Carrier
United Technologies

50KC04-06
Single Package Rooftop Electric Cooling Units with Optional Electric Heat with Puron® (R-410A) Refrigerant

Service and Maintenance Instructions

CONTENTS

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloths for brazing operations and have a fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and appropriate national electrical codes (in USA, ANSI/NFPA70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements.

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.

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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, turn off main power switch to unit. Electrical shock and rotating equipment could cause 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. Tag-out and lock this switch.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

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

⚠ WARNING

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing air conditioning equipment.

UNIT ARRANGEMENT AND ACCESS

General

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

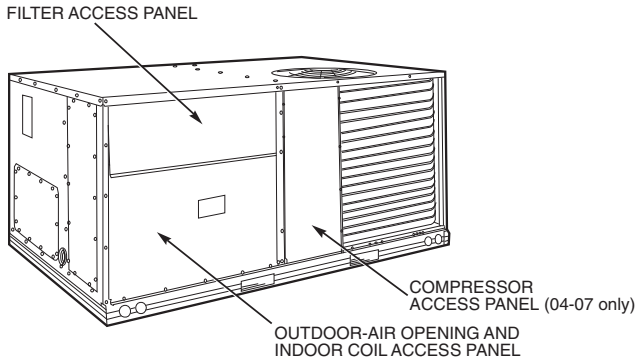


Fig. 1 — Typical Access Panel Locations

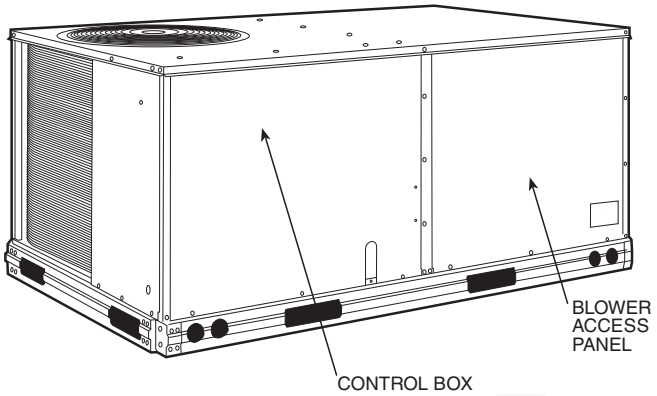


Fig. 2 — Blower Access Panel Location

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)

- Return air filter replacement
- Outdoor hood inlet filters cleaned
- Belt tension checked
- Belt condition checked
- Pulley alignment checked
- Fan shaft bearing locking collar tightness checked
- Condenser coil cleanliness checked
- Condensate drain checked

Seasonal Maintenance

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

AIR CONDITIONING

- Condenser fan motor mounting bolts tightness
- Compressor mounting bolts
- Condenser fan blade positioning
- Control box cleanliness and wiring condition
- Wire terminal tightness
- Refrigerant charge level
- Evaporator coil cleaning
- Evaporator blower motor amperage

HEATING

- Power wire connections
- Fuses ready
- Manual-reset limit switch is closed

ECONOMIZER OR OUTSIDE AIR DAMPER

- 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, an inlet air screen will also be present.

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

RETURN AIR FILTERS

Return air filters are disposable fiberglass media type. Access to the filters is through the small lift-out panel located on the rear side of the unit, above the evaporator/return air access panel. (See Fig. 1.)

To remove the 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 extract the filters from the filter rack.
4. Replace these filters as required with similar replacement filters of same size.

To re-install 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).

IMPORTANT: DO NOT OPERATE THE UNIT WITHOUT THESE FILTERS!

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 spring clips under the top edge of the hood. (See Fig. 3.)

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

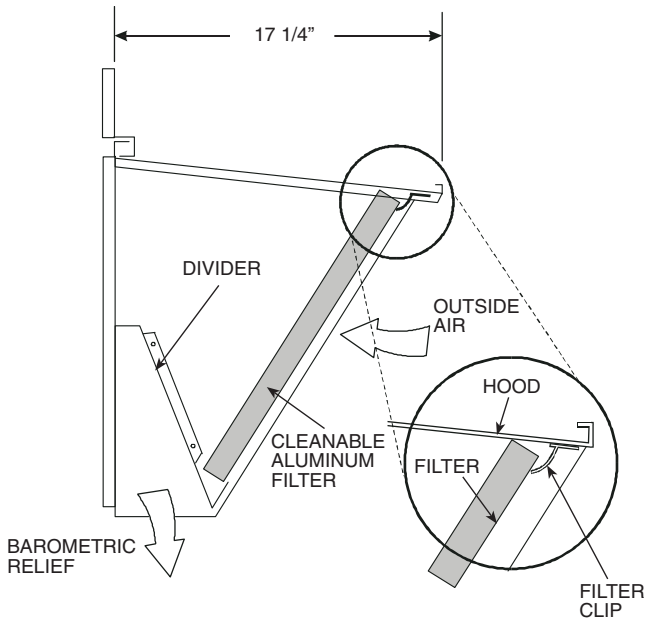


Fig. 3 — Filter Installation

MANUAL OUTSIDE AIR HOOD SCREEN

This inlet screen is secured by a retainer angle across the top edge of the hood. (See Fig. 4.)

To remove the screen, loosen the screws in the top retainer and slip the retainer up until the filter can be removed. Re-install by placing the frame in its track, rotating the retainer back down and tighten all screws.

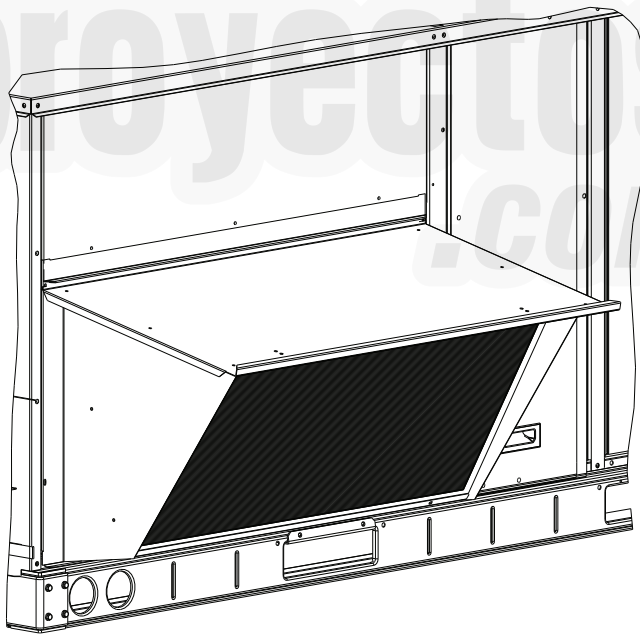


Fig. 4 — Screens Installed on Outdoor-Air Hood

SUPPLY FAN (BLOWER) SECTION

⚠WARNING

ELECTRICAL SHOCK HAZARD

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

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

Supply Fan (Belt-Drive)

The 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" type belt. (See Fig. 5.)

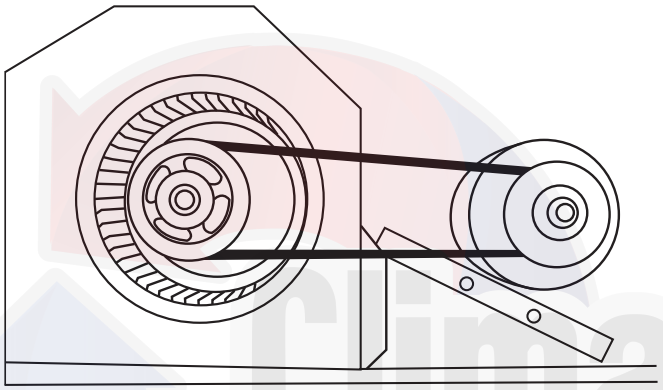


Fig. 5 — Belt Drive Motor Mounting

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 Part Number "Belt Tension Checker" or equivalent tool); tension should be 6-lbs at a $^{5}/_{8}$-in. 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 deflect the belt at mid-span using one finger to a $^{1}/_{2}$-in. deflection.

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt 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). Tighten all bolts when finished.

To replace the belt:

1. 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.
2. Loosen the motor mounting plate front bolts and rear bolts.
3. 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.
4. Remove the belt by gently lifting the old belt over one of the pulleys.
5. Install the new belt by gently sliding the belt over both pulleys and then sliding the motor and plate away from the fan housing until proper tension is achieved.
6. Check the alignment of the pulleys, adjust if necessary.
7. Tighten all bolts.
8. Check the tension after a few hours of runtime and re-adjust as required.

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. 6.)

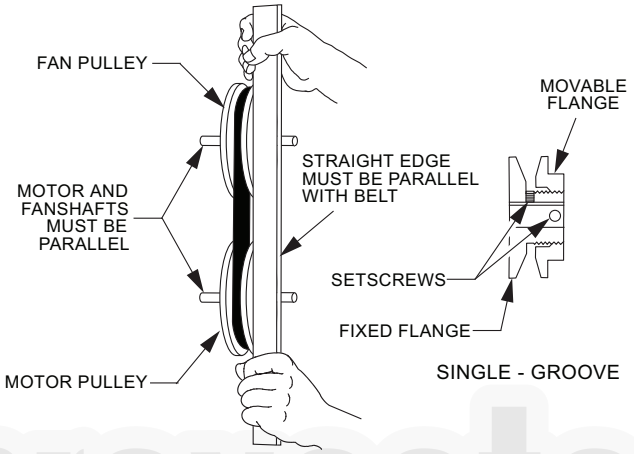


Fig. 6 — Supply-Fan Pulley Adjustment

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 re-alignment of the pulleys after any adjustment of the movable flange. Also, reset the belt tension after each realignment.

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 may be necessary.

To change fan speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. (See Fig. 5.)
3. Loosen movable pulley flange setscrew. (See Fig. 6.)
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 maximum speed specified.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew to torque specifications.

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft. Make angular alignment by loosening motor from mounting.
3. Tighten fan pulley setscrews and motor mounting bolts to torque specifications.
4. Recheck belt tension.

BEARINGS

This fan system uses bearings featuring concentric split locking collars. The collars are tightened through a cap screw bridging the split portion of the collar. The cap screw has a Torx T25 socket head. To tighten the locking collar: Hold the locking collar tightly against the inner race of the bearing and torque the cap screw to 65 to 70 in.-lb (7.4-7.9 Nm). See Fig. 7.

Fig. 7 — 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 to 120 ± 12 in.-lb.

Changing fan wheel speed by changing pulleys:

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 provided on the original factory pulley. 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(s)).

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 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.

COOLING

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

This system uses Puron® 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 Puron refrigerant. If unsure about equipment, consult the equipment manufacturer.

Condenser Coil

The condenser coil is fabricated with round tube copper hairpins and plate fins of various materials and/or coatings (see Model Number Format in Appendix A to identify the materials provided in this unit). The coil may be one-row or composite-type two-row. Composite two-row coils are two single-row coils fabricated with a single return bend end tubesheet.

Condenser Coil Maintenance and Cleaning Recommendation

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 may 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 to the coating of a protected coil) if 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 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 a very low velocity water stream to avoid damaging the fin edges. Monthly cleaning as described below is recommended.

ROUTINE CLEANING OF COIL SURFACES

Periodic cleaning with Totaline® environmentally sound coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement Components Division as part number P902-0301 for a one gallon container, and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including standard aluminum, pre-coated, 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 long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers

- poor quality water for cleaning

Totaline environmentally sound coil cleaner is nonflammable, hypo-allergenic, 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 since coil and unit durability could be affected.

One-Row Coil

Wash coil with commercial coil cleaner. It is not necessary to remove top panel.

Two-Row Coils

Clean coil as follows:

1. Turn off unit power, tag disconnect and lock.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 8. To hold top panel open, place coil corner post between top panel and center post. See Fig. 9.

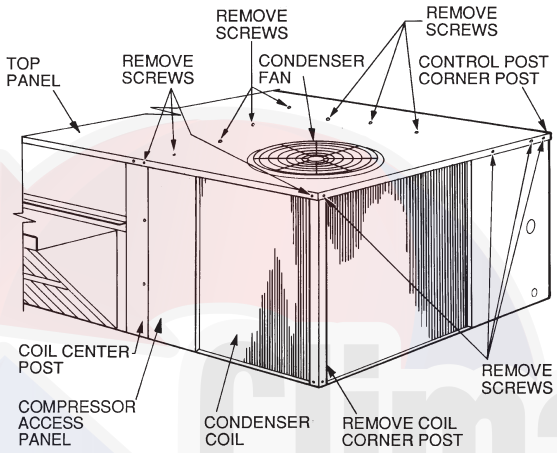


Fig. 8 — Cleaning Condenser Coil

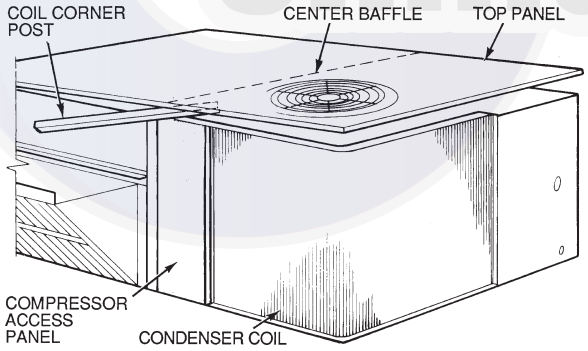


Fig. 9 — Propping Up Top Panel

4. Remove screws securing coil to compressor plate and compressor access panel.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3-in. to 4-in. from the inner coil section. See Fig. 10.

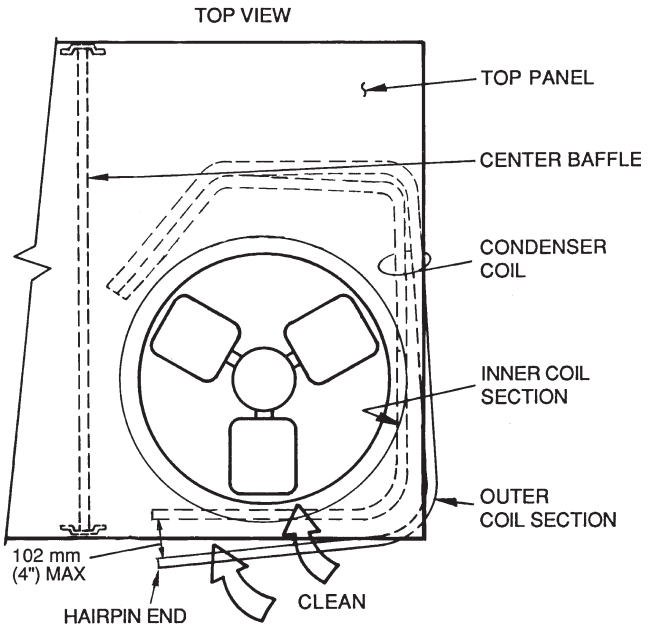


Fig. 10 — Separating Coil Sections

6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. 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

- $2^1/_2$ gallon garden sprayer
- Water rinse with low velocity spray nozzle

⚠CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in accelerated corrosion of unit parts.

Harsh chemicals, household bleach or 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.

⚠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.

Totaline Environmentally Sound Coil Cleaner Application Instructions

1. Proper eye protection such as safety glasses is recommended during mixing and application.
2. Remove all surface loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally sound coil cleaner in a $2^1/_2$ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F.

NOTE: Do NOT USE water in excess of 130°F, 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. Reapplying 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.

Evaporator Coil

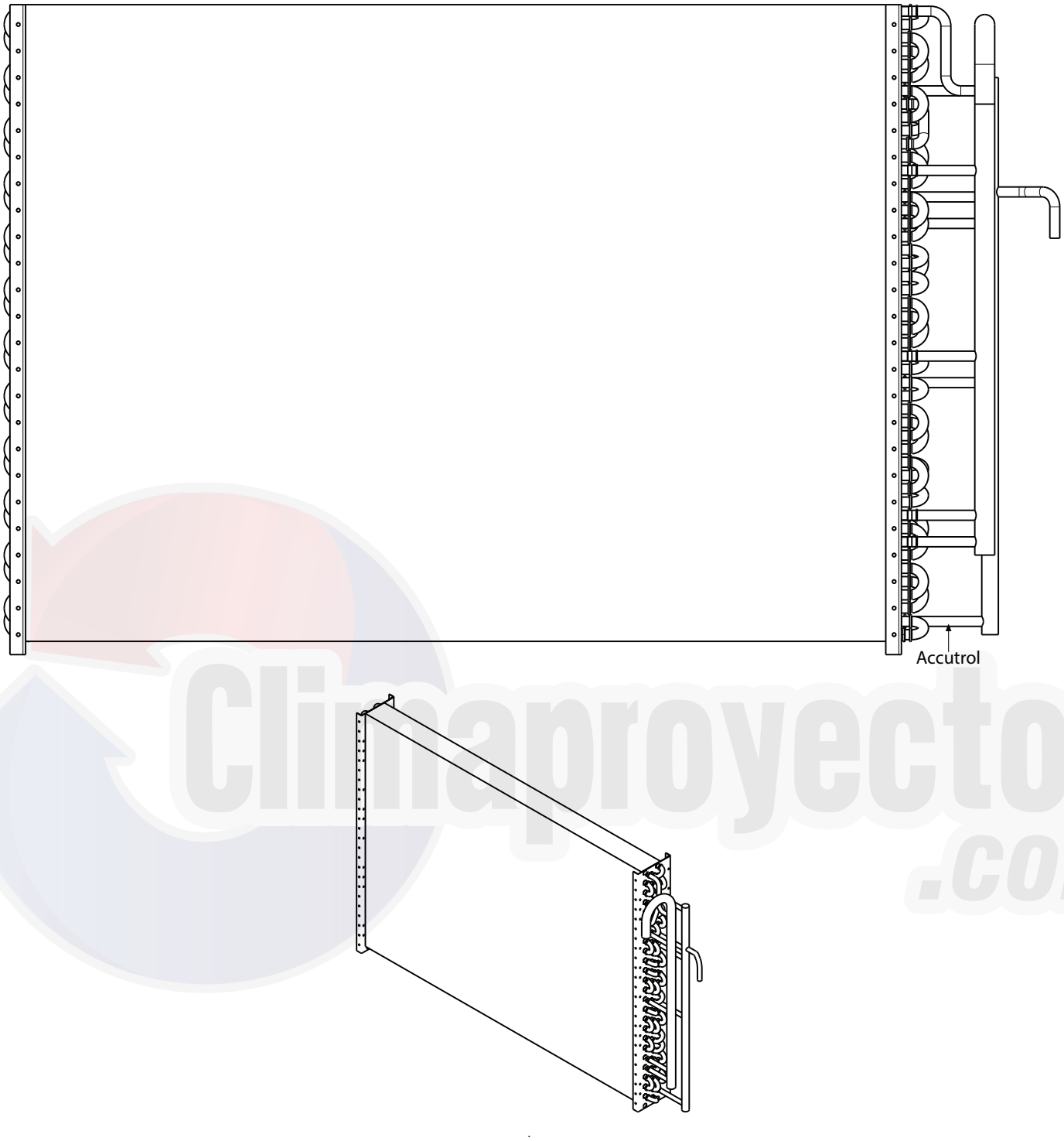
CLEANING THE EVAPORATOR COIL

1. Turn unit power off. Install lockout tag. Remove evaporator coil access panel.
2. If economizer or two-position damper is installed, remove economizer by disconnecting Molex plug and removing mounting screws.
3. Slide filters out of unit.
4. 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, back-flush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

EVAPORATOR COIL METERING DEVICES

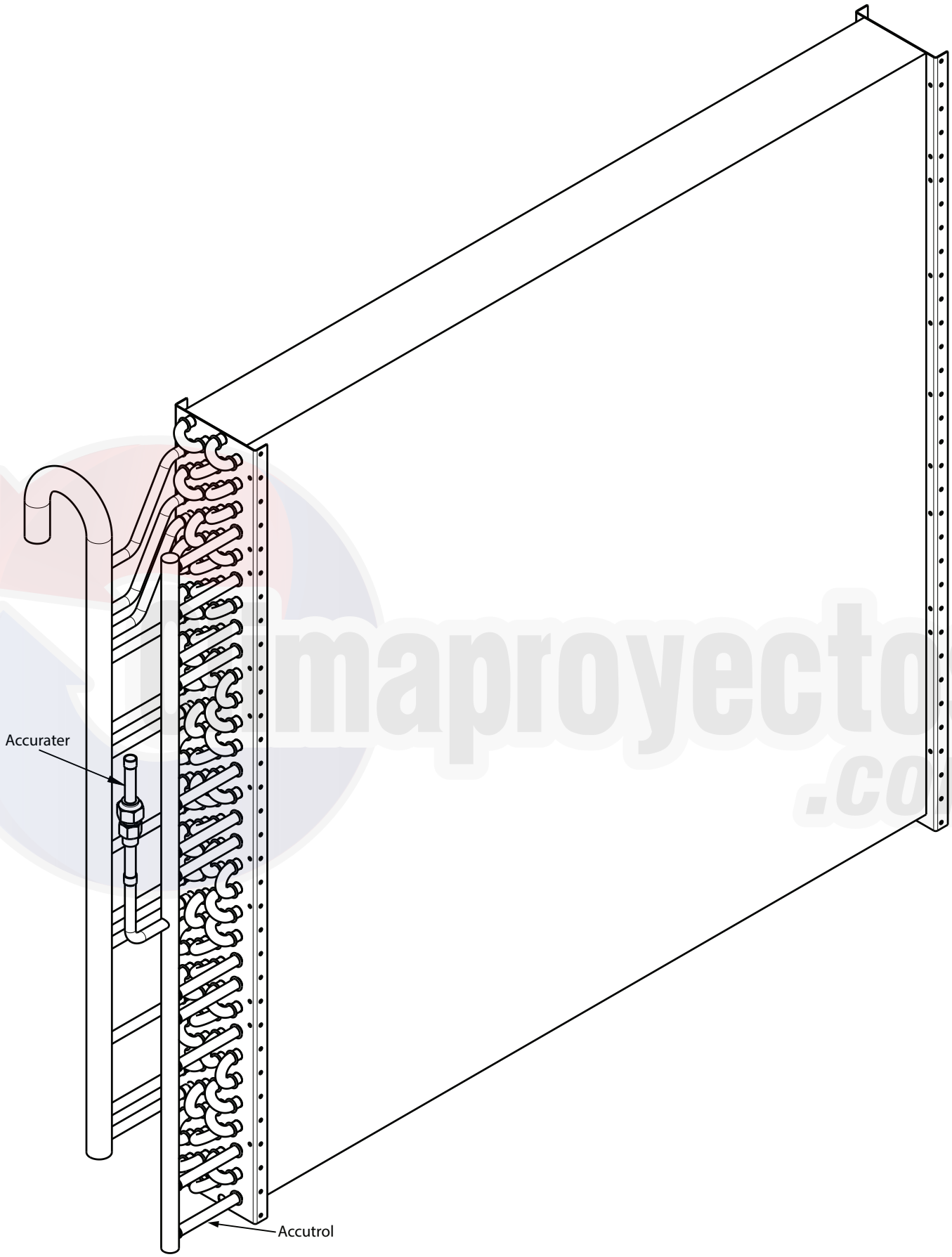
The metering devices are multiple fixed-bore devices (Acutrol™) swedged into the horizontal outlet tubes from the liquid header, located at the entrance to each evaporator coil circuit path. See Fig. 11 and 12 for units with standard metering devices and Fig. 13 for units with Humidi-MiZer metering devices. These are non-adjustable. Service requires replacing the entire liquid header assembly.

To check for possible blockage of one or more of these metering devices, disconnect the supply fan contactor (IFC) coil, then start the compressor and observe the frosting pattern on the face of the evaporator coil. A frost pattern should develop uniformly across the face of the coil starting at each horizontal header tube. Failure to develop frost at an outlet tube can indicate a plugged or a missing orifice.



NOTE: Each feeder tube in the liquid header has a metering device.

Fig. 11 — 50KC*A,B Sizes 04-05 Metering Piping Diagram



NOTE: Each feeder tube in the liquid header has a metering device.

Fig. 12 — 50KC*A,B Sizes 06 Dual Metering Piping Diagram

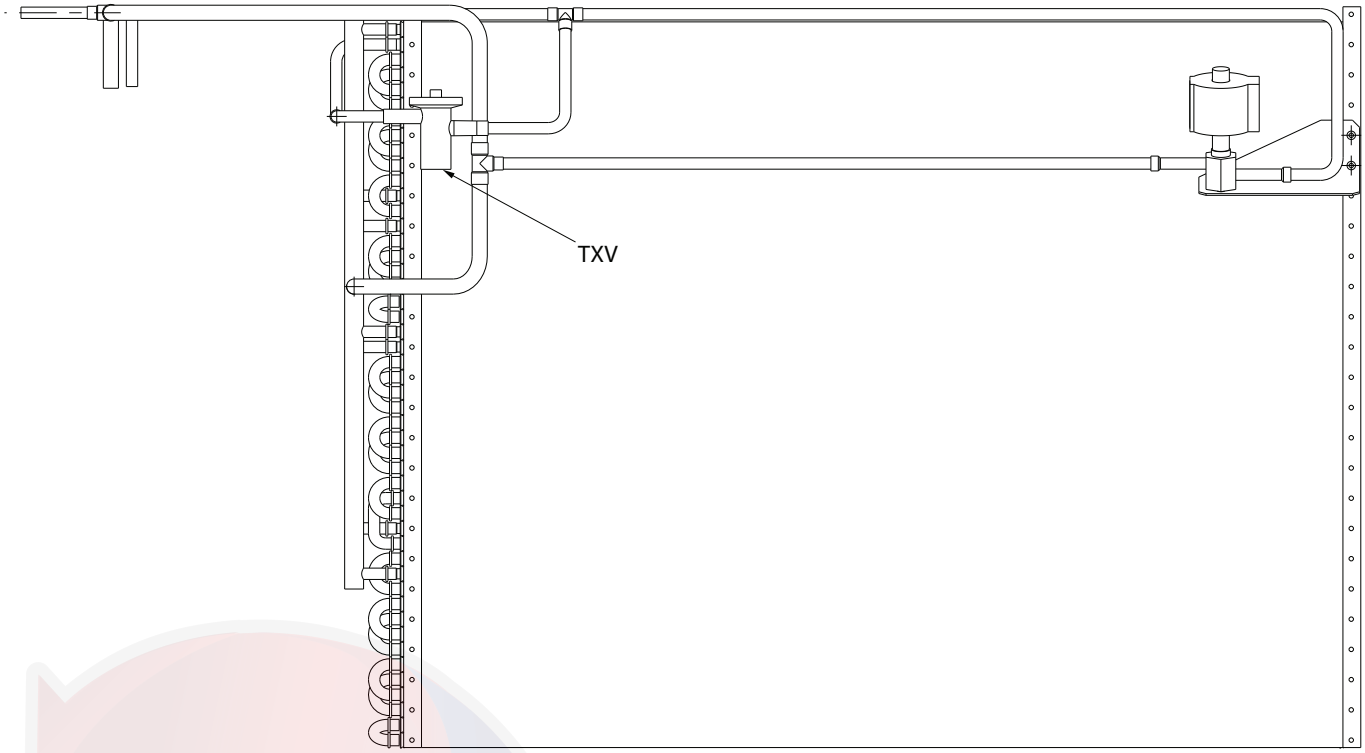


Fig. 13 — TXV (Metering Device) Position in Reheat Coil (Typical Diagram for Sizes 04-06)

Refrigerant System Pressure Access Ports

There are two access ports in the system: one on the suction tube near the compressor and one on 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. 14.) 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 with 96 ±10 in.-lb of torque; do not over-tighten.

