Service and Maintenance Instructions

CONTENTS

SAFETY CONSIDERATIONS

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

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

Follow all safety codes, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

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

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

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

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

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

FIRE, EXPLOSION HAZARD

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

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig (3450 Pa). Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

⚠ CAUTION

UNIT DAMAGE HAZARD

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

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

IMPORTANT: OPERATIONAL TEST ALERT

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

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

IMPORTANT: Lockout/tag-out is a term used when electrical power switches are physically locked preventing power to the unit. A placard is placed on the power switch alerting service personnel that the power is disconnected.

UNIT ARRANGEMENT AND ACCESS

General

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

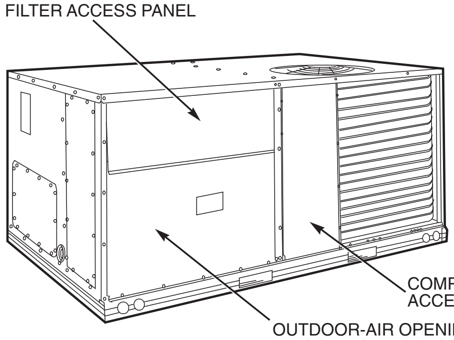


Fig. 1 — Typical Access Panel Locations

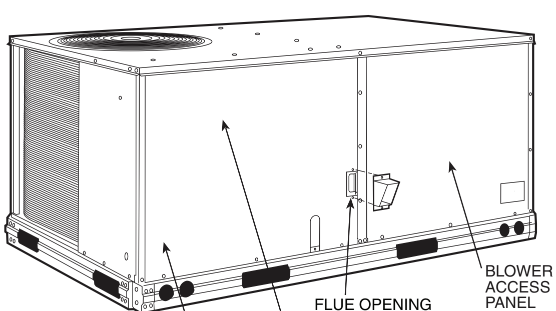


Fig. 2 — Blower Access Panel Location

MAINTENANCE

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

- Heat exchanger flue passageways cleanliness
- Gas burner condition
- Gas manifold pressure
- Heating temperature rise

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

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

Return air filters are disposable fiberglass 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).

Outside Air Hood

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

Economizer Inlet Air Screen

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

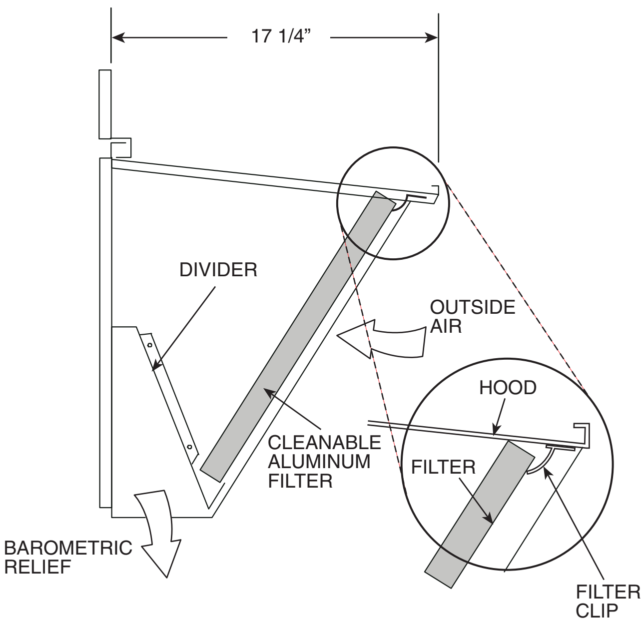


Fig. 3 — Filter Installation

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

Manual Outside Air Hood Screen

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

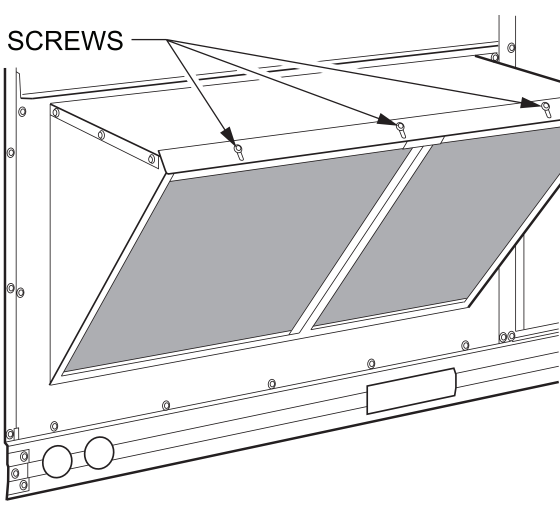


Fig. 4 — Screens Installed on Outdoor-Air Hood (Sizes $7^1/_2$ to $8^1/_2$ Tons Shown)

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 tightening all screws.

SUPPLY FAN (BLOWER) SECTION

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

Supply Fan (Direct-Drive)

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

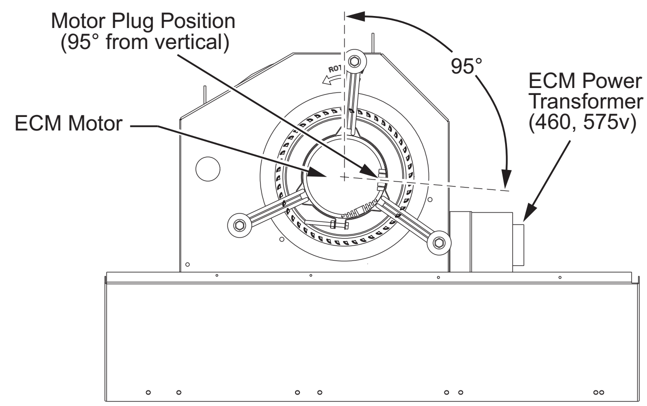


Fig. 5 — Direct-Drive Supply Fan Assembly

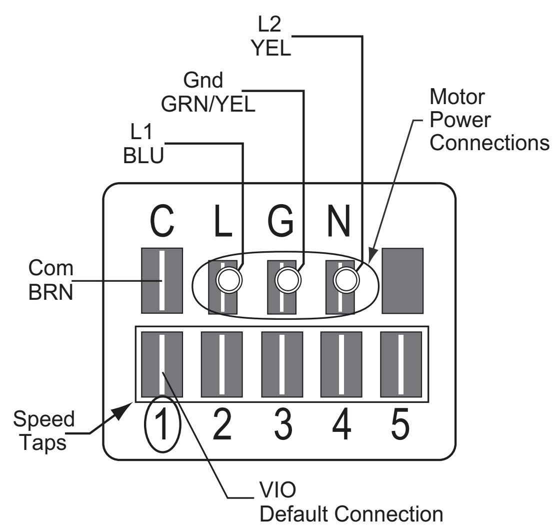


Fig. 6 — ECM Motor Connectors

ECM MOTOR

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

The 208/230-v units use a 230-v motor. 460-v units use a 230-v motor with a stepdown transformer (mounted on the end of the fan housing, see Fig. 5). 575-v units use a 460-v motor with an auto-transformer. Motor power voltage is connected to motor terminals L and N (see Fig. 6 and Fig. 7); ground is connected at terminal G. The motor power voltage is ALWAYS present; it is not switched off by a motor contactor.

EVALUATING MOTOR SPEED

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

SELECTING SPEED TAP

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

Table 1 — Motor Tap Programing (Percent of Full-Load Torque)

48HC UNIT SIZE	TAP 1	TAP 2	TAP 3	TAP 4	TAP 5
04	32	38	45	50	100
05	46	58	61	69	100
06	73	82	85	90	100

NOTE: Factory Default: Tap 1 (VIO)

Selecting another speed:

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

MOTOR “ROCKING” ON START-UP

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

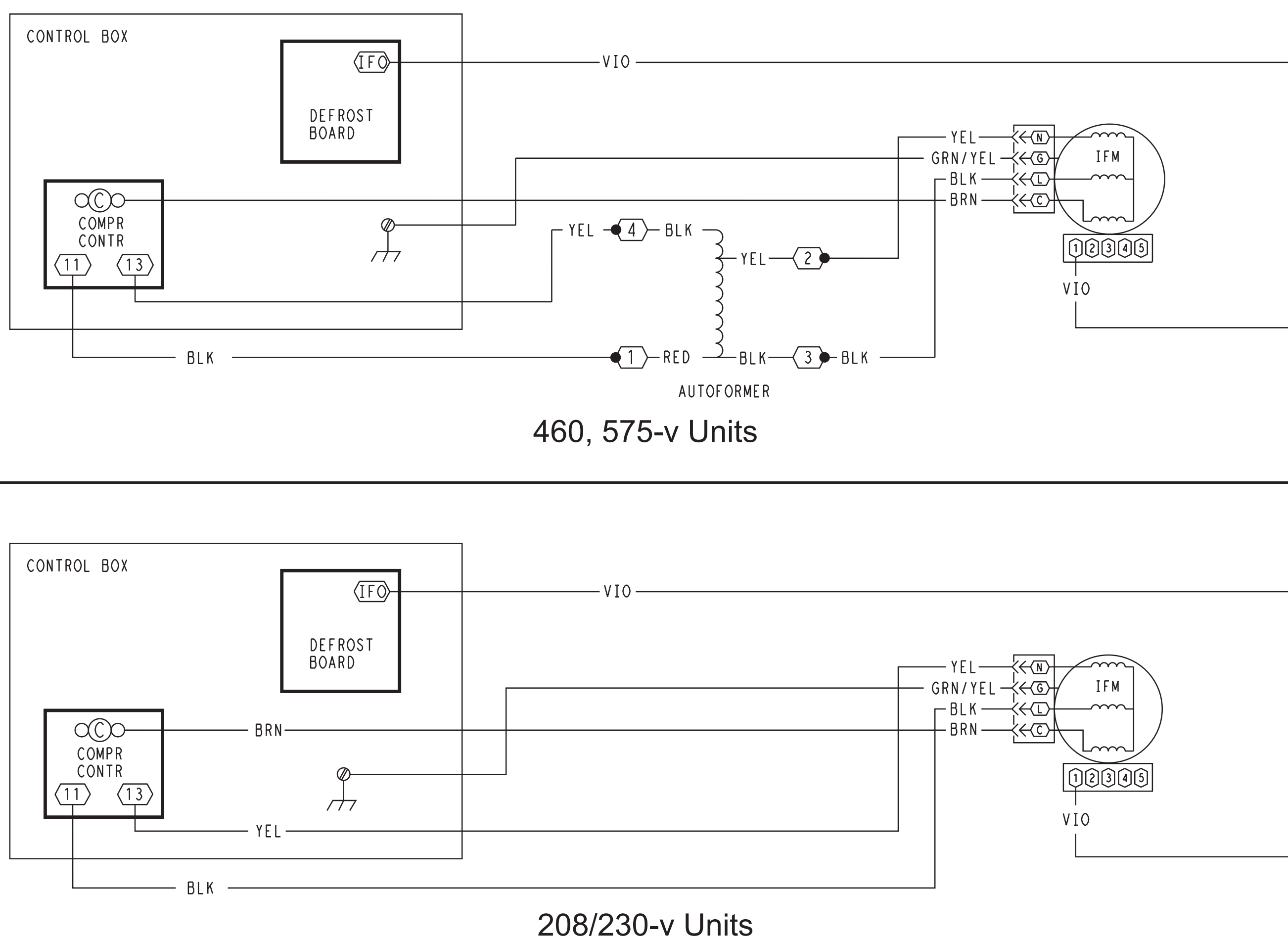


Fig. 7 — Direct-Drive Supply Fan Assembly

TROUBLESHOOTING THE ECM MOTOR

Troubleshooting the X13 ECM requires a voltmeter.

1. Disconnect main power to the unit.
2. Remove the motor power plug (including the control BRN lead) and VIO control signal lead at the motor terminals.
3. Restore main unit power.
4. Check for proper line voltage at motor power leads BLK (at L terminal) and YEL (at N terminal). See Table 2.

Table 2 — Motor Test Volts

UNIT VOLTAGE	MOTOR VOLTAGE	MIN-MAX VOLTS
208/230	230	190-250
460	230	210-250
575	460	420-500

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

REPLACING THE X-13 ECM MOTOR

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

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

Supply Fan (Belt-Drive)

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

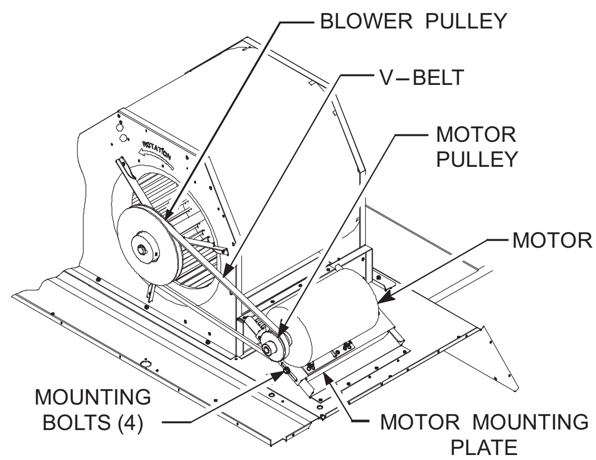


Fig. 8 — Typical Belt Drive Motor Mounting

Belt

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

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

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

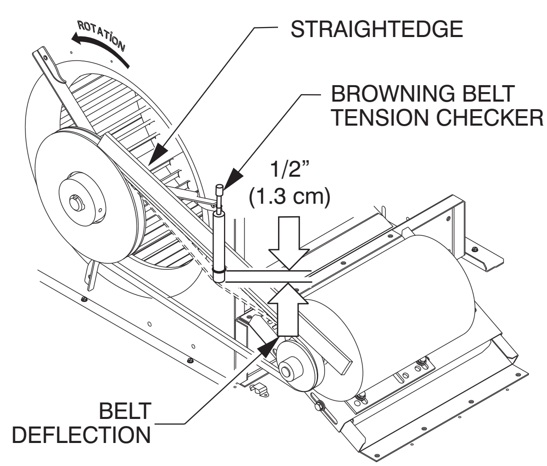


Fig. 9 — Checking Blower Motor Belt Tension

REPLACING THE BELT

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

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

1. Loosen the front and rear motor mounting plate bolts.
2. Push the motor and its mounting plate towards the blower housing as close as possible to reduce the center distance between fan shaft and motor shaft.

3. Remove the belt by gently lifting the old belt over one of the pulleys.
4. Install the new belt by gently sliding the belt over both pulleys and then sliding the motor and plate away from the fan housing until proper tension is achieved.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

5. Check the alignment of the pulleys, adjust if necessary.
6. Tighten all bolts and torque to 65 to 70 in.-lb (7.4 to 7.9 Nm).
7. Check the tension after a few hours of runtime and readjust 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. 10.)

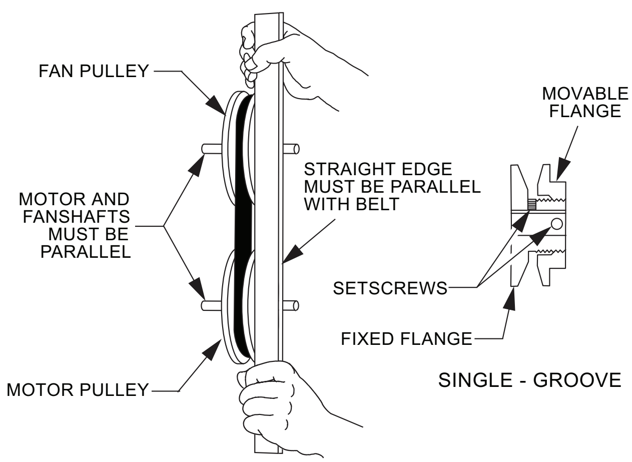


Fig. 10 — Supply-Fan Pulley Adjustment

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

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

CHANGING THE FAN SPEED:

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

ALIGNING BLOWER AND MOTOR PULLEYS:

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

BEARINGS

The fan system uses bearings featuring concentric split locking collars. A Torx T-25 socket head cap screw is used to tighten the locking collars. Tighten the locking collar by holding it tightly against the inner race of the bearing. Tighten the socket head cap screw. Torque cap screw to 65 to 70 in.-lb (7.4 to 7.9 Nm). See Fig. 11. Check the condition of the motor pulley for signs of wear. Glazing of the belt contact surfaces and erosion on these surfaces are signs of improper belt tension and/or belt slippage. Pulley replacement may be necessary.

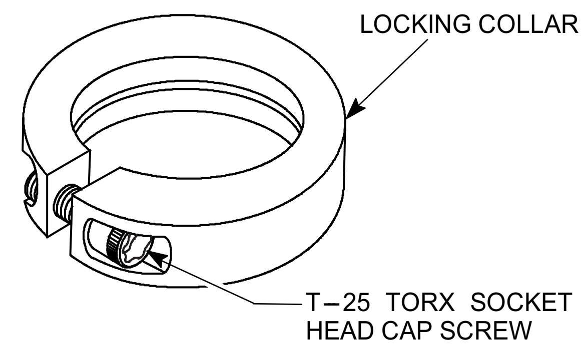


Fig. 11 — Tightening Locking Collar

STAGED AIR VOLUME CONTROL — 2 SPEED FAN WITH VARIABLE FREQUENCY DRIVE (VFD)

Staged Air Volume (SAV) Indoor Fan Speed System

The Staged Air Volume (SAV) system utilizes a fan speed control board and Variable Frequency Drive (VFD) to automatically adjust the indoor fan motor speed in sequence with the unit's ventilation, cooling, and heating operation. Per ASHRAE 90.1 2010 standard section 6.4.3.10.b, during the first stage of cooling operation the SAV system will adjust the fan motor to provide two-thirds ($^{2}/_{3}$) of the design airflow rate for the unit. When the call for the second stage of cooling is required, the SAV system will allow the design airflow rate for the unit established (100%). During the heating mode, the SAV system will allow total design airflow rate (100%) operation. During ventilation mode, the SAV system will operate the fan motor at $^{2}/_{3}$ speed.

Identifying Factory Option

This supplement only applies to units that meet the criteria detailed in Table 3. If the unit does not meet that criteria, discard this document.

Table 3 — Model-Size / VFD Option Indicator

MODEL / SIZES	POSITION IN MODEL NUMBER	VFD FIOP INDICATOR
48HC / 07-14	17	G, J

NOTE: See Appendix A for an example of Model Number Nomenclature.

Unit Installation with SAV Option

48HC ROOFTOP

Refer to the base unit installation instructions for standard required operating and service clearances.

> IMPORTANT: The Remote VFD Keypad is a field-installed option. It is not included as part of the factory-installed VFD option.

See "Variable Frequency Drive (VFD) Installation, Setup and Troubleshooting Supplement" for wiring schematics and performance charts and configuration.

See Fig. 12-14 for locations of the Variable Frequency Drive (VFD) as mounted on the various 48HC models.

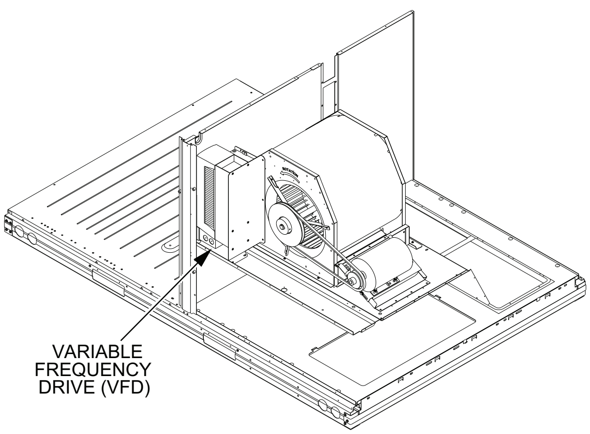


Fig. 12 — VFD Location for sizes 07-09

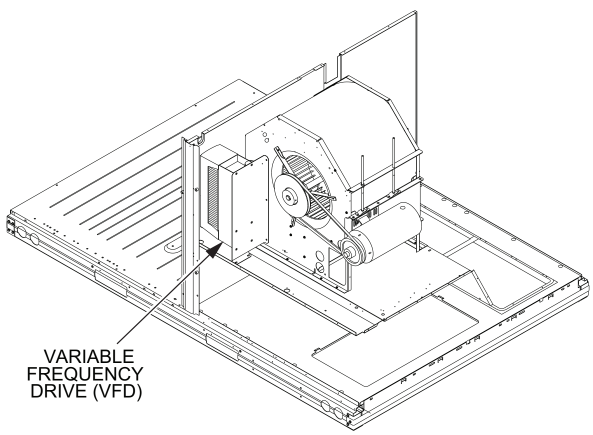


Fig. 13 — VFD Location for size 12

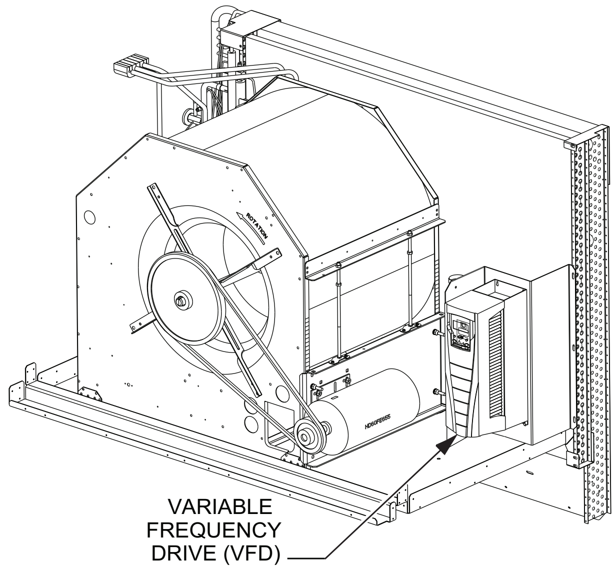


Fig. 14 — VFD Location for size 14

ADDITIONAL VARIABLE FREQUENCY DRIVE (VFD) INSTALLATION AND TROUBLESHOOTING

Additional installation, wiring, and troubleshooting information for the Variable Frequency Drive can be found in the following manual: "Variable Frequency Drive (VFD) Installation, Setup and Troubleshooting Supplement."

MOTOR

When replacing the motor, use the following steps. See Fig. 15.

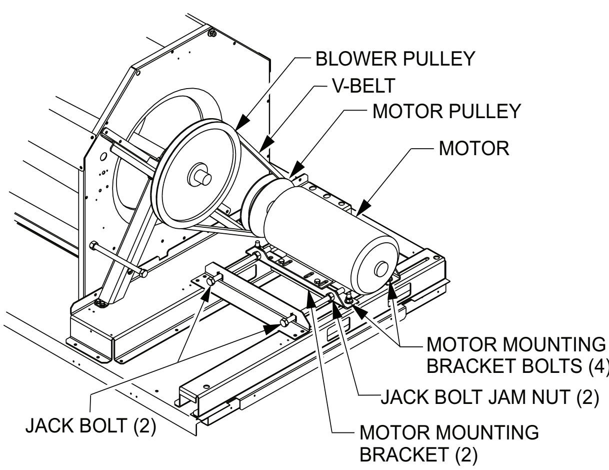


Fig. 15 — Replacing Belt-Driven Motor

Replacing the Motor

Use the following steps to replace the belt-driven motor.

1. Turn off all electrical power to the unit. Use approved lockout/tag-out procedures on all electrical power sources.
2. Remove cover on motor connection box.
3. Disconnect all electrical leads to the motor.
4. Loosen the two jack bolt jam nuts on the motor mounting bracket.
5. Turn two jack bolts counterclockwise until motor assembly moves closer to blower pulley.
6. Remove V-belt from blower pulley and motor pulley.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

7. Loosen the four mounting bracket bolts and lock washers.
8. Remove four bolts, four flat washers, four lock washers and four nuts attaching the motor mounting plate to the unit. Discard all lock washers.
9. Remove motor and motor mounting bracket from unit.
10. Remove four bolts, flat washers, lock washers and single external-tooth lock washer attaching motor to the motor mounting plate. Discard all lock washers and external-tooth lock washer.
11. Lift motor from motor mounting plate and set aside.
12. Slide motor mounting band from old motor.
13. Slide motor mounting band onto new motor and set motor onto the motor mounting plate.
14. Remove variable pitch pulley from old motor and attach it to the new motor.
15. Inspect variable pitch pulley for cracks and wear. Replace the pulley if necessary.
16. Secure the pulley to the motor by tightening the pulley setscrew to the motor shaft.
17. Insert four bolts and flat washers through mounting holes on the motor into holes on the motor mounting plate.
18. On one bolt, place a new external-tooth lock washer between the motor and motor mounting band.
19. Ensure the teeth of the external-tooth lock washer make contact with the painted base of the motor. This washer is essential for properly grounding motor.
20. Install four new lock washers and four nuts on the bolts on the bottom of the motor mounting plate.

NOTE: Do not tighten the mounting bolts at this time.

21. Set new motor and motor mounting bracket back onto the unit. See Fig. 15.
22. Install four bolts, four flat washers, four new lock washers and four nuts attaching the motor assembly to the unit.

NOTE: Do not tighten the mounting bolts at this time.

23. Install motor drive V-belt to motor pulley and blower wheel pulley. See the CAUTION above.
24. Align the motor pulley and blower wheel pulley using a straight edge. See Fig. 10.
25. Adjust the V-belt tension using adjustment tool.
26. Turn two jack bolts clockwise, moving the motor assembly away from the blower pulley, increasing the V-belt tension.
27. Tighten the four bolts securing the motor mounting brackets to the unit. Torque four bolts to 120 ± 12 in.-lb (14 ±1.4 Nm).
28. Remove cover on motor connection box.
29. Re-connect all electrical leads to the motor and replace the connection box cover.
30. Re-connect all electrical power to the unit. Remove lockout tags on all electrical power sources.
31. Start unit and allow to run for a designated period.
32. Shut off unit and make any necessary adjustments to the V-belt tension or the motor and blower wheel pulley alignment.

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

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).

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.

REMOTE VFD KEYPAD REFERENCE

See Tables 4 and 5 for SRT unit VFD parameters.

Table 4 — SRT Unit VFD Parameters — 48HC** 07-12

VFD Part Number	ABB Part Number	Description	Motor Part Number	Voltage (9905)	Nom Amps (9906)	Motor Nom Freq (9907)	Nom RPM (9908)	Nom HP (9909)	Const Speed Sel (1201)	Const Speed 1 (1202)	Const Speed 2 (1203)	Const Speed 3 (1204)	Relay Out 3 (1403)	Max Amps (2003)	Min Freq (2007)	Max Freq (2008)	Switch Freq (2606)	Start Fcn (2101)	Stop Fcn (2102)	Accel/ Decel (2201)	Accel (2202)	Decel (2203)
HK30WA352	ACH550–U0–012A–2	1.7 HP 230V	HD56FR233	230	5.8	60Hz	1725	1.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.7	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–4	1.7 HP 460V	HD56FR463	460	2.9	60Hz	1725	1.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	3.3	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA360	ACH550–U0–03A9–6	1.7 HP 575V	HD56FR579	575	3.1	60Hz	1725	1.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	3.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA352	ACH550–U0–012A–2	2.4 HP 230V	HD56FE653	230	7.9	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	9.1	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–4	2.4 HP 460V	HD56FE653	460	3.6	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.1	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA360	ACH550–U0–03A9–6	2.4 HP 575V	HD56FE577	575	3.8	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.4	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA352	ACH550–U0–012A–2	2.9 HP 230V	HD58FE654	230	9.2	60Hz	1725	2.9	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	10.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–4	2.9 HP 460V	HD58FE654	460	4.2	60Hz	1725	2.9	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.8	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA353	ACH550–U0–017A–2	3.7 HP 230V	HD60FE656	230	11.7	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	13.5	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA357	ACH550–U0–08A8–4	3.7 HP 460V	HD60FE656	460	5.4	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.2	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA361	ACH550–U0–06A1–6	3.7 HP 575V	HD58FE577	575	4.9	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	5.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA354	ACH550–U0–024A–2	5.3 HP 230V	HD60FK658	230	13.6	60Hz	1740	5.3	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	15.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA358	ACH550–U0–012A–4	5.3 HP 460V	HD60FK658	460	6.4	60Hz	1740	5.3	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	7.4	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA362	ACH550–U0–09A0–6	5.3 HP 575V	HD60FE576	575	6.0	60Hz	1725	5.3	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.9	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec

Table 5 — SRT Unit VFD Parameters — 48HC** 14

VFD Part Number	ABB Part Number	Description	Motor Part Number	Voltage (9905)	Nom Amps (9906)	Motor Nom Freq (9907)	Nom RPM (9908)	Nom HP (9909)	Const Speed Sel (1201)	Const Speed 1 (1202)	Const Speed 2 (1203)	Const Speed 3 (1204)	Relay Out 3 (1403)	Max Amps (2003)	Min Freq (2007)	Max Freq (2008)	Switch Freq (2606)	Start Fcn (2101)	Stop Fcn (2102)	Accel/ Decel (2201)	Accel (2202)	Decel (2203)
HK30WA352	ACH550–U0–012A–2	2.4 HP 230V	HD56FE653	230	7.9	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	9.1	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–2	2.4 HP 460V	HD56FE653	460	3.6	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.1	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA360	ACH550–U0–03A9–6	2.4 HP 575V	HD56FE577	575	3.8	60Hz	1725	2.4	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.4	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA352	ACH550–U0–012A–2	2.9 HP 230V	HD58FE654	230	9.2	60Hz	1725	2.9	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	10.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–4	2.9 HP 460V	HD58FE654	460	4.2	60Hz	1725	2.9	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.8	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA353	ACH550–U0–017A–2	3.7 HP 230V	HD60FE656	230	11.7	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	13.5	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA357	ACH550–U0–08A8–4	3.7 HP 460V	HD60FE656	460	5.4	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.2	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA361	ACH550–U0–06A1–6	3.7 HP 575V	HD58FE577	575	4.9	60Hz	1725	3.7	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	5.6	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA354	ACH550–U0–024A–2	5.0 HP 230V	HD60FL657	230	17.1	60Hz	1760	5	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	19.7	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA358	ACH550–U0–012A–4	5.0 HP 460V	HD60FL657	460	8.6	60Hz	1760	5	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	9.9	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec
HK30WA362	ACH550–U0–09A0–6	5.0 HP 575V	HD60FK577	575	7.6	60Hz	1745	5	DI2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	8.7	0Hz	60Hz	4kHz	Auto	Ramp	NotSel	30 sec	30 sec

COOLING

> **⚠ WARNING**
>
> UNIT OPERATION AND SAFETY HAZARD
>
> Failure to follow this warning could cause 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 cause 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 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, hypoallergenic, non-bacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged 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.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 16. To hold top panel open, place coil corner post between top panel and center post. See Fig. 17.

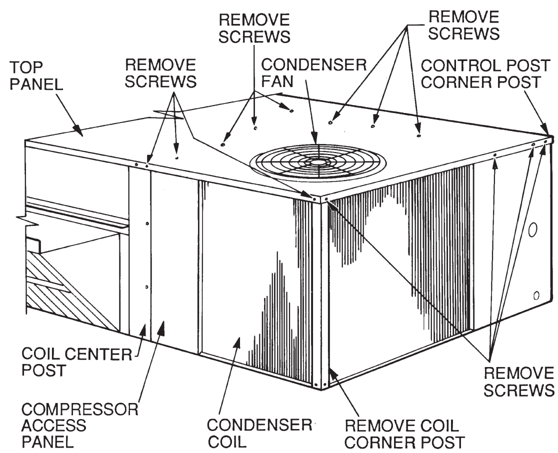


Fig. 16 — Cleaning Condenser Coil

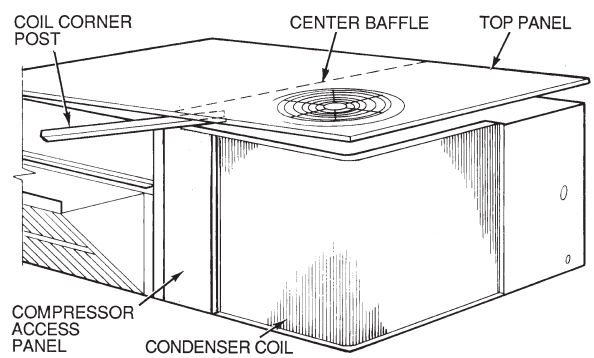


Fig. 17 — Propping Up Top Panel

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. 18.

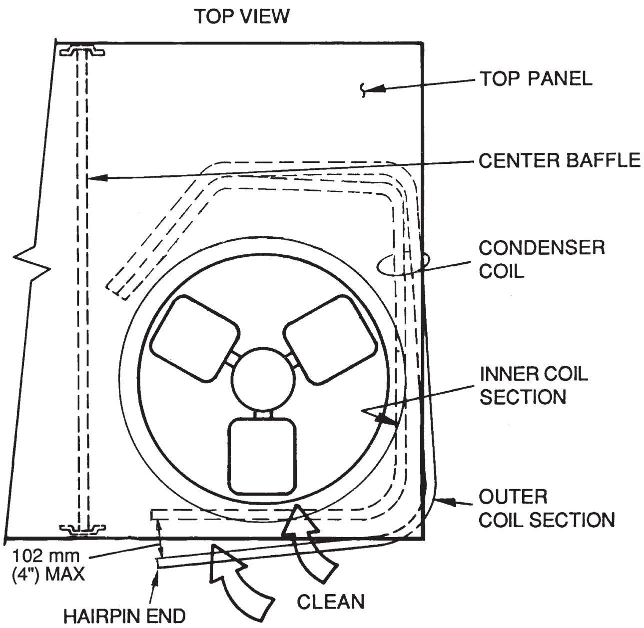


Fig. 18 — Separating Coil Sections

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 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.

⚠ 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 balanced coil cleaner.

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 all 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. Interior and exterior finned areas must be thoroughly cleaned. Finned surfaces should remain wet with cleaning solution for 10 minutes. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10 minute saturation is achieved.
8. 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, backflush 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.

THERMOSTATIC EXPANSION VALVE (TXV)

All 48HCs have a factory-installed nonadjustable thermostatic expansion valve (TXV). The TXV will be a bi-flow, bleed port expansion valve with an external equalizer. TXVs are specifically designed to operate with Puron® or R-22 refrigerant. Use only factory authorized TXVs. Do not interchange Puron and R-22 TXVs.

TXV Operation

The TXV is a metering device that is used in air conditioning and heat pump systems to adjust to the changing load conditions by maintaining a preset superheat temperature at the outlet of the evaporator coil.

The volume of refrigerant metered through the valve seat is dependent upon the following:

1. Superheat temperature is sensed by cap tube sensing bulb on suction tube at outlet of evaporator coil. This temperature is converted into pressure by refrigerant in the bulb pushing

downward on the diaphragm, which opens the valve using the push rods.

2. The suction pressure at the outlet of the evaporator coil is transferred through the external equalizer tube to the underside of the diaphragm.
3. The pin is spring loaded, which exerts pressure on the underside of the diaphragm. Therefore, the bulb pressure works against the spring pressure and evaporator suction pressure to open the valve. If the load increases, the temperature increases at the bulb, which increases the pressure on the top side of the diaphragm. This opens the valve and increases the flow of refrigerant. The increased refrigerant flow causes the leaving evaporator temperature to decrease. This lowers the pressure on the diaphragm and closes the pin. The refrigerant flow is effectively stabilized to the load demand with negligible change in superheat.

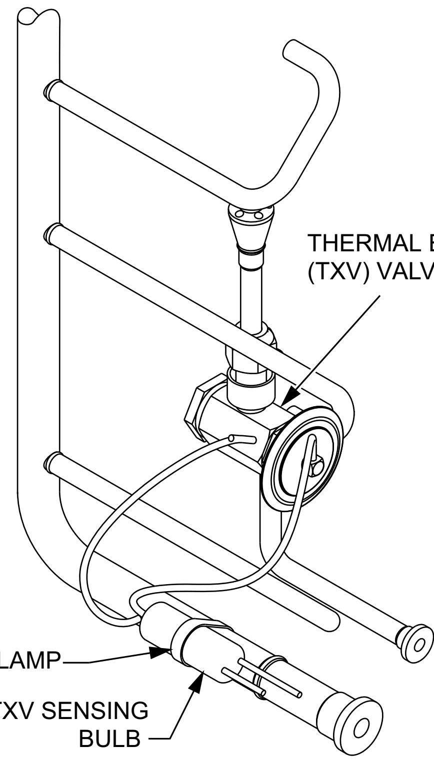
Replacing TXV

1. Recover refrigerant.
2. Remove TXV support clamp using a 5/16-in. nut driver.
3. Remove TXV using a wrench and an additional wrench on connections to prevent damage to tubing.
4. Remove equalizer tube from suction line of coil. Use file or tubing cutter to cut brazed equalizer line approximately 2 inches above suction tube.
5. Remove bulb from vapor tube inside cabinet.
6. Install the new TXV using a wrench and an additional wrench on connections to prevent damage to tubing while attaching TXV to distributor.
7. Attach the equalizer tube to the suction line. If the coil has a mechanical connection, then use a wrench and an additional wrench on connections to prevent damage. If the coil has a brazed connection, use a file or a tubing cutter to remove the mechanical flare nut from the equalizer line. Then use a new coupling to braze the equalizer line to the stub (previous equalizer line) in suction line.
8. Attach TXV bulb in the same location where the original (in the sensing bulb indent) was when it was removed, using the supplied bulb clamps. See Fig. 19.
9. Route equalizer tube through suction connection opening (large hole) in fitting panel and install fitting panel in place.
10. Sweat the inlet of TXV marked "IN" to the liquid line. Avoid excessive heat which could damage the TXV valve. Use quenching cloth when applying heat anywhere on TXV.

Refrigerant System Pressure Access Ports

There are two access ports in the system: on the suction tube near the compressor and 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. 20. 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 (10.85 ± 1.1 Nm) of torque; do not over-tighten.



SENSING BULB INSULATION REMOVED FOR CLARITY

Fig. 19 — TXV Valve and Sensing Bulb Location

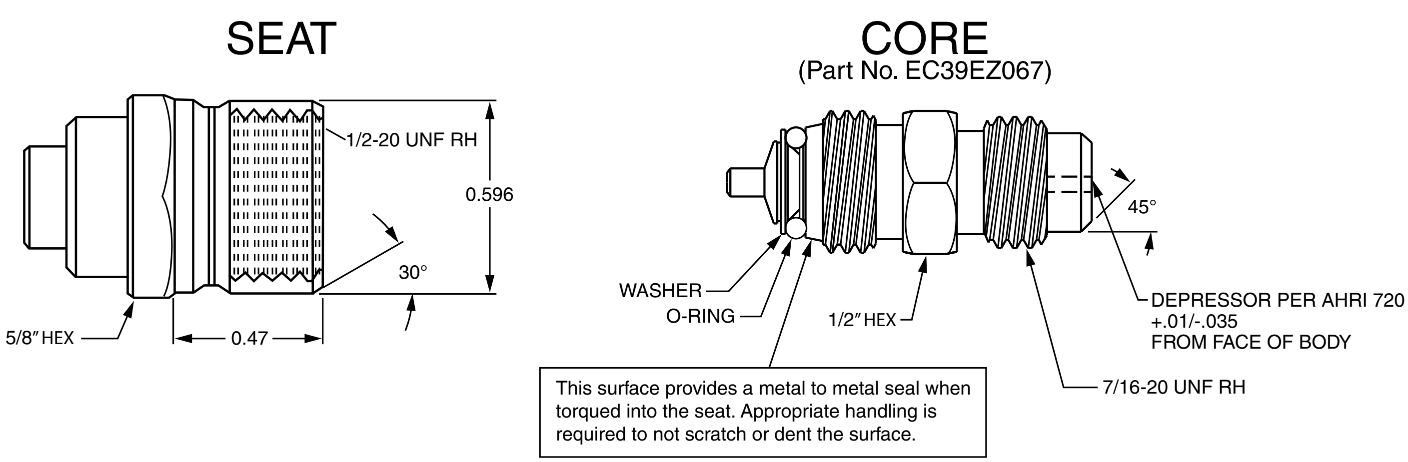


Fig. 20 — CoreMax[1] Access Port Assembly

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. 21-29, 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 sub-cooling for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the liquid line. Mount the temperature sensing device on the liquid 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.

48HC SIZE DESIGNATION	NOMINAL TONS REFERENCE
04	3
05	4
06	5
07	6
08	7.5
09	8.5
12	10
14	12.5

EXAMPLE:

Model 48HC*A04

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

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

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

USING COOLING CHARGING CHARTS

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

COOLING CHARGING CHARTS

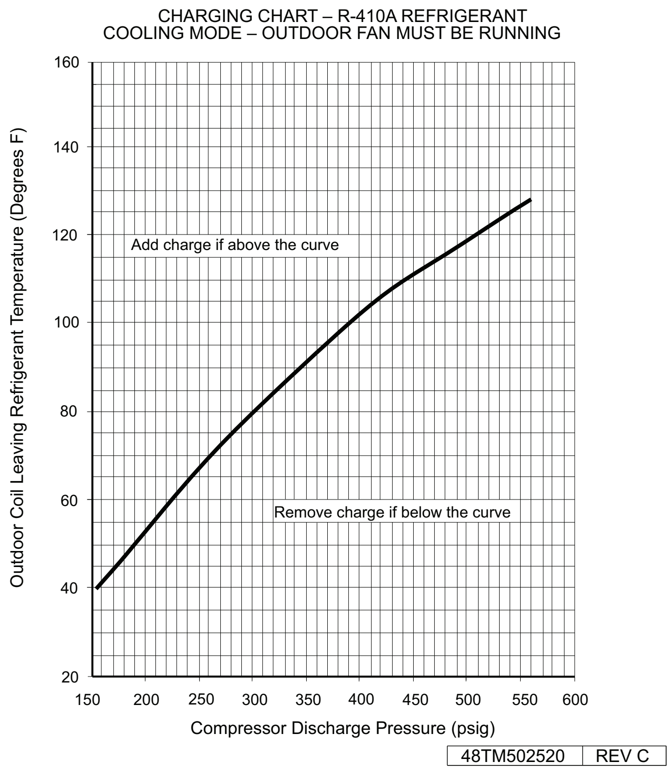


Fig. 21 — Cooling Charging Chart - 3 Ton

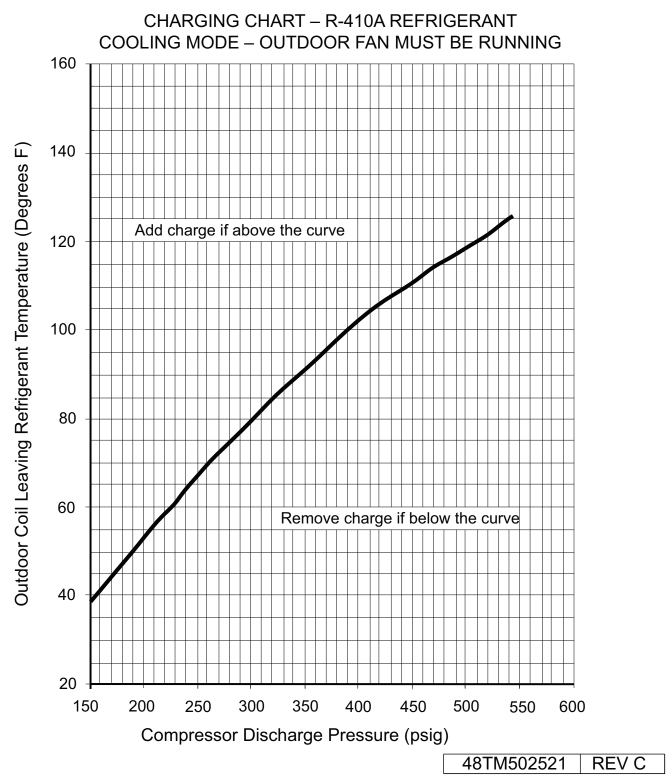


Fig. 22 — Cooling Charging Chart - 4 Ton

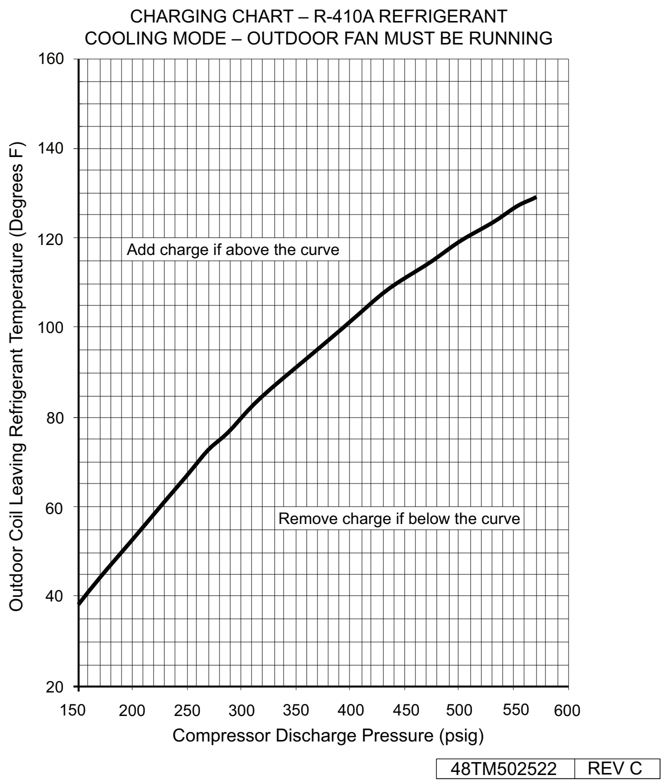


Fig. 23 — Cooling Charging Chart - 5 Ton

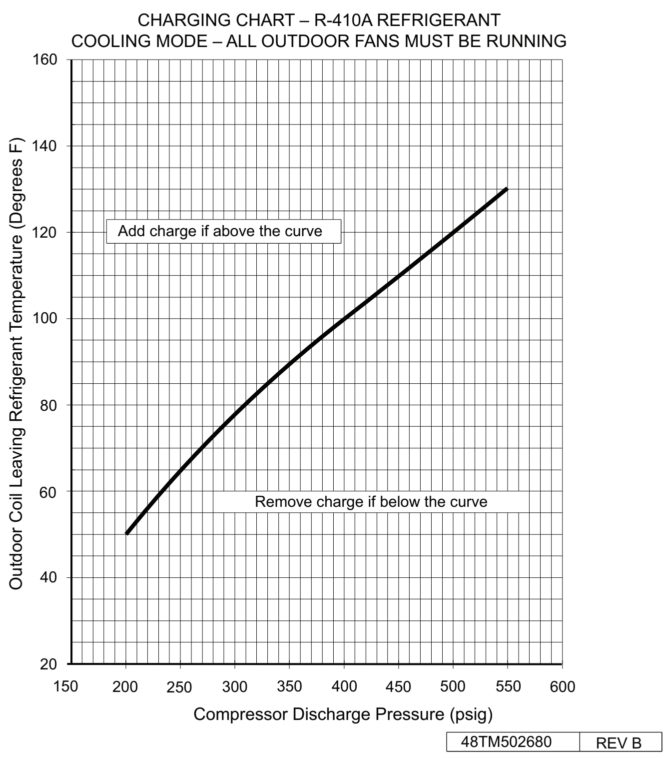


Fig. 24 — Cooling Charging Chart - 6 Ton

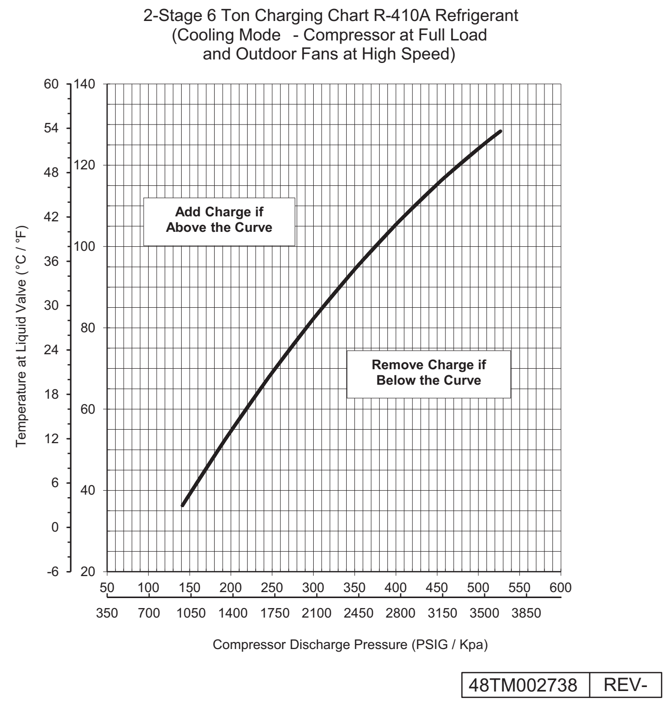


Fig. 25 — Cooling Charging Chart - 2 Stage 6 Ton

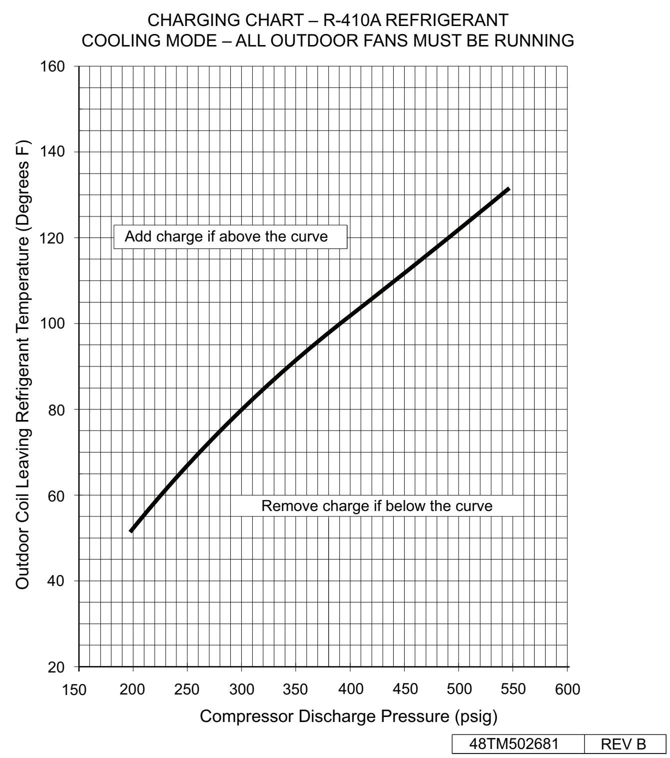


Fig. 26 — Cooling Charging Chart - 7.5 Ton

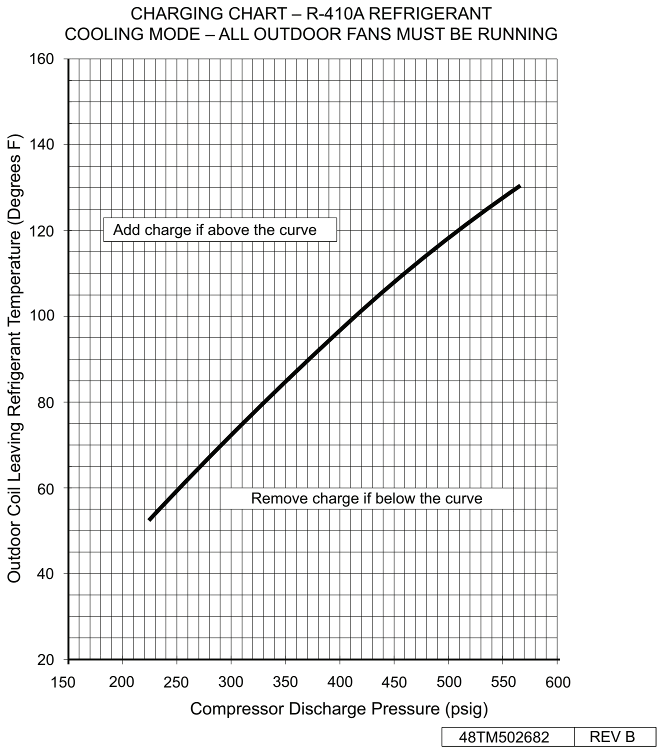


Fig. 27 — Cooling Charging Chart - 8.5 Ton

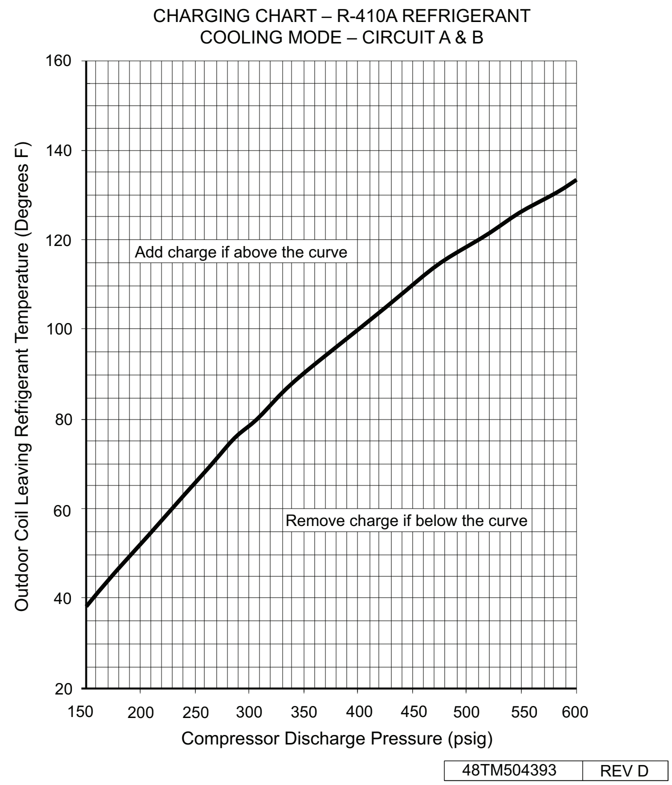


Fig. 28 — Cooling Charging Chart - 10 Ton

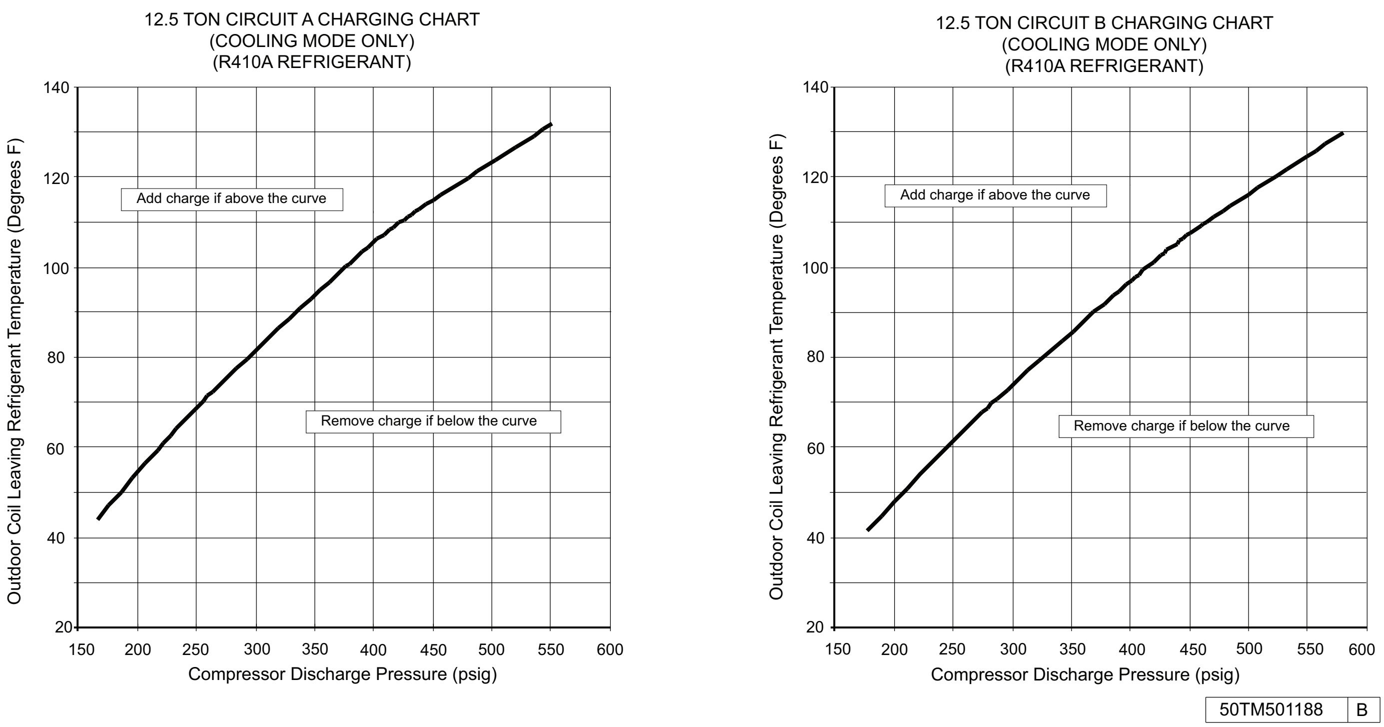


Fig. 29 — Cooling Charging Chart - 12.5 Ton - Circuit A and B

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.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

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

Replacing Compressor

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

⚠ CAUTION

INSTALLATION SITE DAMAGE

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

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

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

Compressor Rotation

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

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

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

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

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine if the 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, the evaporator fan is probably also rotating in the wrong direction.

