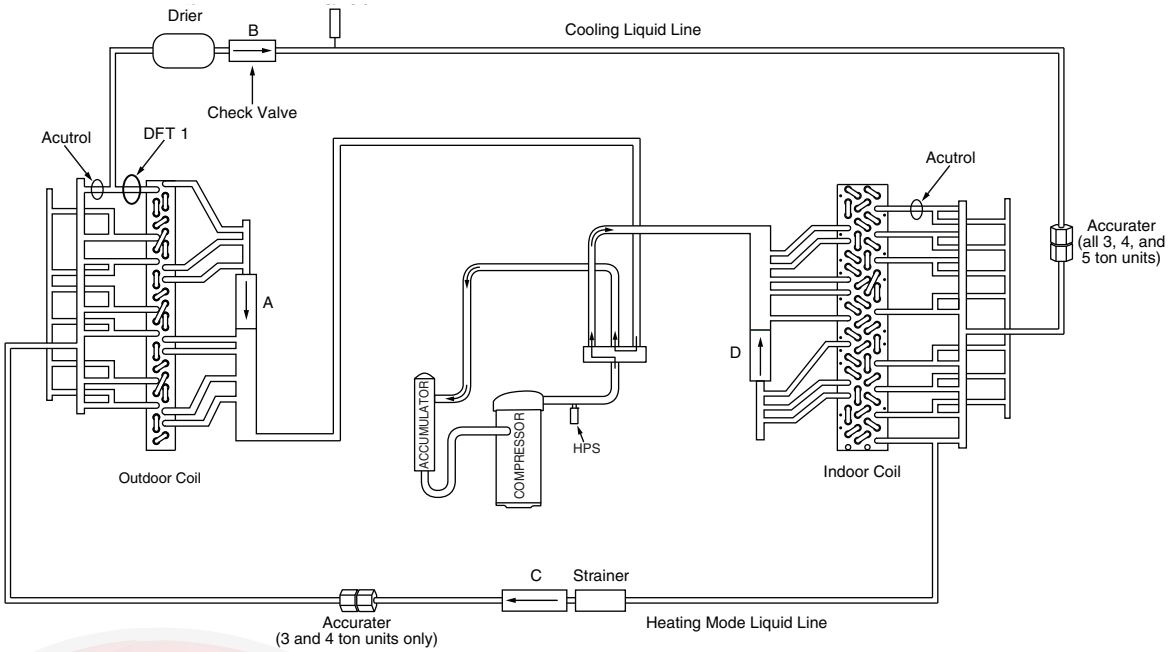


Fig. 14 — Typical Unit Piping Schematic (with TXV valves on Indoor Coils)

Reversing Valve and Checking Valve Position

See Fig. 14.

Table 3 — Cooling Mode (each circuit)

COMPONENT	STATUS/POSITION
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open

Table 4 — Heating Mode (each circuit)

COMPONENT	STATUS/POSITION
Reversing Valve	De-energized
Check Valve A	Open
Check Valve B	Closed
Check Valve C	Open
Check Valve D	Closed

Table 5 — Defrost Mode

A04-A06 Circuit 2

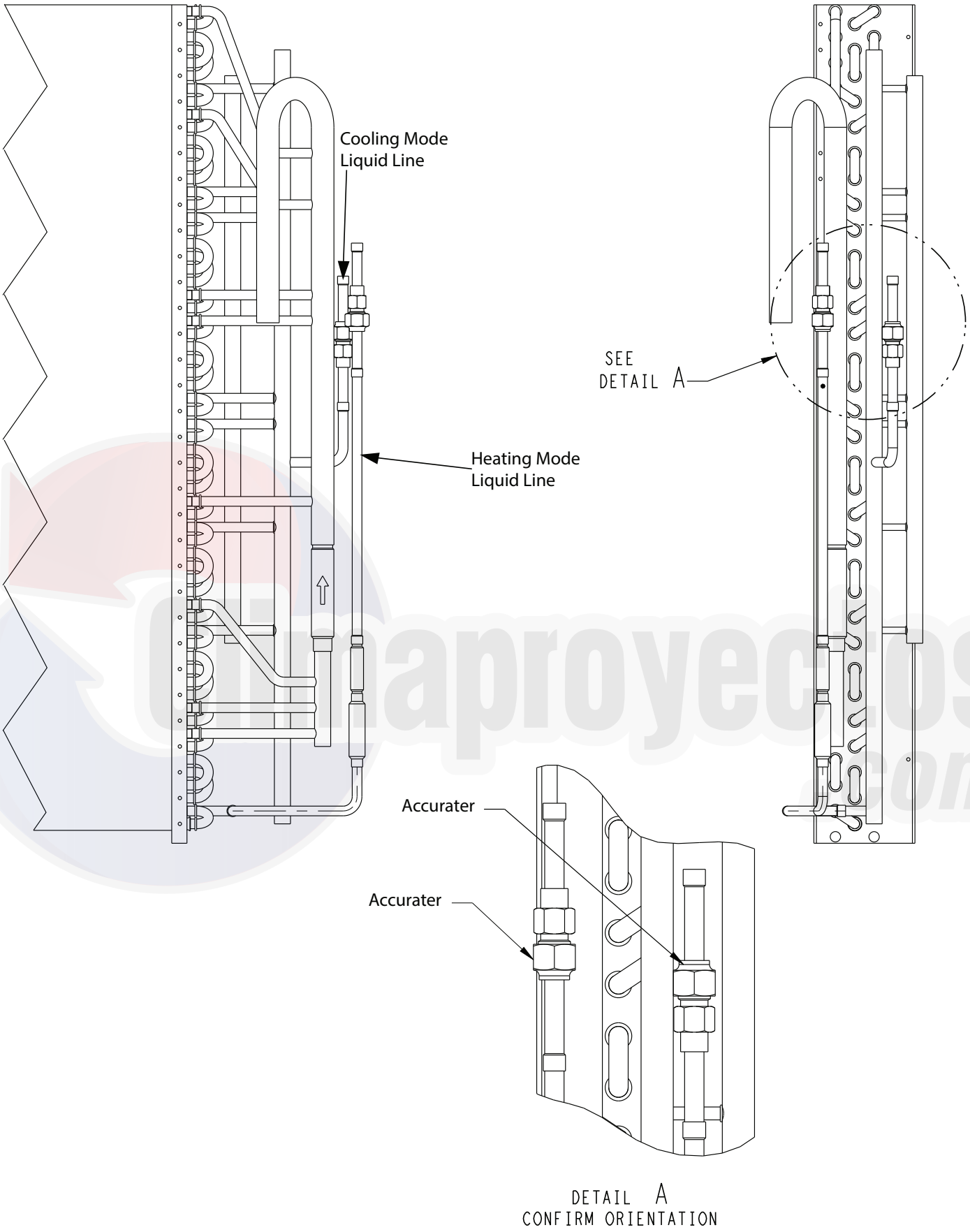
COMPONENT	STATUS/POSITION
Defrost Thermostat	Closed
Outdoor Fan(s)	Off
Reversing Valve	Energized
Check Valve A	Closed
Check Valve B	Open
Check Valve C	Closed
Check Valve D	Open

Troubleshooting Refrigerant Pressure Problems and Check Valves

Refer to Fig. 14, above, and the Cooling Mode and Heating Mode tables (Tables 3 and 4) above. See Table 5 for defrost mode.

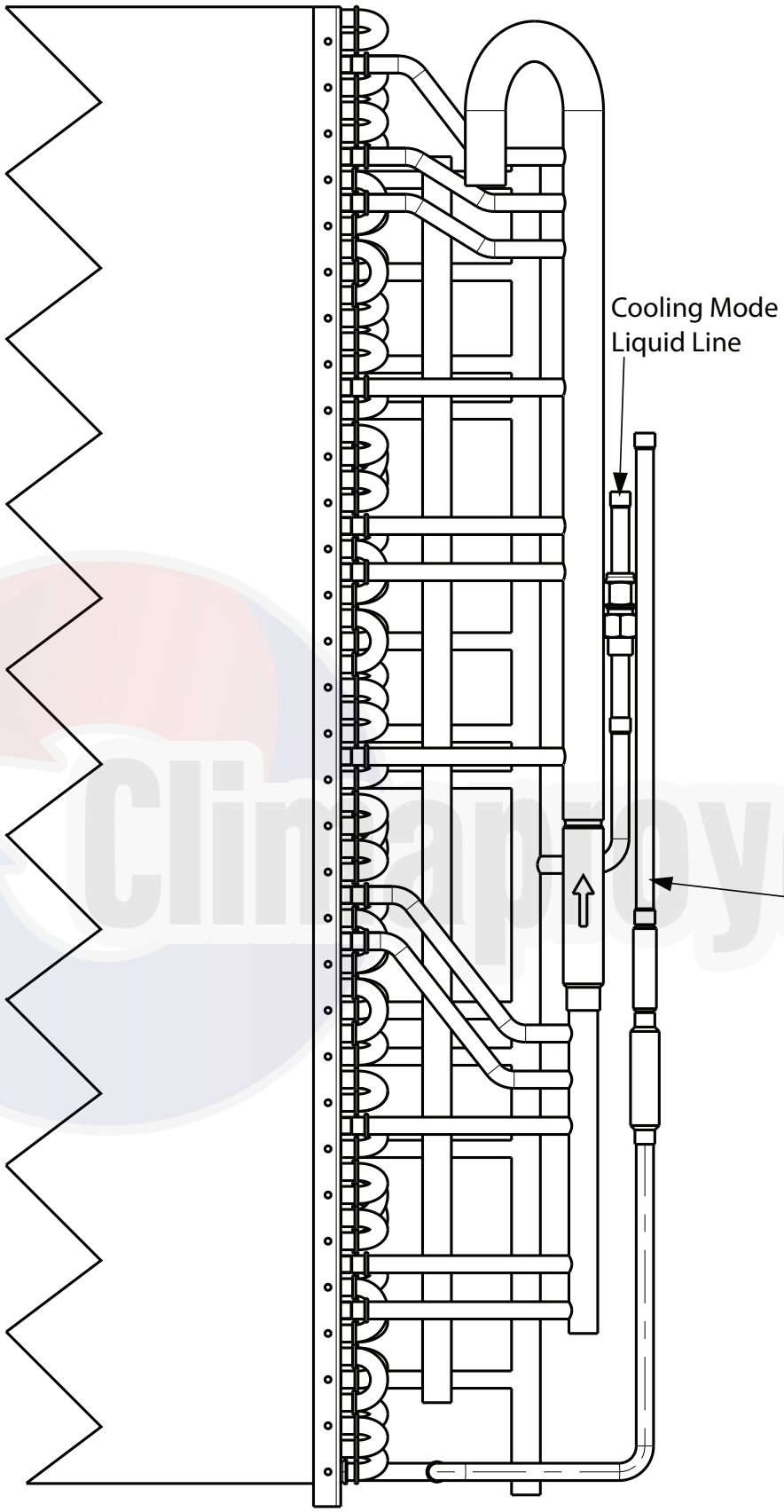
Metering Devices

See Fig. 15-17 for typical metering diagrams.



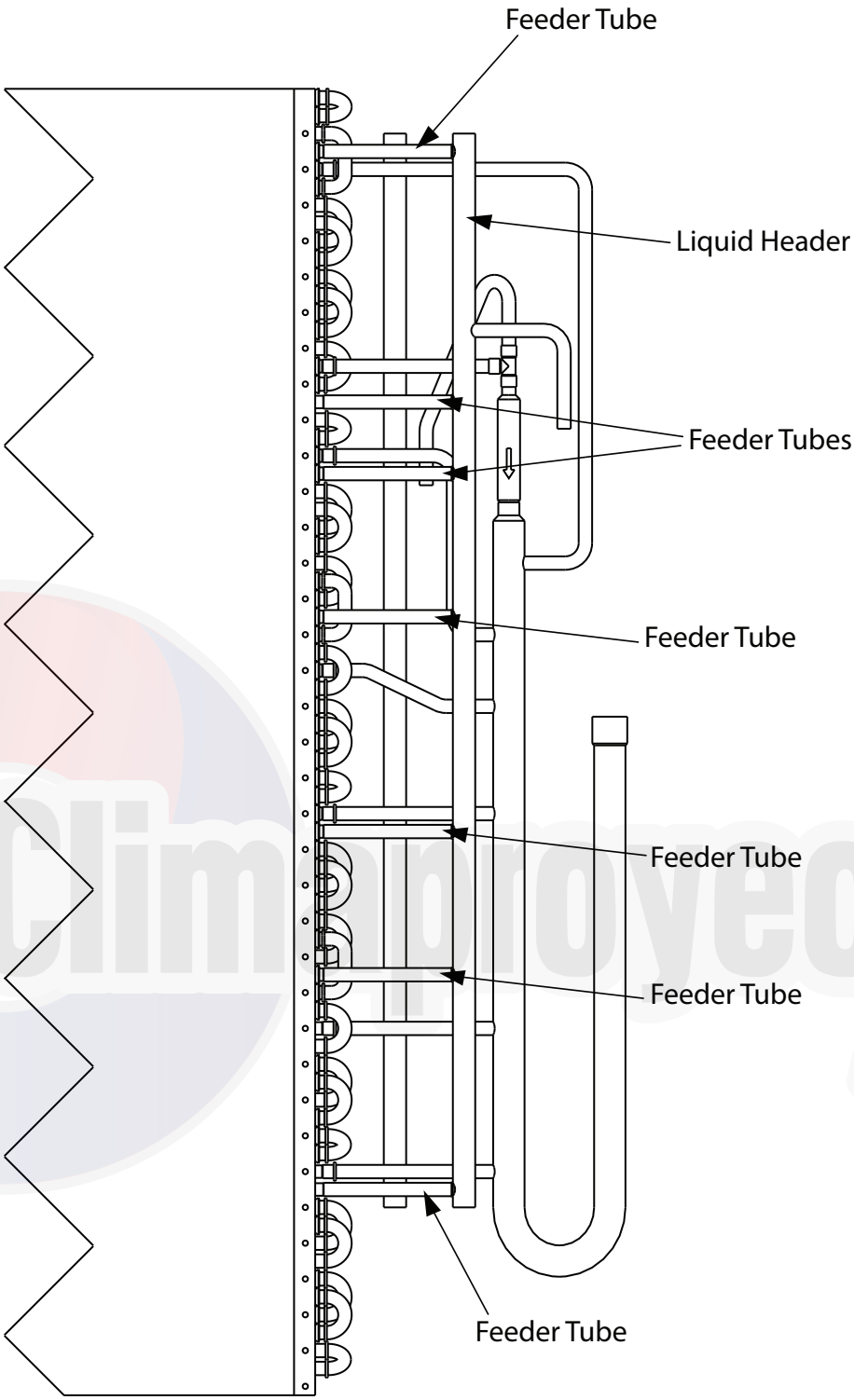
NOTE:
1. This unit has two Accuraters (one in each liquid line, for cooling and heating modes, respectively).
2. While in cooling mode, the liquid line header has Accutrol in each feeder tube.

Fig. 15 — Typical Metering Diagram for 50KCQ04/05 Evaporator



NOTE: While in cooling mode, the liquid line header has Accutrol in each feeder tube.

Fig. 16 — Typical Metering Diagram for 50KCQ06 Evaporator



NOTE: In heating mode, the liquid header on the condenser coil has Accutrol in each feeder tube.

Fig. 17 — Typical Condenser Coil Metering Diagram

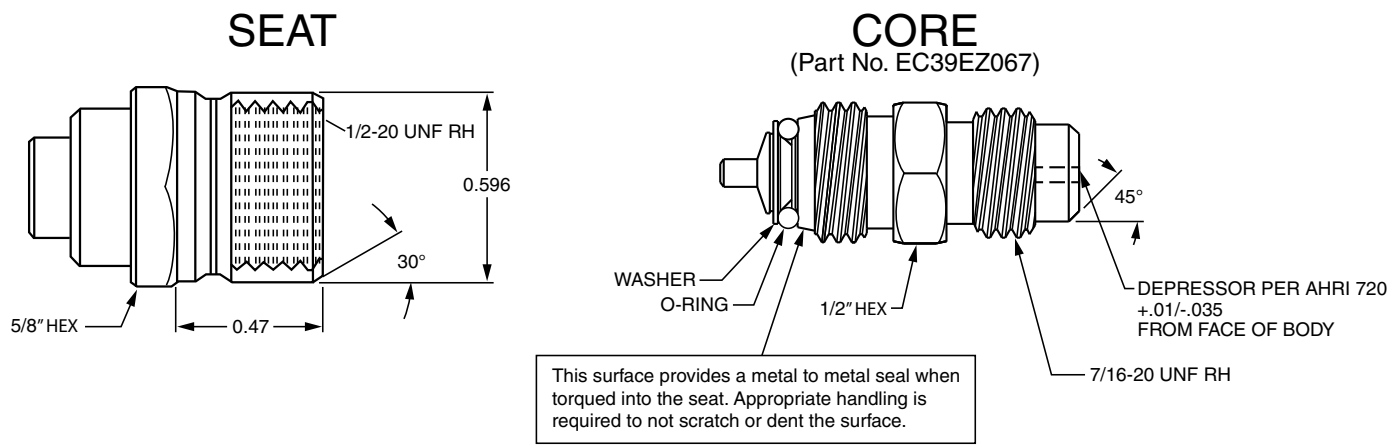


Fig. 18 — CoreMax[1] Access Port Assembly

Refrigerant System Pressure Access Ports

There are two access ports in each circuit - on the suction tube and the discharge tube near the compressor. These are brass fittings with black plastic caps. The hose connection fittings are standard $^1/_4$-in. SAE male flare couplings.

The brass fittings are two-piece High Flow valves, with a receptacle base brazed to the tubing and an integral spring-closed check valve core screwed into the base. See Fig. 18. This check valve is permanently assembled into this core body and cannot be serviced separately. Replace the entire core body if necessary. Service tools are available from RCD that allow the replacement of the check valve core without having to recover the entire system refrigerant charge. Apply compressor refrigerant oil to the check valve core's bottom O-ring. Install the fitting body and torque to 96 ±10 in. lb (10.9 ± 1 Nm). Do not exceed 106 in. lb (11.9 Nm) when tightening.

PURON® (R-410A) REFRIGERANT

This unit is designed for use with Puron (R-410A) refrigerant. Do not use any other refrigerant in this system.

Puron (R-410A) refrigerant is provided in pink (rose) colored cylinders. These cylinders are available with and without dip tubes; cylinders with dip tubes will have a label indicating this feature. For a cylinder with a dip tube, place the cylinder in the upright position (access valve at the top) when removing liquid refrigerant for charging. For a cylinder without a dip tube, invert the cylinder (access valve on the bottom) when removing liquid refrigerant.

Because Puron (R-410A) refrigerant is a blend, it is strongly recommended that refrigerant always be removed from the cylinder as a liquid. Add liquid refrigerant into the system in the discharge line. If adding refrigerant into the suction line, use a commercial metering/expansion device at the gage manifold; remove liquid from the cylinder, pass it through the metering device at the gage set and then pass it into the suction line as a vapor. Do not remove Puron (R-410A) refrigerant from the cylinder as a vapor.

Refrigerant Charge

The amount of refrigerant charge is listed on the unit's nameplate. Refer to Carrier Publication, *GTAC2-5 Charging, Recovery, Recycling and Reclamation Training Manual* and the following procedures:

Unit panels must be in place when unit is operating during the charging procedure. If unit is equipped with a head pressure control device, bypass it to ensure full fan operation during charging.

Charge checking and adjustments must be made while the system is operating in Cooling only.

NO CHARGE:

Use standard evacuation techniques for Puron (R-410A) refrigerant. After evacuating system, weigh the specified amount of refrigerant.

COOLING CHARGING CHARTS

How To Use Cooling Charging Charts

Take the outdoor ambient temperature and read the suction pressure gage. Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

SIZE DESIGNATION	NOMINAL TONS REFERENCE
A04	3
A05	4
A06	5

Example:

Model 50KCQ*A04

Outdoor Temperature . . . . . 85°F (29°C)

Suction Pressure . . . . . 140 psig (965 kPa)

Suction Temperature . . . . . 55°F (13°C)

Refer to Fig. 19-21 for cooling charging charts.

Compressors

LUBRICATION

Compressors are charged with the correct amount of oil at the factory.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution can result in damage to components.

The compressor is in a Puron® (R-410A) refrigerant system and uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Avoid exposure of POE oil to the atmosphere. This exposure to the atmosphere can cause contaminants that are harmful to R-410A components to form. Keep POE oil containers closed until ready for use.

1. CoreMax is a registered trademark of Fastest, Inc.

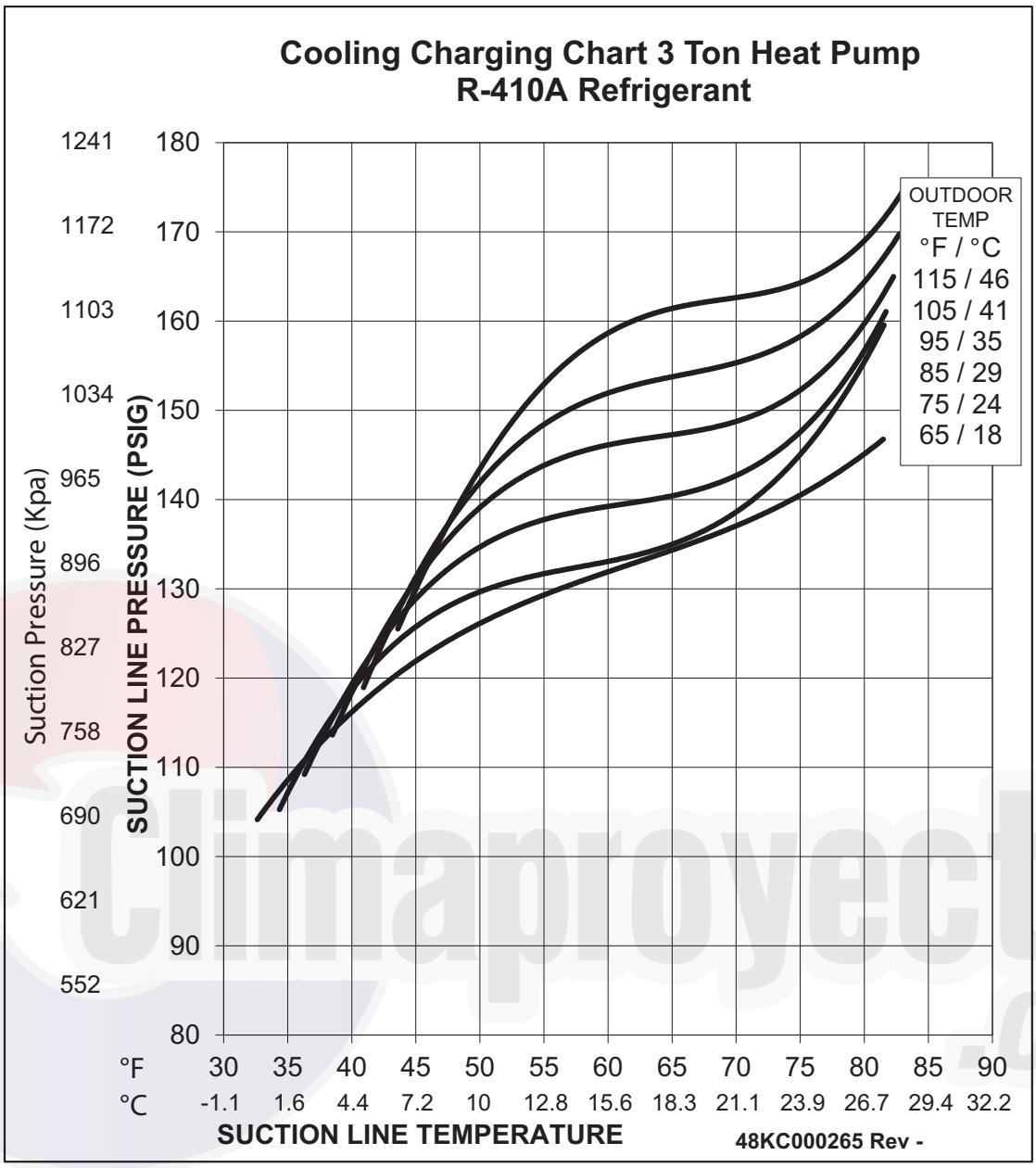


Fig. 19 — Cooling Charging Chart - 50KCQA04

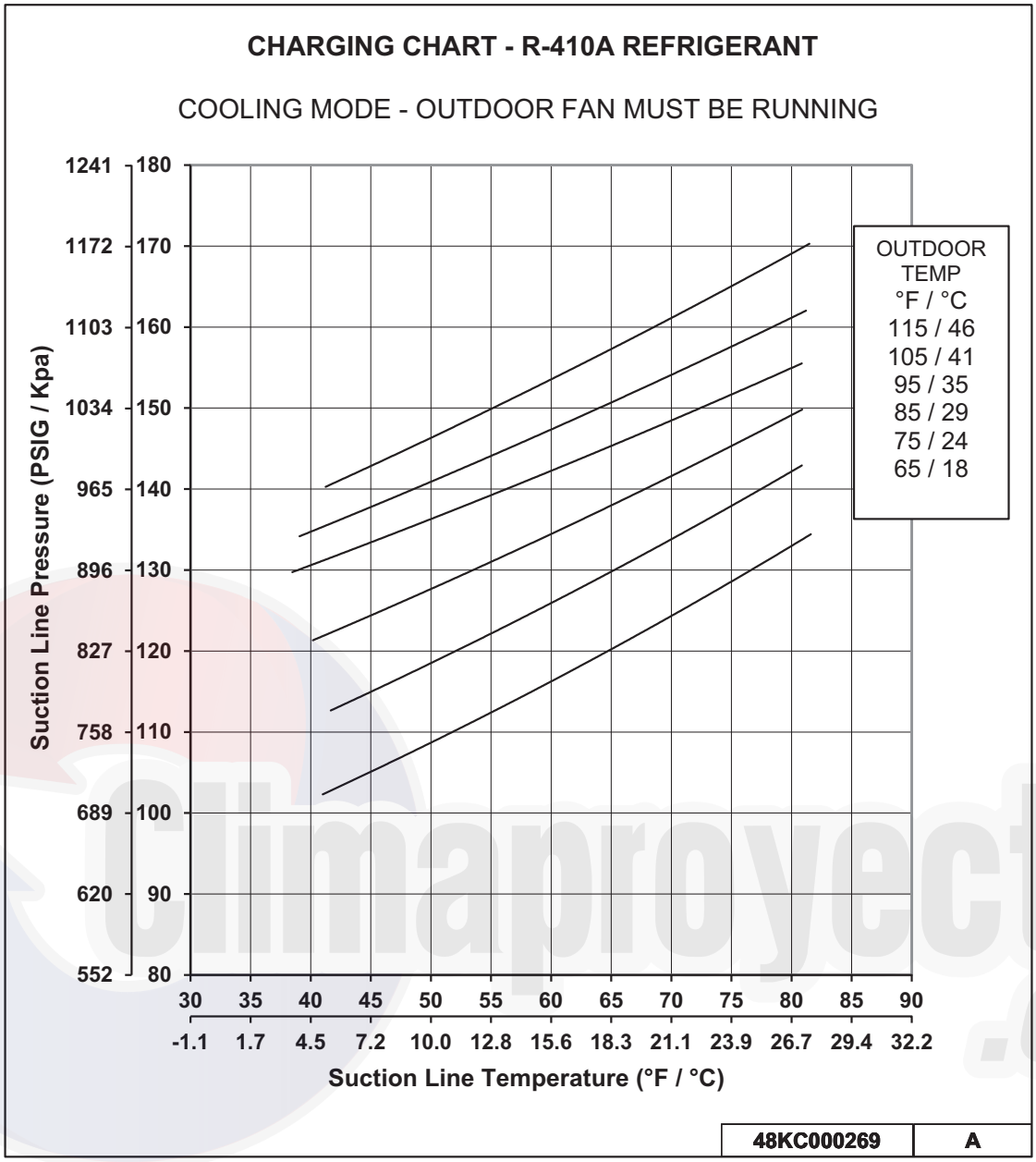


Fig. 20 — Cooling Charging Chart - 50KCQA05

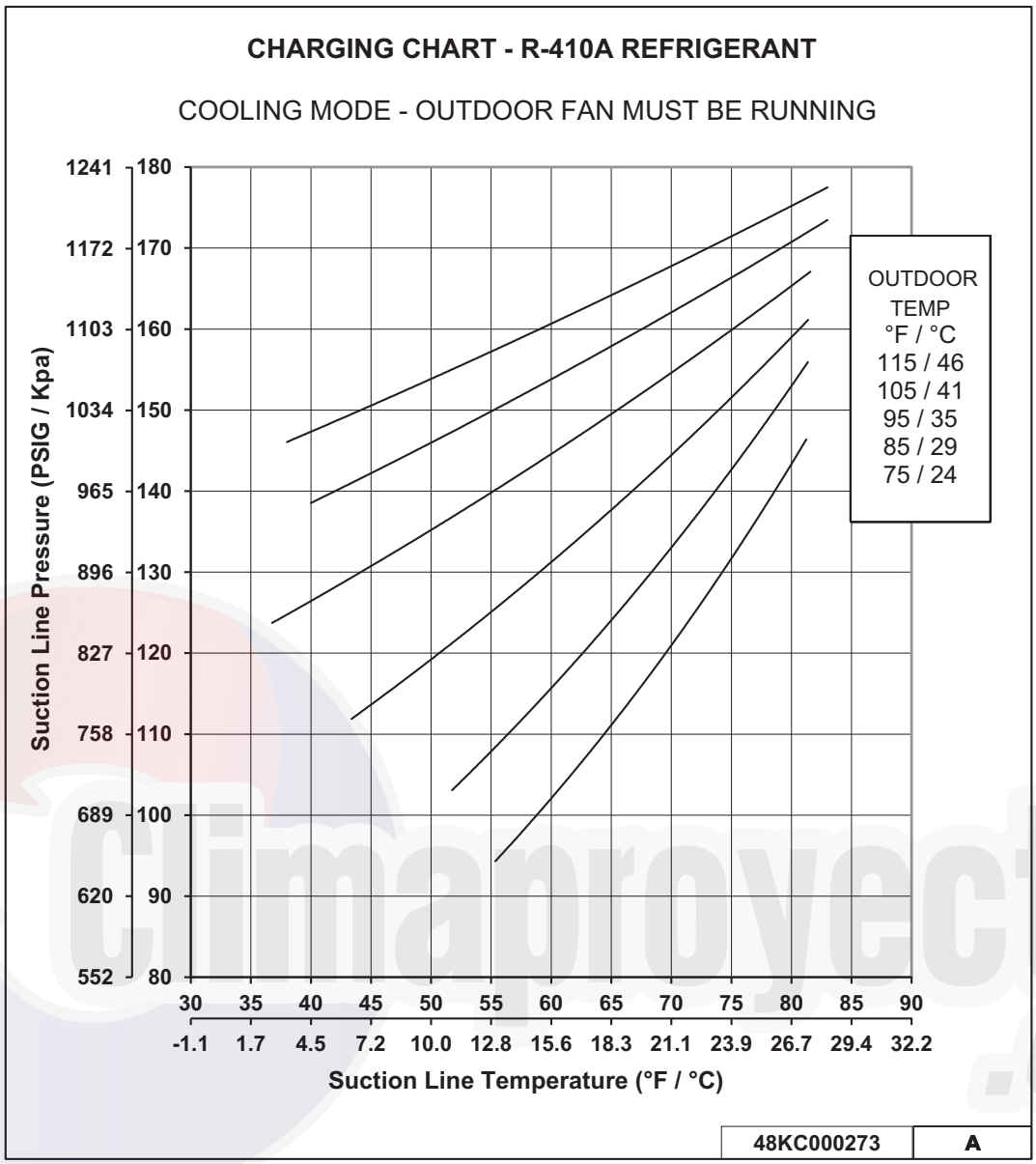


Fig. 21 — Cooling Charging Charts - 50KCQA06

Replacing the Compressor

⚠ WARNING

FIRE, EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury and/or property damage.

Never use air or gases containing oxygen for leak testing or for operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

⚠ CAUTION

INSTALLATION SITE DAMAGE

Failure to follow this caution can result in damage to equipment location site.

R-410A refrigerant contains polyolester (POE) oil that can damage the roof membrane. Caution should be taken to prevent POE oil from spilling onto the roof surface.

The factory also recommends that the suction and discharge lines be cut with a tubing cutter instead of using a torch to remove brazed fittings.

NOTE: Only factory-trained service technicians should remove and replace compressor units.

Compressors using Puron refrigerant contain a polyolester (POE) oil. This oil has a high affinity for moisture. Do not remove the compressor's tube plugs until ready to insert the unit suction and discharge tube ends.

Compressor Rotation

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in premature wear and damage to equipment.

Scroll compressors can only compress refrigerant if rotating in the right direction. Reverse rotation for extended times can result in internal damage to the compressor. Scroll compressors are sealed units and cannot be repaired on site location.

NOTE: When the compressor is rotating in the wrong direction, the unit makes an elevated level of noise and does not provide cooling.