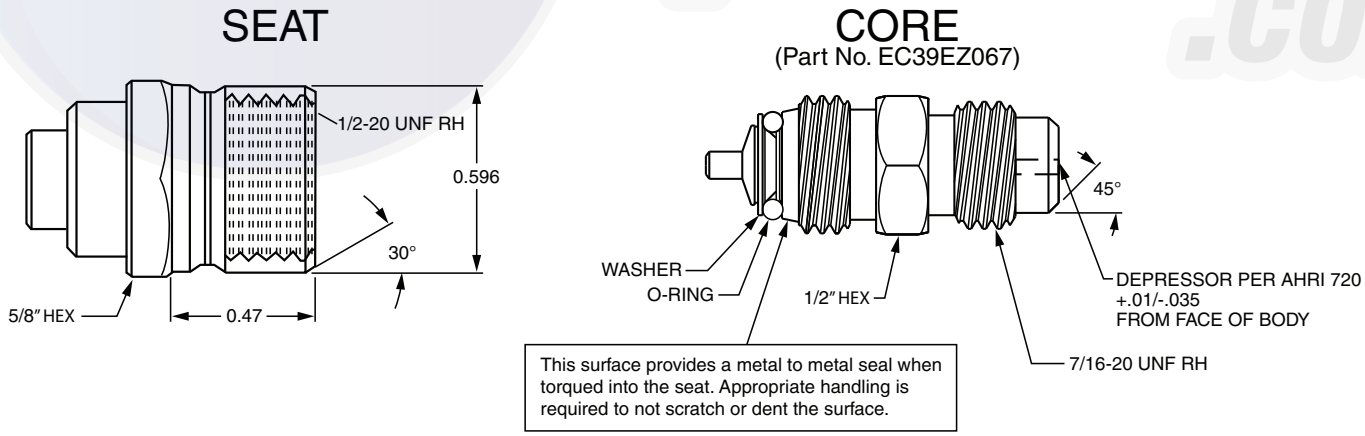


Fig. 14 — CoreMax[1] Access Port Assembly

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

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. Admit 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

Amount of refrigerant charge is listed on the unit's nameplate. Refer to Carrier 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.

NO CHARGE

Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant.

LOW-CHARGE COOLING

Using Fig. 15-19, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

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 50KC*A04

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

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

Suction Temperature should be . . . . . 60°F (16°C)

Compressor

LUBRICATION

The compressor is charged with the correct amount of oil at the factory.

⚠CAUTION

UNIT DAMAGE HAZARD

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

The compressor is in a Puron® 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 the oil to the atmosphere.

REPLACING COMPRESSOR

The compressor used with Puron refrigerant contains a 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 mounting bolt torque is 65 to 75 ft-lb.

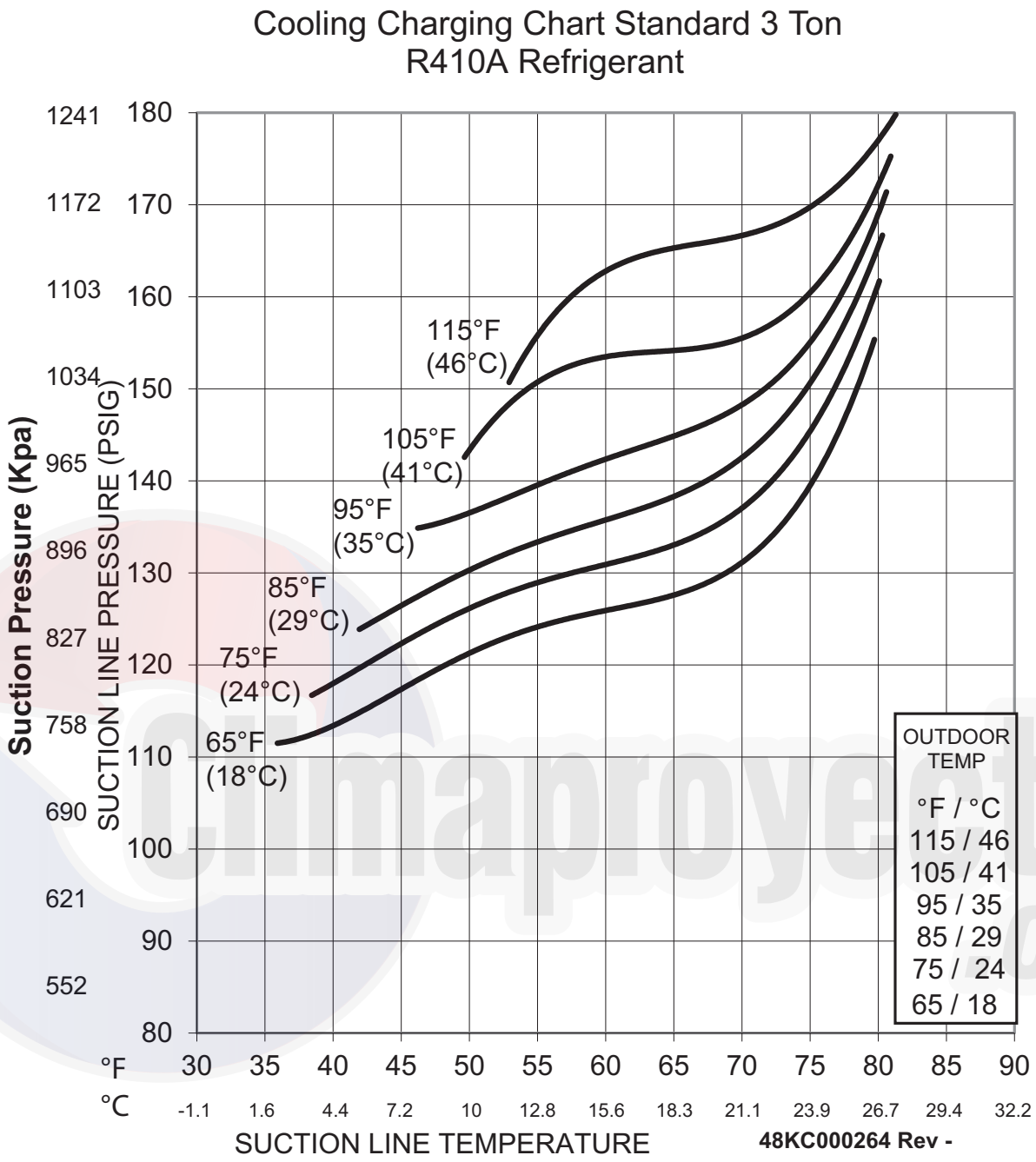


Fig. 15 — 50KC 3 Ton Single Phase and Three Phase Cooling Charging Chart

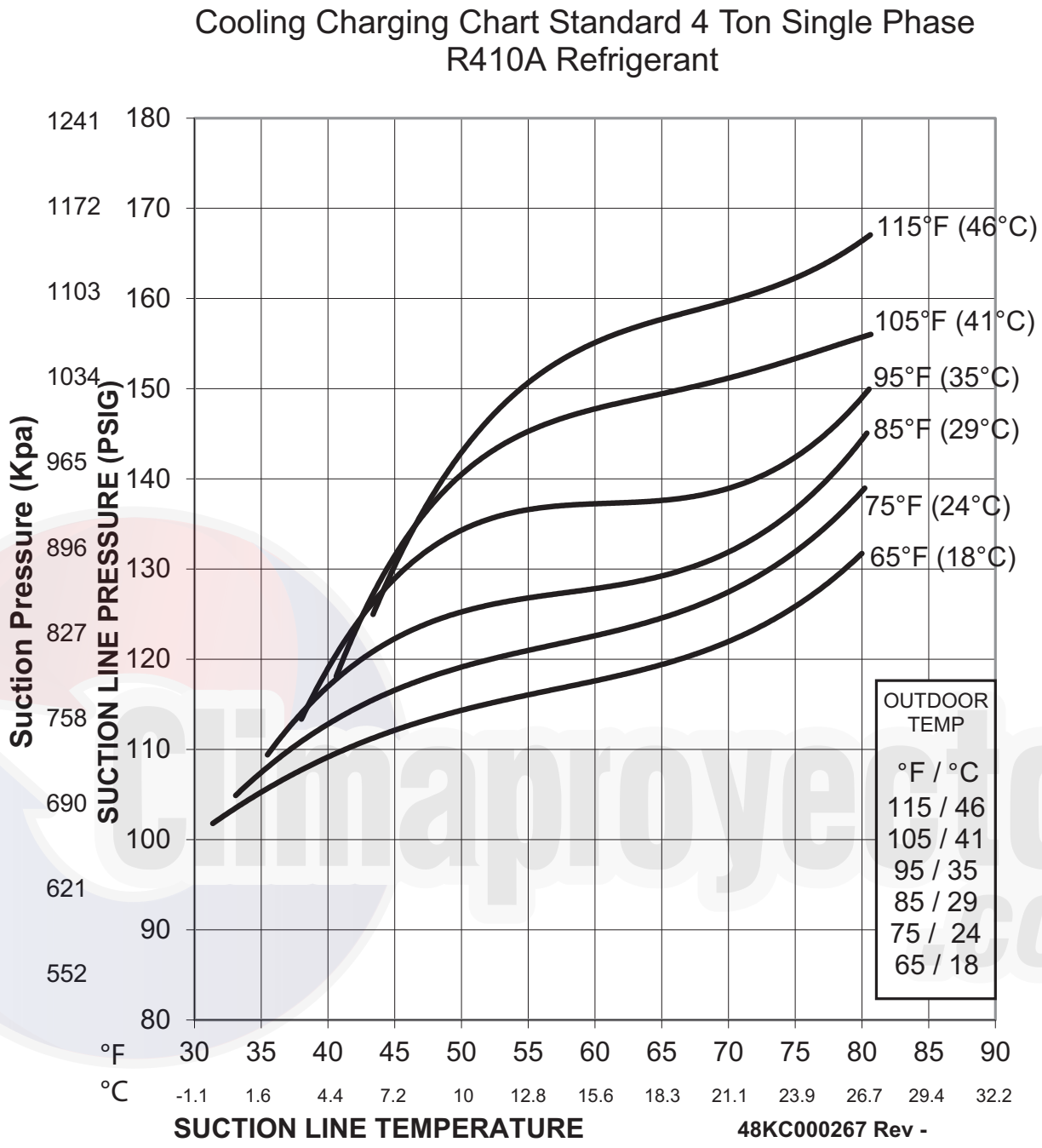


Fig. 16 — 50KC 4 Ton Single Phase Cooling Charging Chart

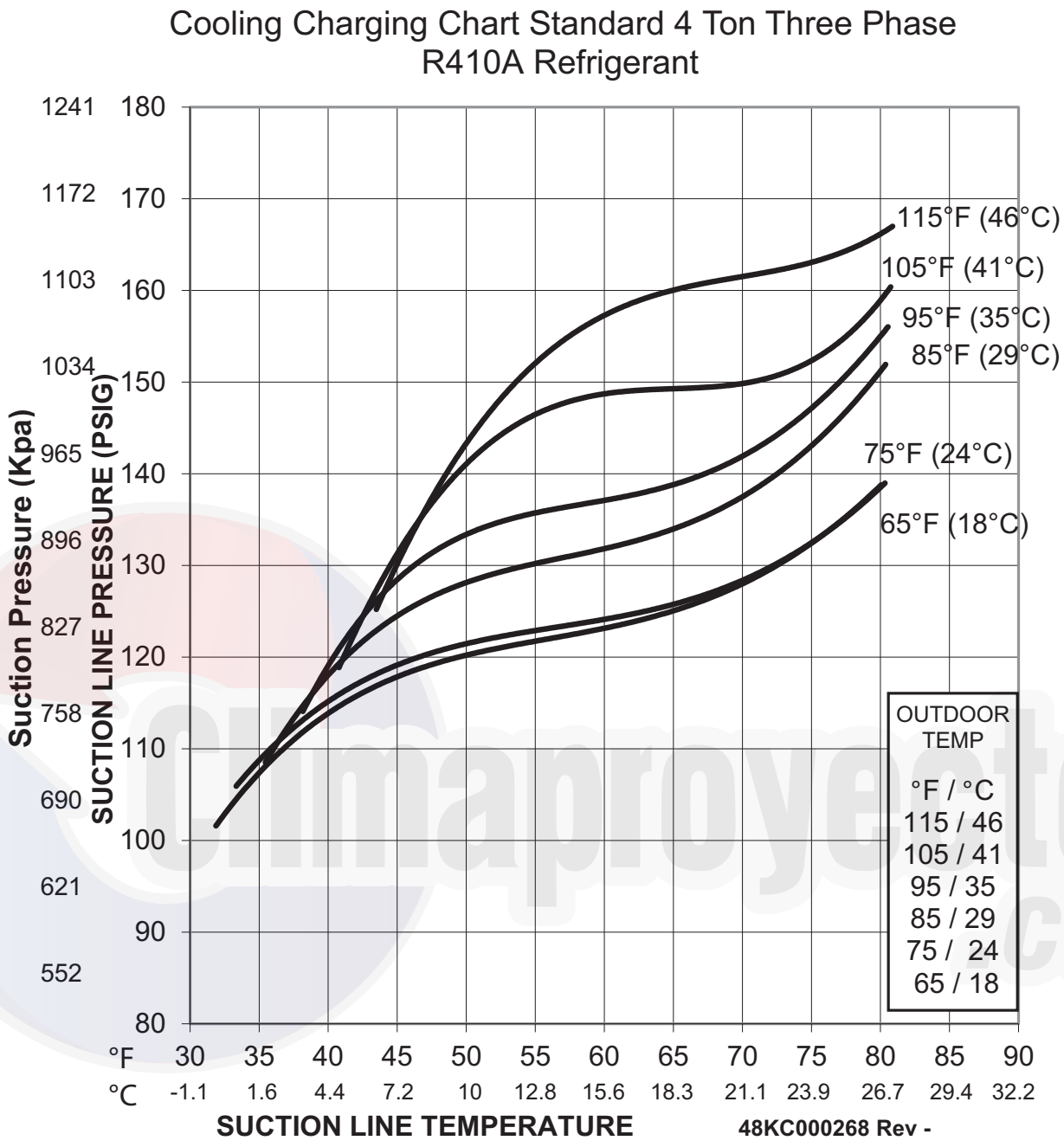


Fig. 17 — 50KC 4 Ton Three Phase Cooling Charging Chart

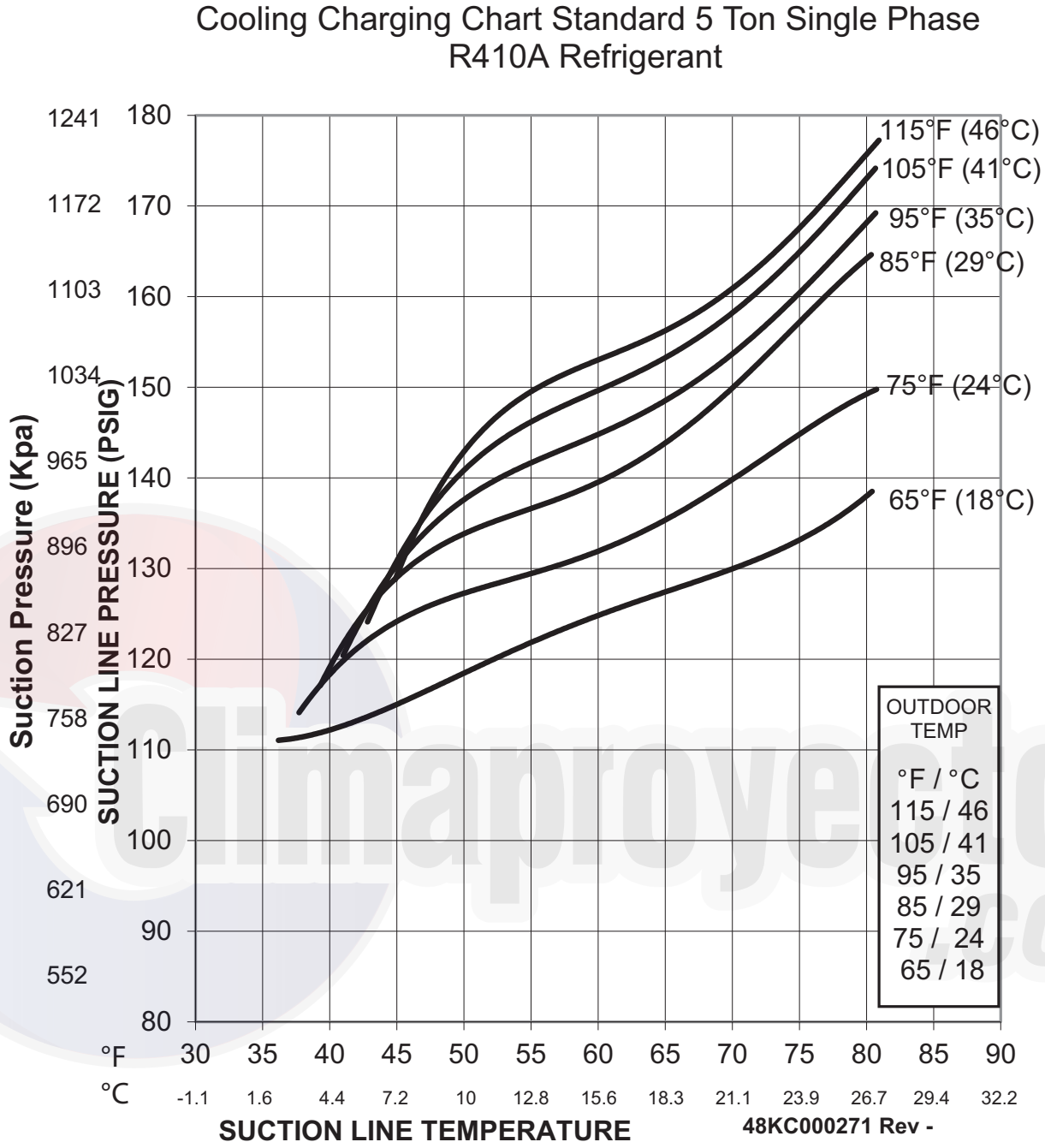


Fig. 18 — 50KC 5 Ton Single Phase Cooling Charging Chart

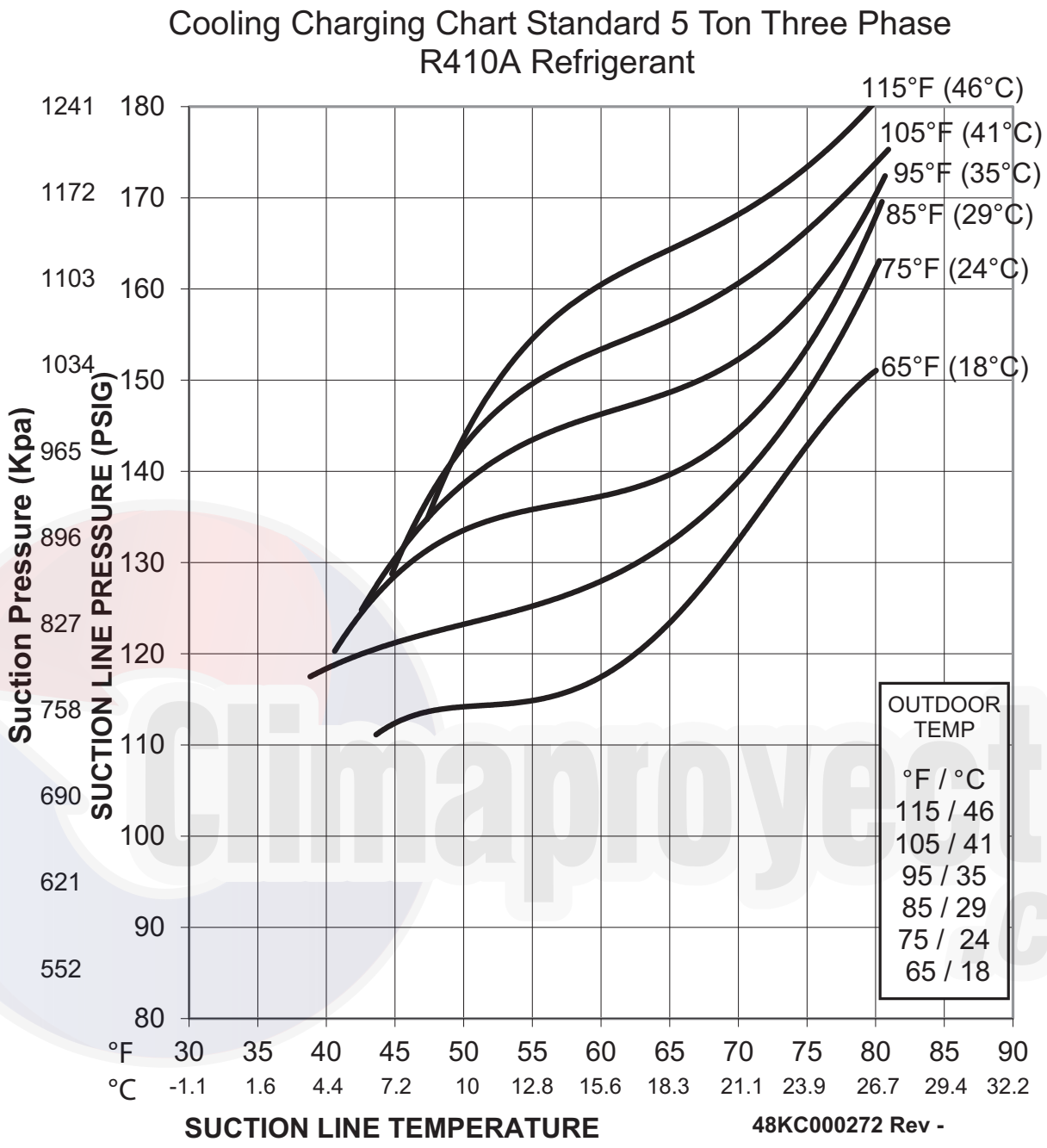


Fig. 19 — 50KC 5 Ton Three Phase Cooling Charging Chart

COMPRESSOR ROTATION

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 unit power leads.
7. Reapply power to the compressor.

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 makes an elevated level of noise and does not provide cooling.

See Table 1 for cooling service analysis.

Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig. Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron refrigerant is required on every unit.

Condenser Fan Adjustment

See Fig. 20.

1. Shut off unit power supply. Install lockout tag.
2. Remove condenser-fan assembly (grille, motor, and fan).
3. Loosen fan hub setscrews.
4. Adjust fan height as shown in Fig. 20.
5. Tighten setscrews.
6. Replace condenser-fan assembly.

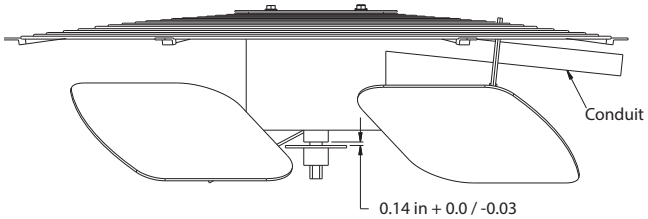


Fig. 20 — Condenser Fan Adjustment

Table 1 — Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	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.
Compressor will not start but condenser 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.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of three-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 condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser, fan 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.	Reset thermostat.
	Low refrigerant charge.	Locate leak; repair and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.

Table 1 — Cooling Service Analysis (cont)

PROBLEM	CAUSE	REMEDY
Head pressure too low	Low refrigerant charge.	Check for leaks; repair and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure	High head load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks; repair and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25°F	Install low-ambient kit.
Evaporator fan will not shut off	Time off delay not finished.	Wait for 30-second off delay.
Compressor makes excessive noise	Compressor rotating in wrong direction.	Reverse the 3-phase power leads.

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. Tag-out and lock this switch.

Two types of convenience outlets are offered on 50KC models: non-powered and unit-powered. Both types provide a 125-v GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 21.

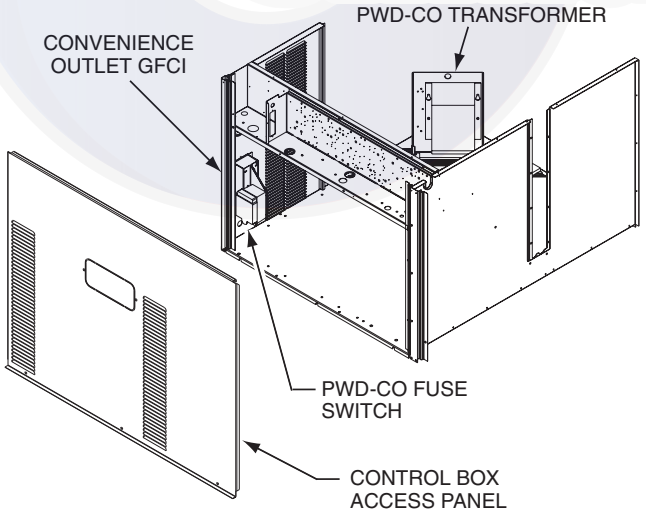


Fig. 21 — Convenience Outlet Location

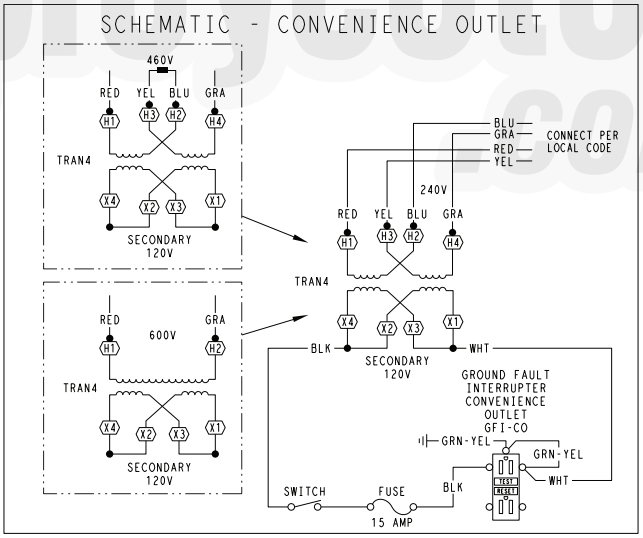
Non-Powered Type

This type requires the field installation of a general-purpose 125-v 15-A 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-v 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 stepdown the main power supply voltage to the unit to 115-v 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. 21.

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 a 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. 22.



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. 22 — Powered Convenience Outlet Wiring

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).

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.

Fuse on Powered Type

The factory fuse is a 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 that 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.

SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 50KC models. Smoke detectors may be specified for supply air only, for return air without or with 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 may 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. 23) 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).