4. Turn off power to the unit.
5. Reverse any two of the three unit power leads.
6. Reapply electrical power to the compressor. The suction pressure should drop and the discharge pressure should rise, which is normal for scroll compressors on start-up.
7. Replace compressor if suction/discharge pressures are not within specifications for the specific compressor.

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

Filter Drier

Replace whenever refrigerant system is exposed to atmosphere. Only use factory-specified liquid-line filter driers with working pressures no lower 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

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. 30.
5. Tighten setscrews.
6. Replace condenser-fan assembly.

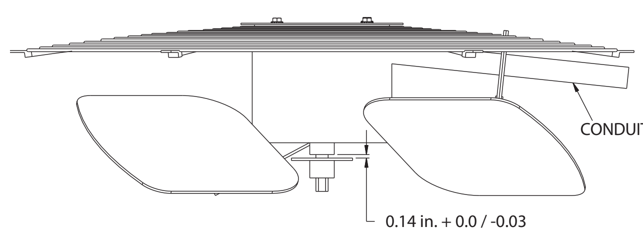


Fig. 30 — Condenser Fan Adjustment

See Fig. 31 for a typical piping schematic.

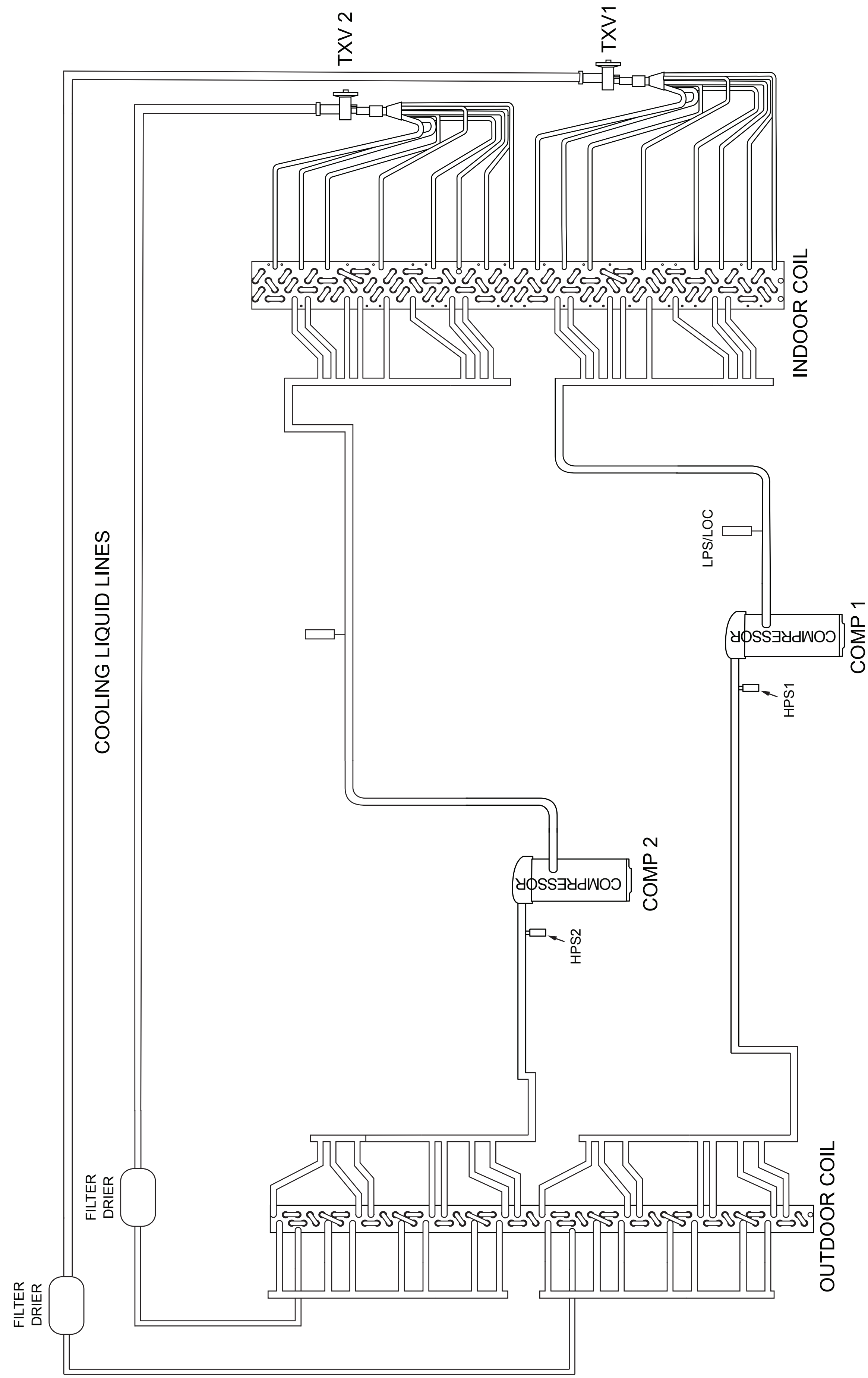


Fig. 31 — Typical Piping Schematic (Dual Circuit Unit Shown)

CONVENIENCE OUTLETS

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

CONVENIENCE OUTLETS

Two types of convenience outlets are offered on 48HC models: non-powered and unit-powered. Both types provide a 125 vac Ground-Fault Circuit-Interrupt (GFCI) duplex receptacle rated at 15A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 32.

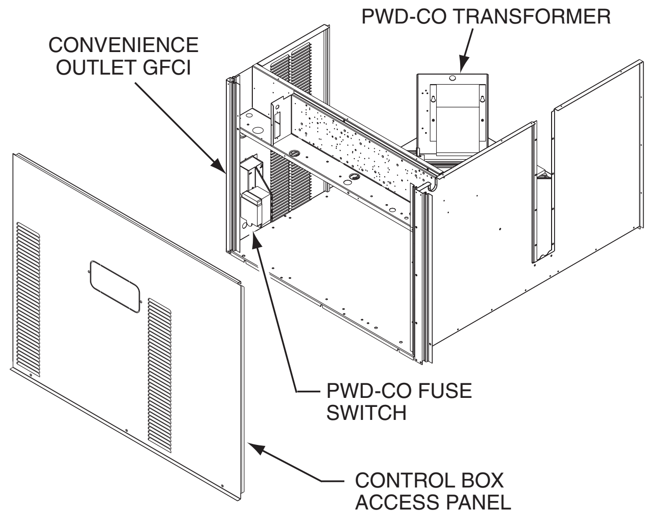


Fig. 32 — Convenience Outlet Location

INSTALLING WEATHERPROOF COVER

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

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

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

1. Remove the blank cover plate at the convenience outlet; discard the blank cover.
2. Loosen the two screws at the GFCI duplex outlet, until approximately $^1/_2$-in. (13 mm) under screw heads are exposed.
3. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug (do not over-tighten).
4. Mount the weatherproof cover to the backing plate as shown in Fig. 33.
5. Remove two slot fillers in the bottom of the cover to permit service tool cords to exit the cover.
6. Check cover installation for full closing and latching.

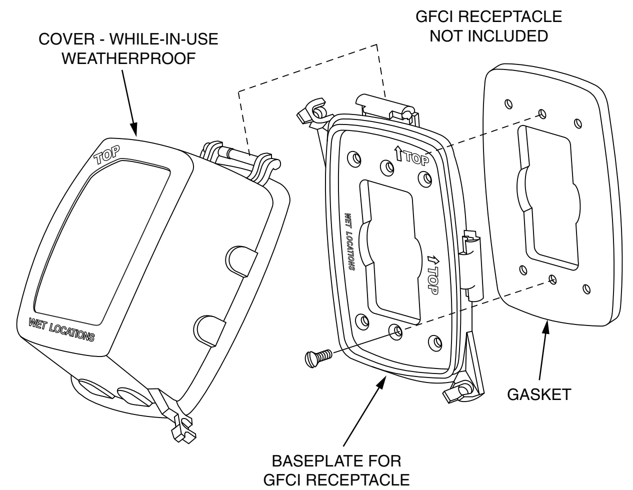


Fig. 33 — Weatherproof Cover Installation

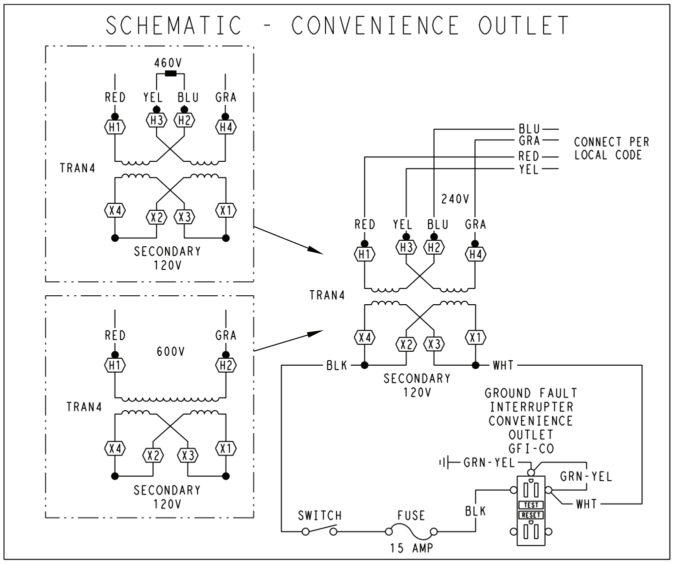
NON-POWERED TYPE

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 step-down 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. 32.

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 Heating, Air Conditioning and Refrigeration (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. 34.



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. 34 — 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 15A loading for continuous duty loads (such as electric heaters for overnight use). Observe a 50% limit on circuit loading above 8A (i.e., limit loads exceeding 8A 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 Bussmann Fusetron[1] 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.

1. Bussmann and Fusetron are registered trademarks of Cooper Technologies Company.

SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 48HC 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. 35) 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).

Smoke Detector Sensor

The smoke detector sensor (see Fig. 36) includes a plastic housing, a printed circuit board, a clear plastic cover, a sampling tube inlet and an exhaust tube. The sampling tube (when used) and exhaust tube are attached during installation. The sampling tube varies in length depending on the size of the rooftop unit. The clear plastic cover permits visual inspections without having to disassemble the sensor. The cover attaches to the sensor housing using four captive screws and forms an airtight chamber around the sensing electronics. Each sensor includes a harness with an RJ45 terminal for connecting to the controller. Each sensor has four LEDs (for Power, Trouble, Alarm and Dirty) and a manual test/reset button (on the left side of the housing).

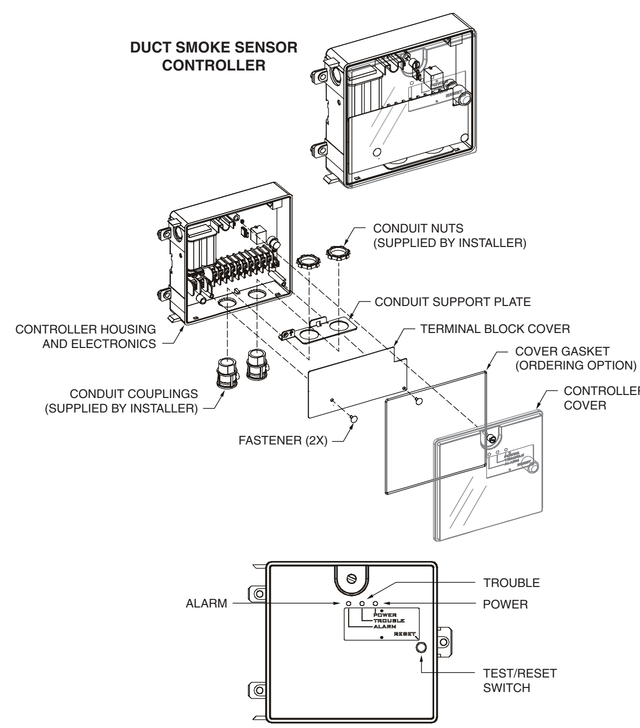


Fig. 35 — Controller Assembly

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.

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.

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

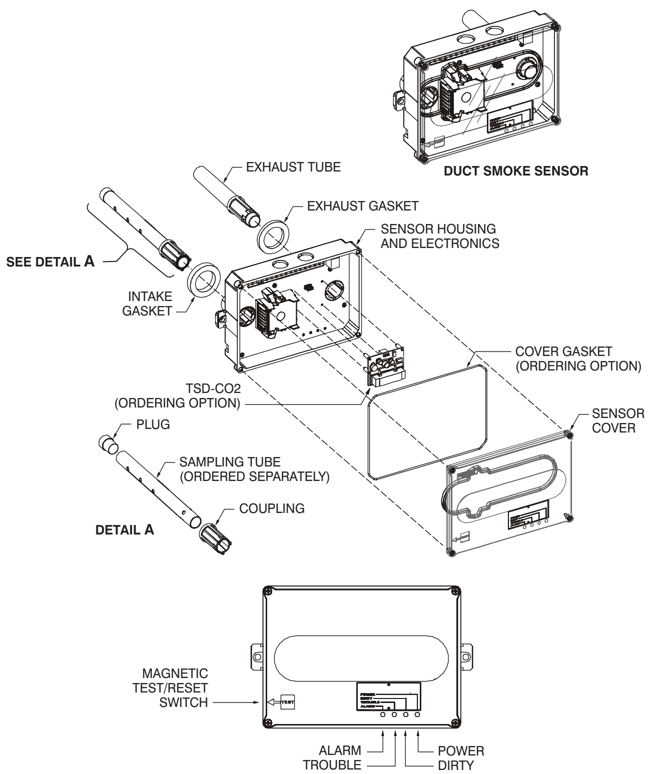


Fig. 36 — Smoke Detector Sensor

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. 37). 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.

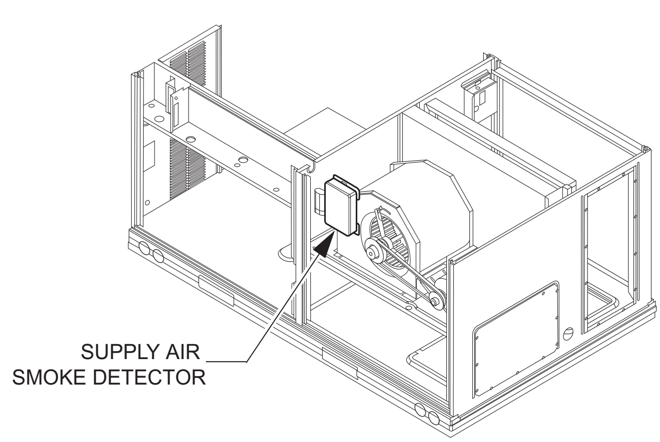
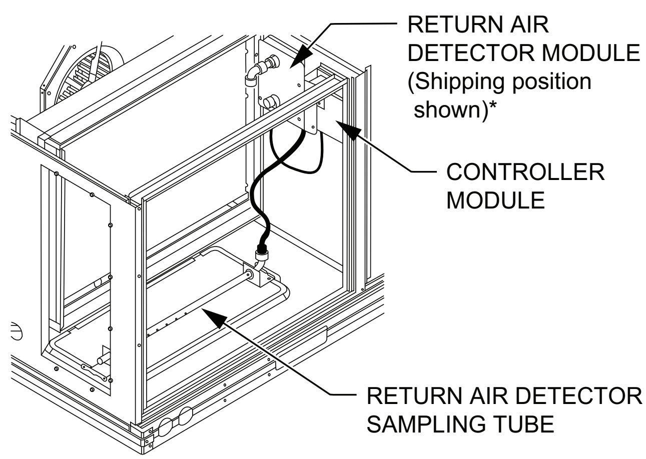


Fig. 37 — Typical Supply Air Smoke Detector Sensor Location

RETURN AIR SMOKE DETECTOR SENSOR WITHOUT ECONOMIZER

The sampling tube is located across the return air opening on the unit basepan (see Fig. 38). The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected through 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 in "Completing Installation of Return Air Smoke Detector" section.)



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

Fig. 38 — Typical Return Air Smoke Detector Location

RETURN AIR SMOKE DETECTOR SENSOR 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. 39). The holes in the sampling tube face downward, into the return air stream. The sampling tube is connected using tubing to the return air sensor mounted on a bracket high on the partition between return filter and controller location. The sensor is shipped in a flat-mounting location. Installation requires the sensor be relocated to its operating location and the tubing to the sampling tube be connected. See installation steps in "Completing Installation of Return Air Smoke Detector" section.

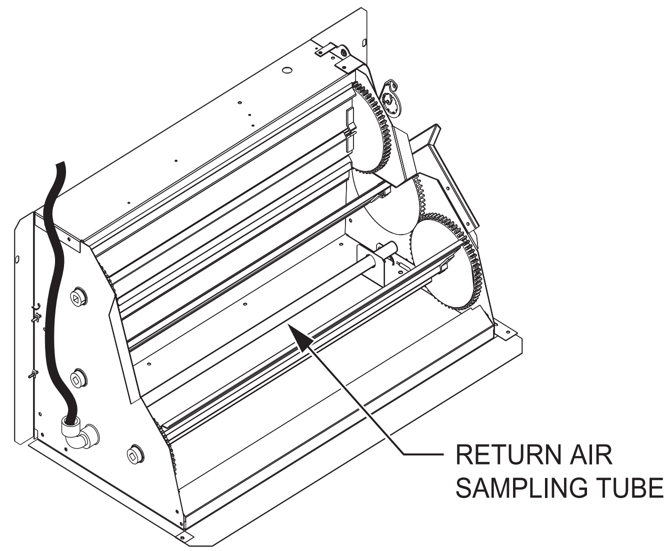


Fig. 39 — Return Air Sampling Tube Location (View reoriented to show opposite side for clarity)

Completing Installation of Return Air Smoke Detector

Use the following steps to complete the installation of the return air smoke detector.

1. Unscrew the two screws holding the return air sensor detector plate (see Fig. 40). Save the screws.
2. Remove the return air smoke sensor module 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. 41).
4. Screw the sensor and detector plate into its operating position using screws from Step 1. Ensure the sampling tube connection is on the bottom and the exhaust tube is on the top.
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 connecting the flexible tubing to the sampling tube is the same.

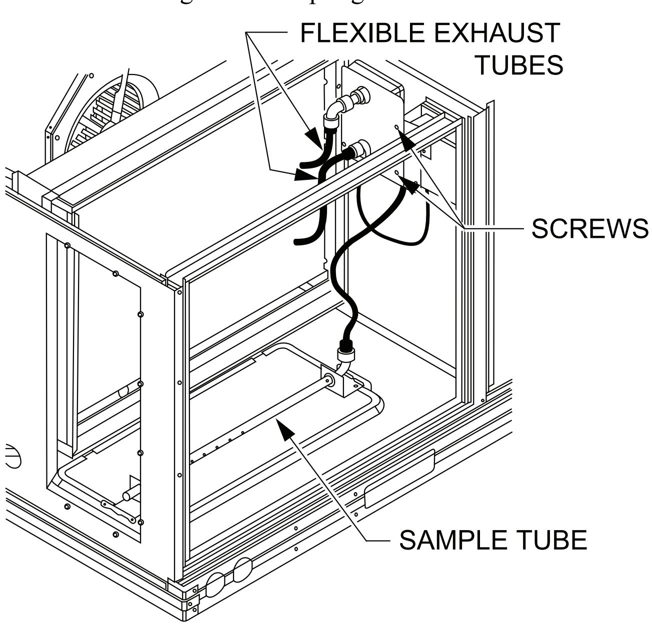


Fig. 40 — Return Air Smoke Detector Module Shipping Position

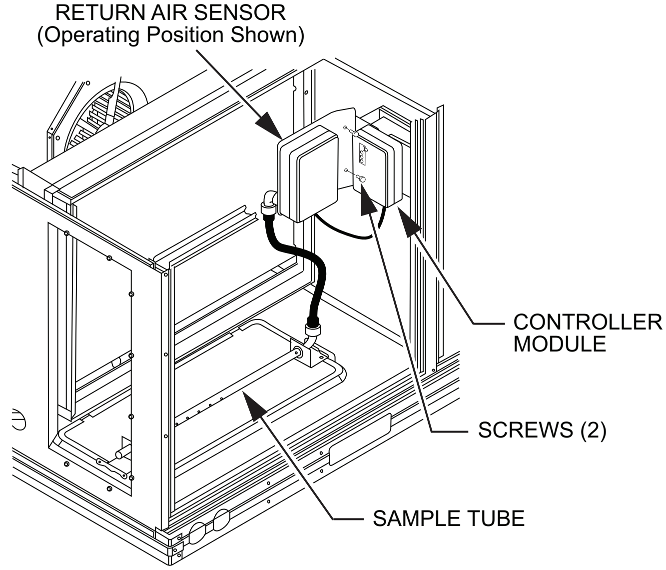


Fig. 41 — Return Air Sensor Operating Position

FIOP Smoke Detector Wiring and Response

ALL UNITS

FIOP smoke detector is configured to automatically shut down all unit operations when a smoke condition is detected. See Fig. 42 for 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 using the ORN lead is removed at the Smoke Detector input on CTB; all unit operations cease immediately.

PREMIERLINK™ AND RTU-OPEN CONTROLS

Unit operating functions (fan, cooling and heating) are terminated as described in this section.

HIGHLIGHT D

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

HIGHLIGHT E

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

PREMIERLINK

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

USING REMOTE LOGIC

Five conductors are provided for field use (see Highlight F in Fig. 42) for additional annunciation functions.

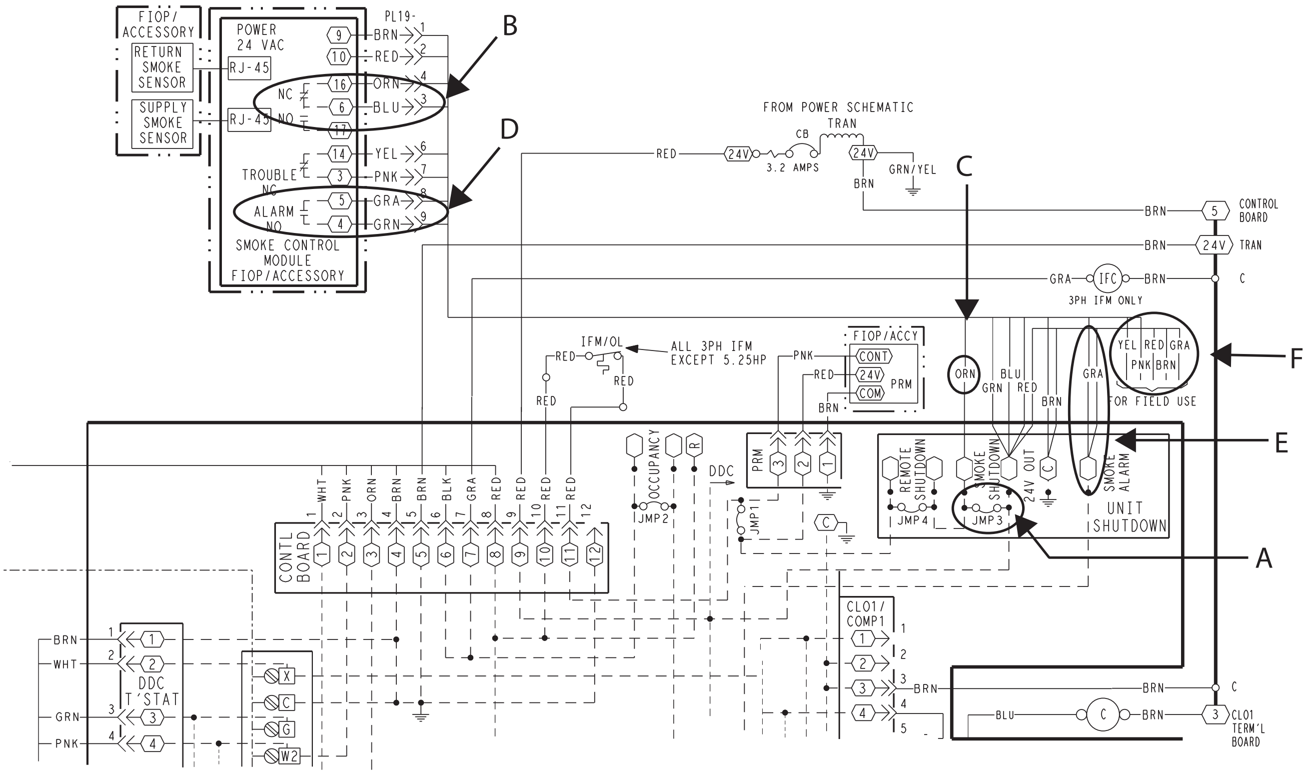


Fig. 42 — Typical Smoke Detector System Wiring

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. 42.

SENSOR AND CONTROLLER TESTS

Sensor Alarm Test

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

> IMPORTANT: OPERATIONAL TEST ALERT
>
> Failure to follow this ALERT can result in an unnecessary evacuation of the facility.
>
> This test places the duct detector into the alarm state. Unless 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.

> IMPORTANT: OPERATIONAL TEST ALERT
>
> Failure to follow this ALERT can result in an unnecessary evacuation of the facility.
>
> This test places the duct detector into the alarm state. Unless part of the test, disconnect all auxiliary equipment from the controller before performing the test. If the duct detector is connected to a fire alarm system, notify the proper authorities before performing the test.

CONTROLLER ALARM TEST PROCEDURE

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

Dirty Controller Test

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

> IMPORTANT: OPERATIONAL TEST ALERT
>
> Failure to follow this ALERT can result in an unnecessary evacuation of the facility.
>
> Pressing the controller's test/reset switch for longer than seven seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

DIRTY CONTROLLER TEST PROCEDURE

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

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. You must use a field provided SD-MAG test magnet to initiate a sensor dirty test. The sensor's Dirty LED indicates the results of the dirty test as shown in Table 6.

IMPORTANT: OPERATIONAL TEST ALERT

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

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

Table 6 — 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.

IMPORTANT: OPERATIONAL TEST ALERT

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

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

Changing the Dirt 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.

IMPORTANT: OPERATIONAL TEST ALERT

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

This test places the duct detector into the alarm state. Unless 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. 43 and configured to operate the controller's supervision relay. For more information, see "Changing sensor dirty test operation."

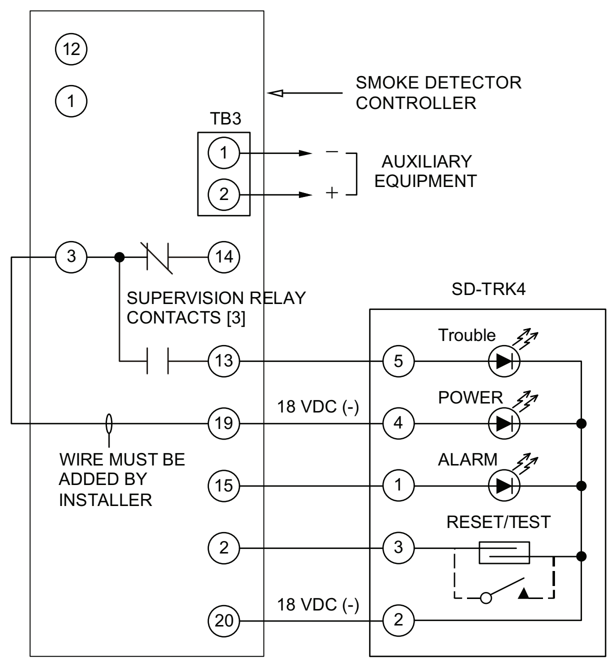


Fig. 43 — Remote Test/Reset Station Connections

IMPORTANT: OPERATIONAL TEST ALERT

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

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

> IMPORTANT: OPERATIONAL TEST ALERT
>
> Failure to follow this ALERT can result in an unnecessary evacuation of the facility.
>
> Holding the test magnet against the sensor housing for more than seven seconds will put the duct detector into the alarm state and activate all automatic alarm responses.

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.

Detector Cleaning

CLEANING THE SMOKE DETECTOR

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

> IMPORTANT: OPERATIONAL TEST ALERT
>
> Failure to follow this ALERT can result in an unnecessary evacuation of the facility.
>
> If the smoke detector is connected to a fire alarm system, first notify the proper authorities that the detector is undergoing maintenance, then disable the relevant circuit to avoid generating a false alarm.

1. Disconnect power from the duct detector, then remove the sensor's cover (see Fig. 44).
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.
4. Lift the housing away from the printed circuit board.
5. Gently remove dirt and debris from around the optic plate and inside the optic housing.
6. Replace the optic housing and sensor cover.
7. Connect power to the duct detector, then perform a sensor alarm test.

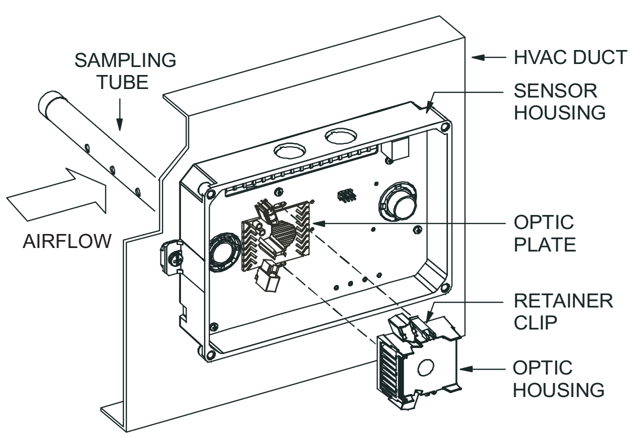


Fig. 44 — Sensor Cleaning Diagram

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 8.) 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 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. 45).
- If a sensor detects trouble, the sensor's Trouble LED the controller's Trouble LED turns on.
- If 100% dirty, the sensor's Dirty LED turns on and the controller's Trouble LED flashes continuously.
- If there is a wiring fault between a sensor and the controller, the controller's Trouble LED turns on, but not the sensor's LED.

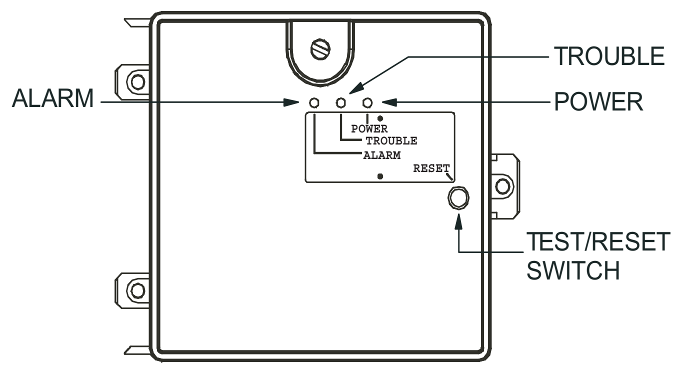


Fig. 45 — Controller Assembly

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

See Table 7.

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. 43. Repair or replace loose or missing wiring.
2. Configure the sensor dirty test to activate the controller's supervision relay. See "Changing sensor dirty test operation."

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 line-break 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 over-temperature protection. Protection devices reset automatically.

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

Table 7 — 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.

CONDENSER FAN MOTOR PROTECTION

The condenser fan motor is internally protected against over-temperature.

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.

GAS HEATING SYSTEM

General

The heat exchanger system consists of a gas valve feeding multiple in-shot burners off a manifold. The burners fire into matching primary tubes. The primary tubes discharge into combustion plenum where gas flow converges into secondary tubes. The secondary tubes exit into the induced draft fan wheel inlet. The induced fan wheel discharges into a flue passage and flue gases exit out a flue hood on the side of the unit. The induced draft fan motor includes a flue gas pressure switch circuit that confirms adequate wheel speed through the Integrated Gas Control (IGC) board. Safety switches include a Rollout Switch (at the top of the burner compartment) and a limit switch (mounted through the fan deck, over the tubes). (See Fig. 46 and 47.)

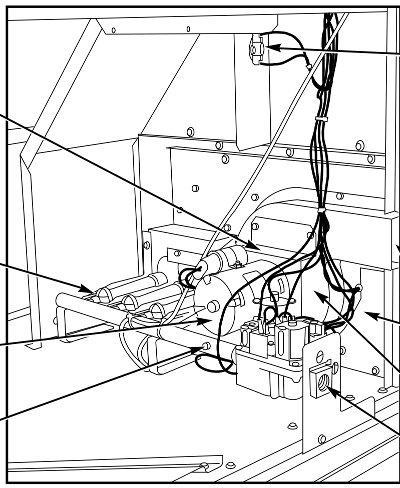


Fig. 46 — Burner Section Details

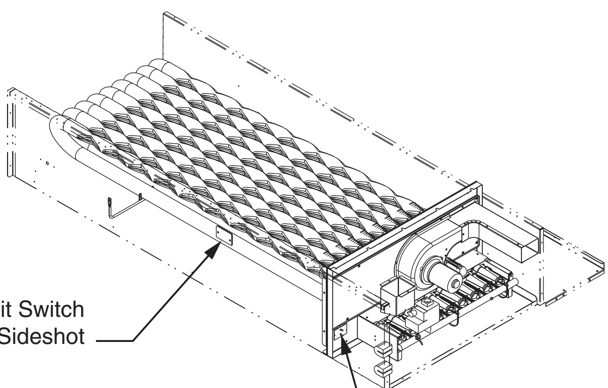


Fig. 47 — Limit Switch Location

Fuel Types and Pressures

NATURAL GAS

The 48HC unit is factory-equipped for use with natural gas (NG) fuel at elevation under 2000 ft (610 m). See section "Orifice Replacement" for information in modifying this unit for installation at elevations above 2000 ft (610 m).

Gas line pressure entering the unit's main gas valve must be within specified ranges (see Table 8). Adjust unit gas regulator valve as required or consult local gas utility.

Table 8 — Natural Gas Supply Line Pressure Ranges

UNIT MODEL	UNIT SIZE	MIN	MAX
48HC	All	4.0 in. wg (996 Pa)	13.0 in. wg (3240 Pa)

Manifold pressure is factory-adjusted for NG fuel use. Adjust as required to obtain best flame characteristic. See Table 9.

Table 9 — Natural Gas Manifold Pressure Ranges

UNIT MODEL	UNIT SIZE	HIGH FIRE	LOW FIRE	RANGE
48HC	All	3.5 in. wg (872 Pa)	1.7 in. wg (423 Pa)†	2.0-5.0 in. wg (Hi) (498-1245 Pa)
48HC Low NOx	All	3.5 in. wg (872 Pa)	NA	2.0-5.0 in. wg (Hi) (498-1245 Pa)

NA: Not Available
†3 Phase models only

LIQUID PROPANE

See Tables 10 and 11.

Accessory packages are available for field-installation that will convert the 48HC unit (except low NOx model) to operate with liquid propane (LP) fuels. These kits include new orifice spuds, new springs for gas valves and a supply line low pressure switch. See section on Orifice Replacement for details on orifice size selections.

Low NOx models include specially-sized orifices and use of different flue flow limits and tube baffles. Because of these extra features, conversion of these models to LP is not recommended.

Fuel line pressure entering unit gas valve must remain within specified range.

Table 10 — Liquid Propane Supply Line Pressure Ranges

UNIT MODEL	UNIT SIZE	MIN	MAX
48HC	All	11.0 in. wg (2740 Pa)	13.0 in. wg (3240 Pa)
48HC Low NOx	All	NA	NA

Manifold pressure for LP fuel use must be adjusted to specified range. Follow instructions in the accessory kit to make initial readjustment.

Table 11 — Liquid Propane Manifold Pressure Ranges

UNIT MODEL	UNIT SIZE	MIN	MAX
48HC	All	11.0 in. wg (2740 Pa)	13.0 in. wg (3240 Pa)
48HC Low NOx	All	NA	NA

NA: Not Available

SUPPLY PRESSURE SWITCH

The LP conversion kit includes a supply low pressure switch. The switch contacts (from terminal C to terminal NO) will open the gas valve power whenever the supply line pressure drops below the set point. See Fig. 48 and 49. If the low pressure remains open for 15 minutes during a call for heat, the IGC circuit will initiate a Ignition Fault (5 flashes) lockout. Reset of the low pressure switch is automatic on rise in supply line pressure. Reset of the IGC requires a recycle of unit power after the low pressure switch has closed.

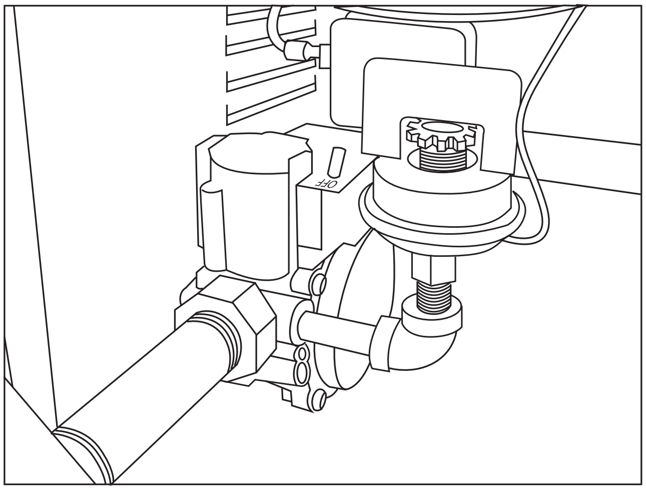


Fig. 48 — LP Low Pressure Switch (Installed)

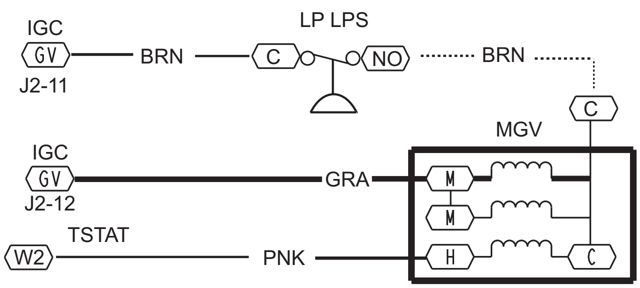


Fig. 49 — LP Supply Line Low Pressure Switch Wiring

This switch also prevents operation when the propane tank level is low, which can result in gas with a high concentration of impurities, additives, and residues that have settled to the bottom of the tank. Operation under these conditions can cause harm to the heat exchanger system. Contact your fuel supplier if this condition is suspected.

Flue Gas Passageways

To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section. See Fig. 50.
2. Remove the flue cover to inspect the heat exchanger.
3. Clean all surfaces as required using a wire brush.

Combustion-Air Blower

Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To access burner section, slide the sliding burner partition out of the unit (see Fig. 51).

To inspect blower wheel, shine a flashlight into draft hood opening. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.
2. Remove the seven screws attaching the induced-draft motor housing to the vestibule plate. (See Fig. 46.)
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. Remove the blower from the motor shaft by removing two setscrews.
5. Removing motor: remove the four screws holding the motor to the mounting plate. Remove the motor cooling fan by removing one setscrew. Remove nuts that hold the motor to the mounting plate.
6. Reverse the procedure outlined above to reinstall the motor.

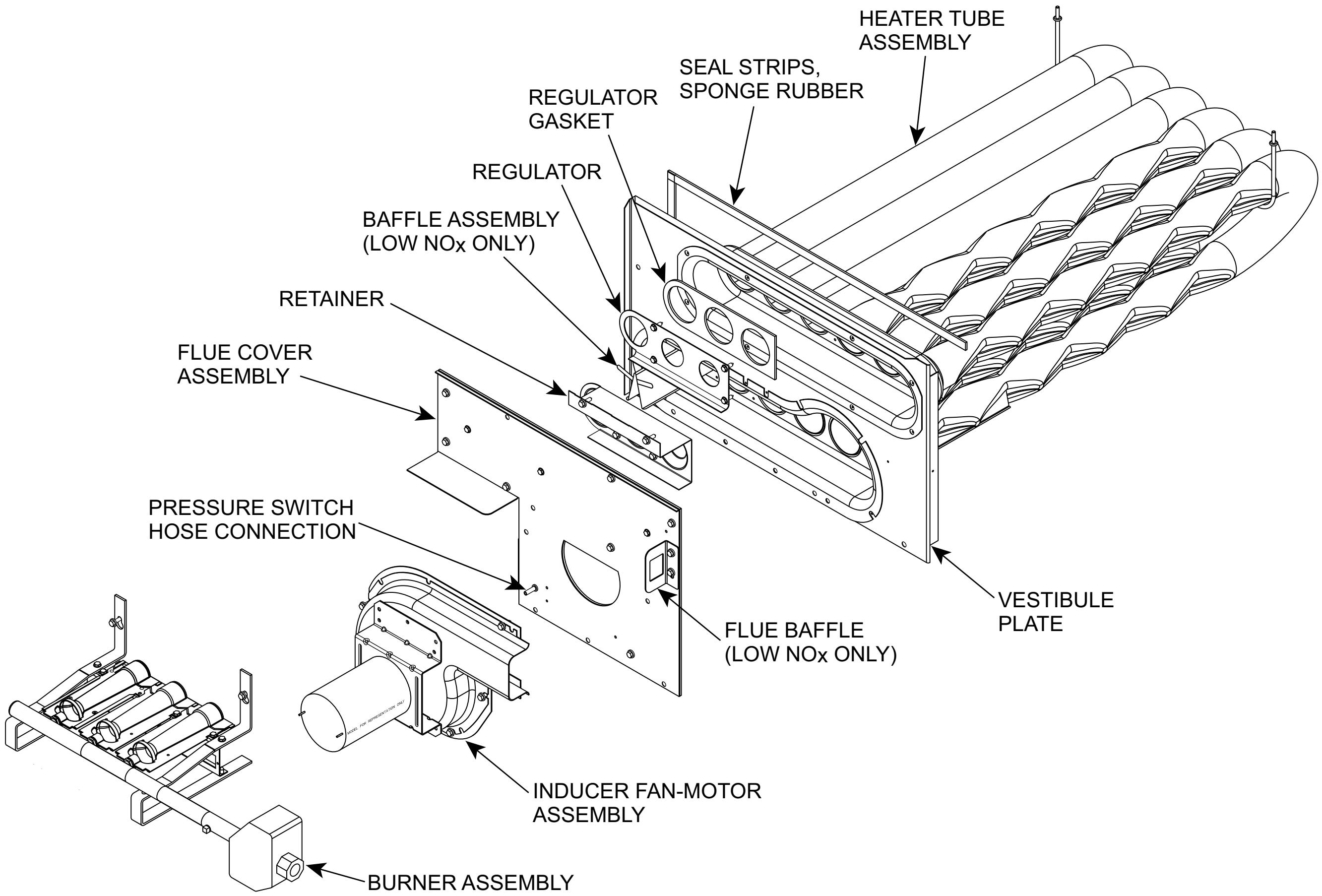


Fig. 50 — Heat Exchanger Assembly

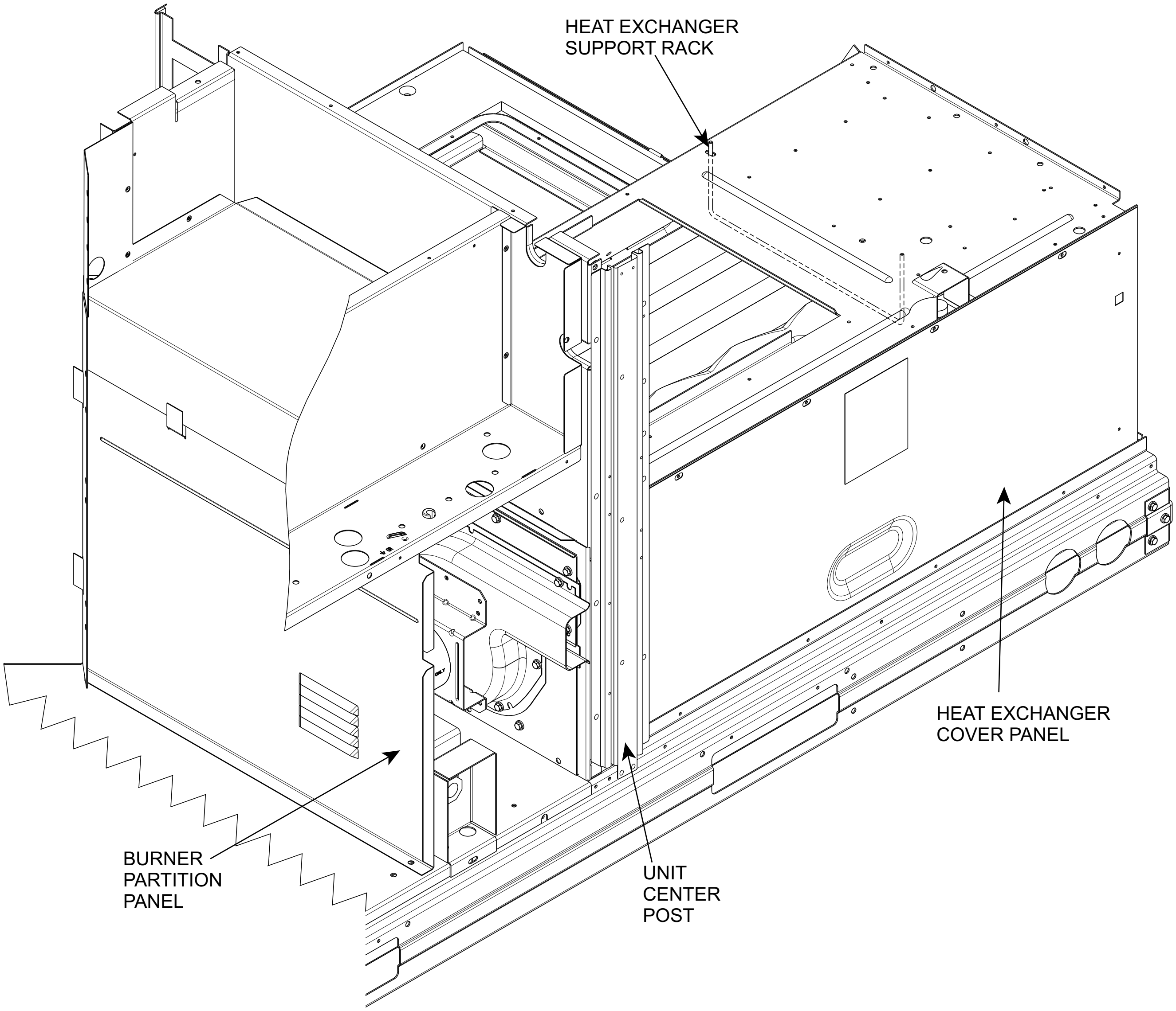


Fig. 51 — Heat Exchanger Access - Internal Panels, Center Post, and HX Rack Locations

Burners and Igniters

> **⚠ CAUTION**
>
> EQUIPMENT DAMAGE HAZARD
>
> Failure to follow this CAUTION can result in premature wear and damage to equipment.
>
> When working on gas train, do not hit or plug orifice spuds.

MAIN BURNERS

To access burners, remove burner access panel and slide out burner partition. At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust, if necessary.

Orifice projection

Refer to Fig. 52 for maximum projection dimension for orifice face to manifold tube.

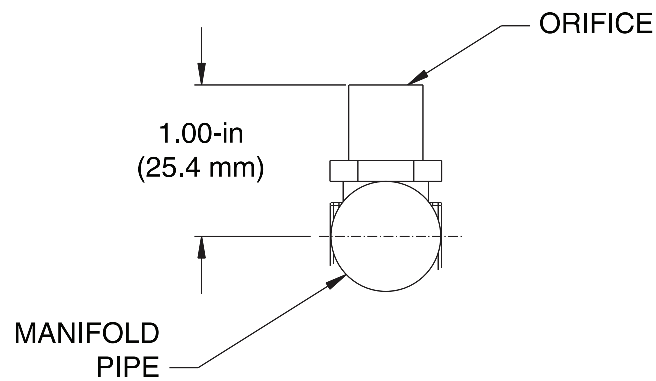


Fig. 52 — Orifice Projection

REMOVAL AND REPLACEMENT OF GAS TRAIN

See Fig. 46, 49, and 53.

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Remove the control box access panel.
4. Remove the control box high voltage cover.
5. Remove the screw at the base of the burner partition panel (see Fig. 51) and slide out the panel.

6. Disconnect gas piping at unit gas valve.
7. Remove wires connected to gas valve. Mark each wire.
8. Remove igniter wires and sensor wires at the Integrated Gas Unit Controller (IGC). (See Fig. 54.)
9. Remove the two screws attaching the burner rack to the vestibule plate (see Fig. 50).
10. Slide the burner tray out of the unit (see Fig. 53).
11. Reverse the procedures outlined above to reinstall the burner rack.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in "Removal and Replacement of Gas Train" section.
2. Inspect burners; if dirty, remove burners from rack. (Mark each burner to identify its position before removing from the rack.)
3. Use a soft brush to clean burners and cross-over port as required.
4. Adjust spark gap. (See Fig. 55-58.)
5. If factory orifice has been removed, check that each orifice is tight at its threads into the manifold pipe and that orifice projection does not exceed maximum valve. See Fig. 52.
6. Reinstall burners on rack in the same locations as factory-installed. (The outside crossover flame regions of the outermost burners are pinched off to prevent excessive gas flow from the side of the burner assembly. If the pinched crossovers are installed between two burners, the flame will not ignite properly.)
7. Reinstall burner rack as described in "Removal and Replacement of Gas Train" section.

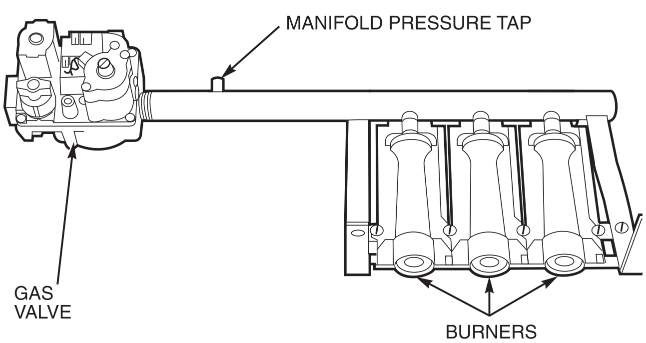


Fig. 53 — Burner Tray Details

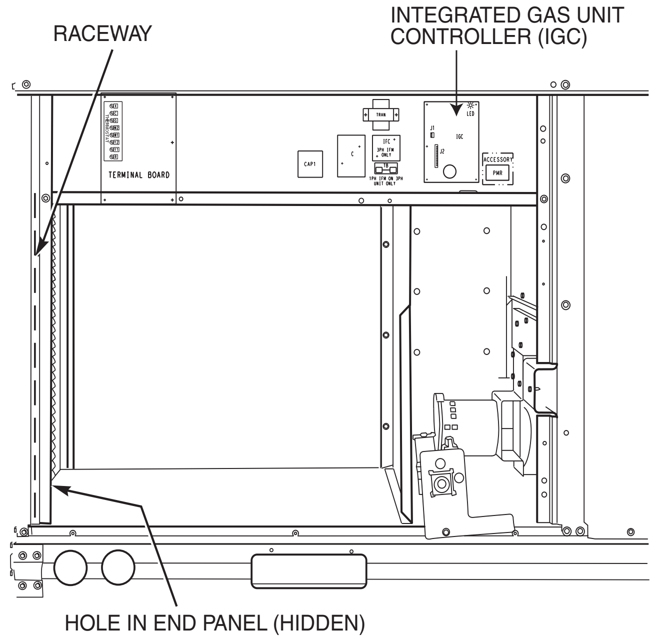


Fig. 54 — Unit Control Box/IGC Location

Removing the Heat Exchanger

The following procedure details the steps to remove the heat exchanged from the unit.