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

NOTE: If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

4. Note that the evaporator fan is probably also rotating in the wrong direction.
5. Turn off power to the unit.
6. Reverse any two of the three unit power leads.
7. Reapply electrical power to the compressor.
8. The suction pressure should drop and the discharge pressure should rise which is normal for scroll compressors on start-up.
9. Replace compressor if suction/discharge pressures are not within specifications for the specific compressor.

Filter Drier

Replace the filter drier whenever refrigerant system is exposed to atmosphere. Only use factory-specified liquid-line filter driers with working pressures no less than 650 psig (4482 kPa).

⚠ CAUTION

EQUIPMENT DAMAGE

Failure to follow this caution can result in equipment damage.

Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with R-410A refrigerant is required on every unit.

Outdoor Fan Location

See Fig. 22.

1. Shut off unit power supply. Apply lockout/tag-out procedures.
2. Remove condenser-fan assembly (grille, motor, and fan).
3. Loosen fan hub setscrews.
4. Adjust fan height as shown in Fig. 22.
5. Tighten setscrews to 84 in. lb (9.5 Nm).
6. Replace condenser-fan assembly.

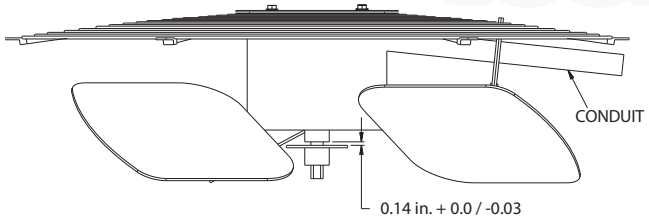


Fig. 22 — Outdoor Fan Adjustment

Troubleshooting Cooling System

Refer to Table 6 for additional troubleshooting topics.

Table 6 — Heating and Cooling Troubleshooting

PROBLEM	CAUSE	REMEDY
Compressor and outdoor fan will not start	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker. Determine root cause.
	Defective thermostat, contactor, transformer, control relay, or capacitor.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
	High pressure switch tripped.	See problem “Excessive head pressure”.
	Low pressure switch tripped.	Check system for leaks. Repair as necessary.
	Freeze-up protection thermostat tripped.	See problem “Suction pressure too low”.
Compressor will not start but outdoor fan runs	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor or allow enough time for internal overload to cool and reset.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace compressor.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat)	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked outdoor coil or dirty air filter.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty outdoor-fan (cooling) or indoor-fan (heating) motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor operates continuously	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low (cooling).	Reset thermostat.
	Low refrigerant charge.	Locate leak; repair and recharge.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Outdoor coil dirty or restricted.	Clean coil or remove restriction.
Compressor makes excessive noise	Compressor rotating in the wrong direction.	Reverse the 3-phase power leads as described in Start-Up (page 55).
Excessive head pressure	Dirty outside air or return air filter (heating).	Replace filter.
	Dirty outdoor coil (cooling).	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condensing air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low	Low refrigerant charge.	Check for leaks; repair and recharge.
	Compressor scroll plates defective.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure	High heat load.	Check for source and eliminate.
	Compressor scroll plates defective.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low	Dirty air filter (cooling).	Replace filter.
	Dirty or heavily iced outdoor coil (heating).	Clean outdoor coil. Check defrost cycle operation.
	Low refrigerant charge.	Check for leaks; repair and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient indoor airflow (cooling mode).	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
	Outdoor ambient below 25°F (cooling).	Install low-ambient kit.
	Outdoor fan motor(s) not operating (heating).	Check fan motor operation.

CONVENIENCE OUTLETS

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

Units with convenience outlet circuits may use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate its disconnect switch, if appropriate, and open it. Lock-out and tag-out this switch, if necessary.

Convenience Outlet Types

Two types of convenience outlets are offered on 50KCQ models: non-powered and unit-powered. Both types provide a 125 vac/15A Ground-Fault Circuit Interrupter (GFCI) duplex receptacle behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 23.

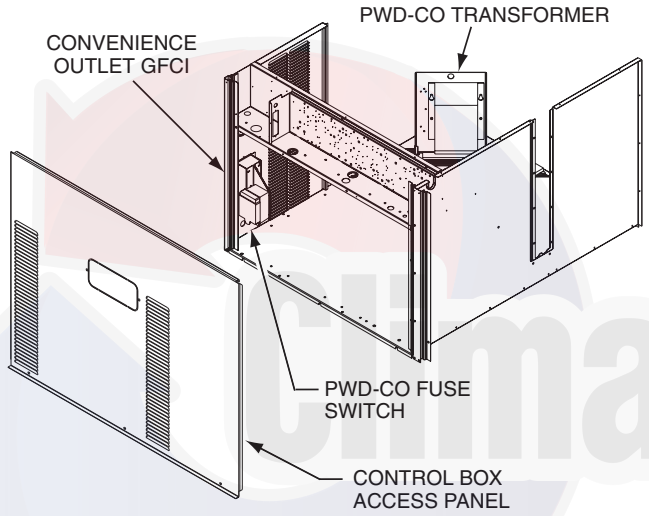


Fig. 23 — Convenience Outlet Location

Installing Weatherproof Cover

A weatherproof while-in-use cover for the factory installed convenience outlets is now required by UL standards. This cover cannot be factory-mounted due to its depth. The cover must be installed at unit installation. For shipment, the convenience outlet is covered with a blank cover plate.

The weatherproof cover kit is shipped in the unit's control box. The kit includes the hinged cover, a backing plate and gasket.

NOTE: DISCONNECT ALL POWER TO UNIT AND CONVENIENCE OUTLET. Use approved lockout/tag-out procedures.

1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. Loosen the two screws at the GFCI duplex outlet, until approximately $^1/_2$-in. (13 mm) under screw heads is exposed.
3. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 24.
5. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check cover installation for full closing and latching.

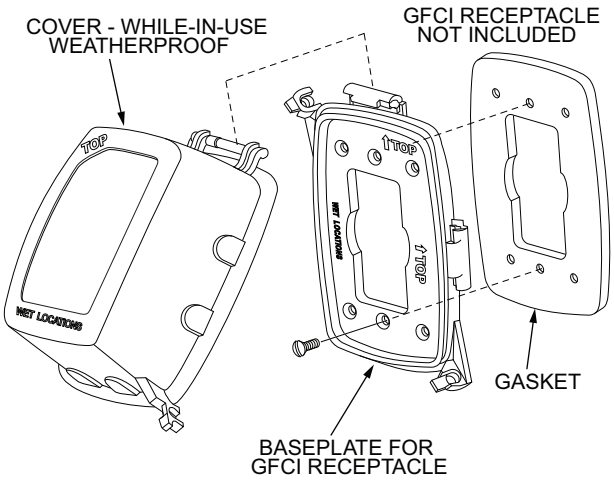


Fig. 24 — Weatherproof Cover Installation

NON-POWERED TYPE

This type requires the field installation of a general-purpose 125 vac/15AC circuit powered from a source elsewhere in the building. Observe national and local codes when selecting wire size, fuse or breaker requirements and disconnect switch size and location. Route 125 vac power supply conductors into the bottom of the utility box containing the duplex receptacle.

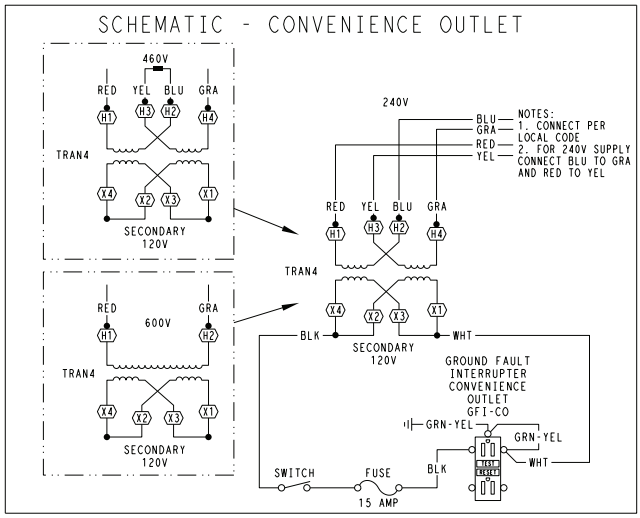
UNIT-POWERED TYPE

A unit-mounted transformer is factory-installed to step-down the main power supply voltage to the unit to 115 vac at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 23.

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on the unit-mounted non-fused disconnect or HACR breaker switch. This will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 26.

DUTY CYCLE

The unit-powered convenience outlet has a duty cycle limitation. The transformer is intended to provide power on an intermittent basis for service tools, lamps, etc; it is not intended to provide 15 amps loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8 amps (i.e., limit loads exceeding 8 amps to 30 minutes of operation every hour).



UNIT VOLTAGE	CONNECT AS	PRIMARY CONNECTIONS	TRANSFORMER TERMINALS
208, 230	240	L1: RED +YEL L2: BLU + GRA	H1 + H3 H2 + H4
460	480	L1: RED Splice BLU + YEL L2: GRA	H1 H2 + H3 H4
575	600	L1: RED L2: GRA	H1 H2

Fig. 25 — Powered Convenience Outlet Wiring

MAINTENANCE

Periodically test the GFCI receptacle by pressing the TEST button on the face of the receptacle. This should cause the internal circuit of the receptacle to trip and open the receptacle. Check for proper grounding wires and power line phasing if the GFCI receptacle does not trip as required. Press the RESET button to clear the tripped condition.

THE FUSE ON THE POWERED TYPE

The factory fuse is a Cooper Bussman[1] Fusetron T-15, non-renewable screw-in (Edison base) type plug fuse.

USING UNIT-MOUNTED CONVENIENCE OUTLETS

Units with unit-mounted convenience outlet circuits will often require two disconnects be opened to de-energize all power to the unit. Treat all units as electrically energized until the convenience outlet power is also checked and de-energization is confirmed. Observe National Electrical Code Article 210, Branch Circuits, for use of convenience outlets.

HEAT PUMP CONTROLS

Central Terminal Board

The Central Terminal Board (CTB) is a large printed circuit board that is located in the center of the unit control box. This printed circuit board contains multiple termination strips and connectors to simplify factory control box wiring and field control connections. Terminals are clearly marked on the board surface. See Fig 26.

The CTB contains no software and no logic. But it does include seven configuration jumpers that are cut to configure the board to read external optional and accessory controls, including whether the unit is a heat pump.

1. Bussman and Fusetron are trademarks of Cooper Technologies Company.

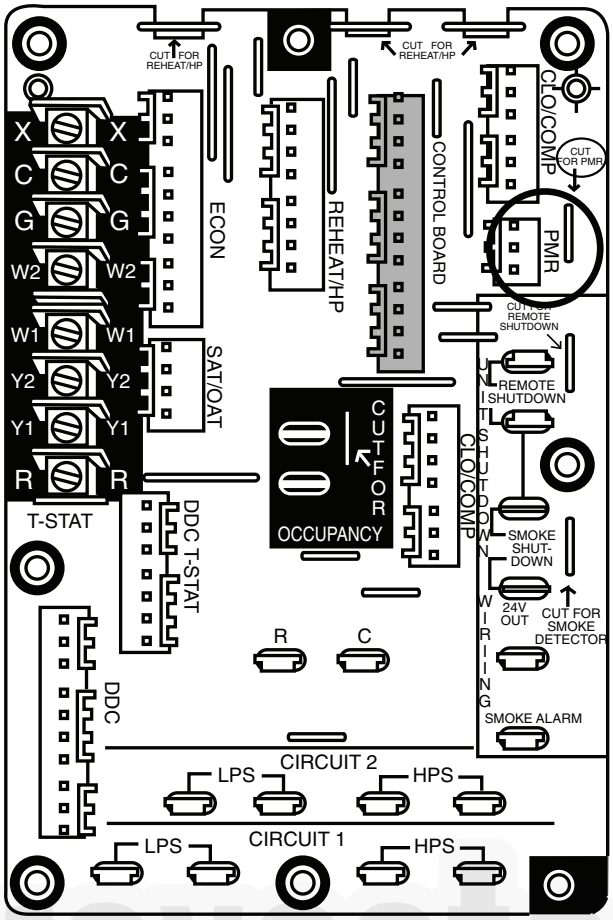


Fig. 26 — Central Terminal Board (CTB)

Table 7 — Jumper Configuration

JUMPER	CONTROL FUNCTION	NOTE
JMP1	Phase Monitor	
JMP2	Occupancy Control	
JMP3	Smoke Detector Shutdown	
JMP4	Remote Shutdown	
JMP5	Heat Pump / Reheat	50KCQ default: Cut
JMP6	Heat Pump / Reheat	50KCQ default: Cut
JMP7	Heat Pump / Reheat	50KCQ default: Cut

Jumpers JMP5, JMP6 and JMP7 are located in notches across the top of the CTB. See Fig. 26. These jumpers are factory cut on all heat pump units. Visually check these jumpers to confirm that they have been cut.

PROTECTIVE CONTROLS

Compressor Protection

OVER-CURRENT

The compressor has internal line-break motor protection.

OVER-TEMPERATURE

The compressor has an internal protector to protect it against excessively high discharge gas temperatures.

HIGH PRESSURE SWITCH

The system is provided with a high pressure switch mounted on the discharge line. The switch is stem-mounted and brazed into the discharge tube. Trip setting is 630 psig ± 10 psig (4344 ± 69 kPa) when hot. Reset is automatic at 505 psig (3482 kPa).

LOSS OF CHARGE SWITCH

The system is protected against a loss of charge and low evaporator coil loading condition by a loss of charge switch located on the liquid line and a freeze protection thermostat on the indoor coil. The switch is stem-mounted. Loss of Charge Switch trip setting is 27 psig ± 3 psig (186 ± 21 kPa). Reset is automatic at 44 ± 3 psig (303 ± 21 kPa).

Freeze Protection Thermostat trip setting is 30°F ± 5°F (–1°C ± 3°C). Reset is automatic at 45°F ± 5°F (7°C ±3°C).

SUPPLY (INDOOR) FAN MOTOR PROTECTION

Disconnect all electrical power and apply appropriate lockout/tag-out procedures when servicing the fan motor.

Motors are equipped with an over-temperature device (Thermik[1]), internal line break, external circuit breaker or electronic controlled circuits for overload protection. All protection schemes are automatically reset except for units with the 2-speed indoor fan option (VFD) or external circuit breakers. These two protection schemes are classified as manual reset. The type of device depends on several factors including motor size, voltage and other options in the unit (i.e. VFD).

The Thermik device is a snap-action over-temperature protection device that is embedded in the motor windings. It is also a pilot-circuit device that is wired into the unit's 24-v control circuit. When this device reaches its trip set point, it opens the 24-v control circuit and causes all unit operation to stop. This device resets automatically when the motor windings cool. Do not bypass this device to correct trouble. Determine the cause of the problem and correct it, then wait for the automatic reset.

The external motor overload device is a specially-calibrated circuit breaker that is UL-recognized as a motor overload controller. It is an over-current device. When the motor current exceeds the circuit breaker set point, the device opens all motor power leads and the motor shuts down. Reset requires a manual reset at the overload switch. This device (designated IFCB) is located on the side of the supply fan housing, behind the fan access panel.

TROUBLESHOOTING SUPPLY FAN MOTOR OVERLOAD TRIP

The supply fan used in the 50KCQ units is a forward-curved centrifugal wheel. At a constant wheel speed, this wheel has a characteristic that causes the fan shaft load to DECREASE when the static pressure in the unit-duct system increases and to INCREASE when the static pressure in the unit-duct system decreases (and fan airflow rate increases). Motor overload conditions typically develop when the unit is operated with an access panel removed, with unfinished duct work, in an economizer-open mode, or a leak develops in the duct system that allows a bypass back to unit return opening.

OUTDOOR FAN MOTOR PROTECTION

The outdoor fan motor is internally protected against overtemperature.

CONTROL CIRCUIT, 24-V

The control circuit is protected against over-current conditions by a circuit breaker mounted on control transformer TRAN. The Control Circuit is reset manually.

COMMERCIAL DEFROST CONTROL

The Commercial Defrost Control Board (DFB) coordinates thermostat demands for supply fan control, 1 or 2 stage cooling, 2 stage heating, emergency heating and defrost control with unit operating sequences. The DFB also provides an indoor fan off delay feature (user selectable). See Fig. 27 for board arrangement.

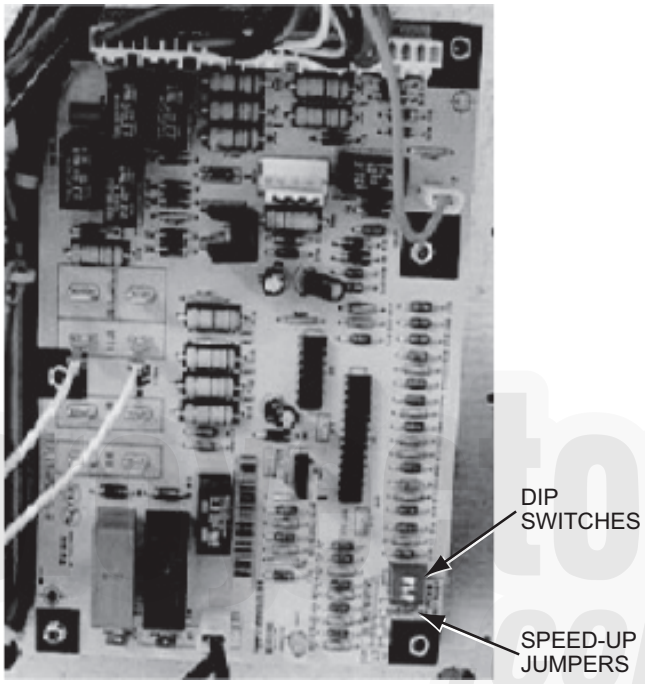


Fig. 27 — Defrost Control Board Arrangement

The DFB is located in the 50KCQ's main control box (see Fig. 28). All connections are factory-made through harnesses to the unit's CTB, to IFC (belt-drive motor) or to ECM (direct-drive motor), reversing valve solenoids and to defrost thermostats. Refer to Table 8 for details of DFB Inputs and Outputs. Detailed unit operating sequences are provided in the Start-Up section starting on page 55.

1. Thermik is a trademark of Thermik Geratebau GmbH.

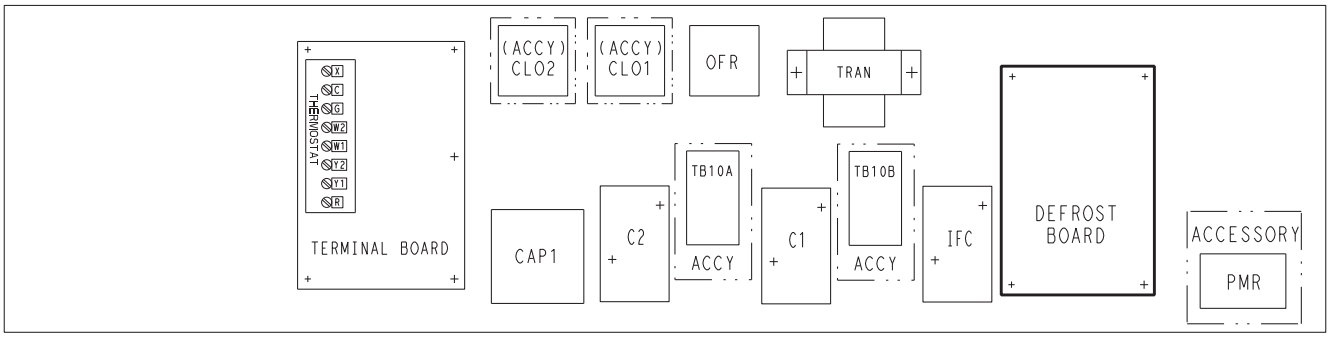


Fig. 28 — Defrost Control Board Location

Table 8 — 50KCQ Defrost Board I/O and Jumper Configurations

POINT NAME	TYPE OF I/O	CONNECTION PIN NUMBER	UNIT CONNECTION	NOTE
		INPUTS		
G Fan	DI, 24 vac	P2-3	LCTB-G	
Y1 Cool 1	DI, 24 vac	P2-5	LCTB-Y1	
Y2 Cool 2	DI, 24 vac	P2-4	LCTB-Y2	
W1 Heat 1	DI, 24 vac	P2-7	LCTB-W1	
W2 Heat 2	DI, 24 vac	P2-6	LCTB-W2	
R Power	24 vac	P3-1	CONTL BRD-8	
C Common	24 vac	P3-2	CONTL BRD-4	
DFT1	DI, 24 vac	DFT-1 to DFT-1		
DFT2	DI, 24 vac	DFT-2 to DFT-2		
		OUTPUTS		
IFO Fan On	DO, 24 vac	P3-9	REHEAT	
OF OD Fan On	DO, 24 vac	OF	OFR	
RVS1	DO, 24 vac	P3-7 to P3-5		Energize in COOL
RVS2	DO, 24 vac	P3-6 to P3-4		Energize in COOL
COMP 1	DO, 24 vac	P3-10	FPT-REHEAT-6	
COMP 2	DO, 24 vac	P3-8	REHEAT-8	
HEAT 2	DO, 24 vac	E-HEAT	HC-1 (TB4-1)	
COM	24 vac	P3-3	HC-1 (TB4-3)	
		CONFIGURATION		
Select Jumper	24 vac	P1-1		
		SPEED-UP CONFIGURATION		
Speed-Up Jumper		JMP17		
Speed-Up Jumper		JMP18		

Jumper for 1-3 seconds: Factory Test, defrost runs for 9 seconds
Jumper for 5-20 seconds: Forced Defrost, defrost runs for 30 seconds if DFT2 is open

Reversing Valve Control

The DFB has two outputs for unit reversing valve control. Operation of the reversing valves is based on internal logic; this application does not use an "O" or "B" signal to determine reversing valve position. Reversing valves are energized during the cooling stages and the defrost cycle and de-energized during heating cycles. Once energized at the start of a cooling stage, the reversing valve will remain energized until the next heating cycle demand is received. Once de-energized at the start of a Heating cycle, the reversing valves will remain de-energized until the next cooling stage is initiated.

Compressor Control

The DFB receives inputs indicating Stage 1 Cooling and Stage 1 Heating from the space thermostat or unit control system (PremierLink® or RTU-OPEN); it generates commands to start compressors with or without reversing valve operation to produce Stage 1 Cooling or Stage 1 Heating. The 04-06 systems have one compressor).

Auxiliary (Electric) Heat Control

The 50KCQ unit can be equipped with one or two auxiliary electric heaters, to provide a second stage of heating. The DFB will energize this Heating System for a Stage 2 Heating Command (heaters operate concurrently with compressor(s) in the Stage 1 Heating cycle), for an Emergency Heating sequence (compressors are off and only the electric heaters are energized) and also during the Defrost cycle (to eliminate a "cold blow" condition in the space).

Defrost

The defrost control mode is a time/temperature sequence. There are two time components: The continuous run period and the test/defrost cycle period. The temperature component is provided by Defrost Thermostat 1 mounted on the outdoor coil.

The continuous run period is a fixed time period between the end of the last defrost cycle (or start of the current Heating cycle) during which no defrost will be permitted. This period can be set at 30, 60, 90 or 120 minutes by changing the positions of DIP switches SW1 and SW2 (see Fig. 29 and Table 9). The default run periods are 60 minutes for unit sizes 04-06.

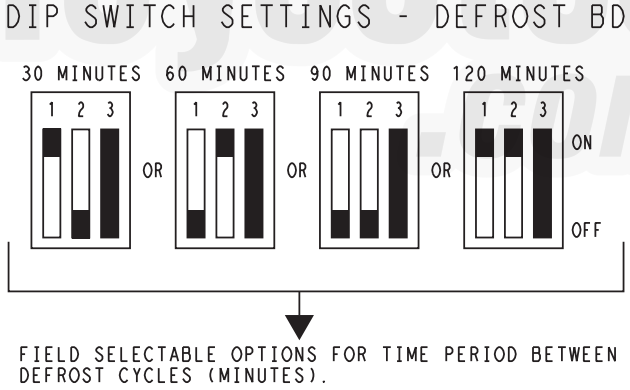


Fig. 29 — DIP Switch Settings - Defrost Board

At the end of the continuous run period, the defrost control will test for a need to defrost. On unit sizes 04-06 (single compressor designs), DFT1 controls the start and termination of the defrost cycle. If DFT1 is still open, the defrost test/run window is closed and the control repeats the continuous run period. If DFT1 is closed, the defrost cycle is initiated. The defrost period will end when DFT1 opens (indicating the outdoor coil has been cleared of frost and ice) or a 10 minute elapsed period expires, whichever comes first.

At the end of the unit defrost cycle, the unit will be returned to Heating cycle for a full continuous run period. If the space heating load is satisfied and compressor operation is terminated, the defrost control will remember where the run period was interrupted. On restart in Heating, the defrost control will resume unit operation at the point in the run period where it was last operating.

Table 9 — Dip Switch Position

SWITCH NO.														
	1	2		1	2		1	2		1	2		3	
1			1		·	1	·		1	·	·	1		On
0	·	·	0	·		0		·	0			0		Off
	90 minutes			60 minutes			30 minutes			120 minutes			Fan Delay	

Defrost Thermostats

These are temperature switches that monitor the surface temperature of the outdoor coil circuits. These switches are mounted on the liquid tube exiting the outdoor coil heating circuits. These switches close on temperature drop at 30°F (-1°C) and reset open on temperature rise at 80°F (27°C).

Indoor Fan Off Delay

The DFB can provide a 60 second delay on Indoor Fan Off if the thermostat's fan selector switch is set on AUTO control. DIP Switch SW3 on the DFB selects use of the fan off time delay feature. Setting SW3 in the OPEN position turns the Fan Off Delay feature on; setting SW3 in the CLOSED position disables this feature. The delay period begins when Y1 demand or W1 demand by the space thermostat is removed.

Defrost Speedup Functions

The DFB permits the servicer to speed-up the defrost cycle. There are two speed-up sequences: relative speed-up and an immediate forced defrost. Speed-up sequences are initiated by shorting jumper wires JMP17 and JMP18 together (see Fig. 27); use a flat-blade screwdriver.

Shorting the jumpers for a period of 1 to 3 seconds reduces the defrost timer periods by a factor of 0.1 sec/minute. (For example, the 90 minute run period is reduced to 9 seconds) The DFB will step the unit through a Heating cycle and a Defrost cycle using these reduced time periods. This mode ends after the Defrost cycle.

Shorting the jumpers for a period of 5 to 20 secs bypasses the remaining continuous run period and places the unit in a Forced Defrost mode. If the controlling DFT is closed when this mode is initiated, the unit will complete a normal defrost period that will terminate when the controlling DFT opens or the 10 minute defrost cycle limit is reached. If the controlling DFT is open when this mode is initiated, the Defrost cycle will run for 30 secs. Both modes end at the end of the Defrost cycle.

ELECTRIC HEATERS

50KCQ units can be equipped with field-installed accessory electric heaters. The heaters are modular in design, with heater frames holding open coil resistance wires strung through ceramic insulators, line-break limit switches and a control contactor. One or two heater modules can be used in a unit.

Heater modules are installed in the compartment below the indoor (supply) fan outlet. Access is through the indoor access panel. Heater modules slide into the compartment on tracks along the bottom of the heater opening. See Fig. 30-32.

Not all available heater modules can be used in every unit. Use only those heater modules that are UL listed for use in a specific size unit. Refer to the label on the unit cabinet regarding approved heaters.

Unit heaters are marked with Heater Model Numbers. However, heaters are ordered by and shipped in cartons marked with a corresponding heater Sales Package part number. See Table 10 for correlation between heater Model Number and Sales Package part number.

NOTE: The value in position 9 of the part number differs between the sales package part number (value is 1) and a bare heater model number (value is 0).

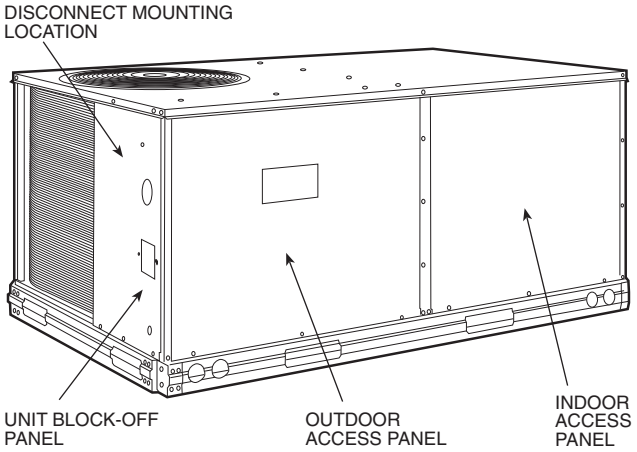


Fig. 30 — Typical Access Panel Location

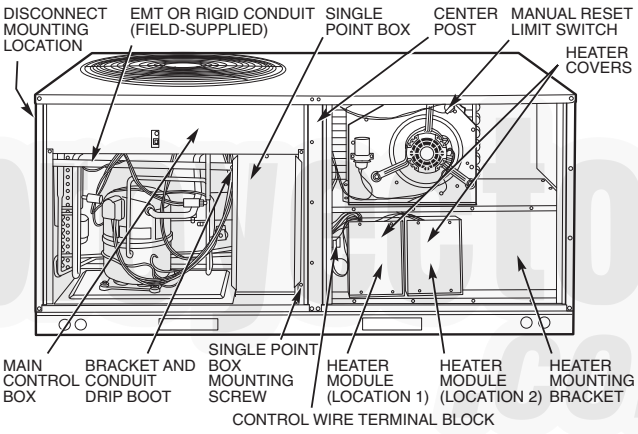


Fig. 31 — Typical Component Location

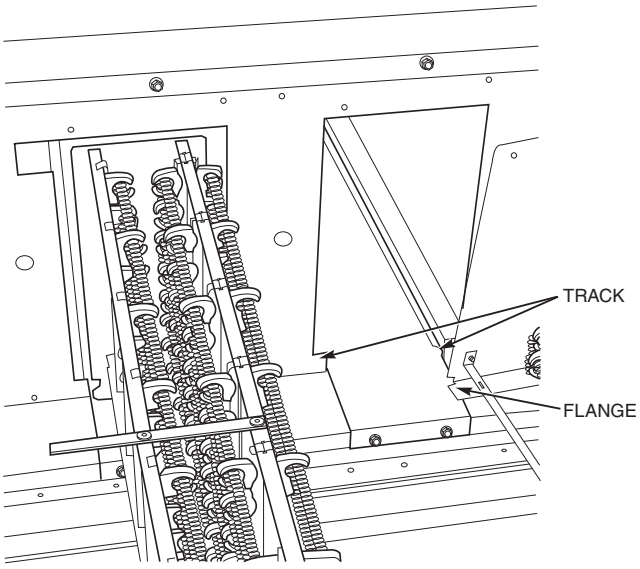


Fig. 32 — Typical Module Installation

Table 10 — Heater Model Number

Bare heater model number	C	R	H	E	A	T	E	R	0	0	1	A	0	0
Heater Sale Package PNO Includes: Bare Heater Carton and packing materials Installation sheet	C	R	H	E	A	T	E	R	1	0	1	A	0	0

Single Point Boxes and Supplementary Fuses

When the unit MOCP device value exceeds 60A, unit-mounted supplementary fuses are required for each heater circuit. These fuses are included in accessory single point boxes, with power distribution and fuse blocks. The single point box will be installed directly under the unit control box, just to the left of the partition separating the indoor section (with electric heaters) from the outdoor section. The single point box has a hinged access cover. See Fig. 33.

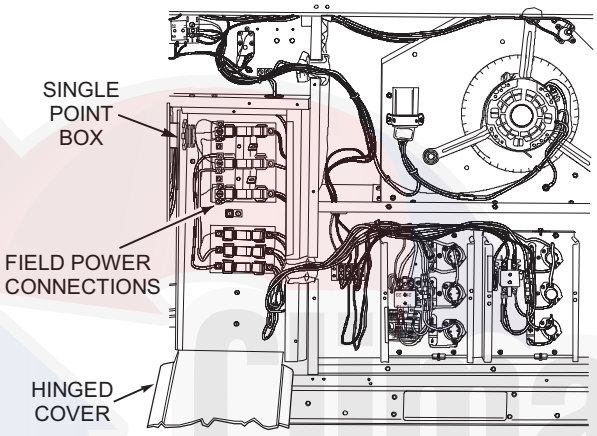


Fig. 33 — Typical Single Point Installation

On 50KCQ units, all fuses are 60A. Single point boxes containing fuses for 208/230-v applications use UL Class RK5 250-v fuses (Bussman FRNR 60 or Shawmut TR 60R). Single point boxes for 460-v and 575-v applications use UL Class T 600-v fuses (Bussman JJS 60 or Shawmut A6T 60). (Note that all heaters are qualified for use with a 60A fuse, regardless of actual heater ampacity, so only 60A fuses are necessary.)

Safety Devices

Electric heater applications use a combination of line-break/auto-reset limit switches and a pilot-circuit/manual reset limit switch to protect the unit against over-temperature situations.

Line-break/auto-reset limit switches are mounted on the base plate of each heater module. See Fig. 34. These are accessed through the indoor access panel. Remove the switch by removing two screws into the base plate and extracting the existing switch.