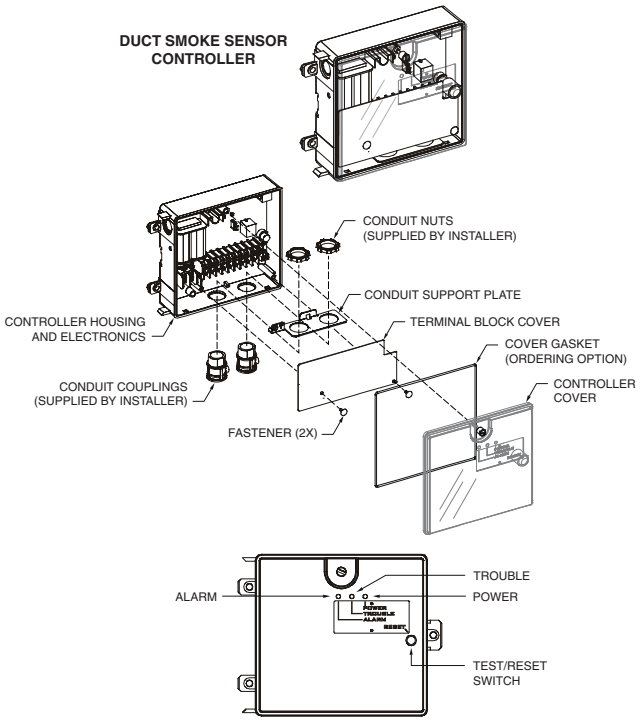


Fig. 23 — Controller Assembly

Sensor

The sensor (see Fig. 24) 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).

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

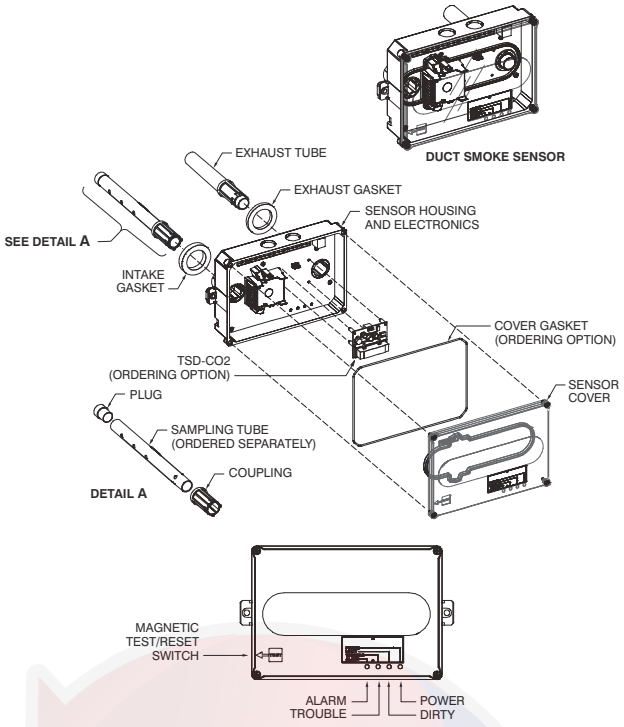


Fig. 24 — Smoke Detector Sensor

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. 25. 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.

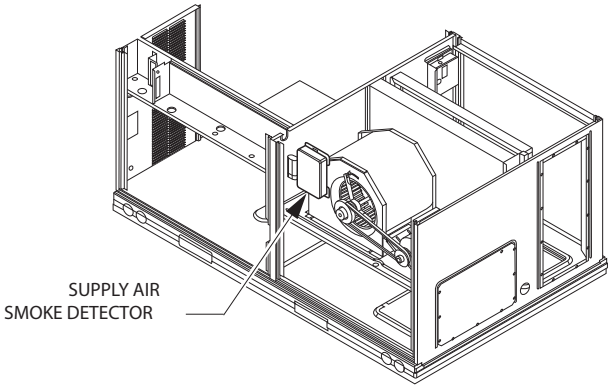
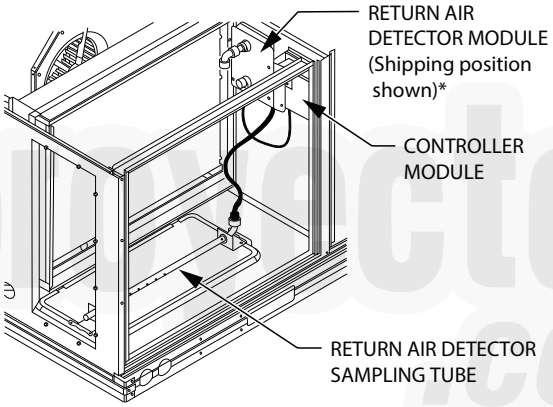


Fig. 25 — Typical Supply Air Smoke Detector Sensor Location

RETURN AIR WITHOUT ECONOMIZER

The sampling tube is located across the return air opening on the unit basepan. See Fig. 26. 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 installation steps below.)



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

Fig. 26 — 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 basepan. See Fig. 27. 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 installation steps below.)

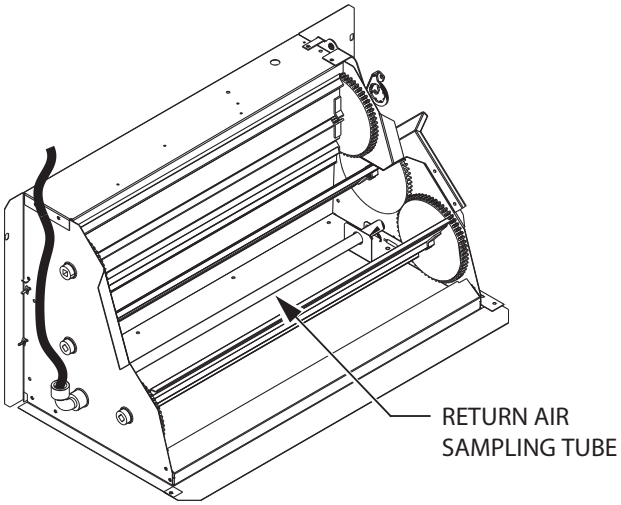


Fig. 27 — Return Air Sampling Tube Location

Completing Installation of Return Air Smoke Sensor

1. Unscrew the two screws holding the Return Air Sensor detector plate. See Fig. 28. 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. 29.
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. 29.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.
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.

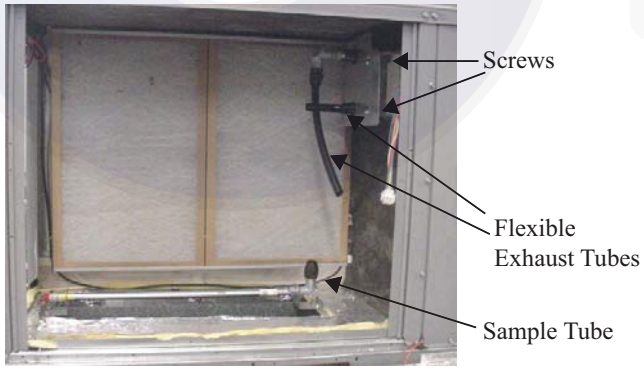


Fig. 28 — Return Air Detector Shipping Position

Fig. 29 — Return Air Sensor Operating Position

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. 30, Smoke Detector 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.

HIGHLIGHT C

24-v power signal via ORN lead is removed at Smoke Detector input on CTB; all unit operations cease immediately.

PREMIERLINK CONTROL

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

HIGHLIGHT D

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

HIGHLIGHT E

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

PREMIER-LINK

This signal is conveyed to PremierLink FIOP’s 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

Six conductors are provided for field use (see Highlight F in Fig. 30) for additional annunciation functions.

Additional Application Data — Refer to *Factory-Installed Smoke Detectors for Small and Medium Rooftop Units 2 to 25 Tons* for discussions on additional control features of these smoke detectors including multiple unit coordination. See Fig. 30.

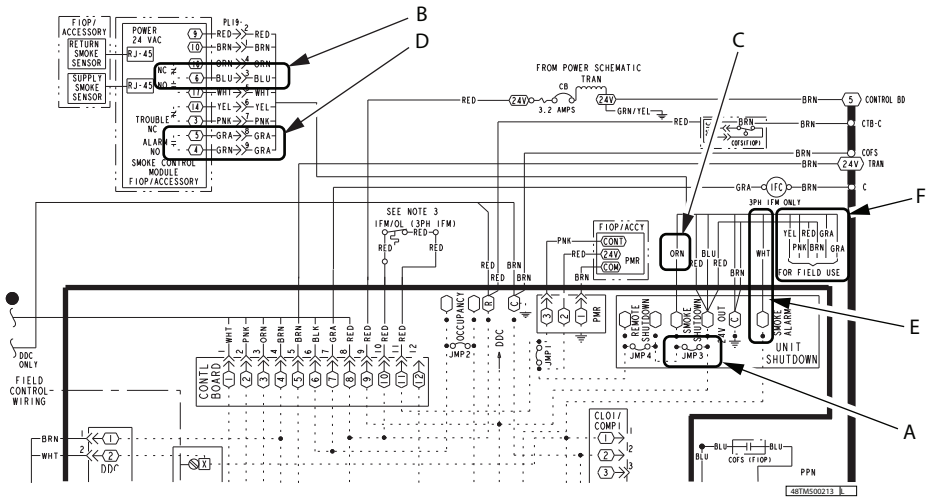


Fig. 30 — Typical Smoke Detector System Wiring

Sensor and Controller Tests

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.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

This test places the duct detector into the alarm state. Unless 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 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.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

This test places the duct detector into the alarm state. 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.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

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.

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. A field-provided SD-MAG test magnet must be used to initiate a sensor dirty test. The sensor's Dirty LED indicates the results of the dirty test as shown in Table 2.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

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 2 — Dirty LED Test

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

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

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.

To 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.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

This test places the duct detector into the alarm state. Unless 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.

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. 31 and configured to operate the controller's supervision relay. For more information, see "Changing the dirty sensor test" operation on page 23.

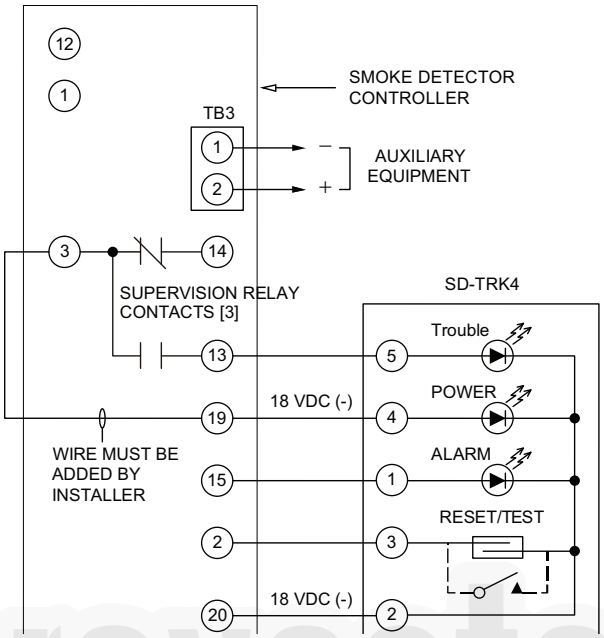


Fig. 31 — Remote Test/Reset Station Connections

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

If the test/reset station's key switch is left in the RESET/TEST position for longer than seven seconds, the detector will automatically go into the alarm state and activate all automatic alarm responses.

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

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

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

Table 3 — 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.

DETECTOR CLEANING

Cleaning the Smoke Detector

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

⚠ CAUTION

OPERATIONAL TEST HAZARD

Failure to follow this caution may result in personnel and authority concern.

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. 32.)
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.

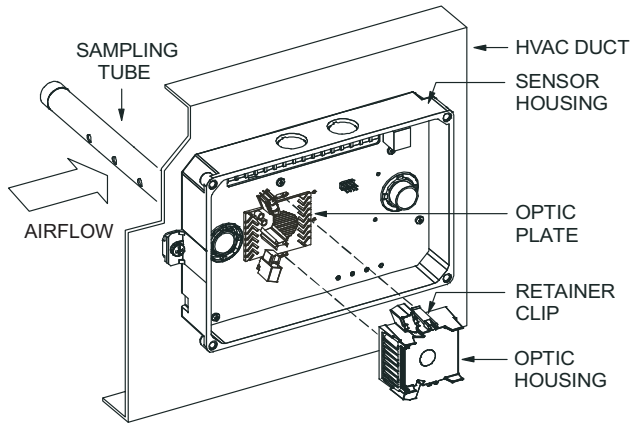


Fig. 32 — Sensor Cleaning Diagram

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 3.)

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 SuperDuct 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. 33.)
- If a sensor trouble, the sensor's Trouble LED the controller's Trouble LED 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 Trouble LED.

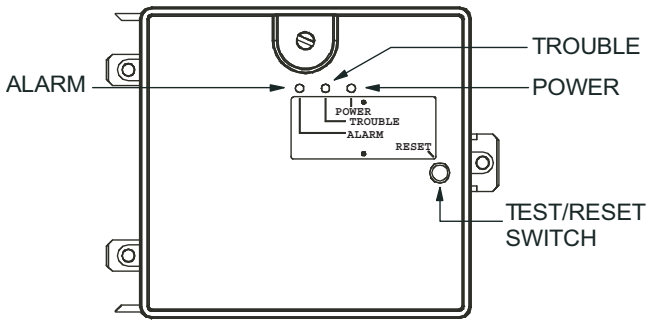


Fig. 33 — Controller Assembly

NOTE: All troubles are latched 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. Make sure 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. 31. Repair or replace loose or missing wiring.
2. Configure the sensor dirty test to activate the controller's supervision relay. See "Changing dirty sensor test" operation on page 23.

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

Remove JP1 on the controller.

PROTECTIVE DEVICES

Compressor Protection

OVERCURRENT

The compressor has internal linebreak motor protection.

OVERTEMPERATURE

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).

LOW PRESSURE SWITCH

The system is protected against a loss of charge and low evaporator coil loading condition by a low pressure switch located on the suction line near the compressor. The switch is stem-mounted. Trip setting is 54 psig ± 5 psig (372 ± 34 kPa). Reset is automatic at 117 ± 5 psig (807 ± 34 kPa).

EVAPORATOR FREEZE PROTECTION

The system is protected against evaporator coil frosting and low temperature conditions by a temperature switch mounted on the evaporator coil hairpin. Trip setting is 30°F ± 5°F (–1°C ± 3°C). Reset is automatic at 45°F (7°C).

SUPPLY (INDOOR) FAN MOTOR PROTECTION

Disconnect and lockout power when servicing fan motor. The standard supply fan motor is equipped with internal overcurrent and overtemperature protection. Protection devices reset automatically.

The High Static option supply fan motor is equipped with a pilot-circuit Thermix combination overtemperature/overcurrent protection device. This device resets automatically. Do not bypass this switch to correct trouble. Determine the cause and correct it.

CONDENSER FAN MOTOR PROTECTION

The condenser fan motor is internally protected against overtemperature.

Relief Device

A soft solder joint at the suction service access port provides pressure relief under abnormal temperature and pressure conditions (i.e., fire in building). Protect this joint during brazing operations near this joint.

Control Circuit, 24-v

The control circuit is protected against overcurrent conditions by a circuit breaker mounted on control transformer TRAN. Reset is manual.

ELECTRIC HEATERS

The 50KC units may 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 may 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. 34-36.

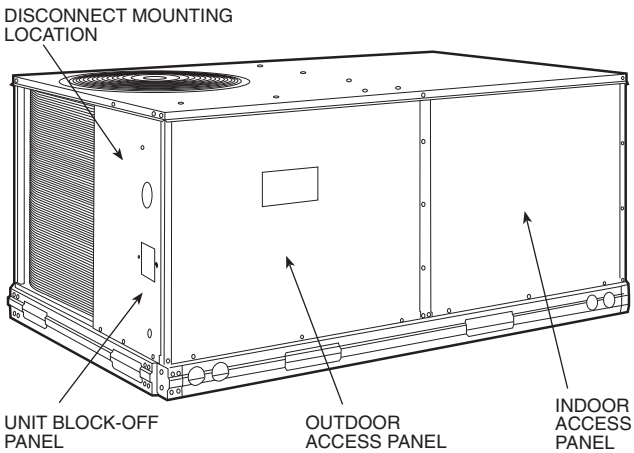


Fig. 34 — Typical Access Panel Location

Table 4 — 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

Not all available heater modules may 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. But heaters are ordered as and shipped in cartons marked with a corresponding heater sales package part number. See Table 4 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).

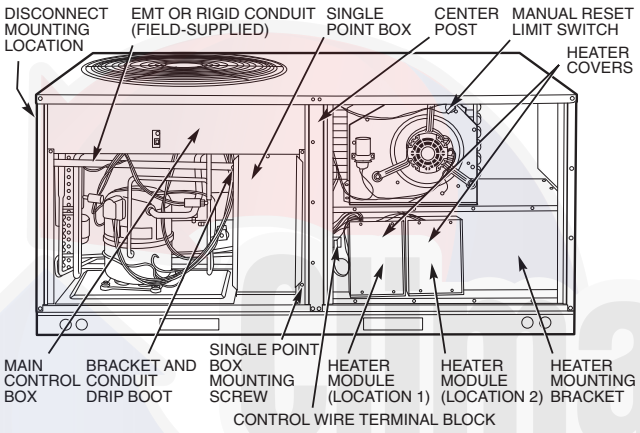


Fig. 35 — Typical Component Location

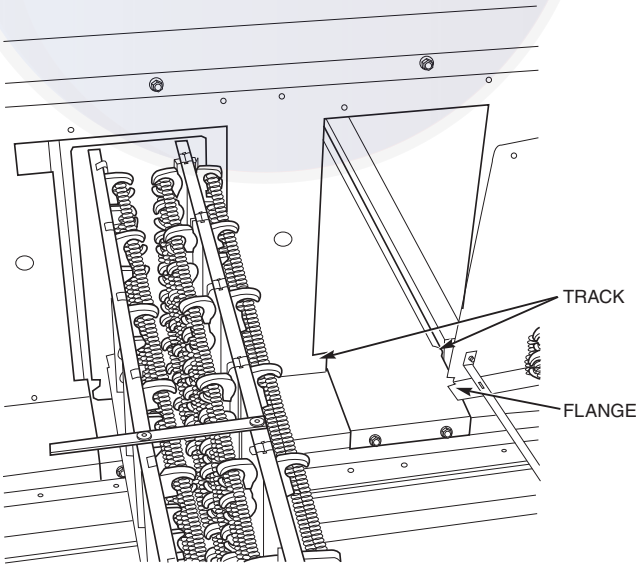


Fig. 36 — Typical Module Installation

Single Point Boxes and Supplementary Fuses

When the unit MOCP device value exceeds 60-A, 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. 37.

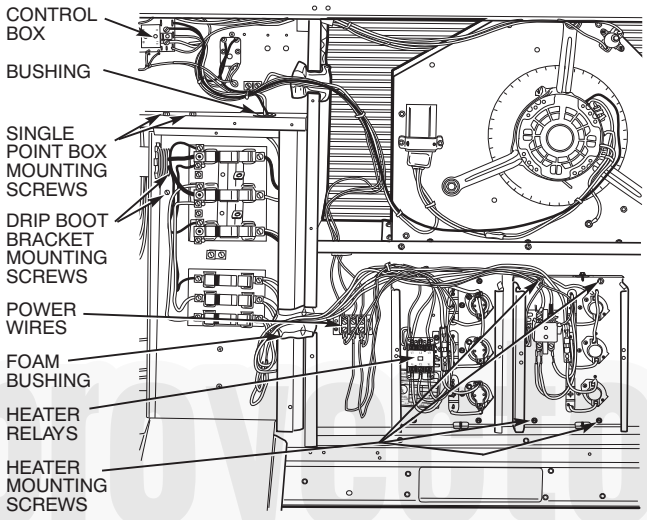


Fig. 37 — Typical Single Point Installation

On 50KC units, all fuses are 60-A. 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 60-A fuse, regardless of actual heater ampacity, so only 60-A fuses are necessary.)

Unit heater applications not requiring supplemental fuses require a special single point box without any fuses. Connect power supply conductors to heater conductors and field-supplied base unit power tap leads (see text below regarding "Completing Heater Installation") inside the empty single point box using UL-approved connectors.

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. 38. 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. 35.

Completing Heater Installation

FIELD POWER CONNECTIONS

Field-supplied tap conductors must be installed between the base unit's field power connection lugs and the single point box (with or without fuses). Refer to unit wiring schematic. Use copper wire only. Size these conductors based on the MCA (Minimum Circuit Ampacity) value marked on the 50KC unit's info plate for the base unit, less electric heater load. For connection using the single point box less 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.

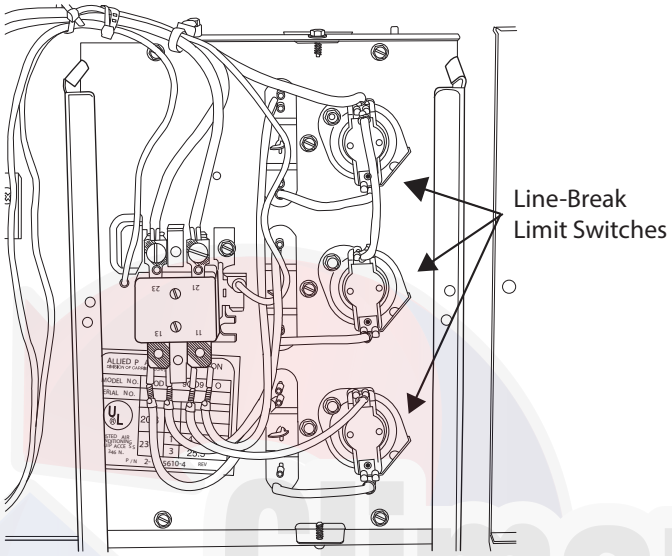
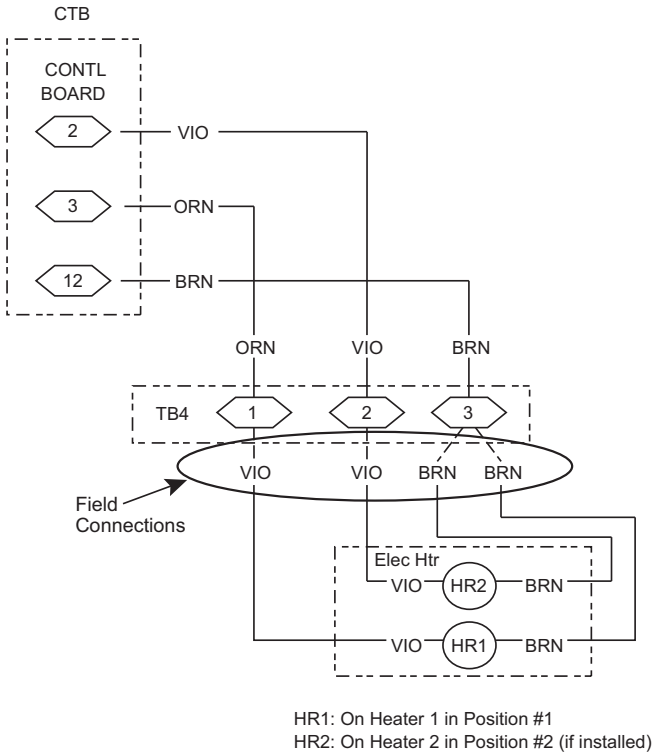


Fig. 38 — Typical Location of Heater Limit Switches (3-phase heater shown)

LOW-VOLTAGE CONTROL CONNECTIONS

Pull the low-voltage control leads from the heater module(s) - VIO and BRN (two of each if two modules are installed; identify for Module #1) - to the 4-pole terminal board TB4 located on the heater bulkhead to the left of Heater #1. Connect the VIO lead from Heater #1 to terminal TB4-1. Connect the VIO lead from Heater #2 to terminal TB4-2. Connect both BRN leads to terminal TB4-3. See Fig. 39.



HR1: On Heater 1 in Position #1
HR2: On Heater 2 in Position #2 (if installed)

Fig. 39 — Accessory Electric Heater Control Connections

PREMIERLINK™ CONTROLLER (Factory Option)

For details on 50KC 04-06 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 50TCQ 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.

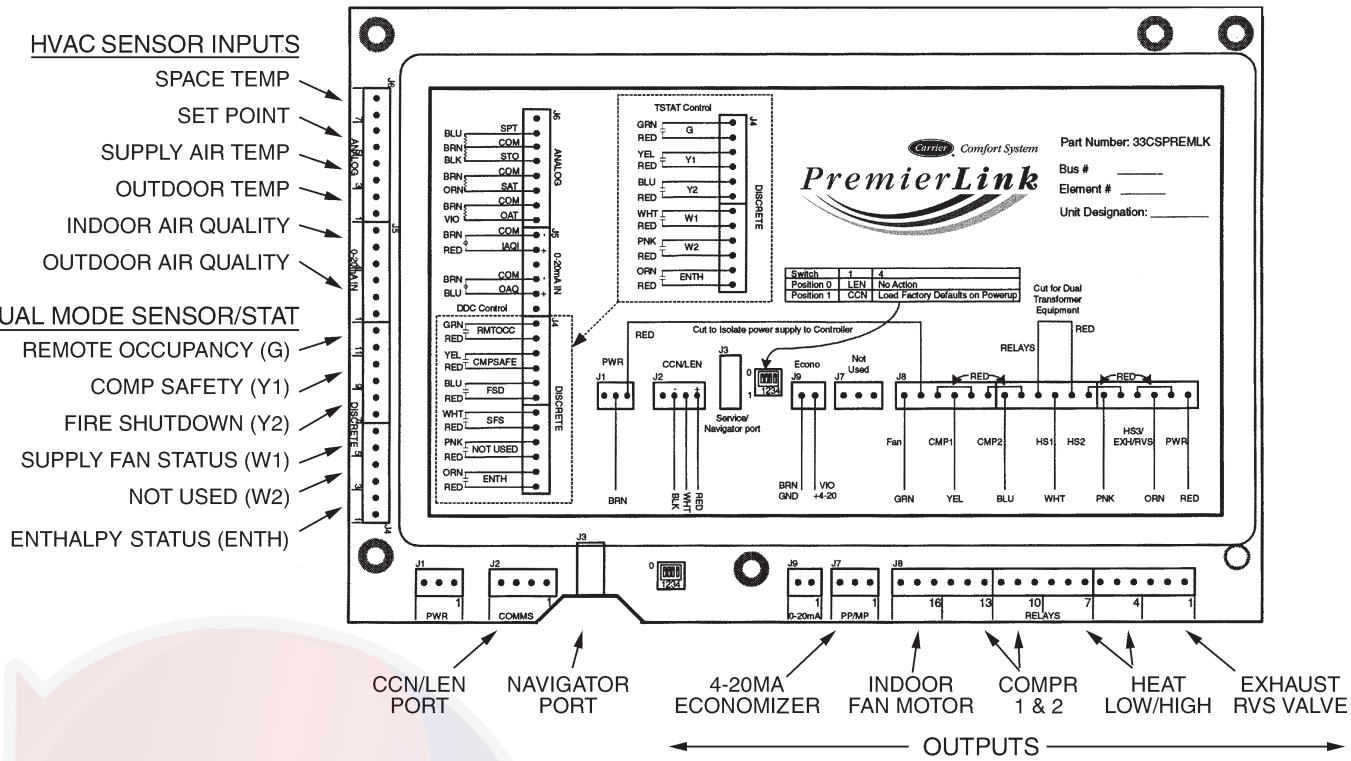


Fig. 40 — PremierLink Controller

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$er2). See Fig. 41-43 for component locations on each type. The W7212 controller is used for EconoMi$er IV and the W7220 controller is used for EconoMi$er X. See Fig. 44-47 for economizer section wiring diagrams.

All three economizers use direct-drive damper actuators.