1. Turn off electric power to the unit and shut off the unit's gas supply.
2. Remove the two exterior panels: control box access panel and indoor blower access panel.
3. Remove the unit center post (see Fig. 51).
4. Remove the three interior panels: control box high voltage panel, burner partition panel, and heat exchanger cover panel.
5. Disconnect the wires connected to the gas valve. Mark each wire.
6. Disconnect the igniter wires and sensor wires at the integrated gas controller (IGC).
7. Disconnect a gas pipe union and remove the gas manifold with the gas valve.
8. Remove the two screws attaching the burner rack to the vestibule plate (see Fig. 50).
9. Remove the pressure switch hose from the connection on the flue cover assembly (see Fig. 50).
10. Remove the screws around the vestibule plate.
11. Remove the nuts holding the heat exchanger support rack to the fan deck.
12. Remove the heat exchanger from the unit.
13. Separate the following from the heat exchanger: inducer fan-motor assembly, flue cover assembly, retainer, regulator, regulator gasket, and if a Low NOx unit, also remove the baffle assembly. See Fig. 50.

GAS VALVE

All three-phase models (except Low NOx) are equipped with 2-stage gas valves. Single-phase models and all Low NOx models are equipped with single-stage gas valves. See Fig. 59 for locations of adjustment screws and features on the gas valves.

To adjust gas valve pressure settings:

IMPORTANT: Leak check all gas connections including the main service connection, gas valve, gas spuds, and manifold pipe plug. All leaks must be repaired before firing unit.

CHECK UNIT OPERATION AND MAKE NECESSARY ADJUSTMENTS

NOTE: Gas supply pressure at gas valve inlet must be within specified ranges for fuel type and unit size. See Tables 8 and 9.

1. Remove manifold pressure tap plug from manifold and connect pressure gage or manometer. (See Fig. 53.)
2. Turn on electrical supply.
3. Turn on unit main gas valve.
4. Set room thermostat to call for heat. If unit has two-stage gas valve, verify high-stage heat operation before attempting to adjust manifold pressure.
5. When main burners ignite, check all fittings, manifold, and orifices for leaks.
6. Adjust high-stage pressure to specified setting by turning the plastic adjustment screw clockwise to increase pressure, counter-clockwise to decrease pressure.
7. For two-stage gas valves, set room thermostat to call for low-stage heat. Adjust low-stage pressure to specified setting.
8. Replace regulator cover screw(s) when finished.
9. With burner access panel removed, observe unit heating operation in both high stage and low stage operation if so equipped. Observe burner flames to see if they are blue in appearance, and that the flames are approximately the same for each burner.
10. Turn off unit, remove pressure manometer and replace the $^1/_8$-in. pipe fitting on the gas manifold. (See Fig. 52.)

LIMIT SWITCH

Remove blower access panel. Limit switch is located on the fan deck. See Fig. 47.

Burner Ignition

Unit is equipped with a direct spark ignition 100% lockout system. The Integrated Gas Unit Controller (IGC) is located in the control box (see Fig. 54). The IGC contains a self-diagnostic LED (light-emitting diode). A single LED (see Fig. 60) on the IGC provides a visual display of operational or sequential problems when the power supply is uninterrupted. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. The LED error code can be observed through the viewport. During servicing, refer to the label on the control box cover or Table 12 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

Table 12 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault
9 Flashes	Software Lockout

LEGEND

LED — Light Emitting Diode

* A 3-second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.
† Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Tables 12 and 13 for additional troubleshooting information.

Orifice Replacement

This unit uses orifice type LH32RFnnn (where “nnn” indicates orifice reference size). When replacing unit orifices, order the necessary parts through RCD. See Table 14 for available orifice sizes. See Tables 15-17 for orifice sizes for natural gas and liquid propane fuel usage at various elevations above sea level.

Ensure each replacement orifice is tight as its threads into the manifold pipe and the orifice projection does not exceed maximum value. See Fig. 52.

See Table 18 for Low NOx usage at various elevations above sea level.

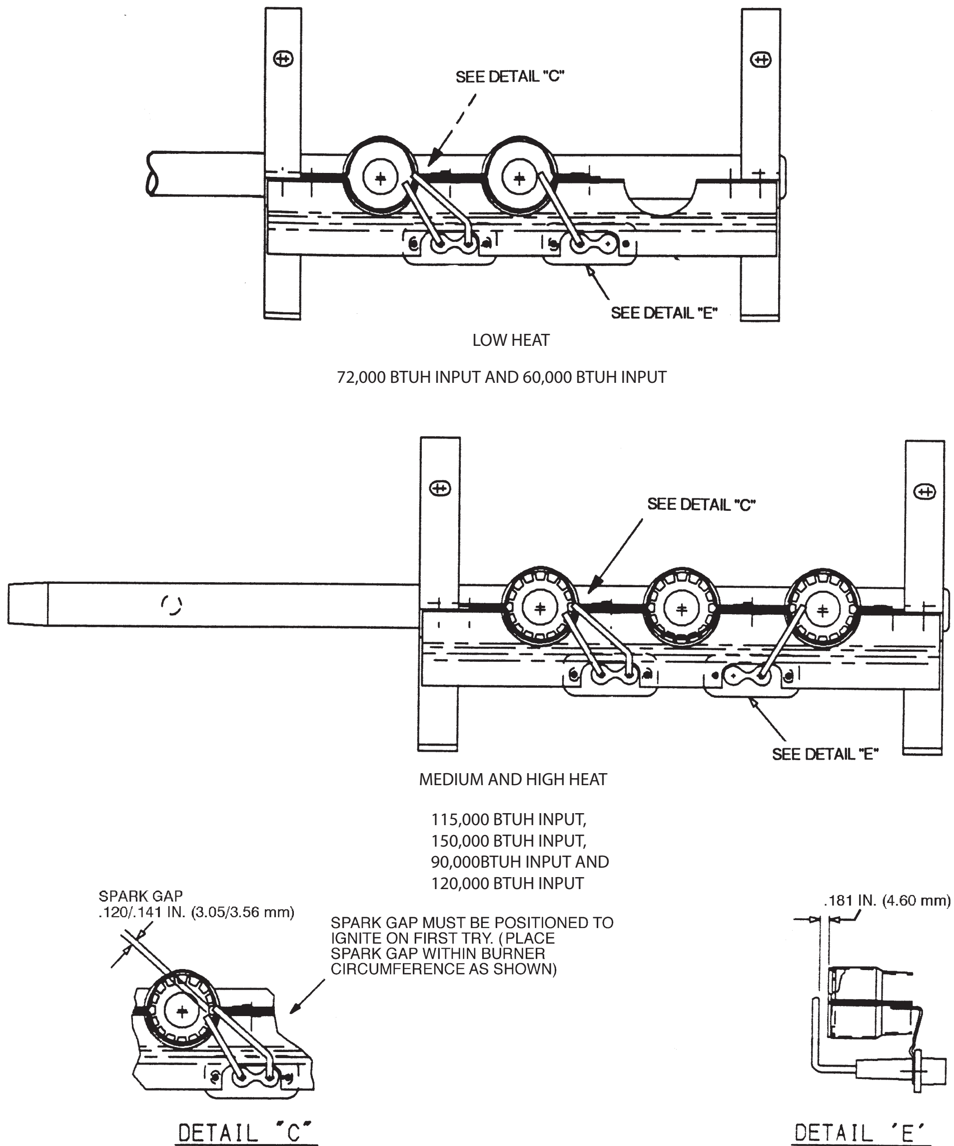


Fig. 55 — Spark Adjustment (Size 04-07)

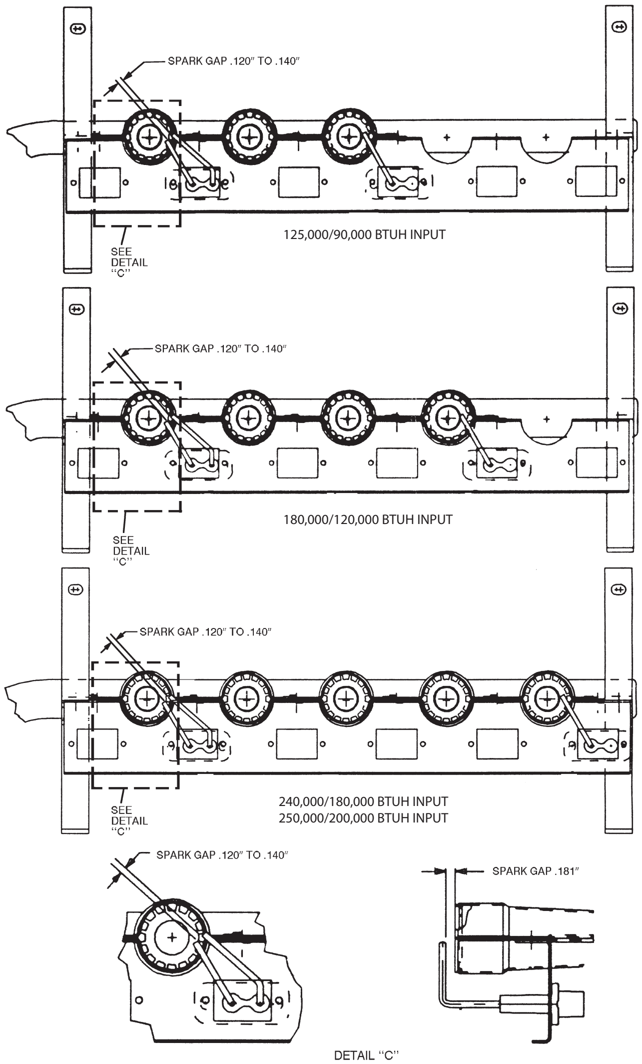


Fig. 56 — Spark Adjustment (Size 08-09)

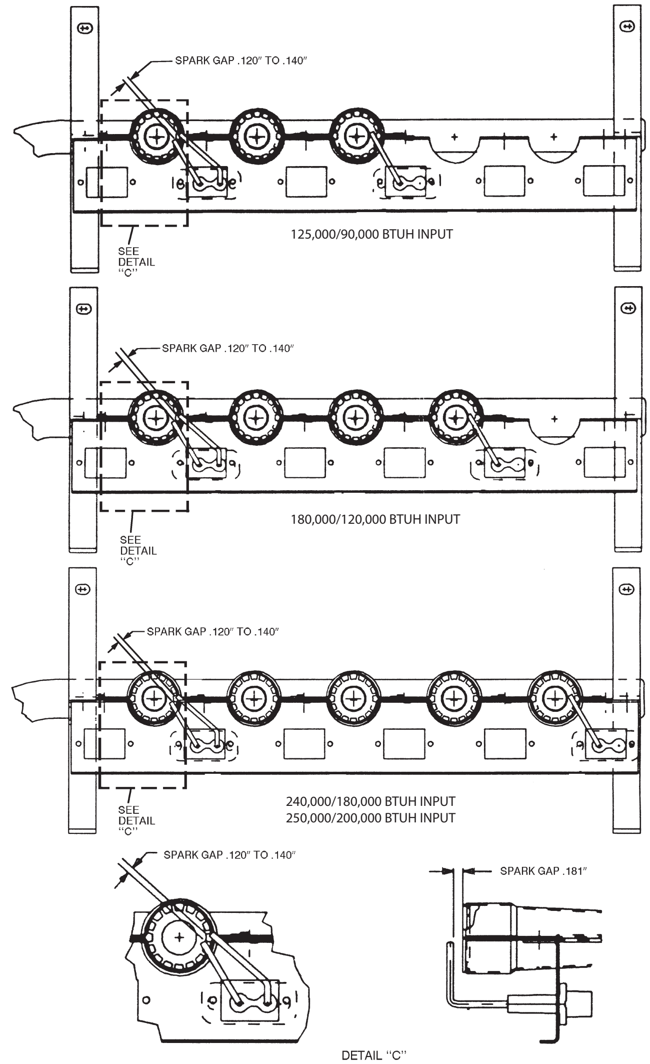


Fig. 57 — Spark Adjustment (Size 12)

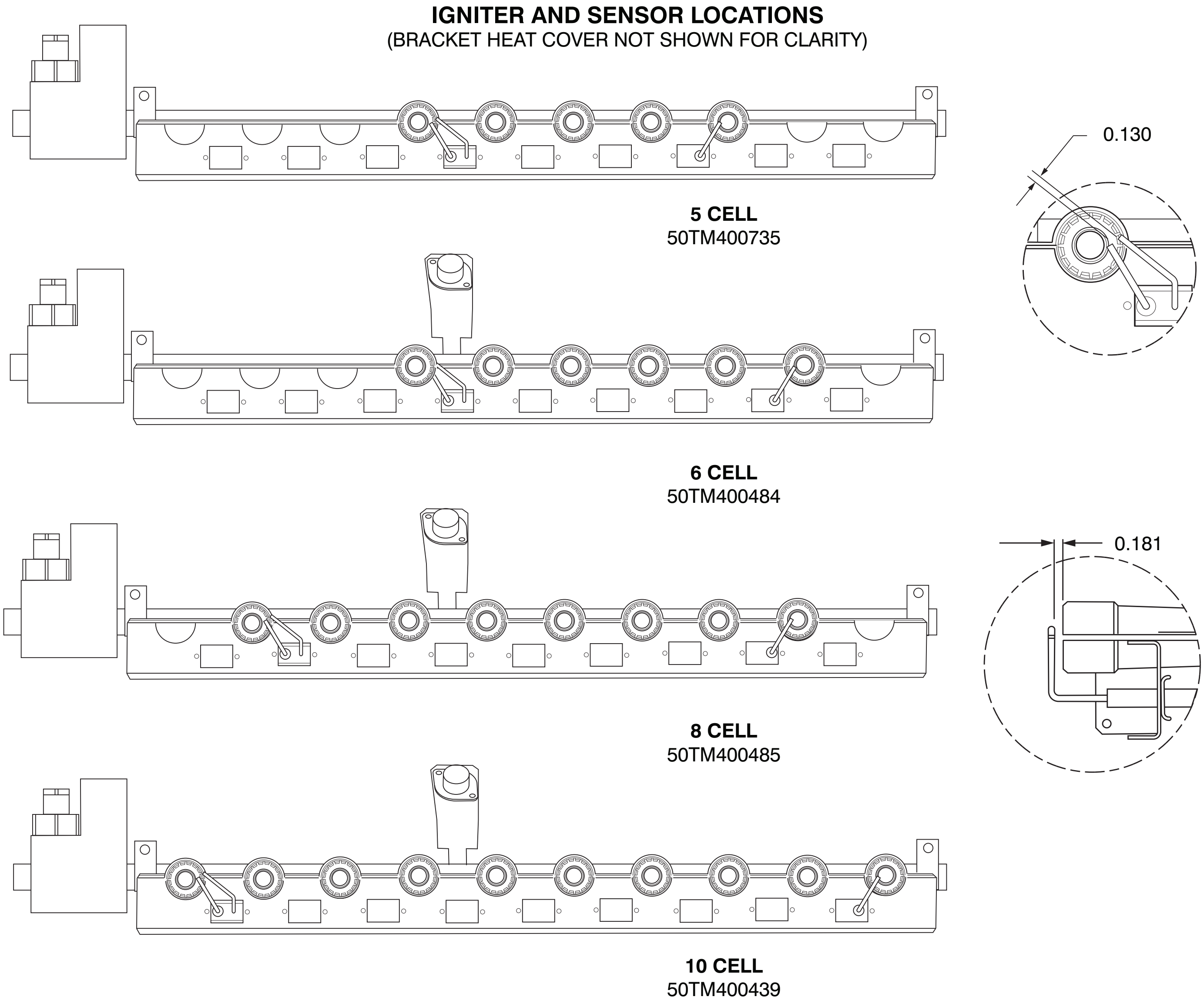


Fig. 58 — Spark Adjustment (Size 14)

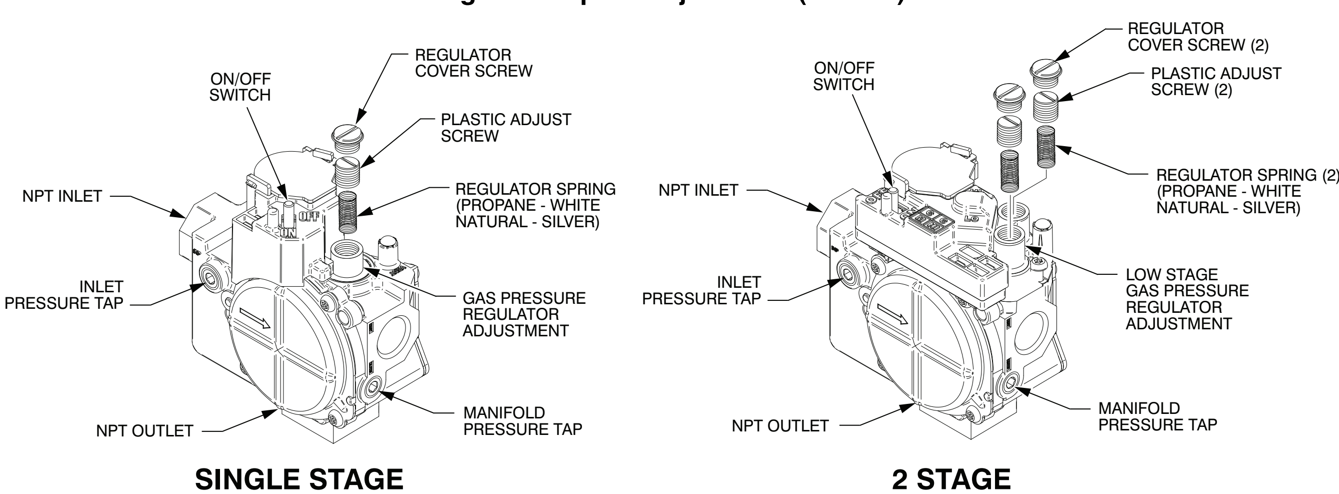


Fig. 59 — Typical Gas Valves

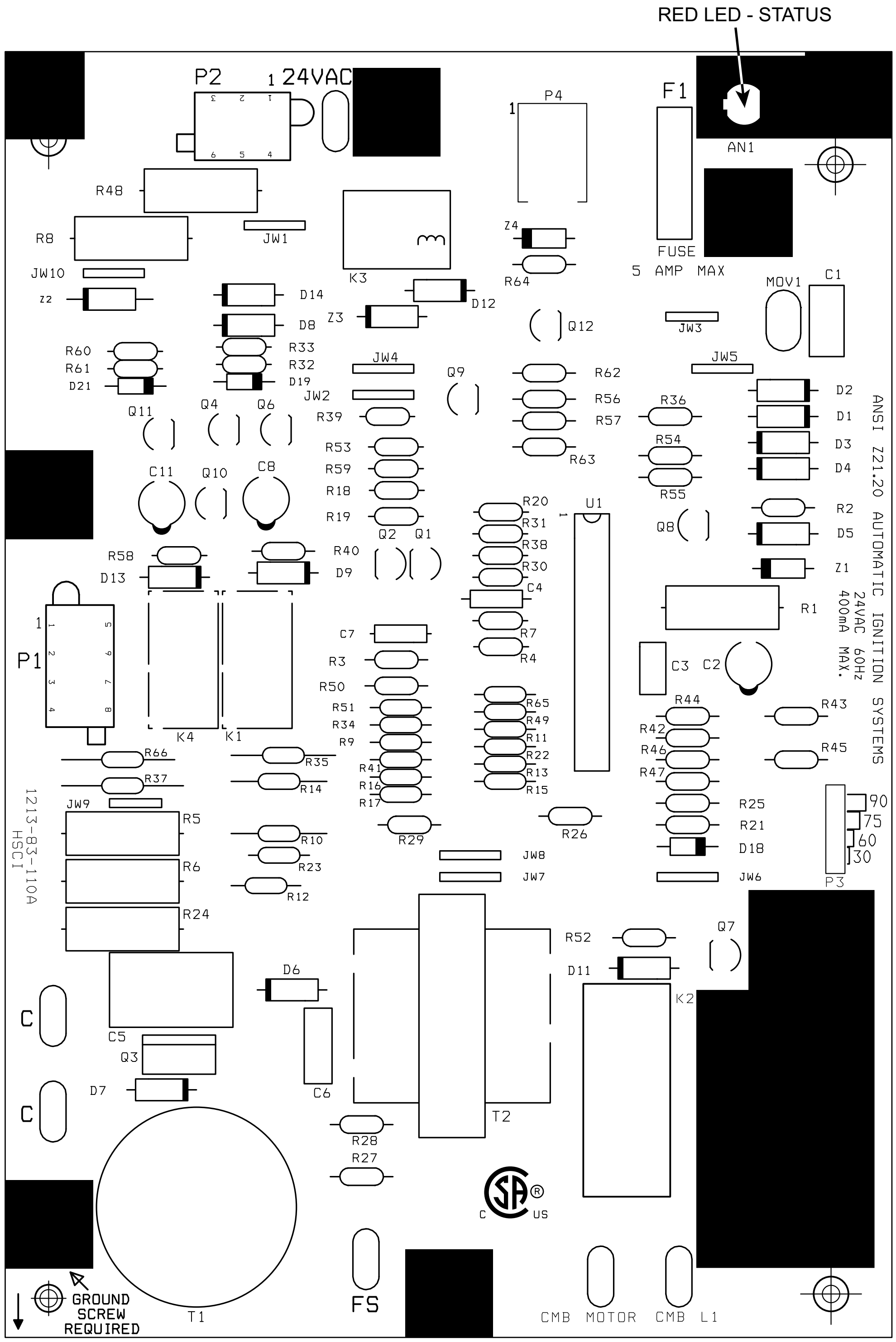


Fig. 60 — Integrated Gas Control (IGC) Board

Table 13 — IGC Connections

TERMINAL LABEL	POINT DESCRIPTION	SENSOR LOCATION	TYPE OF I/O	CONNECTION PIN NUMBER
INPUTS				
RT, C	Input power from TRAN 1	control box	24 VAC	—
SS	Speed sensor	gas section	analog input	J1, 1-3
FS, T1	Flame sensor	gas section	switch input	—
W	Heat stage 1	CTB	24 VAC	J2, 2
RS	Rollout switch	gas section	switch input	J2, 5-6
LS	Limit switch	fan section	switch input	J2, 7-8
CS	Centrifugal switch (not used)	—	switch input	J2, 9-10
OUTPUTS				
L1, CM	Induced draft combustion motor	gas section	line VAC	
IFO	Indoor fan	control box	relay	J2, 1
GV	Gas valve (heat stage 1)	gas section	relay	J2, 11-12

Table 14 — Orifice Sizes

ORIFICE DRILL SIZE	PART NUMBER	DRILL DIA. (IN.)
#30	LH32RF129	0.1285
1/8	LH32RF125	0.1250
#31	LH32RF120	0.1200
#32	LH32RF116	0.1160
#33	LH32RF113	0.1130
#34	LH32RF111	0.1110
#35	LH32RF110	0.1100
#36	LH32RF105	0.1065
#37	LH32RF104	0.1040
#38	LH32RF102	0.1015
#39	LH32RF103	0.0995
#40	LH32RF098	0.0980
#41	LH32RF096	0.0960
#42	LH32RF094	0.0935
#43	LH32RF089	0.0890
#44	LH32RF086	0.0860
#45	LH32RF082	0.0820
#46	LH32RF080	0.0810
#47	LH32RF079	0.0785
#48	LH32RF076	0.0760
#49	LH32RF073	0.0730
#50	LH32RF070	0.0700
#51	LH32RF067	0.0670
#52	LH32RF065	0.0635
#53	LH32RF060	0.0595
#54	LH32RF055	0.0550
#55	LH32RF052	0.0520
#56	LH32RF047	0.0465
#57	LH32RF043	0.0430
#58	LH32RF042	0.0420

Table 15 — Altitude Compensation* (Sizes 04-06)

NATURAL GAS

ELEVATION		NOMINAL HEAT INPUT					
		72K BTUH		115KBTUH		150K BTUH	
Feet	**Meters**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**
0 to 2,000	0-610	33[1]	72,000	33[1]	115,000	†30	150,000
2,000	610	35[1]	66,240	35[1]	105,800	†30	138,000
3,000	914	35[1]	63,360	35[1]	101,200	31[1]	132,000
4,000	1219	36[1]	60,480	36[1]	96,600	31[1]	126,000
5,000	1524	36[1]	57,600	36[1]	92,000	31[1]	120,000
6,000	1829	37[2]	54,720	37[2]	87,400	31[1]	114,000
7,000	2134	38[2]	51,840	38[2]	82,800	32[1]	108,000
8,000	2438	39[2]	48,960	39[2]	78,200	33[1]	102,000
9,000	2743	†40	46,080	†40	73,600	33[1]	96,000
10,000	3048	†41	43,200	†41	69,000	35[1]	90,000
11,000	3353	†42	40,320	†42	64,400	36[1]	84,000
12,000	3658	†43	37,440	†43	59,800	37[2]	78,000
13,000	3962	†43	34,560	†43	55,200	38[2]	72,000
14,000	4267	44[2]	31,680	44[2]	50,600	†40	66,000

PROPANE GAS

ELEVATION		NOMINAL HEAT INPUT					
		72K BTUH		115K BTUH		150K BTUH	
Feet	**Meters**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**
0 to 2,000	0-610	51[4]	72,000	50[3]	115,000	46[3]	150,000
2,000	610	51[4]	66,240	51[4]	105,800	47[3]	138,000
3,000	914	52[4]	63,360	51[4]	101,200	47[3]	132,000
4,000	1219	52[4]	60,480	51[4]	96,600	48[3]	126,000
5,000	1524	52[4]	57,600	51[4]	92,000	48[3]	120,000
6,000	1829	52[4]	54,720	52[4]	87,400	48[3]	114,000
7,000	2134	53[4]	51,840	52[4]	82,800	49[3]	108,000
8,000	2438	53[4]	48,960	52[4]	78,200	49[3]	102,000
9,000	2743	53[4]	46,080	53[4]	73,600	50[3]	96,000
10,000	3048	54[4]	43,200	53[4]	69,000	50[3]	90,000
11,000	3353	54[4]	40,320	53[4]	64,400	51[4]	84,000
12,000	3658	54[4]	37,440	54[4]	59,800	51[4]	78,000
13,000	3962	55[4]	34,560	54[4]	55,200	52[4]	72,000
14,000	4267	†56	31,680	55[4]	50,600	53[4]	66,000

* As the height above sea level increases, there is less oxygen per cubic ft. of air. Therefore, heat input rate should be reduced at higher altitudes.
† Not included in kit. May be purchased separately through dealer.

ORIFICE	ACC. KIT PN
XX[1]	CRLPELEV001A00
XX[2]	CRLPELEV002A00
XX[3]	CRLPELEV003A00
XX[4]	CRLPELEV004A00

Table 16 — Altitude Compensation* (Sizes 07-12)

NATURAL GAS

ELEVATION		NOMINAL HEAT INPUT											
		72K BTUH		125K BTUH		150K BTUH		180K BTUH		224K BTUH		250K BTUH	
FT	**M**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**
0 to 2,000	0 to 610	33[1]	72,000	31[1]	125,000	32[1]	150,000	31[1]	180,000	31[1]	224,000	†30	250,000
2,000	610	35[1]	66,240	32[1]	115,000	33[1]	138,000	32[1]	165,600	32[1]	206,080	†30	230,000
3,000	914	35[1]	63,360	32[1]	110,000	35[1]	132,000	32[1]	158,400	32[1]	197,120	31[1]	220,000
4,000	1219	36[1]	60,480	33[1]	105,000	35[1]	126,000	33[1]	151,200	33[1]	188,160	31[1]	210,000
5,000	1524	36[1]	57,600	33[1]	100,000	35[1]	120,000	33[1]	144,000	33[1]	179,200	31[1]	200,000
6,000	1829	37[2]	54,720	35[1]	95,000	36[1]	114,000	33[1]	136,800	33[1]	170,240	31[1]	190,000
7,000	2134	38[2]	51,840	35[1]	90,000	36[1]	108,000	35[1]	129,600	35[1]	161,280	32[1]	180,000
8,000	2438	38[2]	48,960	36[1]	85,000	36[1]	102,000	36[1]	122,400	36[1]	152,320	33[1]	170,000
9,000	2743	†40	46,080	37[2]	80,000	37[2]	96,000	37[2]	115,200	37[2]	143,360	33[1]	160,000
10,000	3048	†41	43,200	38[2]	75,000	38[2]	90,000	38[2]	108,000	38[2]	134,400	35[1]	150,000
11,000	3353	†42	40,320	39[2]	70,000	†40	84,000	39[2]	100,800	39[2]	125,440	36[1]	140,000
12,000	3658	†42	37,440	†41	65,000	†40	78,000	†41	93,600	†41	116,480	37[2]	130,000
13,000	3962	†43	34,560	†42	60,000	†41	72,000	†42	86,400	†42	107,520	38[2]	120,000
14,000	4267	†43	31,680	†43	55,000	†41	66,000	†43	79,200	†43	98,560	†40	110,000

PROPANE GAS

ELEVATION		NOMINAL HEAT INPUT											
		72K BTUH		125K BTUH		150K BTUH		180K BTUH		224K BTUH		250K BTUH	
FT	**M**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**	**Orifice Size**	**Input (btu/hr)**
0 to 2,000	0 to 610	51[4]	72,000	49[3]	125,000	50[3]	150,000	48[3]	180,000	48[3]	224,000	46[3]	250,000
2,000	610	51[4]	66,240	50[3]	115,000	51[4]	138,000	49[3]	165,600	49[3]	206,080	47[3]	230,000
3,000	914	52[4]	63,360	50[3]	110,000	51[4]	132,000	49[3]	158,400	49[3]	197,120	47[3]	220,000
4,000	1219	52[4]	60,480	50[3]	105,000	51[4]	126,000	49[3]	151,200	49[3]	188,160	48[3]	210,000
5,000	1524	52[4]	57,600	51[4]	100,000	51[4]	120,000	50[3]	144,000	50[3]	179,200	48[3]	200,000
6,000	1829	52[4]	54,720	51[4]	95,000	52[4]	114,000	50[3]	136,800	50[3]	170,240	48[3]	190,000
7,000	2134	53[4]	51,840	51[4]	90,000	52[4]	108,000	50[3]	129,600	50[3]	161,280	49[3]	180,000
8,000	2438	53[4]	48,960	52[4]	85,000	52[4]	102,000	51[4]	122,400	51[4]	152,320	49[3]	170,000
9,000	2743	53[4]	46,080	52[4]	80,000	53[4]	96,000	51[4]	115,200	51[4]	143,360	50[3]	160,000
10,000	3048	54[4]	43,200	52[4]	75,000	53[4]	90,000	52[4]	108,000	52[4]	134,400	50[3]	150,000
11,000	3353	54[4]	40,320	53[4]	70,000	53[4]	84,000	52[4]	100,800	52[4]	125,440	51[4]	140,000
12,000	3658	54[4]	37,440	53[4]	65,000	53[4]	78,000	53[4]	93,600	53[4]	116,480	51[4]	130,000
13,000	3962	55[4]	34,560	54[4]	60,000	53[4]	72,000	53[4]	86,400	53[4]	107,520	52[4]	120,000
14,000	4267	55[4]	31,680	54[4]	55,000	55[4]	66,000	54[4]	79,200	54[4]	98,560	53[4]	110,000

* As the height above sea level increases, there is less oxygen per cubic ft. of air. Therefore, heat input rate should be reduced at higher altitudes.
† Not included in kit. May be purchased separately through dealer.

ORIFICE	ACC. KIT PN
XX[1]	CRLPELEV001A00
XX[2]	CRLPELEV002A00
XX[3]	CRLPELEV003A00
XX[4]	CRLPELEV004A00

Table 17 — Altitude Compensation* (Size 14)

NATURAL GAS

ELEVATION		NOMINAL HEAT INPUT									
		150K BTUH		180K BTUH		240K BTUH		315K BTUH		380K BTUH	
FT	M	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)
0 to 2,000	0 to 610	37[7]	150,000	37[7]	180,000	37[7]	240,000	†35	315,000	†35	350,000
2,000	610	38[7]	138,000	38[7]	165,600	38[7]	220,800	36[7]	289,800	36[7]	322,000
3,000	914	39[7]	132,000	39[7]	158,400	39[7]	211,200	36[7]	277,200	36[7]	308,000
4,000	1219	39[7]	126,000	39[7]	151,200	39[7]	201,600	37[7]	264,600	37[7]	294,000
5,000	1524	40[8]	120,000	40[8]	144,000	40[8]	192,000	37[7]	252,000	37[7]	280,000
6,000	1829	41[8]	114,000	41[8]	136,800	41[8]	182,400	38[7]	239,400	38[7]	266,000
7,000	2134	42[8]	108,000	42[8]	129,600	42[8]	172,800	39[7]	226,800	39[7]	252,000
8,000	2438	42[8]	102,000	42[8]	122,400	42[8]	163,200	40[8]	214,200	40[8]	238,000
9,000	2743	43[8]	96,000	43[8]	115,200	43[8]	153,600	41[8]	201,600	41[8]	224,000
10,000	3048	43[8]	90,000	43[8]	108,000	43[8]	144,000	42[8]	189,000	42[8]	210,000
11,000	3353	†44	84,000	†44	100,800	†44	134,400	43[8]	176,400	43[8]	196,000
12,000	3658	†45	78,000	†45	93,600	†45	124,800	43[8]	163,800	43[8]	182,000
13,000	3962	†46	72,000	†46	86,400	†46	115,200	†44	151,200	†44	168,000
14,000	4267	†47	66,000	†47	79,200	†47	105,600	†45	138,600	†45	154,000

PROPANE GAS

ELEVATION		NOMINAL HEAT INPUT									
		150K BTUH		180K BTUH		240K BTUH		315K BTUH		380K BTUH	
FT	M	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)
0 to 2,000	0 to 610	52[9]	150,000	52[9]	180,000	52[9]	240,000	51[9]	252,000	51[9]	350,000
2,000	610	52[9]	138,000	52[9]	165,600	52[9]	220,800	51[9]	231,840	51[9]	322,000
3,000	914	53[9]	132,000	53[9]	158,400	53[9]	211,200	52[9]	221,760	52[9]	308,000
4,000	1219	53[9]	126,000	53[9]	151,200	53[9]	201,600	52[9]	211,680	52[9]	294,000
5,000	1524	53[9]	120,000	53[9]	144,000	53[9]	192,000	52[9]	201,600	52[9]	280,000
6,000	1829	53[9]	114,000	53[9]	136,800	53[9]	182,400	52[9]	191,520	52[9]	266,000
7,000	2134	53[9]	108,000	53[9]	129,600	53[9]	172,800	53[9]	181,440	53[9]	252,000
8,000	2438	54[9]	102,000	54[9]	122,400	54[9]	163,200	53[9]	171,360	53[9]	238,000
9,000	2743	54[9]	96,000	54[9]	115,200	54[9]	153,600	53[9]	161,280	53[9]	224,000
10,000	3048	54[9]	90,000	54[9]	108,000	54[9]	144,000	54[9]	151,200	54[9]	210,000
11,000	3353	55[9]	84,000	55[9]	100,800	55[9]	134,400	54[9]	141,120	54[9]	196,000
12,000	3658	55[9]	78,000	55[9]	93,600	55[9]	124,800	54[9]	131,040	54[9]	182,000
13,000	3962	55[9]	72,000	55[9]	86,400	55[9]	115,200	55[9]	120,960	55[9]	168,000
14,000	4267	†56	66,000	†56	79,200	†56	105,600	55[9]	110,880	55[9]	154,000

ORIFICE	ACC. KIT PN
XX[7]	CRLPELEV007A00
XX[8]	CRLPELEV008A00
XX[9]	CRLPELEV009A00

Table 18 — Altitude Compensation* (Sizes 04-06)-Low NOx Units

NATURAL GAS ONLY

ELEVATION		NOMINAL HEAT INPUT					
		60K BTUH		90K BTUH		120K BTUH	
FT	M	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)	ORIFICE SIZE	INPUT (BTU/HR)
0 to 2,000	0 to 610	38[2]	60,000	38[2]	90,000	32[1]	120,000
2,000	610	39[2]	55,200	39[2]	82,800	33[1]	110,400
3,000	914	†40	52,800	†40	79,200	33[1]	105,600
4,000	1219	†41	50,400	†41	75,600	35[1]	100,800
5,000	1524	†41	48,000	†41	72,000	35[1]	96,000
6,000	1829	†42	45,600	†42	68,400	36[1]	91,200
7,000	2134	†42	43,200	†42	64,800	36[1]	86,400
8,000	2438	†43	40,800	†43	61,200	37[2]	81,600
9,000	2743	†43	38,400	†43	57,600	38[2]	76,800
10,000	3048	44[2]	36,000	44[2]	54,000	†40	72,000
11,000	3353	44[2]	33,600	44[2]	50,400	†41	67,200
12,000	3658	45[2]	31,200	45[2]	46,800	†42	62,400
13,000	3962	47[3]	28,800	47[3]	43,200	†43	57,600
14,000	4267	48[3]	26,400	48[3]	39,600	†43	52,800

* As the height above sea level increases, there is less oxygen per cubic ft. of air. Therefore, heat input rate should be reduced at higher altitudes.
† Not included in kit. May be purchased separately through dealer.

ORIFICE	ACC. KIT PN
XX[1]	CRLPELEV001A00
XX[2]	CRLPELEV002A00
XX[3]	CRLPELEV003A00
XX[4]	CRLPELEV004A00

MINIMUM HEATING ENTERING AIR TEMPERATURE

When operating on first stage heating, the minimum temperature of air entering the dimpled heat exchanger is 50°F continuous and 45°F intermittent for standard heat exchangers and 40°F continuous and 35°F intermittent for stainless steel heat exchangers. To operate at lower mixed-air temperatures, a field-supplied outdoor-air thermostat must be used to initiate both stages of heat when the temperature is below the minimum required temperature to ensure full fire operation. Wire the outdoor-air thermostat OALT (part no. HH22AG106) in series with the second stage gas valve. See Fig. 61. Set the outdoor-air thermostat at 35°F for stainless steel heat exchangers or 45°F for standard heat exchangers. This temperature setting will bring on the second stage of heat whenever the ambient temperature is below the thermostat set point. Indoor comfort may be compromised when heating is initiated using low entering air temperatures with insufficient heating temperature rise.

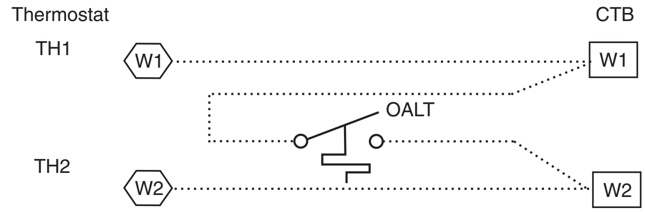


Fig. 61 — OATL Connections

Troubleshooting Heating System

Refer to Tables 19 and 20 for additional troubleshooting topics.

Table 19 — Heating Service Troubleshooting

PROBLEM	CAUSE	REMEDY
Burners Will Not Ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air, purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24-v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting.
	Miswired or loose connections.	Check all wiring and wire nut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate Heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor Flame Characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners Will Not Turn Off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one-minute time period has elapsed or reset power to unit.

Table 20 — IGC Board LED Alarm Codes

LED FLASH CODE	DESCRIPTION	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
On	Normal Operation	—	—	—
Off	Hardware Failure	No gas heating.	—	Loss of power to the IGC. Check 5 amp fuse on IGC, power to unit, 24V circuit breaker, transformer, and wiring to the IGC.
2 Flashes	Limit Switch Fault	Gas valve and igniter Off. Indoor fan and inducer On.	Limit switch closed, or heat call (W) Off.	High temperature limit switch is open. Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is within the range on the unit name-plate. Check wiring and limit switch operation.
3 Flashes	Flame Sense Fault	Indoor fan and inducer On.	Flame sense normal. Power reset for LED reset.	The IGC sensed a flame when the gas valve should be closed. Check wiring, flame sensor, and gas valve operation.
4 Flashes	Four Consecutive Limit Switch Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	4 consecutive limit switch faults within a single call for heat. See Limit Switch Fault.
5 Flashes	Ignition Fault	No gas heating.	Heat call (W) Off. Power reset for LED reset.	Unit unsuccessfully attempted ignition for 15 minutes. Check igniter and flame sensor electrode spacing, gaps, etc. Check flame sense and igniter wiring. Check gas valve operation and gas supply. Check gas valve connections to IGC terminals. BRN lead must be on Pin 11.
6 Flashes	Induced Draft Motor Fault	If heat off: no gas heating. If heat on: gas valve Off and inducer On.	Inducer sense normal, or heat call (W) Off.	Inducer sense On when heat call Off, or inducer sense Off when heat call On. Check wiring, voltage, and operation of IGC motor. Check speed sensor wiring to IGC.
7 Flashes	Rollout Switch Lockout	Gas valve and igniter Off. Indoor fan and inducer On.	Power reset.	Rollout switch has opened. Check gas valve operation. Check induced-draft blower wheel is properly secured to motor shaft.
8 Flashes	Internal Control Lockout	No gas heating.	Power reset.	IGC has sensed internal hardware or software error. If fault is not cleared by resetting 24 v power, replace the IGC.
9 Flashes	Temporary Software Lockout	No gas heating.	1 hour auto reset, or power reset.	Electrical interference is disrupting the IGC software.

LEGEND

IGC — Integrated Gas Unit Control
LED — Light-Emitting Diode

NOTES:
1. There is a 3-second pause between alarm code displays.
2. If more than one alarm code exists, all applicable alarm codes will be displayed in numerical sequence.
3. Alarm codes on the IGC will be lost if power to the unit is interrupted.

PremierLink™ Control

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

ECONOMIZER SYSTEMS

The unit may be equipped with a factory-installed or accessory (field-installed) economizer system. Two types are available: with a logic control system (EconoMi$er IV and EconoMi$er X) and without a control system (EconoMi$er2). See Fig. 62-64 for component locations on each type. See Fig. 65-68 for economizer section wiring diagrams. The W7212 controller is used for EconoMi$er IV and the W7220 controller is used for EconoMi$er X.

All three economizers use direct-drive damper actuators.

IMPORTANT: Any economizer that meets the economizer requirements as laid out in California's Title 24 mandatory section 120.2 (fault detection and diagnostics) and/or prescriptive section 140.4 (life-cycle tests, damper leakage, 5 year warranty, sensor accuracy, etc), will have a label on the economizer. Any economizer without this label does not meet California's Title 24. The five year limited parts warranty referred to in section 140.4 only applies to factory installed economizers. Please refer to the economizer on each unit.

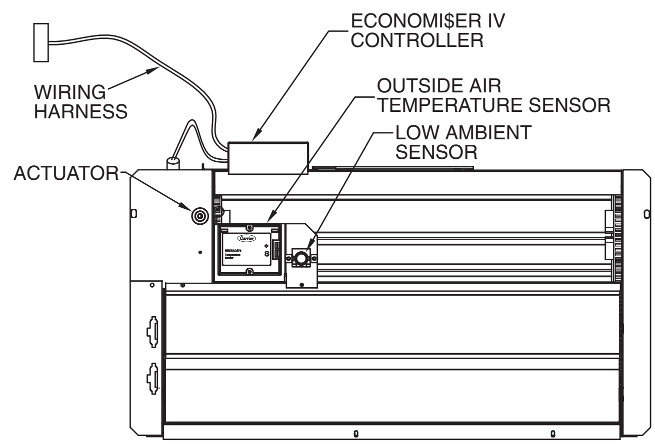


Fig. 62 — EconoMi$er IV Component Locations

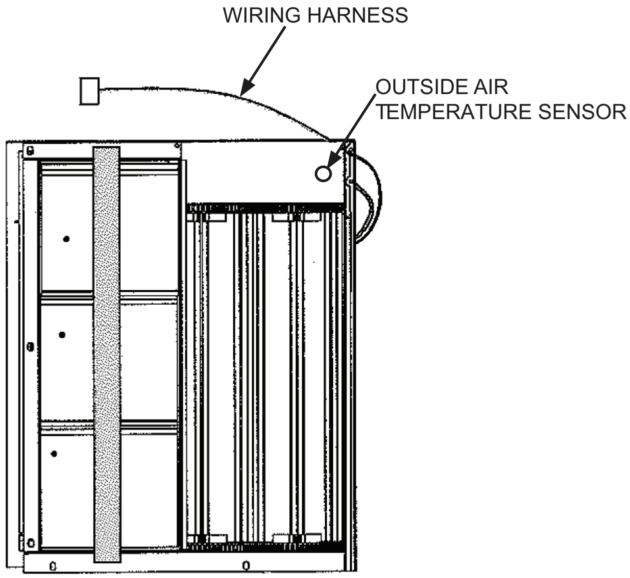


Fig. 63 — EconoMi$er X Component Locations

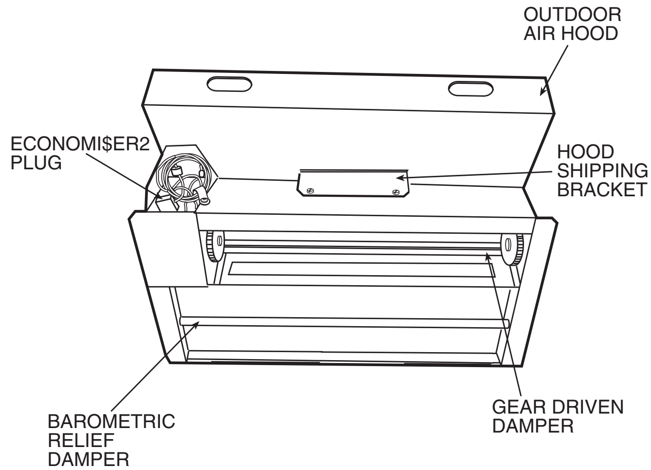


Fig. 64 — EconoMi$er2 Component Locations

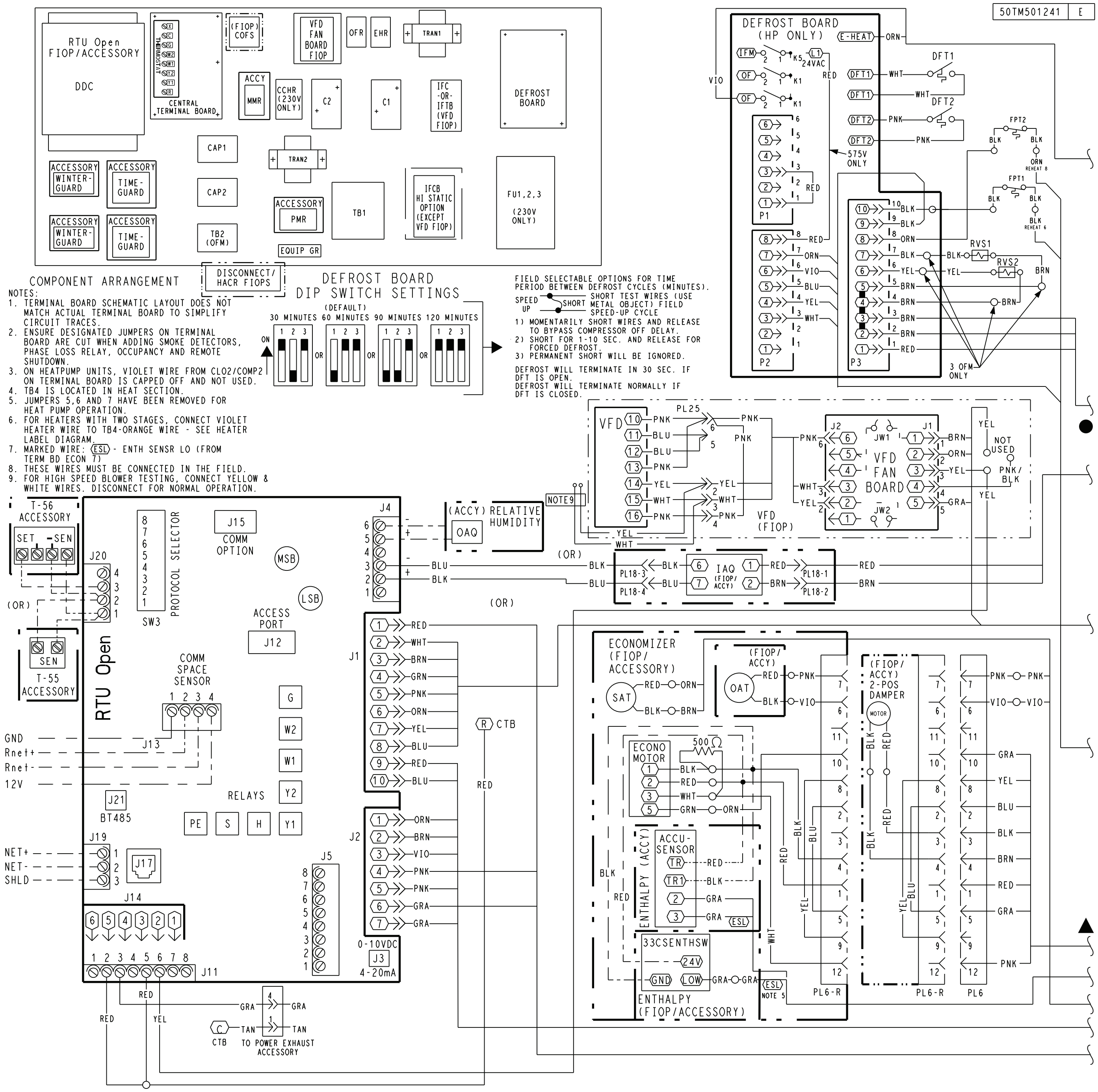


Fig. 65 — RTU Open Overlay for Economizer Wiring

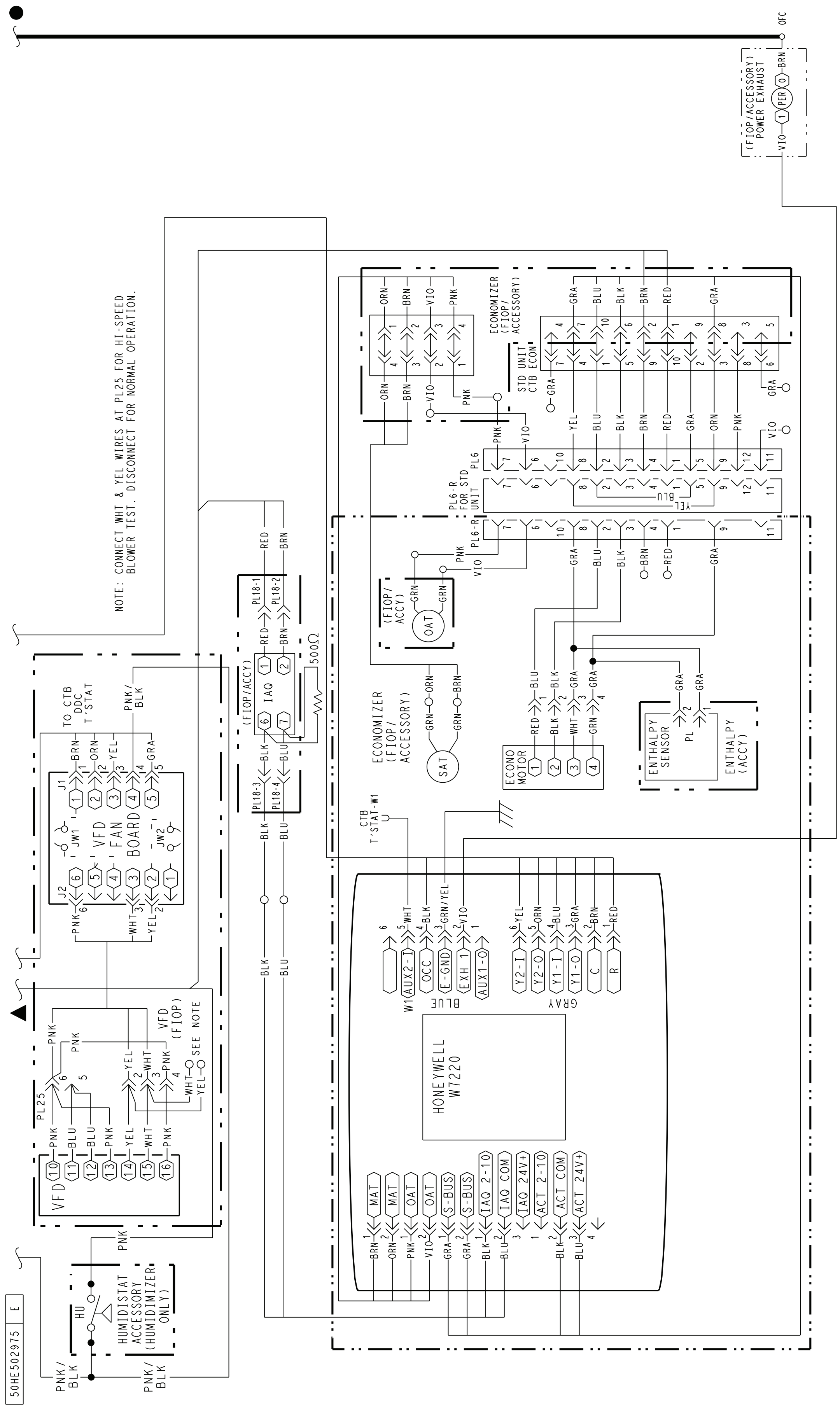
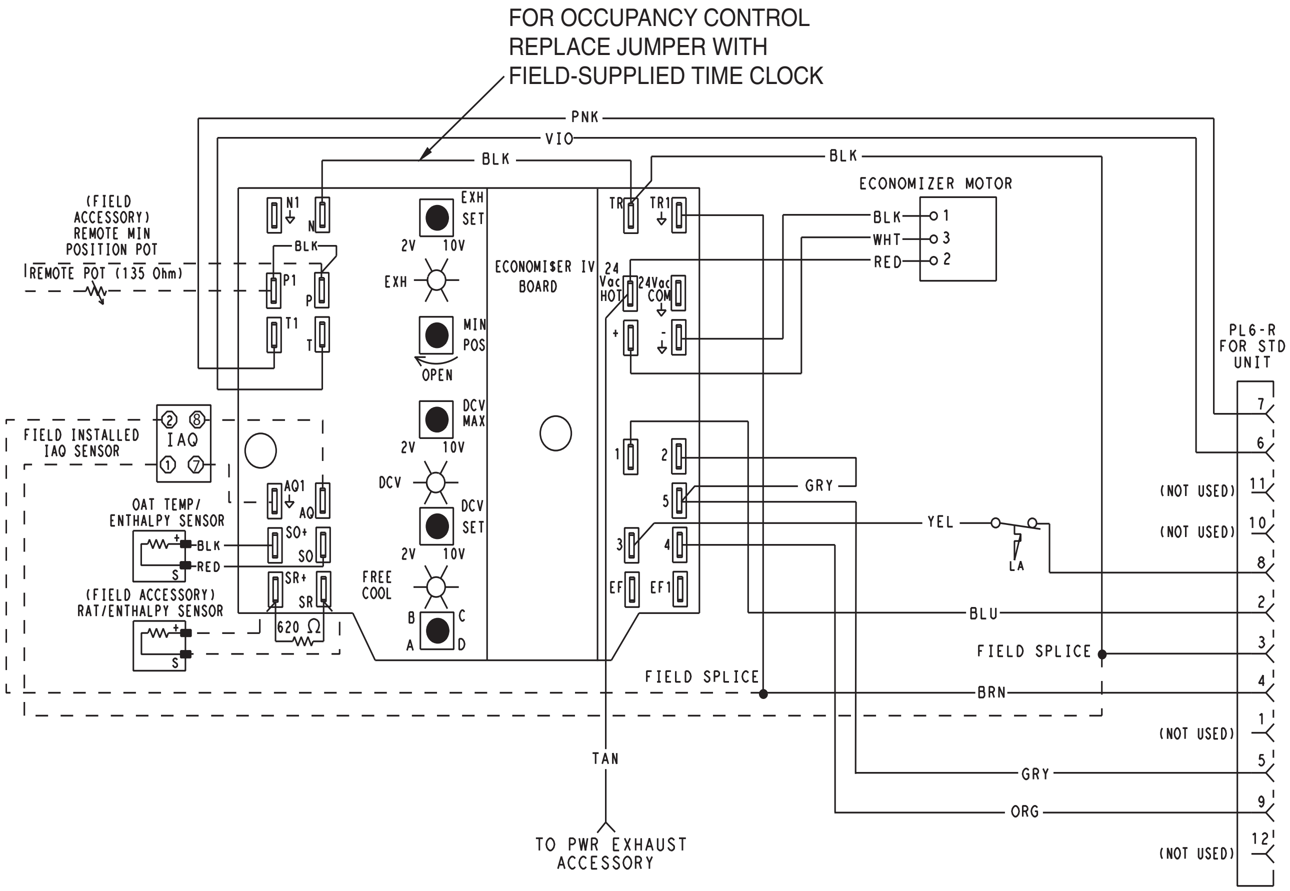


Fig. 66 — VFD Overlay for W2770 Controller Wiring



LEGEND

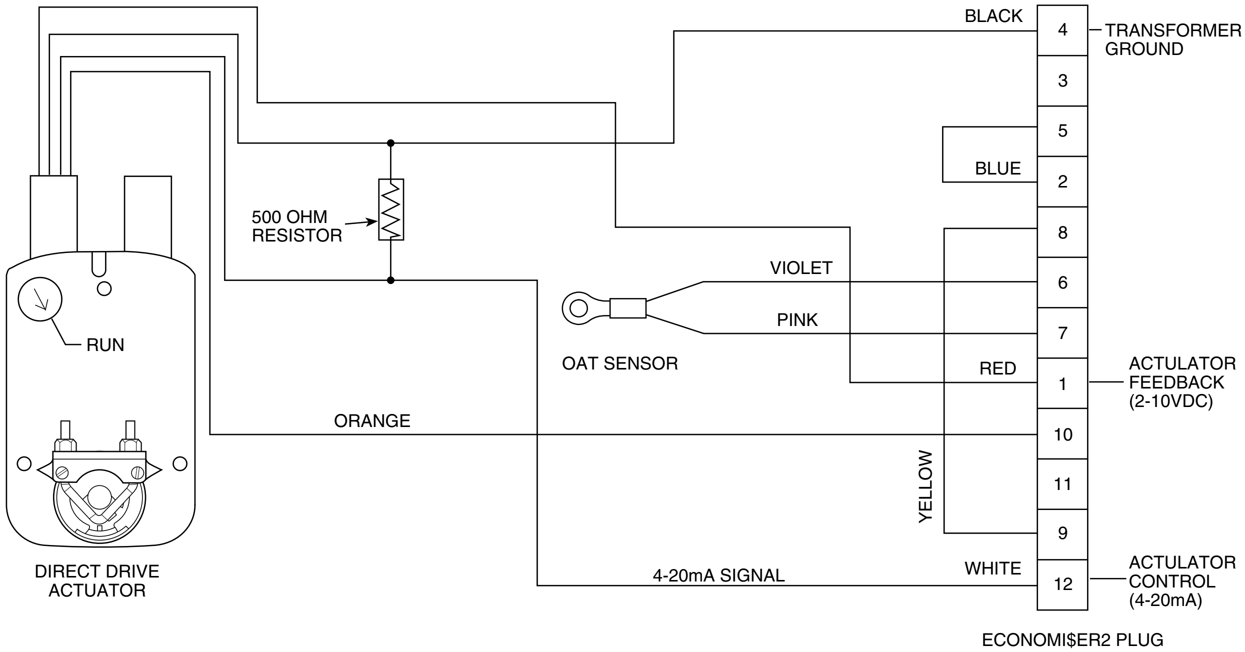
DCV — Demand Controlled Ventilation
IAQ — Indoor Air Quality
LA — Low Ambient Lockout Device
OAT — Outdoor-Air Temperature
POT — Potentiometer
RAT — Return-Air Temperature

Potentiometer Defaults Settings:

Power Exhaust	Middle
Minimum Pos.	Fully Closed
DCV Max.	Middle
DCV Set	Middle
Enthalpy	C Setting

NOTES:
1. 620 ohm, 1 watt 5% resistor should be removed only when using differential enthalpy or dry bulb.
2. If a separate field-supplied 24-v transformer is used for the IAQ sensor power supply, it cannot have the secondary of the transformer grounded.
3. For field-installed remote minimum position POT, remove black wire jumper between P and P1 and set control minimum position POT to the minimum position.