Pilot-circuit/manual reset limit switch is located in the side plate of the indoor (supply) fan housing. See Fig. 31 and 34.

Completing Heater Installation

FIELD POWER CONNECTIONS

Tap conductors must be installed between the base unit's field power connection lugs and the single point box (with or without fuses). See Fig. 33 and refer to unit wiring schematic. Use copper wire only. For connection using the single point box without fuses, connect the field power supply conductors to the heater power leads and the field-supplied tap conductors inside the single point box. Use UL approved pressure connectors (field-supplied) for these splice joints.

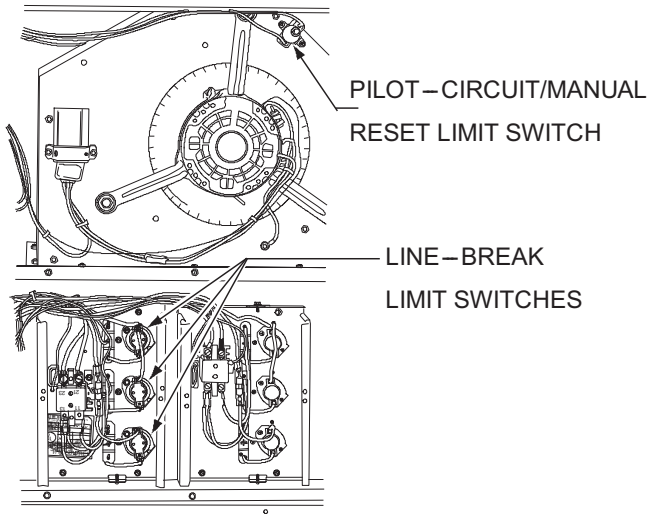


Fig. 34 — Typical Location of Heater Limit Switches (3-phase heater shown)

LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module(s). The 50KCQ units use a various number of control wires, colors and terminal boards depending on voltage and unit size. See Fig. 35-38 and the unit wiring diagram for proper placement.

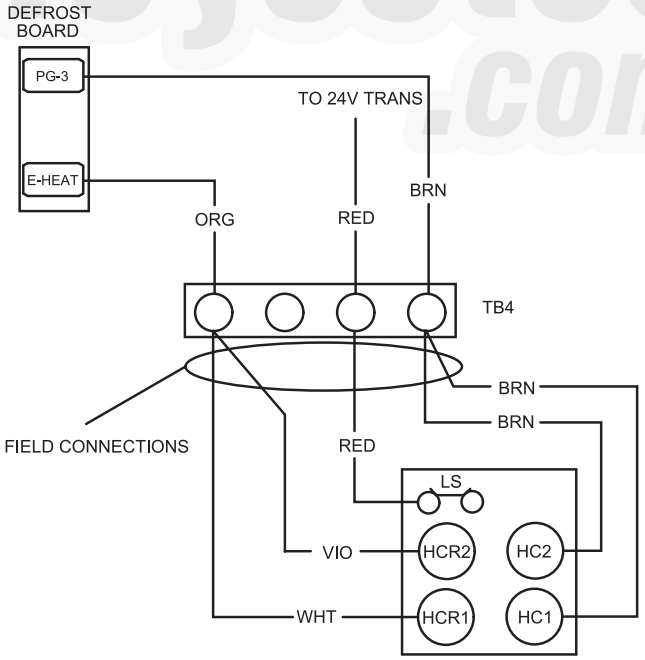


Fig. 35 — Accessory Electric Heater Control Connections (HP-2, Size 06, 575-v Only)

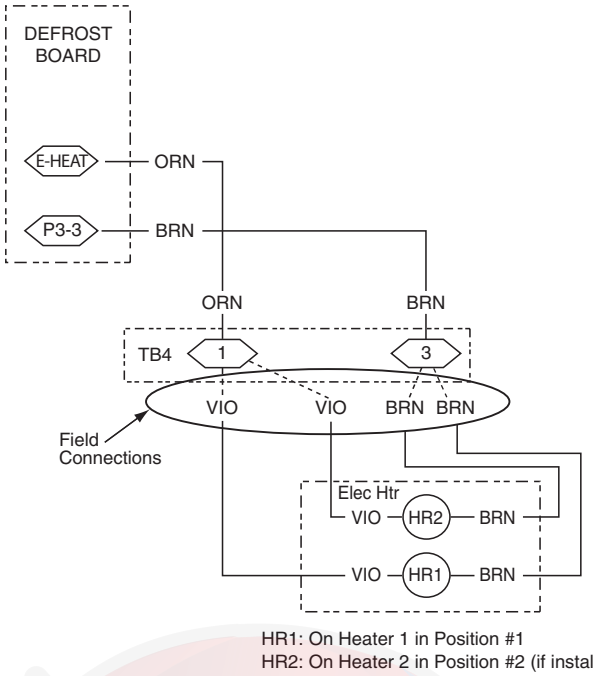


Fig. 36 — Accessory Electric Heater Control Connections (HP-1 and HP-2)

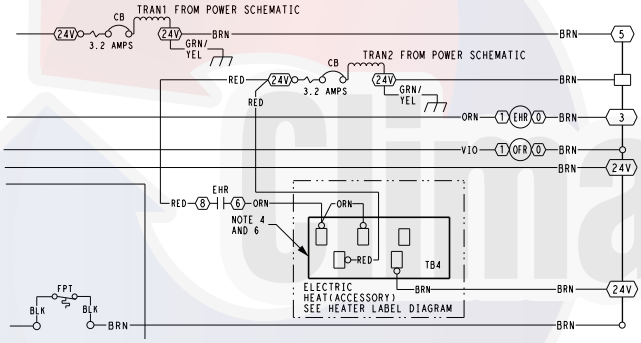


Fig. 37 — TB4 Wiring (HP Only)

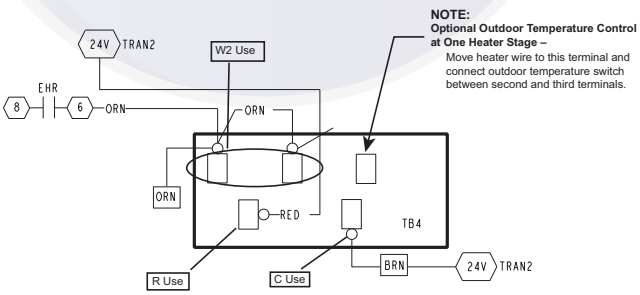


Fig. 38 — TB4 Terminal Use (HP Only)

SMOKE DETECTORS

Smoke detectors are available as factory-installed options (FIOP) on 50KCQ models. Smoke detectors can be specified for supply air only, for return air with or without economizer, or in combination of supply air and return air. Return air smoke detectors are arranged for vertical return configurations only. All components necessary for operation are factory-provided and mounted. The unit is factory-configured for immediate smoke detector shutdown operation; additional wiring or modifications to unit terminal board can be necessary to complete the unit and smoke detector configuration to meet project requirements.

System

The smoke detector system consists of a four-wire controller and one or two sensors. Its primary function is to shut down the rooftop unit in order to prevent smoke from circulating throughout the building. It is not to be used as a life saving device.

Controller

The controller (see Fig. 39) includes a controller housing, a printed circuit board, and a clear plastic cover. The controller can be connected to one or two compatible duct smoke sensors. The clear plastic cover is secured to the housing with a single captive screw for easy access to the wiring terminals. The controller has three LEDs (for Power, Trouble and Alarm) and a manual test/reset button (on the cover face).

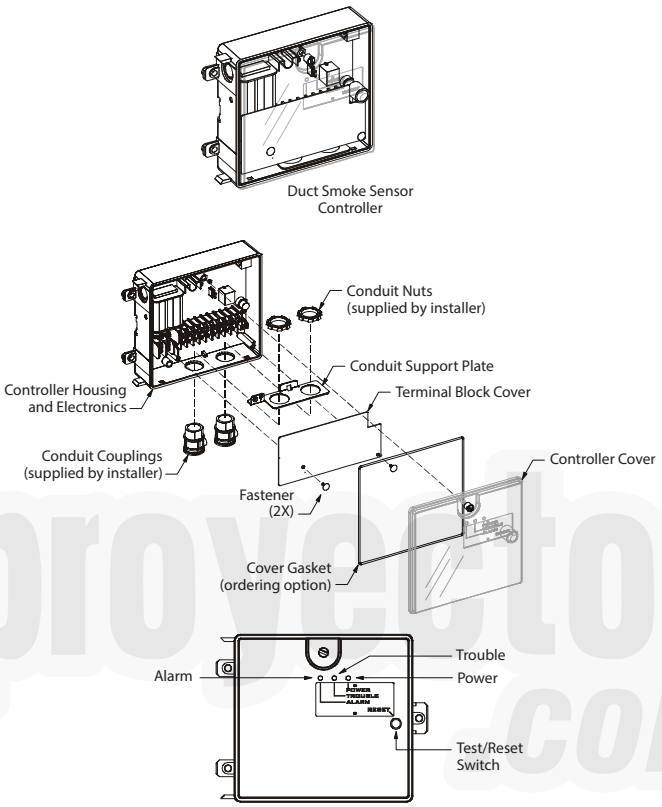


Fig. 39 — Controller Assembly

Sensor

The sensor (see Fig. 40) includes a plastic housing, a printed circuit board, a clear plastic cover, a sampling tube inlet and an exhaust tube. The sampling tube (when used) and exhaust tube are attached during installation. The sampling tube varies in length depending on the size of the rooftop unit. The clear plastic cover permits visual inspections without having to disassemble the sensor. The cover attaches to the sensor housing using four captive screws and forms an airtight chamber around the sensing electronics. Each sensor includes a harness with an RJ45 terminal for connecting to the controller. Each sensor has four LEDs (for Power, Trouble, Alarm and Dirty) and a manual test/reset button (on the left side of the housing).

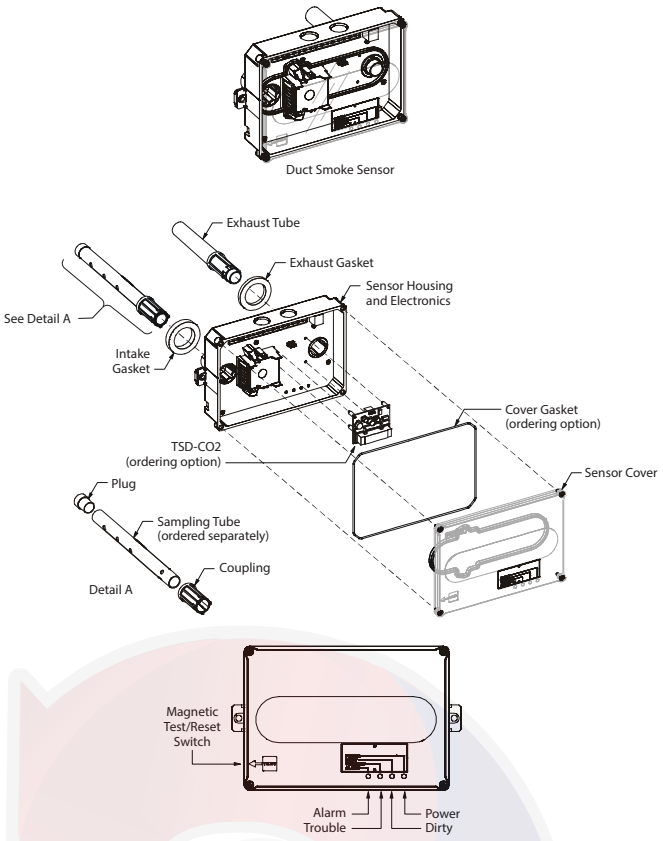


Fig. 40 — Smoke Detector Sensor

Air is introduced to the duct smoke detector sensor's sensing chamber through a sampling tube that extends into the HVAC duct and is directed back into the ventilation system through a (shorter) exhaust tube. The difference in air pressure between the two tubes pulls the sampled air through the sensing chamber. When a sufficient amount of smoke is detected in the sensing chamber, the sensor signals an alarm state and the controller automatically takes the appropriate action to shut down fans and blowers, change over air handling systems, notify the fire alarm control panel, etc.

The sensor uses a process called *Differential Sensing* to prevent gradual environmental changes from triggering false alarms. A rapid change in environmental conditions, such as smoke from a fire, causes the sensor to signal an alarm state, but dust and debris accumulated over time does not.

For installations using two sensors, the duct smoke detector does not differentiate which sensor signals an alarm or trouble condition.

Smoke Detector Locations

SUPPLY AIR

The Supply Air smoke detector sensor is located to the left of the unit's indoor (supply) fan. See Fig. 41. Access is through the fan access panel. There is no sampling tube used at this location. The sampling tube inlet extends through the side plate of the fan housing (into a high pressure area). The controller is located on a bracket to the right of the return filter, accessed through the lift-off filter panel.

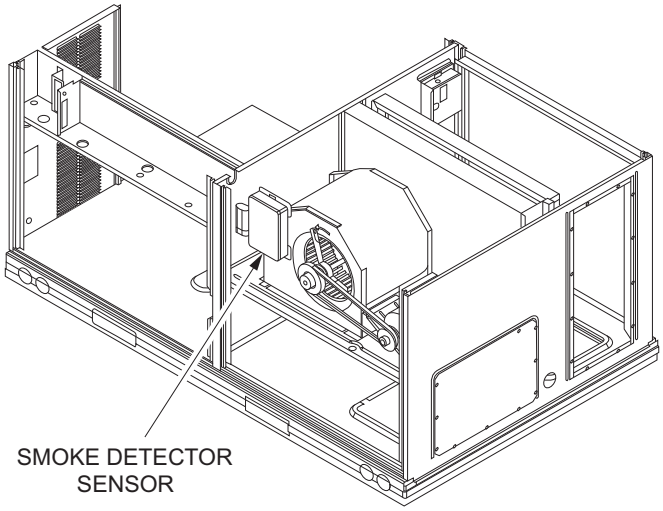
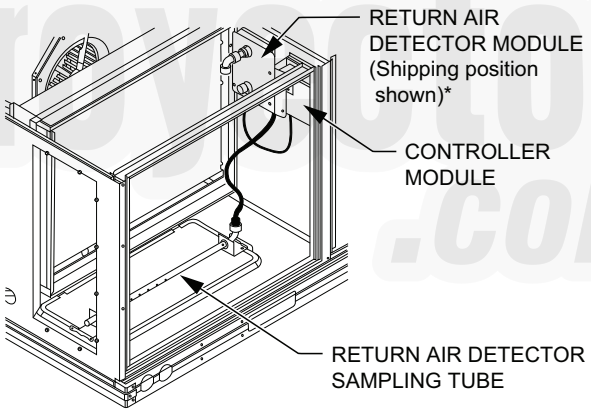


Fig. 41 — Typical Supply-Air Smoke Detector Sensor Location

RETURN AIR WITHOUT ECONOMIZER

The sampling tube is located across the return air opening on the unit base pan. See Fig. 42. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected by tubing to the return air sensor that is mounted on a bracket high on the partition between return filter and controller location. (This sensor is shipped in a flat-mounting location. Installation requires that this sensor be relocated to its operating location and the tubing to the sampling tube be connected. See "Completing Installation of Return Air Smoke Sensor" on page 28 for installation steps.)



*RA detector must be moved from shipping position to operating position by installer.

Fig. 42 — Typical Return-Air Detector Location

RETURN AIR WITH ECONOMIZER

The sampling tube is inserted through the side plates of the economizer housing, placing it across the return air opening on the unit base pan. See Fig. 43. The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected via tubing to the return air sensor that is mounted on a bracket high on the partition between return filter and controller location. (This sensor is shipped in a flat-mounting location. Installation requires that this sensor be relocated to its operating location and the tubing to the sampling tube be connected. See "Completing Installation of Return Air Smoke Sensor" on page 28 for installation steps.)

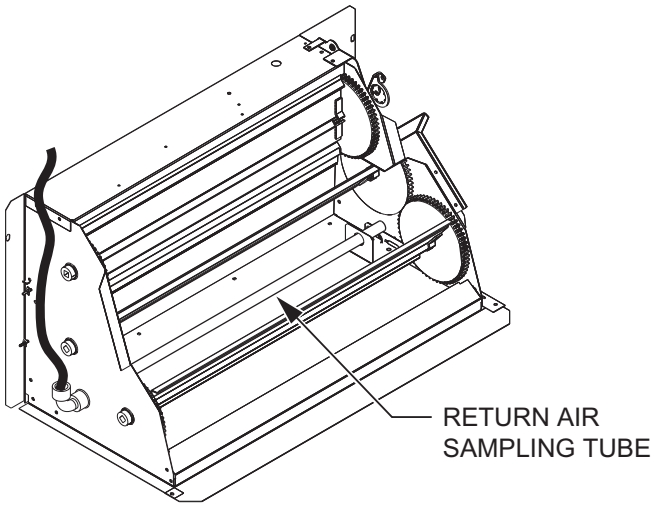


Fig. 43 — Return-Air Sampling Tube Location

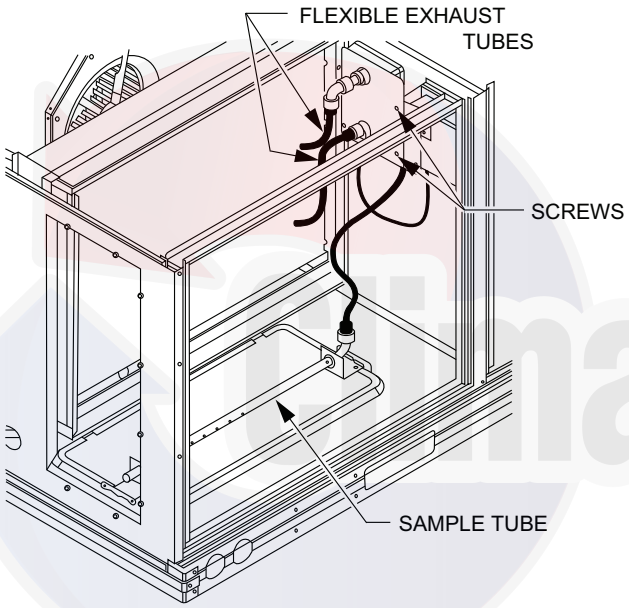


Fig. 44 — Return-Air Detector Shipping Position

Completing Installation of Return-Air Smoke Sensor

1. Unscrew the two screws holding the Return Air Sensor detector plate. See Fig. 44. Save the screws.
2. Remove the Return Air Sensor and its detector plate.
3. Rotate the detector plate so the sensor is facing outwards and the sampling tube connection is on the bottom. See Fig. 45.
4. Screw the sensor and detector plate into its operating position using screws from Step 1. Make sure the sampling tube connection is on the bottom and the exhaust tube is on the top. See Fig. 45.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the base pan.
6. For units with an economizer, the sampling tube is integrated into the economizer housing but the connection of the flexible tubing to the sampling tube is the same.

FIOP Smoke Detector Wiring and Response

All units: FIOP smoke detector is configured to automatically shut down all unit operations when smoke condition is detected. See Fig. 46, Typical Smoke Detector System Wiring.

HIGHLIGHT A:

JMP 3 is factory-cut, transferring unit control to smoke detector.

HIGHLIGHT B:

Smoke detector NC contact set will open on smoke alarm condition, de-energizing the ORN conductor.

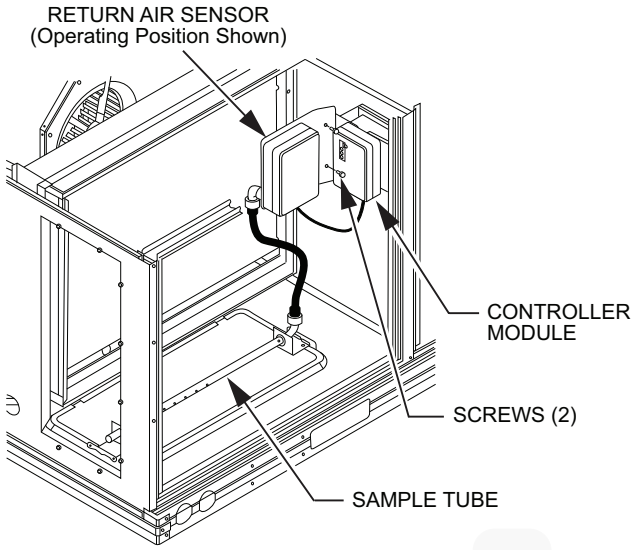


Fig. 45 — Return-Air Sensor Operating Position

HIGHLIGHT C:

24-v power signal via ORN lead is removed at smoke detector input on CTB (Control Terminal Board); all unit operations cease immediately.

PREMIERLINK CONTROL:

Unit operating functions (fan, cooling and heating) are terminated as described above. In addition:

HIGHLIGHT D:

On smoke alarm condition, the smoke detector NO Alarm contact will close, supplying 24-v power to GRA conductor.

HIGHLIGHT E:

GRA lead at Smoke Alarm input on CTB provides 24-v signal to FIOP DDC control.

PREMIERLINK:

This signal is conveyed to PremierLink FIOPs TB1 at terminal TB1-6 (BLU lead). This signal initiates the FSD sequence by the PremierLink control. FSD status is reported to connected CCN network.

RTU-OPEN:

The 24-v signal is conveyed to RTU-OPEN's J1-10 input terminal. This signal initiates the FSD sequence by the RTU-OPEN control. FSD status is reported to connected BAS network.

USING REMOTE LOGIC:

Five conductors are provided for field use (see Highlight F in Fig. 46) for additional annunciation functions.

ADDITIONAL APPLICATION DATA

Refer to Application Data for 50KCQ*04-06 for discussions on additional control features of these smoke detectors including multiple unit coordination. See Fig. 46.

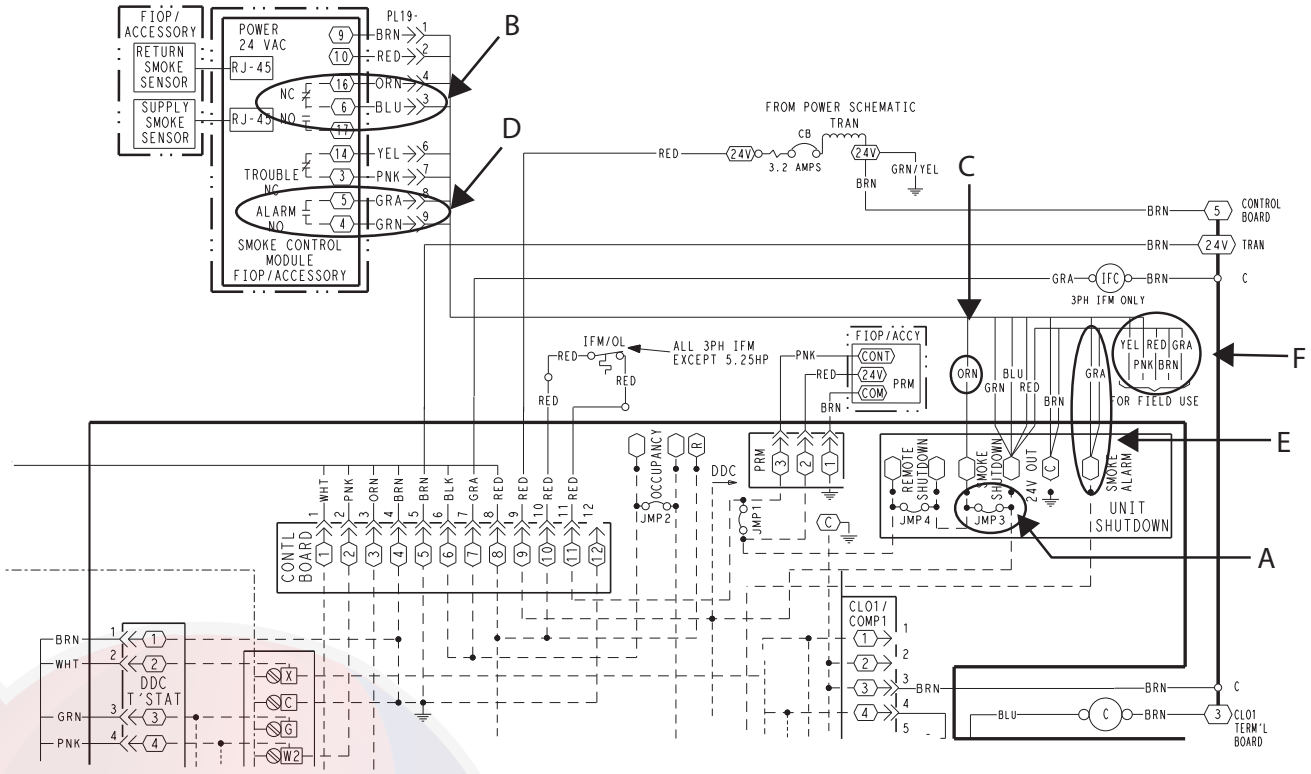


Fig. 46 — Typical Smoke Detector Wiring

Sensor and Controller Tests

See Table 11.

SENSOR ALARM TEST

The sensor alarm test checks a sensor's ability to signal an alarm state. This test requires the use of a field-provided SD-MAG test magnet.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless it is part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

Sensor Alarm Test Procedure

1. Hold the test magnet where indicated on the side of the sensor housing for seven seconds.
2. Verify that the sensor's Alarm Light Emitting Diode (LED) turns on.
3. Reset the sensor by holding the test magnet against the sensor housing for two seconds.
4. Verify that the sensor's Alarm LED turns off.

CONTROLLER ALARM TEST

The controller alarm test checks the controller's ability to initiate and indicate an alarm state.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless it is part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

Controller Alarm Test Procedure

1. Press the controller's test/reset switch for seven seconds.
2. Verify that the controller's Alarm LED turns on.
3. Reset the sensor by pressing the test/reset switch for two seconds.
4. Verify that the controller's Alarm LED turns off.

DIRTY CONTROLLER TEST

The dirty controller test checks the controller's ability to initiate a dirty sensor test and indicate its results.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Pressing the controller's test/reset switch for longer than seven seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

Dirty Controller Test Procedure

1. Press the controller's test/reset switch for two seconds.
2. Verify that the controller's Trouble LED flashes.

Table 11 — Detector Indicators

CONTROL OR INDICATOR	DESCRIPTION
Magnetic test/reset switch	Resets the sensor when it is in the alarm or trouble state. Activates or tests the sensor when it is in the normal state.
Alarm LED	Indicates the sensor is in the alarm state.
Trouble LED	Indicates the sensor is in the trouble state.
Dirty LED	Indicates the amount of environmental compensation used by the sensor (flashing continuously = 100%)
Power LED	Indicates the sensor is energized.

DIRTY SENSOR TEST

The dirty sensor test provides an indication of the sensor's ability to compensate for gradual environmental changes. A sensor that can no longer compensate for environmental changes is considered 100% dirty and requires cleaning or replacing. Use a field-provided SD-MAG test magnet to initiate a sensor dirty test. The sensor's Dirty LED indicates the results of the dirty test as shown in Table 12.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Holding the test magnet against the sensor housing for more than seven seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

Table 12 — Dirty LED Test

FLASHES	DESCRIPTION
1	0 to 25% dirty. (Typical of a newly-installed detector)
2	25 to 50% dirty
3	51 to 75% dirty
4	76 to 99% dirty

Dirty Sensor Test Procedure:

1. Hold the test magnet where indicated on the side of the sensor housing for two seconds.
2. Verify that the sensor's Dirty LED flashes.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Changing the dirty sensor test operation will put the detector into the alarm state and activate all automatic alarm responses. Before changing dirty sensor test operation, disconnect all auxiliary equipment from the controller and notify the proper authorities if connected to a fire alarm system.

CHANGING THE DIRTY SENSOR TEST

By default, sensor dirty test results are indicated by:

- The sensor's Dirty LED flashing.
- The controller's Trouble LED flashing.
- The controller's supervision relay contacts toggle.

The operation of a sensor's dirty test can be changed so that the controller's supervision relay is not used to indicate test results. When two detectors are connected to a controller, sensor dirty test operation on both sensors must be configured to operate in the same manner.

Configure the Dirty Sensor Test Operation:

1. Hold the test magnet where indicated on the side of the sensor housing until the sensor's Alarm LED turns on and its Dirty LED flashes twice (approximately 60 seconds).
2. Reset the sensor by removing the test magnet then holding it against the sensor housing again until the sensor's Alarm LED turns off (approximately 2 seconds).

REMOTE STATION TEST

The remote station alarm test checks a test/reset station's ability to initiate and indicate an alarm state.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

This test places the duct detector into the alarm state. Unless it is part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Holding the test magnet to the target area for longer than seven seconds will put the detector into the alarm state and activate all automatic alarm responses.

SD-TRK4 Remote Alarm Test Procedure:

1. Turn the key switch to the RESET/TEST position for seven seconds.
2. Verify that the test/reset station's Alarm LED turns on.
3. Reset the sensor by turning the key switch to the RESET/TEST position for two seconds.
4. Verify that the test/reset station's Alarm LED turns off.

REMOTE TEST/RESET STATION DIRTY SENSOR TEST

The test/reset station dirty sensor test checks the test/reset station's ability to initiate a sensor dirty test and indicate the results. It must be wired to the controller as shown in Fig. 47 and configured to operate the controller's supervision relay. For more information, see "Changing the Dirty Sensor Test."

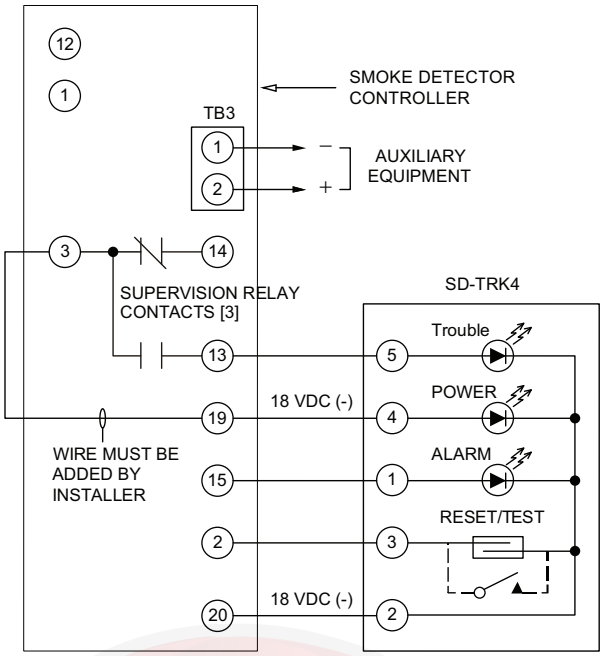


Fig. 47 — Remote Test/Reset Station Connections

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

Holding the test magnet to the target area for longer than seven seconds will put the detector into the alarm state and activate all automatic alarm responses.

Dirty Sensor Test Using an SD-TRK4 Test Set:

1. Turn the key switch to the RESET/TEST position for two seconds.
2. Verify that the test/reset station's Trouble LED flashes.

DETECTOR CLEANING

Cleaning the Smoke Detector:

Clean the duct smoke sensor when the Dirty LED is flashing continuously or sooner if conditions warrant.

IMPORTANT:

OPERATIONAL TEST ALERT

Failure to follow this ALERT can result in an unnecessary evacuation of the facility.

If the smoke detector is connected to a fire alarm system, first notify the proper authorities that the detector is undergoing maintenance, then disable the relevant circuit to avoid generating a false alarm.

1. Disconnect power from the duct detector then remove the sensor's cover. See Fig. 48.
2. Using a vacuum cleaner, clean compressed air, or a soft bristle brush, remove loose dirt and debris from inside the sensor housing and cover. Use isopropyl alcohol and a lint-free cloth to remove dirt and other contaminants from the gasket on the sensor's cover.
3. Squeeze the retainer clips on both sides of the optic housing then lift the housing away from the printed circuit board.
4. Gently remove dirt and debris from around the optic plate and inside the optic housing.
5. Replace the optic housing and sensor cover.
6. Connect power to the duct detector then perform a sensor alarm test.

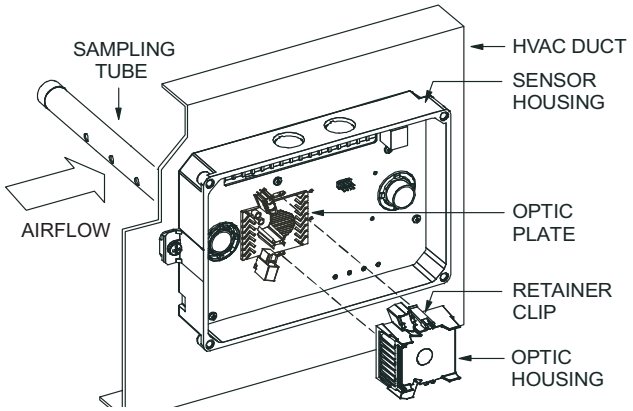


Fig. 48 — Sensor Cleaning Diagram

Indicators

NORMAL STATE

The smoke detector operates in the normal state in the absence of any trouble conditions and when its sensing chamber is free of smoke. In the normal state, the Power LED on both the sensor and the controller are on and all other LEDs are off.

ALARM STATE

The smoke detector enters the alarm state when the amount of smoke particulate in the sensor's sensing chamber exceeds the alarm threshold value. See Table 11. Upon entering the alarm state:

- The sensor's Alarm LED and the controller's Alarm LED turn on.
- The contacts on the controller's two auxiliary relays switch positions.
- The contacts on the controller's alarm initiation relay close.
- The controller's remote alarm LED output is activated (turned on).
- The controller's high impedance multiple fan shutdown control line is pulled to ground Trouble state.