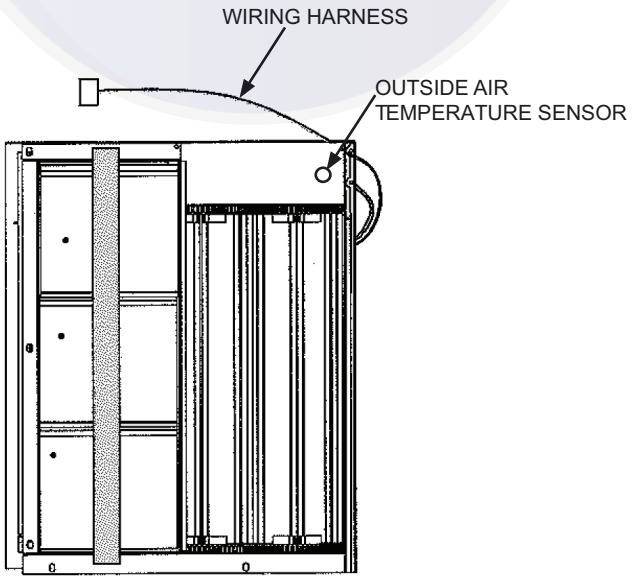


Fig. 41 — EconoMi$er X Component Locations

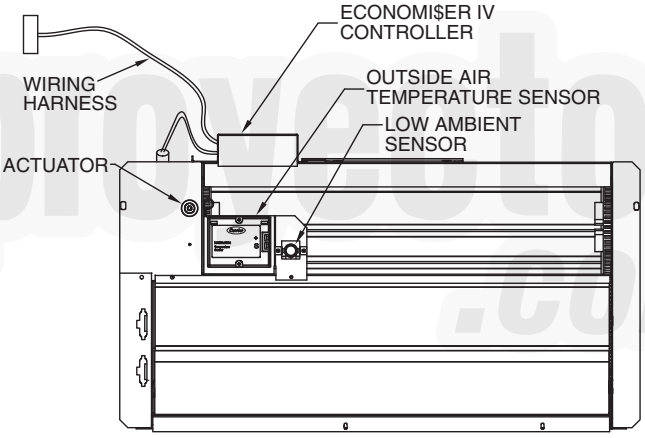


Fig. 42 — EconoMi$er IV Component Locations

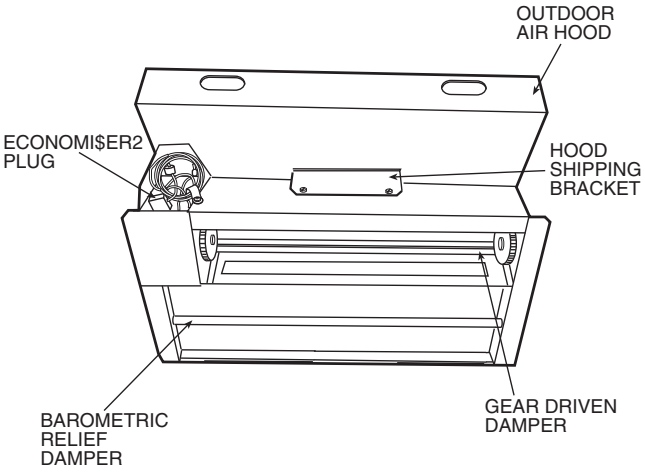


Fig. 43 — EconoMi$er2 Component Locations

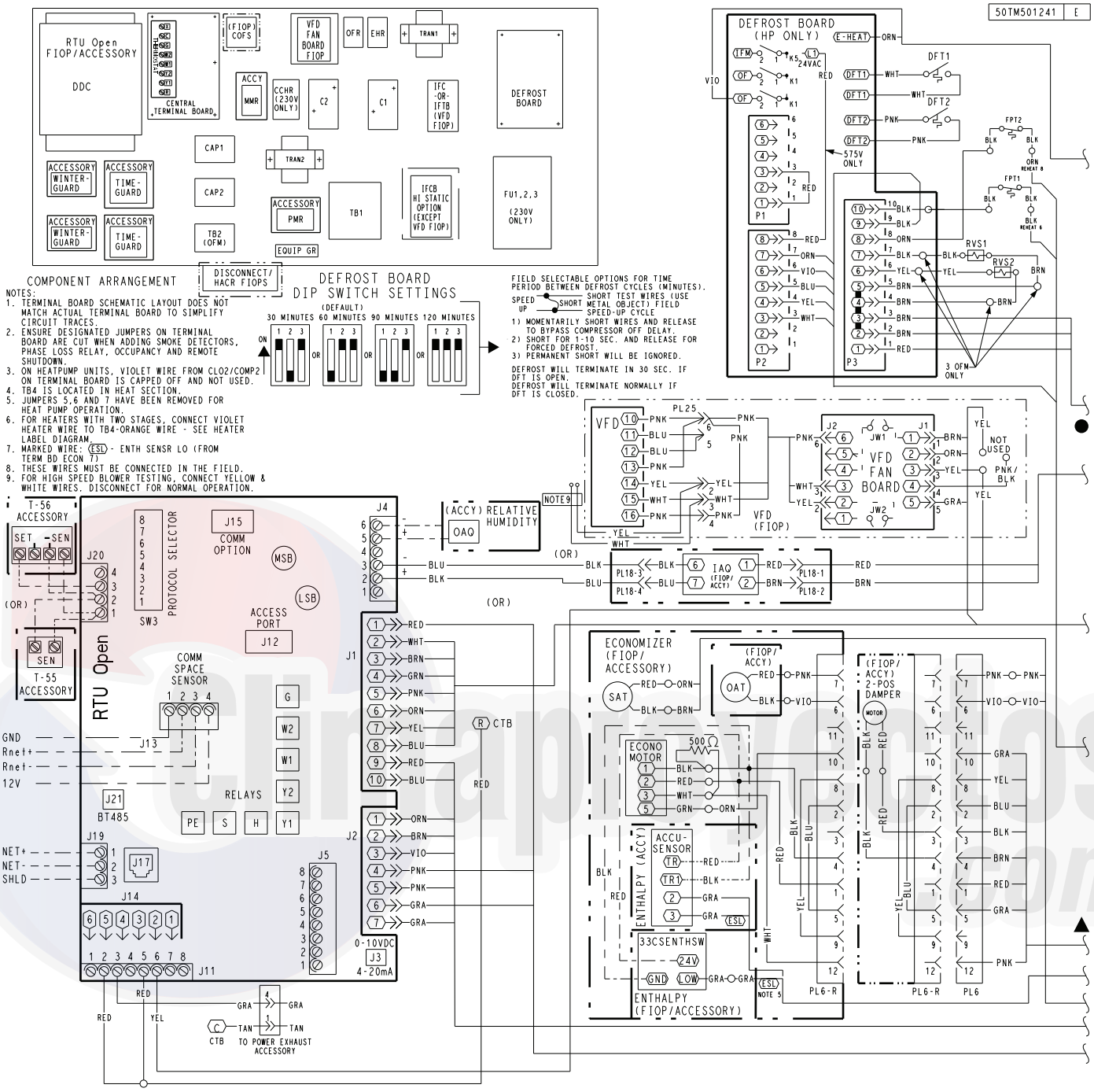


Fig. 44 — RTU Open Overlay for Economizer Wiring

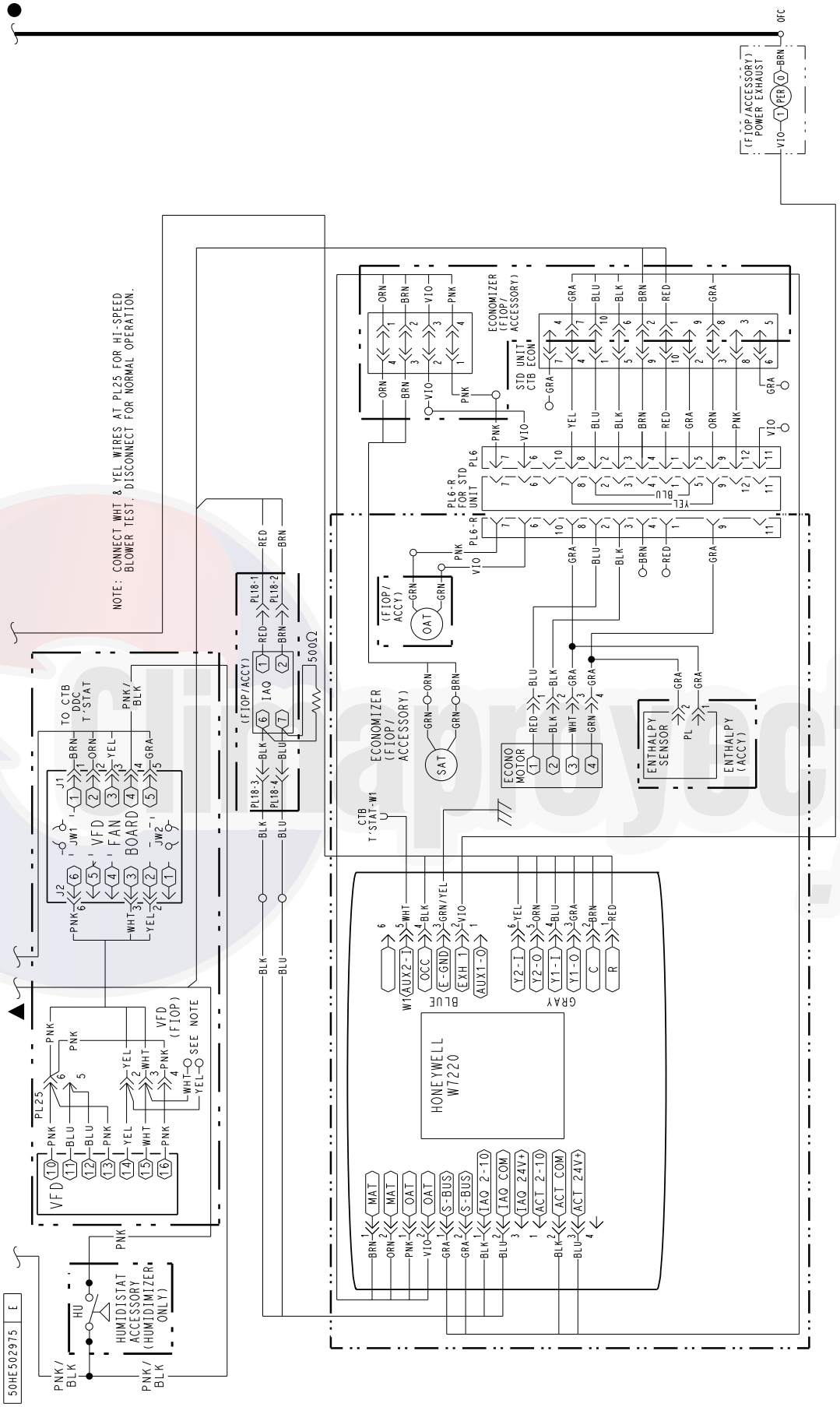


Fig. 45 — VFD Overlay for W2770 Controller Wiring

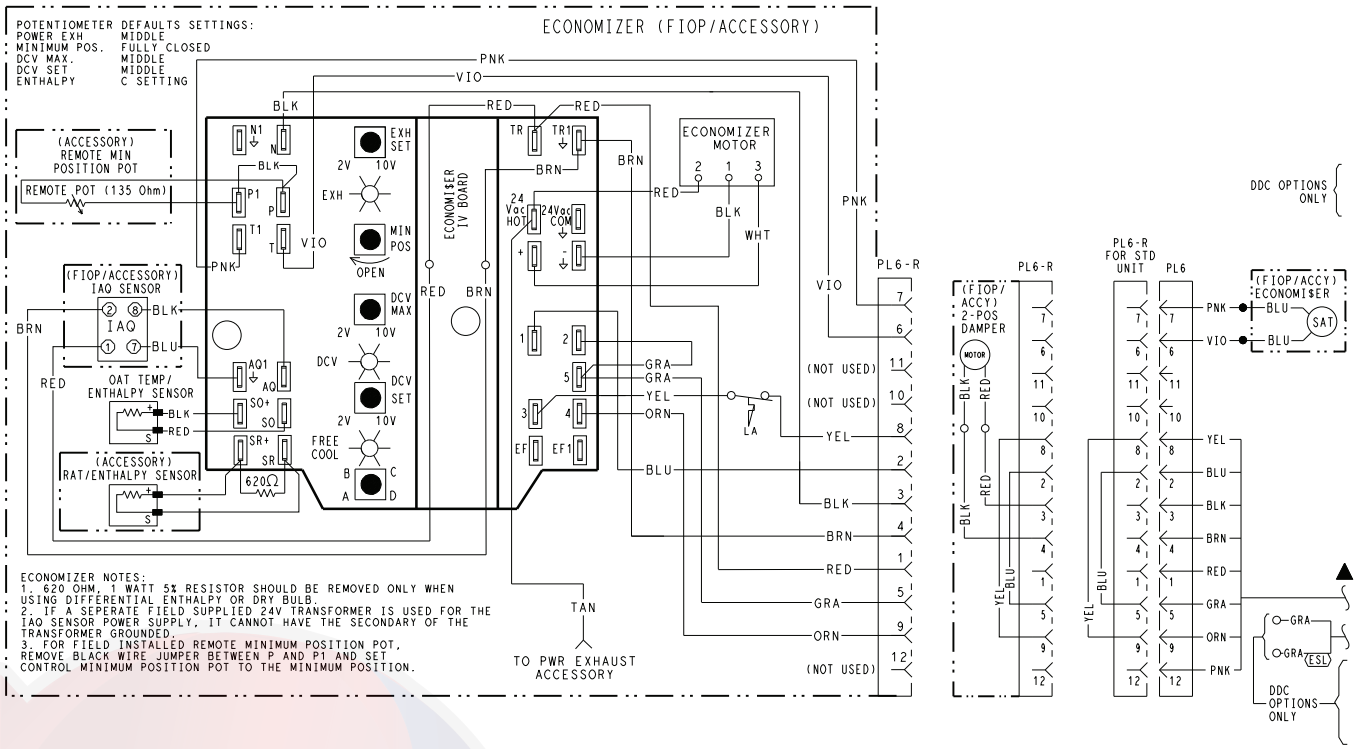
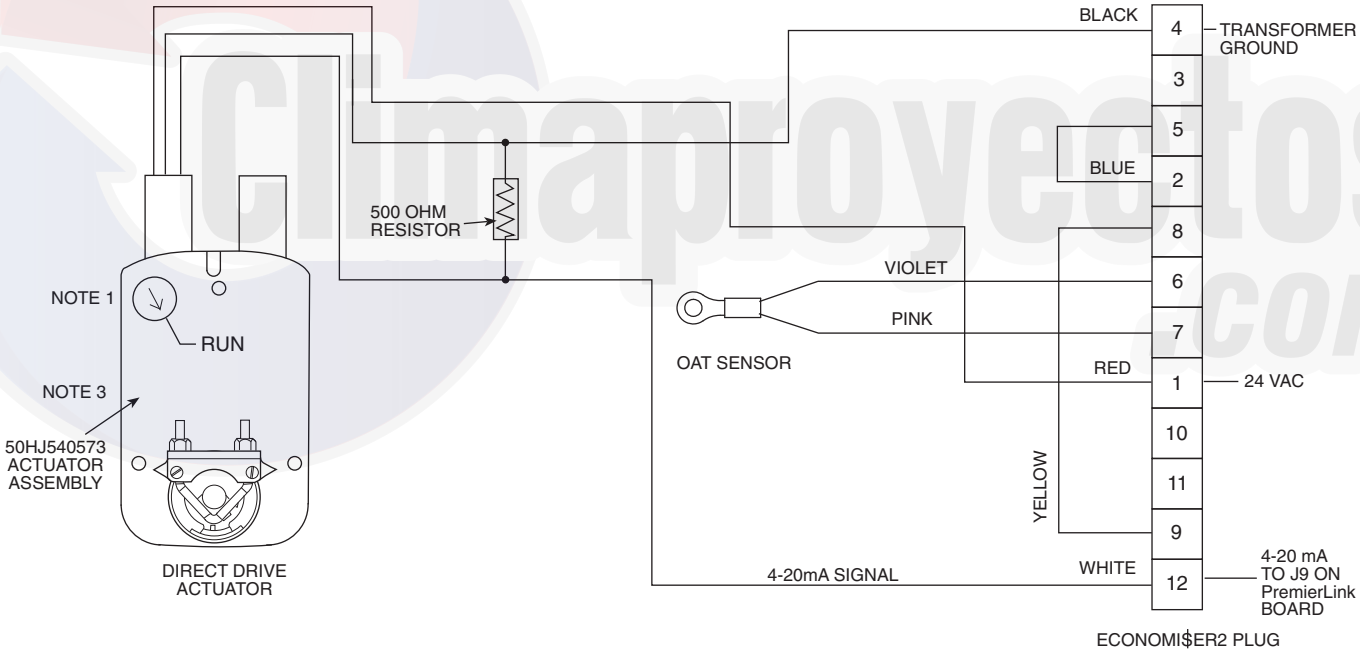


Fig. 46 — EconoMi$er IV Wiring



NOTES:
1. Switch on actuator must be in run position for economizer to operate.
2. PremierLink™ control requires that the standard 50HJ540569 outside-air sensor be replaced by either the CROASENR001A00 dry bulb sensor or HH57A077 enthalpy sensor.
3. 50HJ540573 actuator consists of the 50HJ540567 actuator and a harness with 500-ohm resistor.

Fig. 47 — EconoMi$er2 with 4 to 20 mA Control Wiring

EconoMi$er IV

Table 5 provides a summary of EconoMi$er IV logic. Troubleshooting instructions are enclosed.

A functional view of the EconoMi$er system is shown in Fig. 48. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$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$er IV system can be used for free cooling. The sensor is factory-installed on the EconoMi$er IV system in the outdoor airstream. (See Fig. 49.) The operating range of temperature measurement is 40°F to 100°F (4°C to 38°C). See Fig. 51.

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. 49.) This sensor is factory installed. The operating range of temperature measurement is 0°F to 158°F (–18°C to 70°C). See Table 6 for sensor temperature and resistance values.

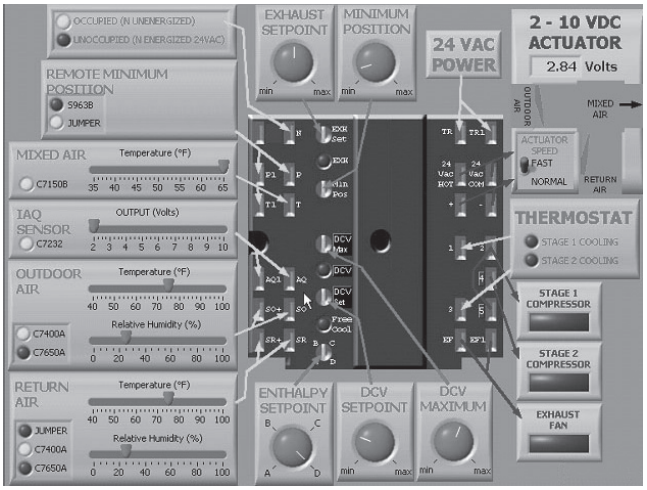


Fig. 48 — EconoMi$er IV Functional View

Table 5 — EconoMi$er IV Input/Output Logic

INPUTS					OUTPUTS			
Demand Control 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).

Table 6 — 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

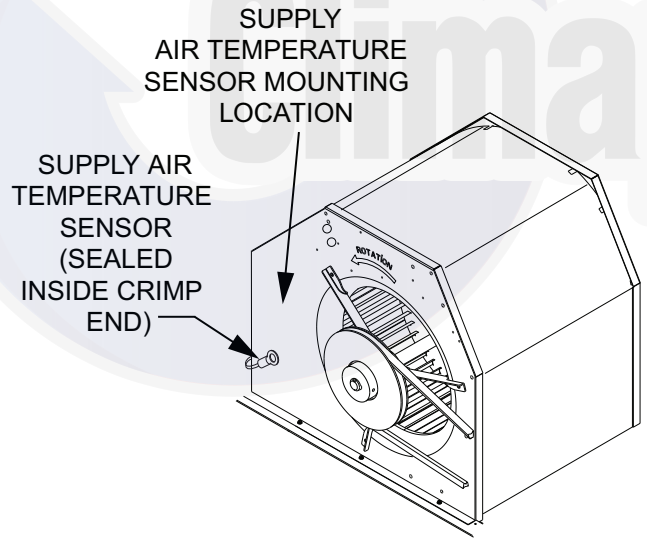


Fig. 49 — Supply Air Sensor Location

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 system 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. 42.)

ECONOMI$ER IV CONTROL MODES

IMPORTANT: The optional EconoMi$er2 system does not include a controller. The EconoMi$er2 system is operated by a 4 to 20 mA signal from an existing field-supplied controller. See Fig. 43 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 system is supplied from the factory with a supply-air temperature sensor and an outdoor-air temperature sensor. This allows for operation of the EconoMi$er IV system with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV system 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 system 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. 50.) The scale on the potentiometer is A, B, C, and D. See Fig. 51 for the corresponding temperature changeover values.

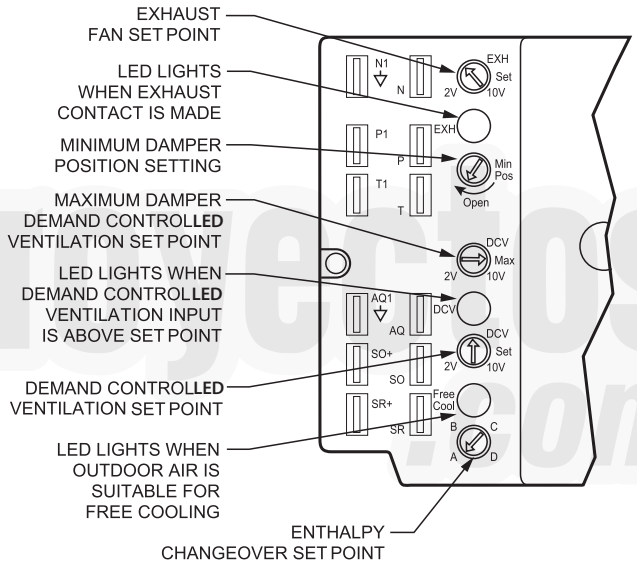


Fig. 50 — EconoMi$er IV Controller Potentiometer and LED Locations

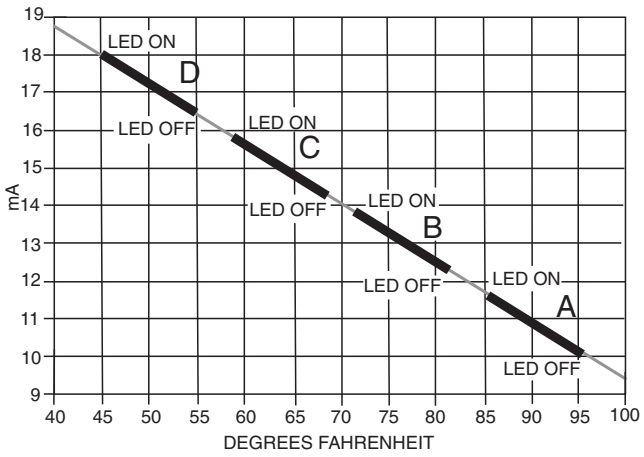


Fig. 51 — Outside Air Temperature Changeover Set Points

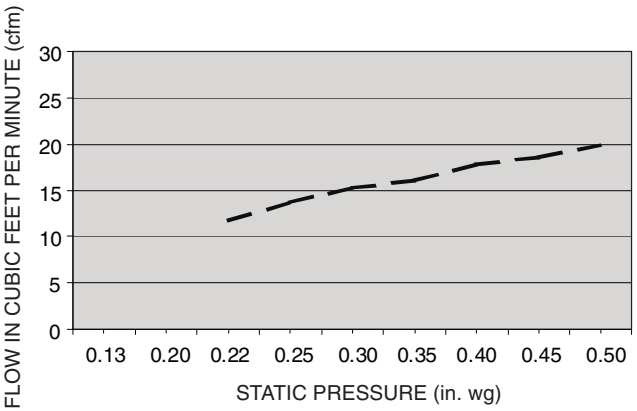


Fig. 52 — Outdoor-Air Damper Leakage

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. 53.) Wiring is provided in the EconoMi$er IV wiring harness.

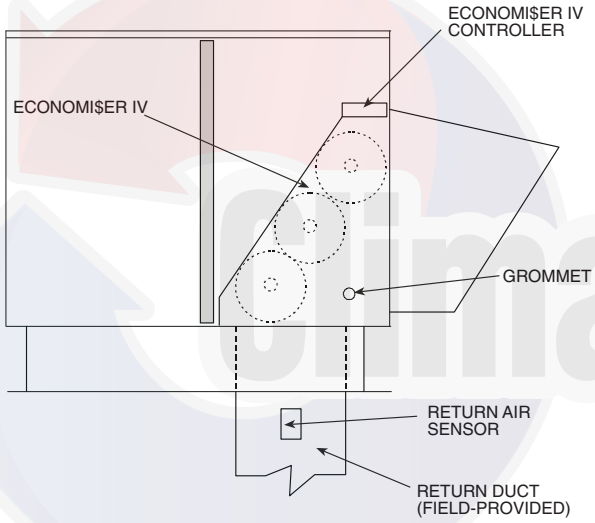


Fig. 53 — Return-Air Temperature or Enthalpy Sensor Mounting Location

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. 50.)

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. 53.) 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$er IV controller. The set points are A, B, C, and D. (See Fig. 54.) The factory-installed 620-ohm jumper must be in place across terminals SR and SR+ on the EconoMi$er IV controller.

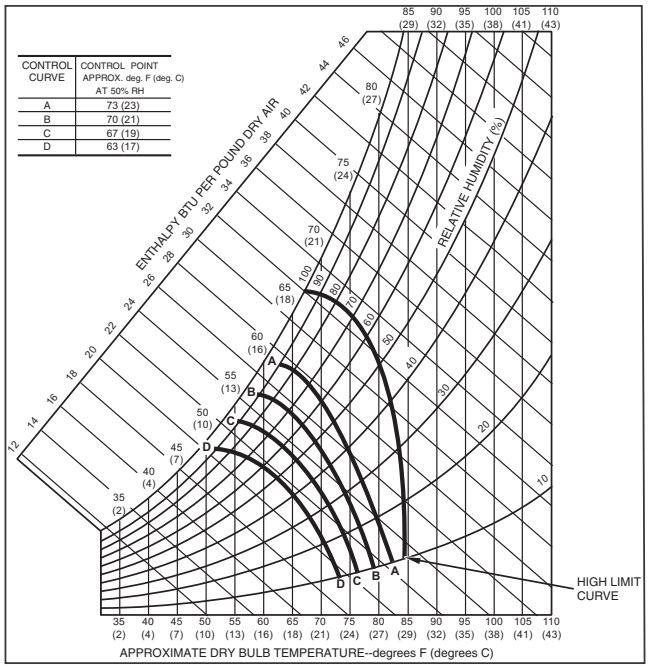


Fig. 54 — Enthalpy Changeover Set Points

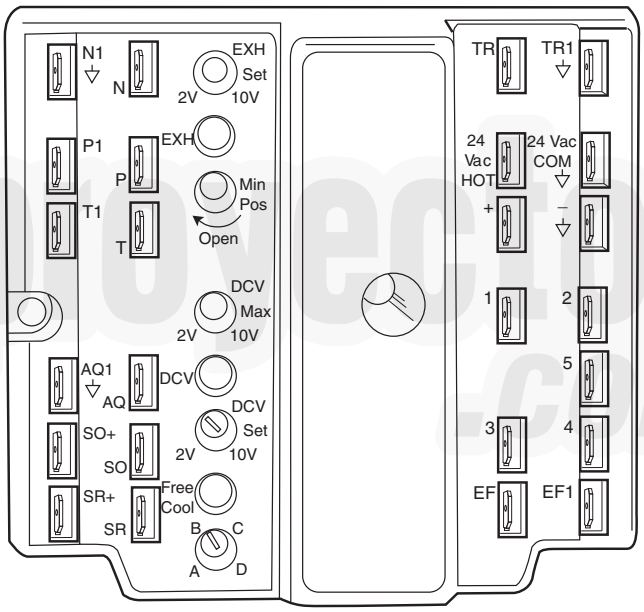


Fig. 55 — EconoMi$er IV Control

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. 42.) Mount the return air enthalpy sensor in the return air duct. (See Fig. 53.) Wiring is provided in the EconoMi$er IV wiring harness. (See Fig. 42.) The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$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 controlled 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. 56.)