Fig. 67 — 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. 68 — EconoMi$er2 with 4 to 20 mA Control Wiring

Table 21 — EconoMi$er IV Input/Output Logic

INPUTS					OUTPUTS			
Demand Controlled Ventilation (DCV)	Enthalpy*		Y1	Y2	Compressor		N Terminal†	
	Outdoor	Return			Stage 1	Stage 2	Occupied	Unoccupied
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).

EconoMi$er IV Standard Sensors

Table 21 provides a summary of EconoMi$er IV. Troubleshooting instructions are enclosed. A functional view of the EconoMi$er is shown in Fig. 69. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$er IV simulator program is available to help with EconoMi$er IV training and troubleshooting.

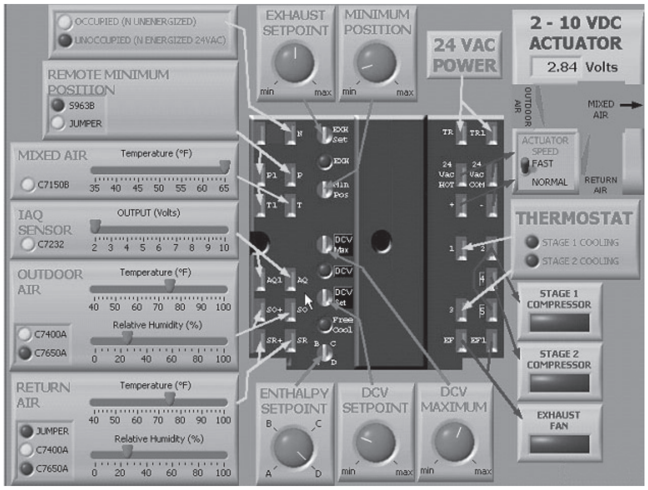


Fig. 69 — EconoMi$er IV Functional View

OUTDOOR AIR TEMPERATURE (OAT) SENSOR

The outdoor air temperature sensor (HH57AC074) is a 10 to 20 mA device used to measure the outdoor-air temperature. The outdoor-air temperature is used to determine when the EconoMi$er IV can be used for free cooling. The sensor is factory installed on the EconoMi$er IV in the outdoor airstream. See Fig. 70. The operating range of temperature measurement is 40°F to 100°F (4°C to 38°C).

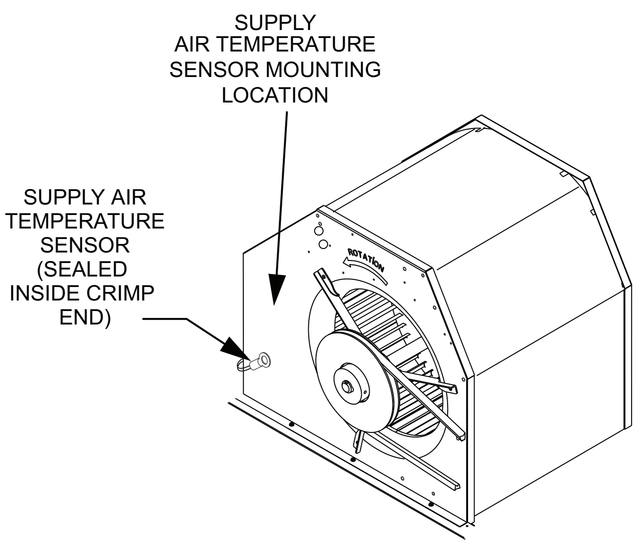


Fig. 70 — Supply Air Sensor Location

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. 70. This sensor is factory installed. The operating range of temperature measurement is 0°F to 158°F (–18°C to 70°C).

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

OUTDOOR AIR LOCKOUT SENSOR

The EconoMi$er IV is equipped with an ambient temperature lockout switch located in the outdoor airstream which is used to lock out the compressors below a 42°F (6°C) ambient temperature. See Fig. 62.

EconoMi$er IV Control Modes

IMPORTANT: The optional EconoMi$er2 does not include a controller. The EconoMi$er2 is operated by a 4 to 20 mA signal from an existing field-supplied controller. See Fig. 68 for wiring information.

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. The EconoMi$er IV is supplied from the factory with a supply-air temperature sensor and an outdoor-air temperature sensor. This allows for operation of the EconoMi$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit. See Table 22.

Table 22 — EconoMi$er IV Sensor Usage

APPLICATION	ECONOMI$ER IV 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.

OUTDOOR DRY BULB CHANGEOVER

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable set point selected on the control. If the outdoor-air temperature is above the set point, the EconoMi$er IV will adjust the outside air dampers to minimum position. If the outdoor-air temperature is below the set point, the position of the outside air dampers will be controlled to provided free cooling using outdoor air. When in this mode, the LED next to the free cooling set point potentiometer will be on. The changeover temperature set point is controlled by the free cooling set point potentiometer located on the control. See Fig. 71. The scale on the potentiometer is A, B, C, and D. See Fig. 72 for the corresponding temperature changeover values and Fig. 73 for damper leakage.

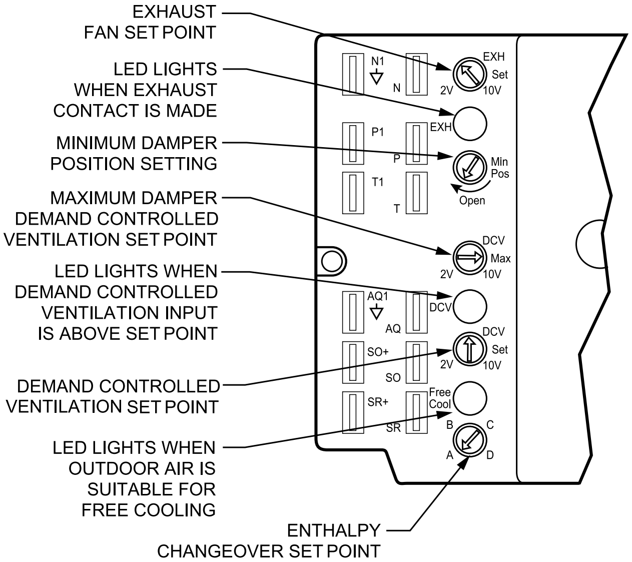


Fig. 71 — EconoMi$er IV Controller Potentiometer and LED Locations

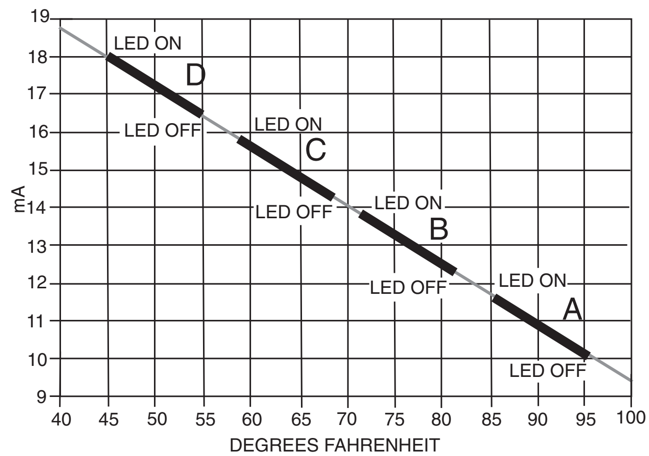


Fig. 72 — Outside Air Temperature Changeover Set Points

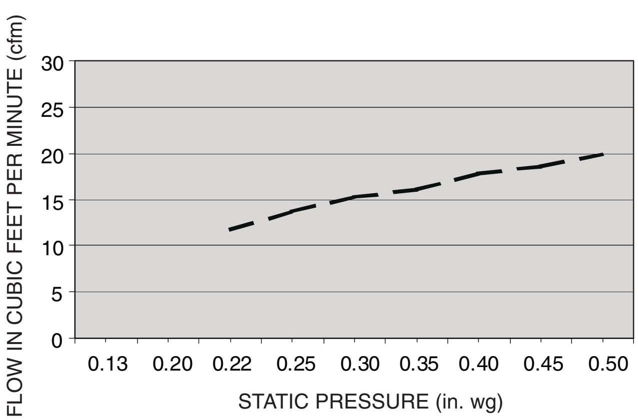


Fig. 73 — Outdoor-Air Damper Leakage

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 (P/N: CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 74. Wiring is provided in the EconoMi$er IV wiring harness.

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. 71.

OUTDOOR ENTHALPY CHANGEOVER

For enthalpy control, accessory enthalpy sensor (P/N: HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 75. 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$er IV controller. The set points are A, B, C, and D. See Fig. 76. The factory-installed 620-ohm jumper must be in place across terminals S_R and SR+ on the EconoMi$er IV controller.

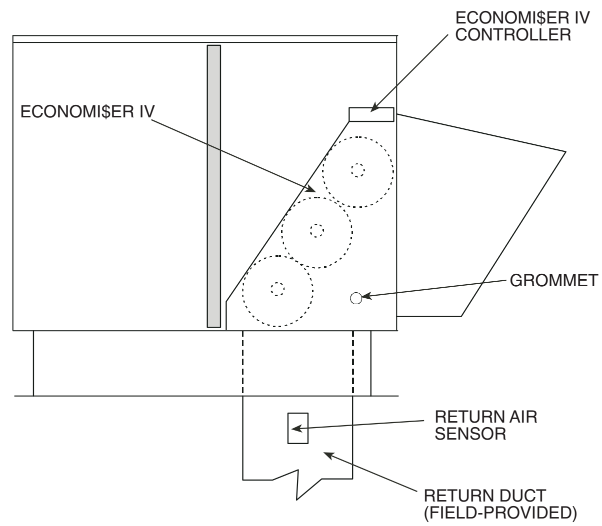


Fig. 74 — Return Air Temperature or Enthalpy Sensor Mounting Location

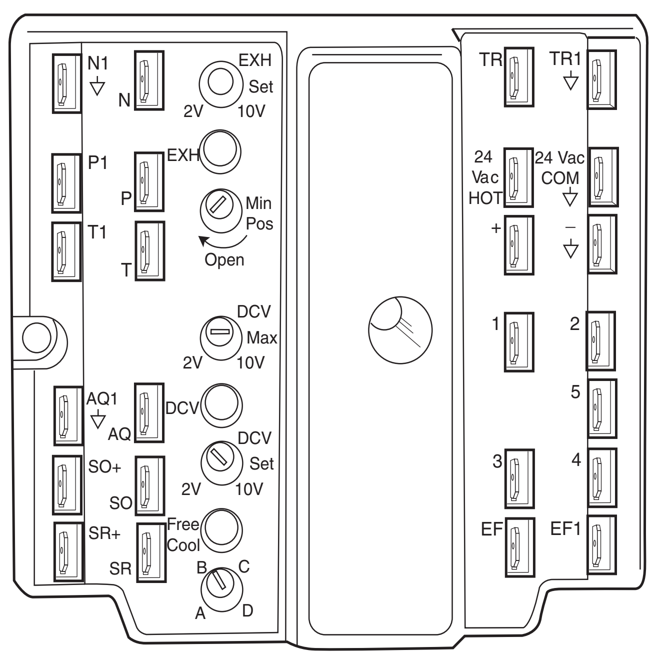


Fig. 75 — EconoMi$er IV Control

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. 75. Mount the return air enthalpy sensor in the return air duct. See Fig. 74. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 67. The outdoor enthalpy changeover set point is set with the outdoor enthalpy set point potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy set point potentiometer fully clockwise to the D setting.

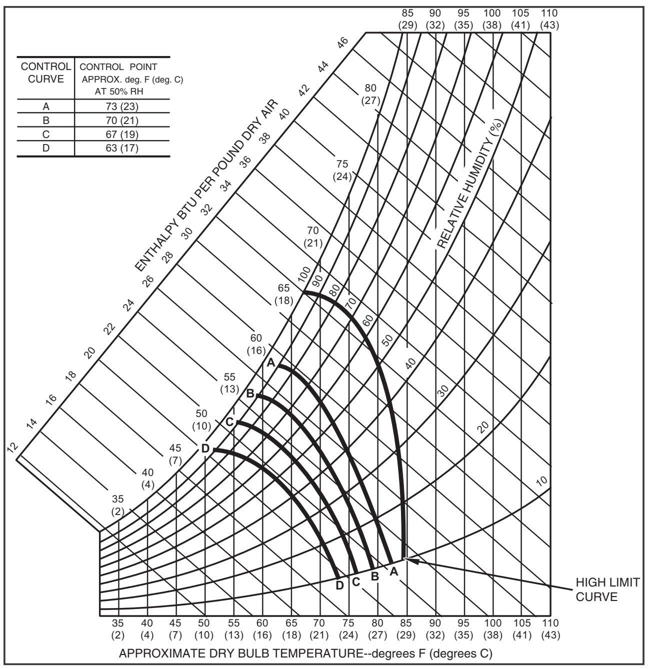


Fig. 76 — Enthalpy Changeover Set Points

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. 77.

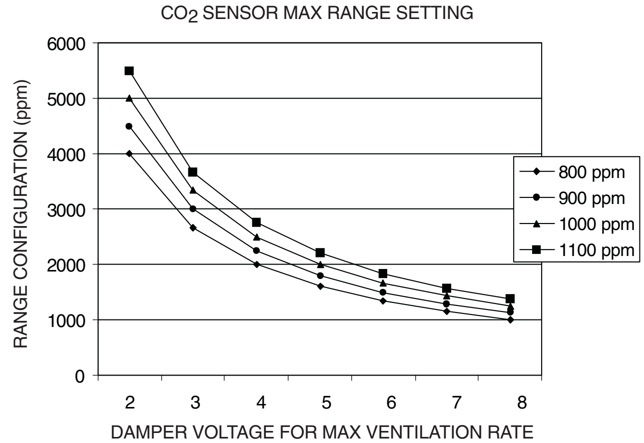


Fig. 77 — CO_2 Sensor Maximum Range Settings

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. 71. 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. 71. 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 Volatile Organic Compound (VOC) 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. 71 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$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer (Honeywell P/N: S963B1128) is wired to the EconoMi$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. 76.)

DAMPER MOVEMENT

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

THERMOSTATS

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

OCCUPANCY CONTROL

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

DEMAND CONTROLLED VENTILATION (DCV)

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

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

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

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

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

T_O = Outdoor-Air Temperature

OA = Percent of Outdoor Air

T_R = Return-Air Temperature

RA = Percent of Return Air

T_M = Mixed-Air Temperature

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

The same equation can be used to determine the occupied or maximum ventilation rate to the building. For example, an output of 3.6 volts to the actuator provides a base ventilation rate of 5% and an output of 6.7 volts provides the maximum ventilation rate of 20% (or base plus 15 cfm per person). Use Fig. 77 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. 77 to find the point when the CO_2 sensor output will be 6.7 volts. Line up the point on the graph with the left side of the chart to determine that the range configuration for the CO_2 sensor should be 1800 ppm. The EconoMi$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV set point may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$er IV controller until it rises above the 3.6 volt setting of the minimum position potentiometer.

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

CO_2 SENSOR CONFIGURATION

The CO_2 sensor has preset standard voltage settings that can be selected anytime after the sensor is powered up.

Use setting 1 or 2 for Carrier equipment.

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 select the preset number.
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$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to mid-point. The actuator should drive to between 20 and 80% open.
6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$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. 78). The W7220 can be configured with optional sensors.

Fig. 78 — 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 CO_2 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 66°C)

Temperature accuracy: 0°F/+2°F

Temperature and Humidity, C7400S1000 (optional)

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

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

Temperature accuracy: 0°F/+2°F (–18°C/–17°C)

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 56 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. 79 and Tables 23 and 24 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.

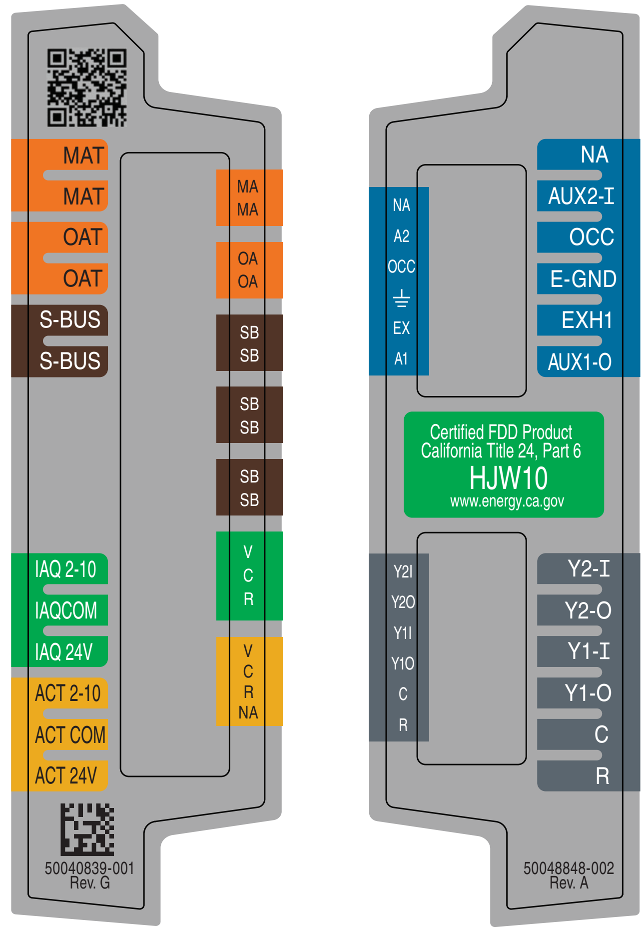


Fig. 79 — W7220 Wiring Terminals

Table 23 — 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 24 — 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. 80 and Table 25 to locate the wiring terminals for each S-Bus and enthalpy control sensor.

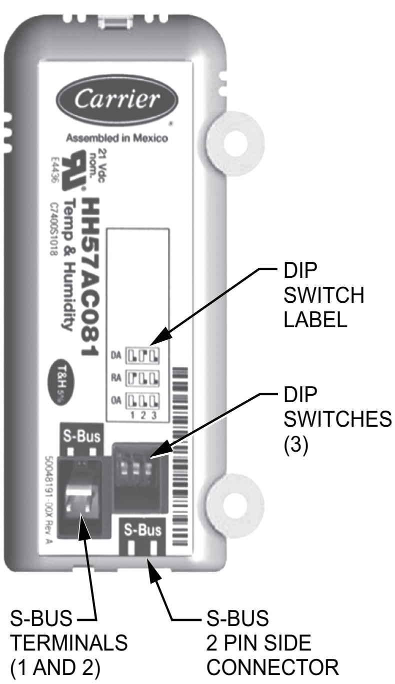


Fig. 80 — S-Bus Sensor DIP Switches

Table 25 — 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. 80 and Table 26 to set the DIP switches for the desired use of the sensor.

Table 26 — 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. 81 for CO_2 sensor wiring.

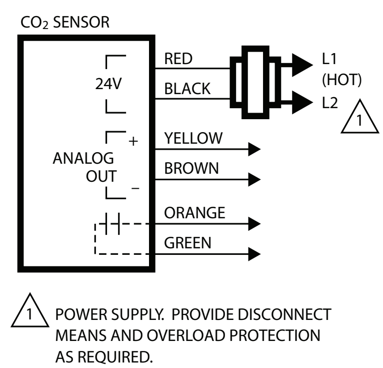


Fig. 81 — CO_2 Sensor Wiring

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. 82) 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.

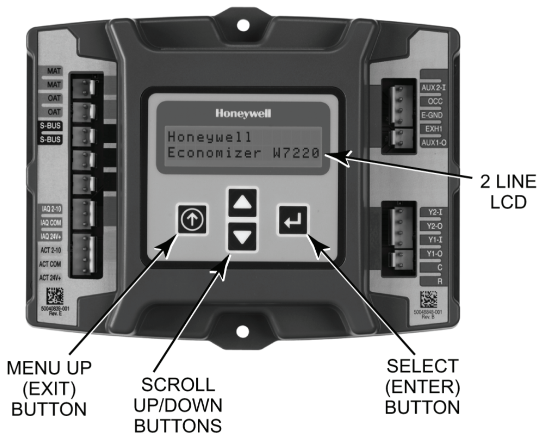


Fig. 82 — W7220 Controller Navigation Buttons

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 27 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 27 — 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 27 — 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 66 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.
				With 2-speed fan units, MIN POS L (low speed fan) and MIN POS H (high speed fan) settings are required. Default for MIN POS L is 3.2V and MIN POS H is 2.8V.
	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

Table 27 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
SETPOINTS (cont)	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. With 2-speed fan units, Exh1 L (low speed fan) and Exh1 H (high speed fan) settings are required. Default for Exh1 L is 65% and Exh1 H is 50%
	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. With 2-speed fan units, Exh2 L (low speed fan) and Exh2 H (high speed fan) settings are required. Default for Exh2 L is 80% and Exh2 H is 75%
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. NOTE: If using 2-speed fan mode, you must program CONV mode for W. Shutdown is not available in 2-speed fan 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. NOTE: 2-speed fan option also needs Heat (W1) programmed in AUX 2 In.
	FAN CFM	5000 cfm	100 to 15000 cfm; increment by 100	UNIT DESIGN AIRFLOW (CFM) Enter only if using DCVCAL ENA = AUTO This is the capacity of the RTU. The value is found on the nameplate label for the specific unit.
	AUX1 OUT	NONE	NONE ERV EXH2 SYS	Select OUTPUT for AUX1 O relay • NONE = not configured (output is not used) • ERV = Energy Recovery Ventilator†† • EXH2 = second damper position 24 vac out for second exhaust fan • SYS = use output as an alarm signal
	OCC	INPUT	INPUT or ALWAYS	OCCUPIED MODE BY EXTERNAL SIGNAL When using a setback thermostat with occupancy out (24 vac), the 24 vac is input “INPUT” to the OCC terminal. If no occupancy output from the thermostat, then change program to “ALWAYS” OR add a jumper from terminal R to OCC terminal.
	FACTORY DEFAULT	NO	NO or YES	Resets all set points to factory defaults when set to YES. LCD will briefly flash YES and change to NO but all parameters will change to the factory default values.
ADVANCED SETUP	MA LO SET	45°F (7°C)	35°F to 65°F (2°C to 18°C); Increment by 1 degree	SUPPLY AIR TEMPERATURE LOW LIMIT Temperature to activate Freeze Protection (close damper or modulate to MIN POS if temp falls below set value).
	FREEZE POS	CLO	CLO or MIN	FREEZE PROTECTION DAMPER POSITION Damper position when freeze protection is active (closed or MIN POS).
	CO2 ZERO	0ppm	0 to 500 ppm; Increment by 10	CO_2 ppm level to match CO_2 sensor start level.
	CO2 SPAN	2000ppm	1000 to 3000 ppm; Increment by 50	CO_2 ppm span to match CO_2 sensor; e.g.: 500-1500 sensor output would be 500 CO_2 zero and 1000 CO_2 span.
	STG3 DLY	2.0h	0 min, 5 min, 15 min, then 15 min intervals. Up to 4 hrs or OFF	COOLING STAGE 3 DELAY Delay after stage 2 cool has been active. Turns on second stage of cooling when economizer is first stage call and mechanical cooling is second stage call. Allows three stages of cooling, 1 economizer and 2 mechanical. OFF = no Stage 3 cooling
	SD DMPR POS	CLO	CLO or OPN	Indicates shutdown signal from space thermostat or unitary controller. When controller receives 24 vac input on the SD terminal in conventional mode, the OA damper will open if programmed for OPN and OA damper will close if programmed for CLO. All other controls, e.g., fans, etc. will shut off.
	DA LO ALM	45°F (7°C)	NONE 35°F to 65°F (2°C to 18°C); Increment by 5°F	Used for alarm for when the DA air temperature is too low. Set lower range of alarm, below this temperature the alarm will show on the display.

Table 27 — W7220 Menu Structure* (cont)

MENU	PARAMETER	PARAMETER DEFAULT VALUE	PARAMETER RANGE AND INCREMENT†	EXPANDED PARAMETER NAME Notes
ADVANCED SETUP (cont)	DA HI ALM	80°F (27°C)	NONE 70°F to 180°F (21°C to 82°C); Increment by 5°F	Used for alarm for when the DA air temperature is too high. Sets upper range of alarm; above this temperature, the alarm will show on the display.
	DCVCAL ENA	MAN	MAN (manual) AUTO	Turns on the DCV automatic control of the dampers. Resets ventilation based on the RA, OA, and MA sensor conditions. Requires all (RA, OA, MA, CO_2) sensors. This operation is not operable with a 2-speed fan unit.
	MAT T CAL	0.0°F	± 2.5°F	SUPPLY AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OAS T CAL	0.0°F	± 2.5°F	OUTSIDE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	OA H CAL	0% RH	±10% RH	OUTSIDE AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	RA T CAL	0.0°F	± 2.5°F	RETURN AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	RA H CAL	0% RH	±10% RH	RETURN AIR HUMIDITY CALIBRATION Allows for operator to adjust for an out of calibration humidity sensor.
	DA T CAL	0.0°F	± 2.5°F	DISCHARGE AIR TEMPERATURE CALIBRATION Allows for the operator to adjust for an out of calibration temperature sensor.
	2SP FAN DELAY	5 Minutes	0 to 20 minutes in 1 minute increments	TIME DELAY ON SECOND STAGE ECONOMIZING When in economizing mode, this is the delay for the high speed fan to try to satisfy the call for second stage cooling before the first stage mechanical cooling is enabled.
CHECKOUT***	DAMPER MINIMUM POSITION	N/A	N/A	The checkout for the damper minimum position is based on the system. See Table 28.
	DAMPER OPEN	N/A	N/A	Position damper to the full open position. Exhaust fan contacts enable during the DAMPER OPEN test. Make sure to pause in the mode to allow exhaust contacts to energize due to the delay in the system.
	DAMPER CLOSE	N/A	N/A	Positions damper to the fully closed position
	CONNECT Y1–O	N/A	N/A	Closes the Y1-O relay (Y1-O)
	CONNECT Y2–O	N/A	N/A	Closes the Y2-O relay (Y2-O)
	CONNECT AUX1–O	N/A	N/A	Energizes the AUX output. If Aux setting is: • NONE — no action taken • ERV — 24 vac out. Turns on or signals an ERV that the conditions are not good for economizing but are for ERV operation.†† • SYS — 24 vac out. Issues a system alarm
	CONNECT EXH1	N/A	N/A	Closes the power exhaust fan 1 relay (EXH1)
ALARMS	Alarms display only when they are active. The menu title “ALARMS(#)” includes the number of active alarms in parenthesis ( ). When using SYLK bus sensors, “SYLK” will appear on the screen, and when using 20k OA temperature sensors, “SENS T” will appear on the screen			
	MA T SENS ERR	N/A	N/A	SUPPLY AIR TEMPERATURE SENSOR ERROR Mixed air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	CO2 SENS ERR	N/A	N/A	CO_2 SENSOR ERROR CO_2 sensor has failed, gone out of range or become disconnected - check wiring then replace sensor if the alarm continues.
	OA SYLK T ERR	N/A	N/A	OUTSIDE AIR S-BUS SENSOR ERROR Outdoor air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SYLK H ERR	N/A	N/A	
	RA SYLK T ERR	N/A	N/A	RETURN AIR S-BUS SENSOR ERROR Return air enthalpy sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	RA SYLK H ERR	N/A	N/A	
	DA SYLK T ERR	N/A	N/A	DISCHARGE AIR S-BUS SENSOR ERROR Discharge air sensor has failed or become disconnected - check wiring, then replace sensor if the alarm continues.
	OA SENS T ERR	N/A	N/A	OUTSIDE AIR TEMPERATURE SENSOR ERROR Outdoor air temperature sensor has failed or become disconnected - check wiring, then replace if the alarm continues.
	ACT ERROR	N/A	N/A	ACTUATOR ERROR Actuator has failed or become disconnected - check for stall, over voltage, under voltage and actuator count. Replace actuator if damper is movable and supply voltage is between 21.6 V and 26.4 V. Check actuator count on STATUS menu.

Table 27 — W7220 Menu Structure* (cont)

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

LEGEND

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

* Table 27 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 28. For dry bulb operation with a 1-speed fan, with or without DCV, see Tables 29 and 30. For enthalpy operation with a 1-speed fan, with or without DCV, see Tables 31 and 32. For dry bulb operation with a 2-speed indoor fan, with or without DCV, see Tables 33 and 34. For enthalpy operation with a 2-speed indoor fan, with or without DCV, see Tables 35 and 36.

Table 28 — 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
	2	MIN POS H	VMAX–HS
		MIN POS L	VMAX–LS
YES	1	VENT MIN	VMAX–HS
		VENT MAX	VMAX–HS
	2	VENT MIN H	VMAX–HS
		VENT MAX H	VMAX–LS
		VENT MIN L	N/A
		VENT MAX L	N/A

Table 29 — 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 30 — 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 Y–I and Y2–I have not been satisfied.

Table 31 — 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 Y–I and Y2–I have not been satisfied.

Table 32 — 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 Y–I and Y2–I have not been satisfied.

Table 33 — Dry Bulb Operation without DCV (CO_2 Sensor) — 2 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	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	24-v/On	0-v/Off	MIN POS L	Closed
		On	On	High	24-v/On	24-v/On	MIN POS H	Closed
NONE	Yes	Off	Off	Low	0-v/Off	0-v/Off	MIN POS L	Closed
		On	Off	Low	0-v/Off	0-v/Off	MIN POS L to Full-Open	Closed to Full-Open
		On	On	High	DELAY* 24-v/On	0-v/Off†	MIN POS H 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 Y–I and Y2–I have not been satisfied.

Table 34 — Dry Bulb Operation with DCV (CO_2 Sensor) — 2 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	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	24v/On	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
Above CO_2 Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN to VENTMAX	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN to VENTMAX	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/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.

Table 35 — Enthalpy Operation without DCV (CO_2 Sensor) — 2 Speed Fan

DEMAND CONTROLLED VENTILATION (DCV)	OUTSIDE AIR GOOD TO ECONOMIZE	Y1-I	Y2-I	FAN SPEED	Y1-O	Y2-O	OCCUPIED	UNOCCUPIED
NO CO_2 SENSOR	NO	OFF	OFF	LOW	0v/Off	0v/Off	MIN POS	Closed
		ON	OFF	LOW	24v/On	0v/Off	MIN POS	Closed
		ON	ON	HIGH	24v/On	24v/On	MIN POS	Closed
	YES	OFF	OFF	LOW	0v/Off	0v/Off	MIN POS	Closed
		ON	OFF	LOW	0v/Off	0v/Off	MIN POS to Full Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/Off†	MIN POS 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.

Table 36 — Enthalpy Operation with DCV (CO_2 Sensor) — 2 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	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	24v/On	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
Above CO_2 Set	No	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	24v/On	0v/Off	VENTMIN to VENTMAX	Closed
		ON	ON	HIGH	24v/On	24v/On	VENTMIN to VENTMAX	Closed
	Yes	OFF	OFF	LOW	0v/Off	0v/Off	VENTMIN to VENTMAX	Closed
		ON	OFF	LOW	0v/Off	0v/Off	VENTMIN to Full-Open	Closed to Full-Open
		ON	ON	HIGH	DELAY* 24v/On	0v/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 83 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 38 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 83 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.

TWO-SPEED FAN OPERATION

The W7220 controller has the capability to work with a system using a 2-speed supply fan. The W7220 does not control the supply directly but uses the following input status to determine the speed of the supply fan and controls the OA damper to the required position, see Table 37.

Table 37 — Fan Speed

STATE	FAN SPEED
OCC	Low
Y1	Low
Y2	High
W	High

The W (heating mode) is not controlled by the W7220 but it requires the status to know where to position the OA damper for minimum position for the fan speed.

The 2-speed fan delay is available when the system is programmed for 2-speed fan (in the System Setup menu item). The 2-speed fan delay is defaulted to 5 minutes and can be changed in the Advanced Setup menu item. When the unit has a call for Y1 In and in the free cooling mode and there is a call for Y2 In, the 2-speed fan delay starts and the OA damper will modulate 100% open, the supply fan should be set to high speed by the unit controller.

After the delay one of two actions will happen:

- The Y2 In call will be satisfied with the damper 100% open and fan on high speed and the call will turn off

OR

- If the call for additional cooling in the space has not been satisfied then the first stage of mechanical cooling will be enabled through Y1 Out or Y2 Out.

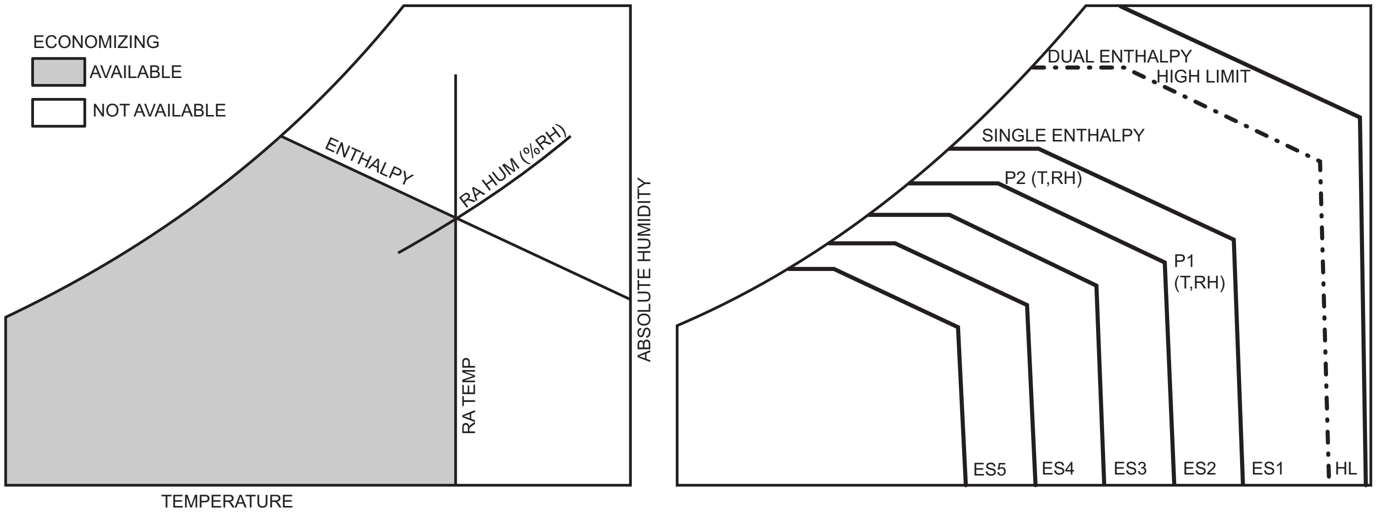


Fig. 83 — Single Enthalpy Curve Boundaries

Table 38 — 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 56.

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 27) 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 56.

Checkout Tests

Use the Checkout menu (see page 61) 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 56.

To perform a Checkout test:

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

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage.

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

TROUBLESHOOTING

Alarms

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

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

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

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

Clearing Alarms

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

To clear an alarm, perform the following:

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

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

PRE-START-UP/START-UP

⚠ WARNING

PERSONAL INJURY HAZARD

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

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

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

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

1. Remove all access panels.
2. Read and follow instructions on all WARNING, CAUTION, and INFORMATION labels attached to, or shipped with, unit.
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 for more details.
   b. Make sure that air filter(s) is 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.

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

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

Additional Installation/Inspection

Inspect the field installed accessories for proper installation, making note of which ones do or do not require configuration changes.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig (3450 Pa). Pressures greater than 0.5 psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced before use. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, a unit connected to such piping must be isolated by closing the manual gas valve(s).

⚠ WARNING

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

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

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠ AVERTISSEMENT

RISQUE D´INCENDIE OU D´EXPLOSION

Si les consignes de sécurité ne sont pas suivies à la lettre, cela peut entraîner la mort, de graves blessures ou des dommages matériels.

Ne pas entreposer ni utiliser d´essence ni autres vapeurs ou liquides inflammables à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI UNE ODEUR DE GAZ EST DÉTECTÉE

- Ne mettre en marche aucun appareil.
- Ne toucher aucun interrupteur électrique; ne pas utiliser de téléphone dans le bâtiment.
- Quitter le bâtiment immédiatement.
- Appeler immédiatement le fournisseur de gaz en utilisant le téléphone d´un voisin. Suivre les instructions du fournisseur de gaz.
- Si le fournisseur de gaz n´est pas accessible, appeler le service d´incendie.

L´installation et l´entretien doivent être effectués par un installateur ou une entreprise d´entretien qualifié, ou le fournisseur de gaz.

Return-Air Filters

Ensure correct filters are installed in unit (see Appendix B — Physical Data). 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:

4. Note that the evaporator fan is probably also rotating in the wrong direction.
5. Turn off power to the unit and install lockout tag.
6. Reverse any two of the unit power leads.
7. 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.

Main Burners

Main burners are factory set and should require no adjustment.

To check ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. Check heating effect, then lower the thermostat setting below the room temperature and verify that the burners and evaporator fan turn off.

Refer to Tables 15-18 for the correct orifice to use at high altitudes.

Heating

1. Purge gas supply line of air by opening union ahead of the gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO or ON position. Set heating temperature lever above room temperature.

4. The induced-draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burner does not light, then there is a 22-second delay before another 5-second try. If the burner still does not light, the time delay is repeated. If the burner does not light within 15 minutes, there is a lockout. To reset the control, break the 24-v power to W1.
6. The evaporator-fan motor will turn on 45 seconds after burner ignition.
7. The evaporator-fan motor will turn off in 45 seconds after the thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

NOTE: The default value for the evaporator-fan motor on/off delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the on delay can be reduced to 0 seconds and the off delay can be extended to 180 seconds. When one flash of the LED is observed, the evaporator-fan on/off delay has been modified.

If the limit switch trips at the start of the heating cycle during the evaporator on delay, the time period of the on delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan on delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5-second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

The evaporator-fan off delay can also be modified. Once the call for heating has ended, there is a 10-minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan off delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan off delay to 180 seconds.

To restore the original default value, reset the power to the unit.

To shut off unit, set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut 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. When the evaporator-fan selector switch is turned to the OFF position, there is a 30-second delay before the fan turns off.

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).

Use the Carrier network communication software to start up and configure the PremierLink controller.

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

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

For specific operating instructions, refer to the literature provided with user interface software.

NOTICE

SET-UP INSTRUCTIONS

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

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

Perform System Check-Out

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

START-UP, RTU-OPEN CONTROLS

NOTICE

SET-UP INSTRUCTIONS

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

FASTENER TORQUE VALUES

See Table 39 for Torque values.

Table 39 — Torque Values

LOCATION	TORQUE VALUE
Supply fan motor mounting	120 in-lbs (13.6 Nm) ±12 in-lbs (1.4Nm)
Supply fan motor adjustment plate	120 in-lbs (13.6 Nm) ±12 in-lbs (1.4Nm)
Motor pulley setscrew	72 in-lbs (8.1 Nm) ± 5 in-lbs (0.6 Nm)
Fan pulley setscrew	72 in-lbs (8.1 Nm) ± 5 in-lbs (0.6 Nm)
Blower wheel hub setscrew	72 in-lbs (8.1 Nm) ± 5 in-lbs (0.6 Nm)
Bearing locking collar setscrew	50 in-lbs (6.2 Nm) – 60 in-lbs (6.8 Nm)
Compressor mounting bolts	65 in-lbs (7.3 Nm) – 75 in-lbs (8.5Nm)
Condenser fan motor mounting bolts	20 in-lbs (2.3 Nm) ± 2 in-lbs 0.2 Nm)
Condenser fan hub setscrew	84 in-lbs (9.5 Nm) ± 12 in-lbs (1.4 Nm)

APPENDIX A — MODEL NUMBER NOMENCLATURE

48 HC D E 09 A 2 A 6 A 0 A 3 B 0

Unit Heat Type
48 - Gas Heat Packaged Rooftop

Model Series - WeatherMaster®
HC - High Efficiency

Heat Options
D = Low Gas Heat
E = Medium Gas Heat
F = High Gas Heat
L = Low NOx - Low Gas Heat
M = Low NOx - Medium Gas Heat
N = Low NOx - High Gas Heat
S = Low Heat w/ Stainless Steel Exchanger
R = Medium Heat w/ Stainless Steel Exchanger
T = High Heat w/ Stainless Steel Exchanger
(Low NOx models include – Stainless Steel HX)

Refrig. Systems Options
A = Single stage cooling models
B = Single stage cooling models with Humidi-MiZer®
D = Two stage cooling models
E = Two stage cooling models with Humidi-MiZer
F = Single stage cooling models with Motormaster® Low Ambient Controller
G = Two stage cooling models with Motormaster Low Ambient Controller

Cooling Tons

04 - 3 ton	09 - 8.5 ton
05 - 4 ton	11 - 10 ton (12.0 EER)*
06 - 5 ton	12 - 10 ton (11.5 EER)*
07 - 6 ton	14 - 12.5 ton
08 - 7.5 ton	

Sensor Options
A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO_2
F = RA Smoke Detector and CO_2
G = SA Smoke Detector and CO_2
H = RA + SA Smoke Detector and CO_2
J = Condensate Overflow Switch
K = Condensate Overflow Switch and RA Smoke Detectors
L = Condensate Overflow Switch and RA + SA Smoke Detectors

Indoor Fan Options 3, 4, 5 Ton Models Only
0 = Electric (Direct) Drive x13 Motor
2 = Medium Static Option - Belt Drive
3 = High Static Option - Belt Drive
Indoor Fan Options 6-12.5 Ton Models Only
1 = Standard Static Option - Belt Drive
2 = Medium Static Option - Belt Drive
3 = High Static Option - Belt Drive
C = High Static Option with High-Efficiency Motor, Belt Drive (Size 14 only)

Coil Options (RTPF) (Outdoor - Indoor - Hail Guard)
A = Al/Cu - Al/Cu
B = Precoat Al/Cu - Al/Cu
C = E-coat Al/Cu - Al/Cu
D = E-coat Al/Cu - E-coat Al/Cu
E = Cu/Cu - Al/Cu
F = Cu/Cu - Cu/Cu
M = Al/Cu -Al/Cu — Louvered Hail Guard
N = Precoat Al/Cu - Al/Cu — Louvered Hail Guard
P = E-coat Al/Cu - Al/Cu — Louvered Hail Guard
Q = E-coat Al/Cu - E-coat Al/Cu — Louvered Hail Guard
R = Cu/Cu - Al/Cu — Louvered Hail Guard
S = Cu/Cu - Cu/Cu — Louvered Hail Guard

Factory Assigned
0 = Standard
1 = LTL

Electrical Options†
A = None
B = HACR Breaker
C = Non-Fused Disconnect
D = Thru-The-Base Connections
E = HACR and Thru-The Base Connections
F = Non-Fused Disconnect and Thru-The-Base Connections
G = 2-Speed Indoor Fan (VFD) Controller
H = 2-Speed Fan Controller (VFD) and HACR Breaker
J = 2-Speed Fan Controller (VFD) and Non-Fused Disconnect
K = 2-Speed Fan Controller (VFD) and Thru-The-Base Connections
L = 2-Speed Fan Controller (VFD) w/ HACR Breaker and Thru-The Base Connections
M = 2-Speed Fan Controller (VFD) with Non-Fused Disconnect and Thru-The-Base Connections

Service Options
0 = None
1 = Unpowered Convenience Outlet
2 = Powered Convenience Outlet
3 = Hinged Panels
4 = Hinged Panels and Unpowered Convenience Outlet
5 = Hinged Panels and Powered Convenience Outlet
C = Foil Faced Insulation
D = Foil Faced Insulation with Unpowered Convenience Outlet
E = Foil Faced Insulation with Powered Convenience Outlet
F = Foil Faced Insulation & Hinged Panels
G = Foil Faced Insulation & Hinged Panels with Unpowered Convenience Outlet
H = Foil Faced Insulation & Hinged Panels with Powered Convenience Outlet

Intake / Exhaust Options
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = 2-Position Damper
Q = EnergyX only
R = EnergyX + Economizer only**
S = EnergyX + Frost Protection only**
T = EnergyX + Economizer + Frost Protection**
U = Low Leak Temperature Economizer w/ Barometric Relief
W = Low Leak Enthalpy Economizer w/ Barometric Relief

Base Unit Controls
0 = Electromechanical Controls can be used with W7212 Controller (Non-Fault Detection and Diagnostic)
1 = PremierLink™ Controller
2 = RTU Open Multi-Protocol Controller
6 = Electro-mechanical w/ 2-speed fan and W7220 controller (w/ Fault Detection & Diagnostic). Can be used with EconoMi$erX
D = ComfortLink Controls (Not available on 2-stage cooling 07 size models or size 11 with Humidi-Mizer®)

Design Revision
A = Factory Design Revision

Voltage††

1 = 575/3/60	5 = 208-230/3/60
3 = 208-230/1/60	6 = 460/3/60

* Staged Air Volume (SAV) is required on sizes 11 and 12 units to meet DOE-2018 minimum efficiency requirements.
† Units sold in the US require a 2-speed fan.
** Includes ComfortLink controls.
†† On single phase models (-3 voltage code), the following are not available as factory-installed options:
- Humidi-MiZer System
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2-Position Damper
- Powered 115 v Convenience Outlet

Fig. A — Model Number Nomenclature

APPENDIX B — PHYSICAL DATA

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

		48HC*A04	48HC*B04	48HC*A05	48HC*B05	48HC*A06	48HC*B06
Refrigeration System							
	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
	Puron® refrigerant (R-410A) charge (lb-oz)	9 - 0	—	12 - 8	—	13 - 3	—
	Humidi-MiZer Puron® refrigerant (R-410A) charge (lb-oz)	—	11 - 0	—	19 - 12	—	20 - 0
	oil A/B (oz)	25	25	42	42	42	42
	Metering Device	TXV	TXV	TXV	TXV	TXV	TXV
	Humidi-MiZer Metering Device	none	none	none	none	none	none
	High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505
	Low-press. Trip / Reset (psig)	54 / 117	N/A	54 / 117	N/A	54 / 117	N/A
	Loss of charge Trip/Reset (psig)	N/A	27 / 44	N/A	27 / 44	N/A	27 / 44
Evaporation Coil							
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	3 / 15	3 / 15	3 / 15	3 / 15	4 / 15	4 / 15
	Total Face Area (ft^2)	5.5	5.5	7.3	7.3	7.3	7.3
	Condensate Drain Conn. Size	3/4”	3/4”	3/4”	3/4”	3/4”	3/4”
Humidi-MiZer® Coil							
	Material	N/A	Cu / Al	N/A	Cu / Al	N/A	Cu / Al
	Coil Type	N/A	3/8” RTPF	N/A	3/8” RTPF	N/A	3/8” RTPF
	Rows / FPI	N/A	1 / 17	N/A	2 / 17	N/A	2 / 17
	Total Face Area (ft^2)	N/A	3.9	N/A	5.2	N/A	5.2
Evap. Fan and Motor							
STANDARD STATIC 1 PHASE	Motor Qty / Drive Type	1 / Direct	1 / Belt	1 / Direct	1 / Belt	1 / Direct	1 / Belt
	Max BHP	1	1.2	1	1.2	1	1.2
	RPM Range	600-1200	560-854	600-1200	560-854	600-1200	770-1175
	Motor Frame Size	48	48	48	48	48	48
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10
MEDIUM STATIC 1 PHASE	Motor Qty / Drive Type	N/A	1 / Belt	N/A	1 / Belt	N/A	1 / Belt
	Max BHP	N/A	1.2	N/A	1.2	N/A	1.5
	RPM Range	N/A	770-1175	N/A	770-1175	N/A	1035-1466
	Motor Frame Size	N/A	48	N/A	48	N/A	56
	Fan Qty / Type	N/A	1 / Centrifugal	N/A	1 / Centrifugal	N/A	1 / Centrifugal
	Fan Diameter (in.)	N/A	10 x 10	N/A	10 x 10	N/A	10 x 10
STANDARD STATIC 3 PHASE	Motor Qty / Drive Type	1 / Direct	1 / Belt	1 / Direct	1 / Belt	1 / Direct	1 / Belt
	Max BHP	1	1.7	1	1.7	1	1.7
	RPM Range	600-1200	560-854	600-1200	560-854	600-1200	770-1175
	Motor Frame Size	48	48	48	48	48	48
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10	10 x 10	11 x 10	10 x 10
MEDIUM STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	1.7	1.7	2.4	2.4
	RPM Range	770-1175	770-1175	920-1303	770-1175	1035-1466	1035-1466
	Motor Frame Size	48	48	56	48	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10
HIGH STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.4	2.9	2.9	2.9	2.9
	RPM Range	1035-1466	1035-1466	1208-1550	1208-1550	1303-1550	1303-1550
	Motor Frame Size	56	56	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10	10 x 10
Cond. coil							
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	12.7	12.7	21.3	21.3	21.3	21.3