The duct smoke detector enters the trouble state under the following conditions:

- A sensor's cover is removed and 20 minutes pass before it is properly secured.
- A sensor's environmental compensation limit is reached (100% dirty).
- A wiring fault between a sensor and the controller is detected.

An internal sensor fault is detected upon entering the trouble state:

The contacts on the controller's supervisory relay switch positions. See Fig. 49.

- If an error is sensed by the sensor, both the sensor's Trouble LED and the controller's Trouble LED will turn on.
- If 100% dirty, the sensor's Dirty LED turns on and the controller's Trouble LED flashes continuously.
- If a wiring fault between a sensor and the controller, the controller's Trouble LED turns on but not the sensor's.

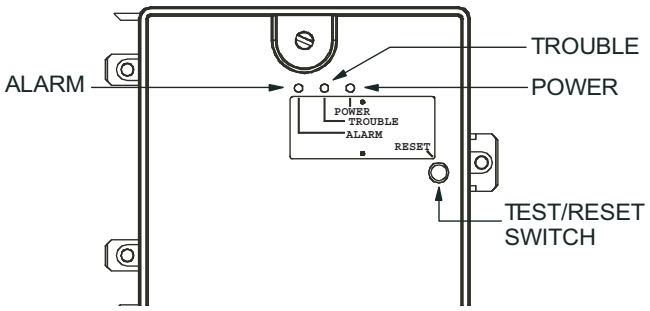


Fig. 49 — Controller Assembly

NOTE: All trouble states are locked by the duct smoke detector. The trouble condition must be cleared and then the duct smoke detector must be reset in order to restore it to the normal state.

RESETTING ALARM AND TROUBLE CONDITION TRIPS

Manual reset is required to restore smoke detector systems to Normal operation. For installations using two sensors, the duct smoke detector does not differentiate which sensor signals an alarm or trouble condition. Check each sensor for Alarm or Trouble status (indicated by LED). Clear the condition that has generated the trip at this sensor. Then reset the sensor by pressing and holding the reset button (on the side) for 2 seconds. Verify that the sensor's Alarm and Trouble LEDs are now off. At the controller, clear its Alarm or Trouble state by pressing and holding the manual reset button (on the front cover) for 2 seconds. Verify that the controller's Alarm and Trouble LEDs are now off. Replace all panels.

TROUBLESHOOTING

Controller's Trouble LED is On:

1. Check the Trouble LED on each sensor connected to the controller. If a sensor's Trouble LED is on, determine the cause and make the necessary repairs.
2. Check the wiring between the sensor and the controller. If wiring is loose or missing, repair or replace as required.

Controller's Trouble LED is Flashing:

1. One or both of the sensors is 100% dirty.
2. Determine which Dirty LED is flashing, then clean that sensor assembly as described in the detector cleaning section.

Sensor's Trouble LED is On:

1. Check the sensor's Dirty LED. If it is flashing, the sensor is dirty and must be cleaned.
2. Check the sensor's cover. If it is loose or missing, secure the cover to the sensor housing.
3. Replace sensor assembly.

Sensor's Power LED is Off:

1. Check the controller's Power LED. If it is off, determine why the controller does not have power and make the necessary repairs.
2. Check the wiring between the sensor and the controller. If wiring is loose or missing, repair or replace as required.

Controller's Power LED is Off:

1. Ensure the circuit supplying power to the controller is operational. If not, make sure JP2 and JP3 are set correctly on the controller before applying power.
2. Verify that power is applied to the controller's supply input terminals. If power is not present, replace or repair wiring as required.

Remote Test/Reset Station's Trouble LED Does Not Flash When Performing a Dirty Test, But the Controller's Trouble LED Does:

1. Verify that the remote test/station is wired as shown in Fig. 47. Repair or replace loose or missing wiring.
2. Configure the sensor dirty test to activate the controller's supervision relay. See "To Configure the Dirty Sensor Test Operation" for details.

Sensor's Trouble LED is On, But the Controller's Trouble LED is OFF:

Remove JP1 on the controller.

Supply Air Temperature (SAT) Sensor

On FIOP-equipped 50KCQ unit, the unit is supplied with a supply-air temperature (SAT) sensor (part number:33ZCSENSAT). This sensor is a tubular probe type, approx 6-in. (12.7 mm) in length. It is a nominal 10-k ohm thermistor. See *PremierLink Installation, Start-Up and Configuration Instructions* for temperature-resistance characteristic.

PREMIERLINK CONTROL

For details on operating 50KCQ units equipped with the factory-installed PremierLink controller option, refer to the *PremierLink Retrofit Rooftop Controller Version 3.x Installation, Start-Up, and Configuration Instructions* manual.

RTU-OPEN CONTROL SYSTEM

For details on operating 50KCQ units equipped with the factory-installed RTU Open controller, refer to the *"Factory-Installed RTU Open Multi-Protocol Controller Control, Start-Up, Operation and Troubleshooting"* manual.

ECONOMIZER SYSTEMS

The 50KC units may be equipped with a factory-installed or accessory (field-installed) economizer system. Three types are available: with a logic control system (EconoMi$er IV and EconoMi$er X) and without a control system (EconoMi$er2). See Fig. 50-52 for component locations on each type. The W7212 controller is used for EconoMi$er IV and the W7220 controller is used for EconoMi$er X. See Fig. 53-56 for economizer section wiring diagrams.

All three economizers use direct-drive damper actuators.

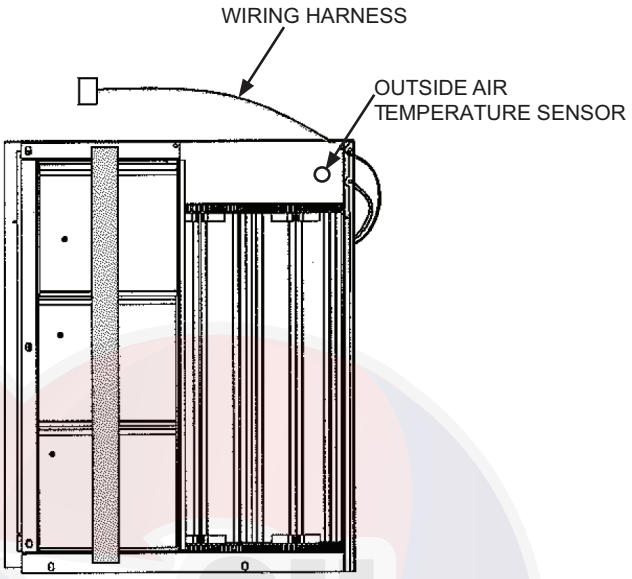


Fig. 50 — EconoMi$er X Component Locations

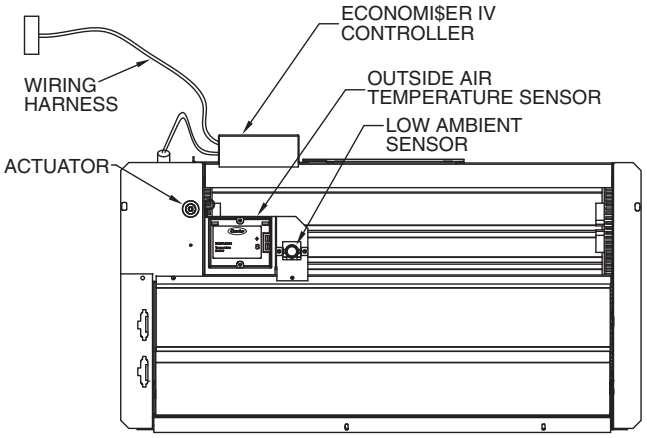


Fig. 51 — EconoMi$er IV Component Locations

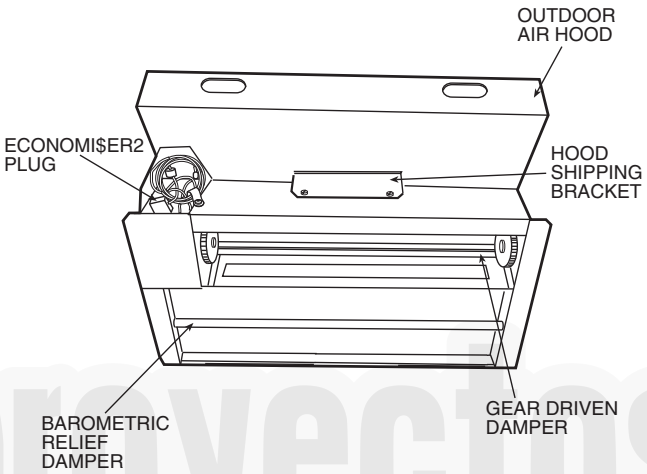


Fig. 52 — EconoMi$er2 Component Locations

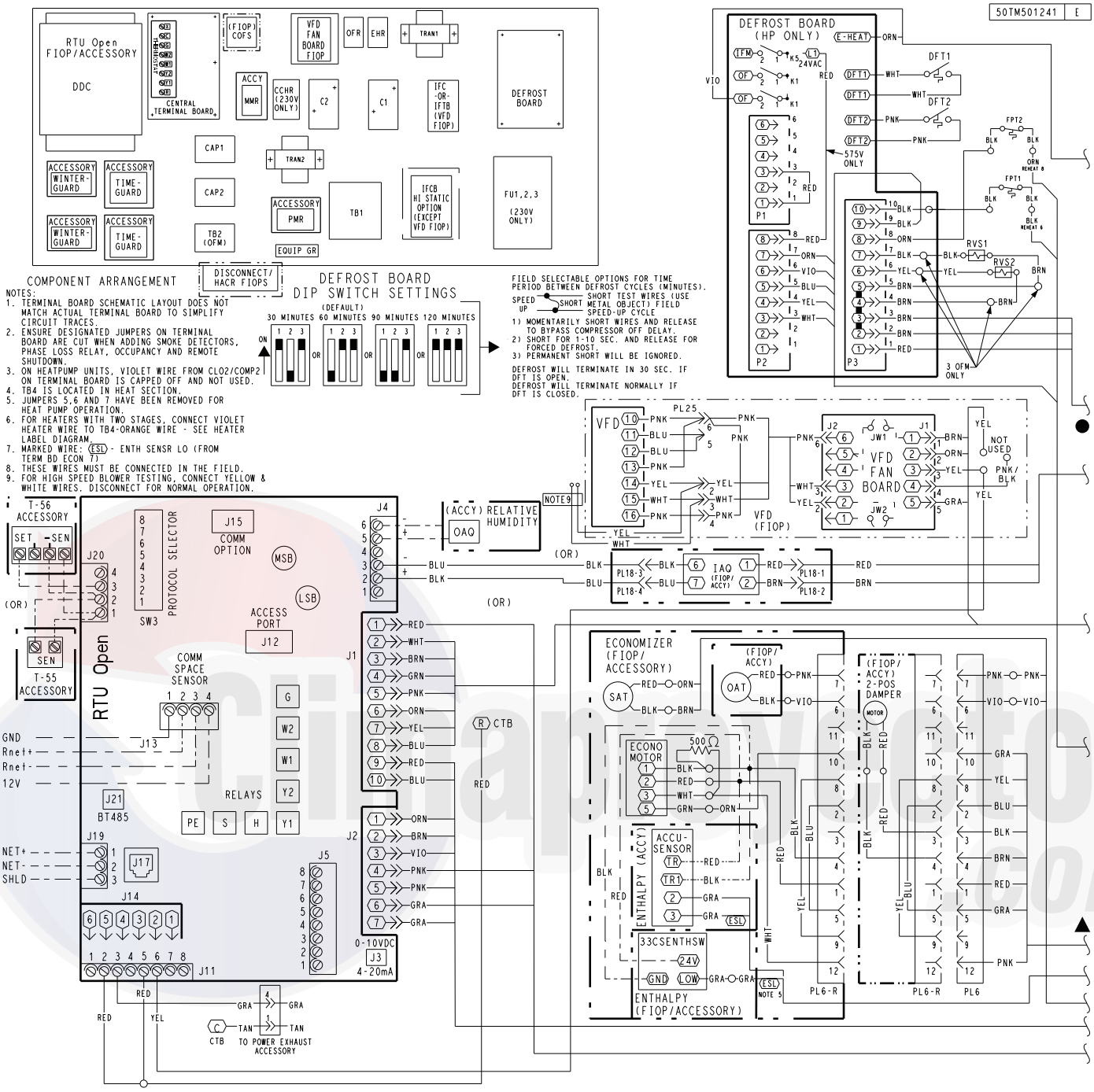


Fig. 53 — RTU Open Overlay for Economizer Wiring

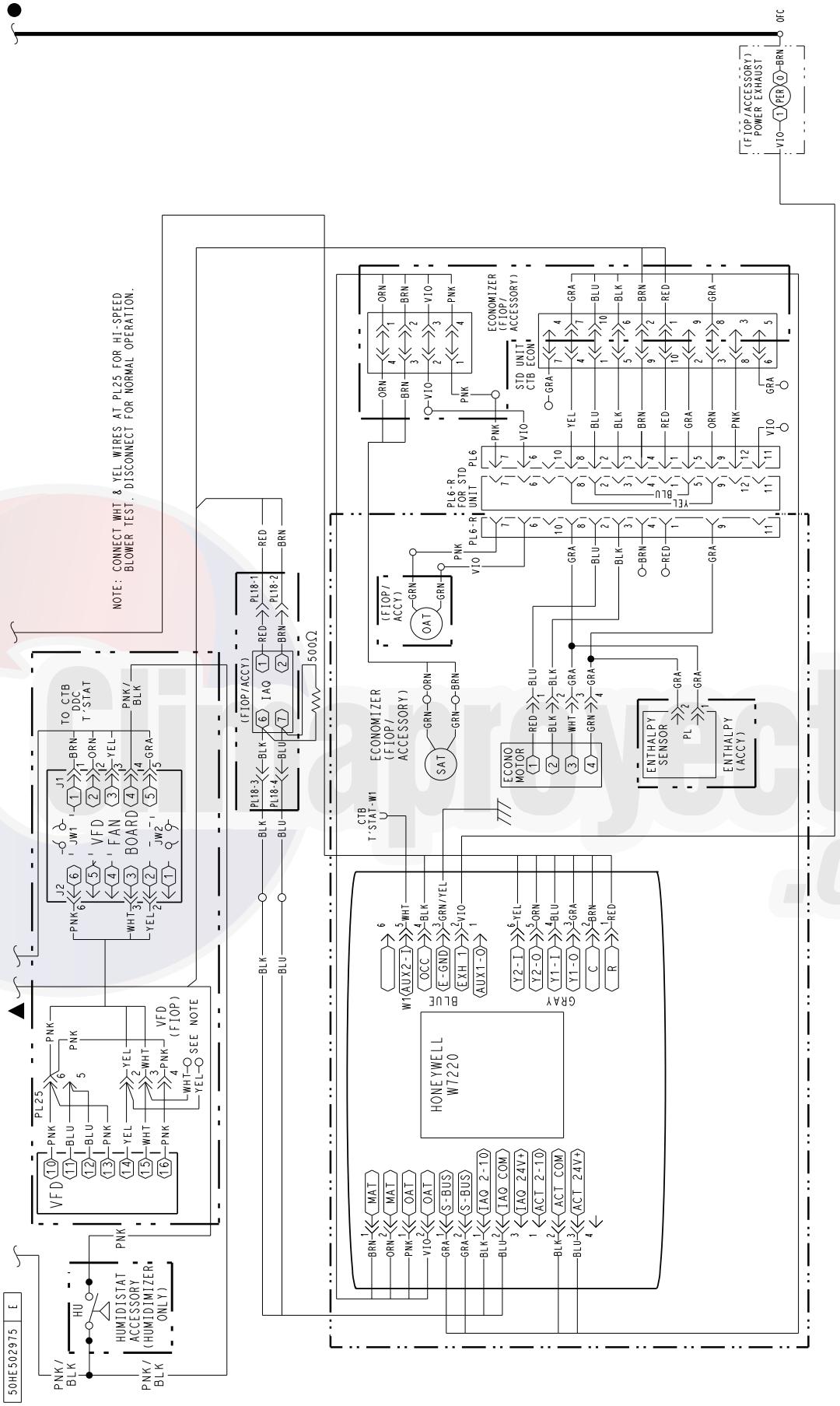


Fig. 54 — VFD Overlay for W2770 Controller Wiring

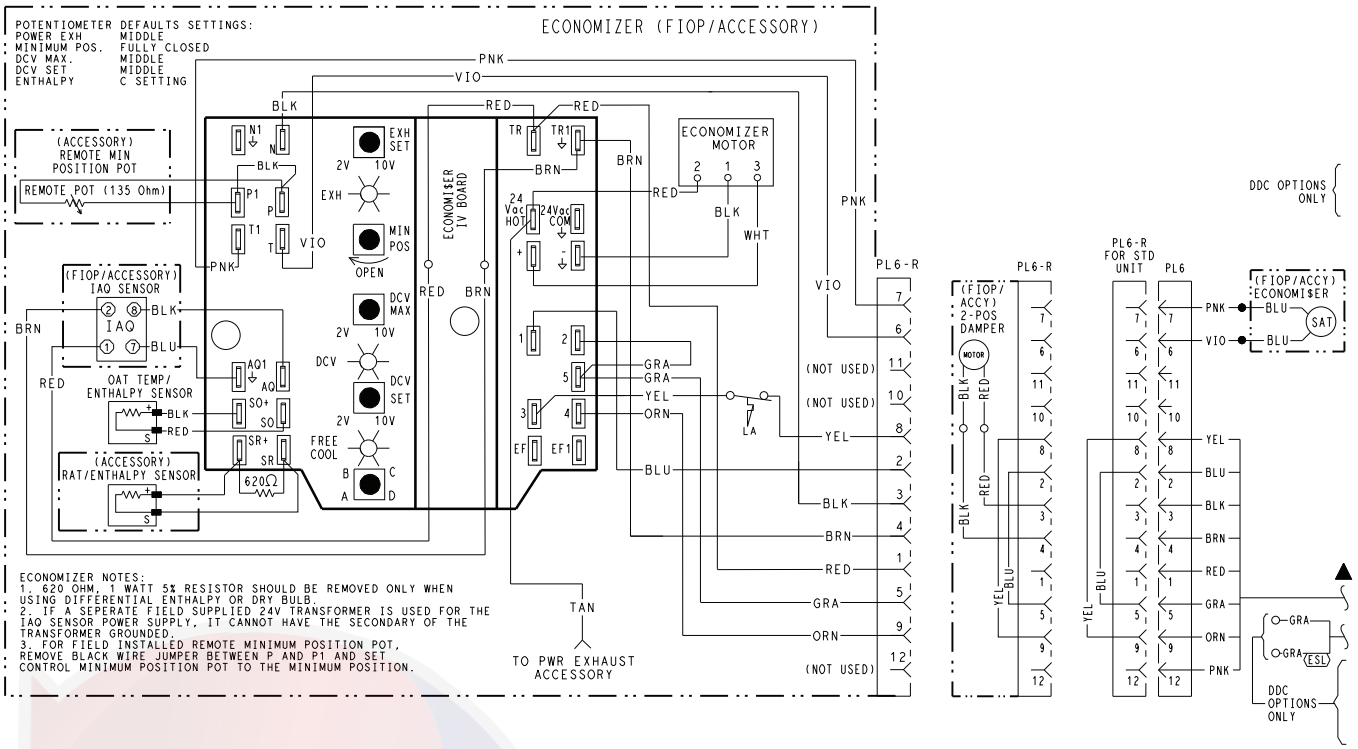


Fig. 55 — EconoMi$er IV Wiring

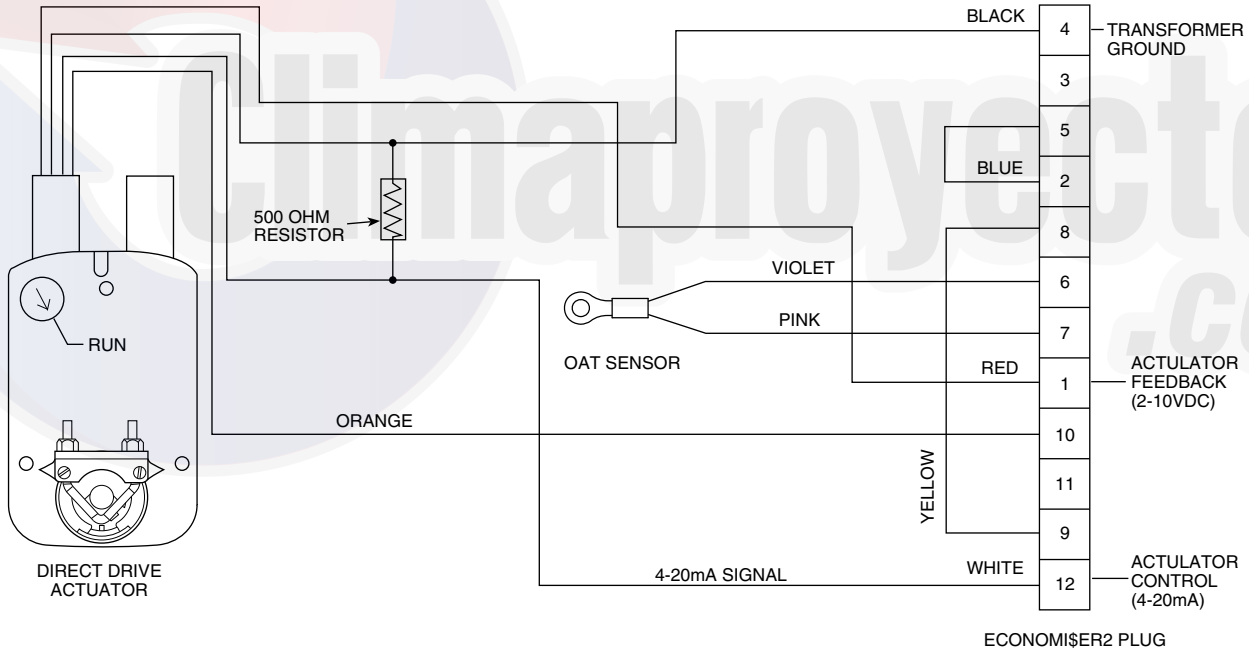


Fig. 56 — EconoMi$er2 with 4 to 20 mA Control Wiring

Table 13 — EconoMi$er IV Input/Output Logic

INPUTS					OUTPUTS			
Demand Controlled Ventilation (DCV)	Enthalpy*		Y1	Y2	Compressor		N Terminal†	
	Outdoor	Return			Stage 1	Stage 2	Occupied	Unoccupied
							Damper	
Below set (DCV LED off)	High (Free Cooling LED off)	Low	On	On	On	On	Minimum position	Closed
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED on)	High	On	On	On	Off	Modulating** (between min. position and full-open)	Modulating** (between closed and full-open)
			On	Off	Off	Off		
			Off	Off	Off	Off	Minimum position	Closed
Above set (DCV LED on)	High (Free Cooling LED off)	Low	On	On	On	On	Modulating†† (between min. position and DCV maximum)	Modulating†† (between closed and DCV maximum)
			On	Off	On	Off		
			Off	Off	Off	Off		
	Low (Free Cooling LED on)	High	On	On	On	Off	Modulating***	Modulating†††
			On	Off	Off	Off		
			Off	Off	Off	Off		

* For single enthalpy control, the module compares outdoor enthalpy to the ABCD set point.
† Power at N terminal determines Occupied/Unoccupied setting: 24 vac (Occupied), no power (Unoccupied).
** Modulation is based on the supply-air sensor signal.
†† Modulation is based on the DCV signal.
*** Modulation is based on the greater of DCV and supply-air sensor signals, between minimum position and either maximum position (DCV) or fully open (supply-air signal).
††† Modulation is based on the greater of DCV and supply-air sensor signals, between closed and either maximum position (DCV) or fully open (supply-air signal).

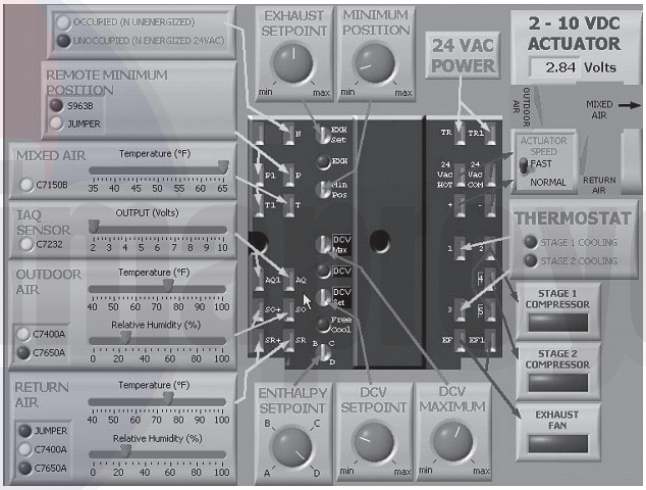


Fig. 57 — EconoMi$er IV Functional View

EconoMi$er IV

Table 13 provides a summary of EconoMi$er IV logic. Troubleshooting instructions are enclosed.

A functional view of the EconoMi$er is shown in Fig. 57. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$er IV simulator program is available from Carrier to help with EconoMi$er IV training and troubleshooting.

ECONOMI$ER IV STANDARD SENSORS

Outdoor Air Temperature (OAT) Sensor

The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV in the outdoor airstream. (See Fig. 58.) The operating range of temperature measurement is 40°F to 100°F (4°C to 38°C). See Fig. 60.

Supply Air Temperature (SAT) Sensor

The supply air temperature sensor is a 3 K thermistor located at the inlet of the indoor fan. (See Fig. 58.) This sensor is factory installed. The operating range of temperature measurement is 0° to 158°F (–18°C to 70°C). See Table 14 for sensor temperature and resistance values.

Table 14 — Thermistor Resistance vs Temperature Values for Space Temperature Sensor, Supply Air Temperature Sensor, and Outdoor Air Temperature Sensor

TEMP (°C)	TEMP (°F)	RESISTANCE (ohms)
-40	-40	335,651
-35	-31	242,195
-30	-22	176,683
-25	-13	130,243
-20	-4	96,974
-15	5	72,895
-10	14	55,298
-5	23	42,315
0	32	32,651
5	41	25,395
10	50	19,903
15	59	15,714
20	68	12,494
25	77	10,000
30	86	8,056
35	95	6,530
40	104	5,325
45	113	4,367
50	122	3,601
55	131	2,985
60	140	2,487
65	149	2,082
70	158	1,752

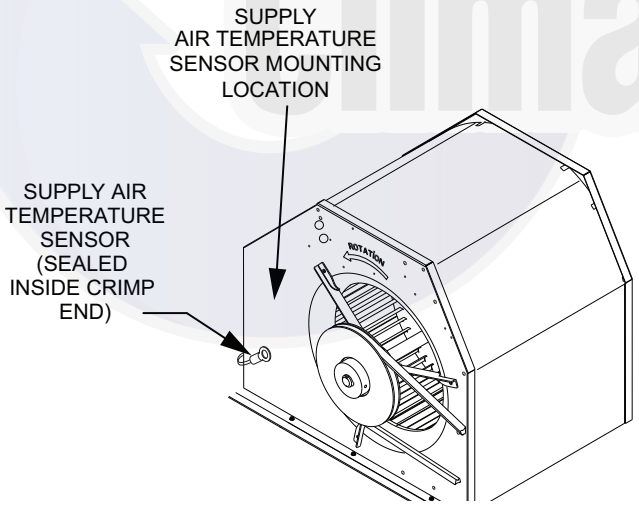


Fig. 58 — Supply Air Sensor Location

The temperature sensor looks like an eyelet terminal with wires running to it. The sensor is located in the "crimp end" and is sealed from moisture.

Outdoor Air Lockout Sensor

The EconoMi$er IV is equipped with an ambient temperature lockout switch located in the outdoor airstream which is used to lock out the compressors below a 42°F (6°C) ambient temperature. (See Fig. 51.)

ECONOMI$ER IV CONTROL MODES

IMPORTANT: The optional EconoMi$er2 does not include a controller. The EconoMi$er2 is operated by a 4 to 20 mA signal from an existing field-supplied controller. See Fig. 52 for wiring information.

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. The EconoMi$er IV is supplied from the factory with a supply-air temperature sensor and an outdoor-air temperature sensor. This allows for operation of the EconoMi$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit.

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$er IV will adjust the outside air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outside air dampers will be controlled to provided free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. (See Fig. 59.) The scale on the potentiometer is A, B, C, and D. See Fig. 60 for the corresponding temperature changeover values.

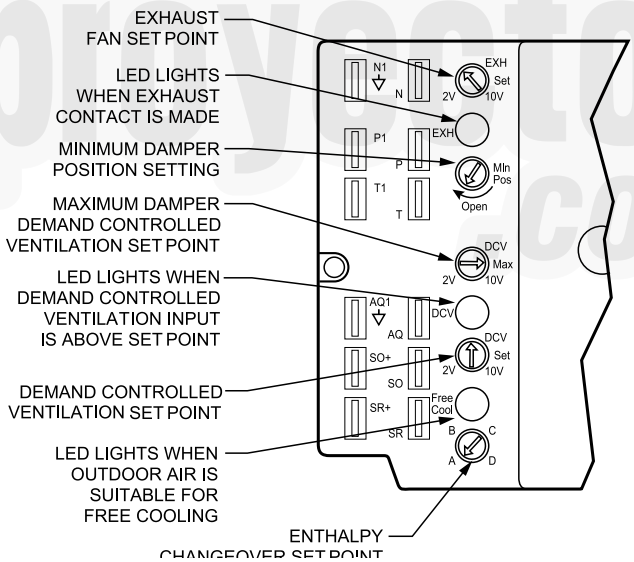


Fig. 59 — EconoMi$er IV Controller Potentiometer and LED Locations

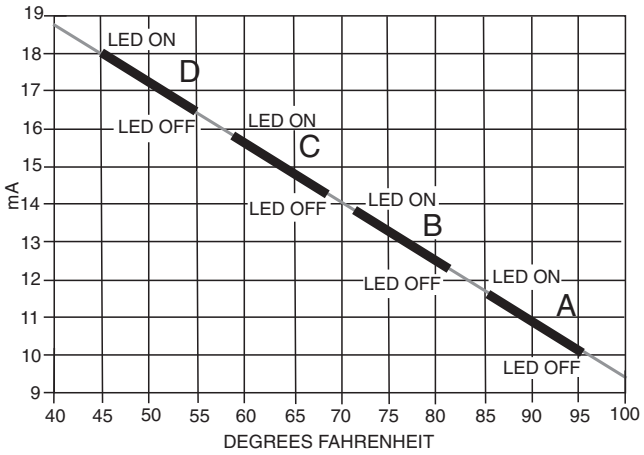


Fig. 60 — Outside Air Temperature Changeover Set Points

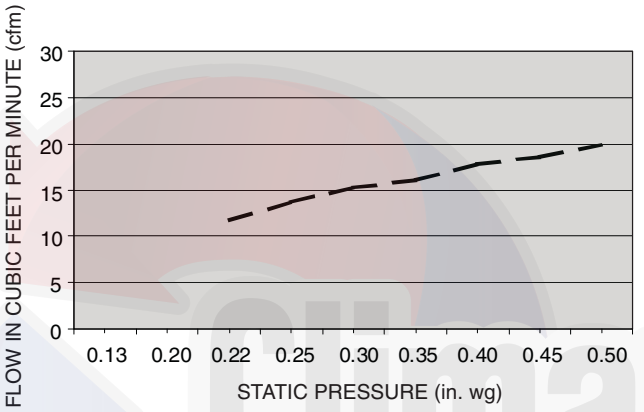


Fig. 61 — Outdoor-Air Damper Leakage

Differential Dry Bulb Control

For differential dry bulb control, the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. (See Fig. 62.) Wiring is provided in the EconoMi$er IV wiring harness.

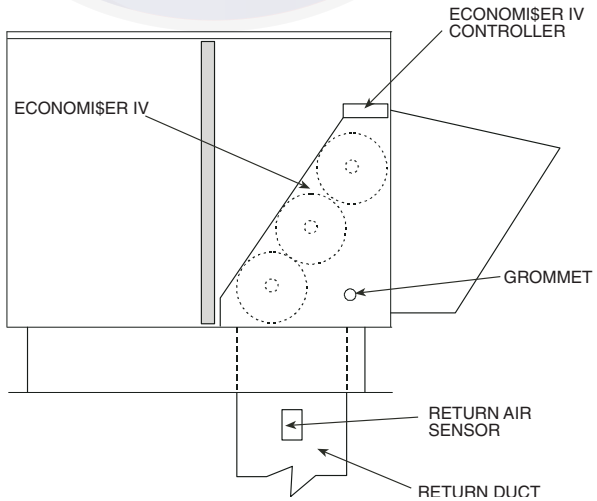


Fig. 62 — Return-Air Temperature or Enthalpy Sensor Mounting Location

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting. (See Fig. 59.)

Outdoor Enthalpy Changeover

For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. (See Fig. 62.) When the outdoor air enthalpy rises above the outdoor enthalpy changeover set point, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. The set points are A, B, C, and D. (See Fig. 63.) The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMi$er IV controller.