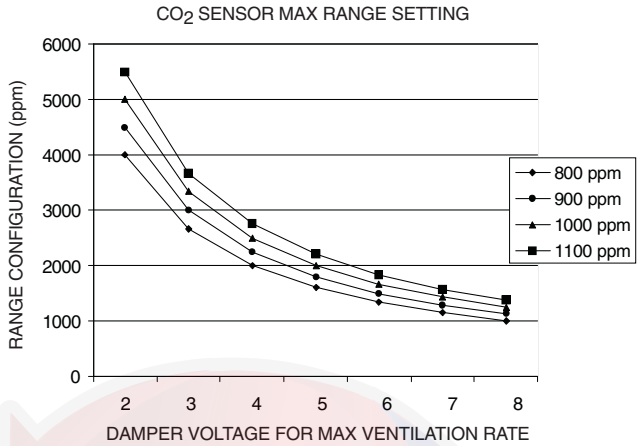


Fig. 56 — CO_2 Sensor Maximum Range Settings

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. 50.) 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. 50.) 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. 46 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. 55.)

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 system will be in unoccupied mode.

Demand Control Ventilation (DCV)

When using the EconoMi$er IV system 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. 56 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. 56 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 controlled 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 7.)

Use setting 1 or 2 for Carrier equipment. (See Table 7.)

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 7 — 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 7.)
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. 57). The W7220 can be configured with optional sensors.

Fig. 57 — 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 (-18°C/-17°C)

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 39 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 (–20°C) with full recovery at –4°F (–20°C) from exposure to –40°F (–40°C).

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. 58 and Tables 8 and 9 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.

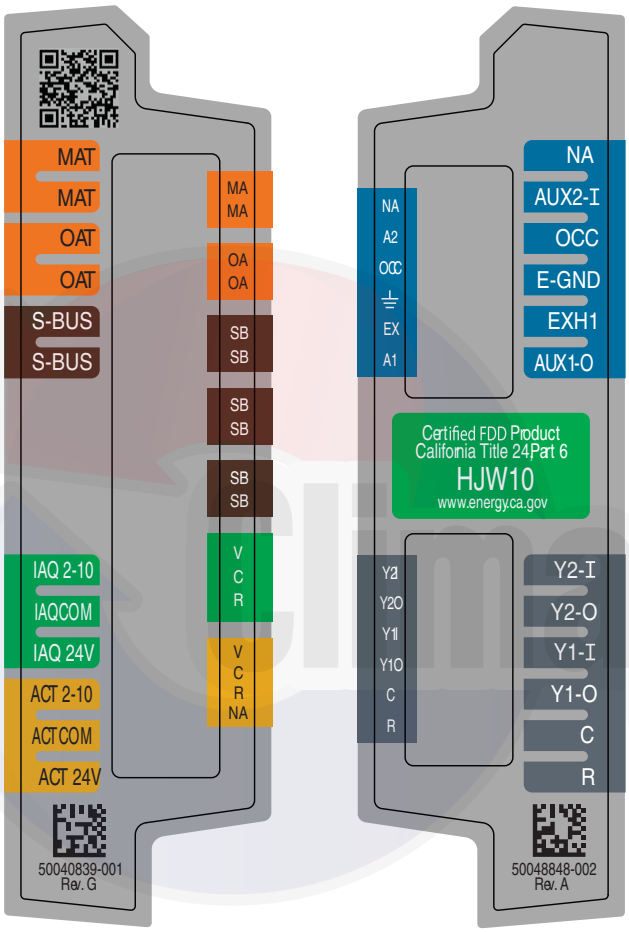


Fig. 58 — W7220 Wiring Terminals

Table 8 — 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 9 — 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. 59 and Table 10 to locate the wiring terminals for each S-Bus sensor.

Use Fig. 58 and Table 10 to locate the wiring terminals for each enthalpy control sensor.

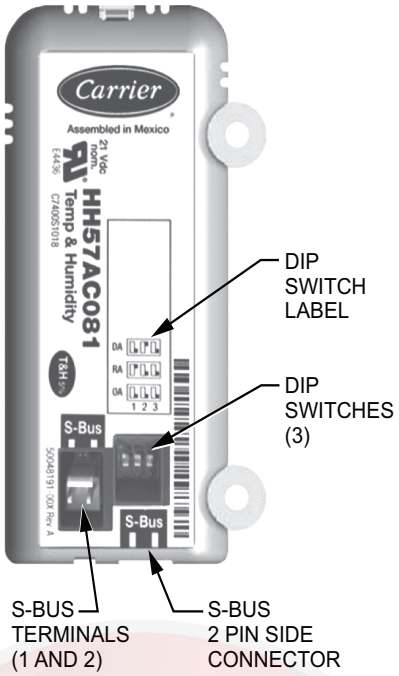


Fig. 59 — S-Bus Sensor DIP Switches

Table 10 — 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. 59 and Table 11 to set the DIP switches for the desired use of the sensor.

Table 11 — 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. 60 for CO_2 sensor wiring.

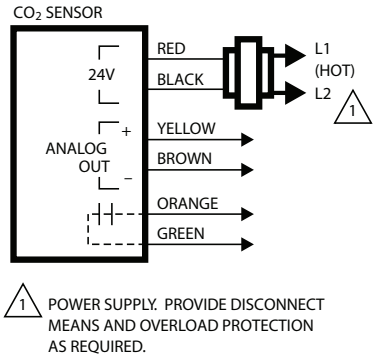


Fig. 60 — CO_2 Sensor Wiring

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. 61) 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.
- Press the ⓘ (Menu Up/Exit) button to exit a menu's item and return to the list of menus.

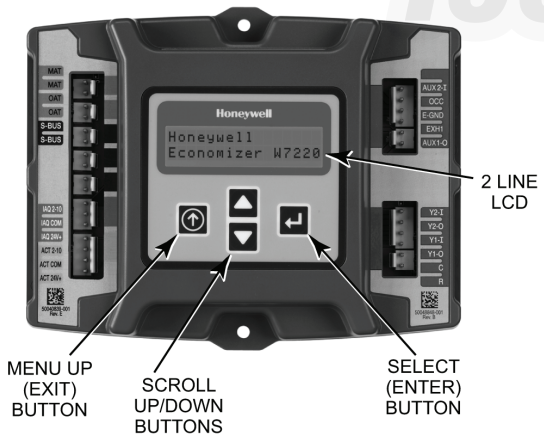


Fig. 61 — W7220 Controller Navigation Buttons

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 12 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 12 — 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 12 — 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 48 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 12 — 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.
	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.

Table 12 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ADVANCED SETUP (cont)	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 13.
	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.
	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-O terminal has 24 vac out.

Table 12 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ALARMS (cont)	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 12 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 Central Terminal 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 13. For dry bulb operation with or without DCV, see Tables 14 and 15. For enthalpy operation with or without DCV, see Tables 16 and 17.

Table 13 — Damper Minimum Position Settings and Readings on Checkout Menu

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

Table 14 — 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 15 — 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 16 — 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 17 — 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 62 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 18 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 62 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.

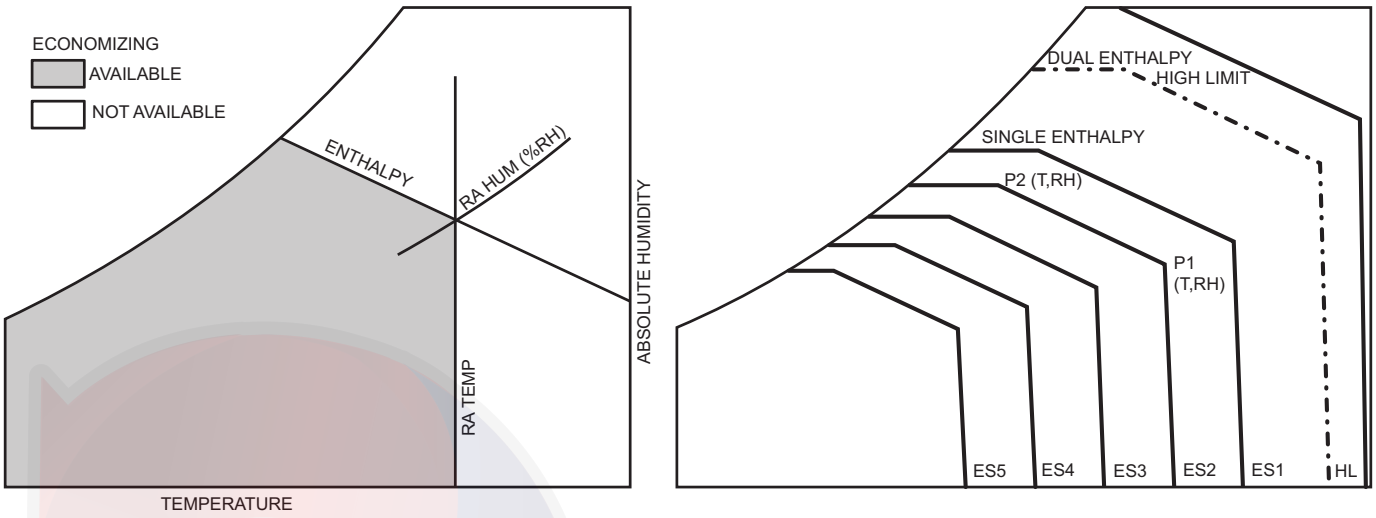


Fig. 62 — Single Enthalpy Curve Boundaries

Table 18 — 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 40.

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 12) 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 40.

Checkout Tests

Use the Checkout menu (see page 45) 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 40.

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

Failure to follow this caution may result in damage to equipment. 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.

WIRING DIAGRAMS

See Fig. 63 and 64 for typical wiring diagrams.

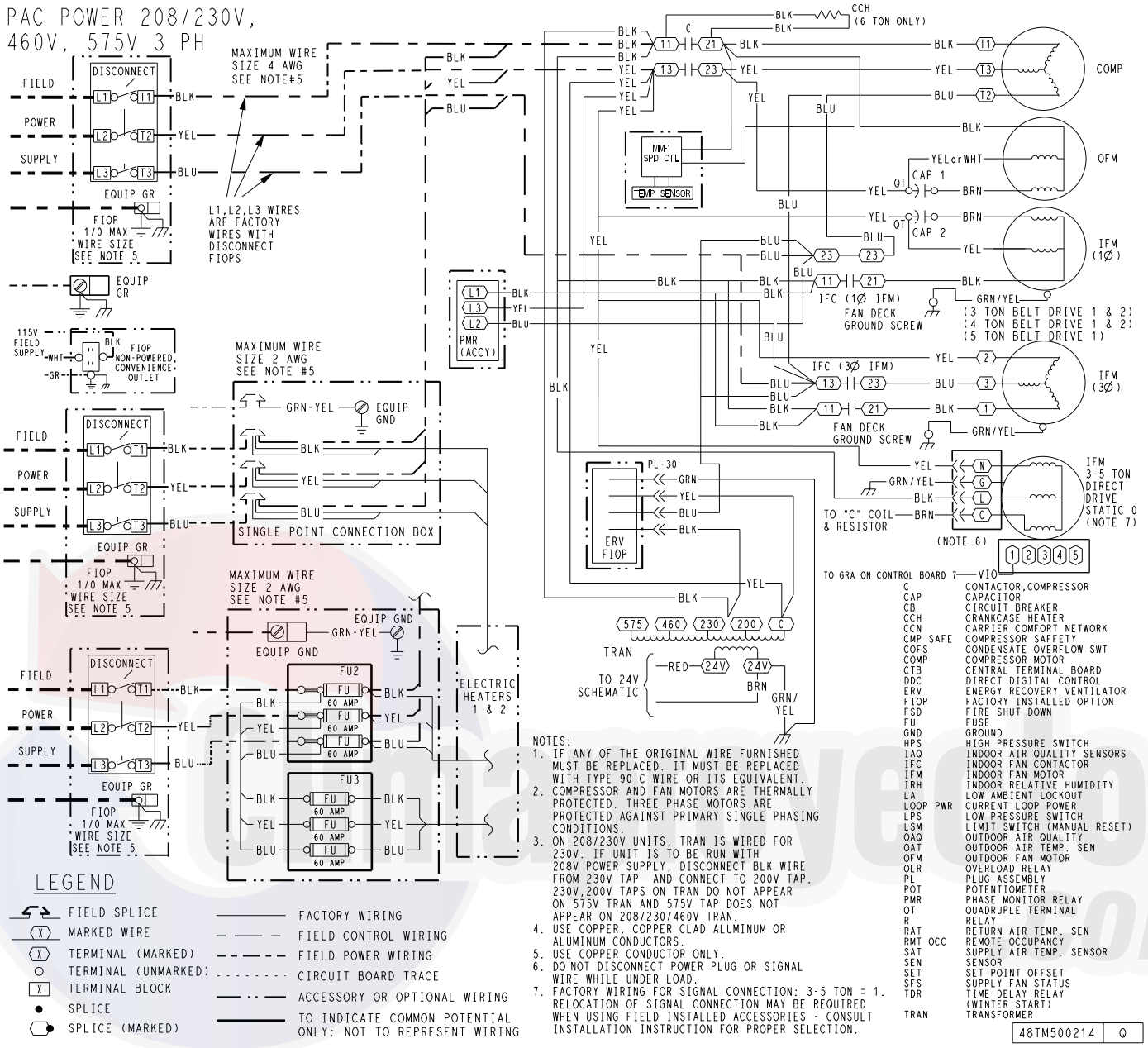


Fig. 63 — 50KC Typical Unit Wiring Diagram - Power (06A, 208/230-3-60)

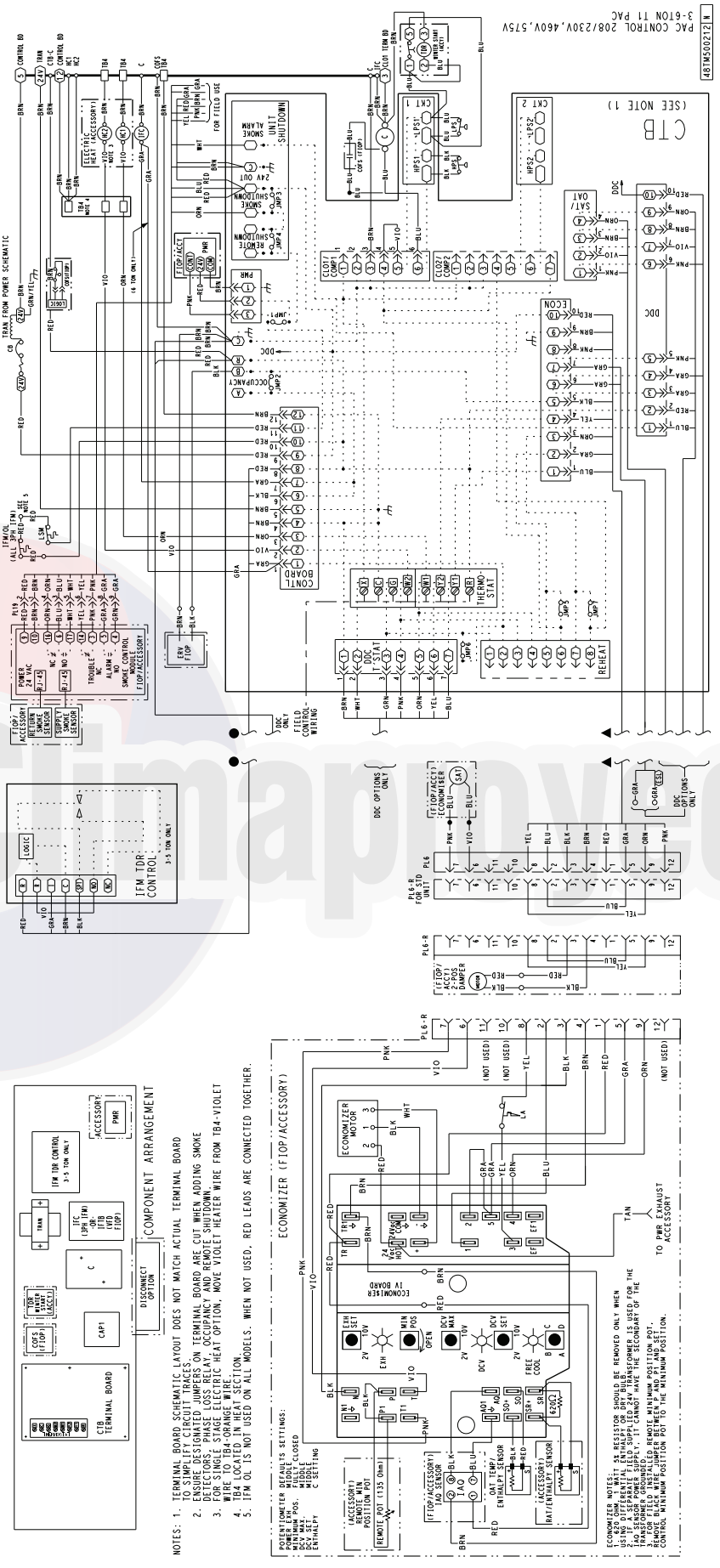


Fig. 64 — 50KC Unit Wiring Diagram - Control (A06)

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 protective goggles when checking or servicing refrigerant system.
2. Do not operate compressor or provide any electric power to unit unless compressor terminal cover is in place and secured.
3. Do not remove compressor terminal cover until all electrical sources are disconnected.
4. Relieve all pressure from system before touching or disturbing anything inside terminal box if refrigerant leak is suspected around compressor terminals.
5. Never attempt to repair soldered connection while refrigerant system is under pressure.
6. Do not use torch to remove any component. System contains oil and refrigerant under pressure.
   To remove a component, wear protective goggles and proceed as follows:
   a. Shut off electrical power to unit.
   b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
   c. Cut component connection tubing with tubing cutter and remove component from unit.
   d. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

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.
3. Make 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 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. Make sure that condenser-fan blade are correctly positioned in fan orifice. See Condenser-Fan Adjustment section on page 17 for more details.
   b. Make sure that air filter(s) are in place.
   c. Make sure that condensate drain trap is filled with water to ensure proper drainage.
   d. Make sure that all tools and miscellaneous loose parts have been removed.

START-UP, GENERAL

Unit Preparation

Make sure that unit has been installed in accordance with installation instructions and applicable codes.

Return-Air Filters

Make sure correct filters are installed in unit (see "APPENDIX B — Physical Data" on page 57). Do not operate unit without return-air filters.

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.

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.

Compressor Rotation

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 install lockout tag.
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.

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 at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Refrigerant Charge section.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after a 30 second delay.

TO SHUT OFF UNIT

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

Heating

To start unit, turn on main power supply.

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

First stage of thermostat energizes the first-stage electric heater elements; second stage energizes second-stage electric heater elements, if installed. Check heating effects at air supply grille(s).

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

To shut off unit - set system selector switch at 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. Evaporator fan operates continuously to provide constant air circulation.

START-UP, PREMIERLINK CONTROLS

⚠ 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.)

For details on operating 50KC**04-06 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.

Refer to *PremierLink Retrofit Rooftop Controller Version 3.x Installation, Start-up, and Configuration Instructions* for full discussion on configuring the PremierLink control system.

START-UP, RTU-OPEN CONTROL

For details on operating 50KC**04-06 units equipped with the factory-installed RTU Open Controller option, refer to the *Factory-Installed Option RTU Open Multi-Protocol Controller Controls, Start-Up, Operation, and Troubleshooting* manual.

OPERATING SEQUENCE

Base Unit Controls

Cooling - Units without Economizer

When thermostat calls for cooling, terminals G and Y1 are energized. The indoor-fan contactor (IFC) and compressor contactor are energized and indoor-fan motor, compressor, and outdoor fan starts. The outdoor fan motor runs continuously while unit is cooling.

Heating - Units without Economizer

When the thermostat calls for heating, terminal W1 will be energized with 24-v. The IFC and heater contactor no. 1 (HC1) are energized.

Cooling, Unit with EconoMi$er IV

For Occupied mode operation of EconoMi$er IV, there must be a 24-v signal at terminals TR and N (provided through PL6-3 from the unit's IFC coil). Removing the signal at N places the EconoMi$er IV control in Unoccupied mode.

During Occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to Minimum Position set point for ventilation. If indoor fan is off, dampers will close. During Unoccupied mode operation, dampers will remain closed unless a Cooling (by free cooling) or DCV demand is received.

Integrated EconoMi$er IV operation on 50KC single compressor model requires a 2-stage thermostat (Y1 and Y2 switches).

When free cooling using outside air is not available, the unit cooling sequence will be controlled directly by the space thermostat as described above in "Cooling - Units without economizer". Outside air damper position will be closed or Minimum Position as determined by occupancy mode and fan signal.

When free cooling is available as determined by the appropriate changeover command (dry bulb, outdoor enthalpy, differential dry bulb or differential enthalpy), a call for cooling (Y1 closes at the thermostat) will cause the economizer control to modulate the dampers open and closed to maintain the unit supply air temperature at 50°F to 55°F. Compressor will not run.

During free cooling operation, a supply air temperature (SAT) above 50°F will cause the dampers to modulate between Minimum Position set point and 100% open. With SAT from 50°F to 45°F, the dampers will maintain at the Minimum Position setting. With SAT below 45°F, the outside air dampers will be closed. When SAT rises to 48°F, the dampers will re-open to Minimum Position setting.

Should 100% outside air not be capable of satisfying the space temperature, space temperature will rise until Y2 is closed. The economizer control will call for compressor operation. Dampers will modulate to maintain SAT at 50°F to 55°F concurrent with compressor operation. The Low Ambient Lockout Thermostat will block compressor operation with economizer operation below 42°F outside air temperature.

When space temperature demand is satisfied (thermostat Y1 opens), the dampers will return to Minimum Damper position if indoor fan is running or fully closed if fan is off.

If accessory power exhaust is installed, the power exhaust fan motors will be energized by the economizer control as the dampers open above the PE-On set point and will be de-energized as the dampers close below the PE-On set point.

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

Heating, Unit with EconoMi$er IV

During Occupied mode operation, indoor fan operation will be accompanied by economizer dampers moving to Minimum Position set point for ventilation. If indoor fan is off, dampers will close. During Unoccupied mode operation, dampers will remain closed unless a DCV demand is received.

When the room temperature calls for heat (W1 closes), the heating controls are energized as described in "Heating - Units without economizer".

Demand Controlled Ventilation

If a field-installed sensor is connected to the EconoMi$er IV control, a Demand Controlled Ventilation strategy will operate automatically. As the level in the space increases above the set point (on the EconoMi$er IV controller), the minimum position of the dampers will be increased proportionally, until the Maximum Ventilation setting is reached. As the space level decreases because of the increase in fresh air, the outdoor-damper will follow the higher demand condition from the DCV mode or from the free-cooling mode.

DCV operation is available in Occupied and Unoccupied periods with EconoMi$er IV. However, a control modification will be required on the 50KC unit to implement the Unoccupied period function.

FASTENER TORQUE VALUES

See Table 19 for torque values.

Table 19 — Torque Values

FASTENER LOCATIONS	TORQUE VALUES
Supply fan motor mounting	120 ± 12 in.-lb
Supply fan motor adjustment plate	120 ± 12 in.-lb
Motor pulley setscrew	72 ± 5 in.-lb
Fan pulley setscrew	72 ± 5 in.-lb
Blower wheel hub setscrew	72 ± 5 in.-lb
Bearing locking collar setscrew	65 to 70 in.-lb
Compressor mounting bolts	65 to 75 in.-lb
Condenser fan motor mounting bolts	20 ± 2 in.-lb
Condenser fan hub setscrew	84 ± 12 in.-lb

APPENDIX A — MODEL NUMBER SIGNIFICANCE

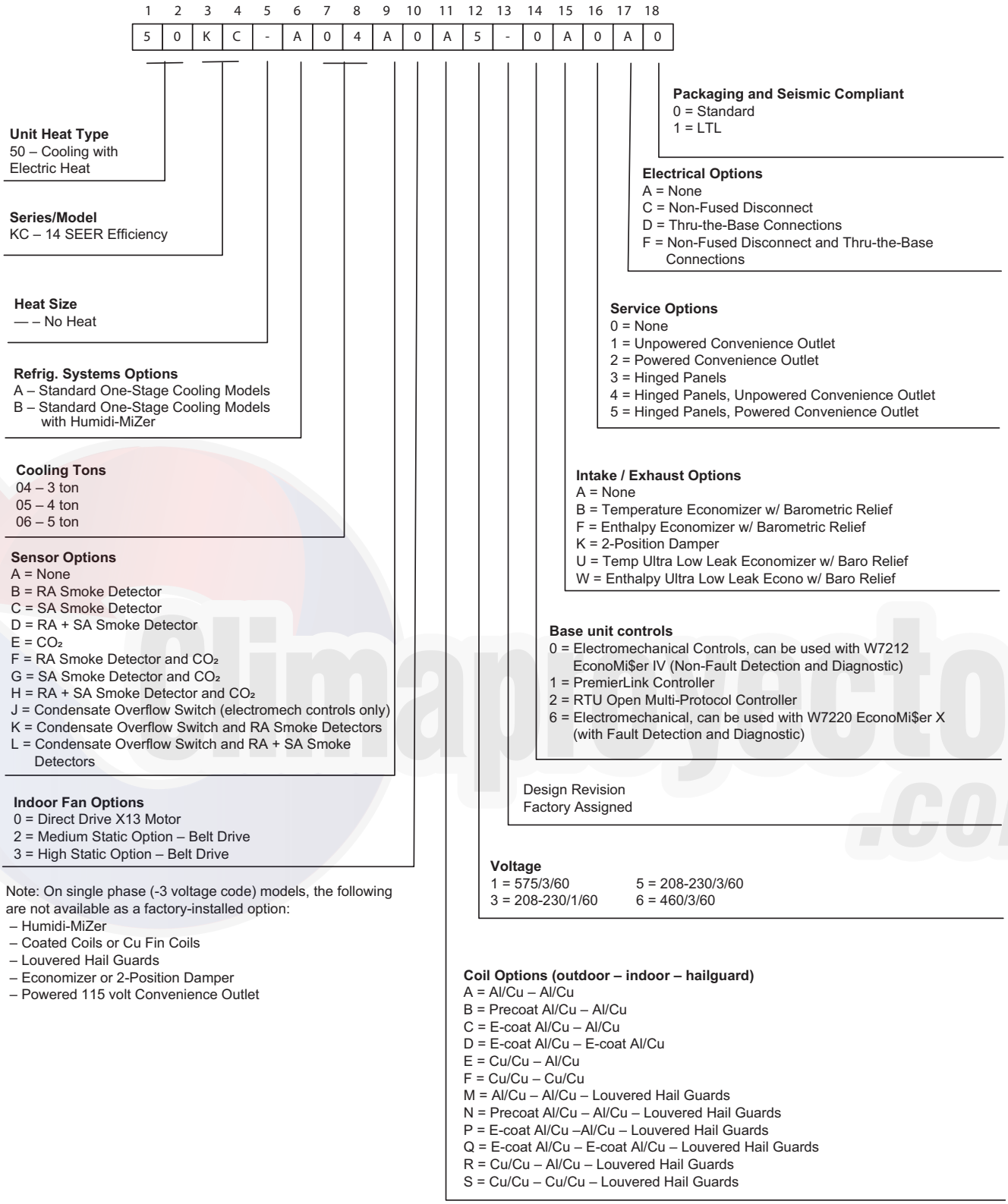


Fig. A — Model Number Nomenclature

Table A — Serial Number Format

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

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

		50KC*A04	50KC*A05	50KC*A06
Refrigeration System	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
	R-410a charge A 1 phase (lbs-oz)	7 - 2	10 - 8	16 - 0
	R-410a charge A 3 phase (lbs-oz)	7 - 2	10 - 8	14 - 8
	Humidi-MiZer Puron® refrig. (R-410A) charge A (lbs-oz)	10 - 6	15 - 5	26 - 0
	oil A/B (oz)	25	42	42
	Metering Device	Accutrol	Accutrol	Accutrol + Accurater
	Humidi-MiZer Metering Device	Accutrol + TXV	Accutrol + TXV	Accutrol + TXV
	High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505
	Low-press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117
	Loss of charge Trip/Reset (psig)	N/A	N/A	N/A
Evaporation Coil	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	3 / 15	3 / 15	4 / 15
	Total Face Area (ft^2)	5.5	5.5	7.3
	Condensate Drain Conn. Size	3/4"	3/4"	3/4"
Humidi-MiZer® Coil	Material	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	1 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	3.9	3.9	5.2
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 (in.)	10 x 10	10 x 10	10 x 10
MEDIUM STATIC 1 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.2	1.2	1.5
	RPM Range	770-1175	770-1175	1035-1466
	Motor Frame Size	48	48	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10
HIGH STATIC 1 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	N/A
	Max BHP	1.5	1.5	N/A
	RPM Range	1035-1466	1035-1466	N/A
	Motor Frame Size	56	56	N/A
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	N/A
	Fan Diameter (in.)	10 x 10	10 x 10	N/A
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 (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	1.7	1.7	2.9
	RPM Range	770-1175	920-1303	1035-1466
	Motor Frame Size	48	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (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	2.9	2.9	2.9
	RPM Range	1035-1466	1208-1550	1303-1550
	Motor Frame Size	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10

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

		50KC*A04	50KC*A05	50KC*A06
Cond. coil				
	Material	Cu / Al	Cu / Al	Cu / Al
1 phase	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	1 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	16.5	16.5	21.3
	Material	Cu / Al	Cu / Al	Cu / Al
3 phase	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	1 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	16.5	14.6	18.8
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.)	Cu / Al	Cu / Al	Cu / Al
	OA inlet screen # / Size (in.)	3/8" RTPF	3/8" RTPF	3/8" RTPF

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 may add static pressure losses.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommended the lower horsepower option.
5. For information on the electrical properties of Carrier's motors, please see the Electrical information section of this book.