APPENDIX B — PHYSICAL DATA

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

	48HC*A04	48HC*B04	48HC*A05	48HC*B05	48HC*A06	48HC*B06
Cond. fan / motor						
Qty / Motor Drive Type	1 / direct	1 / direct	1 / direct	1 / direct	1 / direct	1 / direct
Motor HP / RPM	$^1/_8$ / 825	$^1/_8$ / 825	$^1/_4$ / 1100	$^1/_4$ / 1100	$^1/_4$ / 1100	$^1/_4$ / 1100
Fan diameter (in.)	22	22	22	22	22	22
Filters						
RA Filter qty / Size (in.)	2 / 16 x 25 x 2	2 / 16 x 25 x 2	4 / 16 x 16 x 2	4 / 16 x 16 x 2	4 / 16 x 16 x 2	4 / 16 x 16 x 2
OA inlet screen qty / Size (in.)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

APPENDIX B — PHYSICAL DATA

Table B — PHYSICAL DATA (Cooling) 6 Tons

		48HC*A07	48HC*B07	48HC*D07	48HC*E07
Refrigeration System					
	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / 2-Stage Scroll	1 / 1 /2-Stage Scroll
	Puron® refrigerant (R-410A) charge (lb-oz)	14 - 0	—	14 - 0	—
	Humidi-MiZer Puron® refrigerant (R-410A) charge (lb-oz)	—	22 - 8	—	22 - 8
	oil A/B (oz)	56	56	56	56
	Metering Device	TXV	TXV	TXV	TXV
	Humidi-MiZer Metering Device	none	none	none	none
	High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low-press. Trip / Reset (psig)	54 / 117	N/A	54 / 117	N/A
	Loss of charge Trip/Reset (psig)	N/A	27 / 44	N/A	27 / 44
Evaporation Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	$^3/_8$” RTPF	$^3/_8$” RTPF	$^3/_8$” RTPF	$^3/_8$” RTPF
	Rows / FPI	3 / 15	3 / 15	3 / 15	3 / 15
	Total Face Area (ft^2)	8.9	8.9	8.9	8.9
	Condensate Drain Conn. Size	$^3/_4$”	$^3/_4$”	$^3/_4$”	$^3/_4$”
Humidi-MiZer® Coil					
	Material	N/A	Cu / Al	N/A	Cu / Al
	Coil Type	N/A	$^3/_8$” RTPF	N/A	$^3/_8$” RTPF
	Rows / FPI	N/A	2 / 17	N/A	2 / 17
	Total Face Area (ft^2)	N/A	5.2	N/A	5.2
Evap. Fan and Motor					
STANDARD STATIC 1 PHASE	Motor Qty / Drive Type	n/a / Belt	n/a / Belt	n/a / Belt	n/a / Belt
	Max BHP	N/A	N/A	N/A	N/A
	RPM Range	N/A	N/A	N/A	N/A
	Motor Frame Size	N/A	N/A	N/A	N/A
	Fan Qty / Type	n/a / Centrifugal	n/a / Centrifugal	n/a / Centrifugal	n/a / Centrifugal
	Fan Diameter (in.)	N/A	N/A	N/A	N/A
MEDIUM STATIC 1 PHASE	Motor Qty / Drive Type	n/a / Belt	n/a / Belt	n/a / Belt	n/a / Belt
	Max BHP	N/A	N/A	N/A	N/A
	RPM Range	N/A	N/A	N/A	N/A
	Motor Frame Size	N/A	N/A	N/A	N/A
	Fan Qty / Type	n/a / Centrifugal	n/a / Centrifugal	n/a / Centrifugal	n/a / Centrifugal
	Fan Diameter (in.)	N/A	N/A	N/A	N/A
STANDARD STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	1.7	1.7
	RPM Range	489-747	489-747	489-747	489-747
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
MEDIUM STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.9	2.9	2.9	2.9
	RPM Range	733-949	733-949	733-949	733-949
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
HIGH STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	4.7	4.7	4.7	4.7
	RPM Range	909-1102	909-1102	909-1102	909-1102
	Motor Frame Size	14	14	14	14
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
Cond. coil					
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	$^3/_8$” RTPF	$^3/_8$” RTPF	$^3/_8$” RTPF	$^3/_8$” RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	20.5	20.5	20.5	20.5

APPENDIX B — PHYSICAL DATA

Table B — PHYSICAL DATA (Cooling) 6 Tons (cont)

	48HC*A07	48HC*B07	48HC*D07	48HC*E07
Cond. fan / motor				
Qty / Motor Drive Type	2 / direct	2 / direct	2 / direct	2 / direct
Motor HP / RPM	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100	$^{1}/_{4}$ / 1100
Fan diameter (in.)	22	22	22	22
Filters				
RA Filter qty / Size (in.)	4 / 16 x 20 x 2	4 / 16 x 20 x 2	4 / 16 x 20 x 2	4 / 16 x 20 x 2
OA inlet screen qty / Size (in.)	1 / 20 x 36 x 1	1 / 20 x 36 x 1	1 / 20 x 36 x 1	1 / 20 x 36 x 1

APPENDIX B — PHYSICAL DATA

Table C — PHYSICAL DATA (Cooling) 7.5-8.5 Tons

		48HC*D08	48HC*E08	48HC*D09	48HC*E09
Refrigeration System					
	# Circuits / # Comp. / Type	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
	RTPF models R-410a charge A/B (lbs - oz)	9 - 10 / 9 - 10	—	9 -14 / 9 - 14	—
	Alternate (Humidimizer) R-410a charge A/B (lbs - oz)	—	17 - 0 / 17 - 0	—	15 - 2 / 15 - 0
	oil A/B (oz)	42 / 42	42 / 42	42 / 42	42 / 42
	Metering device	TXV	TXV	TXV	TXV
	Alternate (Humidimizer) Metering device	none	none	none	none
	High-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low-press. Trip / Reset (psig)	54 / 117	N/A	54 / 117	N/A
	Loss of charge Trip / Reset (psig)	N/A	27 / 44	N/A	27 / 44
Evaporation Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	4 / 15	4 / 15	4 / 15	4 / 15
	Total Face Area (ft^2)	11.1	11.1	11.1	11.1
	Condensate Drain Conn. Size	3/4"	3/4"	3/4"	3/4"
Humidi-MiZer® Coil					
	Material	—	Cu / Al	—	Cu / Al
	Coil Type	—	3/8" RTPF	—	3/8" RTPF
	Rows / FPI	—	2 / 17	—	2 / 17
	Total Face Area (ft^2)	—	6.3	—	8.4
Evap. Fan and Motor					
STANDARD STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	1.7	1.7
	RPM Range	518-733	518-733	518-733	518-733
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
MEDIUM STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.4	2.4	2.4
	RPM Range	690-936	690-936	690-936	690-936
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
HIGH STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	3.7	3.7	3.7	3.7
	RPM Range	838-1084	838-1084	838-1084	838-1084
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15
Cond. coil					
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8" RTPF	3/8" RTPF	3/8" RTPF	3/8" RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	25.1	25.1	25.1	25.1
Cond. fan / motor					
	Qty / Motor Drive Type	2 / direct	2 / direct	2 / direct	2 / direct
	Motor HP / RPM	1/4 / 1100	1/4 / 1100	1/4 / 1100	1/4 / 1100
	Fan diameter (in.)	22	22	22	22
Filters					
	RA Filter qty / Size (in.)	4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2
	OA inlet screen qty / Size (in.)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

APPENDIX B — PHYSICAL DATA

Table D — PHYSICAL DATA (Cooling) 10-12.5 Tons

		48HC*D11	48HC*E11	48HC*D12	48HC*E12	48HC*D14	48HC*E14
Refrigeration System							
	# Circuits / # Comp. / Type	2/2/Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
	RTPF models R-410a charge A/B (lbs - oz)	12-10/ 13-0	18-0/18-0	12-11/ 12-5	—	16-7 / 15-5	—
	Alternate (Humidimizer) R-410a charge A/B (lbs - oz)	—	—	—	—	—	—
	oil A/B (oz)	—	—	—	18 - 3 / 17 - 3	—	29 - 8 / 21 - 0
	Metering device	42 / 42	42 / 42	42 / 42	42 / 42	56/56	56/56
	Alternate (Humidimizer) Metering device	TXV	TXV	TXV	TXV	TXV	TXV
	High-press. Trip / Reset (psig)	none	none	none	none	none	none
	Low-press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505	630 / 505
	Loss of charge Trip / Reset (psig)	27/44	N/A	54 / 117	N/A	54 / 117	N/A
Evaporation Coil							
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	4 / 15	4 / 15	4 / 15	4 / 15	4 / 15	4 / 15
	Total Face Area (ft^2)	11.1	11.1	11.1	11.1	17.5	17.5
	Condensate Drain Conn. Size	3/4”	3/4”	3/4”	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	—	2/17	—	2/17	—	1 / 17
	Total Face Area (ft^2)	—	8.6	—	8.6	—	13.8
Evap. Fan and Motor							
STANDARD STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	2.4	2.4	2.4	2.4	2.9	2.9
	RPM Range	591-838	591-838	591-838	591-838	440-609	440-609
	Motor Frame Size	56	56	56	56	56Y	56Y
	Fan Qty / Type	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15	18 x 18	18 x 18
MEDIUM STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	3.7	3.7	3.7	3.7	3.7	3.7
	RPM Range	838-1084	838-1084	838-1084	838-1084	609-778	609-778
	Motor Frame Size	56HZ	56HZ	56HZ	56HZ	56HZ	56HZ
	Fan Qty / Type	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15	18 x 18	18 x 18
HIGH STATIC 3 PHASE	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt	n/a	n/a
	Max BHP	4.9	4.9	4.9	4.9	n/a	n/a
	RPM Range	1022-1240	1022-1240	1022-1240	1022-1240	n/a	n/a
	Motor Frame Size	145TY	145TY	145TY	145TY	n/a	n/a
	Fan Qty / Type	1/Centrifugal	1/Centrifugal	1/Centrifugal	1/Centrifugal	n/a	n/a
	Fan Diameter (in.)	15 x 15	15 x 15	15 x 15	15 x 15	n/a	n/a
HIGH STATIC HIGH EFFICIENCY 3 PHASE	Motor Qty / Drive Type	n/a	n/a	n/a	n/a	1 / Belt	1 / Belt
	Max BHP (208/230/460/575v)	n/a	n/a	n/a	n/a	6.5 / 6.9 / 7.0 / 8.3	6.5 / 6.9 / 7.0 / 8.3
	RPM Range	n/a	n/a	n/a	n/a	776-955	776-955
	Motor Frame Size	n/a	n/a	n/a	n/a	S184T	S184T
	Fan Qty / Type	n/a	n/a	n/a	n/a	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in.)	n/a	n/a	n/a	n/a	18 x 18	18 x 18
Cond. coil							
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil Type	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF	3/8” RTPF
	Rows / FPI	3 / 17	3 / 17	3 / 17	3 / 17	2/17	2/17
	Total Face Area (ft^2)	25.1	25.1	25.1	25.1	(2) 23.1	(2) 23.1
Cond. fan / motor							
	Qty / Motor Drive Type	1/direct-ECM	1 / direct	1 / direct	1 / direct	3 / direct	3 / direct
	Motor HP / RPM	1/1050	1 / 1175	1 / 1175	1 / 1175	1/4 / 1100	1/4 / 1100
	Fan diameter (in.)	30	30	30	30	22	22
Filters							
	RA Filter qty / Size (in.)	4 / 20x20x2	4 / 20x20x2	4 / 20x20x2	4 / 20x20x2	6 / 18x24x2	6 / 18x24x2
	OA inlet screen qty / Size (in.)	1 / 20x24x1	1 / 20x24x1	1 / 20x24x1	1 / 20x24x1	V 2 / 24x27x1 H 1 / 30x39x1	V 2 / 24x27x1 H 1 / 30x39x1

APPENDIX C — FAN PERFORMANCE

Table E — 48HC*A04 Horizontal Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	900	0.45	0.23
	975	0.33	0.22
	1050	0.22	0.20
	1125	0.12	0.19
	1200	0.05	0.17
	1275	—	—
	1350	—	—
	1425	—	—
	1500	—	—
2	900	0.66	0.30
	975	0.52	0.28
	1050	0.39	0.27
	1125	0.27	0.26
	1200	0.16	0.24
	1275	0.05	0.23
	1350	—	—
	1425	—	—
	1500	—	—
3	900	1.01	0.43
	975	0.88	0.41
	1050	0.73	0.39
	1125	0.59	0.38
	1200	0.46	0.36
	1275	0.33	0.36
	1350	0.21	0.33
	1425	0.09	0.31
	1500	—	—
4	900	1.13	0.46
	975	1.03	0.46
	1050	0.92	0.46
	1125	0.81	0.46
	1200	0.69	0.46
	1275	0.57	0.45
	1350	0.44	0.44
	1425	0.31	0.42
	1500	0.18	0.40
5	900	1.20	0.49
	975	1.14	0.51
	1050	0.92	0.53
	1125	0.81	0.55
	1200	0.95	0.57
	1275	0.90	0.60
	1350	0.84	0.62
	1425	0.78	0.65
	1500	0.72	0.68

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

Table F — 48HC*A04 Vertical Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	900	0.30	0.19
	975	0.17	0.17
	1050	0.06	0.16
	1125	—	—
	1200	—	—
	1275	—	—
	1350	—	—
	1425	—	—
	1500	—	—
2	900	0.48	0.25
	975	0.34	0.23
	1050	0.20	0.22
	1125	0.07	0.20
	1200	—	—
	1275	—	—
	1350	—	—
	1425	—	—
	1500	—	—
3	900	0.84	0.38
	975	0.69	0.36
	1050	0.53	0.33
	1125	0.38	0.32
	1200	0.24	0.31
	1275	0.10	0.31
	1350	—	—
	1425	—	—
	1500	—	—
4	900	0.99	0.43
	975	0.88	0.43
	1050	0.75	0.43
	1125	0.61	0.43
	1200	0.47	0.42
	1275	0.33	0.40
	1350	0.19	0.38
	1425	—	—
	1500	—	—
5	900	1.10	0.47
	975	1.02	0.49
	1050	0.75	0.51
	1125	0.61	0.54
	1200	0.81	0.56
	1275	0.74	0.58
	1350	0.67	0.61
	1425	0.60	0.63
	1500	0.52	0.66

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table G — 48HC*A05 Horizontal Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1200	0.49	0.35
	1300	0.34	0.33
	1400	0.20	0.31
	1500	0.06	0.29
	1600	—	—
	1700	—	—
	1800	—	—
	1900	—	—
	2000	—	—
2	1200	0.60	0.40
	1300	0.45	0.38
	1400	0.30	0.36
	1500	0.16	0.34
	1600	0.01	0.32
	1700	—	—
	1800	—	—
	1900	—	—
	2000	—	—
3	1200	0.94	0.59
	1300	0.83	0.61
	1400	0.71	0.63
	1500	0.59	0.61
	1600	0.46	0.59
	1700	0.33	0.56
	1800	0.19	0.53
	1900	0.07	0.49
	2000	—	—
4	1200	0.98	0.59
	1300	0.89	0.62
	1400	0.81	0.65
	1500	0.72	0.66
	1600	0.62	0.67
	1700	0.52	0.68
	1800	0.40	0.68
	1900	0.27	0.66
	2000	0.12	0.61
5	1200	1.02	0.60
	1300	0.95	0.63
	1400	0.81	0.67
	1500	0.72	0.70
	1600	0.74	0.74
	1700	0.67	0.78
	1800	0.59	0.82
	1900	0.51	0.86
	2000	0.42	0.89

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

Table H — 48HC*A05 Vertical Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1200	0.38	0.30
	1300	0.24	0.28
	1400	0.12	0.27
	1500	0.01	0.26
	1600	—	—
	1700	—	—
	1800	—	—
	1900	—	—
	2000	—	—
2	1200	0.49	0.34
	1300	0.34	0.32
	1400	0.20	0.31
	1500	0.05	0.29
	1600	—	—
	1700	—	—
	1800	—	—
	1900	—	—
	2000	—	—
3	1200	0.87	0.56
	1300	0.74	0.57
	1400	0.60	0.59
	1500	0.44	0.56
	1600	0.29	0.50
	1700	0.14	0.47
	1800	0.02	0.46
	1900	—	—
	2000	—	—
4	1200	0.93	0.57
	1300	0.83	0.60
	1400	0.72	0.63
	1500	0.60	0.63
	1600	0.48	0.62
	1700	0.35	0.62
	1800	0.21	0.61
	1900	0.06	0.58
	2000	—	—
5	1200	0.97	0.58
	1300	0.89	0.61
	1400	0.72	0.65
	1500	0.60	0.68
	1600	0.64	0.72
	1700	0.55	0.75
	1800	0.46	0.79
	1900	0.35	0.82
	2000	0.25	0.86

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table I — 48HC*A06 Horizontal Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1500	0.40	0.50
	1625	0.20	0.48
	1750	0.04	0.45
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
2	1500	0.62	0.62
	1625	0.39	0.60
	1750	0.19	0.57
	1875	0.03	0.53
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
3	1500	1.04	0.87
	1625	0.87	0.88
	1750	0.68	0.88
	1875	0.48	0.84
	2000	0.28	0.84
	2125	0.07	0.84
	2250	—	—
	2375	—	—
	2500	—	—
4	1500	1.10	0.90
	1625	0.96	0.94
	1750	0.81	0.98
	1875	0.65	0.95
	2000	0.47	1.00
	2125	0.27	0.94
	2250	0.05	0.96
	2375	—	—
	2500	—	—
5	1500	1.12	0.92
	1625	1.00	0.96
	1750	0.81	1.00
	1875	0.65	1.04
	2000	0.56	1.08
	2125	0.39	0.95
	2250	0.19	1.09
	2375	—	—
	2500	—	—

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

Table J — 48HC*A06 Vertical Unit - Direct Drive Fan Performance

SPEED (TORQUE) TAP	CFM	ESP	BHP
1	1500	0.27	0.45
	1625	0.08	0.43
	1750	—	—
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
2	1500	0.48	0.57
	1625	0.26	0.55
	1750	0.08	0.53
	1875	—	—
	2000	—	—
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
3	1500	0.91	0.82
	1625	0.72	0.82
	1750	0.52	0.81
	1875	0.31	0.78
	2000	0.11	0.77
	2125	—	—
	2250	—	—
	2375	—	—
	2500	—	—
4	1500	0.98	0.85
	1625	0.82	0.89
	1750	0.66	0.92
	1875	0.50	0.90
	2000	0.32	0.92
	2125	0.13	0.86
	2250	—	—
	2375	—	—
	2500	—	—
5	1500	1.00	-
	1625	0.86	0.91
	1750	0.66	0.95
	1875	0.50	0.98
	2000	0.41	1.01
	2125	0.25	0.88
	2250	0.06	1.01
	2375	—	—
	2500	—	—

LEGEND

BHP — Brake Horsepower
ESP — External Static Pressure

APPENDIX C — FAN PERFORMANCE

Table K — 48HC**04 3 Phase without Humidi-MiZer®, 3 Ton, Horizontal Supply — Belt Drive Fan Performance

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	**582**	**0.14**	**715**	**0.24**	825	0.35	921	0.48	1007	0.63
975	**606**	**0.16**	**735**	**0.26**	843	0.38	938	0.51	1023	0.66
1050	**630**	**0.18**	**756**	**0.29**	862	0.41	955	0.55	1040	0.70
1125	**655**	**0.21**	778	0.32	882	0.45	974	0.58	1057	0.74
1200	**681**	**0.24**	800	0.35	902	0.48	992	0.63	1074	0.78
1275	**708**	**0.27**	823	0.39	923	0.53	1012	0.67	1093	0.83
1350	**735**	**0.31**	847	0.43	945	0.57	1032	0.72	1112	0.88
1425	**762**	**0.35**	871	0.48	967	0.62	1053	0.77	1131	0.94
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00

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	1086	0.79	1159	0.96	1228	1.14	1293	1.33	1354	1.53
975	1101	0.82	1174	0.99	1242	1.18	1306	1.37	1367	1.57
1050	1117	0.86	1189	1.03	1256	1.22	1320	1.41	1381	1.62
1125	1133	0.90	1204	1.08	1271	1.26	1335	1.46	1395	1.67
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1275	1168	1.00	1237	1.18	1303	1.37	1365	1.57	1425	1.78
1350	1186	1.05	1255	1.24	1320	1.43	1382	1.63	1441	1.84
1425	1204	1.11	1272	1.30	1337	1.49	1398	1.70	1457	1.91
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	**1473**	**1.99**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 770-1175 RPM, 1.7 bhp max

High static 1035-1466 RPM, 2.4 bhp max

Table L — 48HC**04 3 Phase without Humidi-MiZer®, 3 Ton, Vertical Supply — Belt Drive Fan Performance

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	**592**	**0.14**	**721**	**0.25**	826	0.38	916	0.53	997	0.69
975	**616**	**0.17**	**744**	**0.28**	847	0.41	936	0.56	1016	0.72
1050	**641**	**0.19**	**766**	**0.30**	868	0.44	957	0.59	1036	0.76
1125	**667**	**0.22**	790	0.33	890	0.47	978	0.63	1056	0.80
1200	**693**	**0.25**	813	0.37	913	0.51	999	0.67	1077	0.84
1275	**720**	**0.29**	837	0.41	935	0.55	1021	0.71	1098	0.88
1350	**747**	**0.33**	862	0.45	958	0.60	1043	0.76	1119	0.94
1425	**775**	**0.37**	887	0.50	982	0.65	1066	0.81	1141	0.99
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	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	1070	0.88	1137	1.07	1201	1.29	1260	1.51	1317	1.75
975	1089	0.91	1156	1.11	1219	1.32	1279	1.54	1335	1.78
1050	1108	0.94	1175	1.14	1238	1.36	1297	1.58	1353	1.82
1125	1128	0.98	1195	1.18	1257	1.40	1316	1.62	1372	1.86
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1275	1169	1.07	1235	1.28	1296	1.50	1354	1.72	1410	1.97
1350	1190	1.13	1255	1.33	1316	1.55	1374	1.78	1429	2.03
1425	1211	1.19	1276	1.39	1337	1.61	1394	1.85	1449	2.09
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	**1469**	**2.16**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 770-1175 RPM, 1.7 bhp max

High static 1035-1466 RPM, 2.4 bhp max

APPENDIX C — FAN PERFORMANCE

Table M — 48HC**04 3 Phase with Humidi-MiZer®, 3 Ton, Horizontal Supply — Belt Drive Fan Performance

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	582	0.14	715	0.24	825	0.35	921	0.48	1007	0.63
975	606	0.16	735	0.26	843	0.38	938	0.51	1023	0.66
1050	630	0.18	756	0.29	862	0.41	955	0.55	1040	0.70
1125	655	0.21	778	0.32	882	0.45	974	0.58	1057	0.74
1200	681	0.24	800	0.35	902	0.48	992	0.63	1074	0.78
1275	708	0.27	823	0.39	923	0.53	1012	0.67	1093	0.83
1350	735	0.31	847	0.43	945	0.57	1032	0.72	1112	0.88
1425	762	0.35	871	0.48	967	0.62	1053	0.77	1131	0.94
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00

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	1086	0.79	1159	0.96	1228	1.14	1293	1.33	1354	1.53
975	1101	0.82	1174	0.99	1242	1.18	1306	1.37	1367	1.57
1050	1117	0.86	1189	1.03	1256	1.22	1320	1.41	1381	1.62
1125	1133	0.90	1204	1.08	1271	1.26	1335	1.46	1395	1.67
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1275	1168	1.00	1237	1.18	1303	1.37	1365	1.57	1425	1.78
1350	1186	1.05	1255	1.24	1320	1.43	1382	1.63	1441	1.84
1425	1204	1.11	1272	1.30	1337	1.49	1398	1.70	1457	1.91
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	**1473**	**1.99**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 560-854 RPM, 1.7 bhp max

Medium static 770-1175 RPM, 1.7 bhp max

High static 1035-1466 RPM, 2.4 bhp max

Table N — 48HC**04 3 Phase with Humidi-MiZer®, 3 Ton, Vertical Supply — Belt Drive Fan Performance

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	592	0.14	721	0.25	826	0.38	916	0.53	997	0.69
975	616	0.17	744	0.28	847	0.41	936	0.56	1016	0.72
1050	641	0.19	766	0.30	868	0.44	957	0.59	1036	0.76
1125	667	0.22	790	0.33	890	0.47	978	0.63	1056	0.80
1200	693	0.25	813	0.37	913	0.51	999	0.67	1077	0.84
1275	720	0.29	837	0.41	935	0.55	1021	0.71	1098	0.88
1350	747	0.33	862	0.45	958	0.60	1043	0.76	1119	0.94
1425	775	0.37	887	0.50	982	0.65	1066	0.81	1141	0.99
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	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	1070	0.88	1137	1.07	1201	1.29	1260	1.51	1317	1.75
975	1089	0.91	1156	1.11	1219	1.32	1279	1.54	1335	1.78
1050	1108	0.94	1175	1.14	1238	1.36	1297	1.58	1353	1.82
1125	1128	0.98	1195	1.18	1257	1.40	1316	1.62	1372	1.86
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1275	1169	1.07	1235	1.28	1296	1.50	1354	1.72	1410	1.97
1350	1190	1.13	1255	1.33	1316	1.55	1374	1.78	1429	2.03
1425	1211	1.19	1276	1.39	1337	1.61	1394	1.85	1449	2.09
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	**1469**	**2.16**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 560-854 RPM, 1.7 bhp max

Medium static 770-1175 RPM, 1.7 bhp max

High static 1035-1466 RPM, 2.4 bhp max

APPENDIX C — FAN PERFORMANCE

Table O — 48HC**05 3 Phase without Humidi-MiZer®, 4 Ton, Horizontal Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	**681**	**0.24**	**800**	**0.35**	**902**	**0.48**	992	0.63	1074	0.78
1300	**717**	**0.29**	**831**	**0.41**	930	0.54	1019	0.69	1099	0.85
1400	**753**	**0.34**	**863**	**0.46**	959	0.60	1046	0.75	1125	0.92
1500	**790**	**0.40**	**896**	**0.53**	990	0.67	1074	0.83	1151	1.00
1600	**828**	**0.46**	930	0.60	1021	0.75	1103	0.91	1179	1.09
1700	**866**	**0.54**	964	0.68	1053	0.84	1133	1.01	1207	1.18
1800	**905**	**0.62**	1000	0.77	1085	0.94	1164	1.11	1236	1.29
1900	944	0.71	1036	0.87	1119	1.04	1195	1.22	1266	1.41
2000	984	0.82	1072	0.98	1153	1.15	1227	1.34	1297	1.53

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1300	1173	1.02	1243	1.20	1309	1.39	1371	1.59	1430	1.80
1400	1198	1.09	1266	1.28	1331	1.47	1393	1.68	1451	1.89
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	1473	1.99
1600	1249	1.27	1316	1.46	1379	1.66	1439	1.87	1496	2.09
1700	1277	1.37	1342	1.57	1404	1.77	1463	1.99	1520	2.21
1800	1305	1.48	1369	1.68	1430	1.89	1489	2.11	1545	2.34
1900	1333	1.60	1397	1.81	1457	2.02	1514	2.25	—	—
2000	1363	1.73	1425	1.94	1484	2.16	1541	2.39	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 920-1303 RPM, 1.7 bhp max

High static 1208-1550 RPM, 2.9 bhp max

Table P — 48HC**05 3 Phase without Humidi-MiZer®, 4 Ton, Vertical Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	**693**	**0.25**	**813**	**0.37**	**913**	**0.51**	999	0.67	1077	0.84
1300	**729**	**0.30**	**846**	**0.42**	943	0.57	1028	0.73	1105	0.90
1400	**765**	**0.35**	**879**	**0.48**	974	0.63	1058	0.79	1134	0.97
1500	**802**	**0.42**	**912**	**0.55**	1006	0.70	1088	0.87	1163	1.05
1600	**840**	**0.49**	947	0.63	1038	0.78	1119	0.95	1193	1.14
1700	**878**	**0.57**	982	0.71	1071	0.87	1151	1.05	1224	1.24
1800	**917**	**0.65**	1017	0.81	1105	0.97	1183	1.15	1255	1.35
1900	956	0.75	1053	0.91	1139	1.08	1216	1.27	1287	1.47
2000	995	0.86	1090	1.02	1173	1.20	1249	1.39	1319	1.59

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1300	1176	1.09	1241	1.30	1303	1.51	1361	1.74	1416	1.98
1400	1204	1.17	1269	1.37	1330	1.59	1388	1.82	1442	2.07
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	1469	2.16
1600	1262	1.34	1325	1.55	1385	1.78	1442	2.01	1496	2.26
1700	1291	1.44	1354	1.66	1414	1.89	1470	2.12	1524	2.37
1800	1322	1.55	1384	1.77	1443	2.00	1499	2.25	—	—
1900	1352	1.68	1414	1.90	1472	2.13	1528	2.38	—	—
2000	1384	1.81	1445	2.04	1502	2.27	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 920-1303 RPM, 1.7 bhp max

High static 1208-1550 RPM, 2.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table Q — 48HC**05 3 Phase with Humidi-MiZer®, 4 Ton, Horizontal Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	681	0.24	800	0.35	902	0.48	992	0.63	1074	0.78
1300	717	0.29	831	0.41	930	0.54	1019	0.69	1099	0.85
1400	753	0.34	863	0.46	959	0.60	1046	0.75	1125	0.92
1500	790	0.40	896	0.53	990	0.67	1074	0.83	1151	1.00
1600	828	0.46	930	0.60	1021	0.75	1103	0.91	1179	1.09
1700	866	0.54	964	0.68	1053	0.84	1133	1.01	1207	1.18
1800	905	0.62	1000	0.77	1085	0.94	1164	1.11	1236	1.29
1900	944	0.71	1036	0.87	1119	1.04	1195	1.22	1266	1.41
2000	984	0.82	1072	0.98	1153	1.15	1227	1.34	1297	1.53

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1150	0.95	1221	1.13	1287	1.31	1350	1.51	1410	1.72
1300	1173	1.02	1243	1.20	1309	1.39	1371	1.59	1430	1.80
1400	1198	1.09	1266	1.28	1331	1.47	1393	1.68	1451	1.89
1500	1223	1.18	1291	1.36	1355	1.56	1415	1.77	1473	1.99
1600	1249	1.27	1316	1.46	1379	1.66	1439	1.87	1496	2.09
1700	1277	1.37	1342	1.57	1404	1.77	1463	1.99	1520	2.21
1800	1305	1.48	1369	1.68	1430	1.89	1489	2.11	1545	2.34
1900	1333	1.60	1397	1.81	1457	2.02	1514	2.25	—	—
2000	1363	1.73	1425	1.94	1484	2.16	1541	2.39	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 560-854 RPM, 1.7 bhp max

Medium static 770-1175 RPM, 1.7 bhp max

High static 1208-1550 RPM, 2.9 bhp max

Table R — 48HC**05 3 Phase with Humidi-MiZer®, 4 Ton, Vertical Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	693	0.25	813	0.37	913	0.51	999	0.67	1077	0.84
1300	729	0.30	846	0.42	943	0.57	1028	0.73	1105	0.90
1400	765	0.35	879	0.48	974	0.63	1058	0.79	1134	0.97
1500	802	0.42	912	0.55	1006	0.70	1088	0.87	1163	1.05
1600	840	0.49	947	0.63	1038	0.78	1119	0.95	1193	1.14
1700	878	0.57	982	0.71	1071	0.87	1151	1.05	1224	1.24
1800	917	0.65	1017	0.81	1105	0.97	1183	1.15	1255	1.35
1900	956	0.75	1053	0.91	1139	1.08	1216	1.27	1287	1.47
2000	995	0.86	1090	1.02	1173	1.20	1249	1.39	1319	1.59

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1200	1148	1.03	1214	1.23	1276	1.44	1335	1.67	1391	1.91
1300	1176	1.09	1241	1.30	1303	1.51	1361	1.74	1416	1.98
1400	1204	1.17	1269	1.37	1330	1.59	1388	1.82	1442	2.07
1500	1232	1.25	1297	1.46	1357	1.68	1415	1.91	1469	2.16
1600	1262	1.34	1325	1.55	1385	1.78	1442	2.01	1496	2.26
1700	1291	1.44	1354	1.66	1414	1.89	1470	2.12	1524	2.37
1800	1322	1.55	1384	1.77	1443	2.00	1499	2.25	—	—
1900	1352	1.68	1414	1.90	1472	2.13	1528	2.38	—	—
2000	1384	1.81	1445	2.04	1502	2.27	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 560-854 RPM, 1.7 bhp max

Medium static 770-1175 RPM, 1.7 bhp max

High static 1208-1550 RPM, 2.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table S — 48HC**06 3 Phase without Humidi-MiZer®, 5 Ton, Horizontal Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	**798**	**0.41**	906	0.55	1002	0.71	1088	0.87	1167	1.05
1625	**845**	**0.50**	949	0.65	1041	0.81	1125	0.98	1202	1.17
1750	**893**	**0.60**	993	0.76	1081	0.93	1163	1.11	1238	1.30
1875	**942**	**0.71**	1037	0.88	1123	1.06	1202	1.25	1275	1.44
2000	**992**	**0.84**	1083	1.02	1166	1.21	1242	1.40	1313	1.61
2125	1043	0.98	1129	1.17	1209	1.37	1283	1.57	1353	1.79
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2375	1145	1.32	1225	1.53	1299	1.74	1369	1.97	1434	2.20
2500	1196	1.51	1273	1.73	1345	1.96	1413	2.19	1477	2.43

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1241	1.23	1310	1.42	1375	1.63	1438	1.84	1497	2.06
1625	1274	1.36	1342	1.56	1406	1.77	1467	1.98	1526	2.21
1750	1308	1.50	1375	1.70	1438	1.92	1498	2.14	—	—
1875	1344	1.65	1409	1.86	1471	2.09	1530	2.32	—	—
2000	1380	1.82	1444	2.04	1505	2.27	—	—	—	—
2125	1418	2.01	1481	2.24	1540	2.47	—	—	—	—
2250	1457	2.21	1518	2.45	—	—	—	—	—	—
2375	1497	2.43	—	—	—	—	—	—	—	—
2500	1538	2.68	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 1035-1466 RPM, 2.4 bhp max

High static 1303-1550 RPM, 2.9 bhp max

Table T — 48HC**06 3 Phase without Humidi-MiZer®, 5 Ton, Vertical Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	**847**	**0.41**	966	0.55	1067	0.68	1158	0.81	1240	0.93
1625	**896**	**0.50**	1010	0.65	1109	0.79	1198	0.93	1278	1.07
1750	**947**	**0.59**	1056	0.76	1152	0.92	1238	1.07	1318	1.22
1875	**998**	**0.70**	1103	0.88	1196	1.05	1280	1.22	1358	1.38
2000	1049	0.82	1151	1.02	1241	1.20	1323	1.38	1399	1.56
2125	1102	0.96	1199	1.17	1287	1.37	1367	1.56	1441	1.75
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2375	1208	1.28	1298	1.52	1381	1.74	1457	1.96	1528	2.18
2500	1261	1.47	1349	1.72	1429	1.96	1503	2.19	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1316	1.05	1387	1.17	1454	1.28	1517	1.39	—	—
1625	1353	1.20	1423	1.33	1489	1.46	—	—	—	—
1750	1391	1.36	1460	1.51	1525	1.65	—	—	—	—
1875	1430	1.54	1498	1.70	—	—	—	—	—	—
2000	1470	1.73	1537	1.90	—	—	—	—	—	—
2125	1511	1.93	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Medium static 1035-1466 RPM, 2.4 bhp max

High static 1303-1550 RPM, 2.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table U — 48HC**06 3 Phase with Humidi-MiZer®, 5 Ton, Horizontal Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	798	0.41	906	0.55	1002	0.71	1088	0.87	1167	1.05
1625	845	0.50	949	0.65	1041	0.81	1125	0.98	1202	1.17
1750	893	0.60	993	0.76	1081	0.93	1163	1.11	1238	1.30
1875	942	0.71	1037	0.88	1123	1.06	1202	1.25	1275	1.44
2000	992	0.84	1083	1.02	1166	1.21	1242	1.40	1313	1.61
2125	1043	0.98	1129	1.17	1209	1.37	1283	1.57	1353	1.79
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2375	1145	1.32	1225	1.53	1299	1.74	1369	1.97	1434	2.20
2500	1196	1.51	1273	1.73	1345	1.96	1413	2.19	1477	2.43

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1241	1.23	1310	1.42	1375	1.63	1438	1.84	1497	2.06
1625	1274	1.36	1342	1.56	1406	1.77	1467	1.98	1526	2.21
1750	1308	1.50	1375	1.70	1438	1.92	1498	2.14	—	—
1875	1344	1.65	1409	1.86	1471	2.09	1530	2.32	—	—
2000	1380	1.82	1444	2.04	1505	2.27	—	—	—	—
2125	1418	2.01	1481	2.24	1540	2.47	—	—	—	—
2250	1457	2.21	1518	2.45	—	—	—	—	—	—
2375	1497	2.43	—	—	—	—	—	—	—	—
2500	1538	2.68	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.

Standard static 770-1175 RPM, 1.7 bhp max

Medium static 1035-1466 RPM, 2.4 bhp max

High static 1303-1550 RPM, 2.9 bhp max

Table V — 48HC**06 3 Phase with Humidi-MiZer®, 5 Ton, Vertical Supply — Belt Drive Fan Performance

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	847	0.41	966	0.55	1067	0.68	1158	0.81	1240	0.93
1625	896	0.50	1010	0.65	1109	0.79	1198	0.93	1278	1.07
1750	947	0.59	1056	0.76	1152	0.92	1238	1.07	1318	1.22
1875	998	0.70	1103	0.88	1196	1.05	1280	1.22	1358	1.38
2000	1049	0.82	1151	1.02	1241	1.20	1323	1.38	1399	1.56
2125	1102	0.96	1199	1.17	1287	1.37	1367	1.56	1441	1.75
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2375	1208	1.28	1298	1.52	1381	1.74	1457	1.96	1528	2.18
2500	1261	1.47	1349	1.72	1429	1.96	1503	2.19	—	—

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1316	1.05	1387	1.17	1454	1.28	1517	1.39	—	—
1625	1353	1.20	1423	1.33	1489	1.46	—	—	—	—
1750	1391	1.36	1460	1.51	1525	1.65	—	—	—	—
1875	1430	1.54	1498	1.70	—	—	—	—	—	—
2000	1470	1.73	1537	1.90	—	—	—	—	—	—
2125	1511	1.93	—	—	—	—	—	—	—	—
2250	—	—	—	—	—	—	—	—	—	—
2375	—	—	—	—	—	—	—	—	—	—
2500	—	—	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.

Standard static 770-1175 RPM, 1.7 bhp max

Medium static 1035-1466 RPM, 2.4 bhp max

High static 1303-1550 RPM, 2.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table W — 48HC**07 3 Phase, 6 Ton, Horizontal Supply — Belt Drive Fan Performance

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
1800	441	0.33	533	0.51	611	0.72	681	0.96	745	1.23
1950	462	0.38	550	0.58	626	0.80	694	1.04	757	1.31
2100	483	0.45	567	0.65	641	0.88	708	1.13	769	1.40
2250	505	0.52	586	0.73	657	0.97	722	1.22	782	1.50
2400	528	0.60	605	0.82	674	1.07	738	1.33	796	1.62
2550	550	0.69	625	0.92	692	1.17	754	1.45	811	1.74
2700	574	0.80	645	1.03	710	1.29	770	1.57	826	1.88
2850	597	0.91	666	1.16	729	1.43	788	1.71	843	2.02
3000	621	1.03	688	1.29	749	1.57	806	1.87	859	2.18

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
1800	804	1.51	860	1.82	912	2.15	961	2.49	1008	2.85
1950	815	1.60	869	1.91	920	2.24	969	2.59	1016	2.96
2100	826	1.70	880	2.01	930	2.35	978	2.70	1024	3.07
2250	838	1.81	891	2.12	941	2.46	988	2.82	1033	3.19
2400	851	1.92	903	2.25	952	2.59	999	2.95	1043	3.33
2550	865	2.05	916	2.38	964	2.73	1010	3.10	1054	3.48
2700	879	2.19	929	2.53	976	2.88	1022	3.25	1066	3.64
2850	894	2.35	943	2.69	990	3.05	1035	3.43	1078	3.82
3000	910	2.51	958	2.86	1004	3.23	1048	3.61	1090	4.01

NOTES:

1. For more information, see fan performance notes on page 93.

Standard static 489-747 RPM 1.7 bhp max

Medium static 733-949 RPM, 2.9 bhp max

High static 909-1102 RPM, 4.7 bhp max

Table X — 48HC**07 3 Phase, 6 Ton, Vertical Supply — Belt Drive Fan Performance

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
1800	449	0.34	539	0.53	615	0.75	681	0.99	742	1.26
1950	470	0.40	557	0.60	631	0.83	696	1.08	756	1.35
2100	491	0.47	576	0.68	648	0.91	712	1.17	771	1.45
2250	513	0.54	595	0.76	665	1.01	728	1.27	786	1.56
2400	536	0.63	615	0.86	684	1.11	745	1.39	802	1.68
2550	558	0.72	635	0.97	702	1.23	763	1.51	818	1.81
2700	582	0.83	656	1.08	721	1.35	781	1.65	835	1.95
2850	605	0.94	677	1.21	741	1.49	799	1.79	853	2.11
3000	629	1.07	699	1.35	761	1.64	818	1.95	871	2.28

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
1800	797	1.54	848	1.84	896	2.16	942	2.49	985	2.84
1950	810	1.64	861	1.94	909	2.26	954	2.60	997	2.96
2100	824	1.74	875	2.06	922	2.38	967	2.73	1009	3.09
2250	839	1.86	889	2.18	935	2.52	980	2.87	1022	3.23
2400	854	1.99	903	2.32	950	2.66	993	3.02	1035	3.39
2550	870	2.13	918	2.46	964	2.81	1008	3.18	1049	3.55
2700	886	2.28	934	2.62	979	2.98	1022	3.35	1063	3.74
2850	903	2.44	950	2.79	995	3.16	1037	3.54	1078	3.93
3000	920	2.62	966	2.98	1010	3.35	1052	3.74	1093	4.14

NOTES:

1. For more information, see fan performance notes on page 93.

Standard static 489-747 RPM 1.7 bhp max

Medium static 733-949 RPM, 2.9 bhp max

High static 909-1102 RPM, 4.7 bhp max

APPENDIX C — FAN PERFORMANCE

Table Y — 48HC**08 3 Phase, 7.5 Ton, Horizontal Supply — Belt Drive Fan Performance

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
2250	482	0.36	577	0.51	659	0.66	732	0.82	799	0.98
2438	505	0.43	597	0.59	676	0.75	748	0.92	813	1.09
2625	529	0.51	617	0.68	694	0.85	764	1.03	827	1.22
2813	554	0.60	638	0.78	713	0.97	781	1.16	843	1.35
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3188	604	0.81	683	1.02	753	1.23	817	1.44	877	1.65
3375	630	0.94	706	1.15	774	1.37	836	1.60	895	1.82
3563	657	1.08	729	1.31	795	1.54	856	1.77	913	2.01
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21

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
2250	860	1.14	917	1.31	971	1.48	1022	1.66	1071	1.84
2438	873	1.27	929	1.45	983	1.63	1033	1.81	1081	2.00
2625	887	1.40	942	1.59	995	1.78	1045	1.98	**1092**	**2.18**
2813	901	1.55	956	1.75	1008	1.95	1057	2.15	**1104**	**2.36**
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	**1117**	**2.56**
3188	933	1.87	986	2.09	1036	2.32	1084	2.54	**1130**	**2.77**
3375	950	2.05	1002	2.29	1051	2.52	**1098**	**2.76**	**1144**	**3.00**
3563	967	2.25	1018	2.49	1067	2.74	**1113**	**2.99**	**1158**	**3.24**
3750	985	2.46	1035	2.71	1083	2.97	**1129**	**3.23**	**1173**	**3.49**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 518-733 RPM 1.7 bhp max

Medium static 690-936 RPM, 2.4 bhp max

High static 838-1084 RPM, 3.7 bhp max

Table Z — 48HC**08 3 Phase, 7.5 Ton, Vertical Supply — Belt Drive Fan Performance

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
2250	505	0.39	595	0.54	676	0.69	750	0.86	819	1.03
2438	532	0.47	617	0.63	694	0.79	766	0.97	833	1.15
2625	559	0.56	640	0.73	714	0.90	783	1.08	848	1.28
2813	588	0.67	664	0.84	735	1.03	801	1.22	864	1.42
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3188	646	0.92	715	1.11	780	1.31	842	1.52	901	1.74
3375	675	1.06	742	1.27	804	1.48	864	1.70	920	1.93
3563	705	1.23	769	1.44	829	1.66	886	1.89	941	2.13
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	884	1.21	945	1.40	1003	1.60	1059	1.80	**1112**	**2.01**
2438	896	1.34	955	1.54	1012	1.74	1066	1.95	**1118**	**2.17**
2625	909	1.47	967	1.68	1022	1.89	1075	2.11	**1126**	**2.34**
2813	923	1.62	980	1.84	1034	2.06	1086	2.29	**1136**	**2.52**
3000	939	1.79	994	2.01	1047	2.24	**1098**	**2.47**	**1147**	**2.71**
3188	956	1.97	1010	2.20	1061	2.43	**1111**	**2.68**	**1159**	**2.93**
3375	975	2.16	1027	2.40	1077	2.65	**1125**	**2.90**	**1172**	**3.15**
3563	994	2.37	1044	2.62	**1093**	**2.87**	**1141**	**3.13**	**1186**	**3.40**
3750	1014	2.60	1063	2.86	**1111**	**3.12**	**1157**	**3.39**	**1202**	**3.66**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 518-733 RPM 1.7 bhp max

Medium static 690-936 RPM, 2.4 bhp max

High static 838-1084 RPM, 3.7 bhp max

APPENDIX C — FAN PERFORMANCE

Table AA — 48HC**09 3 Phase, 8.5 Ton, Horizontal Supply — Belt Drive Fan Performance

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
2550	520	0.47	609	0.64	687	0.81	757	0.99	821	1.16
2750	545	0.57	631	0.75	707	0.93	775	1.11	838	1.30
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3200	606	0.82	684	1.03	754	1.24	818	1.45	878	1.66
3400	634	0.95	709	1.17	777	1.40	839	1.62	897	1.85
3600	662	1.10	734	1.34	800	1.57	860	1.81	917	2.05
3850	698	1.32	766	1.56	829	1.81	888	2.07	943	2.32
4050	726	1.50	792	1.76	854	2.03	911	2.29	965	2.56
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81

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
2550	881	1.35	937	1.53	990	1.72	1040	1.91	**1088**	**2.11**
2750	896	1.50	951	1.69	1003	1.89	1053	2.09	**1100**	**2.30**
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	**1117**	**2.56**
3200	934	1.88	987	2.10	1037	2.33	**1085**	**2.56**	**1131**	**2.79**
3400	952	2.08	1004	2.31	1053	2.55	**1100**	**2.79**	**1145**	**3.03**
3600	971	2.29	1022	2.53	1070	2.78	**1116**	**3.03**	**1161**	**3.29**
3850	995	2.58	1045	2.84	**1092**	**3.10**	**1138**	**3.36**	**1181**	**3.63**
4050	1016	2.83	1064	3.10	**1111**	**3.37**	**1156**	**3.65**	**1199**	**3.93**
4250	1037	3.09	1084	3.38	**1130**	**3.66**	**1174**	**3.95**	**1216**	**4.24**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 518-733 RPM, 1.7 bhp max

Medium static 690-936 RPM, 2.4 bhp max

High static 838-1084 RPM, 3.7 bhp max

Table AB — 48HC**09 3 Phase, 8.5 Ton, Vertical Supply — Belt Drive Fan Performance

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
2550	548	0.52	631	0.69	706	0.86	776	1.04	841	1.22
2750	578	0.63	656	0.80	728	0.98	795	1.17	858	1.37
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3200	648	0.93	717	1.12	782	1.32	843	1.53	902	1.75
3400	679	1.09	745	1.29	808	1.50	867	1.72	923	1.95
3600	711	1.26	774	1.48	834	1.70	891	1.93	945	2.17
3850	752	1.51	812	1.74	868	1.98	923	2.22	975	2.47
4050	785	1.73	842	1.97	896	2.22	949	2.47	999	2.74
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02

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
2550	903	1.42	962	1.62	1018	1.83	1072	2.05	**1123**	**2.27**
2750	918	1.57	975	1.78	1030	2.00	1082	2.23	**1133**	**2.46**
3000	939	1.79	994	2.01	1047	2.24	**1098**	**2.47**	**1147**	**2.71**
3200	957	1.98	1011	2.21	1062	2.45	**1112**	**2.69**	**1160**	**2.94**
3400	977	2.19	1029	2.43	1079	2.67	**1127**	**2.93**	**1174**	**3.19**
3600	998	2.41	1048	2.66	**1097**	**2.92**	**1144**	**3.18**	**1189**	**3.45**
3850	1025	2.73	1074	2.99	**1121**	**3.26**	**1166**	**3.53**	**1210**	**3.81**
4050	1048	3.00	**1095**	**3.27**	**1141**	**3.55**	**1185**	**3.83**	**1228**	**4.12**
4250	1072	3.30	**1118**	**3.58**	**1162**	**3.87**	**1205**	**4.16**	**1247**	**4.46**

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 518-733 RPM, 1.7 bhp max

Medium static 690-936 RPM, 2.4 bhp max

High static 838-1084 RPM, 3.7 bhp max

APPENDIX C — FAN PERFORMANCE

Table AC — 48HC**11 3 Phase, 10 Ton, Horizontal Supply — Belt Drive Fan Performance

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
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3250	613	0.85	690	1.06	760	1.27	823	1.49	883	1.71
3500	648	1.03	721	1.25	788	1.48	850	1.71	907	1.95
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4000	719	1.45	786	1.71	848	1.97	905	2.23	959	2.50
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81
4500	792	1.99	853	2.28	910	2.57	964	2.87	1015	3.16
4750	830	2.31	888	2.62	943	2.92	995	3.23	1044	3.54
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95

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
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3250	938	1.93	991	2.16	1041	2.38	1089	2.61	1134	2.85
3500	961	2.18	1013	2.42	1062	2.66	1108	2.91	1153	3.15
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4000	1011	2.76	1059	3.03	1106	3.30	1151	3.58	1194	3.85
4250	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24
4500	1064	3.46	1110	3.76	1155	4.06	1198	4.36	1239	4.66
4750	1091	3.85	1137	4.16	1180	4.48	—	—	—	—
5000	1120	4.28	1164	4.61	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.

Standard static 591-838 RPM, 2.4 bhp max

Medium static 838-1084 RPM, 3.7 bhp max

High static 1022-1240 RPM, 4.9 bhp max

Table AD — 48HC**11 3 Phase, 10 Ton, Vertical Supply — Belt Drive Fan Performance

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
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31

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
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	1072	3.30	1118	3.58	1162	3.87	1205	4.16	**1247**	**4.46**
4500	1103	3.70	1147	4.00	1190	4.29	1232	4.60	—	—
4750	1135	4.14	1177	4.45	—	—	—	—	—	—
5000	1167	4.63	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 591-838 RPM, 2.4 bhp max

Medium static 838-1084 RPM, 3.7 bhp max

High static 1022-1240 RPM, 4.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table AE — 48HC**12 3 Phase, 10 Ton, Horizontal Supply — Belt Drive Fan Performance

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
3000	579	0.70	660	0.89	732	1.09	799	1.29	860	1.50
3250	613	0.85	690	1.06	760	1.27	823	1.49	883	1.71
3500	648	1.03	721	1.25	788	1.48	850	1.71	907	1.95
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4000	719	1.45	786	1.71	848	1.97	905	2.23	959	2.50
4250	756	1.71	819	1.98	879	2.26	934	2.53	987	2.81
4500	792	1.99	853	2.28	910	2.57	964	2.87	1015	3.16
4750	830	2.31	888	2.62	943	2.92	995	3.23	1044	3.54
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95

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
3000	917	1.70	970	1.91	1021	2.13	1070	2.34	1117	2.56
3250	938	1.93	991	2.16	1041	2.38	1089	2.61	1134	2.85
3500	961	2.18	1013	2.42	1062	2.66	1108	2.91	1153	3.15
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4000	1011	2.76	1059	3.03	1106	3.30	1151	3.58	1194	3.85
4250	1037	3.09	1084	3.38	1130	3.66	1174	3.95	1216	4.24
4500	1064	3.46	1110	3.76	1155	4.06	1198	4.36	1239	4.66
4750	1091	3.85	1137	4.16	1180	4.48	—	—	—	—
5000	1120	4.28	1164	4.61	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.