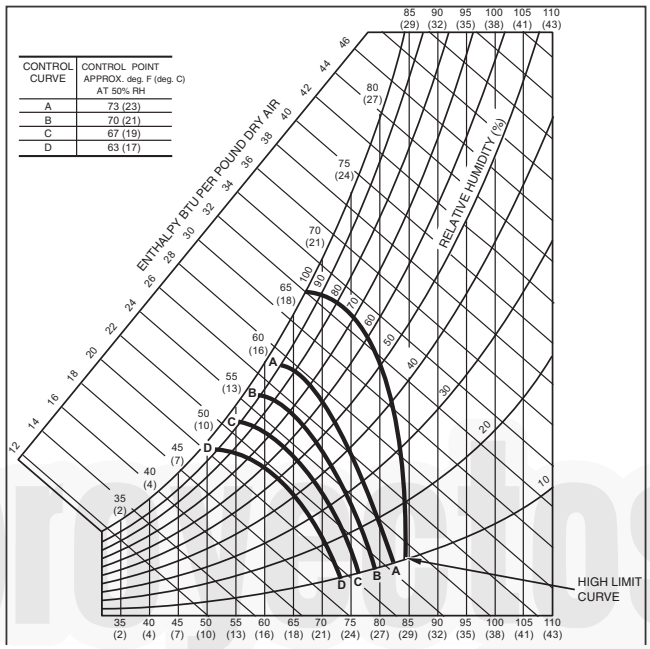


Fig. 63 — Enthalpy Changeover Set Points

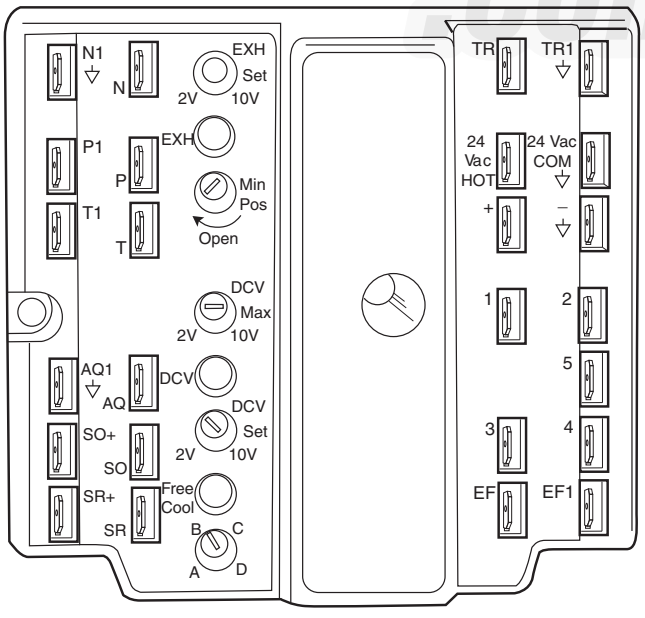


Fig. 64 — EconoMi$er IV Control

Differential Enthalpy Control

For differential enthalpy control, the EconoMi$er IV controller uses two enthalpy sensors (HH57AC078 and CRENTDIF004A00), one in the outside air and one in the return air

duct. The EconoMi$er IV controller compares the outdoor air enthalpy to the return air enthalpy to determine EconoMi$er IV use. The controller selects the lower enthalpy air (return or outdoor) for cooling. For example, when the outdoor air has a lower enthalpy than the return air, the EconoMi$er IV opens to bring in outdoor air for free cooling.

Replace the standard outside air dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. (See Fig. 51.) Mount the return air enthalpy sensor in the return air duct. (See Fig. 62.) Wiring is provided in the EconoMi$er IV wiring harness. (See Fig. 51.) The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

Indoor Air Quality (IAQ) Sensor Input

The IAQ input can be used for demand control ventilation control based on the level of CO_2 measured in the space or return air duct.

Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined set point. (See Fig. 65.)

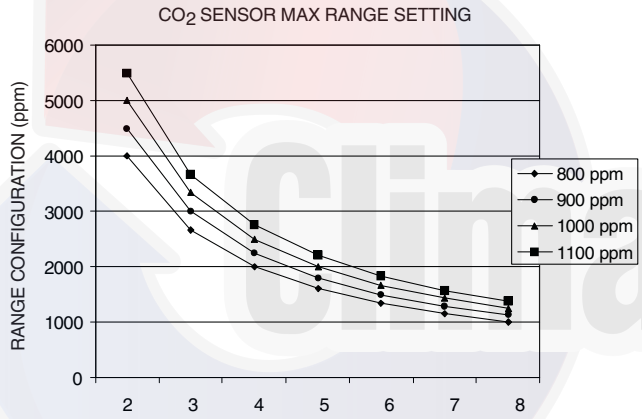


Fig. 65 — CO_2 Sensor Maximum Range Settings

If a separate field-supplied transformer is used to power the IAQ sensor, the sensor must not be grounded or the EconoMi$er IV control board will be damaged.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compounds) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Exhaust Set Point Adjustment

The exhaust set point will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The set point is modified with the Exhaust Fan Set Point (EXH SET) potentiometer. (See Fig. 59.) The set point represents the damper position above which the exhaust fans will be turned on. When there is a call for exhaust, the EconoMi$er IV controller provides a 45 ± 15 second delay before exhaust fan activation to allow the dampers to open. This delay allows the damper to reach the appropriate position to avoid unnecessary fan overload.

Minimum Position Control

There is a minimum damper position potentiometer on the EconoMi$er IV controller. (See Fig. 59.) The minimum damper position maintains the minimum airflow into the building during the occupied period.

When using demand ventilation, the minimum damper position represents the minimum ventilation position for VOC (volatile organic compound) ventilation requirements. The maximum demand ventilation position is used for fully occupied ventilation.

When demand ventilation control is not being used, the minimum position potentiometer should be used to set the occupied ventilation position. The maximum demand ventilation position should be turned fully clockwise.

Adjust the minimum position potentiometer to allow the minimum amount of outdoor air, as required by local codes, to enter the building. Make minimum position adjustments with at least 10°F temperature difference between the outdoor and return-air temperatures.

To determine the minimum position setting, perform the following procedure:

1. Calculate the appropriate mixed air temperature using the following formula:

$$(T_O \times \frac{OA}{100}) + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

As an example, if local codes require 10% outdoor air during occupied conditions, outdoor-air temperature is 60°F, and return-air temperature is 75°F.

(60 x 0.10) + (75 x 0.90) = 73.5°F

2. Disconnect the supply air sensor from terminals T and T1.
3. Ensure that the factory-installed jumper is in place across terminals P and P1. If remote damper positioning is being used, make sure that the terminals are wired according to Fig. 50 and that the minimum position potentiometer is turned fully clockwise.
4. Connect 24 vac across terminals TR and TR1.
5. Carefully adjust the minimum position potentiometer until the measured mixed air temperature matches the calculated value.
6. Reconnect the supply air sensor to terminals T and T1.

Remote control of the EconoMi$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell part number S963B1128) is wired to the EconoMi$er IV controller, the minimum position of the damper can be controlled from a remote location.

To control the minimum damper position remotely, remove the factory-installed jumper on the P and P1 terminals on the EconoMi$er IV controller. Wire the field-supplied potentiometer to the P and P1 terminals on the EconoMi$er IV controller. (See Fig. 64.)

Damper Movement

Damper movement from full open to full closed (or vice versa) takes $2^1/_2$ minutes.

Thermostats

The EconoMi$er IV control works with conventional thermostats that have a Y1 (cool stage 1), Y2 (cool stage 2), W1 (heat stage 1), W2 (heat stage 2), and G (fan). The EconoMi$er IV control does not support space temperature sensors. Connections are made at the thermostat terminal connection board located in the main control box.

Occupancy Control

The factory default configuration for the EconoMi$er IV control is occupied mode. Occupied status is provided by the black jumper from terminal TR to terminal N. When unoccupied mode is desired, install a field-supplied timeclock function in place of the jumper between TR and N. When the timeclock contacts are closed, the EconoMi$er IV control will be in occupied mode. When the timeclock contacts are open (removing the 24-v signal from terminal N), the EconoMi$er IV will be in unoccupied mode.

Demand Control Ventilation (DCV)

When using the EconoMi$er IV for demand controlled ventilation, there are some equipment selection criteria which should be considered. When selecting the heat capacity and cool capacity of the equipment, the maximum ventilation rate must be evaluated for design conditions. The maximum damper position must be calculated to provide the desired fresh air.

Typically the maximum ventilation rate will be about 5% to 10% more than the typical cfm required per person, using normal outside air design criteria.

A proportional anticipatory strategy should be taken with the following conditions: a zone with a large area, varied occupancy, and equipment that cannot exceed the required ventilation rate at design conditions. Exceeding the required ventilation rate means the equipment can condition air at a maximum ventilation rate that is greater than the required ventilation rate for maximum occupancy. A proportional-anticipatory strategy will cause the fresh air supplied to increase as the room CO_2 level increases even though the CO_2 set point has not been reached. By the time the CO_2 level reaches the set point, the damper will be at maximum ventilation and should maintain the set point.

In order to have the CO_2 sensor control the economizer damper in this manner, first determine the damper voltage output for minimum or base ventilation. Base ventilation is the ventilation required to remove contaminants during unoccupied periods. The following equation may be used to determine the percent of outside air entering the building for a given damper position. For best results, there should be at least a 10 degree difference in outside and return-air temperatures.

$$(T_O \times \frac{OA}{100}) + (T_R \times \frac{RA}{100}) = T_M$$

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

Once base ventilation has been determined, set the minimum damper position potentiometer to the correct position.

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 65 to determine the maximum setting of the CO_2 sensor. For example, an 1100 ppm set point relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 65 to find the point when the CO_2 sensor output will be 6.7 volts. Line up the point on thegraph with the left side of the chart to determine that the range configuration for the CO_2 sensor should be 1800 ppm. The EconoMi$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

Once the fully occupied damper position has been determined, set the maximum damper demand control ventilation potentiometer to this position. Do not set to the maximum position as this can result in over-ventilation to the space and potential high humidity levels.

CO_2 Sensor Configuration

The CO_2 sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up. (See Table 15.)

Use setting 1 or 2 for Carrier equipment. (See Table 15.)

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.

Table 15 — EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER WITH OUTDOOR AIR DRY BULB SENSOR		
	Accessories Required		
Outdoor Air Dry Bulb	None. The outdoor-air dry bulb sensor is factory-installed.		
Differential Dry Bulb	CRTEMPSN002A00*		
Single Enthalpy	HH57AC078		
Differential Enthalpy	HH57AC078 and CRENTDIF004A00*		
CO_2 for DCV Control using a wall-mounted CO_2 sensor	33ZCSENCO2		
CO_2 for DCV Control using a duct-mounted CO_2 sensor	33ZCSENCO2† and 33ZCASPCO2**	OR	CRCBDIOX005A00††

* CRENTDIF004A00 and CRTEMPSN002A00 accessories are used on many different base units. As such, these kits may contain parts that will not be needed for installation.
† 33ZCSENCO2 is an accessory CO_2 sensor.
** 33ZCASPCO2 is an accessory aspirator box required for duct-mounted applications.
†† CRCBDIOX005A00 is an accessory that contains both 33ZCSENCO2 and 33ZCASPCO2 accessories.

3. Use the Up/Down button to select the preset number. (See Table 15.)
4. Press Enter to lock in the selection.
5. Press Mode to exit and resume normal operation.

The custom settings of the CO_2 sensor can be changed anytime after the sensor is energized. Follow the steps below to change the non-standard settings:

1. Press Clear and Mode buttons. Hold at least 5 seconds until the sensor enters the Edit mode.
2. Press Mode twice. The STDSET Menu will appear.
3. Use the Up/Down button to toggle to the NONSTD menu and press Enter.
4. Use the Up/Down button to toggle through each of the nine variables, starting with Altitude, until the desired setting is reached.
5. Press Mode to move through the variables.
6. Press Enter to lock in the selection, then press Mode to continue to the next variable.

Dehumidification of Fresh Air with DCV (Demand Controlled Ventilation) Control

If normal rooftop heating and cooling operation is not adequate for the outdoor humidity level, an energy recovery unit and/or a dehumidification option should be considered.

ECONOMI$ER IV PREPARATION

This procedure is used to prepare the EconoMi$er IV for troubleshooting. No troubleshooting or testing is done by performing the following procedure.

NOTE: This procedure requires a 9-v battery, 1.2 kilo-ohm resistor, and a 5.6 kilo-ohm resistor which are not supplied with the EconoMi$er IV.

IMPORTANT: Be sure to record the positions of all potentiometers before starting troubleshooting.

1. Disconnect power at TR and TR1. All LEDs should be off. Exhaust fan contacts should be open.
2. Disconnect device at P and P1.
3. Jumper P to P1.
4. Disconnect wires at T and T1. Place 5.6 kilo-ohm resistor across T and T1.
5. Jumper TR to 1.
6. Jumper TR to N.
7. If connected, remove sensor from terminals SO and +. Connect 1.2 kilo-ohm 4074EJM checkout resistor across terminals SO and +.
8. Put 620-ohm resistor across terminals SR and +.
9. Set minimum position, DCV set point, and exhaust potentiometers fully CCW (counterclockwise).
10. Set DCV maximum position potentiometer fully CW (clockwise).
11. Set enthalpy potentiometer to D.
12. Apply power (24 vac) to terminals TR and TR1.

DIFFERENTIAL ENTHALPY

To check differential enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Place 620-ohm resistor across SO and +.
3. Place 1.2 kilo-ohm resistor across SR and +. The Free Cool LED should be lit.
4. Remove 620-ohm resistor across SO and +. The Free Cool LED should turn off.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

SINGLE ENTHALPY

To check single enthalpy:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the enthalpy potentiometer to A (fully CCW). The Free Cool LED should be lit.
3. Set the enthalpy potentiometer to D (fully CW). The Free Cool LED should turn off.
4. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV (DEMAND CONTROLLED VENTILATION) AND POWER EXHAUST

To check DCV and Power Exhaust:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90% and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV set point potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9-v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV MINIMUM AND MAXIMUM POSITION

To check the DCV minimum and maximum position:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90% and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20% and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20% and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

SUPPLY-AIR SENSOR INPUT

To check supply-air sensor input:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Set the Enthalpy potentiometer to A. The Free Cool LED turns on. The actuator should drive to between 20% and 80% open.
3. Remove the 5.6 kilo-ohm resistor and jumper T to T1. The actuator should drive fully open.
4. Remove the jumper across T and T1. The actuator should drive fully closed.
5. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

ECONOMI$ER IV TROUBLESHOOTING COMPLETION

This procedure is used to return the EconoMi$er IV to operation. No troubleshooting or testing is done by performing the following procedure.

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV set point, and exhaust potentiometers to previous settings.
5. Remove 620-ohm resistor from terminals SR and +.
6. Remove 1.2 kilo-ohm checkout resistor from terminals SO and +. If used, reconnect sensor from terminals SO and +.
7. Remove jumper from TR to N.
8. Remove jumper from TR to 1.
9. Remove 5.6 kilo-ohm resistor from T and T1. Reconnect wires at T and T1.
10. Remove jumper from P to P1. Reconnect device at P and P1.
11. Apply power (24 vac) to terminals TR and TR1.

Economi$er® X (Factory Option)

The EconoMi$er X system is an expandable economizer control system, which includes a W7220 economizer module (controller) with an LCD and keypad (See Fig. 66). The W7220 can be configured with optional sensors.

Fig. 66 — W7220 Economizer Module

The W7220 economizer module can be used as a stand-alone economizer module wired directly to a commercial set-back space thermostat and sensors to provide outside air dry-bulb economizer control.

The W7220 economizer module can be connected to optional sensors for single or differential enthalpy control. The W7220 economizer module provides power and communications for the sensors.

The W7220 economizer module automatically detects sensors by polling to determine which sensors are present. If a sensor loses communications after it has been detected, the W7220 economizer controller indicates a device fail error on its LCD.

SYSTEM COMPONENTS

The EconoMi$er X system includes an economizer module, 20k mixed air sensor, damper actuator, and either a 20k outdoor air temperature sensor or S-Bus enthalpy sensors.

Economizer Module

The module is the core of the EconoMi$er X system. The module is mounted in the unit's control box, and includes the user interface for the system. The W7220 economizer module provides the basic inputs and outputs to provide simple economizer control. When used with the optional sensors, the economizer module provides more advanced economizer functionality.

S-Bus Enthalpy Control Sensors

The sensor is a combination temperature and humidity sensor which is powered by and communicates on the S-Bus. Up to three sensors may be configured with the W7220 economizer module.

CO_2 Sensor (optional)

The sensor can be added for Demand Controlled Ventilation (DCV).

SPECIFICATIONS

W7220 Economizer Module

The module is designed for use with 2 to 10 vdc or bus communicating actuator. The module includes terminals for CO_2 sensor, Mixed Air sensor, and an Outdoor Dry Bulb sensor. Enthalpy and other options are available with bus sensors.

User Interface

Provides status for normal operation, setup parameters, checkout tests, and alarm and error conditions with a 2-line 16 character LCD display and four button keypad.

Electrical

- Rated Voltage — 20 to 30 vac RMS, 50/60 Hz
- Transformer — 100 va maximum system input
- Nominal Power Consumption (at 24 vac, 60 Hz) — 11.5 VA without sensors or actuators
- Relay Digital Output Rating at 30 vac (maximum power from Class 2 input only) — 1.5A run:
  3.5A inrush at 0.45PF (200,000 cycles) or
  7.5A inrush at 0.45PF (100,000 cycles)
- External Sensors Power Output — 21 vdc ± 5% at 48mA

IMPORTANT: All inputs and outputs must be Class 2 wiring.

INPUTS

Sensors

NOTE: A Mixed Air (MA) analog sensor is required on all W7220 units; either an Outdoor Air (OA) sensor for dry bulb change over or an OA bus sensor for outdoor enthalpy change over is required in addition to the MA sensor. An additional Return Air (RA) bus sensor can be added to the system for differential enthalpy or dry bulb changeover. For differential dry bulb changeover a 20k ohm sensor is required in the OA and a bus sensor in the RA. DIP switch on RA bus sensor must be set in the RA position.

Dry Bulb Temperature (optional) and Mixed Air (required), 20k NTC

2-wire (18 to 22 AWG);

Temperature range –40°F to 150°F (–40°C to 65°C)

Temperature accuracy: 0°F/+2°F

Temperature and Humidity, C7400S1000 (optional)

S-Bus; 2-wire (18 to 22 AWG)

Temperature: range –40°F to 150°F (–40°C to 65°C)

Temperature accuracy: 0°F/+2°F

Humidity: range 0 to 100% RH with 5% accuracy.

NOTE: Up to three (3) S-Bus sensors may be connected to the W7220 economizer module for outdoor air (OA), return air (RA) and discharge (supply) air (DA).

4 Binary Inputs

1-wire 24 vac + common GND (see page 44 for wiring details).

24 vac power supply

20 to 30 vac 50/60Hz; 100 VA Class 2 transformer.

OUTPUTS

Actuator Signal

2 to 10 vdc; minimum actuator impedance is 2k ohm; bus two-wire output for bus communicating actuators.

Exhaust fan, Y1, Y2 and AUX1 O

All Relay Outputs (at 30 vac):

Running: 1.5A maximum

Inrush: 7.5A maximum

ENVIRONMENTAL

Operating Temperature

–40°F to 150°F (–40°C to 65°C).

Exception of display operation down to –4°F with full recovery at –4°F from exposure to –40°F

Storage Temperature

–40°F to 150°F (–40°C to 65°C)

Shipping Temperature

–40°F to 150°F (–40°C to 65°C)

Relative Humidity

5% to 95% RH non-condensing

ECONOMIZER MODULE WIRING DETAILS

Use Fig. 67 and Tables 16 and 17 to locate the wiring terminals for the Economizer module.

NOTE: The four terminal blocks are removable. Slide out each terminal block, wire it, and then slide it back into place.

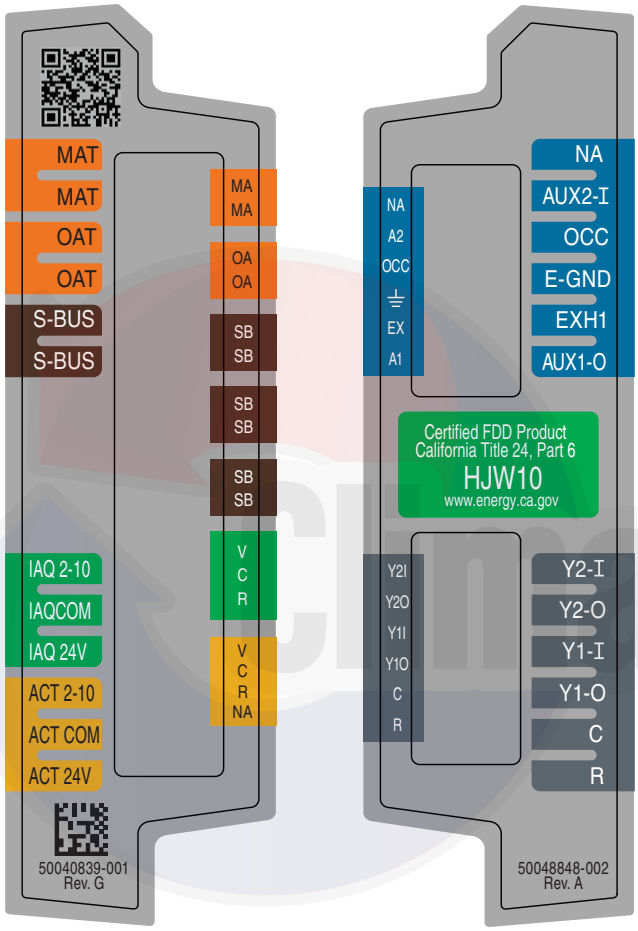


Fig. 67 — W7220 Wiring Terminals

Table 16 — Economizer Module - Left Hand Terminal Blocks

LABEL	TYPE	DESCRIPTION
Top Left Terminal Block		
MAT MAT	20k NTC and COM	Mixed Air Temperature Sensor (Polarity Insensitive Connection)
OAT OAT	20k NTC and COM	Outdoor Air Temperature Sensor (Polarity Insensitive Connection)
S-BUS S-BUS	S-BUS (Sylk* Bus)	Enthalpy Control Sensor (Polarity Insensitive Connection)
Bottom Left Terminal Block		
IAQ 2-10	2-10 vdc	Air Quality Sensor Input (e.g. CO_2 sensor)
IAQ COM	COM	Air Quality Sensor Common
IAQ 24V	24 vac	Air Quality Sensor 24 vac Source
ACT 2-10	2-10 vdc	Damper Actuator Output (2-10 vdc)
ACT COM	COM	Damper Actuator Output Common
ACT 24v	24 vac	Damper Actuator 24 vac Source

*Sylk is a trademark of Honeywell International Inc.

Table 17 — Economizer Module - Right Hand Terminal Blocks

LABEL	TYPE	DESCRIPTION
Top Right Terminal Blocks		
AUX2 I	24 vac IN	The first terminal is not used.
OCC	24 vac IN	Shut Down (SD) or HEAT (W) Conventional only and Heat Pump Changeover (O-B) in Heat Pump mode.
E-GND	E-GND	Occupied/Unoccupied Input
EXH1	24 vac OUT	Exhaust Fan 1 Output
AUX1 O	24 vac OUT	Programmable: Exhaust fan 2 output or ERV or System alarm output
Bottom Right Terminal Blocks		
Y2-I	24 vac IN	Y2 in - Cooling Stage 2 Input from space thermostat
Y2-O	24 vac OUT	Y2 out - Cooling Stage 2 Output to stage 2 mechanical cooling
Y1-I	24 vac IN	Y1 in - Cooling Stage 2 Input from space thermostat
Y1-O	24 vac OUT	Y1 out - Cooling Stage 2 Output to stage 2 mechanical cooling
C	COM	24 vac Common
R	24 vac	24 vac Power (hot)

S-Bus Sensor Wiring

The labels on the sensors and controller are color coded for ease of installation. Orange labeled sensors can only be wired to orange terminals on the controller. Brown labeled sensors can only be wired to S-bus (brown) terminals. Use Fig. 68 and Table 18 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 67 and Table 18 to locate the wiring terminals for each enthalpy control sensor.

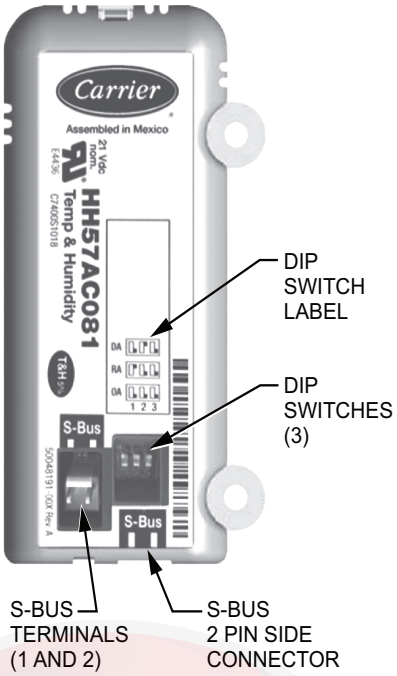


Fig. 68 — S-Bus Sensor DIP Switches

Table 18 — HH57AC081 Sensor Wiring Terminations

TERMINAL		TYPE	DESCRIPTION
NUMBER	LABEL		
1	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)
2	S-BUS	S-BUS	S-BUS Communications (Enthalpy Control Sensor Bus)

Use Fig. 68 and Table 19 to set the DIP switches for the desired use of the sensor.

Table 19 — HH57AC081 Sensor DIP Switch

USE	DIP SWITCH POSITIONS FOR SWITCHES 1, 2, AND 3		
	1	2	3
DA	OFF	ON	OFF
RA	ON	OFF	OFF
OA	OFF	OFF	OFF

NOTE: When an S-Bus sensor is connected to an existing network, it will take 60 minutes for the network to recognize and auto-configure itself to use the new sensor.

During the 60-minute setup period, no alarms for sensor failures (except SAT) will be issued and no economizing function will be available.

CO_2 Sensor Wiring

When using a CO_2 sensor, the black and brown common wires are internally connected and only one is connected to "IAQ COM" on the W7220. Use the power from the W7220 to power the CO_2 sensor OR make sure the ground for the power supplies are common. See Fig. 69 for CO_2 sensor wiring.

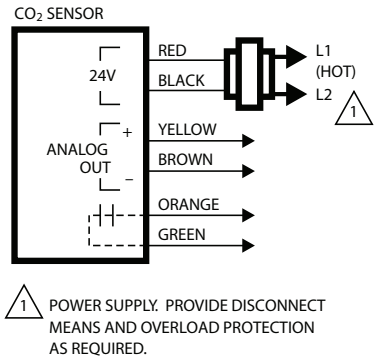


Fig. 69 — CO_2 Sensor Wiring

INTERFACE OVERVIEW

This section describes how to use the EconoMi$er® user interface for:

- Keypad and menu navigation
- Settings and parameter changes
- Menu structure and selection

User Interface

The user interface consists of a 2-line LCD display and a 4-button keypad on the front of the economizer controller.

Keypad

Use the four navigation buttons (see Fig. 70) to scroll through the menus and menu items, select menu items, and to change parameter and configuration settings.

To use the keypad when working with menus:

- Press the ▲ (Up arrow) button to move to the previous menu.
- Press the ▼ (Down arrow) button to move to the next menu.
- Press the ↵ (Enter) button to display the first item in the currently displayed menu.

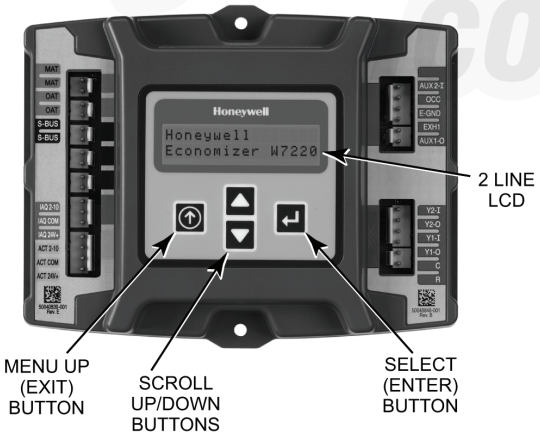


Fig. 70 — W7220 Controller Navigation Buttons

Press the ⓘ (Menu Up/Exit) button to exit a menu's item and return to the list of menus. To use the keypad when working with Setpoints, System and Advanced Settings, Checkout tests and Alarms:

1. Navigate to the desired menu.
2. Press the ↵ (Enter) button to display the first item in the currently displayed menu.
3. Use the ▲ and ▼ buttons to scroll to the desired parameter.
4. Press the ↵ (Enter) button to display the value of the currently displayed item.

5. Press the ▲ button to increase (change) the displayed parameter value.
6. Press the ▼ button to decrease (change) the displayed parameter value.

NOTE: When values are displayed, pressing and holding the ▲or ▼ button causes the display to automatically increment or decrement.

1. Press the ↵ (Enter) button to accept the displayed value and store it in nonvolatile RAM. “CHANGE STORED” displays.
2. Press the ↵ (Enter) button to return to the current menu parameter.
3. Press the ⓘ (Menu Up/Exit) button to return to the previous menu.

Menu Structure

Table 20 illustrates the complete hierarchy of menus and parameters for the EconoMi$er® X system.

The Menus in display order are:

- STATUS
- SETPOINTS
- SYSTEM SETUP
- ADVANCED SETUP
- CHECKOUT
- ALARMS

NOTE: Some parameters in the menus use the letters MA or MAT, indicating a mixed air temperature sensor location before the cooling coil. This unit application has the control sensor located after the cooling coil, in the fan section, where it is designated as (Cooling) Supply Air Temperature or SAT sensor.

SETUP AND CONFIGURATION

Before being placed into service, the W7220 Economizer module must be set up and configured for the installed system.

IMPORTANT: During setup, the economizer module is live at all times.

The setup process uses a hierarchical menu structure that is easy to use. Press the ▲ and ▼ arrow buttons to move forward and backward through the menus and press the button to select and confirm setup item changes.

Time-Out and Screensaver

When no buttons have been pressed for 10 minutes, the LCD displays a screen saver, which cycles through the Status items. Each Status items displays in turn and cycles to the next item after 5 seconds.