Table C — 50KC**04 3 Ton Horizontal Supply (1 Phase)

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	—	—
1050	1108	0.84	1180	1.01	1247	1.19	1311	1.38	—	—
1125	1123	0.88	1195	1.05	1261	1.23	1325	1.42	—	—
1200	1140	0.92	1210	1.10	1276	1.28	1339	1.47	—	—
1275	1157	0.97	1226	1.15	1292	1.33	—	—	—	—
1350	1174	1.02	1243	1.20	1308	1.39	—	—	—	—
1425	1192	1.08	1260	1.26	1325	1.45	—	—	—	—
1500	1210	1.14	1278	1.33	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:
1. For more information, see General Fan Performance Notes above.
2. Recommend using field-supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039) with field-supplied drive.
3. Recommend using field-supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035) with field-supplied drive.

Medium static 770-1175 RPM, 1.2 BHP max

High static 1035-1466 RPM, 1.5 BHP max

Table D — 50KC**04 3 Ton Vertical Supply (1 Phase)

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	—	—
975	1186	0.89	1275	1.08	1358	1.29	—	—	—	—
1050	1194	0.92	1281	1.12	1363	1.32	—	—	—	—
1125	1204	0.97	1289	1.16	1370	1.37	—	—	—	—
1200	1215	1.01	1298	1.21	1378	1.42	—	—	—	—
1275	1227	1.06	1309	1.26	1387	1.47	—	—	—	—
1350	1240	1.12	1321	1.32	—	—	—	—	—	—
1425	1254	1.18	1333	1.38	—	—	—	—	—	—
1500	1270	1.24	1347	1.45	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039) with field-supplied drive.
3. Recommend using field-supplied motor pulley (part number KR11HY161) and belt (part number KR30AE035) with field-supplied drive.

Medium static 770-1175 RPM, 1.2 BHP max

High static 1035-1466 RPM, 1.5 BHP max

Table E — 50KC**04 3 Ton Horizontal Supply (3 Phase)

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

Boldface indicates field-supplied drive is required.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039) with field-supplied drive.

Medium static 770-1175 RPM, 1.7 BHP max

High static 1035-1466 RPM, 2.9 BHP max

Table F — 50KC**04 3 Ton Vertical Supply (3 Phase)

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.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AG006) and belt (part number KR30AE039) with field-supplied drive.

Medium static 770-1175 RPM, 1.7 BHP max

High static 1035-1466 RPM, 2.9 BHP max

Table G — 50KC**05 4 Ton Horizontal Supply (1 Phase)

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	**671**	**0.23**	790	0.34	892	0.47	982	0.61	1064	0.76
975	**705**	**0.28**	820	0.39	919	0.52	1007	0.67	1088	0.82
1050	**740**	**0.33**	851	0.45	947	0.58	1034	0.73	1113	0.89
1125	776	0.38	883	0.51	977	0.65	1061	0.80	1138	0.97
1200	813	0.45	916	0.58	1007	0.73	1089	0.89	1165	1.05
1275	851	0.52	949	0.66	1038	0.81	1118	0.97	1192	1.15
1350	888	0.60	984	0.75	1069	0.90	1148	1.07	1221	1.25
1425	927	0.69	1019	0.84	1102	1.00	1179	1.18	1250	1.36
1500	965	0.78	1054	0.94	1135	1.11	1210	1.29	1280	1.48

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	1140	0.92	1210	1.10	1276	1.28	1339	1.47	—	—
975	1162	0.99	1232	1.16	1297	1.35	—	—	—	—
1050	1186	1.06	1254	1.24	1319	1.43	—	—	—	—
1125	1210	1.14	1278	1.33	—	—	—	—	—	—
1200	1236	1.23	1302	1.42	—	—	—	—	—	—
1275	1262	1.33	—	—	—	—	—	—	—	—
1350	1289	1.44	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:
1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11HY161)) and belt (part number KR30AE035) with field-supplied drive.

Medium static 770-1175 RPM, 1.2 BHP max
High static 1035-1466 RPM, 1.5 BHP max

Table H — 50KC**05 4 Ton Vertical Supply (1 Phase)

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	**695**	**0.25**	818	0.37	930	0.51	1032	0.66	1126	0.83
975	**731**	**0.30**	849	0.43	955	0.57	1053	0.72	1145	0.89
1050	**769**	**0.36**	880	0.49	982	0.63	1077	0.79	1166	0.97
1125	807	0.42	913	0.56	1011	0.71	1103	0.87	1188	1.05
1200	847	0.49	948	0.63	1042	0.79	1130	0.96	1213	1.14
1275	887	0.57	983	0.72	1073	0.88	1158	1.06	1239	1.24
1350	928	0.66	1020	0.82	1106	0.98	1188	1.16	1266	1.35
1425	969	0.76	1057	0.92	1140	1.09	1219	1.28	1295	1.48
1500	1010	0.87	1095	1.04	1175	1.21	1251	1.41	—	—

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
900	1215	1.01	1298	1.21	1378	1.42	—	—	—	—
975	1231	1.08	1313	1.28	1390	1.49	—	—	—	—
1050	1249	1.16	1329	1.36	—	—	—	—	—	—
1125	1270	1.24	1347	1.45	—	—	—	—	—	—
1200	1292	1.34	—	—	—	—	—	—	—	—
1275	1315	1.44	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:
1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11HY161)) and belt (part number KR30AE035) with field-supplied drive.

Medium static 770-1175 RPM, 1.2 BHP max
High static 1035-1466 RPM, 1.5 BHP max

Table I — 50KC**05 4 Ton Horizontal Supply (3 Phase)

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	**671**	**0.23**	**790**	**0.34**	**892**	**0.47**	982	0.61	1064	0.76
975	**705**	**0.28**	**820**	**0.39**	**919**	**0.52**	1007	0.67	1088	0.82
1050	**740**	**0.33**	**851**	**0.45**	947	0.58	1034	0.73	1113	0.89
1125	**776**	**0.38**	**883**	**0.51**	977	0.65	1061	0.80	1138	0.97
1200	**813**	**0.45**	**916**	**0.58**	1007	0.73	1089	0.89	1165	1.05
1275	**851**	**0.52**	949	0.66	1038	0.81	1118	0.97	1192	1.15
1350	**888**	**0.60**	984	0.75	1069	0.90	1148	1.07	1221	1.25
1425	927	0.69	1019	0.84	1102	1.00	1179	1.18	1250	1.36
1500	965	0.78	1054	0.94	1135	1.11	1210	1.29	1280	1.48

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	1140	0.92	1210	1.10	1276	1.28	1339	1.47	1399	1.68
975	1162	0.99	1232	1.16	1297	1.35	1360	1.55	1419	1.75
1050	1186	1.06	1254	1.24	1319	1.43	1381	1.63	1439	1.84
1125	1210	1.14	1278	1.33	1342	1.52	1403	1.72	1461	1.93
1200	1236	1.23	1302	1.42	1365	1.62	1425	1.82	1483	2.04
1275	1262	1.33	1328	1.52	1390	1.72	1449	1.93	1505	2.15
1350	1289	1.44	1354	1.63	1415	1.84	1473	2.05	1529	2.27
1425	1317	1.55	1380	1.75	1441	1.96	1498	2.18	—	—
1500	1345	1.68	1408	1.88	1467	2.10	1524	2.32	—	—

Boldface indicates field-supplied drive is required.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AZ506), motor pulley (part number KR11HY181), and belt (part number KR30AE041) with field-supplied drive.

Medium static 920-1303 RPM, 1.7 BHP max
High static 1208-1550 RPM, 2.9 BHP max

Table J — 50KC**05 4 Ton Vertical Supply (3 Phase)

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	**695**	**0.25**	**818**	**0.37**	930	0.51	1032	0.66	1126	0.83
975	**731**	**0.30**	**849**	**0.43**	955	0.57	1053	0.72	1145	0.89
1050	**769**	**0.36**	**880**	**0.49**	982	0.63	1077	0.79	1166	0.97
1125	**807**	**0.42**	**913**	**0.56**	1011	0.71	1103	0.87	1188	1.05
1200	**847**	**0.49**	948	0.63	1042	0.79	1130	0.96	1213	1.14
1275	**887**	**0.57**	983	0.72	1073	0.88	1158	1.06	1239	1.24
1350	928	0.66	1020	0.82	1106	0.98	1188	1.16	1266	1.35
1425	969	0.76	1057	0.92	1140	1.09	1219	1.28	1295	1.48
1500	1010	0.87	1095	1.04	1175	1.21	1251	1.41	1325	1.61

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	1215	1.01	1298	1.21	1378	1.42	1454	1.64	1526	1.87
975	1231	1.08	1313	1.28	1390	1.49	1465	1.71	1536	1.94
1050	1249	1.16	1329	1.36	1405	1.57	1478	1.79	1547	2.03
1125	1270	1.24	1347	1.45	1421	1.66	1492	1.89	—	—
1200	1292	1.34	1367	1.54	1440	1.76	1509	1.99	—	—
1275	1315	1.44	1389	1.65	1459	1.88	1527	2.11	—	—
1350	1341	1.56	1412	1.77	1481	2.00	1547	2.23	—	—
1425	1367	1.68	1437	1.90	1504	2.13	—	—	—	—
1500	1395	1.82	1463	2.04	1528	2.28	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AZ506), motor pulley (part number KR11HY181), and belt (part number KR30AE041) with field-supplied drive.

Medium static 920-1303 RPM, 1.7 BHP max

High static 1208-1550 RPM, 2.9 BHP max

Table K — 50KC**06 5 Ton Horizontal Supply (1 Phase)

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	**725**	**0.33**	**840**	**0.46**	**937**	**0.60**	**1023**	**0.75**	1101	0.90
975	**765**	**0.40**	**876**	**0.54**	**970**	**0.68**	1054	0.84	1131	1.00
1050	**806**	**0.48**	**912**	**0.63**	**1004**	**0.78**	1087	0.94	1162	1.11
1125	**847**	**0.57**	**950**	**0.72**	1039	0.88	1120	1.05	1194	1.23
1200	**889**	**0.66**	**988**	**0.83**	1075	1.00	1154	1.18	1226	1.36
1275	**931**	**0.78**	**1027**	**0.95**	1112	1.13	1189	1.31	1260	1.50
1350	**974**	**0.90**	1067	1.08	1149	1.27	1224	1.46	—	—
1425	**1018**	**1.03**	1107	1.23	1187	1.43	—	—	—	—
1500	1061	1.19	1148	1.39	—	—	—	—	—	—

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	1172	1.06	1239	1.23	1302	1.40	—	—	—	—
975	1201	1.16	1267	1.34	1329	1.52	—	—	—	—
1050	1231	1.28	1296	1.46	—	—	—	—	—	—
1125	1262	1.41	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:

1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AZ606) and belt (part number KR30AE037) with field-supplied drive.

Medium static 1035-1466 RPM, 1.5 BHP max

Table L — 50KC**06 5 Ton Vertical Supply (1 Phase)

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	**794**	**0.41**	**902**	**0.55**	**993**	**0.69**	1074	0.85	1147	1.00
975	**840**	**0.49**	**945**	**0.64**	**1034**	**0.80**	1113	0.96	1185	1.13
1050	**888**	**0.59**	**988**	**0.75**	1075	0.92	1153	1.09	1223	1.26
1125	**936**	**0.70**	**1033**	**0.87**	1117	1.05	1193	1.23	1263	1.41
1200	**984**	**0.82**	1078	1.00	1160	1.19	1235	1.39	—	—
1275	**1033**	**0.96**	1124	1.15	1204	1.35	—	—	—	—
1350	1083	1.11	1170	1.32	1248	1.53	—	—	—	—
1425	1133	1.28	1217	1.50	—	—	—	—	—	—
1500	1183	1.47	—	—	—	—	—	—	—	—

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	1214	1.16	1277	1.33	1336	1.50	—	—	—	—
975	1251	1.30	1313	1.47	—	—	—	—	—	—
1050	1289	1.44	—	—	—	—	—	—	—	—
1125	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1275	—	—	—	—	—	—	—	—	—	—
1350	—	—	—	—	—	—	—	—	—	—
1425	—	—	—	—	—	—	—	—	—	—
1500	—	—	—	—	—	—	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:
1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AZ606) and belt (part number KR30AE037) with field-supplied drive.

Medium static 1035-1466 RPM, 1.5 BHP max

Table M — 50KC**06 5 Ton Horizontal Supply (3 Phase)

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	**725**	**0.33**	**840**	**0.46**	937	0.60	1023	0.75	1101	0.90
975	**765**	**0.40**	**876**	**0.54**	970	0.68	1054	0.84	1131	1.00
1050	**806**	**0.48**	**912**	**0.63**	1004	0.78	1087	0.94	1162	1.11
1125	**847**	**0.57**	**950**	**0.72**	1039	0.88	1120	1.05	1194	1.23
1200	**889**	**0.66**	**988**	**0.83**	1075	1.00	1154	1.18	1226	1.36
1275	**931**	**0.78**	**1027**	**0.95**	1112	1.13	1189	1.31	1260	1.50
1350	**974**	**0.90**	1067	1.08	1149	1.27	1224	1.46	1294	1.66
1425	**1018**	**1.03**	1107	1.23	1187	1.43	1261	1.63	1329	1.84
1500	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
900	1172	1.06	1239	1.23	1302	1.40	1361	1.58	1418	1.77
975	1201	1.16	1267	1.34	1329	1.52	1388	1.71	1444	1.90
1050	1231	1.28	1296	1.46	1358	1.65	1416	1.84	1472	2.04
1125	1262	1.41	1326	1.60	1387	1.79	1445	1.99	1499	2.20
1200	1294	1.55	1357	1.74	1417	1.95	1474	2.15	1528	2.36
1275	1326	1.70	1388	1.90	1447	2.11	1504	2.33	—	—
1350	1359	1.87	1420	2.08	1479	2.29	1534	2.51	—	—
1425	1393	2.05	1453	2.27	1511	2.49	—	—	—	—
1500	1427	2.24	1487	2.47	1543	2.70	—	—	—	—

Boldface indicates field-supplied drive is required.

NOTES:
1. For more information, see General Fan Performance Notes on page 59.
2. Recommend using field-supplied fan pulley (part number KR11AZ606) and belt (part number KR30AE037) with field-supplied drive.

Medium static 1035-1466-1303 RPM, 2.9 BHP max

High static 1303-1550 RPM, 2.9 BHP max

Table N — 50KC**06 5 Ton Vertical Supply (3 Phase)

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	**794**	**0.41**	**902**	**0.55**	**993**	**0.69**	1074	0.85	1147	1.00
975	**840**	**0.49**	**945**	**0.64**	**1034**	**0.80**	1113	0.96	1185	1.13
1050	**888**	**0.59**	**988**	**0.75**	1075	0.92	1153	1.09	1223	1.26
1125	**936**	**0.70**	**1033**	**0.87**	1117	1.05	1193	1.23	1263	1.41
1200	**984**	**0.82**	1078	1.00	1160	1.19	1235	1.39	1303	1.58
1275	**1033**	**0.96**	1124	1.15	1204	1.35	1277	1.56	1343	1.76
1350	1083	1.11	1170	1.32	1248	1.53	1319	1.74	1385	1.96
1425	1133	1.28	1217	1.50	1293	1.72	1363	1.95	1427	2.17
1500	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
900	1214	1.16	1277	1.33	1336	1.50	1392	1.67	1445	1.85
975	1251	1.30	1313	1.47	1371	1.65	1427	1.83	1479	2.02
1050	1289	1.44	1350	1.63	1407	1.81	1462	2.01	1514	2.20
1125	1327	1.60	1387	1.80	1444	1.99	1498	2.19	1550	2.40
1200	1366	1.78	1426	1.98	1482	2.19	1535	2.40	—	—
1275	1406	1.97	1464	2.18	1520	2.40	—	—	—	—
1350	1446	2.18	1504	2.40	—	—	—	—	—	—
1425	1487	2.40	1544	2.63	—	—	—	—	—	—
1500	1529	2.64	—	—	—	—	—	—	—	—

NOTE: For more information, see General Fan Performance Notes on page 59.
Boldface indicates field-supplied drive is required.

Medium static 1035-1466-1303 RPM, 2.9 BHP max
High static 1303-1550 RPM, 2.9 BHP max

Table O — PULLEY ADJUSTMENT - BELT DRIVE

UNIT		MOTOR/ DRIVE COMBO	MOTOR PULLEY TURNS OPEN										
			0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
1 phase	04	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
	05	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
	06	Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
		High Static	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3 phase	04	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
		High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
	05	Medium Static	1303	1265	1226	1188	1150	1112	1073	1035	997	958	920
		High Static	1550	1516	1482	1447	1413	1379	1345	1311	1276	1242	1208
	06	Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
		High Static	1550	1525	1501	1476	1451	1427	1402	1377	1352	1328	1303

NOTE: For more information, see General Fan Performance Notes.

– Factory setting
N/A – Not Available

APPENDIX D — ELECTRICAL DATA

Table P — 50KC**04 (3 Tons) Cooling

v-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-1-60	187	253	16.6	79	190	1.0	DD-STD	78%	7.4
					190	1.0	MED	67%	4.9
					190	1.0	HIGH	76%	7.0
230-1-60	187	253	16.6	79	190	1.0	DD-STD	78%	7.4
					190	1.0	MED	67%	4.9
					190	1.0	HIGH	76%	7.0
208-3-60	187	253	10.4	73	190	1.0	DD-STD	78%	7.4
					190	1.0	MED	87%	5.2
					190	1.0	HIGH	89%	8.4
230-3-60	187	253	10.4	73	190	1.0	DD-STD	78%	7.4
					190	1.0	MED	87%	4.9
					190	1.0	HIGH	89%	8.3
460-3-60	414	506	5.8	38	190	0.5	DD-STD	78%	4.0
					190	0.5	MED	87%	2.5
					190	0.5	HIGH	89%	4.2
575-3-60	518	633	3.8	37	190	0.5	DD-STD	78%	4.0
					190	0.5	MED	72%	1.6
					190	0.5	HIGH	77%	2.8

Table Q — 50KC**05 (4 Tons) Cooling

v-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-1-60	187	253	21.8	117	325	1.5	DD-STD	78%	7.4
					325	1.5	MED	67%	4.9
					325	1.5	HIGH	76%	7.0
230-1-60	187	253	21.8	117	325	1.5	DD-STD	78%	7.4
					325	1.5	MED	67%	4.9
					325	1.5	HIGH	76%	7.0
208-3-60	187	253	13.7	83	325	1.5	DD-STD	78%	7.4
					325	1.5	MED	87%	5.2
					325	1.5	HIGH	89%	8.4
230-3-60	187	253	13.7	83	325	1.5	DD-STD	78%	7.4
					325	1.5	MED	87%	4.9
					325	1.5	HIGH	89%	8.3
460-3-60	414	506	6.2	41	325	0.8	DD-STD	78%	4.0
					325	0.8	MED	87%	2.5
					325	0.8	HIGH	89%	4.2
575-3-60	518	633	4.8	33	325	0.6	DD-STD	78%	4.0
					325	0.6	MED	72%	1.6
					325	0.6	HIGH	77%	2.8

See Legend and Notes on page 68.

Table R — 50KC**06 (5 Tons) Cooling

v-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		OFM (ea)		IFM		
	MIN	MAX	RLA	LRA	WATTS	FLA	TYPE	EFF at Full Load	FLA
208-1-60	187	253	25.0	134	325	1.4	DD-STD	78%	7.4
					325	1.4	MED	76%	7.0
230-1-60	187	253	25.0	134	325	1.4	DD-STD	78%	7.4
					325	1.4	MED	76%	7.0
208-3-60	187	253	15.9	110	325	1.4	DD-STD	78%	7.4
					325	1.4	MED	89%	8.4
					325	1.4	HIGH	89%	8.4
230-3-60	187	253	15.9	110	325	1.4	DD-STD	78%	7.4
					325	1.4	MED	89%	8.3
					325	1.4	HIGH	89%	8.3
460-3-60	414	506	7.0	52	325	0.9	DD-STD	78%	4.0
					325	0.9	MED	89%	4.2
					325	0.9	HIGH	89%	4.2
575-3-60	518	633	5.1	40	325	0.9	DD-STD	78%	4.0
					325	0.9	MED	77%	2.8
					325	0.9	HIGH	77%	2.8

Legend and Notes for Tables P-X.

LEGEND

BRKR — Circuit breaker
C.O. — Convenience outlet
DISC — Disconnect
FLA — Full load amps
IFM — Indoor fan motor
LRA — Locked rotor amps
MCA — Minimum circuit amps
P.E. — Power exhaust
pwrd fr/ unit — Powered from unit
PWRD C.O. — Powered convenience outlet
UNPWR C.O. — Unpowered convenience outlet

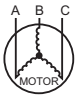
NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. Unbalanced 3-Phase Supply Voltage
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.
(AB) 227-224 = 3 v
(BC) 231-227 = 4 v
(AC) 227-226 = 1 v
Maximum deviation is 4 v.
Determine percent of voltage imbalance.

$$\text{\% Voltage Imbalance} = 100 \times \frac{4}{227} = 1.78\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

NOTE: Check all factory and field electrical connections for tightness.

Table S — 50KC**04 - MCA/MOCP Determination (No CO or Unpowered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			NO CO OR UNPWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
		CRHEATER***A00	NOM (kW)	FLA	MCA	FUSE or HACR BRKR	DISC SIZE		MCA	FUSE or HACR BRKR	DISC SIZE	
							FLA	LRA			FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	30	45	29	88	32	45	31	90
		101A	3.3/4.4	15.9/18.3	30/33	45/45	29/30	88/88	32/35	45/45	31/32	90/90
		102A	4.9/6.5	23.5/27.1	39/44	45/45	36/40	88/88	41/46	45/50	38/42	90/90
		103B	6.5/8.7	31.4/36.3	49/55	50/60	45/50	88/88	51/57	60/60	47/52	90/90
		104B	7.9/10.5	37.9/43.8	57/64	60/70	52/59	88/88	59/67	60/70	54/61	90/90
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/71	88/88	71/80	80/80	65/73	90/90
	MED	NONE	—	—	27	40	26	93	29	45	28	95
		101A	3.3/4.4	15.9/18.3	27/29	40/40	26/27	93/93	29/32	45/45	28/29	95/95
		102A	4.9/6.5	23.5/27.1	36/40	40/45	33/37	93/93	38/43	45/45	35/39	95/95
		103B	6.5/8.7	31.4/36.3	46/52	50/60	42/47	93/93	48/54	50/60	44/50	95/95
		104B	7.9/10.5	37.9/43.8	54/61	60/70	49/56	93/93	56/64	60/70	51/58	95/95
		102A+102A	9.8/13.0	46.9/54.2	65/74	70/80	60/68	93/93	68/77	70/80	62/70	95/95
	HIGH	NONE	—	—	29	45	28	118	31	45	30	120
		101A	3.3/4.4	15.9/18.3	29/32	45/45	28/29	118/118	31/34	45/45	30/31	120/120
		102A	4.9/6.5	23.5/27.1	39/43	45/45	35/39	118/118	41/45	45/50	37/41	120/120
		103B	6.5/8.7	31.4/36.3	48/55	50/60	44/50	118/118	51/57	60/60	46/52	120/120
		104B	7.9/10.5	37.9/43.8	57/64	60/70	52/58	118/118	59/66	60/70	54/61	120/120
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/70	118/118	70/79	70/80	64/73	120/120
208/230-3-60	DD-STD	NONE	—	—	22	30	22	82	24	30	24	84
		101A	3.3/4.4	9.2/10.6	22/23	30/30	22/22	82/82	24/25	30/30	24/24	84/84
		102A	4.9/6.5	13.6/15.6	27/29	30/30	24/26	82/82	29/32	30/35	26/29	84/84
		103B	6.5/8.7	18.1/20.9	32/36	35/40	29/33	82/82	35/38	35/40	32/35	84/84
		104B	7.9/10.5	21.9/25.3	37/41	40/45	34/38	82/82	39/44	40/45	36/40	84/84
		105A	12.0/16.0	33.4/38.5	51/58	60/60	47/53	82/82	54/60	60/60	49/55	84/84
	MED	NONE	—	—	20/19	25/25	19/19	111	22/21	30/30	21/21	113
		101A	3.3/4.4	9.2/10.6	20/20	25/25	19/19	111/111	22/22	30/30	21/21	113/113
		102A	4.9/6.5	13.6/15.6	24/26	25/30	22/24	111/111	26/28	30/30	24/26	113/113
		103B	6.5/8.7	18.1/20.9	30/33	30/35	27/30	111/111	32/35	35/35	29/32	113/113
		104B	7.9/10.5	21.9/25.3	34/38	35/40	31/35	111/111	37/41	40/45	33/37	113/113
		105A	12.0/16.0	33.4/38.5	49/55	50/60	44/50	111/111	51/57	60/60	47/52	113/113
	HIGH	NONE	—	—	23/23	30/30	23/23	147	25/25	30/30	25/25	149
		101A	3.3/4.4	9.2/10.6	23/24	30/30	23/23	147/147	25/26	30/30	25/25	149/149
		102A	4.9/6.5	13.6/15.6	28/30	30/30	25/27	147/147	30/33	30/35	27/30	149/149
		103B	6.5/8.7	18.1/20.9	34/37	35/40	30/34	147/147	36/39	40/40	33/36	149/149
		104B	7.9/10.5	21.9/25.3	38/42	40/45	35/39	147/147	41/45	45/45	37/41	149/149
		105A	12.0/16.0	33.4/38.5	53/59	60/60	48/54	147/147	55/61	60/70	50/56	149/149
460-3-60	DD-STD	NONE	—	—	12	15	12	43	13	15	13	44
		106A	6.0	7.2	14	15	13	43	16	20	14	44
		107A	8.8	10.6	19	20	17	43	20	20	18	44
		108A	11.5	13.8	23	25	20	43	24	25	22	44
		109A	14.0	16.8	26	30	24	43	28	30	25	44
	MED	NONE	—	—	11	15	10	57	12	15	11	58
		106A	6.0	7.2	13	15	11	57	14	15	12	58
		107A	8.8	10.6	17	20	15	57	18	20	16	58
		108A	11.5	13.8	21	25	19	57	22	25	20	58
		109A	14.0	16.8	25	25	22	57	26	30	23	58
	HIGH	NONE	—	—	12	15	12	75	13	15	13	76
		106A	6.0	7.2	15	15	13	75	16	20	14	76
		107A	8.8	10.6	19	20	17	75	20	20	18	76
		108A	11.5	13.8	23	25	21	75	24	25	22	76
		109A	14.0	16.8	27	30	24	75	28	30	25	76
575-3-60	DD-STD	NONE	—	—	10	15	10	42	12	15	12	44
	MED	NONE	—	—	7	15	7	45	9	15	9	47
	HIGH	NONE	—	—	9	15	8	60	10	15	10	62

See Legend and Notes on page 68.