Standard static 591-838 RPM, 2.4 bhp max

Medium static 838-1084 RPM, 3.7 bhp max

High static 1022-1240 RPM, 4.9 bhp max

Table AF — 48HC**12 3 Phase, 10 Ton, Vertical Supply — Belt Drive Fan Performance

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
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31

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
3000	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	1072	3.30	1118	3.58	1162	3.87	1205	4.16	**1247**	**4.46**
4500	1103	3.70	1147	4.00	1190	4.29	1232	4.60	—	—
4750	1135	4.14	1177	4.45	—	—	—	—	—	—
5000	1167	4.63	—	—	—	—	—	—	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 591-838 RPM, 2.4 bhp max

Medium static 838-1084 RPM, 3.7 bhp max

High static 1022-1240 RPM, 4.9 bhp max

APPENDIX C — FAN PERFORMANCE

Table AG — 48HC**14 3 Phase, 12.5 Ton, Horizontal Supply — Belt Drive Fan Performance

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
3438	421	0.57	493	0.78	561	1.02	627	1.30	688	1.62
3750	445	0.69	512	0.91	576	1.17	638	1.45	697	1.77
4063	470	0.84	533	1.07	593	1.33	651	1.62	707	1.94
4375	496	1.00	555	1.25	612	1.52	666	1.82	720	2.14
4688	522	1.19	579	1.46	632	1.74	683	2.04	734	2.37
5000	549	1.41	602	1.68	653	1.98	702	2.29	750	2.62
5313	576	1.64	627	1.94	675	2.24	721	2.57	767	2.91
5625	603	1.91	652	2.22	698	2.54	742	2.87	786	3.23
5938	630	2.20	677	2.53	721	2.87	764	3.21	805	3.57
6250	657	2.53	702	2.87	745	3.22	786	3.58	826	3.96
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**
3438	746	1.96	799	2.32	849	2.70	896	3.09	940	3.50
3750	753	2.12	806	2.48	856	2.88	903	3.28	947	3.70
4063	761	2.29	813	2.67	862	3.07	909	3.48	953	3.92
4375	771	2.50	821	2.88	869	3.28	916	3.70	**960**	**4.15**
4688	783	2.73	831	3.11	878	3.52	923	3.95	**966**	**4.40**
5000	797	2.99	843	3.37	888	3.78	931	4.22	**974**	**4.67**
5313	812	3.28	856	3.67	899	4.08	941	4.52	**983**	**4.98**
5625	828	3.60	870	3.99	912	4.41	953	4.85	**993**	**5.31**
5938	846	3.95	886	4.36	926	4.78	**965**	**5.22**	**1004**	**5.69**
6250	865	4.35	904	4.75	942	5.18	**979**	**5.63**	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 440-609 RPM, 2.9 bhp max

Medium static 609-778 RPM, 3.7 bhp max

High static 776-955 RPM
Voltage: 208-v / 230-v / 460-v / 575-v
Max bhp: 6.5 / 6.9 / 7.0 / 8.3

APPENDIX C — FAN PERFORMANCE

Table AH — 48HC**14 3 Phase, 12.5 Ton, Vertical Supply — Belt Drive Fan Performance

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
3438	431	0.59	504	0.81	574	1.08	643	1.40	706	1.74
3750	456	0.71	524	0.95	589	1.22	653	1.54	715	1.90
4063	481	0.86	546	1.11	606	1.39	666	1.71	725	2.07
4375	507	1.03	569	1.30	626	1.59	681	1.91	736	2.27
4688	533	1.22	593	1.51	647	1.81	698	2.13	750	2.49
5000	560	1.44	617	1.74	669	2.05	718	2.39	766	2.75
5313	587	1.68	642	2.00	691	2.33	738	2.67	784	3.04
5625	614	1.95	667	2.29	715	2.63	760	2.99	804	3.36
5938	642	2.25	692	2.60	739	2.97	782	3.34	824	3.72
6250	670	2.58	718	2.95	763	3.33	805	3.72	846	4.11

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
3438	763	2.10	815	2.46	862	2.82	905	3.18	946	3.55
3750	772	2.28	825	2.66	873	3.05	918	3.45	**959**	**3.84**
4063	781	2.46	834	2.87	883	3.29	929	3.71	**971**	**4.14**
4375	790	2.66	843	3.09	892	3.53	938	3.98	**982**	**4.43**
4688	801	2.89	852	3.32	901	3.78	947	4.25	**991**	**4.73**
5000	814	3.15	863	3.58	910	4.04	**956**	**4.53**	**999**	**5.03**
5313	830	3.44	875	3.87	920	4.33	**965**	**4.83**	**1008**	**5.34**
5625	847	3.77	890	4.20	933	4.66	**975**	**5.15**	**1017**	**5.67**
5938	865	4.13	906	4.56	947	5.03	**987**	**5.52**	**1028**	**6.04**
6250	885	4.53	924	4.97	962	5.43	**1001**	**5.92**	—	—

NOTES:
1. For more information, see fan performance notes on page 93.
2. **Boldface** indicates field-supplied drive is required.

Standard static 440-609 RPM, 2.9 bhp max

Medium static 609-778 RPM, 3.7 bhp max

High static 776-955 RPM
Voltage: 208-v / 230-v / 460-v / 575-v
Max bhp: 6.5 / 6.9 / 7.0 / 8.3

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. Selection software is available, through your salesperson, to help you select the best motor/drive combination for your application.
4. The fan performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommends the lower horsepower option.
5. For information on the electrical properties of Carrier motors, please see the Electrical Data section of this unit's product data.
6. For more information on the performance limits of Carrier motors, see the application data section of this unit's product data.
7. The EPACT (Energy Policy Act of 1992) regulates energy requirements for specific types of indoor fan motors. Motors regulated by EPACT include any general purpose, T-frame (three-digit, 143 and larger), single-speed, foot mounted, polyphase, squirrel cage induction motors of NEMA (National Electrical Manufacturers Association) design A and B, manufactured for use in the United States. Ranging from 1 to 200 Hp, these continuous-duty motors operate on 230 and 460 volt, 60 Hz power. If a motor does not fit into these specifications, the motor does not have to be replaced by an EPACT compliant energy-efficient motor. Variable-speed motors are exempt from EPACT compliance requirements.

APPENDIX D — WIRING DIAGRAMS

Table AI — Wiring Diagrams

48HC*A04-D14 UNITS					
		STANDARD		HUMIDI-MIZER	
SIZE	**VOLTAGE**	**CONTROL**	**POWER**	**CONTROL**	**POWER**
A04 - A06	230-1-60 208/230-3-60 460-3-60 575-3-60	48TM502525 (page 95)	48TM502526 (page 102) 48TM502527 (page 103) 48TM502527 (page 103) 48TM502528 (page 104)	48TM503098 (Page 120)	48TM503099 (Page 125) 48TM503100 (Page 126) 48TM503100 (Page 126) 48TM503101 (Page 127)
A07	208/230-3-60 460-3-60 575-3-60	48TM500929 (Page 98)	48TM500803 (Page 107) 48TM500803 (Page 107) 48TM500804 (Page 108)	48TM503217 (Page 121)	48TM503237 (Page 128) 48TM503237 (Page 128) 48TM503239 (Page 129)
D07	208/230-3-60 460-3-60 575-3-60	48TM002689 (Page 96)	48TM002721 (Page 105)	48TM002692 (Page 97)	48TM002725 (Page 106)
D08 - D09	208/230-3-60 460-3-60 575-3-60	48TM501325 (Page 99)	48TM501326 (Page 109) 48TM501326 (Page 109) 48TM501327 (Page 110)	48TM503251 (Page 122)	48TM503252 (Page 130) 48TM503252 (Page 130) 48TM503253 (Page 131)
D12	208/230-3-60 460-3-60 575-3-60	48TM501379 (Page 102)	48TM501380 (Page 114) 48TM501380 (Page 114) 48TM501381 (Page 115)	48TM503254 (Page 124)	48TM503255 (Page 135) 48TM503255 (Page 135) 48TM503256 (Page 136)
D11	208/230-3-60 460-3-60 575-3-60	48TM504179 (Page 101)	48TM504181 (Page 111) 48TM504552 (Page 112) 48TM504182 (Page 113)	48TM504723 (Page 123)	48TM504181 (Page 132) 48TM504552 (Page 133) 48TM504182 (Page 134))
D14	208/230-3-60 460-3-60 575-3-60	50TM501063 (Page 116)	50TM000642 (Page 117) 50TM501065 (Page 118) 50TM501158 (Page 119)	50TM501504 (Page 137)	50TM000644 (Page 138) 50TM501508 (Page 139) 50TM501507 (Page 140)
ALL	PremierLink*	50HE500751 (Page 141) / 50HE500891 (Page 142)		50HE502181 (Page 143) / 50HE500891 (Page 142)	
ALL	RTU - Open*	50HE500751 (Page 141) / 50HE501687 (Page 144)		50HE502181 (Page 143) / 50HE501687 (Page 144)	

APPENDIX D — WIRING DIAGRAMS

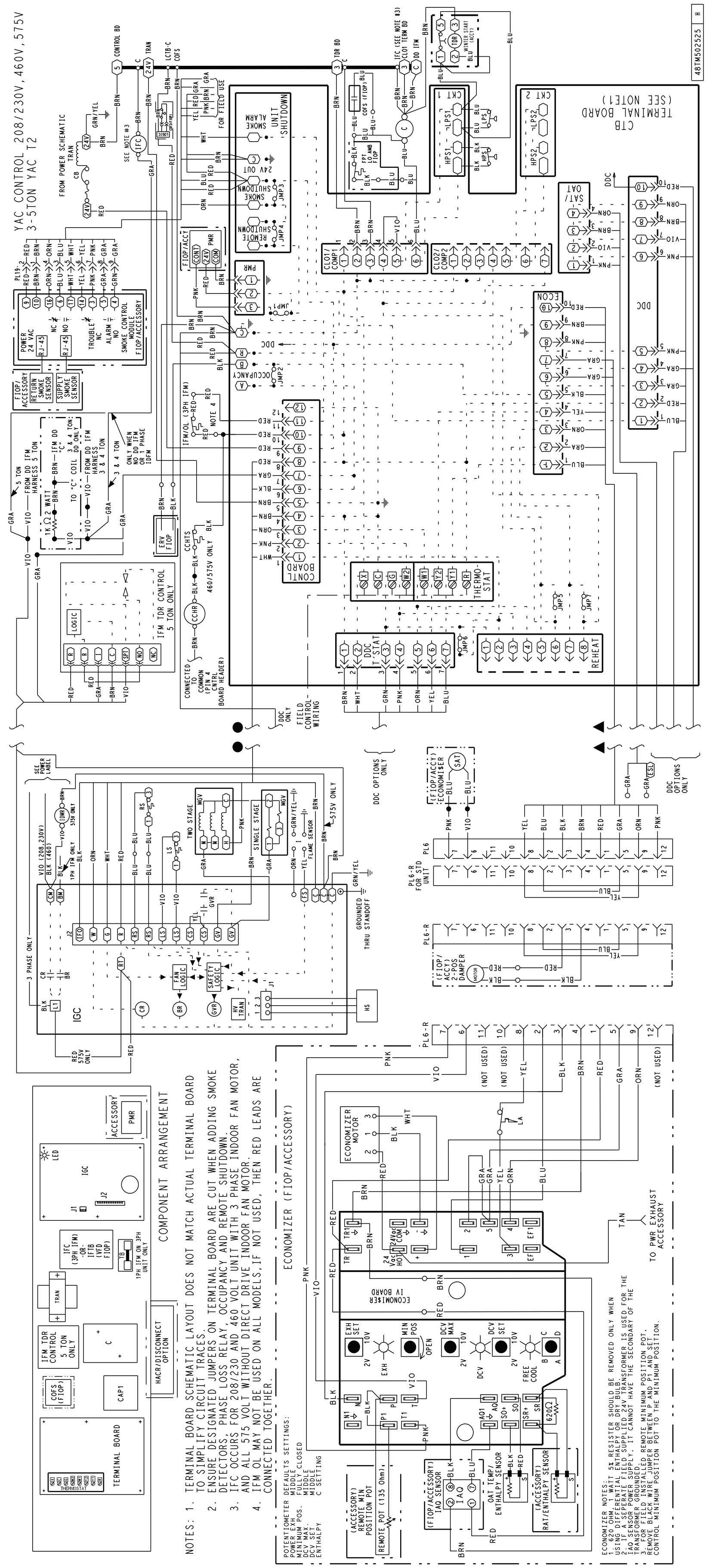


Fig. B — 48HC*A04-A06 YAC Control Diagram — 208-1-60; 208/230-3-60; 460/575-3-60

APPENDIX D — WIRING DIAGRAMS

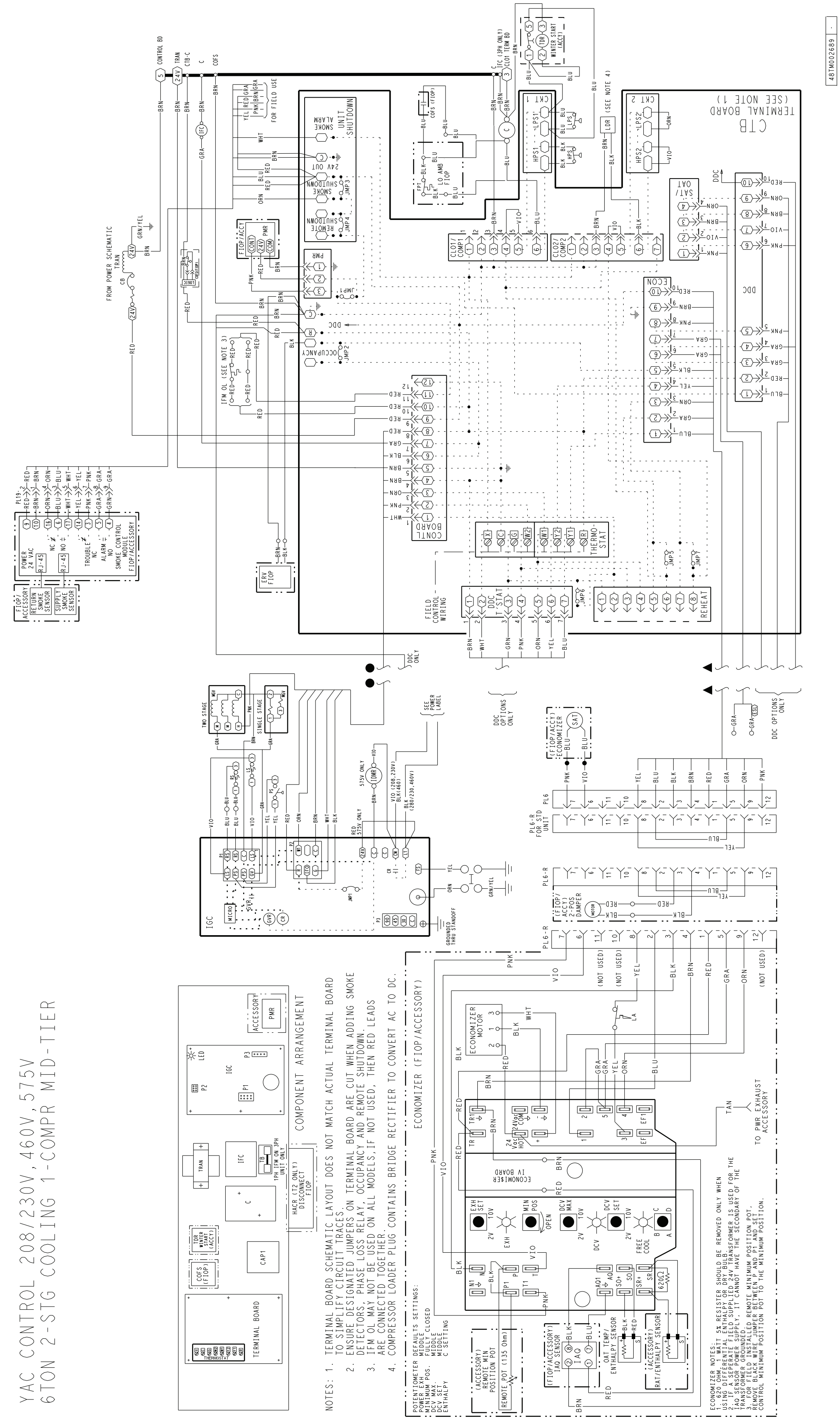


Fig. C — 48HC*D07 YAC Control Diagram — 208/230-3-60; 460/575-3-60 (6 Ton 2 Stage Cooling)

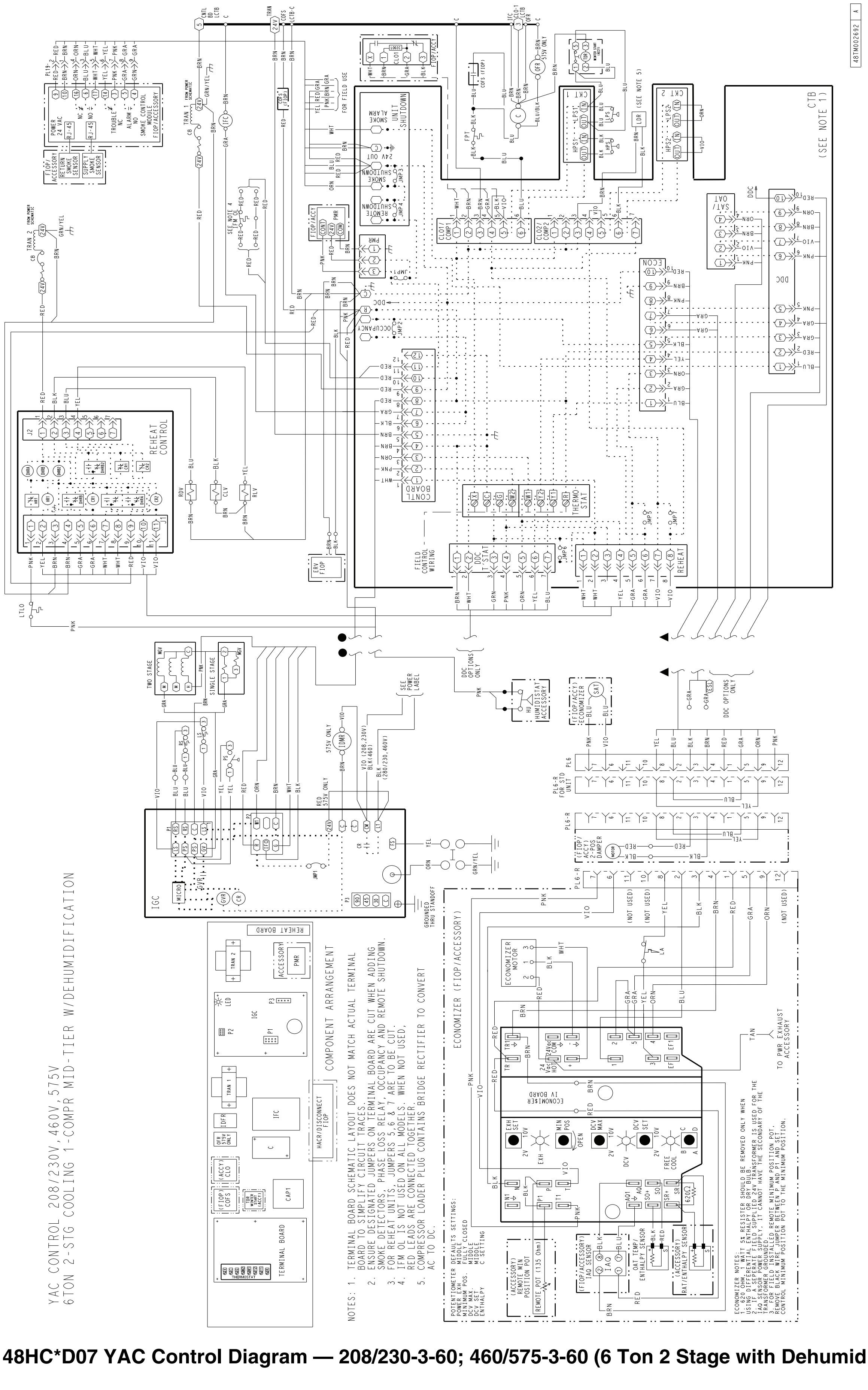


Fig. D — 48HC*D07 YAC Control Diagram — 208/230-3-60; 460/575-3-60 (6 Ton 2 Stage with Dehumidification)

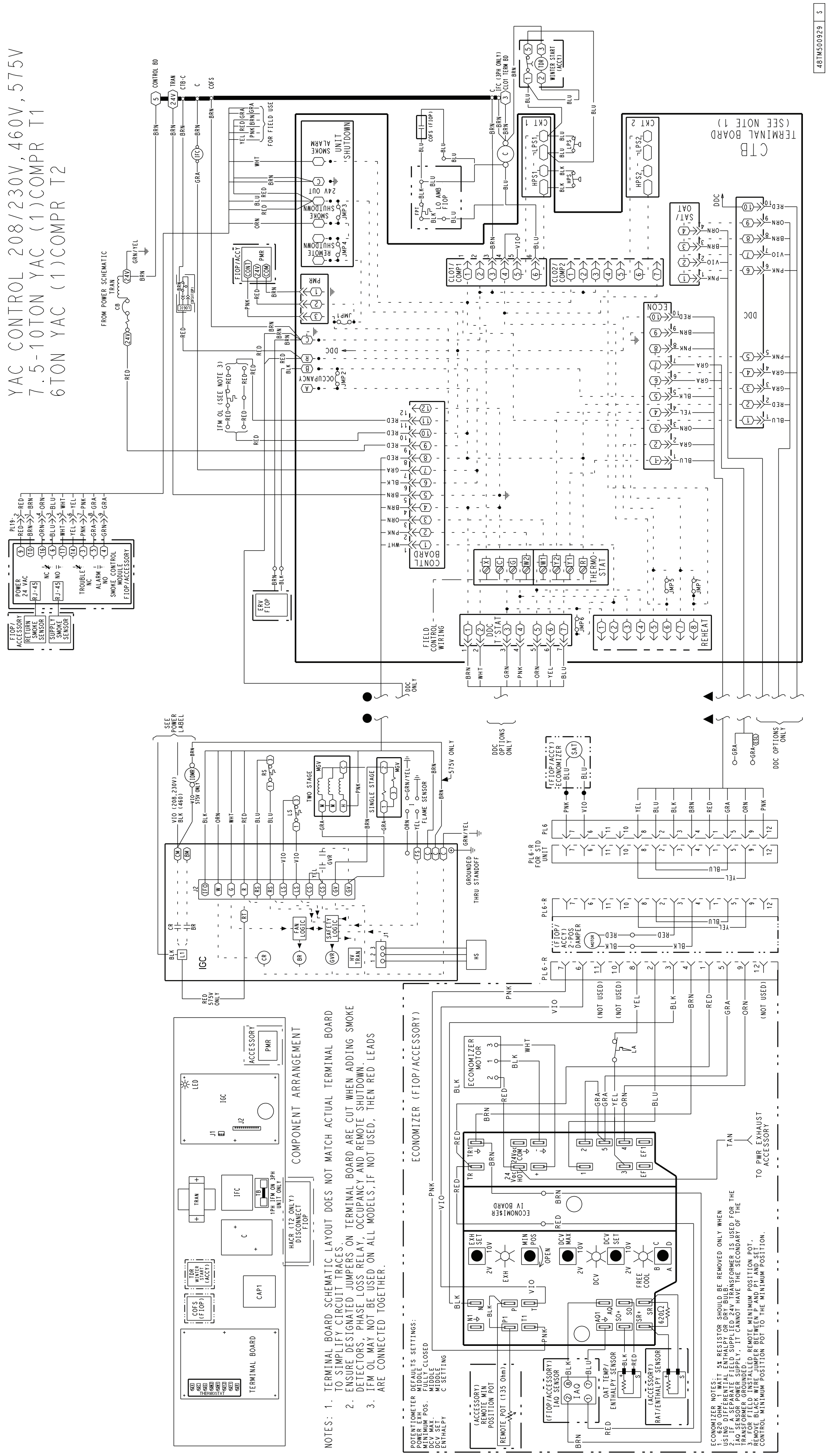


Fig. E — 48HC*A07 YAC Control Diagram — 208/230-3-60; 460/575-3-60

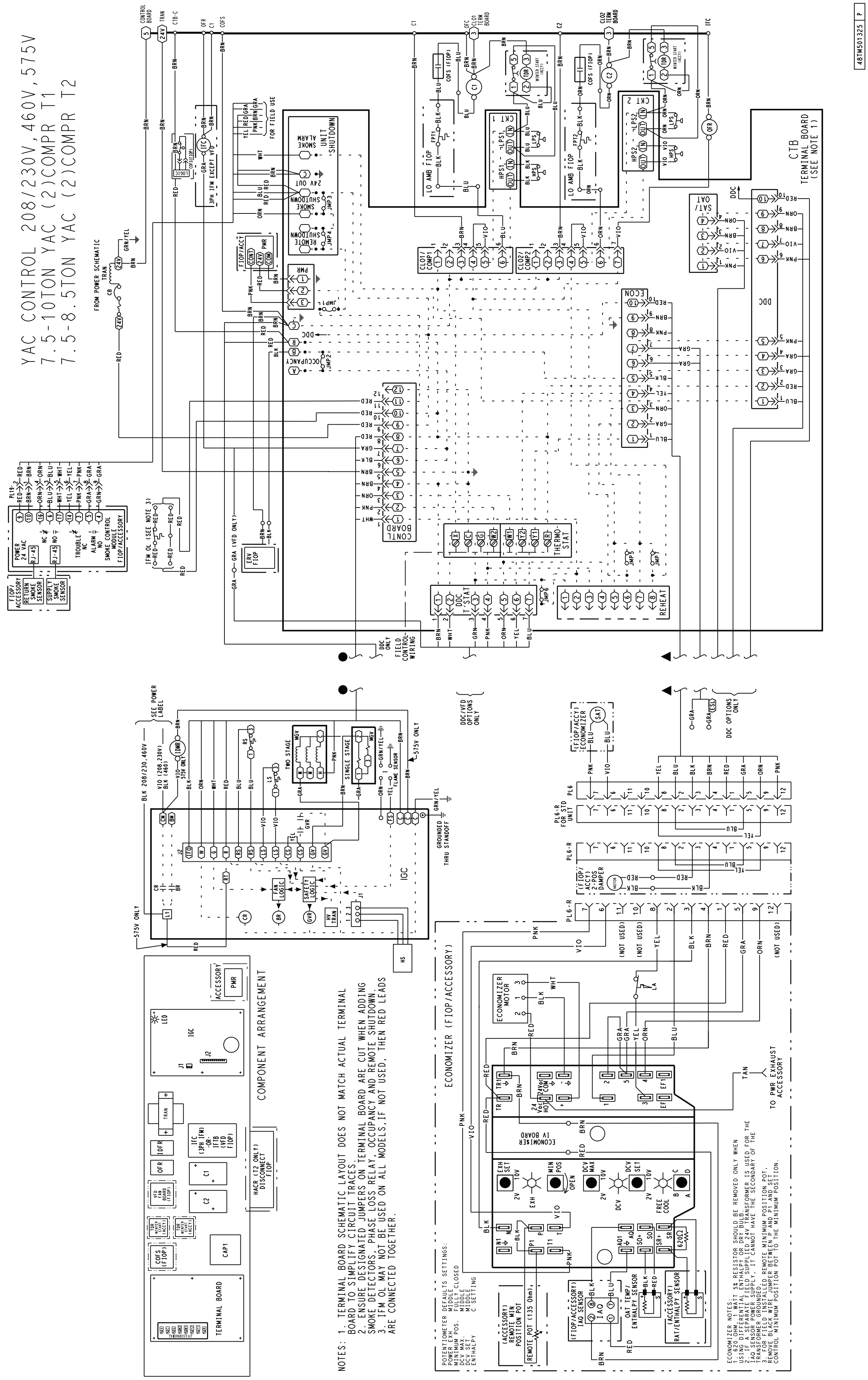


Fig. F — 48HC*D08-D09 YAC Control Diagram — 208/230-3-60; 460/575-3-60

APPENDIX D — WIRING DIAGRAMS

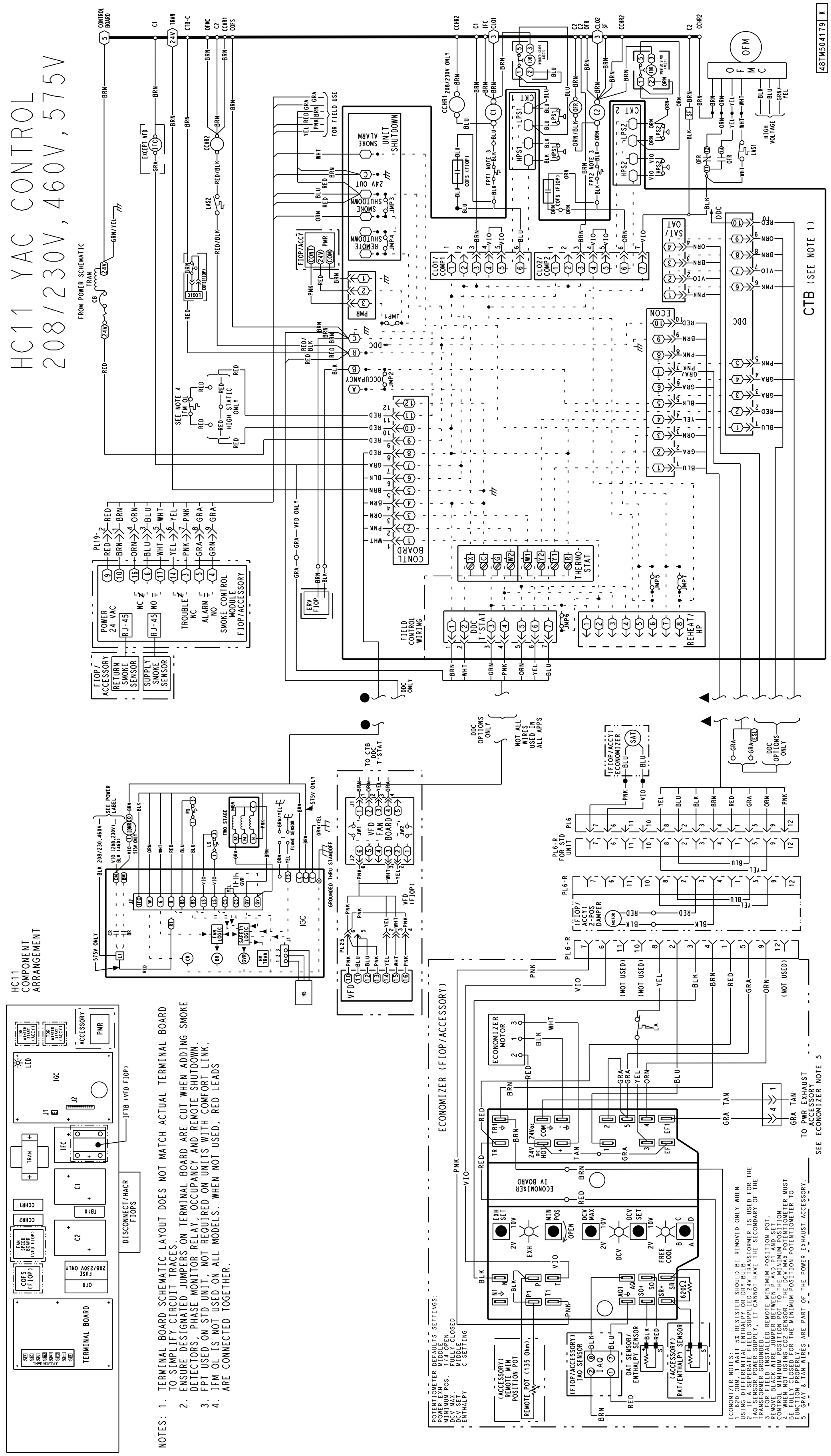


Fig. G — 48HC*D11YAC Control Diagram — 208/230-3-60, 460/575-3-60

APPENDIX D — WIRING DIAGRAMS

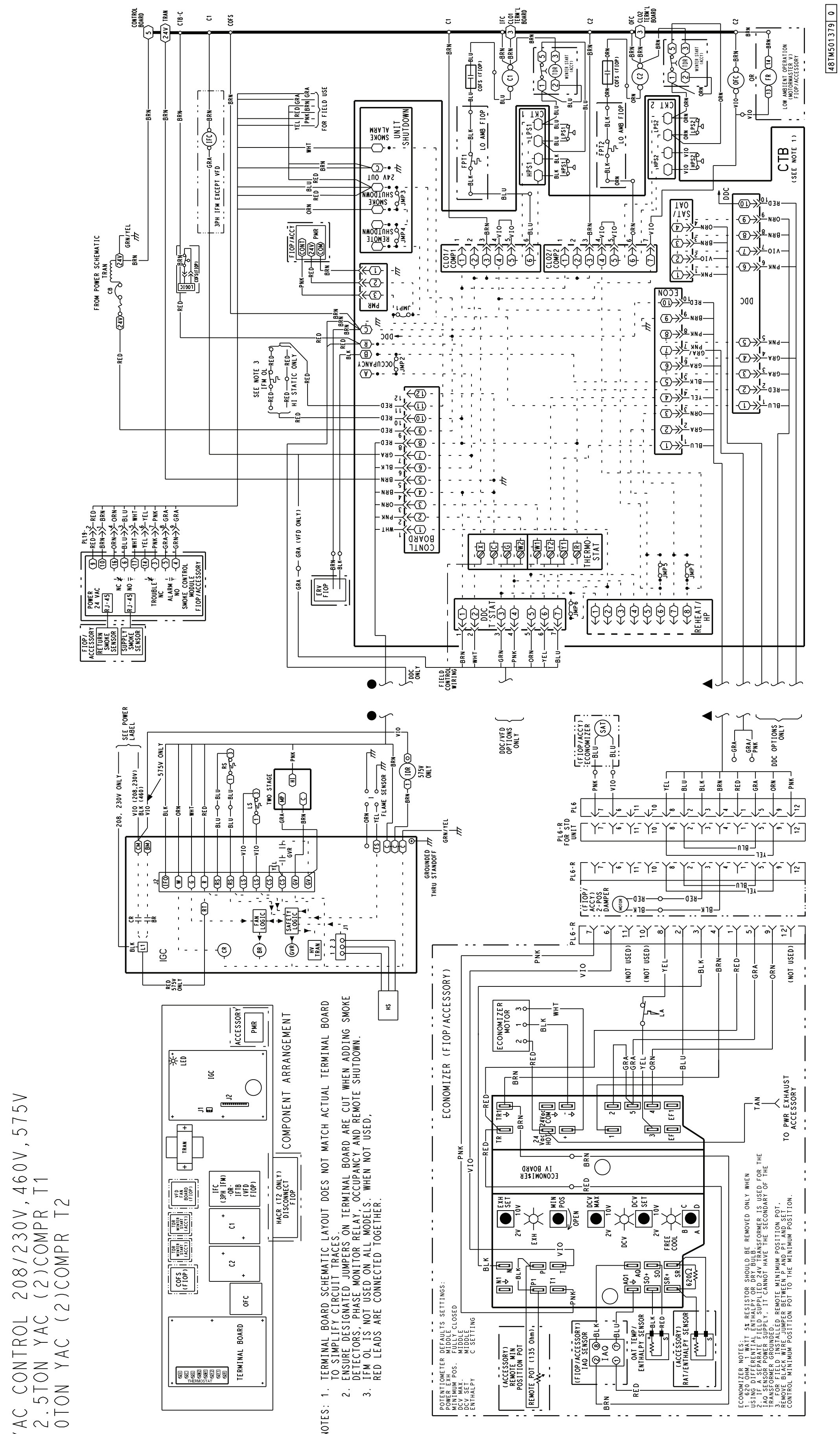
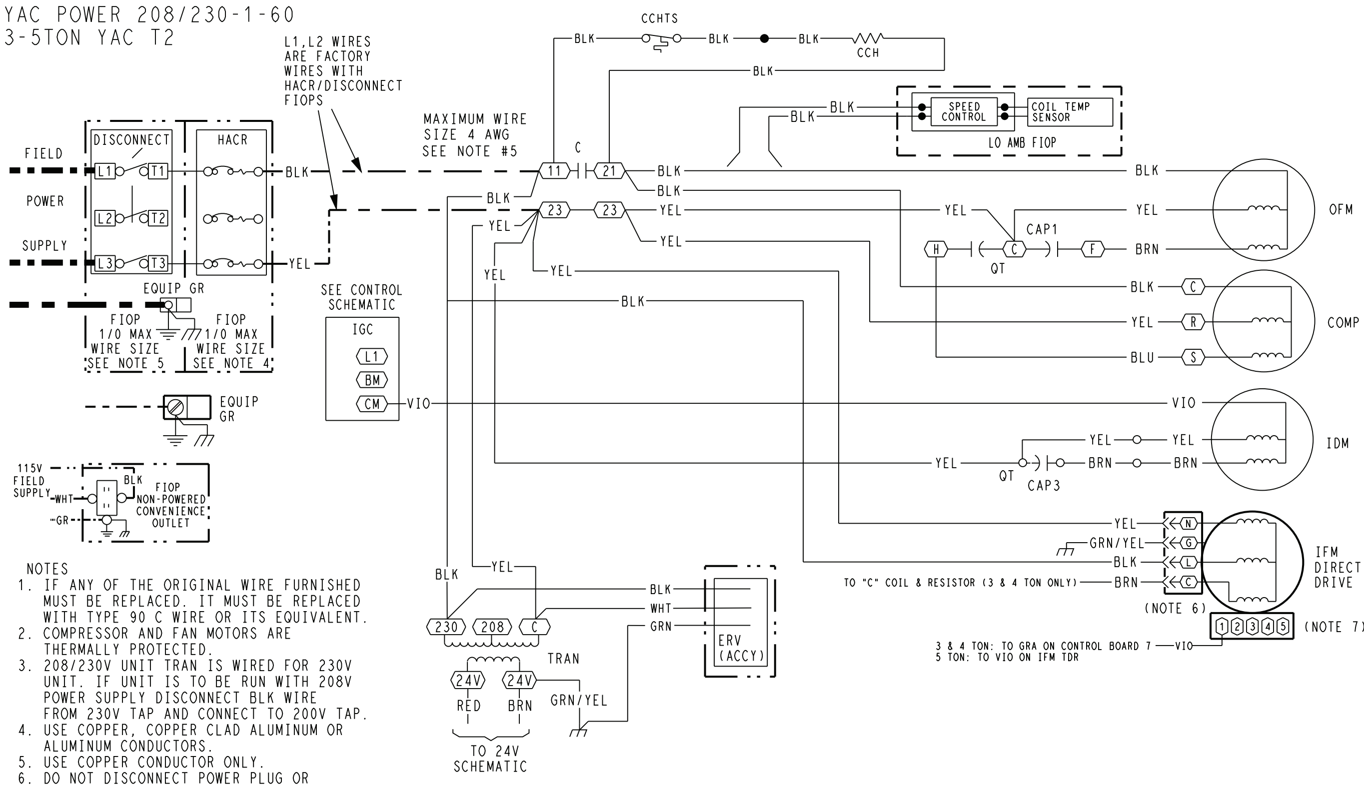


Fig. H — 48HC*D12 YAC Control Diagram — 208/230-3-60; 460/575-3-60

APPENDIX D — WIRING DIAGRAMS



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

LEGEND

- X MARKED WIRE
- X TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- X TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

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

48TM502526 F

Fig. I — 48HC*A04-A06 YAC Power Diagram — 208/230-1-60

APPENDIX D — WIRING DIAGRAMS

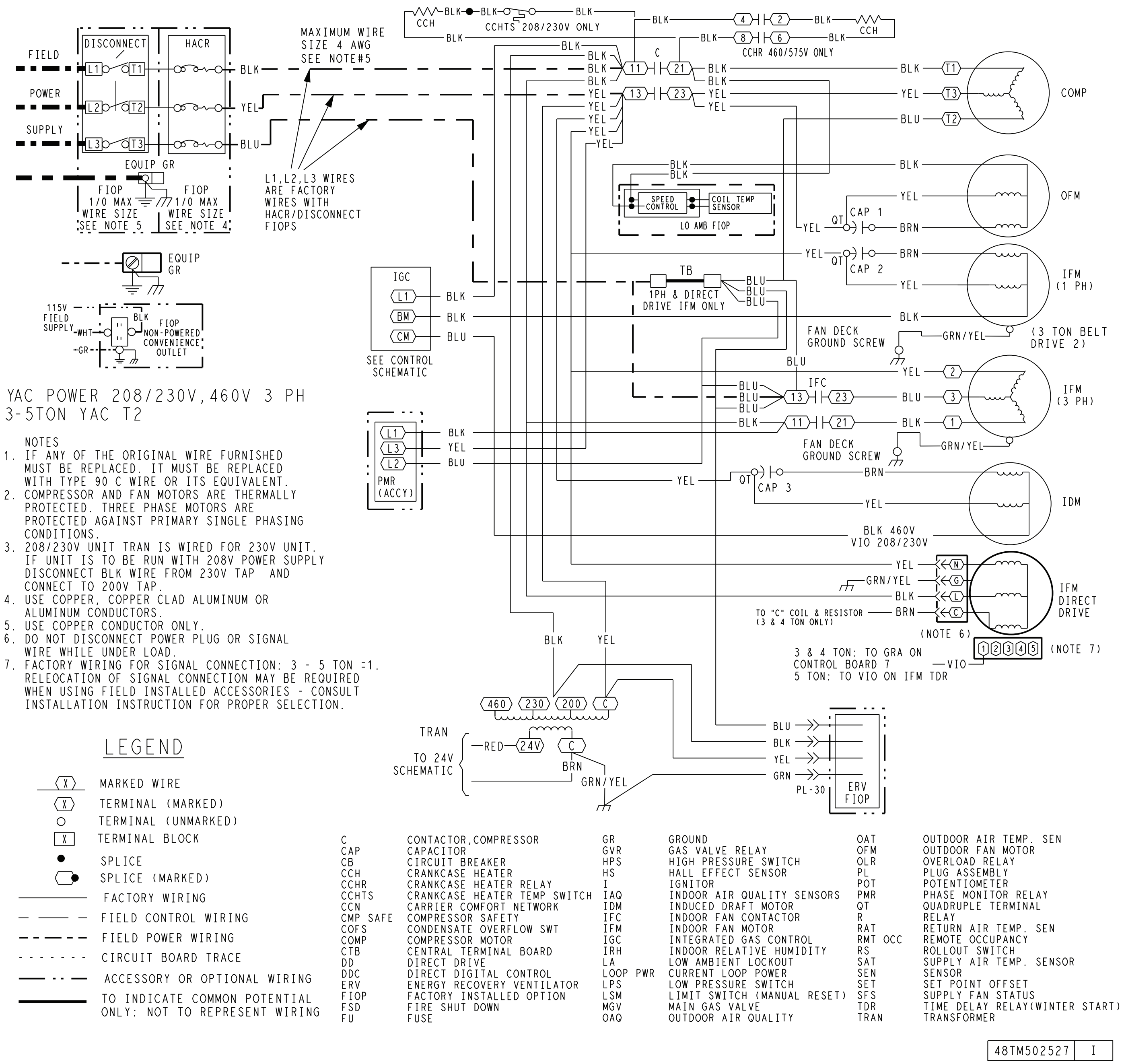


Fig. J — 48HC*A04-A06 YAC Power Diagram — 208/230-3-60; 460-3-60

APPENDIX D — WIRING DIAGRAMS

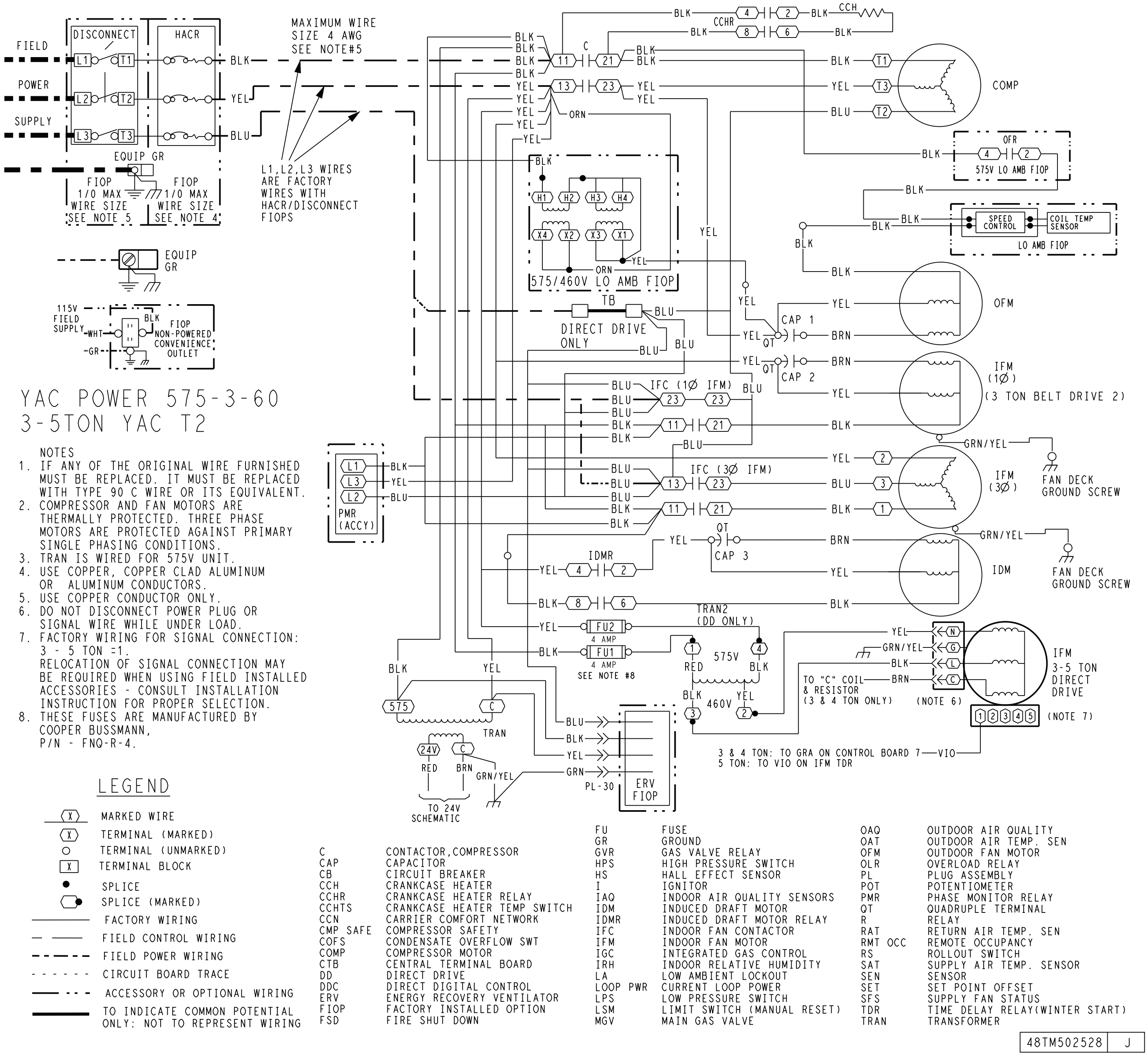
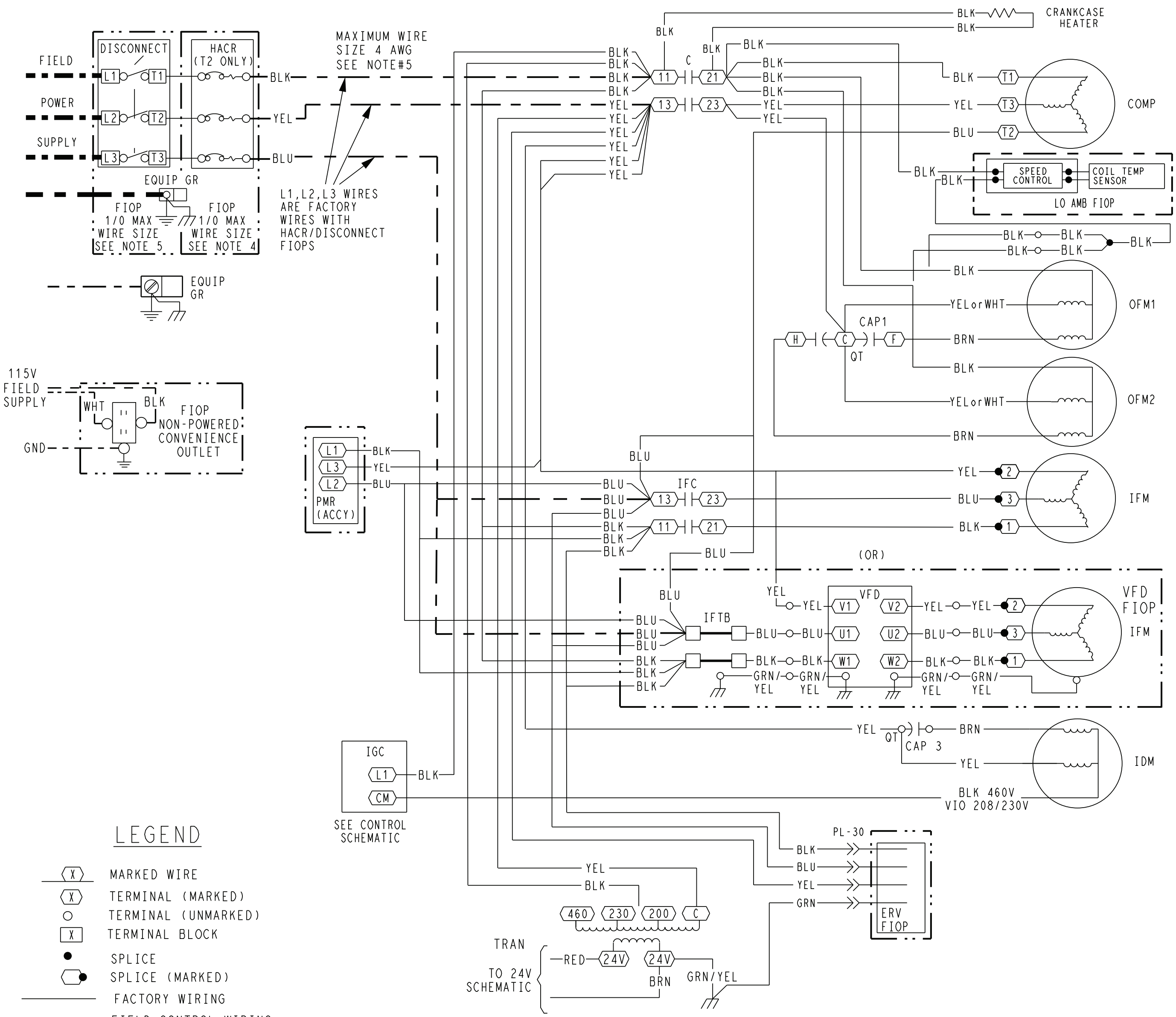


Fig. K — 48HC*A04-A06 YAC Power Diagram — 575-3-60

YAC POWER 208/230V,460V 3 PH
6TON 2-STG COOLING 1-COMPR MID-TIER



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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

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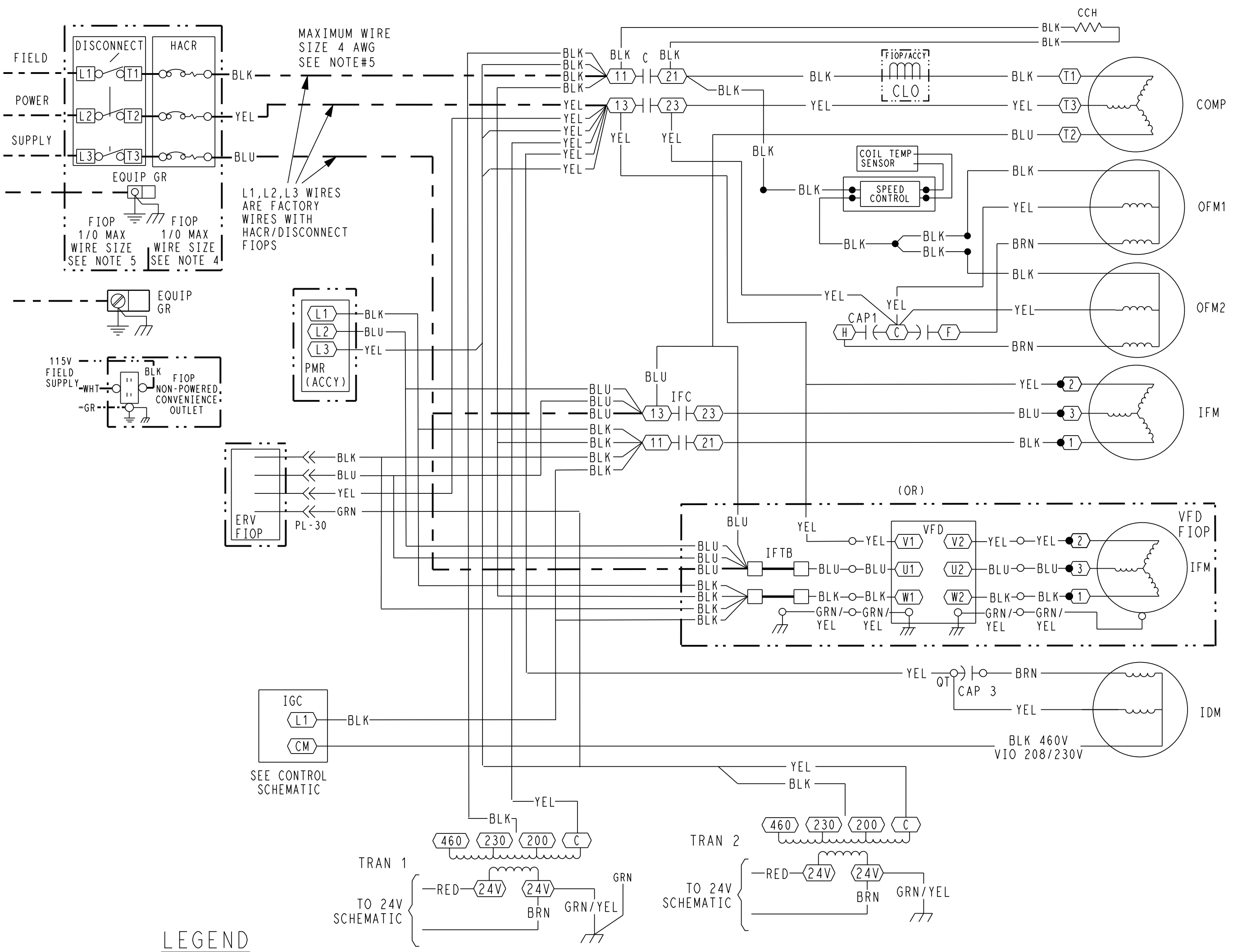
Fig. L — 48HC*D07-D12 YAC Power Diagram — 208/230-3-60, 460-3-60 (6 Ton 2 Stage with Cooling)