Table 20 — W7220 Menu Structure*

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
STATUS	ECON AVAIL	NO	YES/NO	FIRST STAGE COOLING DEMAND (Y1–IN) YES = economizing available; the system can use outside air for free cooling when required
	ECONOMIZING	NO	YES/NO	FIRST STAGE COOLING RELAY OUTPUT YES = outside air being used for first stage cooling
	OCCUPIED	NO	YES/NO	OCCUPIED YES = OCC signal received from space thermostat or unitary controller YES = 24 vac on terminal OCC NO = 0 vac on terminal OCC
	HEAT PUMP	N/A**	COOL HEAT	HEAT PUMP MODE Displays COOL or HEAT when system is set to heat pump (Non-conventional)
	COOL Y1—IN	OFF	ON/OFF	FIRST STAGE COOLING DEMAND (Y1-IN) Y1–I signal from space thermostat or unitary controller for cooling stage 1. ON = 24 vac on terminal Y1–I OFF = 0 vac on terminal Y1–I
	COOL Y1—OUT	OFF	ON/OFF	FIRST STAGE COOLING RELAY OUTPUT Cool stage 1 Relay Output to stage 1 mechanical cooling (Y1–OUT terminal)
	COOL Y2—IN	OFF	ON/OFF	SECOND STAGE COOLING DEMAND (Y2–IN) Y2–I signal from space thermostat or unitary controller for second stage cooling. ON = 24 vac on terminal Y2–I OFF = 0 vac on terminal Y2–I
	COOL Y2—OUT	OFF	ON/OFF	SECOND STAGE COOLING RELAY OUTPUT Cool Stage 2 Relay Output to mechanical cooling (Y2–OUT terminal)
	MA TEMP	_ _ . _ °F (or _ _ . _ °C)	–40°F to 150°F (–40°C to 66°C)	SUPPLY AIR TEMPERATURE, Cooling Mode Displays value of measured mixed air from MAT sensor. Displays _ _ . _F if not connected, short or out of range.
	DA TEMP	_ _ . _ °F (or _ _ . _ °C)	–40°F to 150°F (–40°C to 66°C)	DISCHARGE AIR TEMPERATURE, after Heating section Displays when Discharge Air Sylk Bus sensor is connected and displays measured discharge temperature. Displays _ _ . _F if sensor sends invalid value, if not connected, short or out of range.
	OA TEMP	_ _ . _ °F (or _ _ . _ °C)	–40°F to 140°F (–40°C to 60°C)	OUTSIDE AIR TEMP Displays measured value of outdoor air temperature. Displays _ _ . _F if sensor sends invalid value, short or out of range.
	OA HUM	_ _ %	0 to 100%	OUTSIDE AIR RELATIVE HUMIDITY Displays measured value of outdoor humidity from OA Sylk Bus sensor. Displays _ _% if not connected short, or out of range.
	RA TEMP	_ _ . _ °F (or _ _ . _ °C)	0°F to 140°F (–18°C to 60°C)	RETURN AIR TEMPERATURE Displays measured value of return air temperature from RAT Sylk Bus sensor. Displays _ _ . _ F if sensor sends invalid value, if not connected, short or out of range
	RA HUM	_ _ %	0 to 100%	RETURN AIR RELATIVE HUMIDITY Displays measured value of return air humidity from RA Sylk Bus sensor. Displays _ _% if sensor sends invalid value, if not connected, short or out of range
	IN CO2	_ _ _ ppm	0 to 2000 ppm	SPACE/RETURN AIR CO_2 Displays value of measured CO_2 from CO_2 sensor. Invalid if not connected, short or out of range. May be adjusted in Advanced menu by Zero offset and Span.
	DCV STATUS	N/A	ON/OFF	DEMAND CONTROLLED VENTILATION STATUS Displays ON if above set point and OFF if below set point, and ONLY if a CO_2 sensor is connected.
	DAMPER OUT	2.0v	2.0 to 10.0v	Displays voltage output to the damper actuator.***
	ACT POS	N/A	0 to 100%	Displays actual position of actuator
	ACT COUNT	N/A	1 to 65,535	Displays number of times actuator has cycled. 1 cycle equals 180 degrees of actuator movement in any direction.
	ACTUATOR	N/A	OK/Alarm (on Alarm menu)	Displays ERROR if voltage or torque is below actuator range.
	EXH1 OUT	OFF	ON/OFF	EXHAUST STAGE 1 RELAY OUTPUT Displays ON when damper position reaches programmed percentage set point. Output of EXH1 terminal: ON = relay closed OFF = relay open

Table 20 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
STATUS (cont)	EXH2 OUT	OFF	ON/OFF	EXHAUST STAGE 2 RELAY OUTPUT Output of AUX1 O terminal Displays ON when damper position reaches programmed percentage set point. ON = 24 vac output OFF = No output Displays only if AUX1 O = EXH2
	ERV	OFF	ON/OFF	ENERGY RECOVERY VENTILATOR Output of AUX1 O terminal; displays only if AUX1 O = ERV ON = 24 vac output OFF = No Output
	MECH COOL ON or HEAT STAGES ON	0	0, 1, or 2	Displays stage of mechanical cooling that is active. Displays the stage of heat pump heating that is active.
	FAN SPEED	N/A	LOW or HIGH	SUPPLY FAN SPEED Displays speed setting of fan on a 2-speed fan unit.
	W (HEAT IN)	N/A	ON/OFF	HEAT DEMAND STATUS Displays status of heat demand on a 2-speed fan unit.
SETPOINTS	MAT SET	53°F (12°C)	38°F to 70°F (3°C to 21°C); increment by 1 degree	SUPPLY AIR SETPOINT The economizer will modulate the OA damper to maintain the mixed air temperature at the set point
	LOW T LOCK	32°F (0°C)	–45°F to 80°F (–43°C to 27°C); increment by 1 degree	COMPRESSOR LOW TEMPERATURE LOCKOUT Set point determines outdoor temperature when the mechanical cooling cannot be turned on. Commonly referred to as the Compressor lockout. At or below the set point, the Y1-O and Y2-O will not be energized on the controller.
	DRYBLB SET	63°F (17°C)	48°F to 80°F (9°C to 27°C); increment by 1 degree	OA DRY BULB TEMPERATURE CHANGEOVER SETPOINT Dry bulb set point will only appear if using dry bulb changeover. Set point determines where the economizer will assume outdoor air temperature is good for free cooling; e.g.; at 63°F unit will economize at 62°F and below and not economize at 64°F and above. There is a 2°F deadband.
	ENTH CURVE	ES3	ES1,ES2,ES3,ES4, or ES5	ENTHALPY CHANGEOVER CURVE ES curve will only appear if using enthalpy changeover. Enthalpy boundary “curves” for economizing using single enthalpy. See page 53 for description of enthalpy curves.
	DCV SET	1100ppm	500 to 2000 ppm; increment by 100	DEMAND CONTROLLED VENTILATION Displays only if CO_2 sensor is connected. Set point for Demand Controlled Ventilation of space. Above the set point, the OA dampers will modulate open to bring in additional OA to maintain a space ppm level below the set point.
	MIN POS	2.8 V	2 to 10 vdc	VENTILATION MINIMUM POSITION Displays ONLY if a CO_2 sensor is NOT connected.
	VENTMAX	2.8 V	2 to 10 vdc	DCV MAXIMUM DAMPER POSITION Displays only if a CO_2 sensor is connected. Used for Vbz (ventilation max cfm) set point. VENTMAX is the same setting as MIN POS would be if unit did not have CO_2 sensor.
			100 to 9990 cfm; increment by 10	If OA, MA, RA, and CO_2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.
			2 to 10 vdc	With 2-speed fan units, VENTMAX L (low speed fan) and VENTMAX H (high speed fan) settings are required. Default for VENTMAX L is 3.2V and VENTMAX H is 2.8V
	VENTMIN	2.25 V	2 to 10 vdc or 100 to 9990 cfm increment by 10	DCV MINIMUM DAMPER POSITION Displays only if a CO_2 sensor is connected. Used for Va (ventilation min cfm) set point. This is the ventilation for less than maximum occupancy of the space.
			100 to 9990 cfm; increment by 10	If OA, MA, RA, and CO_2 sensors are connected and DCV CAL ENABLE is set to AUTO mode, the OA dampers are controlled by CFM and displays from 100 to 9990 CFM.
			2 to 10 vdc	With 2-speed fan units VENTMIN L (low speed fan) and VENTMIN H (high speed fan) settings are required. Default for VENTMIN L is 2.5V and VENTMIN H is 2.25V
	ERV OAT SP††	32°F (0°C)	0°F to 50°F (–18°C to 10°C); increment by 1 degree	ENERGY RECOVERY VENTILATOR UNIT OUTDOOR AIR TEMPERATURE SETPOINT Only when AUX1 O = ERV
	EXH1 SET	50%	0 to 100%; increment by 1	EXHAUST FAN STAGE 1 SETPOINT Set point for OA damper position when exhaust fan 1 is powered by the economizer.
	EXH2 SET	75%	0 to 100%; increment by 1	EXHAUST FAN STAGE 2 SETPOINT Set point for OA damper position when exhaust fan 2 is powered by the economizer. Only used when AUX1 O is set to EHX2.

Table 20 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
SYSTEM SETUP	INSTALL	01/01/10	N/A	Display order = MM/DD/YY Setting order = DD, MM, then YY.
	UNITS DEG	°F	°F or °C	Sets economizer controller in degrees Fahrenheit or Celsius
	EQUIPMENT	CONV	CONV or HP	CONV = conventional; HP O/B = Enable Heat Pump mode. Use AUX2 I for Heat Pump input from thermostat or controller.
	AUX2 IN	W	Shutdown (SD) Heat (W1) HP(O) HP(B)	In CONV mode: SD = Enables configuration of shutdown (default); W = Informs controller that system is in heating mode. In HP O/B mode: HP(O) = energize heat pump on Cool (default); HP(B) = energize heat pump on heat.
	FAN SPEED	2 speed	1 speed/2 speed	Sets the economizer controller for operation of 1 speed or 2 speed supply fan. The controller does not control the fan, but positions the OA and RA dampers to heating or cooling mode.
	FAN CFM	5000 cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCAL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit.
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input “INPUT” to the OCC terminal. If no occupancy output from the thermostat, then change program to “ALWAYS” OR add a jumper from terminal R to OCC terminal.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.
ADVANCED SETUP	MA LO SET	45°F (7°C)	35°F to 65°F (2°C to 18°C); Increment by 1 degree	SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value).
	FREEZE POS	CLO	CLO or MIN	FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS).
	CO2 ZERO	0ppm	0 to 500 ppm; Increment by 10	CO_2 ppm level to match CO_2 sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO_2 ppm span to match CO_2 sensor; e.g.: 500-1500 sensor output would be 500 CO_2 zero and 1000 CO_2 span.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF	COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.
	DA LO ALM	45°F (7°C)	NONE 35°F to 65°F (2°C to 18°C); Increment by 5°F	Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.

Table 20 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ADVANCED SETUP (cont)	DA HI ALM	80°F (27°C)	NONE 70°F to 180°F (21°C to 82°C); Increment by 5°F	Used for alarm for when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO_2) sensors. This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0˚F	± 2.5˚F	SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OAS T CAL	0.0˚F	± 2.5˚F	OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OA H CAL	0% RH	±10% RH	OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	RA T CAL	0.0˚F	± 2.5˚F	RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	RA H CAL	0% RH	±10% RH	RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	DA T CAL	0.0˚F	± 2.5˚F	DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments	TIME DELAY ON SECOND STAGE ECONOMIZING When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.
CHECKOUT***	DAMPER MINIMUM POSITION	N/A	N/A	The checkout for the damper minimum position is based on the system. See Table 21.
	DAMPER OPEN	N/A	N/A	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	N/A	N/A	Positions damper to the fully closed position
	CONNECT Y1–O	N/A	N/A	Closes the Y1-O relay (Y1-O)
	CONNECT Y2–O	N/A	N/A	Closes the Y2-O relay (Y2-O)
	CONNECT AUX1–O	N/A	N/A	Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation.†† • SYS — 24 vac out. Issues a system alarm
	CONNECT EXH1	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)
ALARMS	Alarms display only when they are active. The menu title “ALARMS(#)” includes the number of active alarms in parenthesis ( ). When using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen			
	MA T SENS ERR	N/A	N/A	SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	CO2 SENS ERR	N/A	N/A	CO_2 SENSOR ERROR CO_2 sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.
	OA SYLK T ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SYLK H ERR	N/A	N/A	
	RA SYLK T ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK H ERR	N/A	N/A	
	DA SYLK T ERR	N/A	N/A	DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SENS T ERR	N/A	N/A	OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.
	ACT ERROR	N/A	N/A	ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.

Table 20 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ALARMS (cont)	FREEZE ALARM	N/A	N/A	Check if outdoor temperature is below the LOW Temp Lockout on set point menu. Check if Mixed air temperature on STATUS menu is below the Lo Set point on Advanced menu. When conditions are back in normal range, the alarm will go away.
	SHUTDOWN ACTIVE	N/A	N/A	AUX2 IN is programmed for SHUTDOWN and 24 V has been applied to AUX2 IN terminal.
	DMP CAL RUNNING	N/A	N/A	DAMPER CALIBRATION ROUTINE RUNNING If DCV Auto enable has been programmed, this alarm will display when the W7220 is completing a calibration on the dampers. Wait until the calibration is completed and the alarm will go away. Must have OA, MA and RA sensors for DCV calibration; set up is in the Advanced setup menu.
	DA SENS ALM	N/A	N/A	DISCHARGE AIR TEMPERATURE SENSOR ALARM Discharge air temperature is out of the range set in the ADVANCED SETUP Menu. Check the temperature of the discharge air.
	SYS ALARM	N/A	N/A	When AUX1-O is set to SYS and there is any alarm (e.g., failed sensors, etc.), the AUX1-0 terminal has 24 vac out.
	ACT UNDER V	N/A	N/A	ACTUATOR VOLTAGE LOW Voltage received by actuator is above expected range.
	ACT OVER V	N/A	N/A	ACTUATOR VOLTAGE HIGH Voltage received by actuator is below expected range.
	ACT STALLED	N/A	N/A	ACTUATOR STALLED Actuator stopped before achieving commanded position.

LEGEND

CLO — Compressor Lockout
ERV — Energy Recovery Ventilator
LCD — Liquid Crystal Display
MA — Mixed Air
MAT — Mixed Air Temperature
N/A — Not Applicable
OA — Outdoor Air
OAT — Outdoor Air Temperature
OCC — Occupied
RA — Return Air
RAT — Return Air Temperature
RTU — Rooftop Unit
SYS — System

* Table 20 illustrates the complete hierarchy. Your menu parameters may be different depending on your configuration. For example if you do not have a DCV (CO_2) sensor, then none of the DCV parameters appear.

† When values are displayed, pressing and holding the ▲ or ▼ button causes the display to automatically increment.

** N/A = Not Applicable.

†† ERV Operation: When in cooling mode AND the conditions are NOT OK for economizing - the ERV terminal will be energized. In the Heating mode, the ERV terminal will be energized when the OA is below the ERV OAT set point in the set point menu.

*** After 10 minutes without a command or mode change, the controller will change to normal operation.

NOTES:

1. STATUS —> OCCUPIED — The factory-standard Occupancy signal originates with a thermostat or other controller call for indoor fan operation at CTB terminal G. This signal passes through the Unit Control Board's OCCUPANCY jumper to the ECONO connector and to the W7220's OCC input terminal.An external timeclock or relay is required to implement an Occupancy schedule on the economizer damper position.
2. STATUS —> MA TEMP, SETPOINTS —> MAT SET — The W7220 menu parameters and labels include designations MA, MAT and Mixed Air for the economizer cooling control sensor. On these rooftop units, the economizer control sensor is located downstream of the evaporator/indoor coil in the supply fan section where this sensor is designated as Supply Air Temperature (SAT) sensor.
3. SETPOINTS —> DRYBLB SET — This point is not displayed if a Return Air (differential) temperature sensor or an Outdoor Air enthalpy sensor is connected.
4. SYSTEM SETUP parameters must be configured as noted for 2-Speed unit operation:
   EQUIPMENT = CONV
   AUX2 I = W
   FAN SPEED = 2SPEED

For damper minimum position settings and checkout menu readings, see Table 21. See Tables 22-25 for enthalpy and dry bulb operation.

Table 21 — Damper Minimum Position Settings and Readings on Checkout Menu

FAN SPEED	DEMAND CONTROLLED VENTILATION (CO_2 SENSOR)	SETPOINTS	CHECKOUT
1	NO	MIN POS	VMAX–HS
		N/A	N/A
	YES	VENT MIN	VMAX–HS
		VENT MAX	VMAX–HS

Table 22 — Dry Bulb Operation without DCV (CO_2 Sensor) — 1 Speed Fan

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y–I and Y2–I have not been satisfied.

Table 23 — Dry Bulb Operation with DCV (CO_2 Sensor) — 1 Speed Fan

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open
Above CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	VENTMIN to Full-Open	Closed to Full-Open

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y1–I and Y2–I have not been satisfied.

Table 24 — Enthalpy Operation without DCV (CO_2 Sensor) — 1 Speed Fan

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NONE	No	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	24-v/On	0-v/Off	MIN POS	Closed
		On	On	High	24-v/On	24-v/On	MIN POS	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	MIN POS	Closed
		On	Off	High	0-v/Off	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off*	MIN POS to Full-Open	Closed to Full-Open

*With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y1–I and Y2–I have not been satisfied.

Table 25 — Enthalpy Operation with DCV (CO_2 Sensor) — 1 Speed Fan

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
Below CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open
Above CO_2 set	No	Off	Off	High	0-v/Off	0-v/Off	VENTMIN to VENTMAX	Closed
		On	Off	High	24-v/On	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	On	High	24-v/On	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	Off	High	0-v/Off	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	Off	High	0-v/Off	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	On	High	DELAY* 24-v/On	0-v/Off†	VENTMIN to Full-Open	Closed to Full-Open

*With 2SP FAN DELAY (Advanced Setup Menu) when in the economizing mode there is a delay for the high speed fan to try to satisfy the call for second stage cooling by turning on the fan to high and opening the OA damper 100% before the first stage mechanical cooling is enabled.
†With stage 3 delay (STG3 DLY) in Advanced setup menu can turn on second stage of mechanical cooling Y2–O after the delay if the call for Y1–I and Y2–I have not been satisfied.

ENTHALPY SETTINGS

When the OA temperature, enthalpy and dew point are below the respective set points, the Outdoor Air can be used for economizing. Figure 71 shows the new single enthalpy boundaries in the W7220. There are 5 boundaries (set points ES1 through ES5), which are defined by dry bulb temperature, enthalpy and dew point.

Refer to Table 26 for ENTH CURVE set point values.

The W7220 calculates the enthalpy and dew point using the OA temperature and humidity input from the OA enthalpy sensor. When the OA temperature, OA humidity and OA dew point are all below the selected boundary, the economizer sets the economizing mode to YES, economizing is available.

When all of the OA conditions are above the selected boundary, the conditions are not good to economize and the mode is set to NO.

Figure 71 shows the 5 current boundaries. There is also a high limit boundary for differential enthalpy. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL (high limit) when a compressor stage is energized.

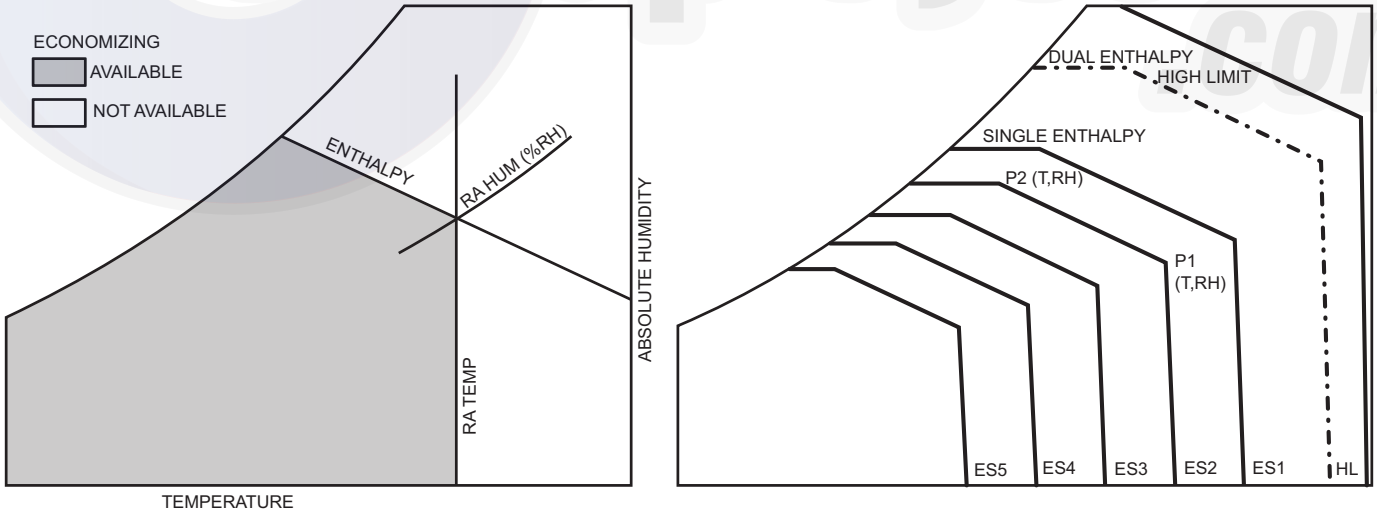


Fig. 71 — Single Enthalpy Curve Boundaries

Table 26 — Single Enthalpy and Dual Enthalpy High Limit Curves

ENTHALPY CURVE	TEMP. DRY BULB (F)	TEMP. DEWPOINT (F)	ENTHALPY (btu/lb/da)	POINT P1		POINT P2	
				TEMP. (F)	HUMIDITY (%RH)	TEMP. (F)	HUMIDITY (%RH)
ES1	80	60	28.0	80	36.8	66.3	80.1
ES2	75	57	26.0	75	39.6	63.3	80.0
ES3	70	54	24.0	70	42.3	59.7	81.4
ES4	65	51	22.0	65	44.8	55.7	84.2
ES5	60	48	20.0	60	46.9	51.3	88.5
HL	86	66	32.4	86	38.9	72.4	80.3

CHECKOUT

Inspect all wiring connections at the economizer module's terminals, and verify compliance with the installation wiring diagrams. For checkout, review the Status of each configured parameter and perform the Checkout tests.

NOTE: For information about menu navigation and use of the keypad see Interface Overview on page 45.

Power Up

After the W7220 module is mounted and wired, apply power.

Initial Menu Display

On initial start up, Honeywell displays on the first line and economizer W7220 on the second line. After a brief pause, the revision of the software appears on the first line and the second line will be blank.

Power Loss (Outage or Brownout)

All set points and advanced settings are restored after any power loss or interruption.

NOTE: All settings are stored in non-volatile flash memory.

Status

Use the Status menu (see Table 20) to check the parameter values for the various devices and sensors configured.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 45.

Checkout Tests

Use the Checkout menu (see page 50) to test the damper operation and any configured outputs. Only items that are configured are shown in the Checkout menu.

NOTE: For information about menu navigation and use of the keypad, see Interface Overview on page 45.

To perform a Checkout test:

1. Scroll to the desired test in the Checkout menu using the ▲ and ▼ buttons.
2. Press the ↵ (Enter) button to select the item. RUN? appears.
3. Press the ↵ (Enter) button to start the test. The unit pauses and then displays IN PROGRESS. When the test is complete, DONE appears.
4. When all desired parameters have been tested, press the ⓘ (Menu Up) button to end the test.

The Checkout tests can all be performed at the time of installation or at any time during the operation of the system as a test that the system is operable.

⚠CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

Be sure to allow enough time for compressor start-up and shutdown between checkout tests so that you do not short-cycle the compressors.

TROUBLESHOOTING

Alarms

The economizer module provides alarm messages that display on the 2-line LCD.

NOTE: Upon power up, the module waits 60 minutes before checking for alarms. This allows time for all the configured devices (e.g. sensors, actuator) to become operational. The exception is the SAT sensor which will alarm immediately.

If one or more alarms are present and there has been no keypad activity for at least 5 minutes, the Alarms menu displays and cycles through the active alarms.

You can also navigate to the Alarms menu at any time.

Clearing Alarms

Once the alarm has been identified and the cause has been removed (e.g. replaced faulty sensor) the alarm can be cleared from the display.

To clear an alarm, perform the following:

1. Navigate to the desired alarm.
2. Press the ↵ (Enter) button. ERASE? displays.
3. Press the ↵ (Enter) button. ALARM ERASED displays.
4. Press the ⓘ (Menu up/Exit) button to complete the action and return to the previous menu.

If the alarm still exists after clearing it, it is redisplayed within 5 seconds.

PRE-START-UP

⚠ WARNING

PERSONAL INJURY HAZARD

Failure to follow this warning could result in personal injury or death.

1. Follow recognized safety practices and wear approved Personal Protective Equipment (PPE), including safety glasses and gloves when checking or servicing refrigerant system.
2. Do not use a torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear PPE and proceed as follows:
   a. Shut off all electrical power to unit. Apply applicable lockout/tag-out procedures.
   b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
   c. Do not use a torch. Cut component connection tubing with tubing cutter and remove component from unit.
   d. Carefully un-sweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.
3. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
4. Do not remove compressor terminal cover until all electrical power is disconnected and approved lockout/tag-out procedures are in place.
5. Relieve all pressure from system before touching or disturbing anything inside terminal box whenever refrigerant leak is suspected around compressor terminals.
6. Never attempt to repair a soldered connection while refrigerant system is under pressure.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

The unit must be electrically grounded in accordance with local codes and NEC ANSI/NFPA 70 (American National Standards Institute/National Fire Protection Association).

Proceed as follows to inspect and prepare the unit for initial start-up:

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.

⚠ WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

Failure to follow this warning could cause personal injury or death.

Relieve pressure and recover all refrigerant before system repair or final unit disposal.

Wear safety glasses and gloves when handling refrigerants. Keep torches and other ignition sources away from refrigerants and oils.

3. Perform the following inspections:
   a. Inspect for shipping and handling damages such as broken lines, loose parts, or disconnected wires, etc.
   b. Inspect for oil at all refrigerant tubing connections and on unit base. Detecting oil generally indicates a refrigerant leak. Leak-test all refrigerant tubing connections using electronic leak detector, halide torch, or liquid-soap solution.
   c. Inspect all field-wiring and factory-wiring connections. Be sure that connections are completed and tight. Be sure that all electrical wires are not in contact with refrigerant tubing or sharp edges.
   d. Inspect coil fins. If damaged during shipping and handling, carefully straighten fins with a fin comb.
4. Verify the following conditions:
   a. Ensure that condenser-fan blades are correctly positioned in fan orifice. See Outdoor Fan Adjustment figure on page 18 for more details.
   b. Ensure all air filters are in place.
   c. Ensure that condensate drain trap is filled with water to ensuring proper drainage.
   d. Ensure that all tools and miscellaneous loose parts have been removed.

START-UP, GENERAL

IMPORTANT: Follow the base unit's start-up sequence as described in the unit's installation instructions.

In addition to the base unit start-up, there are a few steps needed to properly start-up the controls. RTU-OPEN's Service Test function should be used to assist in the base unit start-up and also allows verification of output operation. Controller configuration is also part of start-up. This is especially important when field accessories have been added to the unit. The factory pre-configures options installed at the factory. There may also be additional installation steps or inspection required during the start-up process.

Additional Installation/Inspection

Inspect the field-installed accessories for proper installation, making note of which ones do or do not require configuration changes. Inspect the RTU-OPEN's Alarms for initial insight to any potential issues. See troubleshooting section for alarms. Inspect the SAT sensor for relocation as intended during installation. Inspect special wiring as directed in "Internal Wiring" on page 56.

UNIT PREPARATION

Ensure the unit has been installed in accordance with installation instructions and applicable codes.

RETURN-AIR FILTERS

Ensure the correct filters are installed in the unit (see Appendix B - Physical Data on page 59). Do not operate unit without return-air filters in place.

OUTDOOR-AIR INLET SCREENS

Outdoor-air inlet screen must be in place before operating unit.

COMPRESSOR MOUNTING

Compressors are internally spring-mounted. Do not loosen or remove compressor hold down bolts.

INTERNAL WIRING

Check all electrical connections in unit control boxes. Tighten as required.

COMPRESSOR ROTATION

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in premature wear and damage to equipment.

Scroll compressors can only compress refrigerant if rotating in the right direction. Reverse rotation for extended times can result in internal damage to the compressor. Scroll compressors are sealed units and cannot be repaired on site location.

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit and apply lockout/tag-out procedures.
3. Reverse any two of the unit power leads.
4. Re-energize to the compressor. Check pressures.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When the compressor is rotating in the wrong direction, the unit will make an elevated level of noise and will not provide cooling.

REFRIGERANT SERVICE PORTS

Each unit system has two $^1/_4$-in. SAE flare (with check valves) service ports: one on the suction line, and one on the compressor discharge line. Be sure that caps on the ports are tight.

COOLING

Set space thermostat to OFF position. To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch to AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section on page 14.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after a 60-second delay if the dip switch for the indoor fan off delay on the Defrost Control Board (DFB) is set to on.

To shut off unit

Set system selector switch to the OFF position. Resetting thermostat at a position above room temperature shuts the unit off temporarily until space temperature exceeds thermostat setting.

HEATING

To start unit, turn on main power supply.

Set system selector switch to the HEAT position and set thermostat at a setting above room temperature. Set fan to AUTO position.

First stage of thermostat energizes compressor heating. Second stage of thermostat energizes electric heaters (if installed). Check heating effects at air supply grille(s).

If electric heaters do not energize, reset limit switch (located on supply-fan scroll) by pressing button located between terminals on the switch.

To shut off unit

Set system selector switch to the OFF position. Resetting thermostat at a position below room temperature temporarily shuts unit off until space temperature falls below thermostat setting.

VENTILATION (CONTINUOUS FAN)

Set fan and system selector switches at ON and OFF positions, respectively. Supply fan operates continuously to provide constant air circulation.

START-UP, PREMIERLINK™

⚠ WARNING

ELECTRICAL OPERATION HAZARD

Failure to follow this warning could result in personal injury or death.

The unit must be electrically grounded in accordance with local codes and NEC ANSI/NFPA 70 (American National Standards Institute/National Fire Protection Association).

Use the Carrier Communication Network (CCN) software to start up and configure the PremierLink controller.

Changes can be made using the ComfortWORKS® software, ComfortVIEW™ software, Network Service Tool, System Pilot™ device, or Touch Pilot™ device. The System Pilot and Touch Pilot are portable interface devices that allow the user to change system set-up and setpoints from a zone sensor or terminal control module. During start-up, the Carrier software can also be used to verify communication with PremierLink controller.

⚠ NOTICE

SET-UP INSTRUCTIONS

All set-up and set point configurations are factory set and field-adjustable.

Refer to PremierLink™ Installation, Start-Up and Configuration Instructions for specific operating instructions for the controller. Have a copy of this manual available at unit start-up.

Perform System Check-Out

1. Check all power and communication connections ensuring the are properly connected and securely tightened.
2. At the unit, check fan and system controls for proper operation.
3. At the unit, check electrical system and connections of any optional electric reheat coil.
4. Ensure all area around the unit is clear of construction dirt and debris.
5. Ensure final filters are installed in the unit. Dust and debris can adversely affect system operation.
6. Verify the PremierLink controls are properly connected to the CCN bus.

START-UP, RTU-OPEN

⚠ NOTICE

SET-UP INSTRUCTIONS

Refer to the following manuals for additional installation, wiring and troubleshooting information for the RTU-OPEN Controller: *Controls, Start-up, Operation and Troubleshooting Instructions*, *RTU Open Installation and Start-up Guide* and *RTU-Open Integration Guide*. Have a copy of these manuals available at unit start-up.