Table T — 50KC**04 - MCA/MOCP Determination (Powered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			PWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
						FUSE or HACR BRKR	DISC SIZE			FUSE or HACR BRKR	DISC SIZE	
		CRHEATER***A00	NOM (kW)	FLA	MCA		FLA	LRA	MCA		FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	34	50	34	93	36	50	36	95
		101A	3.3/4.4	15.9/18.3	36/39	50/50	34/35	93/93	38/41	50/50	36/37	95/95
		102A	4.9/6.5	23.5/27.1	45/50	50/50	41/45	93/93	47/52	50/60	43/47	95/95
		103B	6.5/8.7	31.4/36.3	55/61	60/70	50/56	93/93	57/63	60/70	52/58	95/95
		104B	7.9/10.5	37.9/43.8	63/70	70/80	58/64	93/93	65/73	70/80	60/67	95/95
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	93/93	77/86	80/90	70/79	95/95
	MED	NONE	—	—	32	45	31	98	34	45	34	100
		101A	3.3/4.4	15.9/18.3	32/35	45/45	31/32	98/98	35/38	45/45	34/34	100/100
		102A	4.9/6.5	23.5/27.1	42/46	45/50	38/42	98/98	44/49	45/50	40/45	100/100
		103B	6.5/8.7	31.4/36.3	52/58	60/60	47/53	98/98	54/60	60/60	49/55	100/100
		104B	7.9/10.5	37.9/43.8	60/67	60/70	55/62	98/98	62/70	70/70	57/64	100/100
		102A+102A	9.8/13.0	46.9/54.2	71/80	80/80	65/73	98/98	74/83	80/90	67/76	100/100
	HIGH	NONE	—	—	34	50	34	123	36	50	36	125
		101A	3.3/4.4	15.9/18.3	35/38	50/50	34/35	123/123	37/40	50/50	36/37	125/125
		102A	4.9/6.5	23.5/27.1	45/49	50/50	41/45	123/123	47/51	50/60	43/47	125/125
		103B	6.5/8.7	31.4/36.3	54/61	60/70	50/55	123/123	57/63	60/70	52/58	125/125
		104B	7.9/10.5	37.9/43.8	63/70	70/70	57/64	123/123	65/72	70/80	59/66	125/125
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	123/123	76/85	80/90	70/78	125/125
208/230-3-60	DD-STD	NONE	—	—	27	30	27	87	29	35	29	89
		101A	3.3/4.4	9.2/10.6	27/29	30/30	27/27	87/87	30/31	35/35	29/29	89/89
		102A	4.9/6.5	13.6/15.6	33/35	35/35	30/32	87/87	35/38	35/40	32/34	89/89
		103B	6.5/8.7	18.1/20.9	38/42	40/45	35/38	87/87	41/44	45/45	37/40	89/89
		104B	7.9/10.5	21.9/25.3	43/47	45/50	39/43	87/87	45/50	50/50	41/45	89/89
		105A	12.0/16.0	33.4/38.5	57/64	60/70	52/58	87/87	60/66	60/70	55/60	89/89
	MED	NONE	—	—	24/24	30/30	25/24	116	26/26	30/30	27/26	118
		101A	3.3/4.4	9.2/10.6	24/26	30/30	25/24	116/116	27/28	30/30	27/26	118/118
		102A	4.9/6.5	13.6/15.6	30/32	30/35	27/29	116/116	32/34	35/35	29/31	118/118
		103B	6.5/8.7	18.1/20.9	36/39	40/40	32/35	116/116	38/41	40/45	35/37	118/118
		104B	7.9/10.5	21.9/25.3	40/44	40/45	37/40	116/116	43/47	45/50	39/42	118/118
		105A	12.0/16.0	33.4/38.5	55/61	60/70	50/55	116/116	57/63	60/70	52/58	118/118
	HIGH	NONE	—	—	28/28	30/30	28/28	152	30/29	35/35	30/30	154
		101A	3.3/4.4	9.2/10.6	28/30	30/30	28/28	152/152	31/32	35/35	30/30	154/154
		102A	4.9/6.5	13.6/15.6	34/36	35/40	31/33	152/152	36/39	40/40	33/35	154/154
		103B	6.5/8.7	18.1/20.9	40/43	40/45	36/39	152/152	42/45	45/45	38/41	154/154
		104B	7.9/10.5	21.9/25.3	44/48	45/50	40/44	152/152	47/51	50/60	43/46	154/154
		105A	12.0/16.0	33.4/38.5	59/65	60/70	54/59	152/152	61/67	70/70	56/62	154/154
460-3-60	DD-STD	NONE	—	—	14	20	14	45	15	20	16	46
		106A	6.0	7.2	17	20	15	45	18	20	17	46
		107A	8.8	10.6	21	25	19	45	23	25	20	46
		108A	11.5	13.8	25	25	23	45	27	30	24	46
		109A	14.0	16.8	29	30	26	45	30	30	28	46
	MED	NONE	—	—	13	15	13	59	14	15	14	60
		106A	6.0	7.2	15	15	14	59	17	20	15	60
		107A	8.8	10.6	20	20	18	59	21	25	19	60
		108A	11.5	13.8	24	25	21	59	25	25	22	60
		109A	14.0	16.8	27	30	25	59	29	30	26	60
	HIGH	NONE	—	—	15	20	15	77	16	20	16	78
		106A	6.0	7.2	17	20	16	77	19	20	17	78
		107A	8.8	10.6	22	25	20	77	23	25	21	78
		108A	11.5	13.8	26	30	23	77	27	30	24	78
		109A	14.0	16.8	29	30	27	77	31	35	28	78
575-3-60	DD-STD	NONE	—	—	11	15	12	44	13	15	14	46
	MED	NONE	—	—	9	15	9	47	11	15	11	49
	HIGH	NONE	—	—	10	15	10	62	12	15	12	64

See Legend and Notes on page 68.

Table U — 50KC**05 - MCA/MOCP Determination (No CO or Unpowered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			NO CO OR UNPWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
						FUSE or HACR BRKR	DISC SIZE			FUSE or HACR BRKR	DISC SIZE	
		CRHEATER***A00	NOM (kW)	FLA	MCA		FLA	LRA	MCA		FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	37	50	35	128	39	50	37	130
		101A	3.3/4.4	15.9/18.3	37/37	50/50	35/35	128/128	39/39	50/50	37/37	130/130
		103B	6.5/8.7	31.4/36.3	49/55	50/60	45/50	128/128	51/57	60/60	47/52	130/130
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/71	128/128	71/80	80/80	65/73	130/130
		103B+103B	13.1/17.4	62.8/72.5	88/100	90/100	81/92	128/128	91/103	100/110	83/94	130/130
		104B+104B	15.8/21.0	75.8/87.5	104/119	110/125	96/109	128/128	107/121	110/125	98/111	130/130
	MED	NONE	—	—	34	50	32	133	36	50	35	135
		101A	3.3/4.4	15.9/18.3	34/34	50/50	32/32	133/133	36/36	50/50	35/35	135/135
		103B	6.5/8.7	31.4/36.3	46/52	50/60	42/47	133/133	48/54	50/60	44/50	135/135
		102A+102A	9.8/13.0	46.9/54.2	65/74	70/80	60/68	133/133	68/77	70/80	62/70	135/135
		103B+103B	13.1/17.4	62.8/72.5	85/97	90/100	78/89	133/133	87/100	90/100	80/91	135/135
		104B+104B	15.8/21.0	75.8/87.5	101/116	110/125	93/106	133/133	104/118	110/125	95/108	135/135
	HIGH	NONE	—	—	36	50	35	158	38	50	37	160
		101A	3.3/4.4	15.9/18.3	36/36	50/50	35/35	158/158	38/38	50/50	37/37	160/160
		103B	6.5/8.7	31.4/36.3	48/55	50/60	44/50	158/158	51/57	60/60	46/52	160/160
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/70	158/158	70/79	70/80	64/73	160/160
		103B+103B	13.1/17.4	62.8/72.5	88/100	90/100	80/91	158/158	90/102	90/110	82/94	160/160
		104B+104B	15.8/21.0	75.8/87.5	104/119	110/125	95/109	158/158	106/121	110/125	97/111	160/160
208/230-3-60	DD-STD	NONE	—	—	26	30	26	94	28	40	28	96
		102A	4.9/6.5	13.6/15.6	27/29	30/30	26/26	94/94	29/32	40/40	28/29	96/96
		103B	6.5/8.7	18.1/20.9	32/36	35/40	29/33	94/94	35/38	40/40	32/35	96/96
		105A	12.0/16.0	33.4/38.5	51/58	60/60	47/53	94/94	54/60	60/60	49/55	96/96
		104B+104B	15.8/21.0	43.8/50.5	64/73	70/80	59/67	94/94	67/75	70/80	61/69	96/96
	MED	NONE	—	—	24/24	30/30	23/23	123	26/26	30/30	26/25	125
		102A	4.9/6.5	13.6/15.6	24/26	30/30	23/24	123/123	26/28	30/30	26/26	125/125
		103B	6.5/8.7	18.1/20.9	30/33	30/35	27/30	123/123	32/35	35/35	29/32	125/125
		105A	12.0/16.0	33.4/38.5	49/55	50/60	44/50	123/123	51/57	60/60	47/52	125/125
		104B+104B	15.8/21.0	43.8/50.5	62/70	70/70	56/64	123/123	64/72	70/80	59/66	125/125
	HIGH	NONE	—	—	27/27	40/40	27/27	159	29/29	40/40	29/29	161
		102A	4.9/6.5	13.6/15.6	28/30	40/40	27/27	159/159	30/33	40/40	29/30	161/161
		103B	6.5/8.7	18.1/20.9	34/37	40/40	30/34	159/159	36/39	40/40	33/36	161/161
		105A	12.0/16.0	33.4/38.5	53/59	60/60	48/54	159/159	55/61	60/70	50/56	161/161
		104B+104B	15.8/21.0	43.8/50.5	66/74	70/80	60/68	159/159	68/76	70/80	62/70	161/161
460-3-60	DD-STD	NONE	—	—	13	15	13	47	14	20	14	48
		106A	6.0	7.2	14	15	13	47	16	20	14	48
		108A	11.5	13.8	23	25	20	47	24	25	22	48
		109A	14.0	16.8	26	30	24	47	28	30	25	48
		108A+108A	23.0	27.7	40	40	36	47	41	45	38	48
	MED	NONE	—	—	12	15	11	61	13	15	12	62
		106A	6.0	7.2	13	15	11	61	14	15	12	62
		108A	11.5	13.8	21	25	19	61	22	25	20	62
		109A	14.0	16.8	25	25	22	61	26	30	23	62
		108A+108A	23.0	27.7	38	40	35	61	39	40	36	62
	HIGH	NONE	—	—	13	15	13	79	14	20	14	80
		106A	6.0	7.2	15	15	13	79	16	20	14	80
		108A	11.5	13.8	23	25	21	79	24	25	22	80
		109A	14.0	16.8	27	30	24	79	28	30	25	80
		108A+108A	23.0	27.7	40	40	37	79	42	45	38	80
575-3-60	DD-STD	NONE	—	—	11	15	11	39	13	15	13	41
	MED	NONE	—	—	9	15	8	42	11	15	10	44
	HIGH	NONE	—	—	10	15	9	57	12	15	12	59

See Legend and Notes on page 68.

Table V — 50KC**05 - MCA/MOCP Determination (Powered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			PWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
						FUSE or HACR BRKR	DISC SIZE			FUSE or HACR BRKR	DISC SIZE	
		CRHEATER***A00	NOM (kW)	FLA	MCA		FLA	LRA	MCA		FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	41	60	41	133	43	60	43	135
		101A	3.3/4.4	15.9/18.3	41/41	60/60	41/41	133/133	43/43	60/60	43/43	135/135
		103B	6.5/8.7	31.4/36.3	55/61	60/70	50/56	133/133	57/63	60/70	52/58	135/135
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	133/133	77/86	80/90	70/79	135/135
		103B+103B	13.1/17.4	62.8/72.5	94/106	100/110	86/97	133/133	97/109	100/110	88/100	135/135
		104B+104B	15.8/21.0	75.8/87.5	110/125	125/125	101/115	133/133	113/127	125/150	103/117	135/135
	MED	NONE	—	—	39	60	38	138	41	60	40	140
		101A	3.3/4.4	15.9/18.3	39/39	60/60	38/38	138/138	41/41	60/60	40/40	140/140
		103B	6.5/8.7	31.4/36.3	52/58	60/60	47/53	138/138	54/60	60/60	49/55	140/140
		102A+102A	9.8/13.0	46.9/54.2	71/80	80/80	65/73	138/138	74/83	80/90	67/76	140/140
		103B+103B	13.1/17.4	62.8/72.5	91/103	100/110	83/95	138/138	93/106	100/110	86/97	140/140
		104B+104B	15.8/21.0	75.8/87.5	107/122	110/125	98/112	138/138	110/124	110/125	101/114	140/140
	HIGH	NONE	—	—	41	60	40	163	43	60	43	165
		101A	3.3/4.4	15.9/18.3	41/41	60/60	40/40	163/163	43/43	60/60	43/43	165/165
		103B	6.5/8.7	31.4/36.3	54/61	60/70	50/55	163/163	57/63	60/70	52/58	165/165
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	163/163	76/85	80/90	70/78	165/165
		103B+103B	13.1/17.4	62.8/72.5	94/106	100/110	86/97	163/163	96/108	100/110	88/99	165/165
		104B+104B	15.8/21.0	75.8/87.5	110/125	110/125	101/114	163/163	112/127	125/150	103/116	165/165
208/230-3-60	DD-STD	NONE	—	—	31	40	32	99	33	45	34	101
		102A	4.9/6.5	13.6/15.6	33/35	40/40	32/32	99/99	35/38	45/45	34/34	101/101
		103B	6.5/8.7	18.1/20.9	38/42	40/45	35/38	99/99	41/44	45/45	37/40	101/101
		105A	12.0/16.0	33.4/38.5	57/64	60/70	52/58	99/99	60/66	60/70	55/60	101/101
		104B+104B	15.8/21.0	43.8/50.5	70/79	80/80	64/72	99/99	73/81	80/90	67/74	101/101
	MED	NONE	—	—	29/29	40/40	29/29	128	31/31	40/40	31/31	130
		102A	4.9/6.5	13.6/15.6	30/32	40/40	29/29	128/128	32/34	40/40	31/31	130/130
		103B	6.5/8.7	18.1/20.9	36/39	40/40	32/35	128/128	38/41	40/45	35/37	130/130
		105A	12.0/16.0	33.4/38.5	55/61	60/70	50/55	128/128	57/63	60/70	52/58	130/130
		104B+104B	15.8/21.0	43.8/50.5	68/76	70/80	62/69	128/128	70/78	70/80	64/71	130/130
	HIGH	NONE	—	—	32/32	45/45	33/33	164	34/34	45/45	35/35	166
		102A	4.9/6.5	13.6/15.6	34/36	45/45	33/33	164/164	36/39	45/45	35/35	166/166
		103B	6.5/8.7	18.1/20.9	40/43	45/45	36/39	164/164	42/45	45/45	38/41	166/166
		105A	12.0/16.0	33.4/38.5	59/65	60/70	54/59	164/164	61/67	70/70	56/62	166/166
		104B+104B	15.8/21.0	43.8/50.5	31	40	32	99	33	45	34	101
460-3-60	DD-STD	NONE	—	—	15	20	15	49	16	20	16	50
		106A	6.0	7.2	17	20	15	49	18	20	17	50
		108A	11.5	13.8	25	25	23	49	27	30	24	50
		109A	14.0	16.8	29	30	26	49	30	30	28	50
		108A+108A	23.0	27.7	43	45	39	49	44	45	40	50
	MED	NONE	-	-	14	15	13	63	15	20	15	64
		106A	6.0	7.2	15	15	14	63	17	20	15	64
		108A	11.5	13.8	24	25	21	63	25	25	22	64
		109A	14.0	16.8	27	30	25	63	29	30	26	64
		108A+108A	23.0	27.7	41	45	37	63	42	45	38	64
	HIGH	NONE	—	—	15	20	15	81	16	20	17	82
		106A	6.0	7.2	17	20	16	81	19	20	17	82
		108A	11.5	13.8	26	30	23	81	27	30	24	82
		109A	14.0	16.8	29	30	27	81	31	35	28	82
		108A+108A	23.0	27.7	43	45	39	81	44	45	40	82
575-3-60	DD-STD	13	15	13	41	15	20	15	43	13	15	13
	MED	10	15	10	44	12	15	12	46	10	15	10
	HIGH	12	15	11	59	13	15	14	61	12	15	11

See Legend and Notes on page 68.

Table W — 50KC**06 - MCA/MOCP Determination (No CO or Unpowered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			NO CO OR UNPWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
						FUSE or HACR BRKR	DISC SIZE			FUSE or HACR BRKR	DISC SIZE	
		CRHEATER***A00	NOM (kW)	FLA	MCA		FLA	LRA	MCA		FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	41	60	39	144	42	60	41	146
		102A	4.9/6.5	23.5/27.1	41/44	60/60	39/40	144/144	42/46	60/60	41/42	146/146
		103B	6.5/8.7	31.4/36.3	49/55	60/60	45/50	144/144	51/57	60/60	47/52	146/146
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/71	144/144	71/80	80/80	65/73	146/146
		103B+103B	13.1/17.4	62.8/72.5	88/100	90/100	81/92	144/144	91/103	100/110	83/94	146/146
		104B+104B	15.8/21.0	75.8/87.5	104/119	110/125	96/109	144/144	107/121	110/125	98/111	146/146
	MED	NONE	—	—	40	60	38	174	42	60	41	176
		102A	4.9/6.5	23.5/27.1	40/43	60/60	38/39	174/174	42/45	60/60	41/41	176/176
		103B	6.5/8.7	31.4/36.3	48/55	60/60	44/50	174/174	51/57	60/60	46/52	176/176
		102A+102A	9.8/13.0	46.9/54.2	68/77	70/80	62/70	174/174	70/79	70/80	64/73	176/176
		103B+103B	13.1/17.4	62.8/72.5	88/100	90/100	80/91	174/174	90/102	90/110	82/94	176/176
		104B+104B	15.8/21.0	75.8/87.5	104/119	110/125	95/109	174/174	106/121	110/125	97/111	176/176
208/230-3-60	DD-STD	NONE	—	—	29	40	28	120	31	45	31	122
		102A	4.9/6.5	13.6/15.6	29/29	40/40	28/28	120/120	31/32	45/45	31/31	122/122
		104B	7.9/10.5	21.9/25.3	37/41	40/45	34/38	120/120	39/44	45/45	36/40	122/122
		105A	12.0/16.0	33.4/38.5	51/58	60/60	47/53	120/120	54/60	60/60	49/55	122/122
		104B+104B	15.8/21.0	43.8/50.5	64/73	70/80	59/67	120/120	67/75	70/80	61/69	122/122
		104B+105A	19.9/26.5	55.2/63.8	79/89	80/90	72/82	120/120	81/92	90/100	74/84	122/122
	MED	NONE	—	—	30/30	45/45	30/29	185	32/32	45/45	32/32	187
		102A	4.9/6.5	13.6/15.6	30/30	45/45	30/29	185/185	32/33	45/45	32/32	187/187
		104B	7.9/10.5	21.9/25.3	38/42	45/45	35/39	185/185	41/45	45/45	37/41	187/187
		105A	12.0/16.0	33.4/38.5	53/59	60/60	48/54	185/185	55/61	60/70	50/56	187/187
		104B+104B	15.8/21.0	43.8/50.5	66/74	70/80	60/68	185/185	68/76	70/80	62/70	187/187
		104B+105A	19.9/26.5	55.2/63.8	80/91	80/100	73/83	185/185	82/93	90/100	75/85	187/187
	HIGH	NONE	—	—	30/30	45/45	30/29	185	32/32	45/45	32/32	187
		102A	4.9/6.5	13.6/15.6	30/30	45/45	30/29	185/185	32/33	45/45	32/32	187/187
		104B	7.9/10.5	21.9/25.3	38/42	45/45	35/39	185/185	41/45	45/45	37/41	187/187
		105A	12.0/16.0	33.4/38.5	53/59	60/60	48/54	185/185	55/61	60/70	50/56	187/187
		104B+104B	15.8/21.0	43.8/50.5	66/74	70/80	60/68	185/185	68/76	70/80	62/70	187/187
		104B+105A	19.9/26.5	55.2/63.8	80/91	80/100	73/83	185/185	82/93	90/100	75/85	187/187
460-3-60	DD-STD	NONE	—	—	14	20	14	58	15	20	15	59
		106A	6.0	7.2	14	20	14	58	16	20	15	59
		108A	11.5	13.8	23	25	20	58	24	25	22	59
		109A	14.0	16.8	26	30	24	58	28	30	25	59
		108A+108A	23.0	27.7	40	40	36	58	41	45	38	59
		108A+109A	25.5	30.7	44	45	40	58	45	45	41	59
	MED	NONE	—	—	14	20	14	90	15	20	15	91
		106A	6.0	7.2	15	20	14	90	16	20	15	91
		108A	11.5	13.8	23	25	21	90	24	25	22	91
		109A	14.0	16.8	27	30	24	90	28	30	25	91
		108A+108A	23.0	27.7	40	40	37	90	42	45	38	91
		108A+109A	25.5	30.7	44	45	40	90	45	45	41	91
	HIGH	NONE	—	—	14	20	14	90	15	20	15	91
		106A	6.0	7.2	15	20	14	90	16	20	15	91
		108A	11.5	13.8	23	25	21	90	24	25	22	91
		109A	14.0	16.8	27	30	24	90	28	30	25	91
		108A+108A	23.0	27.7	40	40	37	90	42	45	38	91
		108A+109A	25.5	30.7	44	45	40	90	45	45	41	91
575-3-60	DD-STD	NONE	—	—	12	15	12	46	14	15	14	48
	MED	NONE	—	—	11	15	10	64	12	15	12	66
	HIGH	NONE	—	—	11	15	10	64	12	15	12	66

See Legend and Notes on page 68.