YAC POWER 208/230V,460V-3-60
6TON 2-STG COOLING 1-COMPR MID-TIER W/DEHUMIDIFICATION



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

C	CONTACTOR,COMPRESSOR	LA	LOW AMBIENT LOCKOUT
CAP	CAPACITOR	LDR	COMPRESSOR LOADER (INTERNAL)
CB	CIRCUIT BREAKER	LOOP PWR	CURRENT LOOP POWER
CCH	CRANKCASE HEATER	LOC	LOSS OF CHARGE (SWITCH)
CCN	CARRIER COMFORT NETWORK	LPS	LOW PRESSURE SWITCH
CMP SAFE	COMPRESSOR SAFFETY	LSM	LIMIT SWITCH (MANUAL RESET)
CLO	COMPRESSOR LOCKOUT	LS	LIMIT SWITCH
COFS	CONDENSATE OVERFLOW SWT	LTLO	LOW TEMP LOCKOUT
COMP	COMPRESSOR MOTOR	MGV	MAIN GAS VALVE
CLV	COOLING LIQUID VALVE	OAQ	OUTDOOR AIR QUALITY
DDC	DIRECT DIGITAL CONTROL	OAT	OUTDOOR AIR TEMP. SEN
ERV	ENERGY RECOVERY VELTILATOR	OFM	OUTDOOR FAN MOTOR
FIOP	FACTORY INSTALLED OPTION	OFR	OUTDOOR FAN RELAY
FPT	FREEZE PROTECTION TSTAT	OL	OVERLOAD
FSD	FIRE SHUT DOWN	PL	PLUG ASSEMBLY
FS	FLAME SENSOR	POT	POTENTIOMETER
FU	FUSE	PMR	PHASE MONITOR RELAY
GND	GROUND	QT	QUADRUPLE TERMINAL
GVR	GAS VALVE RELAY	R	RELAY
HGRH	HOT GAS REHEAT	RAT	RETURN AIR TEMP. SEN
HPS	HIGH PRESSURE SWITCH	RDV	REHEAT DISCHARGE VALVE
HS	HALL EFFECT SENSOR	RLV	REHEAT LIQUID VALVE
I	IGNITOR	RMT OCC	REMOTE OCCUPANCY
IAQ	INDOOR AIR QUALITY SENSORS	RS	ROLLOUT SWITCH
IDM	INDUCED DRAFT MOTOR	SAT	SUPPLY AIR TEMP. SENSOR
IFC	INDOOR FAN CONTACTOR	SEN	SENSOR
IFCB	INDOOR FAN CIRCUIT BREAKER	SET	SET POINT OFFSET
IFM	INDOOR FAN MOTOR	SFS	SUPPLY FAN STATUS
IFTB	INDOOR FAN TERMINAL BLOCK	TDR	TIME DELAY RELAY
IGC	INTEGRATED GAS CONTROL	TRAN	TRANSFORMER
IRH	INDOOR RELATIVE HUMIDITY	VFD	VARIABLE FREQUENCY DRIVE
JMP	JUMPER		

NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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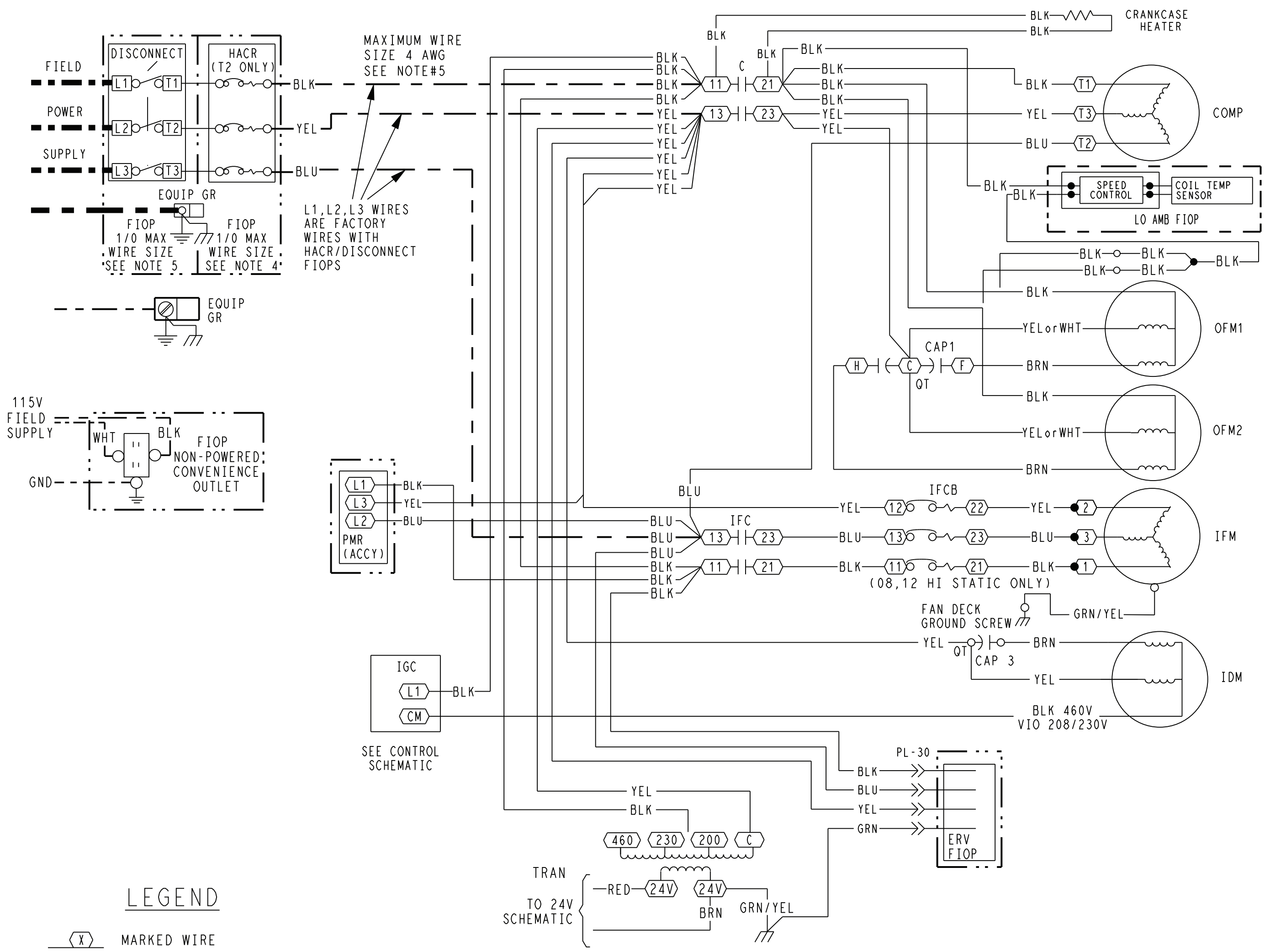
Fig. M — 48HC*D07-D12 YAC Power Diagram — 208/230-3-60, 460-3-60 (6 Ton 2 Stage with Dehumidification)

APPENDIX D — WIRING DIAGRAMS

YAC POWER 208/230V,460V 3 PH
7.5-10TON YAC (1)COMPR T1
6TON YAC (1)COMPR T2



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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

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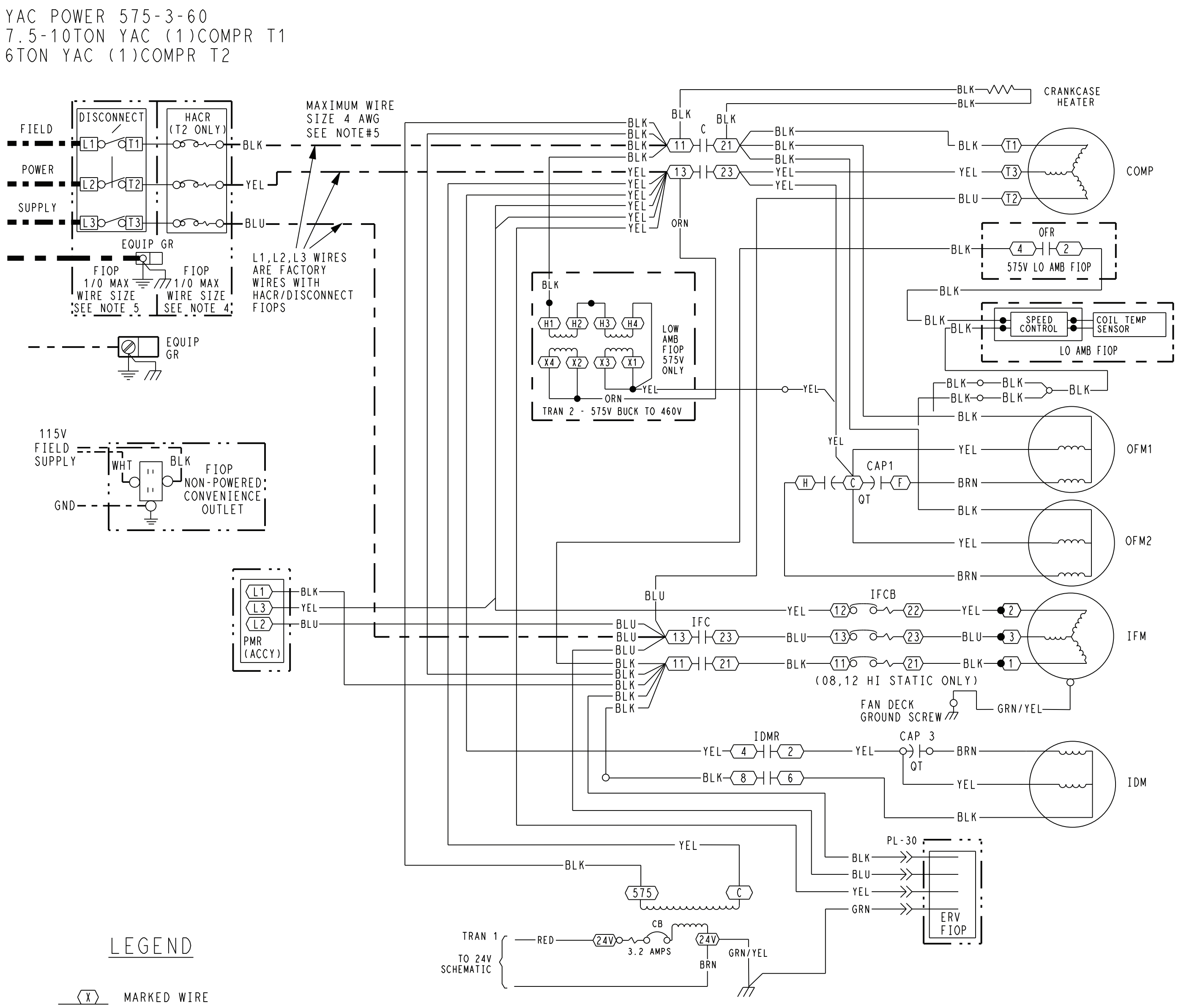
Fig. N — 48HC*A07-A12 YAC Power Diagram — 208/230-3-60, 460-3-60



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

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. TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDMR	INDUCED DRAFT MOTOR RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFTB	INDOOR FAN TERMINAL BLOCK
IFM	INDOOR FAN MOTOR
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER

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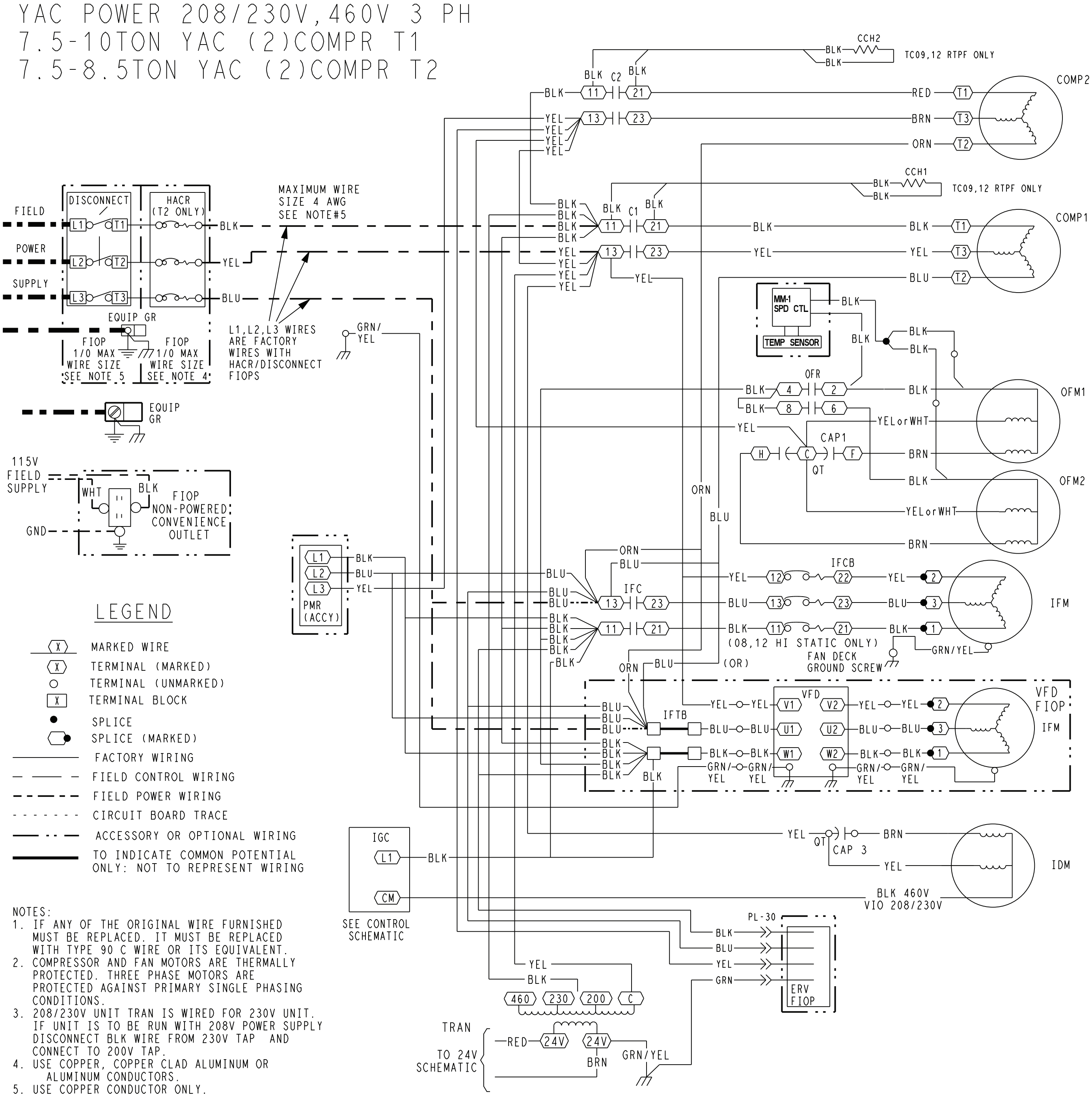
Fig. O — 48HC*A07-A12 YAC Power Diagram — 575-3-60

APPENDIX D — WIRING DIAGRAMS



LEGEND

Symbol	Meaning
⟨X⟩	MARKED WIRE
⟨X⟩	TERMINAL (MARKED)
○	TERMINAL (UNMARKED)
[X]	TERMINAL BLOCK
●	SPLICE
⟨●⟩	SPLICE (MARKED)
———	FACTORY WIRING
— —— —	FIELD CONTROL WIRING
- - - -	FIELD POWER WIRING
- - - - - - -	CIRCUIT BOARD TRACE
—— · —	ACCESSORY OR OPTIONAL WIRING
━━━	TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES:
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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

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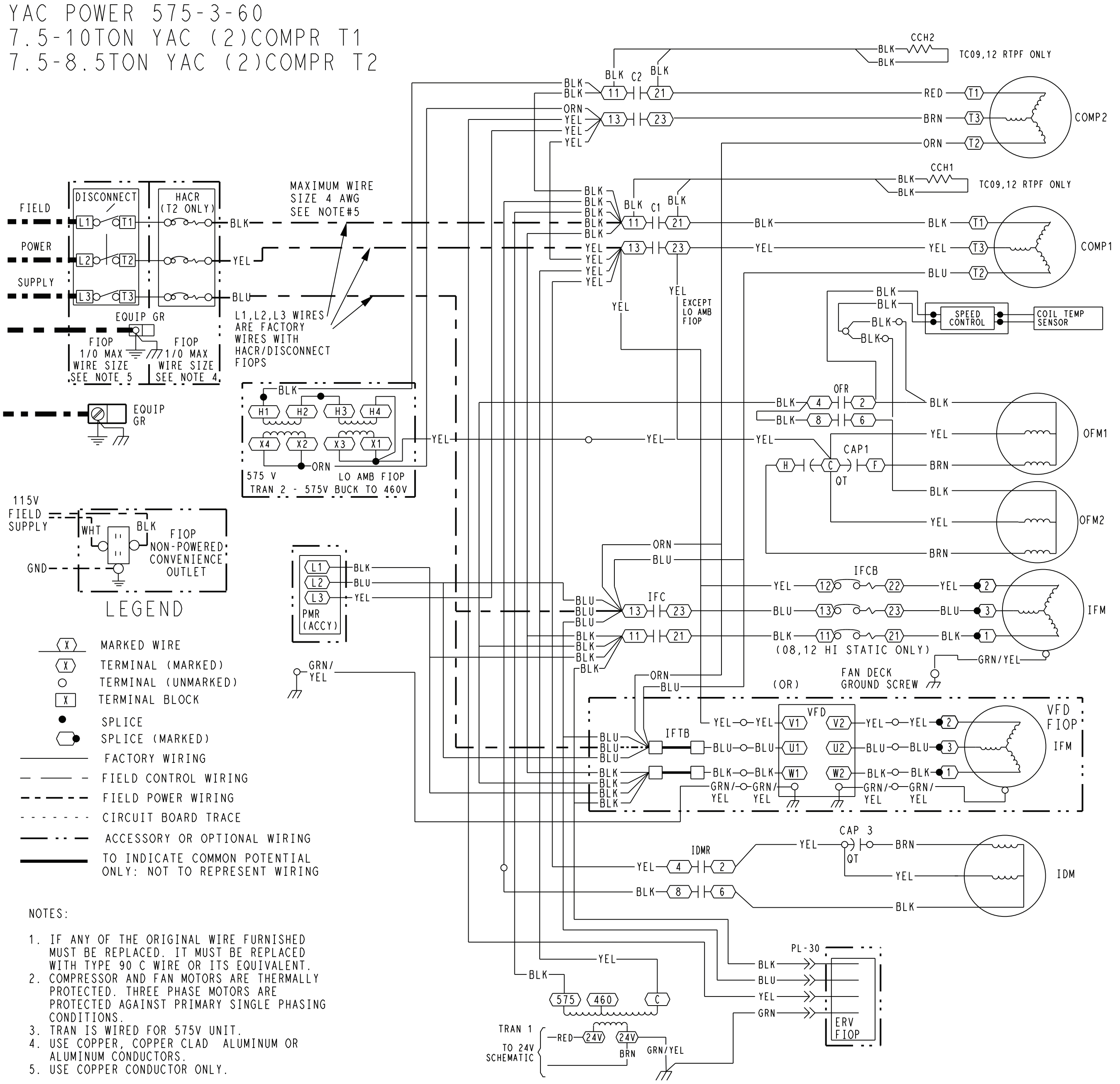
Fig. P — 48HC*D08-D09 YAC Power Diagram — 230/460-3-60

APPENDIX D — WIRING DIAGRAMS



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

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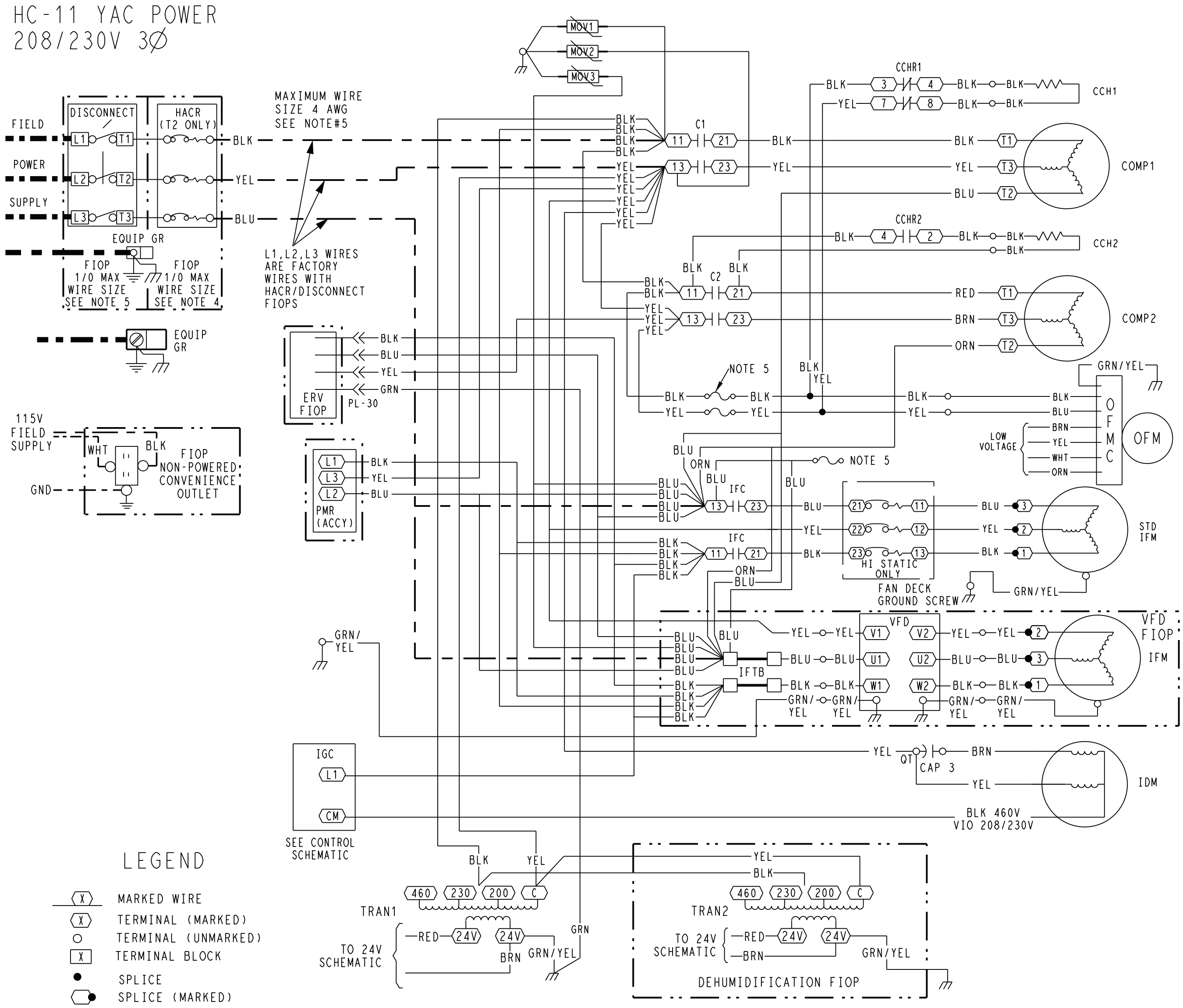
Fig. Q — 48HC*D08-D09 YAC Power Diagram — 575-3-60

APPENDIX D — WIRING DIAGRAMS



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.
5. 30A FUSES USED ON 208/230V ONLY.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHS	CRANKCASE HEATER SWITCH
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
FPT	FREEZE PROTECTION THERMOSTAT
FR	FAN RELAY
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
HUMR	HUMIDISTAT RELAY
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IFR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERM BLK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAS	LOW AMBIENT SWITCH
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
MGV	MAIN GAS VALVE
MOV	METAL OXIDE VARISTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFMC	OUTDOOR FAN MOTOR CONTROL
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SF	SIGNAL FILTER
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER
TB	TERMINAL BLOCK
VFD	VARIABLE FREQUENCY DRIVE

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Fig. R — 48HC*D11 YAC Power Diagram 208/230-3-60

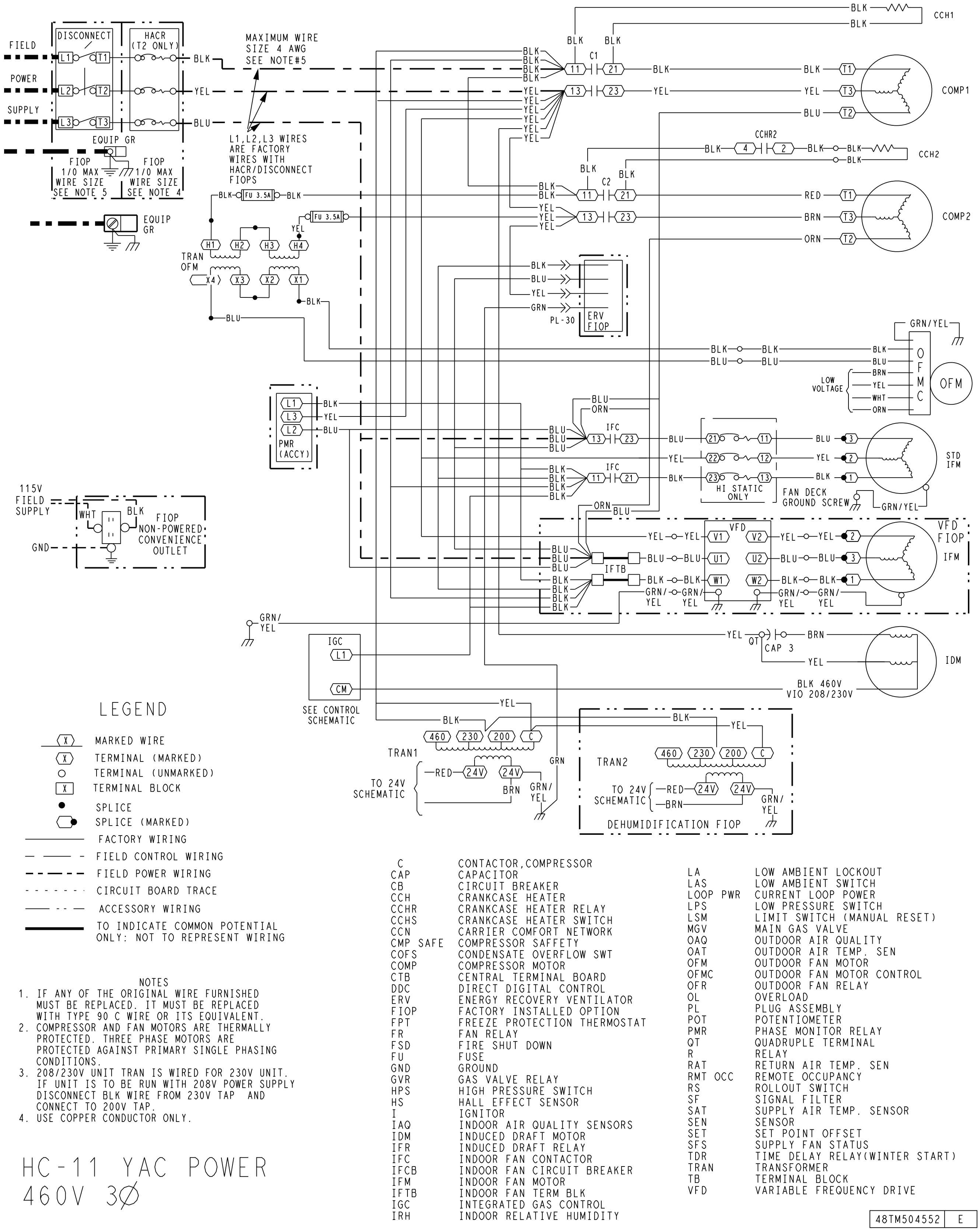
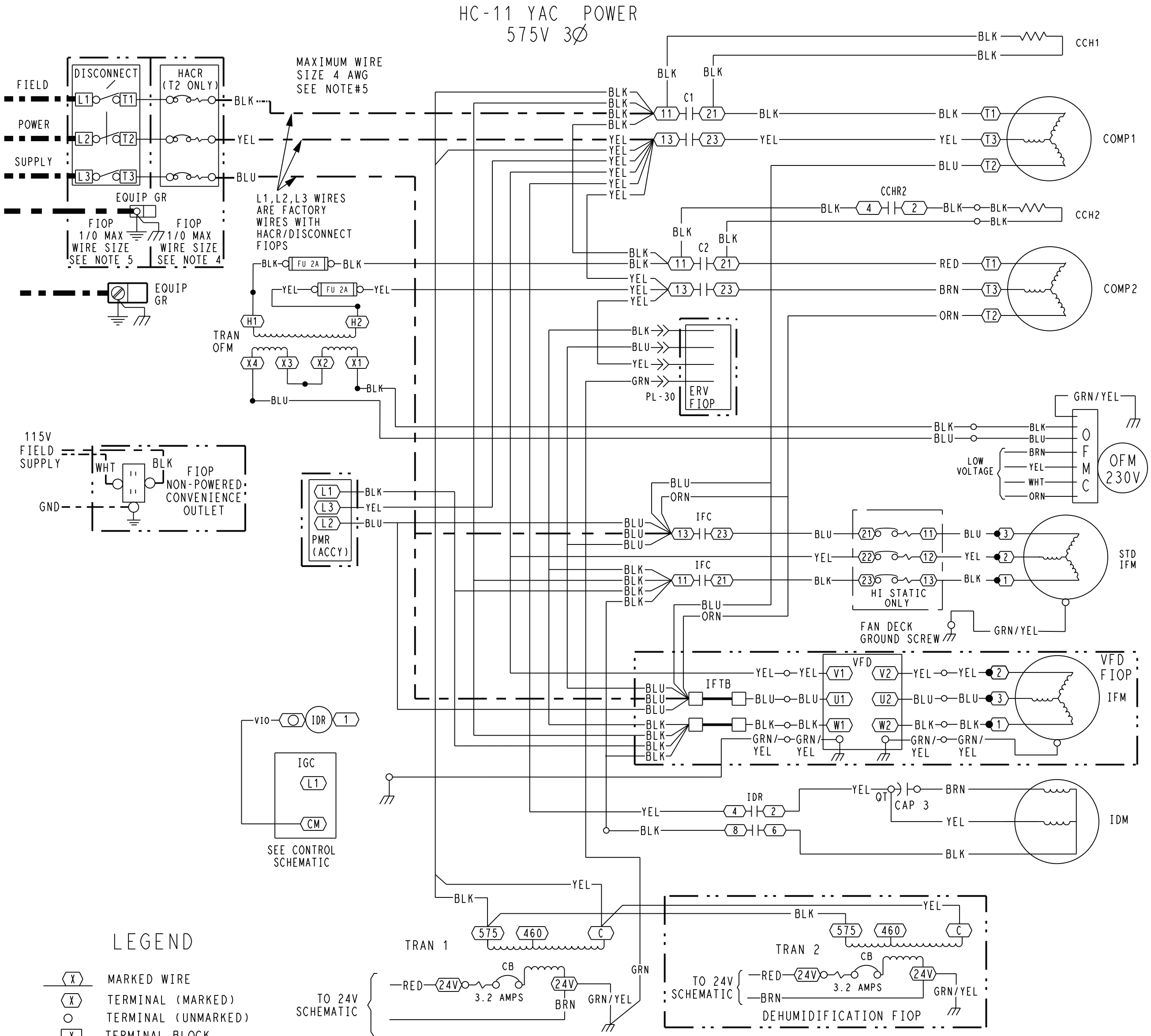


Fig. S — 48HC*D11 YAC Power Diagram 460-3-60



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

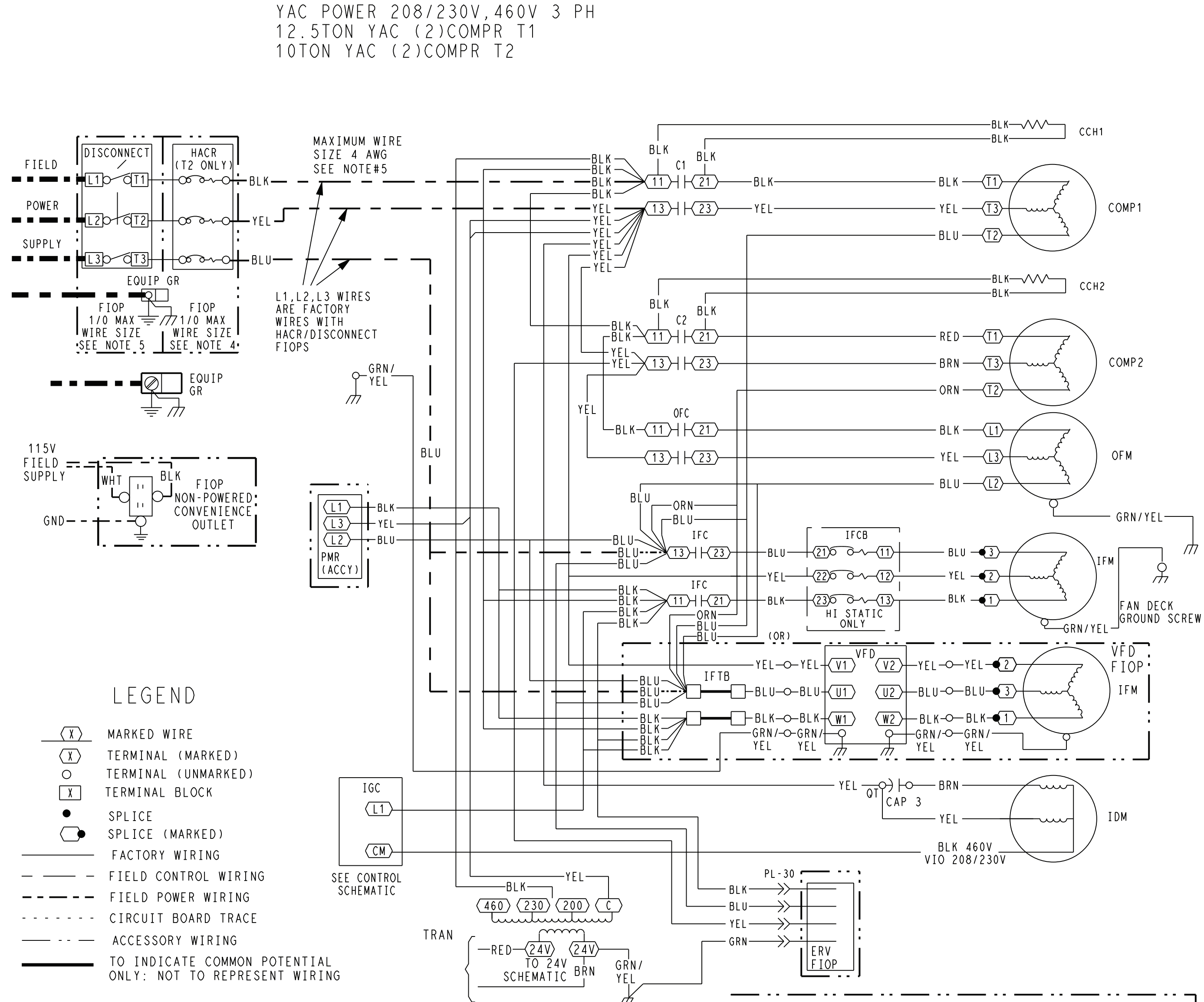
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.

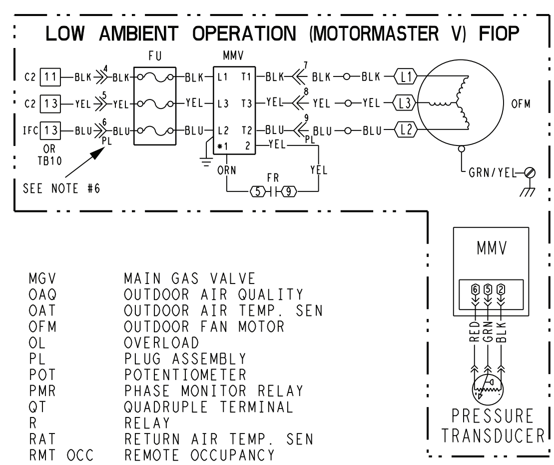
C	CONTACTOR,COMPRESSOR	IRH	INDOOR RELATIVE HUMIDITY
CAP	CAPACITOR	LA	LOW AMBIENT LOCKOUT
CB	CIRCUIT BREAKER	LAS	LOW AMBIENT SWITCH
CCH	CRANKCASE HEATER	LOOP PWR	CURRENT LOOP POWER
CCHR	CRANKCASE HEATER RELAY	LPS	LOW PRESSURE SWITCH
CCHS	CRANKCASE HEATER SWITCH	LSM	LIMIT SWITCH (MANUAL RESET)
CCN	CARRIER COMFORT NETWORK	MGV	MAIN GAS VALVE
CMP SAFE	COMPRESSOR SAFFETY	OAQ	OUTDOOR AIR QUALITY
COFS	CONDENSATE OVERFLOW SWT	OAT	OUTDOOR AIR TEMP. SEN
COMP	COMPRESSOR MOTOR	OFM	OUTDOOR FAN MOTOR
CTB	CENTRAL TERMINAL BOARD	OFMC	OUTDOOR FAN MOTOR CONTROL
DDC	DIRECT DIGITAL CONTROL	OFR	OUTDOOR FAN RELAY
ERV	ENERGY RECOVERY VENTILATOR	OL	OVERLOAD
FIOP	FACTORY INSTALLED OPTION	PL	PLUG ASSEMBLY
FPT	FREEZE PROTECTION THERMOSTAT	POT	POTENTIOMETER
FR	FAN RELAY	PMR	PHASE MONITOR RELAY
FSD	FIRE SHUT DOWN	QT	QUADRUPLE TERMINAL
FU	FUSE	R	RELAY
GND	GROUND	RAT	RETURN AIR TEMP. SEN
GVR	GAS VALVE RELAY	RMT OCC	REMOTE OCCUPANCY
HPS	HIGH PRESSURE SWITCH	RS	ROLLOUT SWITCH
HS	HALL EFFECT SENSOR	SAT	SUPPLY AIR TEMP. SENSOR
I	IGNITOR	SEN	SENSOR
IAQ	INDOOR AIR QUALITY SENSORS	SET	SET POINT OFFSET
IDM	INDUCED DRAFT MOTOR	SF	SIGNAL FILTER
IFR	INDUCED DRAFT RELAY	SFS	SUPPLY FAN STATUS
IFC	INDOOR FAN CONTACTOR	TDR	TIME DELAY RELAY(WINTER START)
IFCB	INDOOR FAN CIRCUIT BREAKER	TRAN	TRANSFORMER
IFM	INDOOR FAN MOTOR	TB	TERMINAL BLOCK
IFTB	INDOOR FAN TERM BLK	VFD	VARIABLE FREQUENCY DRIVE
IGC	INTEGRATED GAS CONTROL		

48TM504182 E

Fig. T — 48HC*D11 YAC Power Diagram 575-3-60

APPENDIX D — WIRING DIAGRAMS





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
FR	FAN RELAY
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IFR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERMINAL BLOCK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)

MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

NOTES:

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.
6. PIN NO'S 4, 5 & 6 ARE FOR 460/575V. FOR 208/230V PINS 1, 2 & 3 ARE USED RESPECTIVELY.

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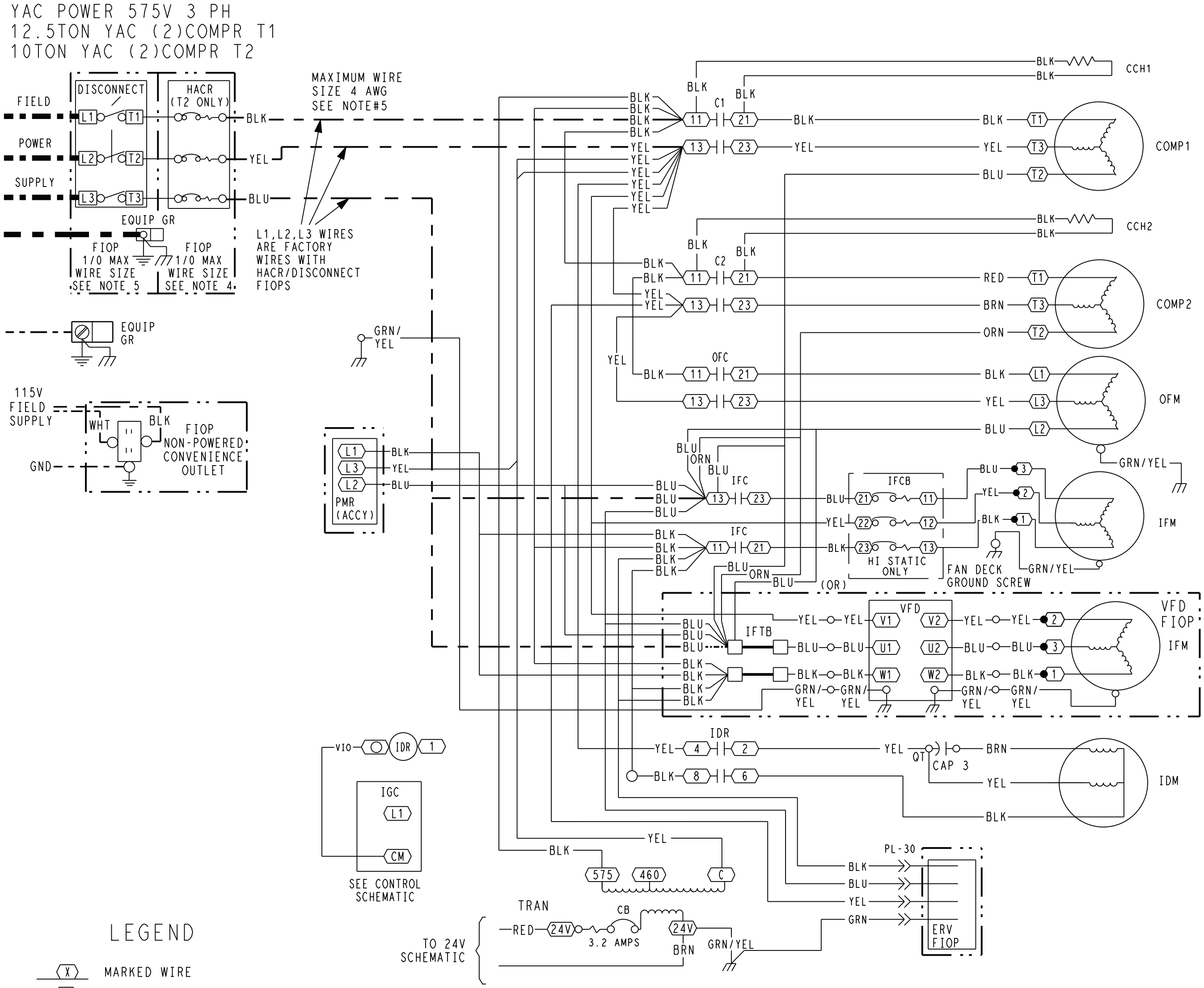
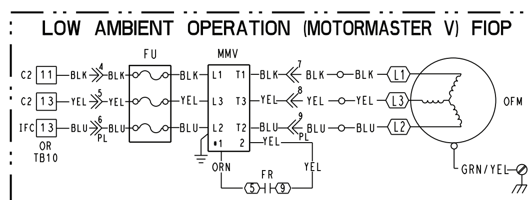
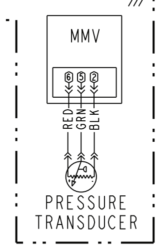
Fig. U — 48HC*D12 YAC Power Diagram — 230/460-3-60

APPENDIX D — WIRING DIAGRAMS







LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER,COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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

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Fig. V — 48HC*D12 YAC Power Diagram — 575-3-60