FASTENER TORQUE VALUES

Table 27 — Torque Values

FASTENER LOCATIONS	TORQUE VALUES (IN. LB)	TORQUE VALUES (Nm)
Supply fan motor mounting	120 ± 12 in. lbs	13.6 ± 1.4 Nm
Supply fan motor adjustment plate	120 ± 12 in. lbs	13.6 ± 1.4 Nm
Motor pulley setscrew	75 ± 5 in. lbs	8.1 ± 0.6 Nm
Fan pulley setscrew	75 ± 5 in. lbs	8.1 ± 0.6 Nm
Blower wheel hub setscrew	75 ± 5 in. lbs	8.1 ± 0.6 Nm
Bearing locking collar setscrew	55 to 60 in. lbs	6.2 to 6.8 Nm
Compressor mounting bolts	65 to 75 in. lbs	7.3 to 7.9 Nm
Condenser fan motor mounting bolts	20 ± 2 in. lbs	2.3 ± 0.2Nm
Condenser fan hub setscrew	84 ± 12 in. lbs	9.5 ± 1.4 Nm
A05-06 Direct Drive:		
Motor mount arm	60 ± 5 in. lbs	6.8 ± 0.5 Nm
Fan wheel hub setscrew	120 ± 12 in. lbs	13.6 ± 1.4 Nm
Motor belly band bolt	80 ± 5 in. lbs	9.0 ± 0.6 Nm

APPENDIX A — MODEL NUMBER NOMENCLATURE

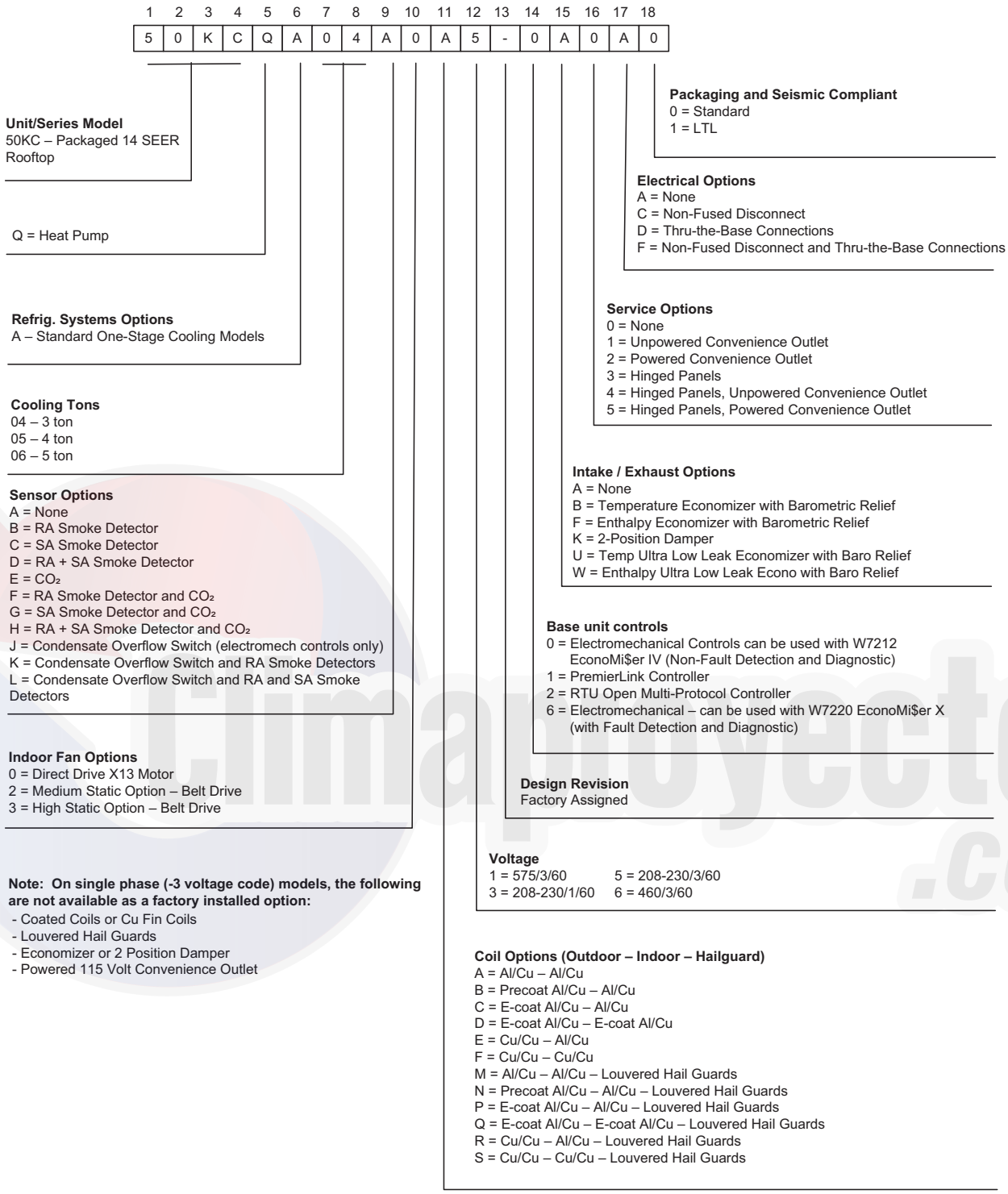


Fig. A — Model Number Nomenclature

Table A — Serial Number Format

POSITION NUMBER	1	2	3	4	5	6	7	8	9	10
TYPICAL	0	4	0	9	C	1	2	3	4	5

POSITION	DESIGNATES
1-2	Week of manufacture (fiscal calendar)
3-4	Year of manufacture (“08” = 2008)
5	Manufacturing location (C = Monterrey, Mexico)
6-10	Sequential number

APPENDIX B — PHYSICAL DATA

Table B — PHYSICAL DATA (Cooling) 3-5 Tons

		50KCQ*A04	50KCQ*A05	50KCQ*A06
Refrigeration System				
	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
	R-410A charge A/B (lbs-oz)	14 - 8 / -	18 - 0 / -	19 - 8 / -
	oil A/B (oz)	25 / -	42 / -	42 / -
	Metering Device	Accutrol + Accurater	Accutrol + Accurater	Accutrol + Accurater
	High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505
	Loss of charge Trip/Reset (psig)	27 / 44	27 / 44	27 / 44
Evaporation Coil				
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8-in. RTPF	3/8-in. RTPF	3/8-in. RTPF
	Rows / FPI	3 / 15	3 / 15	4/ 15
	Total Face Area (ft^2)	5.5	7.3	7.3
	Condensate Drain Conn. Size	3/4-in.	3/4-in.	3/4-in.
Evap. Fan and Motor				
STANDARD STATIC 1 PHASE	Motor Qty / Drive Type	1 / Direct	1 / Direct	1 / Direct
	Max BHP	1	1	1
	RPM Range	600-1200	600-1200	600-1200
	Motor Frame Size	48	48	48
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter x Length (in.)	10 x 10	10 x 10	11 x 10
STANDARD STATIC 3 PHASE	Motor Qty / Drive Type	1 / Direct	1 / Direct	1 / Direct
	Max BHP	1	1	1
	RPM Range	600-1200	600-1200	600-1200
	Motor Frame Size	48	48	48
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter x Length (in.)	10 x 10	10 x 10	11 x 10
MEDIUM STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.5	1.5	2.0
	RPM Range	819-1251	920-1303	1066-1380
	Motor Frame Size	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter x Length (in.)	10 x 10	10 x 10	10 x 10
HIGH STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.0	2.0	2.9
	RPM Range	1035-1466	1035-1466	1208-1550
	Motor Frame Size	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter x Length (in.)	10 x 10	10 x 10	10 x 10
Cond. coil				
	Material	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8-in. RTPF	3/8-in. RTPF	3/8-in. RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	16.5	21.3	21.3
Cond. fan / motor				
	Qty / Motor Drive Type	1 / direct	1 / direct	1 / direct
	Motor HP / RPM	1/8 / 825	1/4 / 1100	1/4 / 1100
	Fan diameter (in.)	22	22	22
Filters	RA Filter # / Size (in.)	2 / 16 x 25 x 2	4 / 16 x 16 x 2	4 / 16 x 16 x 2
	OA inlet screen # / Size (in.)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

LEGEND

BHP — Brake Horsepower
Cu/Al — Copper/Aluminum
OA — Outside Air
RA — Return Air
RTPF — Round Tube, Plate Fin

APPENDIX C — FAN PERFORMANCE

General Fan Performance Notes:

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, and wet coils. Factory options and accessories can add static pressure losses.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommends the lower horsepower option.

APPENDIX C — FAN PERFORMANCE

Table C — 50KCQ A04 DIRECT DRIVE, 3 TON (HORIZONTAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	900	0.57	0.25
	975	0.47	0.24
	1050	0.37	0.22
	1125	0.27	0.21
	1200	0.18	0.20
	1275	0.09	0.20
	1350	—	—
	1425	—	—
	1500	-	-
2	900	0.73	0.30
	975	0.62	0.29
	1050	0.51	0.28
	1125	0.41	0.27
	1200	0.30	0.25
	1275	0.19	0.24
	1350	0.08	0.22
	1425	—	—
	1500	—	—
3	900	1.04	0.41
	975	0.93	0.40
	1050	0.82	0.39
	1125	0.70	0.38
	1200	0.58	0.36
	1275	0.46	0.35
	1350	0.34	0.33
	1425	0.23	0.31
	1500	0.12	0.30
4	900	1.26	0.49
	975	1.18	0.50
	1050	1.09	0.50
	1125	0.99	0.50
	1200	0.88	0.49
	1275	0.76	0.47
	1350	0.63	0.46
	1425	0.50	0.44
	1500	0.37	0.42
5	900	1.35	0.52
	975	1.30	0.54
	1050	1.26	0.57
	1125	1.21	0.59
	1200	1.16	0.62
	1275	1.12	0.64
	1350	1.07	0.67
	1425	1.02	0.70
	1500	0.97	0.73

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

Table D — 50KCQ A04 DIRECT DRIVE, 3 TON (VERTICAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	900	0.44	0.19
	975	0.34	0.18
	1050	0.24	0.17
	1125	0.15	0.16
	1200	0.07	0.16
	1275	—	—
	1350	—	—
	1425	—	—
	1500	—	—
2	900	0.60	0.24
	975	0.49	0.23
	1050	0.38	0.22
	1125	0.28	0.21
	1200	0.18	0.20
	1275	0.09	0.19
	1350	—	—
	1425	—	—
	1500	—	—
3	900	0.93	0.36
	975	0.81	0.35
	1050	0.70	0.34
	1125	0.58	0.33
	1200	0.47	0.31
	1275	0.36	0.30
	1350	0.25	0.29
	1425	0.14	0.27
	1500	—	—
4	900	1.15	0.44
	975	1.07	0.45
	1050	0.97	0.46
	1125	0.86	0.46
	1200	0.74	0.43
	1275	0.61	0.41
	1350	0.48	0.40
	1425	0.35	0.39
	1500	0.23	0.37
5	900	1.24	0.51
	975	1.19	0.52
	1050	1.24	0.54
	1125	1.24	0.57
	1200	1.03	0.59
	1275	0.98	0.61
	1350	0.93	0.64
	1425	0.88	0.67
	1500	0.82	0.69

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table E — 50KCQ A05 DIRECT DRIVE, 4 TON (HORIZONTAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1200	0.93	0.48
	1300	0.80	0.46
	1400	0.66	0.44
	1500	0.51	0.41
	1600	0.36	0.39
	1700	0.22	0.36
	1800	0.08	0.33
	1900	—	—
	2000	—	—
2	1200	1.04	0.53
	1300	0.91	0.51
	1400	0.76	0.48
	1500	0.61	0.46
	1600	0.45	0.43
	1700	0.30	0.40
	1800	0.16	0.38
	1900	0.04	0.35
	2000	—	—
3	1200	1.18	0.58
	1300	1.09	0.59
	1400	0.98	0.60
	1500	0.86	0.60
	1600	0.72	0.57
	1700	0.57	0.54
	1800	0.42	0.51
	1900	0.28	0.48
	2000	0.15	0.45
4	1200	1.24	0.60
	1300	1.18	0.63
	1400	1.12	0.66
	1500	1.04	0.71
	1600	0.95	0.70
	1700	0.85	0.71
	1800	0.73	0.71
	1900	0.60	0.69
	2000	0.45	0.65
5	1200	1.25	0.61
	1300	1.20	0.65
	1400	1.12	0.68
	1500	1.04	0.68
	1600	1.05	0.76
	1700	1.01	0.76
	1800	0.96	0.84
	1900	0.91	0.89
	2000	0.87	0.93

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

Table F — 50KCQ A05 DIRECT DRIVE, 4 TON (VERTICAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1200	0.87	0.43
	1300	0.73	0.41
	1400	0.59	0.39
	1500	0.43	0.37
	1600	0.27	0.34
	1700	0.12	0.33
	1800	—	—
	1900	—	—
	2000	-	-
2	1200	0.96	0.48
	1300	0.84	0.46
	1400	0.69	0.44
	1500	0.53	0.41
	1600	0.37	0.39
	1700	0.21	0.36
	1800	0.06	0.34
	1900	—	—
	2000	—	—
3	1200	1.13	0.53
	1300	1.06	0.53
	1400	0.98	0.54
	1500	0.88	0.56
	1600	0.76	0.54
	1700	0.62	0.52
	1800	0.47	0.50
	1900	0.31	0.47
	2000	0.15	0.45
4	1200	1.16	0.57
	1300	1.12	0.59
	1400	1.07	0.62
	1500	1.00	0.67
	1600	0.91	0.66
	1700	0.80	0.67
	1800	0.67	0.67
	1900	0.52	0.63
	2000	0.35	0.61
5	1200	1.16	0.59
	1300	1.11	0.63
	1400	1.01	0.67
	1500	0.91	0.67
	1600	0.96	0.75
	1700	0.91	0.75
	1800	0.86	0.83
	1900	0.80	0.87
	2000	0.74	0.91

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table G — 50KCQ A06 DIRECT DRIVE, 5 TON (HORIZONTAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1500	0.37	0.35
	1625	0.22	0.33
	1750	0.08	0.31
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
2	1500	0.54	0.44
	1625	0.37	0.41
	1750	0.20	0.38
	1875	0.04	0.35
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
3	1500	1.28	0.83
	1625	1.10	0.81
	1750	0.90	0.78
	1875	0.68	0.74
	2000	0.47	0.70
	2125	0.27	0.66
	2250	0.10	0.62
	2375	—	—
	2500	—	—
4	1500	1.46	0.94
	1625	1.32	0.92
	1750	1.16	0.96
	1875	0.96	0.95
	2000	0.76	0.91
	2125	0.54	0.86
	2250	0.33	0.82
	2375	0.14	0.78
	2500	0.00	0.72
5	1500	1.52	0.97
	1625	1.42	1.01
	1750	1.16	1.05
	1875	0.96	1.09
	2000	1.00	1.09
	2125	0.82	1.06
	2250	0.62	1.02
	2375	0.40	0.98
	2500	0.16	0.93

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

Table H — 50KCQ A06 DIRECT DRIVE, 5 TON (VERTICAL SUPPLY)

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1500	0.27	0.32
	1625	0.13	0.30
	1750	—	—
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
2	1500	0.42	0.40
	1625	0.25	0.37
	1750	0.08	0.34
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
3	1500	1.11	0.79
	1625	0.91	0.76
	1750	0.70	0.74
	1875	0.50	0.70
	2000	0.30	0.67
	2125	0.12	0.63
	2250	—	—
	2375	—	—
	2500	—	—
4	1500	1.29	0.90
	1625	1.13	0.88
	1750	0.95	0.91
	1875	0.74	0.88
	2000	0.52	0.84
	2125	0.30	0.80
	2250	0.11	0.77
	2375	—	—
	2500	—	—
5	1500	1.36	0.94
	1625	1.24	0.99
	1750	0.95	1.02
	1875	0.74	1.05
	2000	0.74	1.03
	2125	0.53	0.99
	2250	0.31	0.94
	2375	0.08	0.90
	2500	-0.14	0.86

LEGEND

BHP — Brake Horsepower
CFM — Cubic Feet per Minute
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table I — 50KCQ A04 - 3 Ton Horizontal Supply

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	574	0.13	707	0.23	817	0.34	913	0.47	999	0.61
975	597	0.15	727	0.25	835	0.37	929	0.50	1015	0.64
1050	621	0.18	747	0.28	853	0.40	946	0.53	1030	0.68
1125	646	0.20	768	0.31	872	0.43	964	0.57	1047	0.72
1200	671	0.23	790	0.34	892	0.47	982	0.61	1064	0.76
1275	696	0.26	812	0.38	912	0.51	1001	0.65	1082	0.81
1350	723	0.30	835	0.42	933	0.55	1020	0.70	1100	0.86
1425	749	0.34	859	0.46	955	0.60	1040	0.75	1119	0.91
1500	776	0.38	883	0.51	977	0.65	1061	0.80	1138	0.97

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1078	0.77	1151	0.93	1220	1.11	1284	1.30	1346	1.49
975	1093	0.80	1165	0.97	1233	1.15	1297	1.33	1358	1.53
1050	1108	0.84	1180	1.01	1247	1.19	1311	1.38	1371	1.58
1125	1123	0.88	1195	1.05	1261	1.23	1325	1.42	1385	1.62
1200	1140	0.92	1210	1.10	1276	1.28	1339	1.47	1399	1.68
1275	1157	0.97	1226	1.15	1292	1.33	1354	1.53	1414	1.73
1350	1174	1.02	1243	1.20	1308	1.39	1370	1.59	1429	1.80
1425	1192	1.08	1260	1.26	1325	1.45	1386	1.65	1444	1.86
1500	1210	1.14	1278	1.33	1342	1.52	1403	1.72	1461	1.93

Medium static 819-1251 RPM, 1.5 BHP max
High static 1035-1466 RPM, 2.0 BHP max

Table J — 50KCQ A04 - 3 TON VERTICAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	594	0.15	740	0.25	867	0.37	981	0.52	1084	0.68
975	618	0.17	758	0.28	881	0.40	991	0.55	1092	0.71
1050	642	0.19	777	0.30	896	0.43	1003	0.58	1102	0.75
1125	668	0.22	797	0.34	912	0.47	1017	0.62	1113	0.79
1200	695	0.25	818	0.37	930	0.51	1032	0.66	1126	0.83
1275	722	0.29	841	0.41	949	0.55	1048	0.71	1140	0.88
1350	750	0.33	864	0.46	968	0.60	1065	0.76	1155	0.93
1425	778	0.37	888	0.50	989	0.65	1083	0.81	1171	0.99
1500	807	0.42	913	0.56	1011	0.71	1103	0.87	1188	1.05

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1180	0.86	1269	1.05	1354	1.25	1434	1.47	**1511**	**1.70**
975	1186	0.89	1275	1.08	1358	1.29	1437	1.51	**1513**	**1.74**
1050	1194	0.92	1281	1.12	1363	1.32	1441	1.54	**1516**	**1.78**
1125	1204	0.97	1289	1.16	1370	1.37	1447	1.59	**1520**	**1.82**
1200	1215	1.01	1298	1.21	1378	1.42	1454	1.64	**1526**	**1.87**
1275	1227	1.06	1309	1.26	1387	1.47	1462	1.69	**1533**	**1.92**
1350	1240	1.12	1321	1.32	1397	1.53	**1471**	**1.75**	**1541**	**1.99**
1425	1254	1.18	1333	1.38	1409	1.59	**1481**	**1.82**	—	—
1500	1270	1.24	1347	1.45	1421	1.66	**1492**	**1.89**	—	—

Boldface indicates field-supplied drive is required.

1. Recommend using field-supplied fan pulley (part number KR11AZ606), motor pulley (part number KR11HY191), and belt (part number KR29AF043) with field-supplied drive.

Medium static 819-1251 RPM, 1.5 BHP max
High static 1035-1466 RPM, 2.0 BHP max

APPENDIX C — FAN PERFORMANCE

Table K — 50KCQ A05 - 4 TON HORIZONTAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	630	0.20	755	0.31	859	0.43	949	0.56	1030	0.70
1300	659	0.24	781	0.36	883	0.48	972	0.61	1052	0.76
1400	689	0.28	808	0.40	908	0.53	995	0.67	1075	0.82
1500	720	0.33	836	0.46	933	0.59	1020	0.74	1098	0.89
1600	752	0.38	864	0.52	960	0.66	1044	0.81	1121	0.97
1700	784	0.44	893	0.58	986	0.73	1070	0.89	1146	1.05
1800	816	0.50	922	0.65	1014	0.81	1096	0.97	1171	1.14
1900	849	0.58	952	0.73	1042	0.90	1122	1.07	1196	1.24
2000	882	0.66	982	0.82	1070	0.99	1149	1.17	1222	1.35

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1104	0.84	1173	0.99	1237	1.15	1298	1.32	1356	1.49
1300	1125	0.91	1194	1.06	1258	1.23	1318	1.40	1375	1.58
1400	1147	0.98	1215	1.14	1278	1.31	1338	1.48	1395	1.67
1500	1170	1.05	1237	1.22	1299	1.39	1359	1.57	1416	1.76
1600	1193	1.13	1259	1.31	1321	1.49	1380	1.67	1437	1.86
1700	1216	1.22	1282	1.40	1344	1.59	1402	1.78	1458	1.97
1800	1240	1.32	1305	1.50	1366	1.69	1424	1.89	*1480*	*2.09*
1900	1265	1.43	1329	1.61	1390	1.81	*1447*	*2.01*	*1502*	*2.22*
2000	1290	1.54	1353	1.73	1413	1.93	*1470*	*2.14*	*1525*	*2.35*

Italics indicates field-supplied drive is required.

1. Recommend using field-supplied motor (HD58FE651 for 230-v and 460-v, HD58FE576 for 575-v), fan pulley (part number KR11AZ606), motor pulley (part number KR11HY213), and belt (part number KR29AF043).

Medium static 920-1303 RPM, 1.5 HP
High static 1035-1466 RPM, 2.0 BHP max

Table L — 50KCQ A05 - 4 TON VERTICAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	682	0.25	800	0.36	897	0.48	982	0.61	1058	0.75
1300	717	0.29	832	0.42	928	0.55	1011	0.68	1086	0.82
1400	753	0.34	865	0.48	958	0.61	1041	0.76	1115	0.91
1500	789	0.40	898	0.54	990	0.69	1071	0.84	1144	1.00
1600	826	0.47	932	0.62	1022	0.77	1102	0.93	1174	1.09
1700	863	0.54	966	0.70	1055	0.86	1133	1.03	1205	1.20
1800	901	0.62	1001	0.79	1088	0.96	1165	1.13	1235	1.31
1900	939	0.71	1037	0.89	1121	1.07	1197	1.25	1267	1.44
2000	978	0.81	1073	0.99	1156	1.18	1230	1.37	1299	1.57

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1128	0.89	1192	1.03	1252	1.18	1309	1.34	1363	1.50
1300	1155	0.97	1219	1.12	1279	1.28	1336	1.44	1389	1.61
1400	1183	1.06	1247	1.22	1306	1.38	1362	1.55	1416	1.72
1500	1212	1.16	1275	1.32	1334	1.49	1389	1.67	1443	1.85
1600	1241	1.26	1303	1.43	1362	1.61	1417	1.79	1470	1.98
1700	1271	1.37	1332	1.55	1390	1.74	1445	1.93	*1498*	*2.12*
1800	1301	1.50	1362	1.68	1419	1.87	*1474*	*2.07*	*1526*	*2.27*
1900	1331	1.63	1392	1.82	*1449*	*2.02*	*1503*	*2.22*	—	—
2000	1362	1.77	1422	1.97	*1478*	*2.18*	*1532*	*2.38*	—	—

Italics indicates field-supplied drive is required.

1. Recommend using field-supplied motor (HD58FE651 for 230-v and 460-v, HD58FE576 for 575-v), fan pulley (part number KR11AD561), motor pulley (part number KR11HY184), and belt (part number KR29AF041).

Medium static 920-1303 RPM, 1.5 HP
High static 1035-1466 RPM, 2.0 BHP max

APPENDIX C — FAN PERFORMANCE

Table M — 50KCQ A06 - 5 TON HORIZONTAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	725	0.33	840	0.46	937	0.60	1023	0.75	1101	0.90
1625	765	0.40	876	0.54	970	0.68	1054	0.84	1131	1.00
1750	806	0.48	912	0.63	1004	0.78	1087	0.94	1162	1.11
1875	847	0.57	950	0.72	1039	0.88	1120	1.05	1194	1.23
2000	889	0.66	988	0.83	1075	1.00	1154	1.18	1226	1.36
2125	931	0.78	1027	0.95	1112	1.13	1189	1.31	1260	1.50
2250	974	0.90	1067	1.08	1149	1.27	1224	1.46	1294	1.66
2375	1018	1.03	1107	1.23	1187	1.43	1261	1.63	1329	1.84
2500	1061	1.19	1148	1.39	1226	1.59	1297	1.81	1364	2.02

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1172	1.06	1239	1.23	1302	1.40	1361	1.58	1418	1.77
1625	1201	1.16	1267	1.34	1329	1.52	1388	1.71	1444	1.90
1750	1231	1.28	1296	1.46	1358	1.65	1416	1.84	1472	2.04
1875	1262	1.41	1326	1.60	1387	1.79	1445	1.99	1499	2.20
2000	1294	1.55	1357	1.74	1417	1.95	1474	2.15	1528	2.36
2125	1326	1.70	1388	1.90	1447	2.11	1504	2.33	—	—
2250	1359	1.87	1420	2.08	1479	2.29	1534	2.51	—	—
2375	1393	2.05	1453	2.27	1511	2.49	—	—	—	—
2500	1427	2.24	1487	2.47	1543	2.70	—	—	—	—

Medium static 1066-1380 RPM, 2.0 HP max
High static 1208-1550 RPM, 2.9 BHP max

Table N — 50KCQ A06 - 5 TON VERTICAL SUPPLY

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	794	0.41	902	0.55	993	0.69	1074	0.85	1147	1.00
1625	840	0.49	945	0.64	1034	0.80	1113	0.96	1185	1.13
1750	888	0.59	988	0.75	1075	0.92	1153	1.09	1223	1.26
1875	936	0.70	1033	0.87	1117	1.05	1193	1.23	1263	1.41
2000	984	0.82	1078	1.00	1160	1.19	1235	1.39	1303	1.58
2125	1033	0.96	1124	1.15	1204	1.35	1277	1.56	1343	1.76
2250	1083	1.11	1170	1.32	1248	1.53	1319	1.74	1385	1.96
2375	1133	1.28	1217	1.50	1293	1.72	1363	1.95	1427	2.17
2500	1183	1.47	1265	1.70	1339	1.93	1406	2.17	1470	2.41

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1214	1.16	1277	1.33	1336	1.50	1392	1.67	1445	1.85
1625	1251	1.30	1313	1.47	1371	1.65	1427	1.83	1479	2.02
1750	1289	1.44	1350	1.63	1407	1.81	1462	2.01	1514	2.20
1875	1327	1.60	1387	1.80	1444	1.99	1498	2.19	1550	2.40
2000	1366	1.78	1426	1.98	1482	2.19	1535	2.40	—	—
2125	1406	1.97	1464	2.18	1520	2.40	—	—	—	—
2250	1446	2.18	1504	2.40	—	—	—	—	—	—
2375	1487	2.40	1544	2.63	—	—	—	—	—	—
2500	1529	2.64	—	—	—	—	—	—	—	—

Medium static 1066-1380 RPM, 2.0 HP max
High static 1208-1550 RPM, 2.9 BHP max

APPENDIX C — FAN PERFORMANCE

Table O — Fan RPM at Motor Pulley Settings

UNIT		MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN										
			0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
04	3 phase	Medium static	1251	1208	1165	1121	1078	1035	992	949	905	862	819
		High static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
05	3 phase	Medium static	1303	1265	1226	1188	1150	1112	1073	1035	997	958	920
		High static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
06	3 phase	Medium static	1380	1349	1317	1286	1254	1223	1192	1160	1129	1097	1066
		High static	1550	1516	1482	1447	1413	1379	1345	1311	1276	1242	1208

= factory setting

NOTES:
1. Do not adjust pulley further than 5 turns open.
2. Do not set motor pulley above 5 turns open for A or AX section belts.
3. Do not set motor pulley below 1 turn open for B or BX section belts.

APPENDIX D — WIRING DIAGRAMS

Table P — Wiring Diagrams

50KCQ		DRAWING NUMBER	
Size	**Voltage**	**Control**	**Power**
A04	208/230-1-60	48TM501434 (page 69)	48TM501435 (page 71)
	208/230-3-60		48TM501436 (page 72)
	460-3-60		48TM501515 (page 73)
	575-3-60	48TM501520 (page 70)	48TM501516 (page 74)
A05	208/230-1-60	48TM501434 (page 69)	48TM501435 (page 71)
	208/230-3-60		48TM501436 (page 72)
	460-3-60		48TM501515 (page 73)
	575-3-60	48TM501520 (page 70)	48TM501516 (page 74)
A06	208/230-1-60	48TM501434 (page 69)	48TM501435 (page 71)
	208/230-3-60		48TM501436 (page 72)
	460-3-60		48TM501515 (page 73)
	575-3-60	48TM501520 (page 70)	48TM501516 (page 74)
ALL	PremierLink	48TM501529 (page 75)	
ALL	RTU-Open	50HE500751 (page 76)	

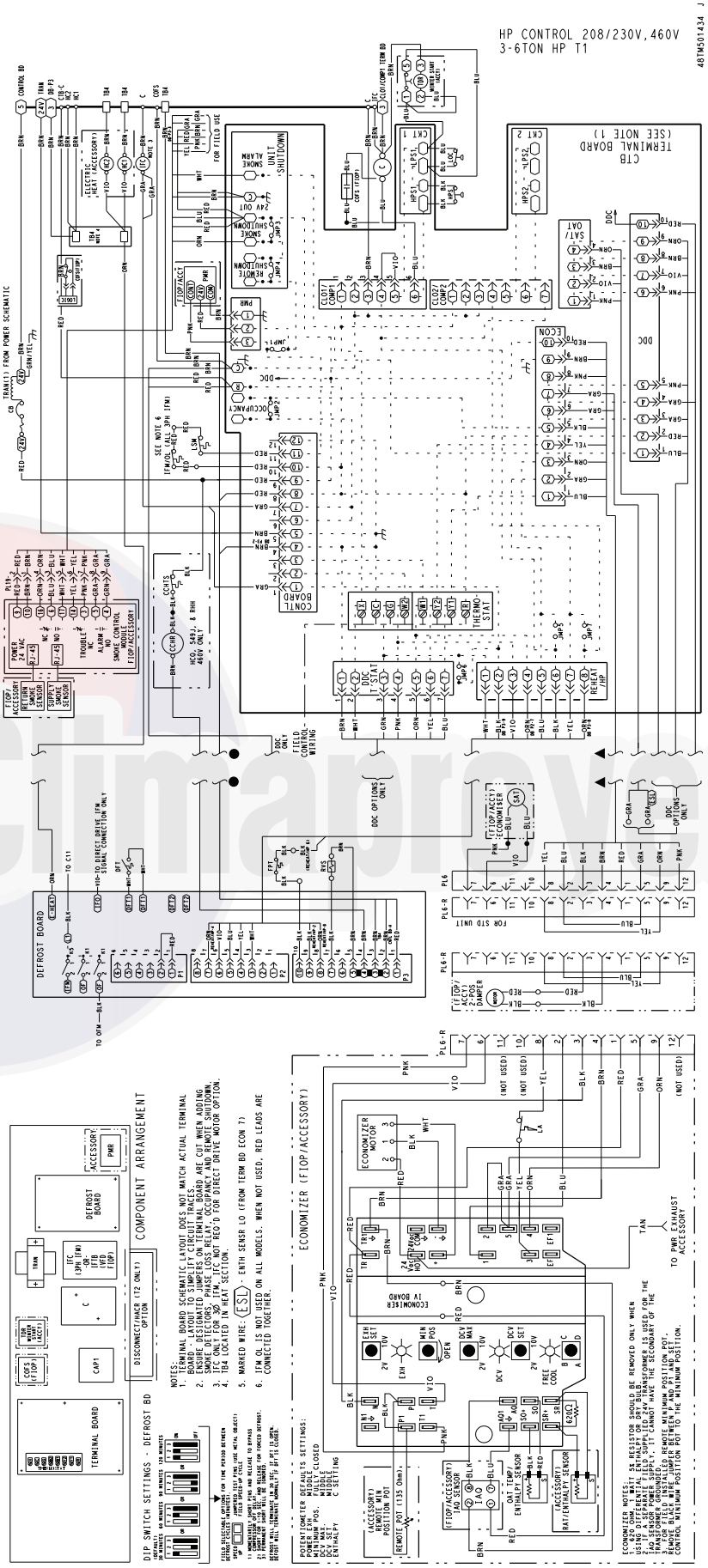


Fig. B — 50KCQ A04/A05/A06 Control Wiring Diagram (208/230-1-60; 208/230-3-60; 460-3-60)

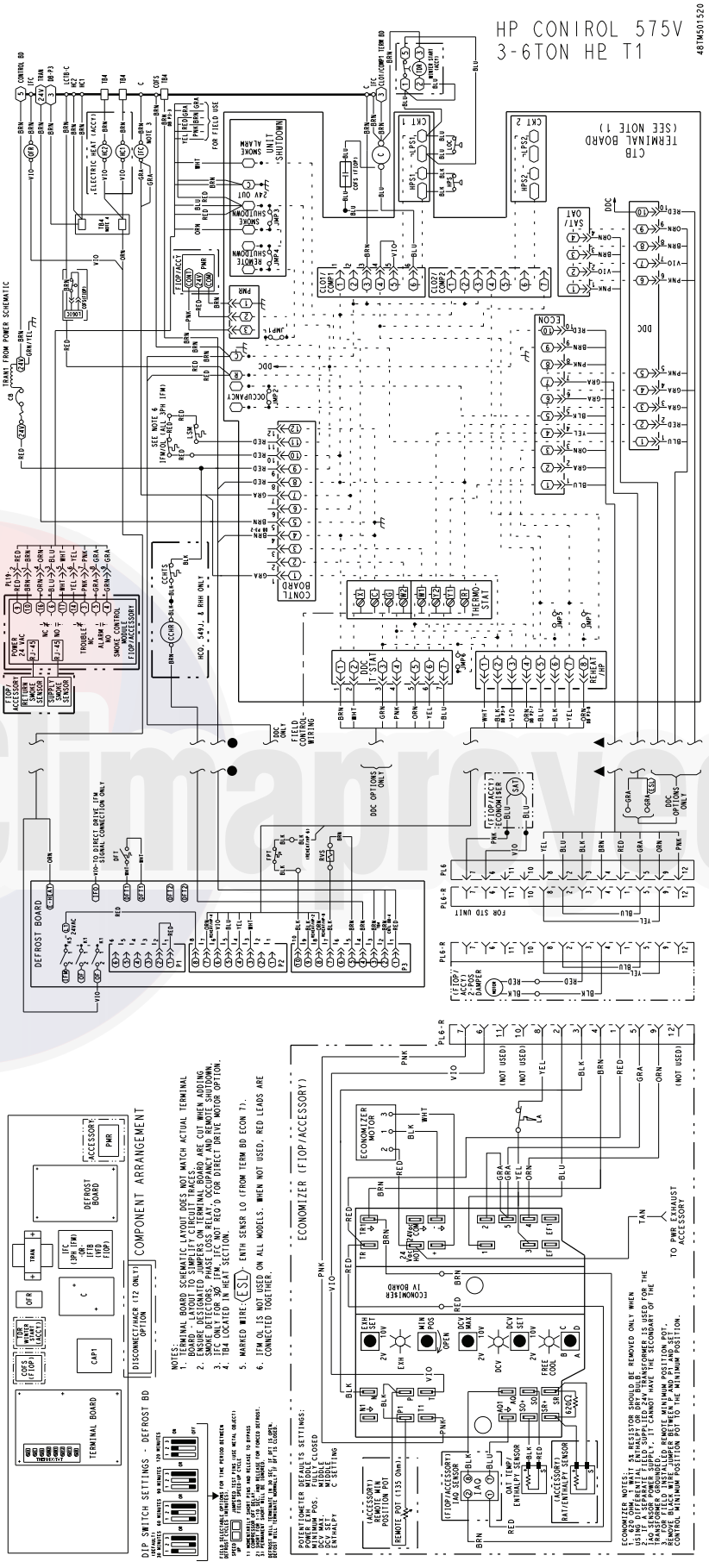


Fig. C — 50KCQ A04/A05/A06 Control Wiring Diagram (575-3-60)