Table X — 50KC**06 - MCA/MOCP Determination (Powered CO)

NOM. v-Ph-Hz	IFM TYPE	ELEC. HEATER			PWRD CO							
					NO PE				w/ PE (pwrd fr/unit)			
		CRHEATER***A00	NOM (kW)	FLA	MCA	FUSE or HACR BRKR	DISC SIZE		MCA	FUSE or HACR BRKR	DISC SIZE	
							FLA	LRA			FLA	LRA
208/230-1-60	DD-STD	NONE	—	—	45	60	44	149	47	60	47	151
		102A	4.9/6.5	23.5/27.1	45/50	60/60	44/45	149/149	47/52	60/60	47/47	151/151
		103B	6.5/8.7	31.4/36.3	55/61	60/70	50/56	149/149	57/63	60/70	52/58	151/151
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	149/149	77/86	80/90	70/79	151/151
		103B+103B	13.1/17.4	62.8/72.5	94/106	100/110	86/97	149/149	97/109	100/110	88/100	151/151
		104B+104B	15.8/21.0	75.8/87.5	110/125	125/125	101/115	149/149	113/127	125/150	103/117	151/151
	MED	NONE	—	—	45	60	44	179	47	60	46	181
		102A	4.9/6.5	23.5/27.1	45/49	60/60	44/45	179/179	47/51	60/60	46/47	181/181
		103B	6.5/8.7	31.4/36.3	54/61	60/70	50/55	179/179	57/63	60/70	52/58	181/181
		102A+102A	9.8/13.0	46.9/54.2	74/83	80/90	68/76	179/179	76/85	80/90	70/78	181/181
		103B+103B	13.1/17.4	62.8/72.5	94/106	100/110	86/97	179/179	96/108	100/110	88/99	181/181
		104B+104B	15.8/21.0	75.8/87.5	110/125	110/125	101/114	179/179	112/127	125/150	103/116	181/181
208/230-3-60	DD-STD	NONE	—	—	34	45	34	125	36	50	36	127
		102A	4.9/6.5	13.6/15.6	34/35	45/45	34/34	125/125	36/38	50/50	36/36	127/127
		104B	7.9/10.5	21.9/25.3	43/47	45/50	39/43	125/125	45/50	50/50	41/45	127/127
		105A	12.0/16.0	33.4/38.5	57/64	60/70	52/58	125/125	60/66	60/70	55/60	127/127
		104B+104B	15.8/21.0	43.8/50.5	70/79	80/80	64/72	125/125	73/81	80/90	67/74	127/127
		104B+105A	19.9/26.5	55.2/63.8	85/95	90/100	78/87	125/125	87/98	90/100	80/90	127/127
	MED	NONE	—	—	35/35	50/50	35/35	190	37/37	50/50	37/37	192
		102A	4.9/6.5	13.6/15.6	35/36	50/50	35/35	190/190	37/39	50/50	37/37	192/192
		104B	7.9/10.5	21.9/25.3	44/48	50/50	40/44	190/190	47/51	50/60	43/46	192/192
		105A	12.0/16.0	33.4/38.5	59/65	60/70	54/59	190/190	61/67	70/70	56/62	192/192
		104B+104B	15.8/21.0	43.8/50.5	72/80	80/80	66/73	190/190	74/82	80/90	68/75	192/192
		104B+105A	19.9/26.5	55.2/63.8	86/97	90/100	79/88	190/190	88/99	90/100	81/91	192/192
	HIGH	NONE	—	—	35/35	50/50	35/35	190	37/37	50/50	37/37	192
		102A	4.9/6.5	13.6/15.6	35/36	50/50	35/35	190/190	37/39	50/50	37/37	192/192
		104B	7.9/10.5	21.9/25.3	44/48	50/50	40/44	190/190	47/51	50/60	43/46	192/192
		105A	12.0/16.0	33.4/38.5	59/65	60/70	54/59	190/190	61/67	70/70	56/62	192/192
		104B+104B	15.8/21.0	43.8/50.5	72/80	80/80	66/73	190/190	74/82	80/90	68/75	192/192
		104B+105A	19.9/26.5	55.2/63.8	86/97	90/100	79/88	190/190	88/99	90/100	81/91	192/192
460-3-60	DD-STD	NONE	—	—	16	20	16	60	17	20	17	61
		106A	6.0	7.2	17	20	16	60	18	20	17	61
		108A	11.5	13.8	25	25	23	60	27	30	24	61
		109A	14.0	16.8	29	30	26	60	30	30	28	61
		108A+108A	23.0	27.7	43	45	39	60	44	45	40	61
		108A+109A	25.5	30.7	47	50	42	60	48	50	44	61
	MED	NONE	—	—	17	20	16	92	18	20	18	93
		106A	6.0	7.2	17	20	16	92	19	20	18	93
		108A	11.5	13.8	26	30	23	92	27	30	24	93
		109A	14.0	16.8	29	30	27	92	31	35	28	93
		108A+108A	23.0	27.7	43	45	39	92	44	45	40	93
		108A+109A	25.5	30.7	47	50	43	92	48	50	44	93
	HIGH	NONE	—	—	17	20	16	92	18	20	18	93
		106A	6.0	7.2	17	20	16	92	19	20	18	93
		108A	11.5	13.8	26	30	23	92	27	30	24	93
		109A	14.0	16.8	29	30	27	92	31	35	28	93
		108A+108A	23.0	27.7	43	45	39	92	44	45	40	93
		108A+109A	25.5	30.7	47	50	43	92	48	50	44	93
575-3-60	DD-STD	NONE	—	—	13	15	13	48	15	20	16	50
	MED	NONE	—	—	12	15	12	66	14	15	14	68
	HIGH	NONE	—	—	12	15	12	66	14	15	14	68

See Legend and Notes on page 68.

APPENDIX E — WIRING DIAGRAMS

Table Y — Wiring Diagrams

50KC		DRAWING NUMBER.REV	
Size	**Voltage**	**Control**	**Power**
A04	208/230-1-60	48TM500212 (page 76)	48TM500211 (page 77)
	208/230-3-60		48TM500214 (page 79)
	460-3-60		48TM500214 (page 79)
	575-3-60		48TM500214 (page 79)
A05	208/230-1-60		48KC000133 (page 78)
	208/230-3-60		48TM500214 (page 79)
	460-3-60		48TM500214 (page 79)
	575-3-60		48TM500214 (page 79)
A06	208/230-1-60		48TM500211 (page 77)
	208/230-3-60		48TM500214 (page 79)
	460-3-60		48TM500214 (page 79)
	575-3-60		48TM500214 (page 79)

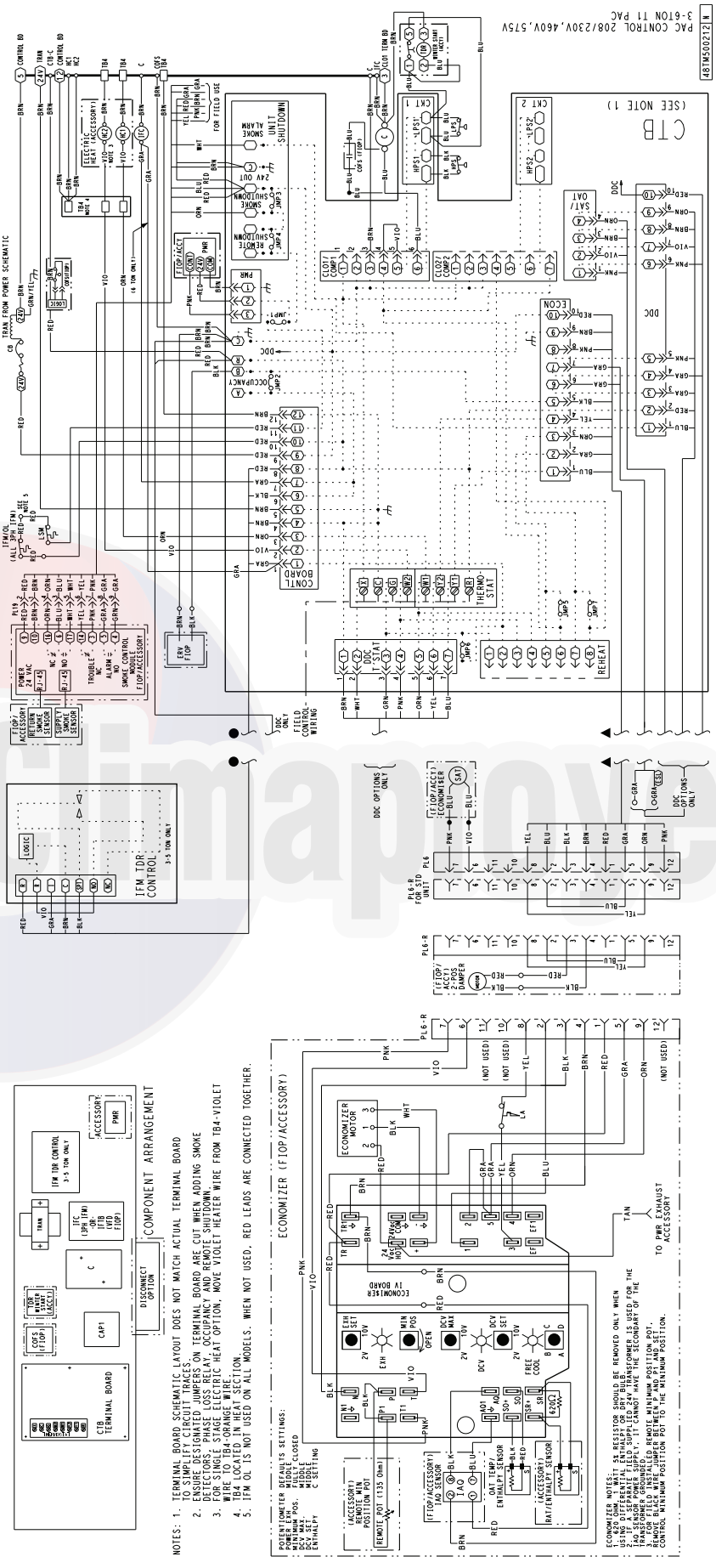


Fig. B — Unit Wiring Diagram (Controls) for Sizes A04-A06 (208/230-1-60, 208/230-3-60, 460-3-60, 575-3-60)

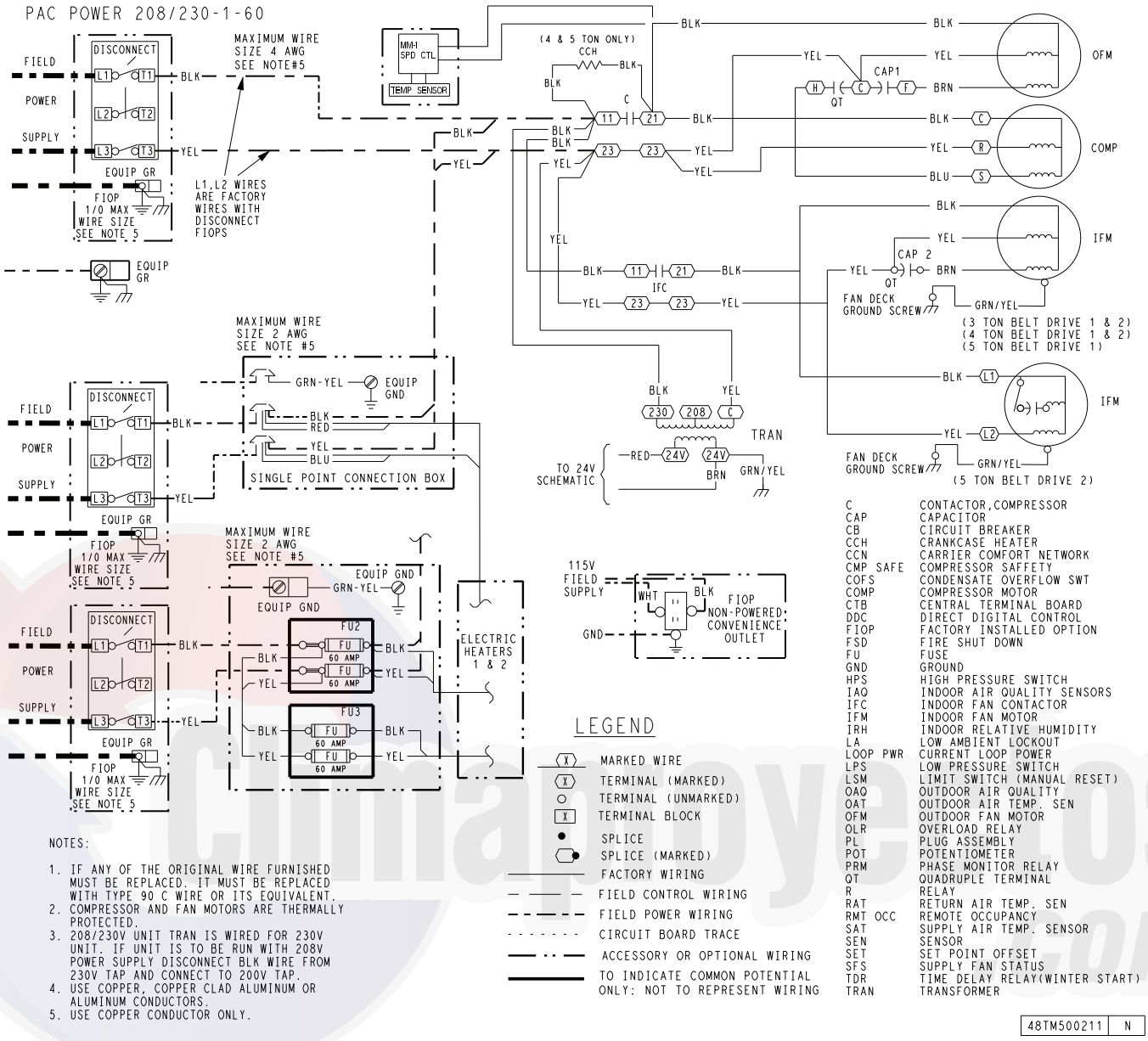


Fig. C — Unit Wiring Diagram (Power) for Sizes A04 and A06 (208/230-1-60)

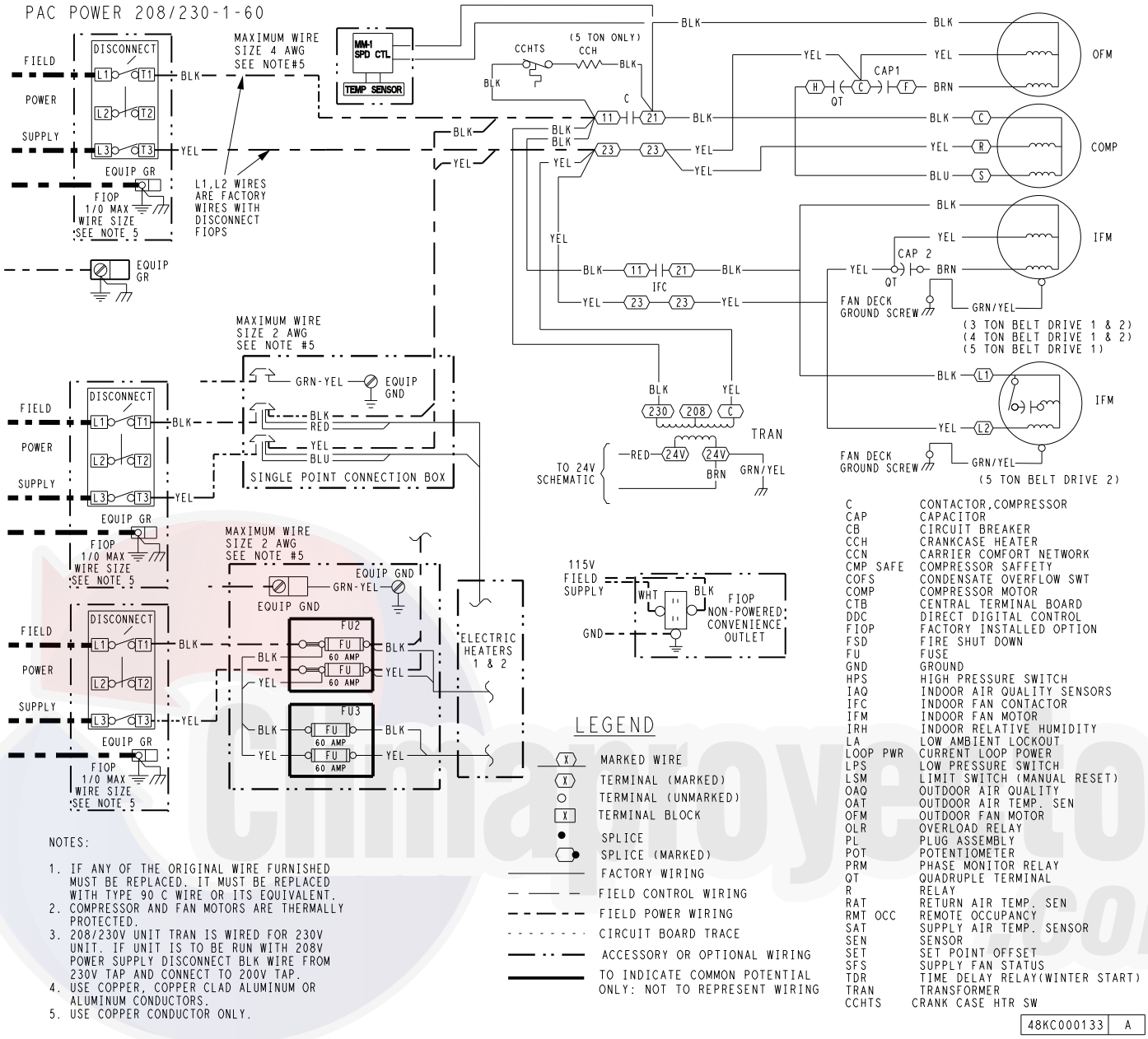
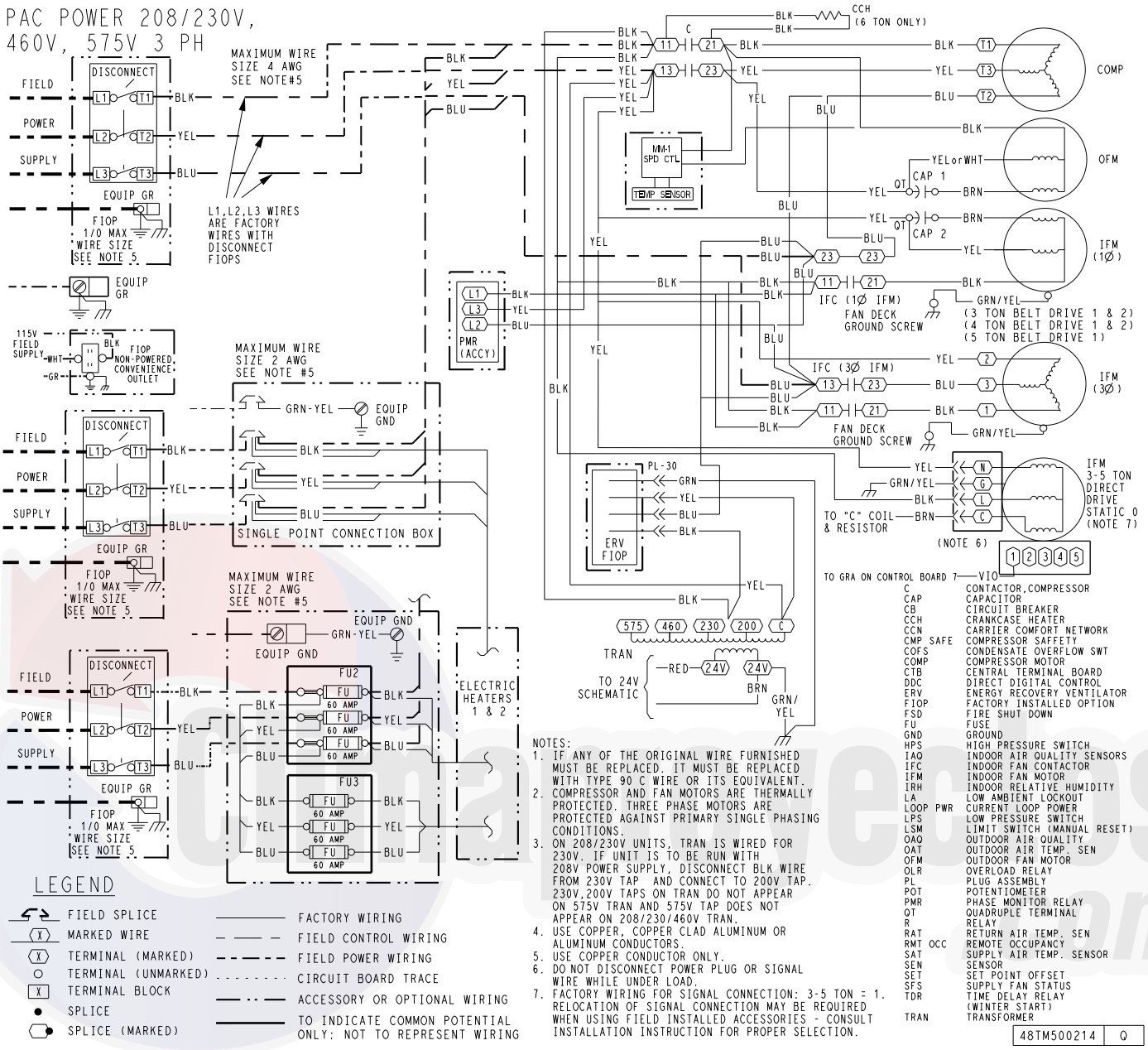


Fig. D — Unit Wiring Diagram (Power) for Size A05 (208/230-1-60)



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. ON 208/230V UNITS, TRAN IS WIRED FOR 230V. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY, DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP. 230V,200V TAPS ON TRAN DO NOT APPEAR ON 575V TRAN AND 575V TAP DOES NOT APPEAR ON 208/230/460V TRAN.
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: 3-5 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
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWT
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
HPS	HIGH PRESSURE SWITCH
IAQ	INDOOR AIR QUALITY SENSORS
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LOOP PWR	CURRENT LOOP POWER
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
POT	POTENTIOMETER
PWR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY (WINTER START)
TRAN	TRANSFORMER

48TM500214 | Q

Fig. E — Unit Wiring Diagram (Power) for Sizes A04-A06 (208/230-3-60, 460-3-60, 575-3-60)

APPENDIX F — MOTORMASTER SENSOR LOCATIONS

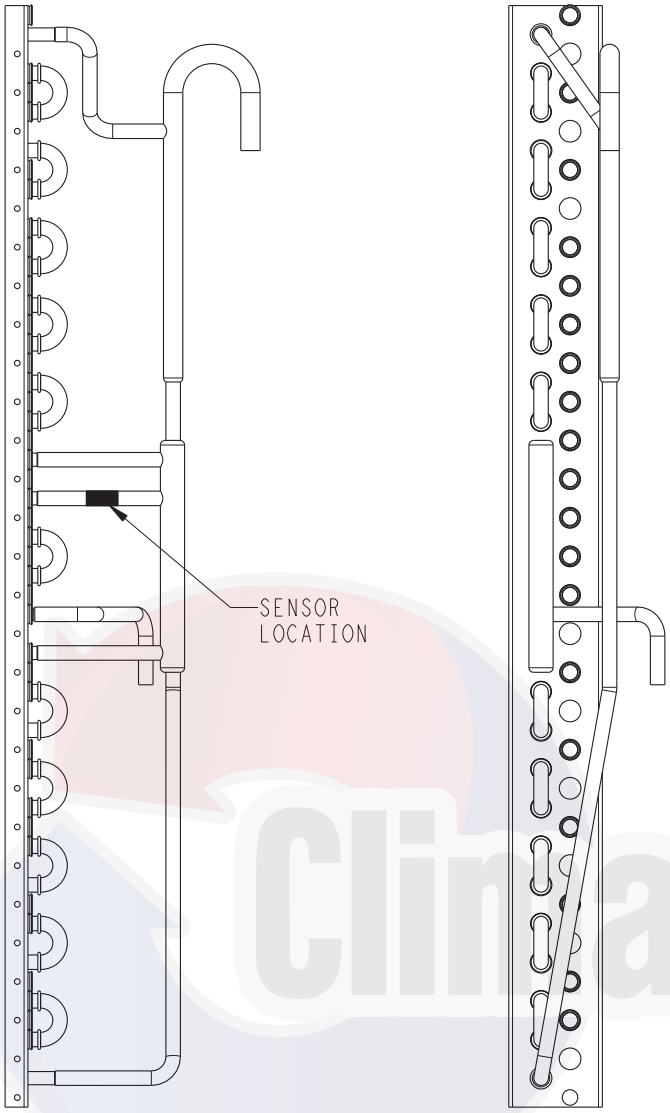


Fig. F — 50KC*A04 Outdoor Circuiting

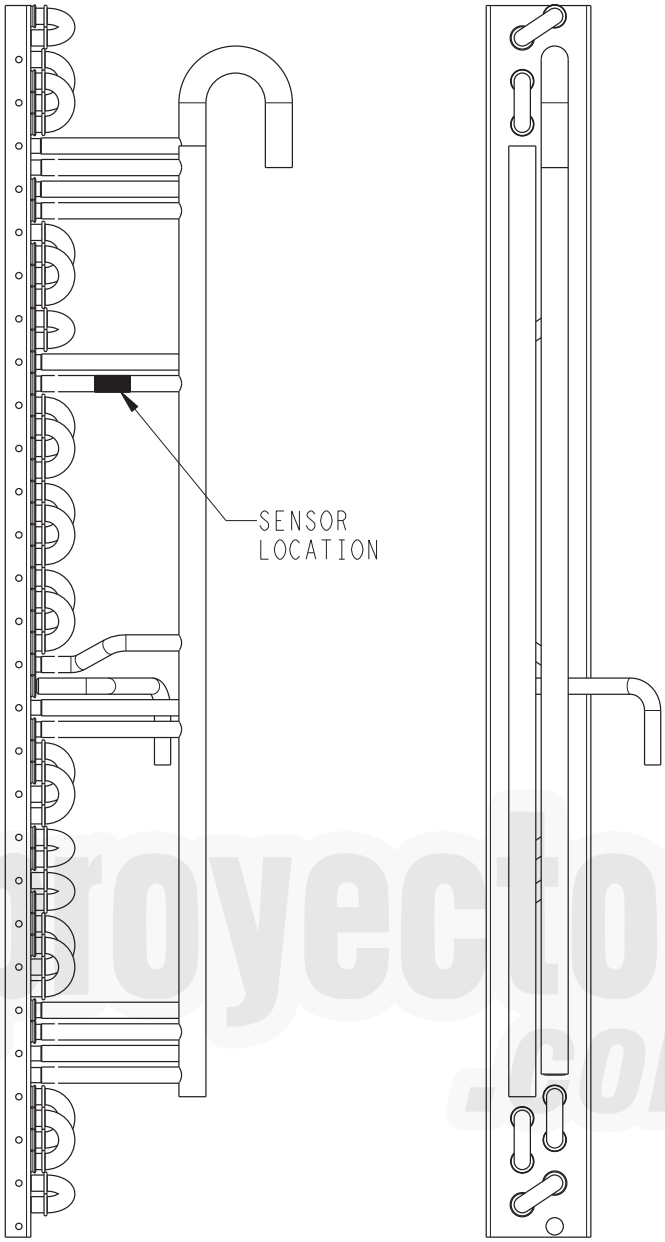


Fig. G — 50KC*A05 Outdoor Circuiting

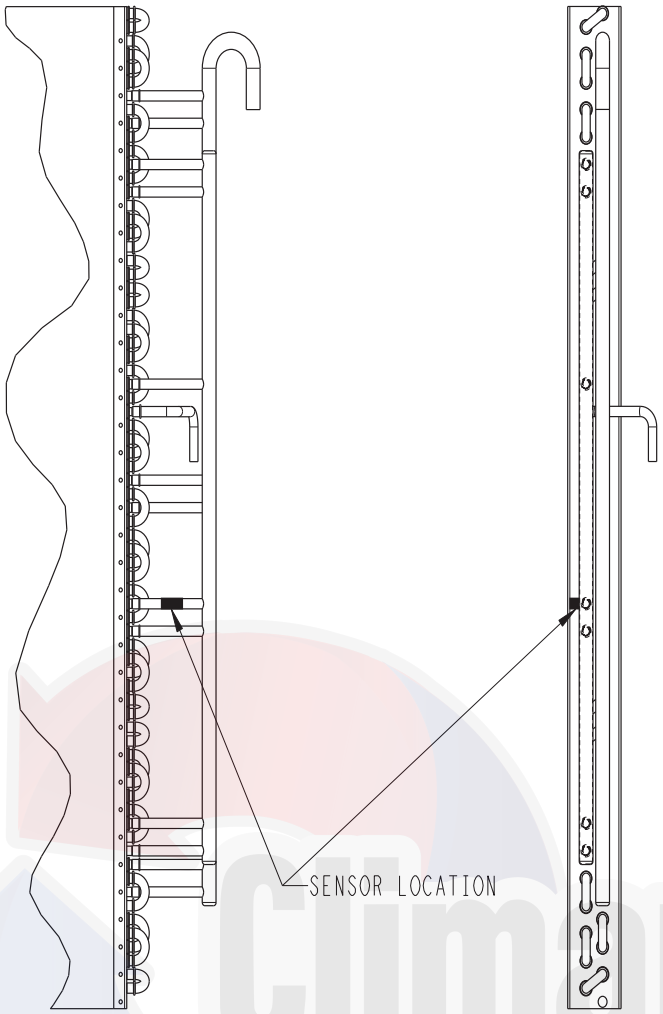


Fig. H — 50KC*A06 Outdoor Circuiting

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

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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) _____
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_____
Compressor Amps 1	L1 _____	L2 _____	L3 _____
Compressor Amps 2	L1 _____	L2 _____	L3 _____
Indoor Fan Amps	L1 _____	L2 _____	L3 _____

TEMPERATURES

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

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

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