APPENDIX D — WIRING DIAGRAMS

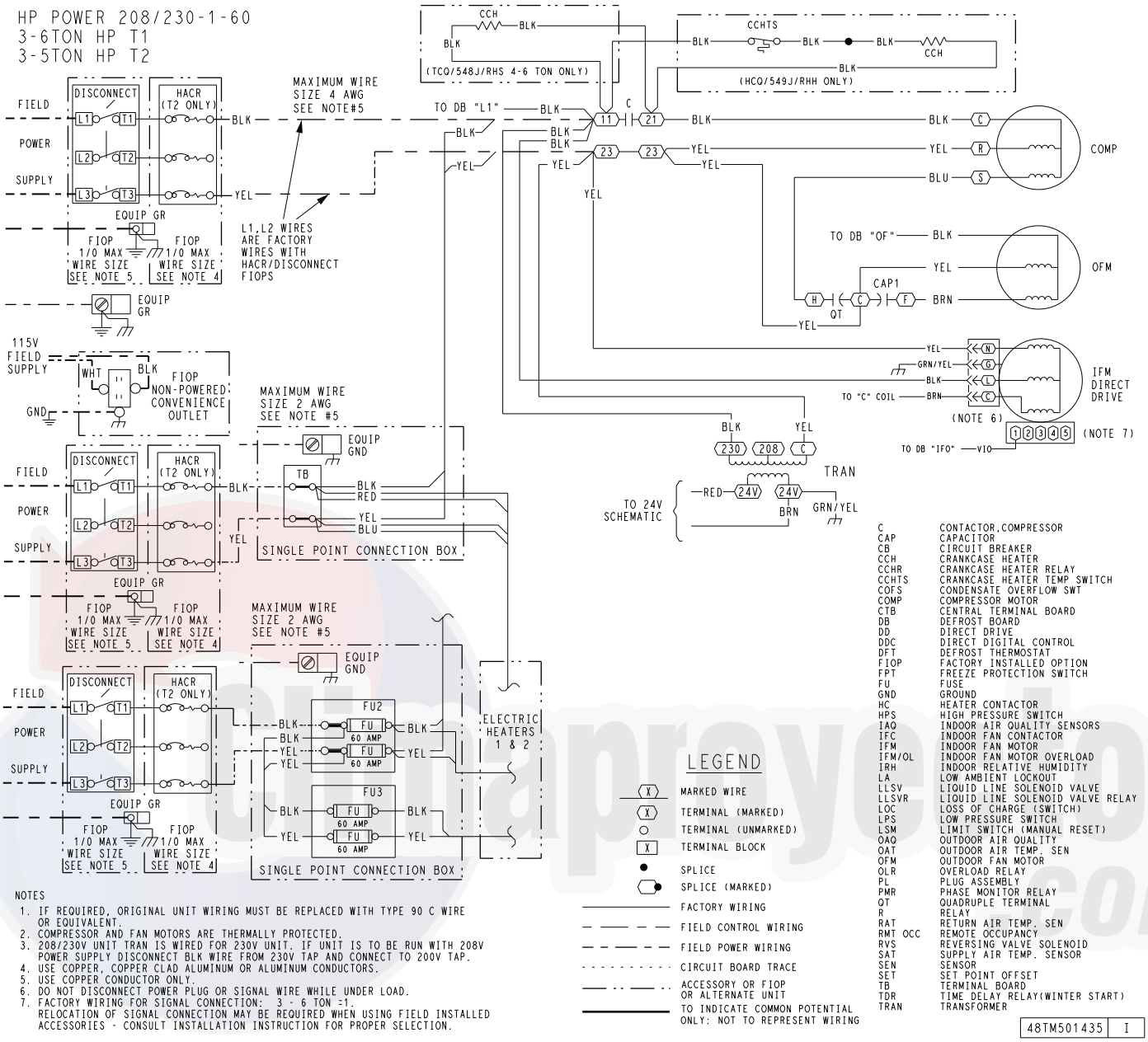


Fig. D — 50KCQ A04/A05/A06 Power Wiring Diagram (208/230-1-60)

APPENDIX D — WIRING DIAGRAMS

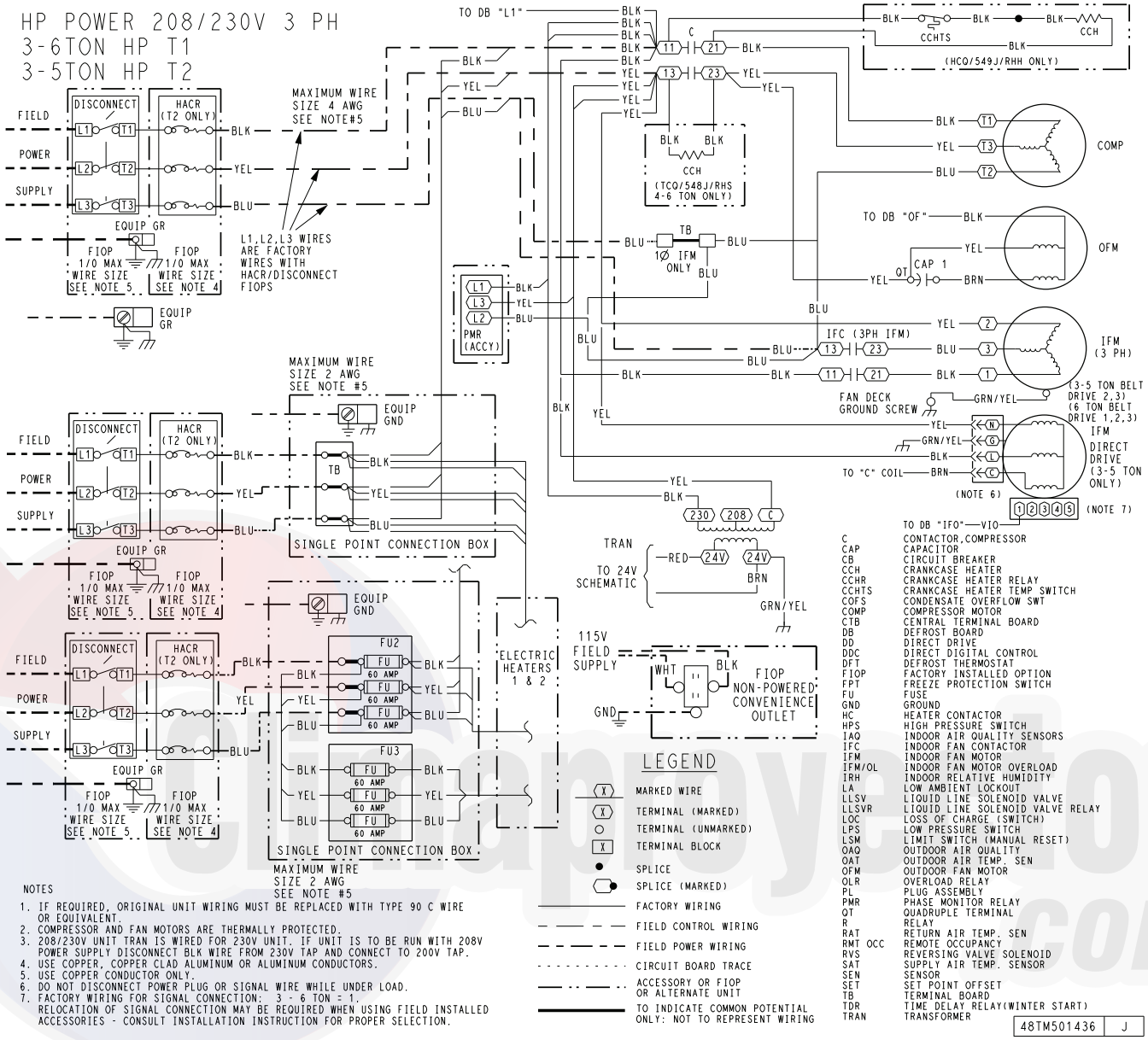
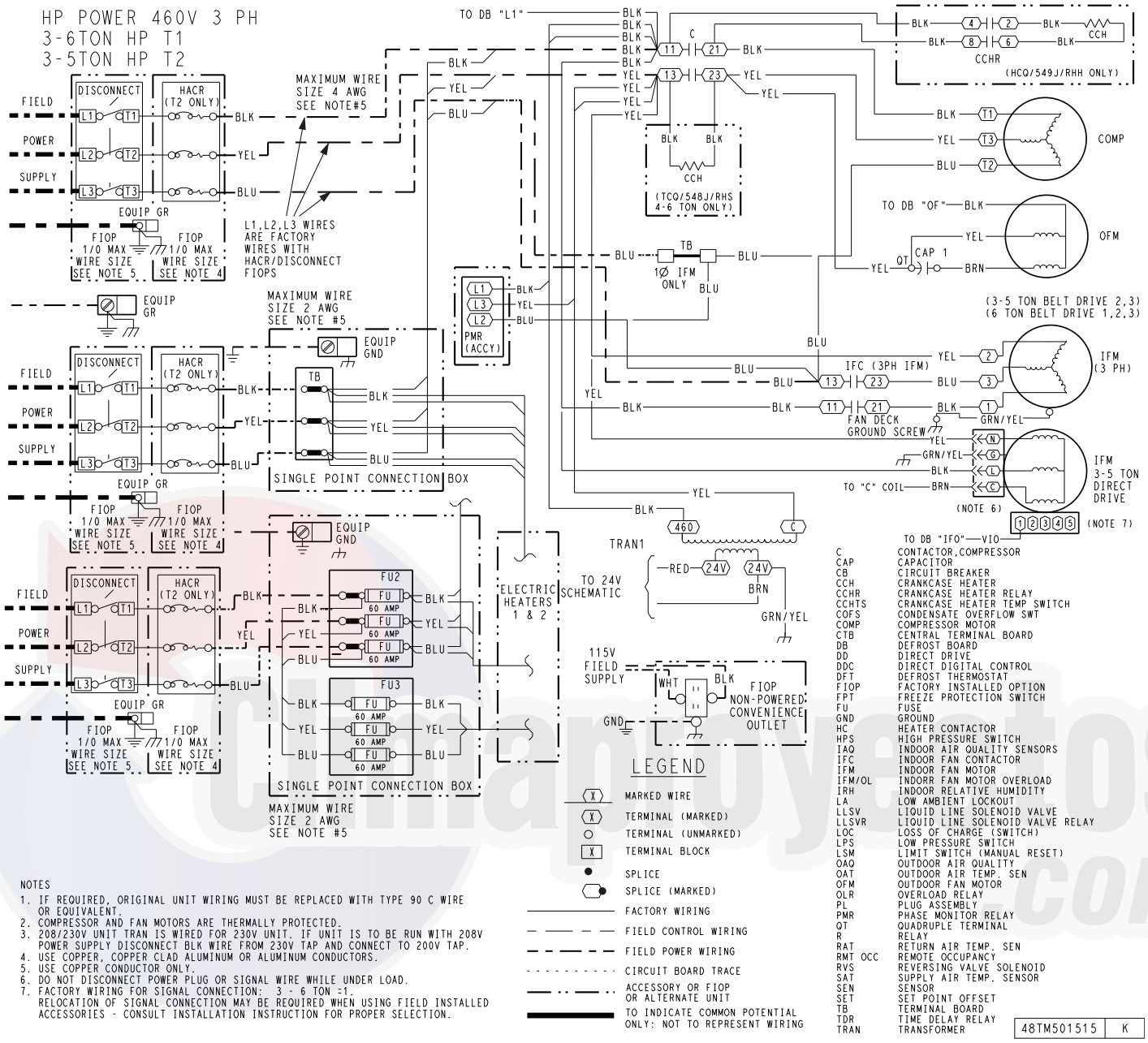


Fig. E — 50KCQ A04/A05/A06 Power Wiring Diagram (208/230-3-60)

APPENDIX D — WIRING DIAGRAMS



NOTES
1. IF REQUIRED, ORIGINAL UNIT WIRING MUST BE REPLACED WITH TYPE 90 C WIRE OR EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.
6. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.
7. FACTORY WIRING FOR SIGNAL CONNECTION: 3 - 6 TON =1. RELOCATION OF SIGNAL CONNECTION MAY BE REQUIRED WHEN USING FIELD INSTALLED ACCESSORIES - CONSULT INSTALLATION INSTRUCTION FOR PROPER SELECTION.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH
COFS	CONDENSATE OVERFLOW SWT
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DB	DEFROST BOARD
DD	DIRECT DRIVE
DDC	DIRECT DIGITAL CONTROL
DFT	DEFROST THERMOSTAT
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION SWITCH
FU	FUSE
GND	GROUND
HC	HEATER CONTACTOR
HPS	HIGH PRESSURE SWITCH
IAQ	INDOOR AIR QUALITY SENSORS
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IFM/OL	INDORR FAN MOTOR OVERLOAD
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LLSV	LIQUID LINE SOLENOID VALVE
LLSVR	LIQUID LINE SOLENOID VALVE RELAY
LOC	LOSS OF CHARGE (SWITCH)
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OLR	OVERLOAD RELAY
PL	PLUG ASSEMBLY
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RVS	REVERSING VALVE SOLENOID
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
TB	TERMINAL BOARD
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER

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Fig. F — 50KCQ A04/A05/A06 Power Wiring Diagram (460-3-60)

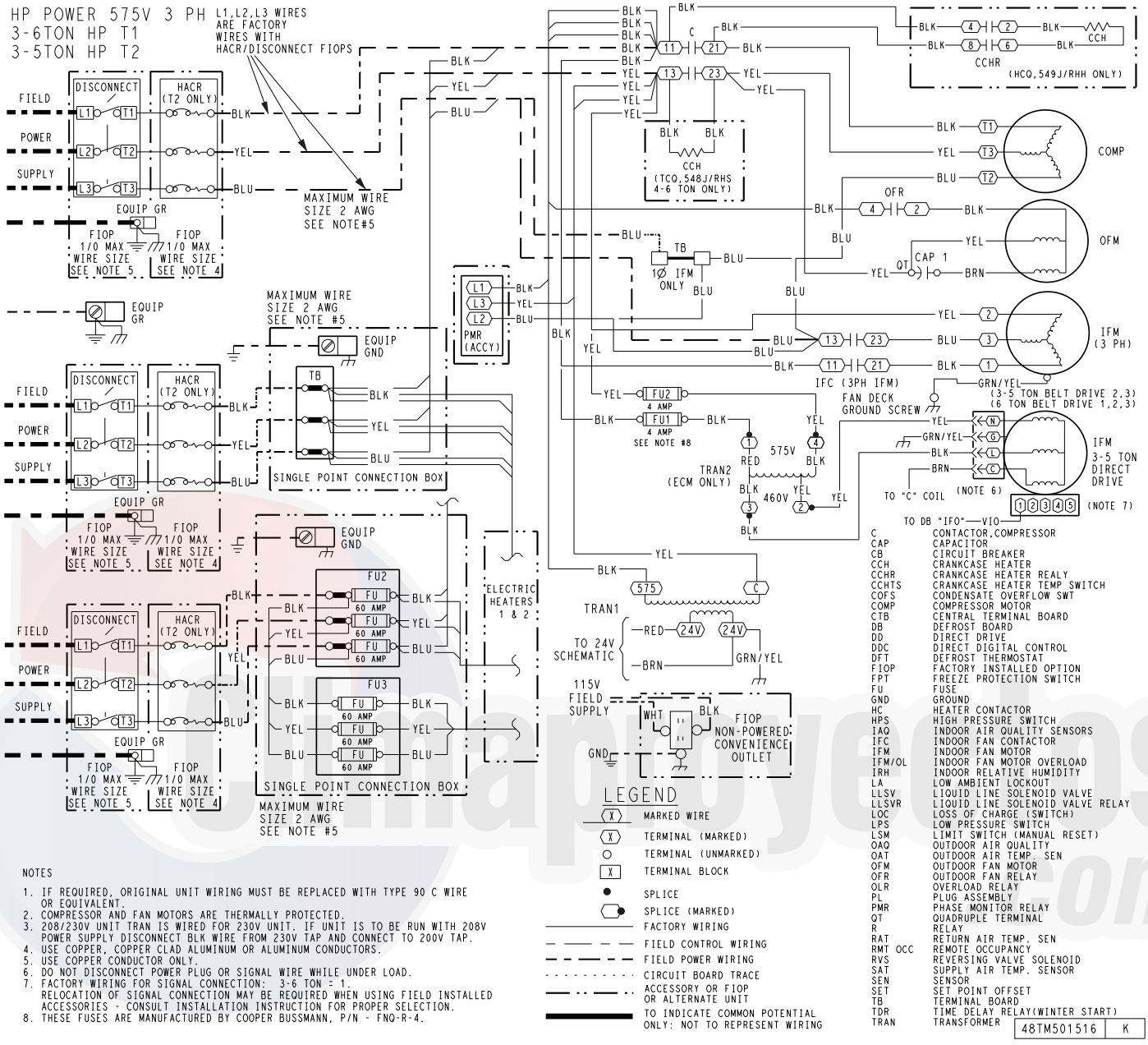
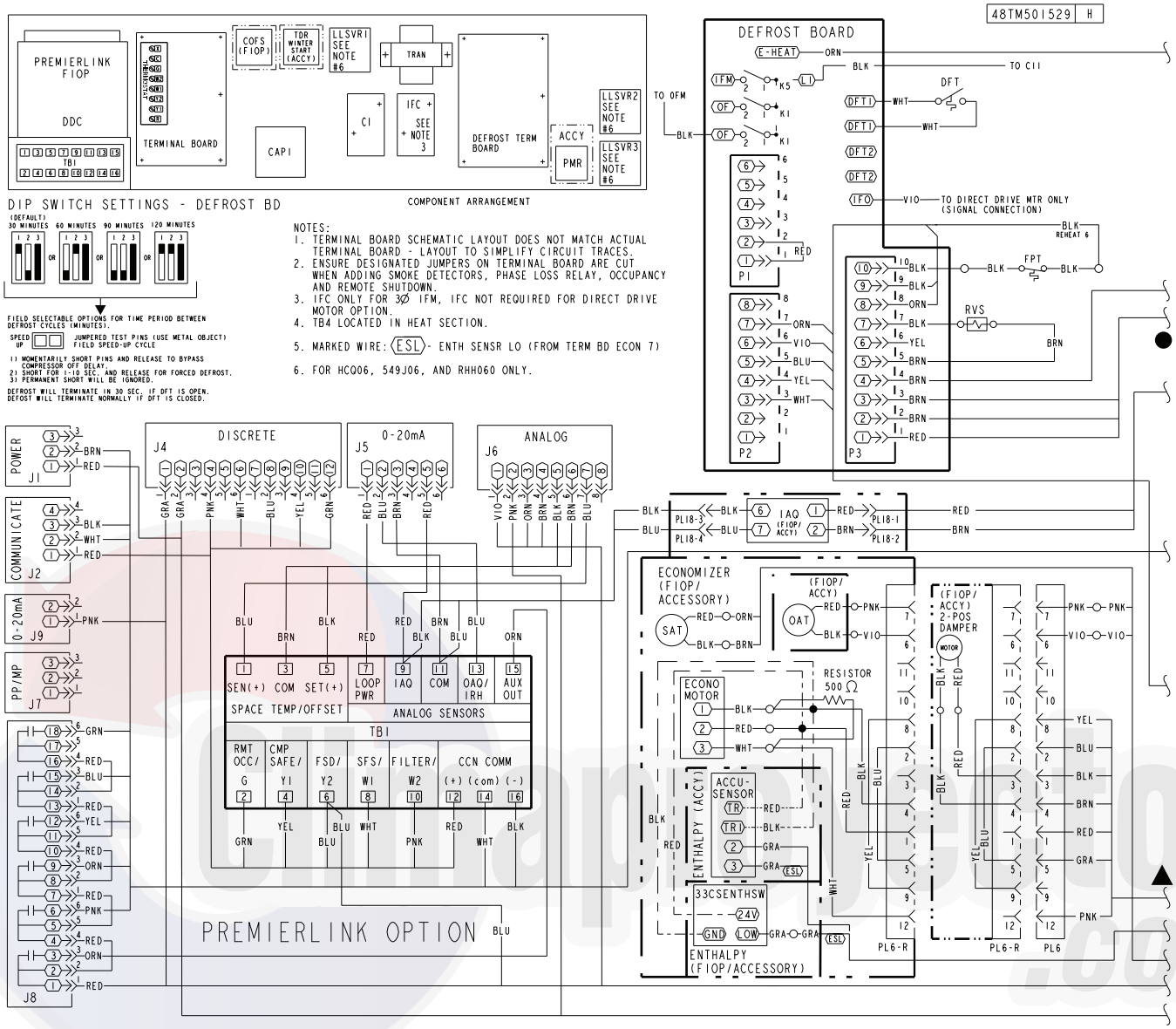


Fig. G — 50KCQ A04/A05/A06 Power Wiring Diagram (575-3-60)

APPENDIX D — WIRING DIAGRAMS

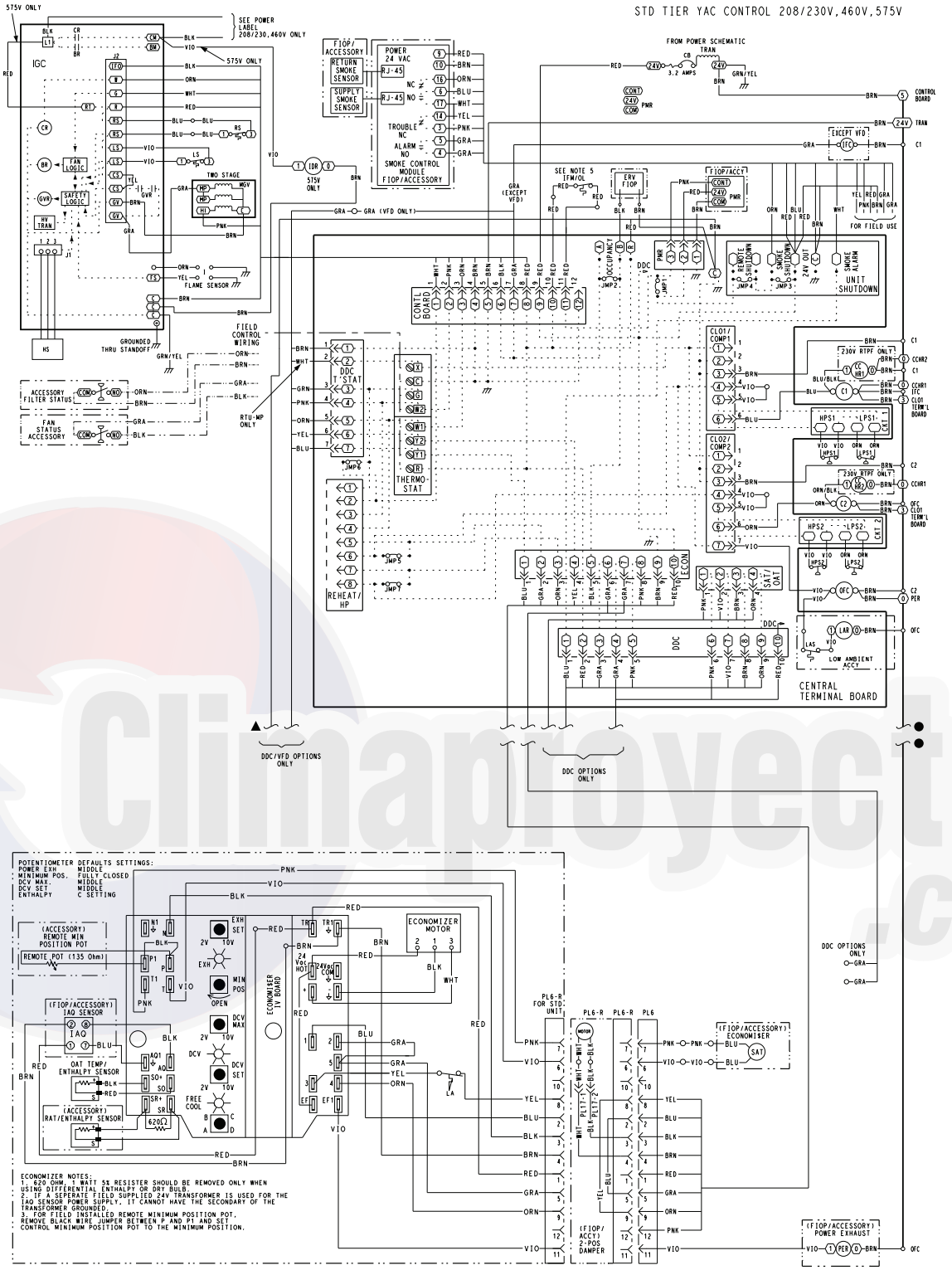


208/230V
460V

PREMIERLINK LABEL 48TM501529 IS TO OVERLAY CONTROL LABELS 48TM501434,2975. IF ANY CHANGES ARE MADE, ENSURE ALIGNMENT MARKS ARE MAINTAINED.

Fig. H — 50KCQ Premier Link Control Diagram

APPENDIX D — WIRING DIAGRAMS



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.
5. IFM OL IS NOT USED ON ALL MODELS. WHEN NOT USED, RED LEADS ARE CONNECTED TOGETHER.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRFANKCASE HEATER RELAY
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWITCH
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DDC	DIRECT DIGITAL CONTROL
ERV	ENERGY RECOVERY VENTILATOR
FIOP	FACTORY INSTALLED OPTION
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IDR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFC	OUTDOOR FAN CONTACTOR
OFM	OUTDOOR FAN MOTOR
OFTB	OUTDOOR FAN TERMINAL BLOCK
OLR	OVERLOAD RELAY
PER	POWER EXHAUST RELAY
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
RTPF	ROUND TUBE PLATE FIN CONDENSER COIL
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

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Fig. I — 50KCQ RTU-Open Control Diagram

APPENDIX E — MOTORMASTER SENSOR LOCATIONS

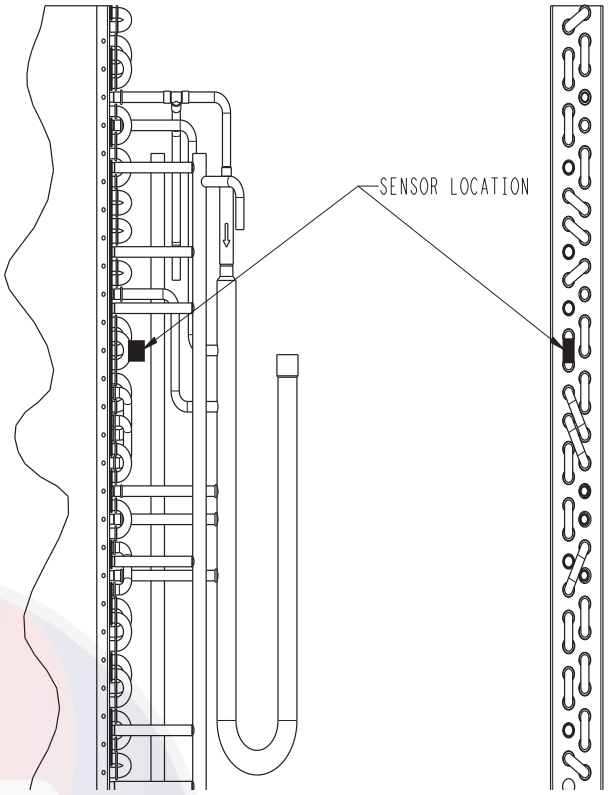

Fig. J — 50KCQ A04 Outdoor Circuiting

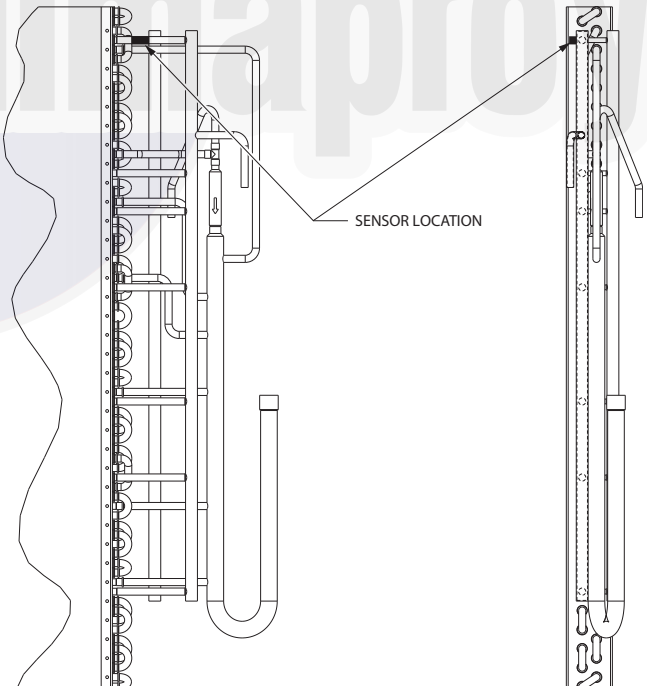

Fig. K — 50KCQ A05/A06 Outdoor Circuiting

START-UP CHECKLIST
(Remove and Store in Job File)

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instruction document.

I. PRELIMINARY INFORMATION

MODEL NO _____

JOB NAME_____

SERIAL NO _____

ADDRESS _____

START-UP DATE_____

TECHNICIAN NAME _____

ADDITIONAL ACCESSORIES

_____

II. PRE-START-UP

Verify that jobsite voltage agrees with voltage listed on rating plate (Y/N) _____
Verify that all packaging materials have been removed from unit (Y/N) _____
Remove all shipping hold-down bolts and brackets per installation instructions (Y/N) _____
Verify installation of outdoor air hood (Y/N) _____
Verify that condensate connection is installed per instructions (Y/N) _____
Check refrigerant piping for indications of leaks; investigate and repair if necessary (Y/N) _____
Verify that all electrical connections and terminals are tight (Y/N) _____
Check that indoor-air filters are clean and in place (Y/N) _____
Check that outdoor-air inlet screens are in place (Y/N) _____
Verify that unit is level (Y/N) _____
Check fan wheels and propeller for location in housing/orifice and verify setscrew is tight (Y/N) _____
Verify that electrical wiring is not in contact with refrigerant lines or sharp metal edges (Y/N) _____
Check pulley alignment and belt tension per install (Y/N) _____
Verify that fan sheaves are aligned and belts are properly tensioned (Y/N) _____
Verify installation of thermostat (Y/N) _____

III. START-UP

ELECTRICAL

Supply Voltage	L1-L2_____	L2-L3_____	L3-L1_____
Circuit 1 Compressor Amps	L1 _____	L2 _____	L3 _____
Circuit 2 Compressor Amps	L1 _____	L2 _____	L3 _____
Indoor Fan Amps	L1 _____	L2 _____	L3 _____
Outdoor Fan Amps	L1 _____	L2 _____	L3 _____

TEMPERATURES

Outdoor-air Temperature	_____ °F DB (Dry Bulb)	_____ °F WB (Wet Bulb)
Return-air Temperature	_____ °F DB	_____ °F WB
Cooling Supply Air Temperature	_____ °F DB	_____ °F WB

PRESSURES (Cooling Mode)

Refrigerant Suction	CIRCUIT A _____ PSIG	_____ °F
	CIRCUIT B _____ PSIG	_____ °F
Refrigerant Discharge	CIRCUIT A _____ PSIG	_____ °F
	CIRCUIT B _____ PSIG	_____ °F

Verify Refrigerant Charge using Charging Charts (Y/N) _____
Verify that 3-phase fan motor and blower are rotating in correct direction (Y/N) _____
Verify that 3-phase scroll compressor is rotating in the correct direction (Y/N) _____

GENERAL

Set economizer minimum vent and changeover settings to job requirements (if equipped) (Y/N) _____
Verify smoke detector unit shutdown by utilizing magnet test (Y/N) _____

IV. HUMIDI-MIZER® START-UP

NOTE: Units equipped with either SystemVu™ or RTU Open controls have Service Test menus or modes that can assist with the Humidi-MiZer System Start-Up function and provide the means to make the observations listed for this start-up.

STEPS

1. Check CTB for jumper 5, 6, 7 (Jumper 5, 6, 7 must be cut and open) (Y/N) _____
2. Open humidistat contacts (Y/N) _____
3. Start unit In cooling (Close Y1) (Y/N) _____

OBSERVE AND RECORD

A. Suction pressure _____ PSIG
B. Discharge pressure _____ PSIG
C. Entering air temperature _____ ° F
D. Liquid line temperature at outlet or reheat coil _____ ° F
E. Confirm correct rotation for compressor (Y/N) _____
F. Check for correct ramp-up of outdoor fan motor as condenser coil warms (Y/N) _____

4. Check unit charge per charging chart (Y/N) _____
   (Jumper 32L Motormaster® temperature sensor during this check. Remove jumper when complete.)
5. Switch unit to high-latent mode (sub-cooler) by closing humidistat with Y1 closed (Y/N) _____

OBSERVE

A. Reduction in suction pressure (5 to 7 psi expected) (Y/N) _____
B. Discharge pressure unchanged (Y/N) _____
C. Liquid temperature drops to 50°F to 55°F range (Y/N) _____
D. LSV solenoid energized (valve closes) (Y/N) _____

6. Switch unit to dehumid (reheat) by opening Y1 (Y/N) _____

OBSERVE

A. Suction pressure increases to normal cooling level
B. Discharge pressure decreases (35 to 50 psi) (Limited by Motormaster control)
C. Liquid temperature returns to normal cooling level
D. LSV solenoid energized (valve closes)
E. DSV solenoid energized, valve opens

7. With unit in dehumid mode close W1 compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
8. Open W1 restore unit to dehumid mode (Y/N) _____
9. Open humidistat input compressor and outdoor fan stop; LSV and DSV solenoids de-energized (Y/N) _____
10. Restore set-points for thermostat and humidistat (Y/N) _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.
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