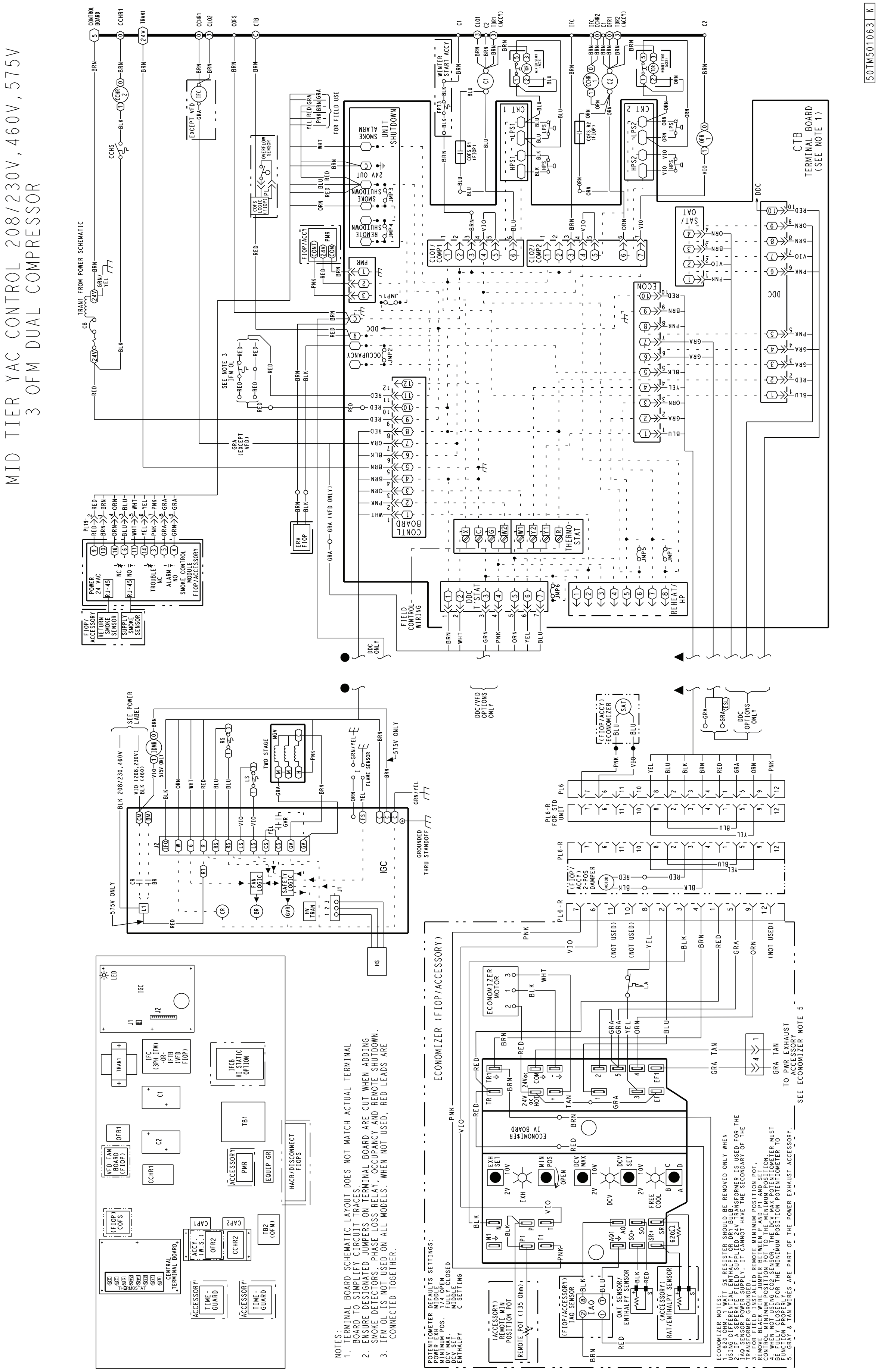


Fig. W — 48HC*D14 YAC Control Diagram — 208/230-3-60; 460/575-3-60

APPENDIX D — WIRING DIAGRAMS

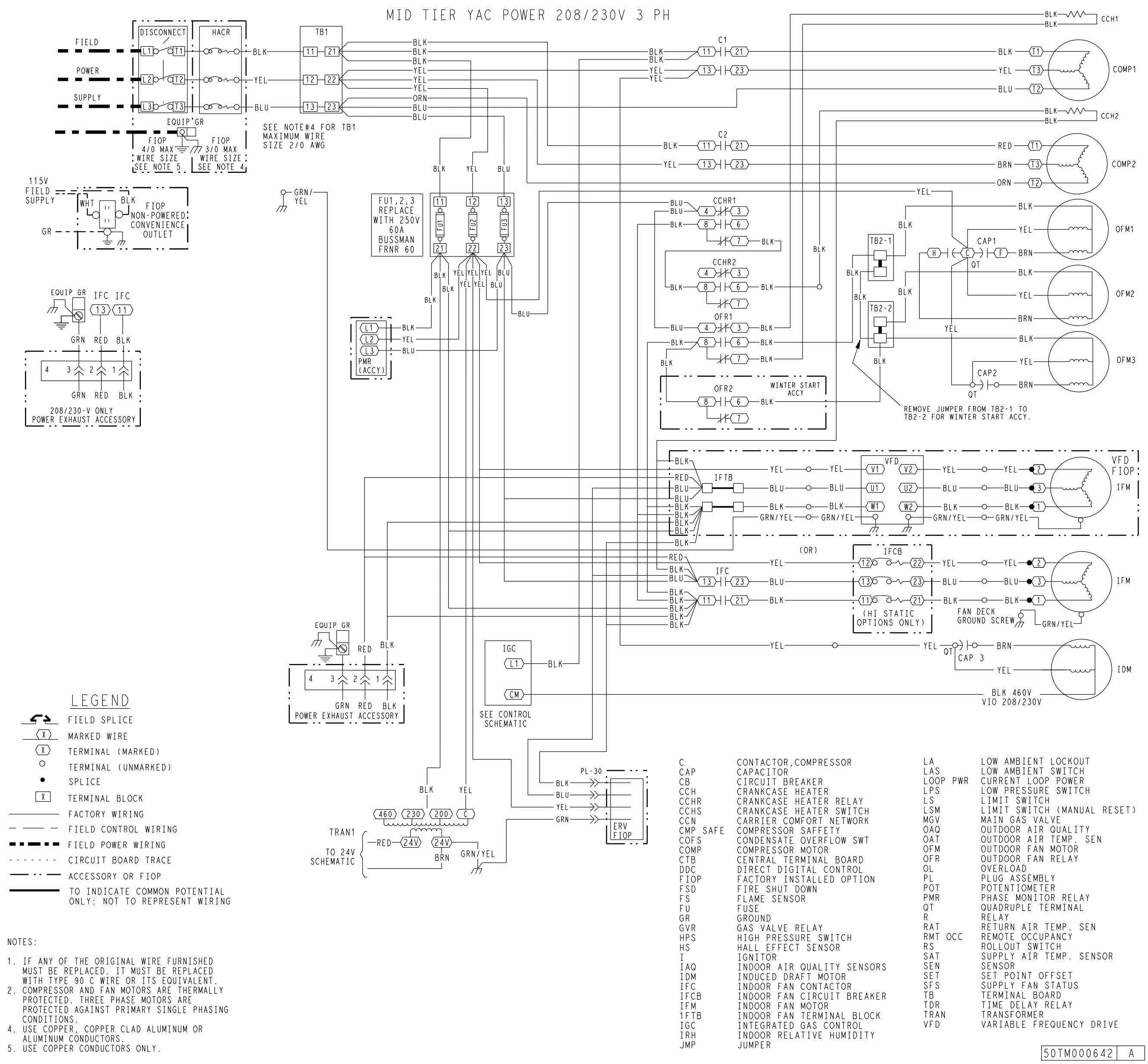


Fig. X — 48HC*D14 YAC Power Diagram — 208/230-3-60

APPENDIX D — WIRING DIAGRAMS

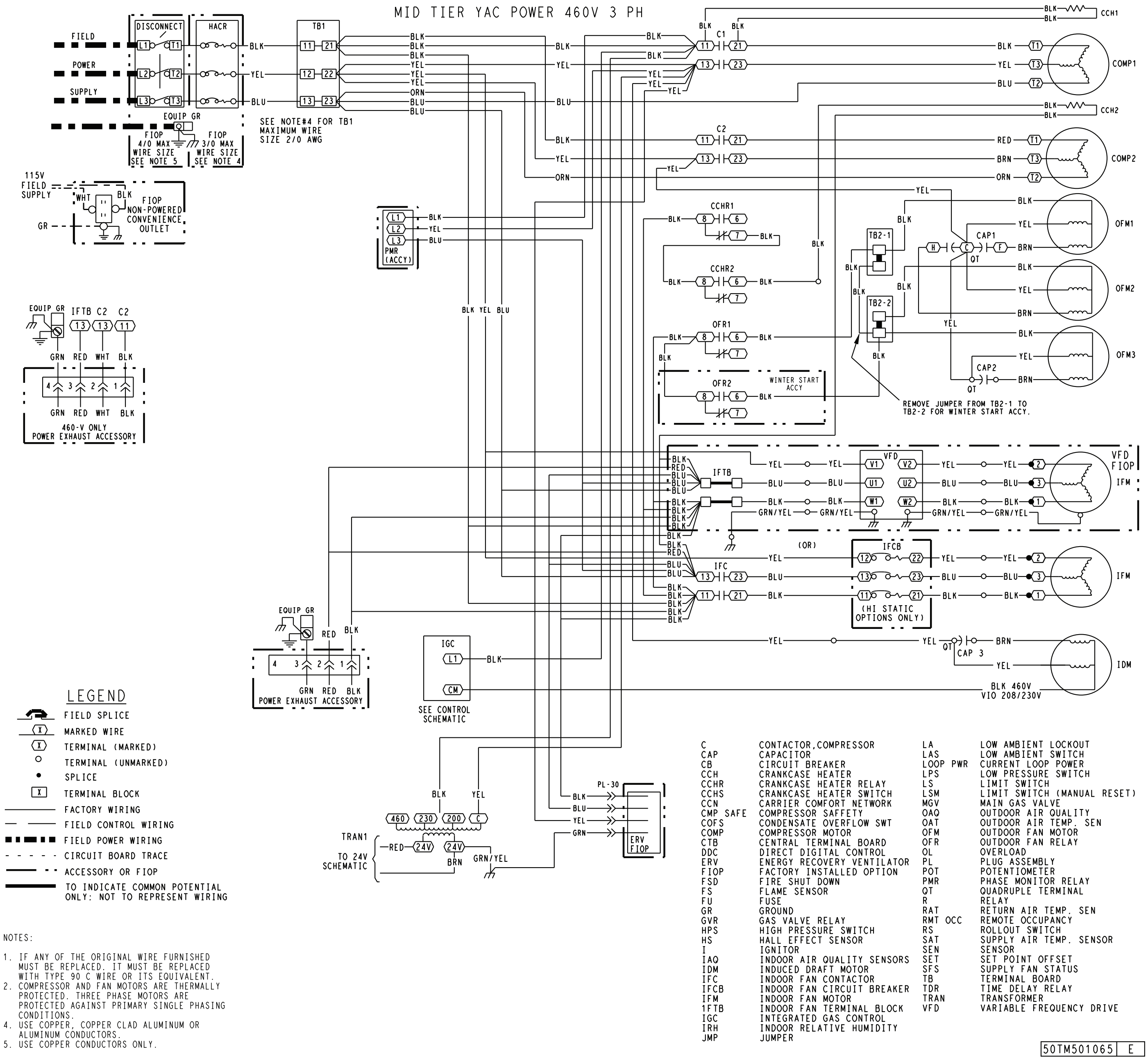


Fig. Y — 48HC*D14 YAC Power Diagram — 460-3-60

APPENDIX D — WIRING DIAGRAMS

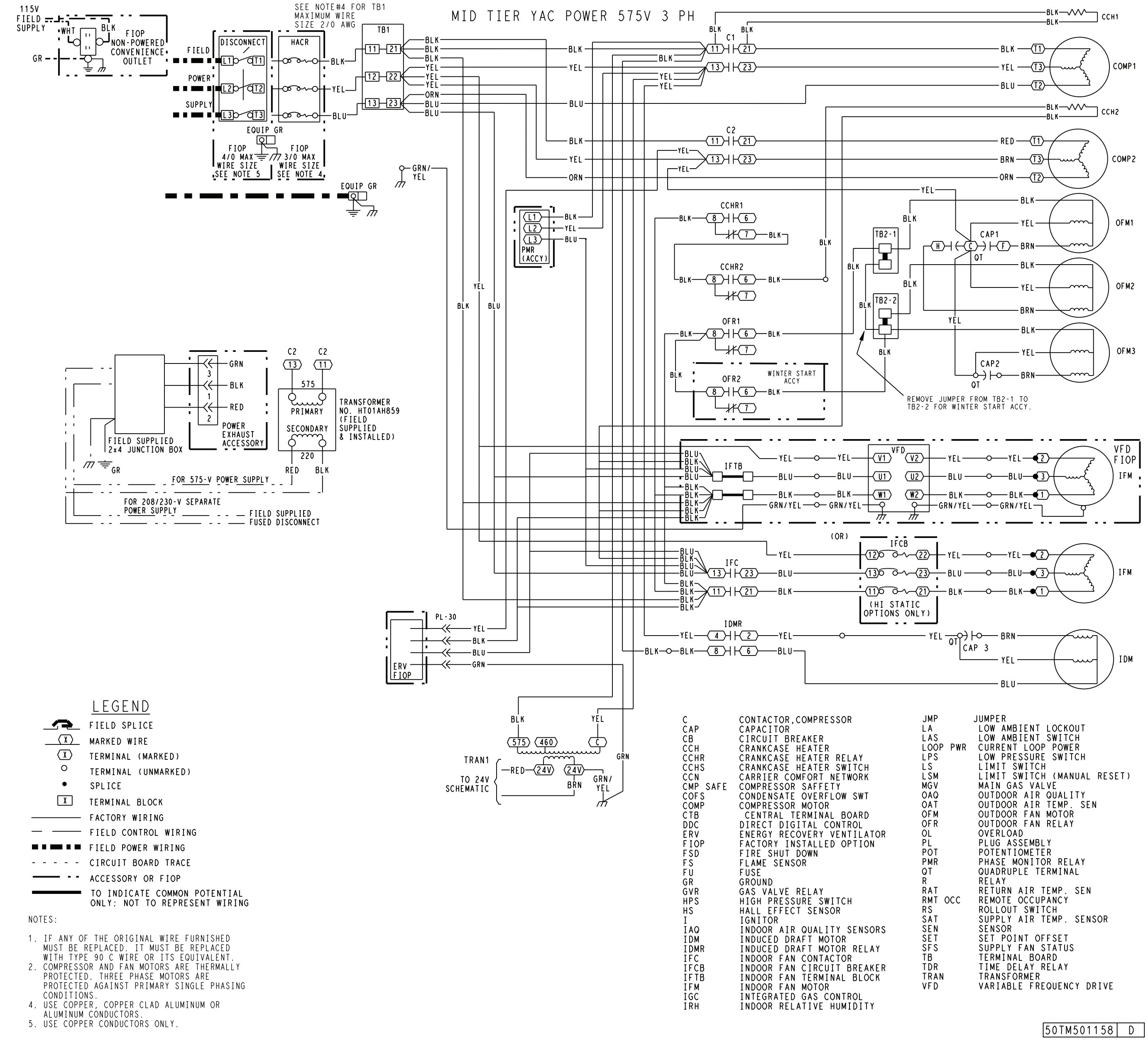


Fig. Z — 48HC*D14 YAC Power Diagram — 575-3-60

APPENDIX D — WIRING DIAGRAMS

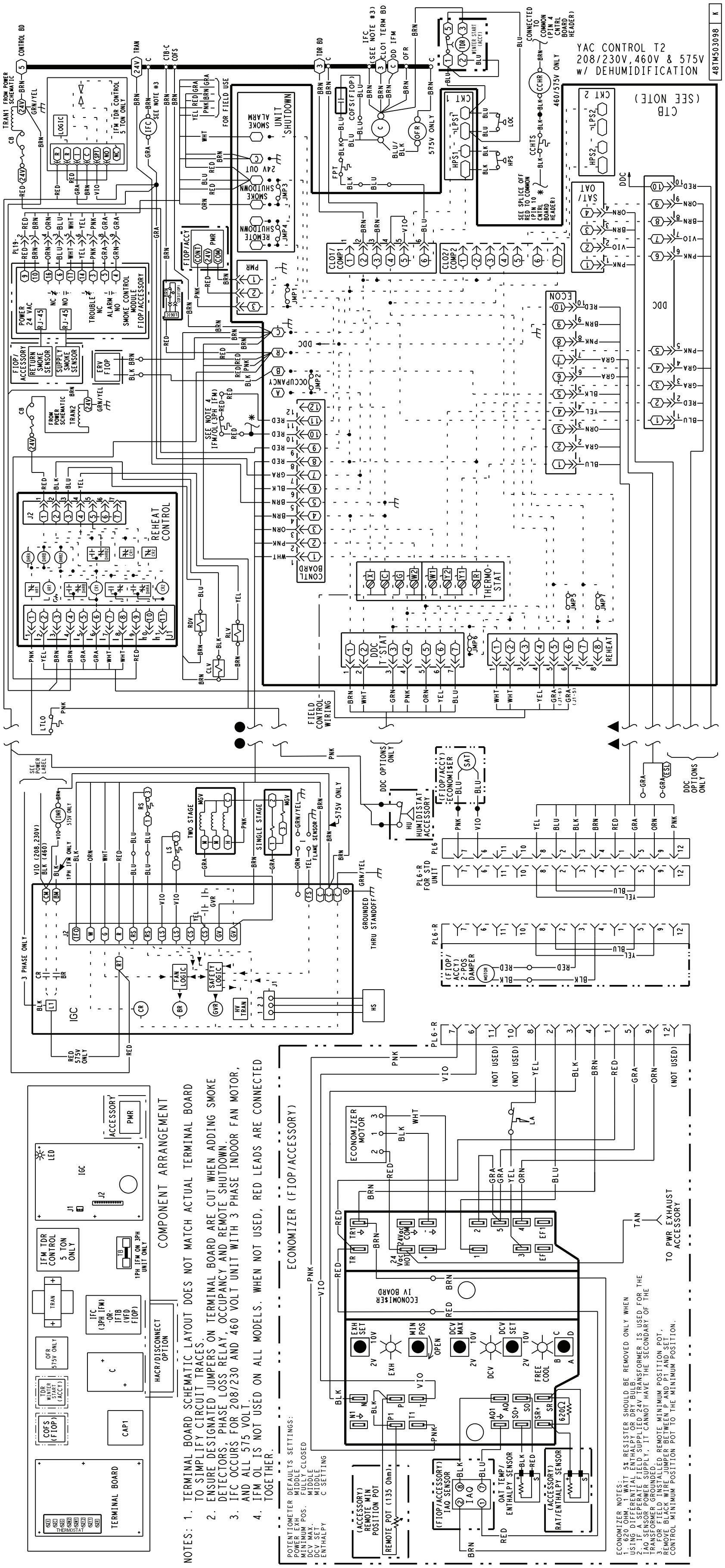


Fig. AA — 48HC*A04-A06 YAC Control Diagram — 230-1-60; 230/460/575-3-60 with Dehumidification

APPENDIX D — WIRING DIAGRAMS

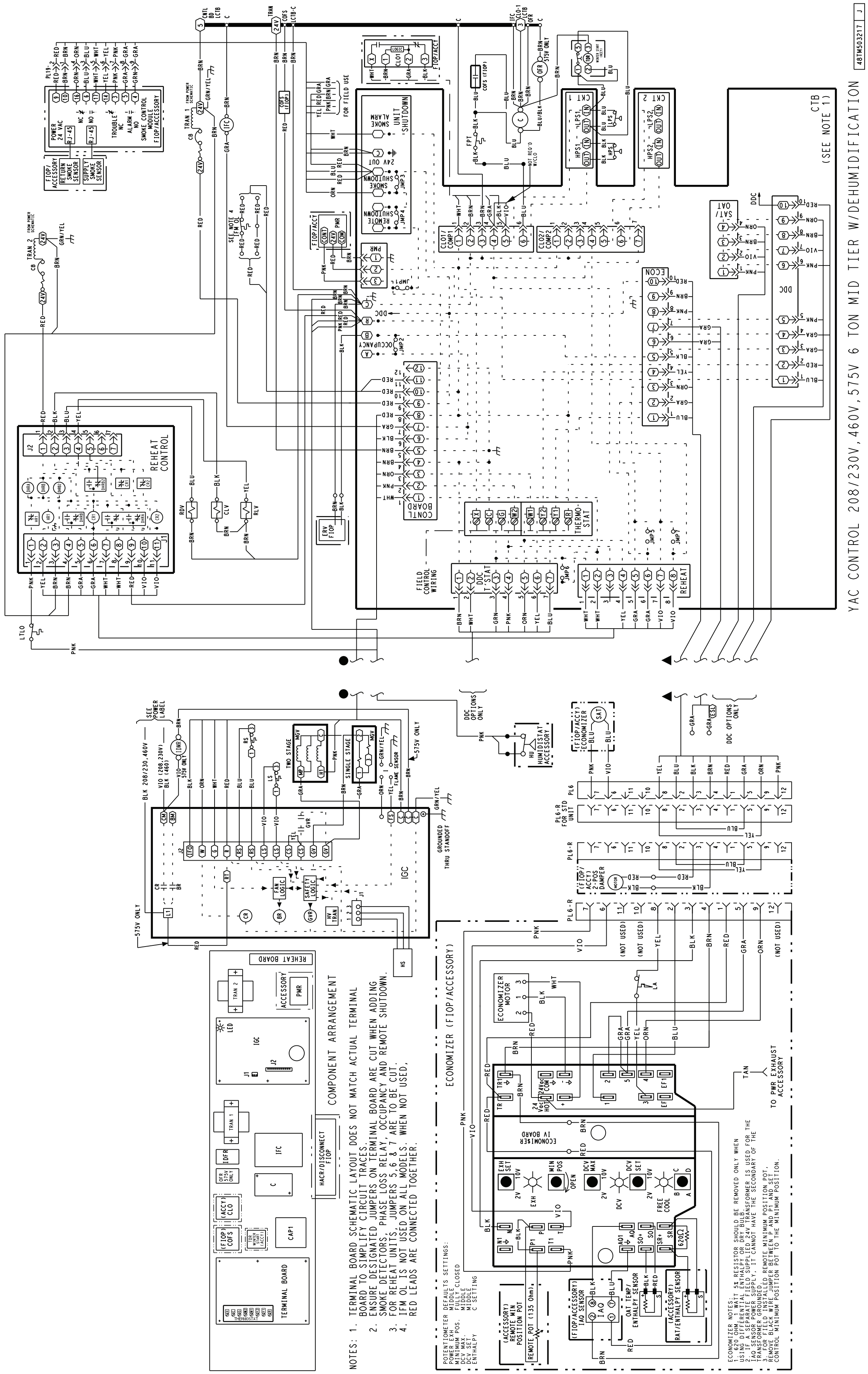


Fig. AB — 48HC*A07 YAC Control Diagram — 230-1-60; 230/460/575-3-60 with Dehumidification

APPENDIX D — WIRING DIAGRAMS

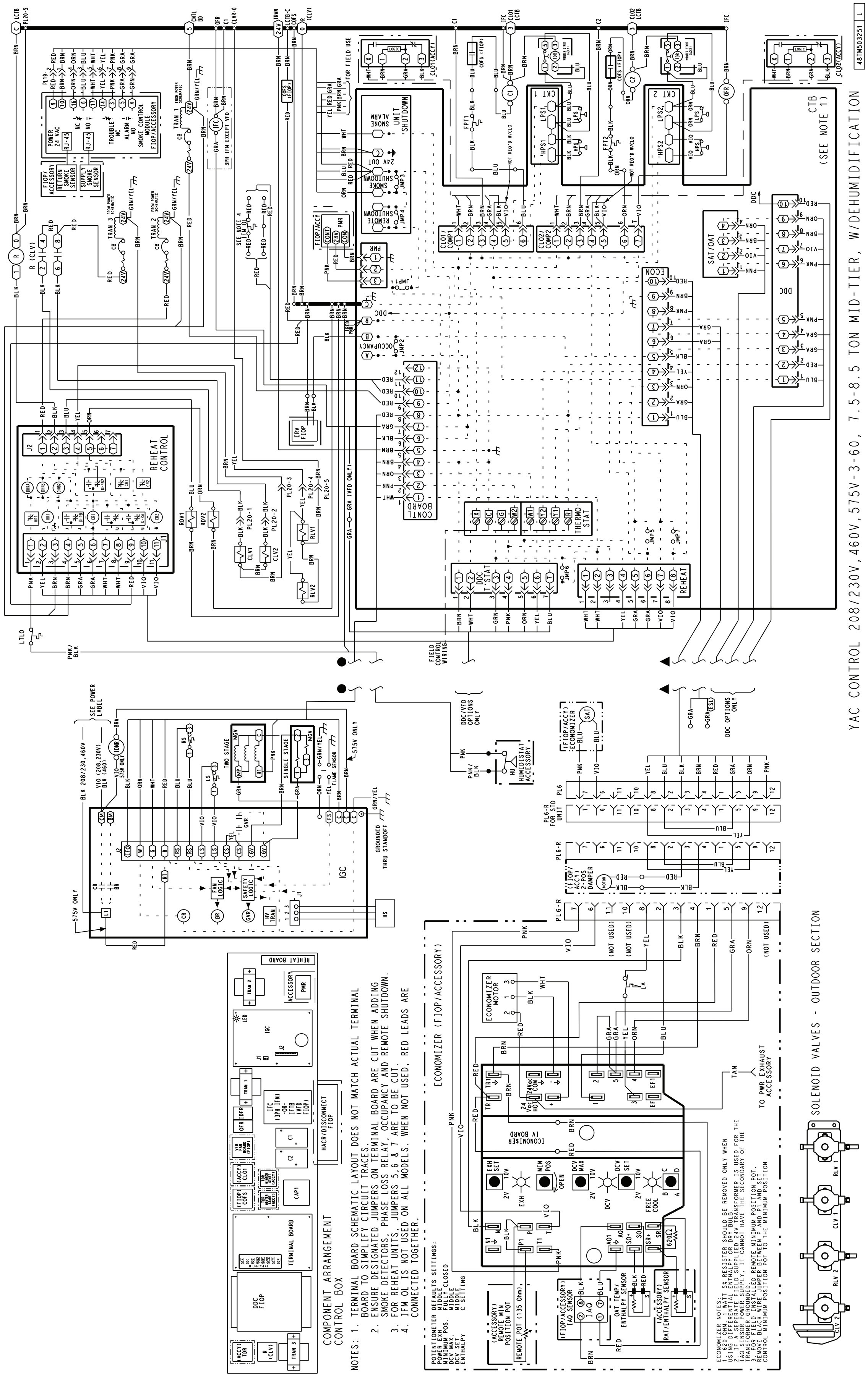


Fig. AC — 48HC*D08-D09 YAC Control Diagram — 230/460/575-3-60 with Dehumidification

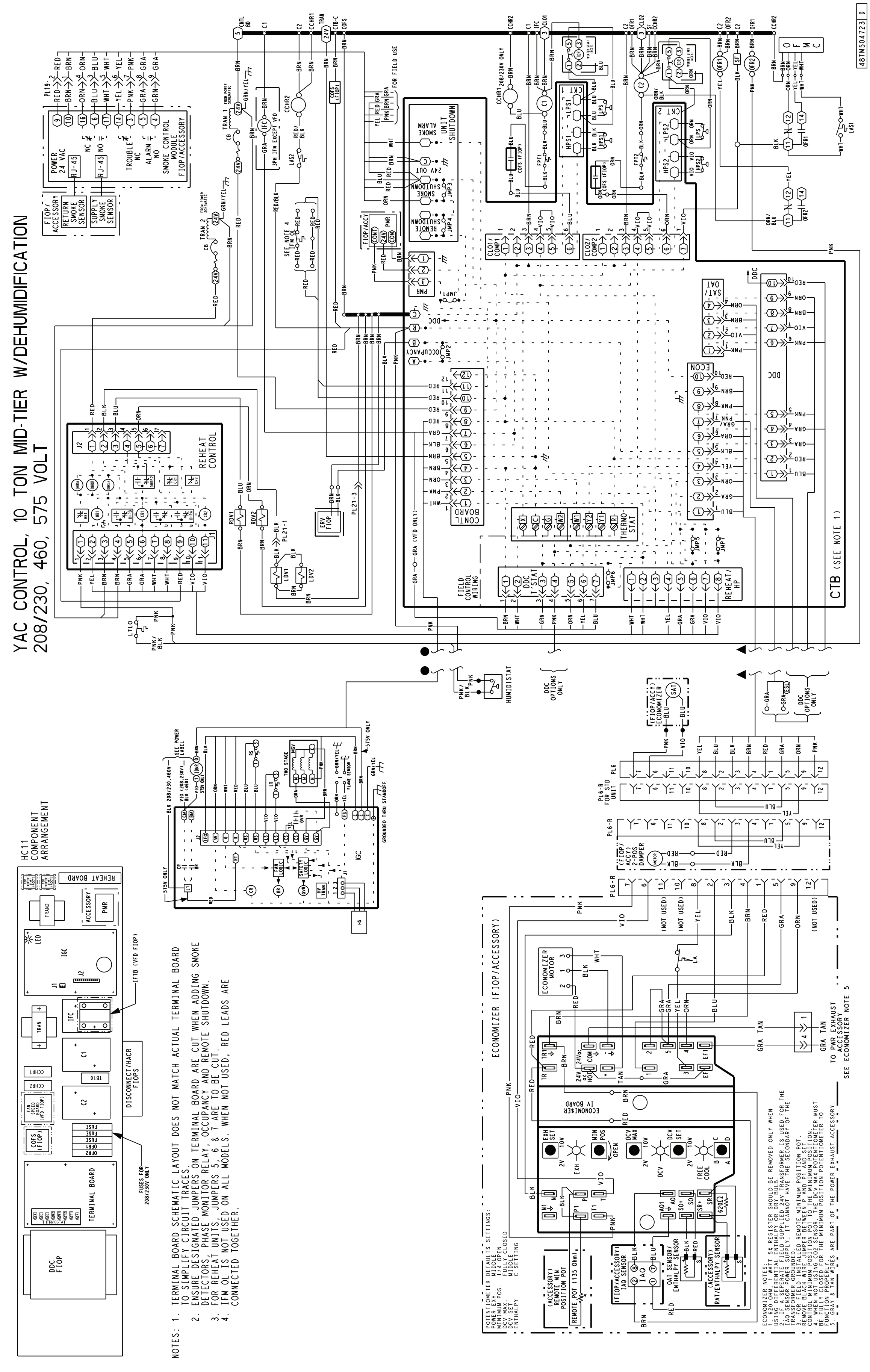


Fig. AD — 48HC*D11 YAC Control Diagram — 230-1-60; 230/460/575-3-60 with Dehumidification

APPENDIX D — WIRING DIAGRAMS

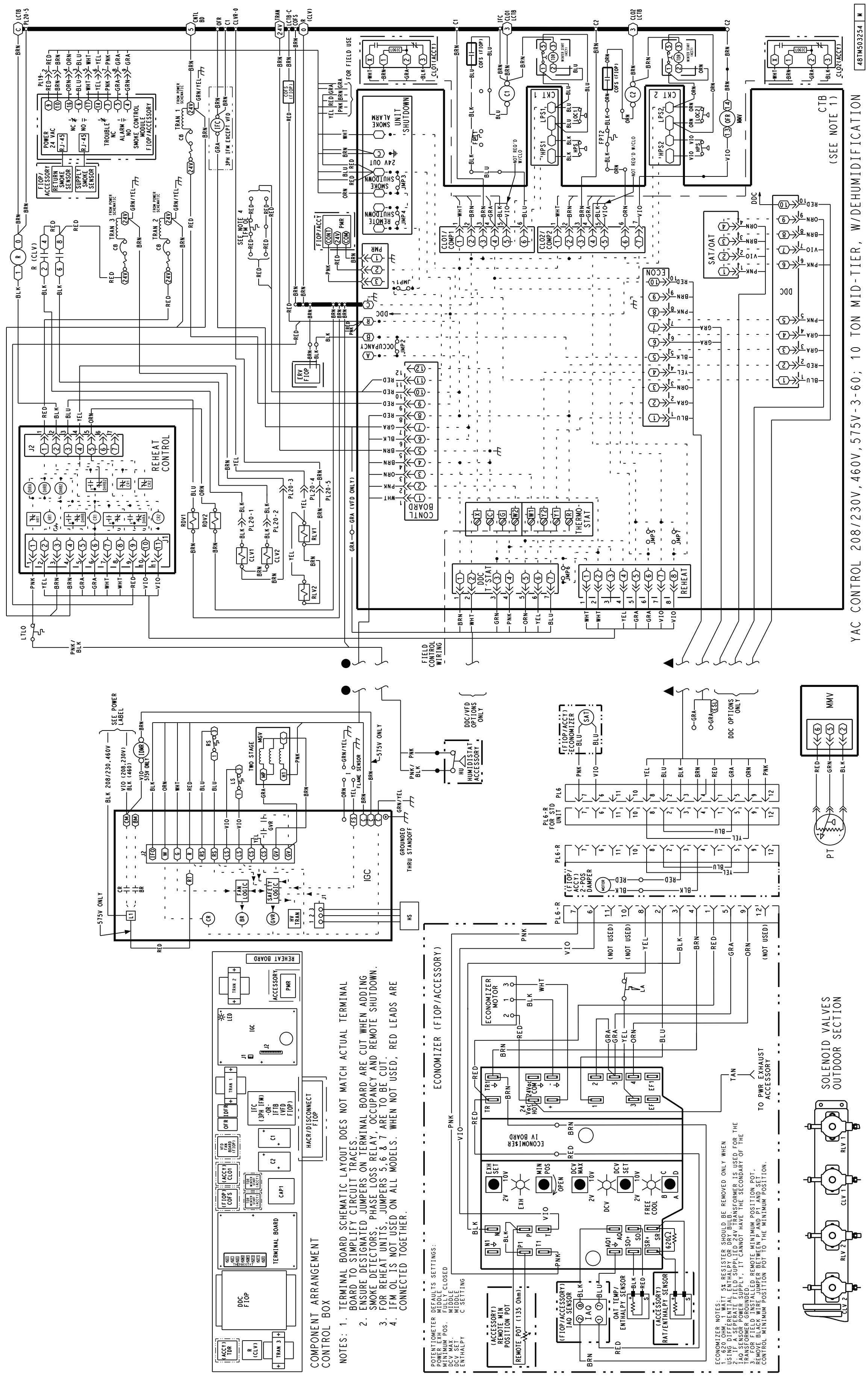


Fig. AE — 48HC*D12 YAC Control Diagram — 230/460/575-3-60 with Dehumidification

APPENDIX D — WIRING DIAGRAMS

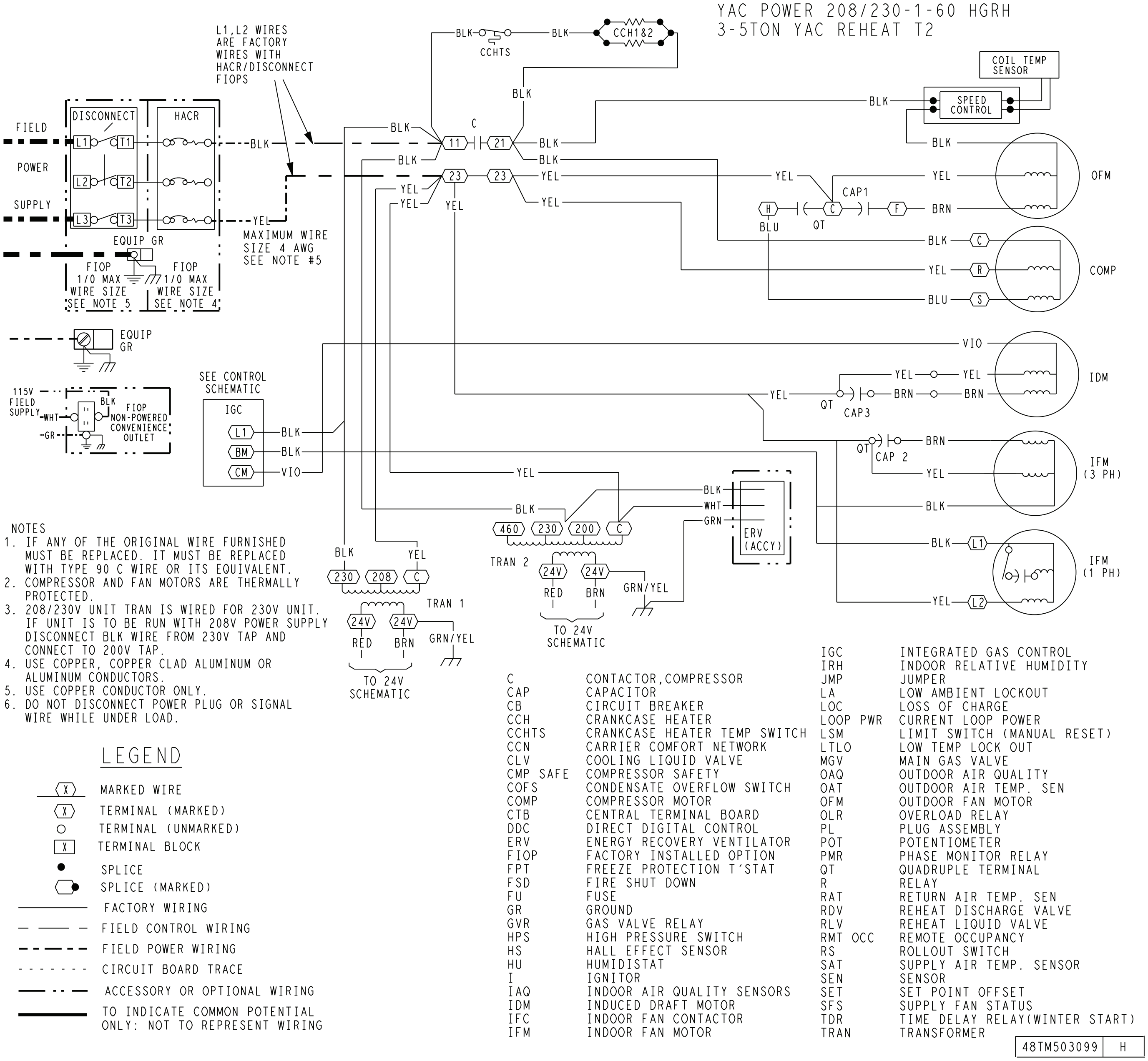
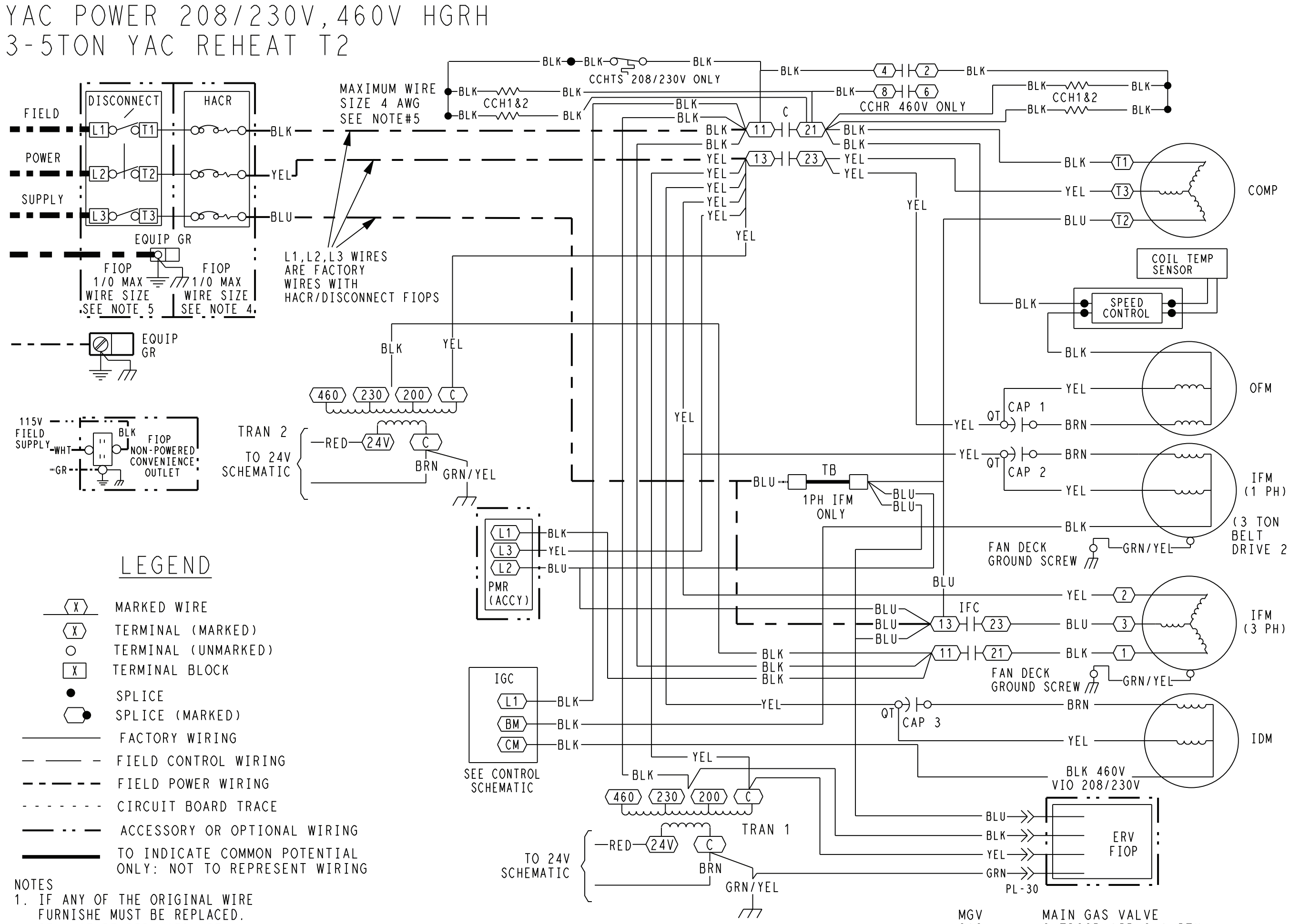


Fig. AF — 48HC*A04-A06 YAC Power Diagram — 208/230-1-60 with Humidi-MiZer® System



NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHE MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.
6. DO NOT DISCONNECT POWER PLUG OR SIGNAL WIRE WHILE UNDER LOAD.

C	CONTACTOR,COMPRESSOR	GR	GROUND	MGV	MAIN GAS VALVE
CAP	CAPACITOR	GVR	GAS VALVE RELAY	OAQ	OUTDOOR AIR QUALITY
CB	CIRCUIT BREAKER	HPS	HIGH PRESSURE SWITCH	OAT	OUTDOOR AIR TEMP. SEN
CCH	CRANKCASE HEATER	HS	HALL EFFECT SENSOR	OFM	OUTDOOR FAN MOTOR
CCHR	CRANKCASE HEATER RELAY	HU	HUMIDISTAT	OLR	OVERLOAD RELAY
CCHTS	CRANKCASE HEATER TEMP SWITCH	I	IGNITOR	PL	PLUG ASSEMBLY
CCN	CARRIER COMFORT NETWORK	IAQ	INDOOR AIR QUALITY SENSORS	POT	POTENTIOMETER
CLV	COOLING LIQUID VALVE	IDM	INDUCED DRAFT MOTOR	PMR	PHASE MONITOR RELAY
CMP SAFE	COMPRESSOR SAFETY	IFC	INDOOR FAN CONTACTOR	QT	QUADRUPLE TERMINAL
COFS	CONDENSATE OVERFLOW SWITCH	IFM	INDOOR FAN MOTOR	R	RELAY
COMP	COMPRESSOR MOTOR	IGC	INTEGRATED GAS CONTROL	RAT	RETURN AIR TEMP. SEN
CTB	CENTRAL TERMINAL BOARD	IRH	INDOOR RELATIVE HUMIDITY	RDV	REHEAT DISCHARGE VALVE
DDC	DIRECT DIGITAL CONTROL	JMP	JUMPER	RLV	REHEAT LIQUID VALVE
ERV	ENERGY RECOVERY VENTILATOR	LA	LOW AMBIENT LOCKOUT	RMT OCC	REMOTE OCCUPANCY
FIOP	FACTORY INSTALLED OPTIONS	LOC	LOSS OF CHARGE	RS	ROLLOUT SWITCH
FPT	FREEZE PROTECTION T´STAT	LOOP PWR	CURRENT LOOP POWER	SAT	SUPPLY AIR TEMP. SENSOR
FSD	FIRE SHUT DOWN	LSM	LIMIT SWITCH (MANUAL RESET)	SEN	SENSOR
FU	FUSE	LTLO	LOW TEMP LOCKOUT	SET	SET POINT OFFSET
				SFS	SUPPLY FAN STATUS
				TDR	TIME DELAY RELAY(WINTER START)
				TRAN	TRANSFORMER

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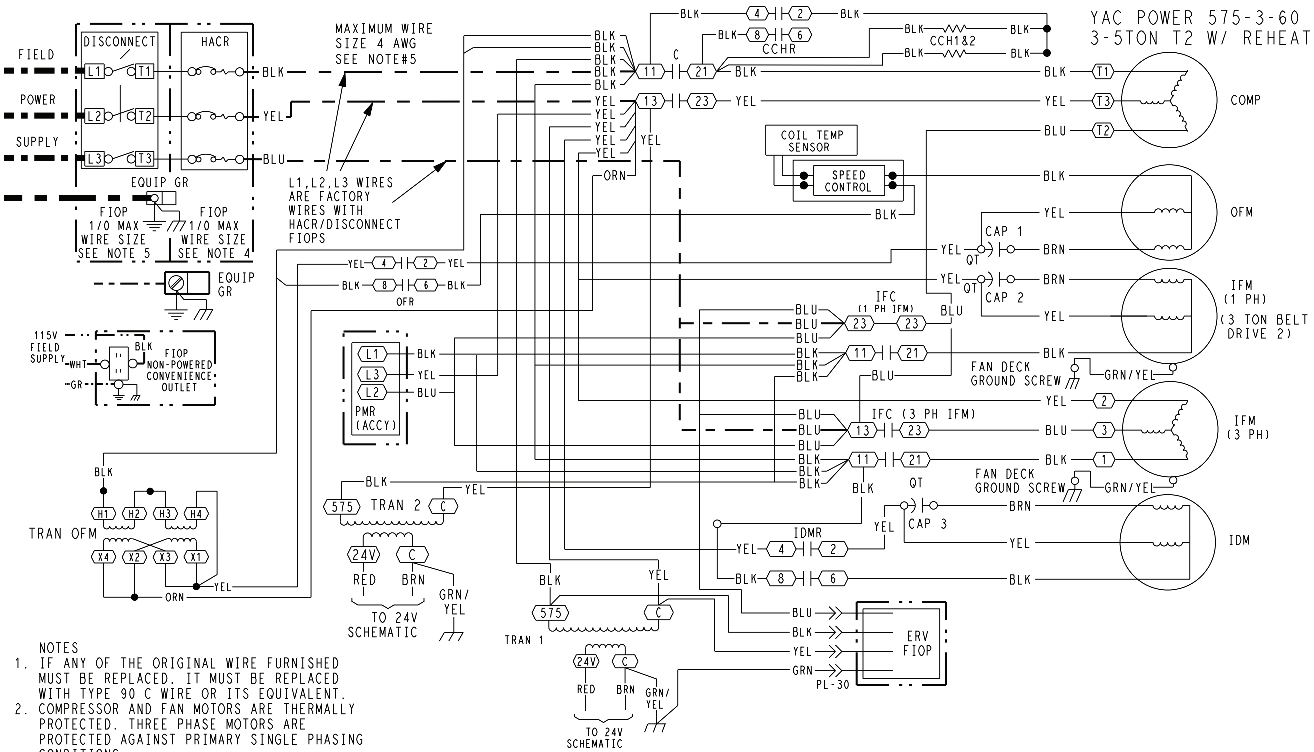
Fig. AG — 48HC*A04-A06 YAC Power Diagram — 230/460-3-60 with Humidi-MiZer® System



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. TRAN IS WIRED FOR 575V UNIT.
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.

LEGEND

- X MARKED WIRE
- X TERMINAL (MARKED)
- ○ TERMINAL (UNMARKED)
- X TERMINAL BLOCK
- ● SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

C	CONTACTOR,COMPRESSOR	IRH	INDOOR RELATIVE HUMIDITY
CAP	CAPACITOR	JMP	JUMPER
CB	CIRCUIT BREAKER	LA	LOW AMBIENT LOCKOUT
CCH	CRANKCASE HEATER	LOC	LOSS OF CHARGE
CCHR	CRANKCASE HEATER RELAY	LOOP PWR	CURRENT LOOP POWER
CCN	CARRIER COMFORT NETWORK	LSM	LIMIT SWITCH (MANUAL RESET)
CLV	COOLING LIQUID VALVE	LTLO	LOW TEMP LOCKOUT
CMP SAFE	COMPRESSOR SAFETY	MGV	MAIN GAS VALVE
COFS	CONDENSATE OVERFLOW SWITCH	OAQ	OUTDOOR AIR QUALITY
COMP	COMPRESSOR MOTOR	OAT	OUTDOOR AIR TEMP. SEN
CTB	CENTRAL TERMINAL BOARD	OFM	OUTDOOR FAN MOTOR
DDC	DIRECT DIGITAL CONTROL	OLR	OVERLOAD RELAY
ERV	ENERGY RECOVERY VENTILATOR	PL	PLUG ASSEMBLY
FIOP	FACTORY INSTALLED OPTION.	POT	POTENTIOMETER
FPT	FREEZE PROTECTION T´STAT	PMR	PHASE MONITOR RELAY
FSD	FIRE SHUT DOWN	QT	QUADRUPLE TERMINAL
FU	FUSE	R	RELAY
GR	GROUND	RAT	RETURN AIR TEMP. SEN
GVR	GAS VALVE RELAY	RDV	REHEAT DISCHARGE VALVE
HPS	HIGH PRESSURE SWITCH	RLV	REHEAT LIQUID VALVE
HS	HALL EFFECT SENSOR	RMT OCC	REMOTE OCCUPANCY
HU	HUMIDSTAT	RS	ROLLOUT SWITCH
I	IGNITOR	SAT	SUPPLY AIR TEMP. SENSOR
IAQ	INDOOR AIR QUALITY SENSORS	SEN	SENSOR
IDM	INDUCED DRAFT MOTOR	SET	SET POINT OFFSET
IDMR	INDUCED DRAFT MOTOR RELAY	SFS	SUPPLY FAN STATUS
IFC	INDOOR FAN CONTACTOR	TDR	TIME DELAY RELAY(WINTER START)
IFM	INDOOR FAN MOTOR	TRAN	TRANSFORMER
IGC	INTEGRATED GAS CONTROL		

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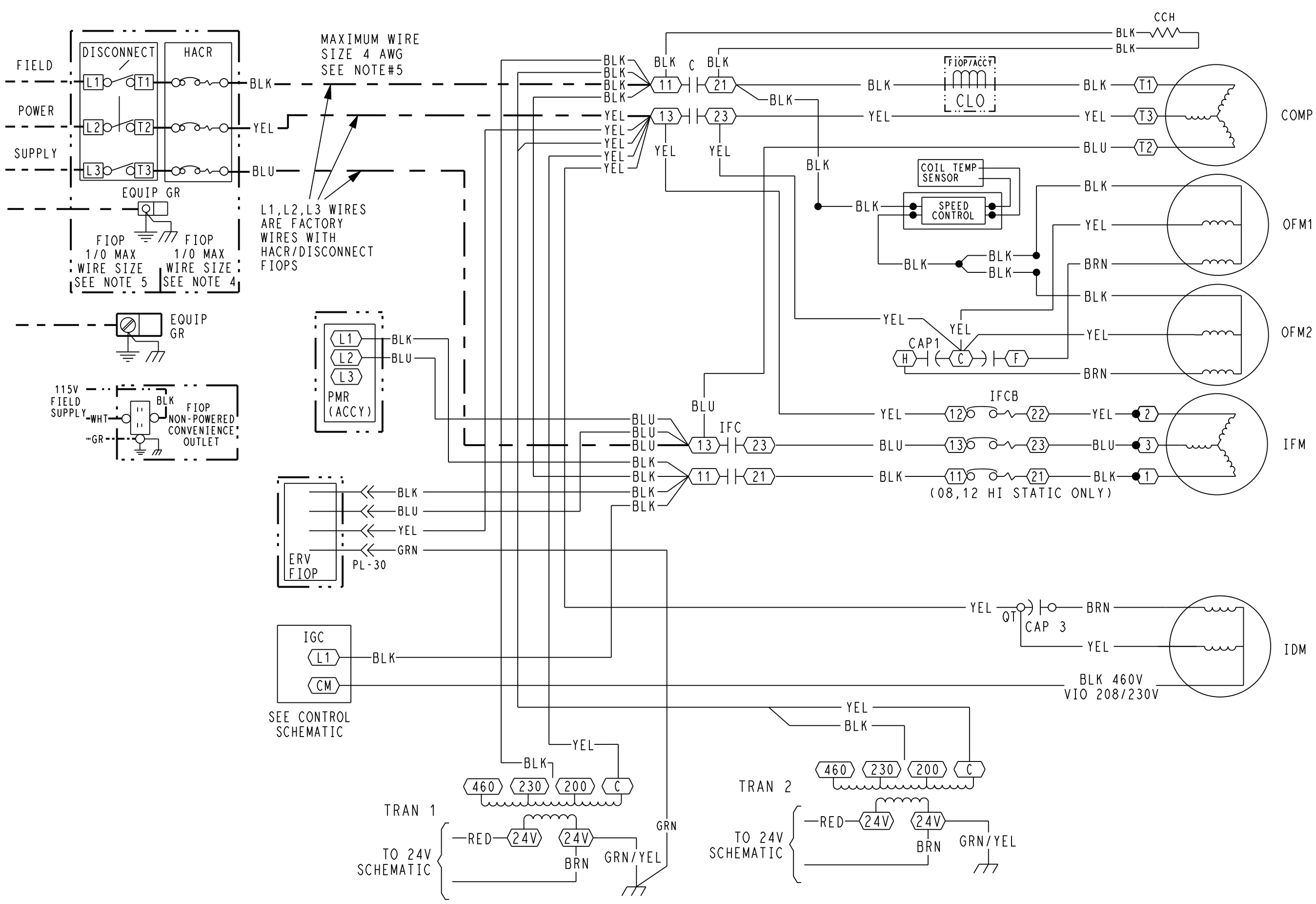
Fig. AH — 48HC*A04-A06 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

YAC POWER 208/230V,460V-3-60
6 TON MID-TIER, W/DEHUMIDIFICATION



LEGEND

(X)	MARKED WIRE
(X)	TERMINAL (MARKED)
○	TERMINAL (UNMARKED)
[X]	TERMINAL BLOCK
●	SPLICE
	SPLICE (MARKED)
	FACTORY WIRING
	FIELD CONTROL WIRING
	FIELD POWER WIRING
	CIRCUIT BOARD TRACE
	ACCESSORY OR OPTIONAL WIRING
	TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
CLO	COMPRESSOR LOCKOUT
COFS	CONDENSATE OVERFLOW SWT
COMP	COMPRESSOR MOTOR
CLV	COOLING LIQUID VALVE
DDC	DIRECT DIGITAL CONTROL
ERV	ENERGY RECOVERY VELTILATOR
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION TSTAT
FSD	FIRE SHUT DOWN
FS	FLAME SENSOR
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HGRH	HOT GAS REHEAT
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERMINAL BLOCK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
JMP	JUMPER
LA	LOW AMBIENT LOCKOUT
LOOP PWR	CURRENT LOOP POWER
LOC	LOSS OF CHARGE (SWITCH)
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LS	LIMIT SWITCH
LTLO	LOW TEMP LOCKOUT
MGV	MAIN GAS VALVE

OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RLV	REHEAT LIQUID VALVE
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

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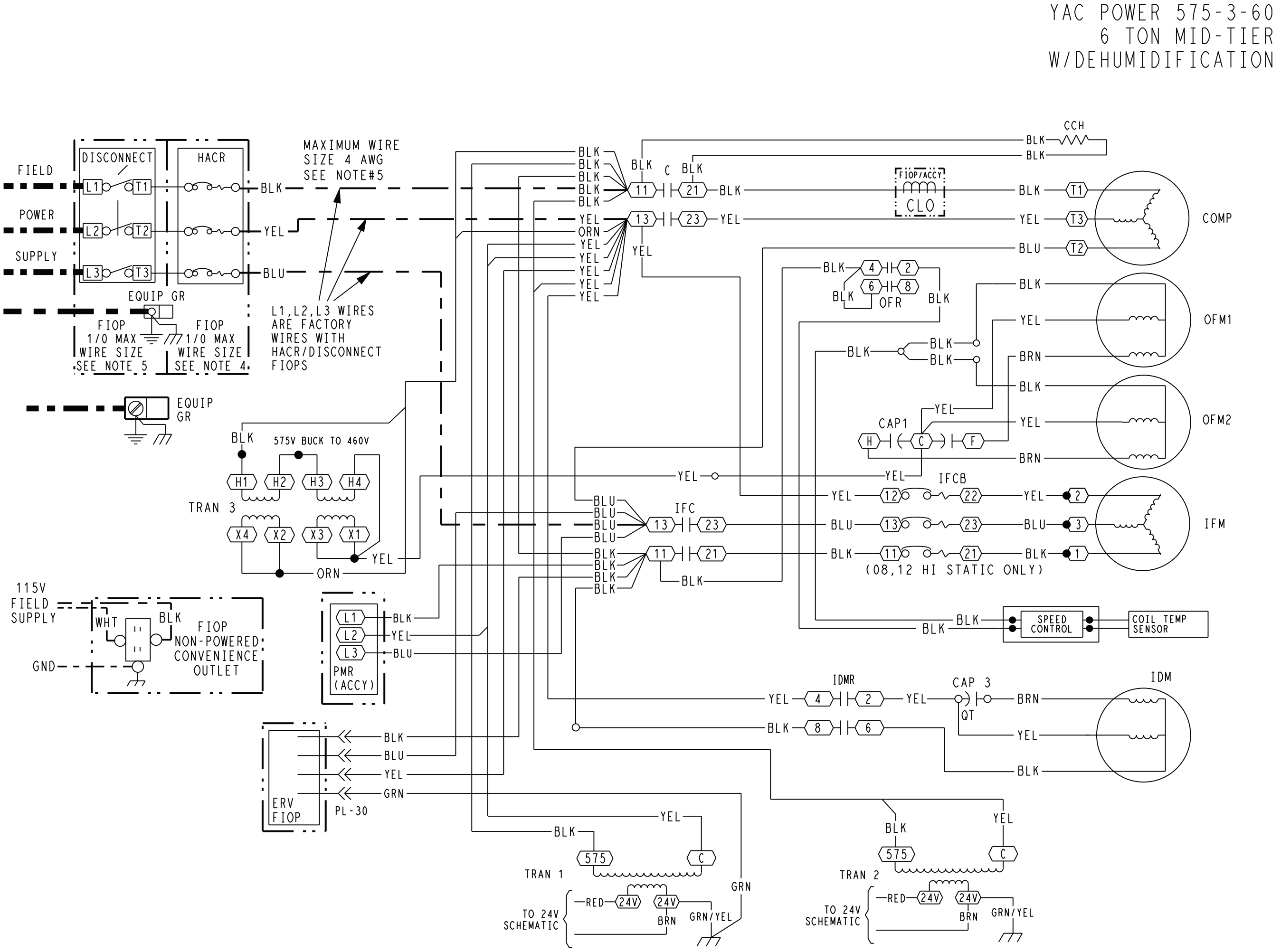
Fig. AI — 48HC*A07 YAC Power Diagram — 230/460-3-60 with Humidi-MiZer® System



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES:

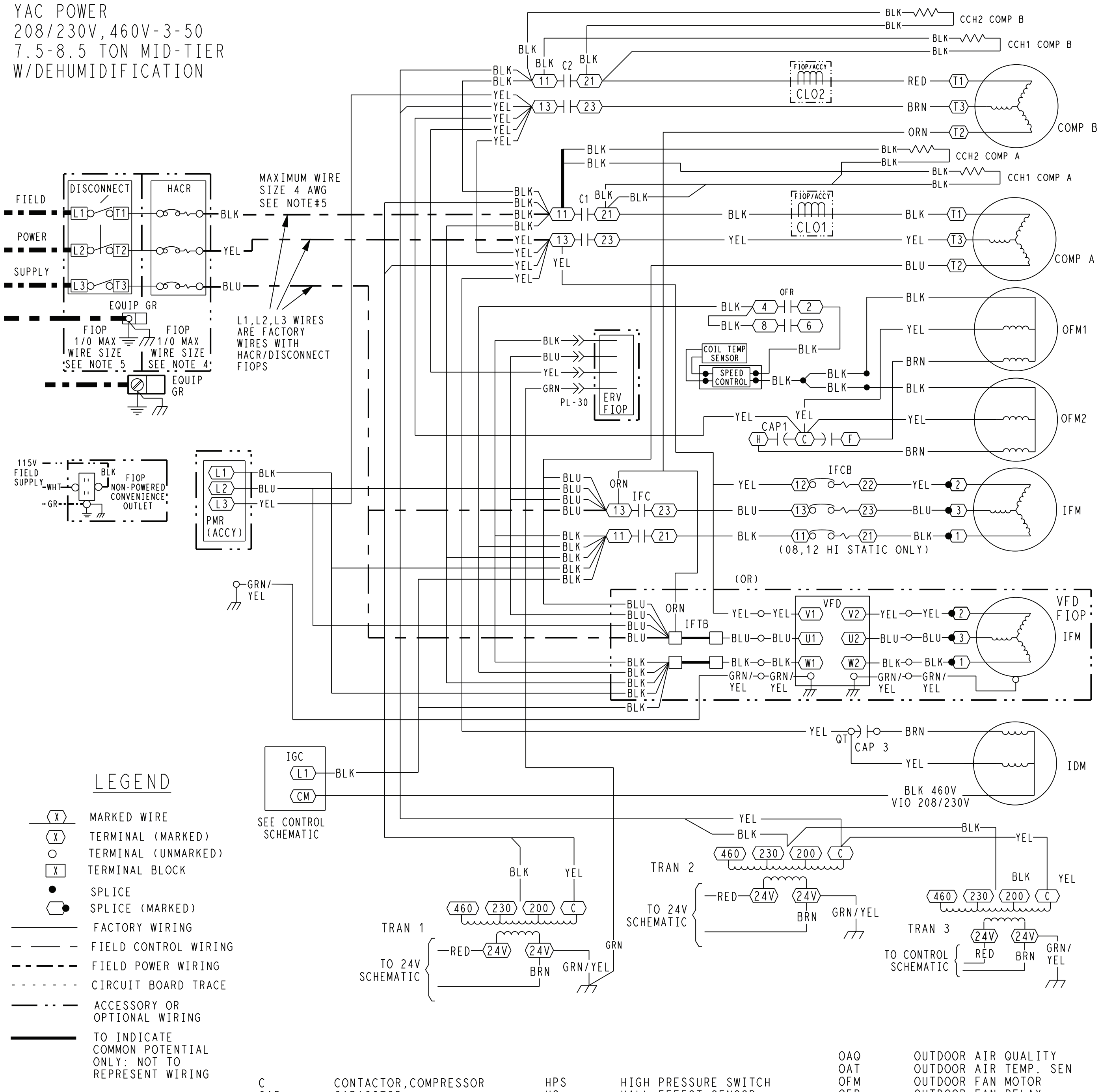
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

C	CONTACTOR,COMPRESSOR	IRH	INDOOR RELATIVE HUMIDITY
CAP	CAPACITOR	LA	LOW AMBIENT LOCKOUT
CB	CIRCUIT BREAKER	LOC	LOSS OF CHARGE
CCH	CRANKCASE HEATER	LOOP PWR	CURRENT LOOP POWER
CCN	CARRIER COMFORT NETWORK	LPS	LOW PRESSURE SWITCH
CLO	COMPRESSOR LOCKOUT	LS	LIMIT SWITCH
CMP SAFE	COMPRESSOR SAFFETY	LSM	LIMIT SWITCH (MANUAL RESET)
COFS	CONDENSATE OVERFLOW SWT	LTLO	LOW TEMP LOCKOUT
COMP	COMPRESSOR MOTOR	MGV	MAIN GAS VALVE
CLV	COOLING LIQUID VALVE	OAQ	OUTDOOR AIR QUALITY
DDC	DIRECT DIGITAL CONTROL	OAT	OUTDOOR AIR TEMP. SEN
ERV	ENERGY RECOVERY VENTILATOR	OFM	OUTDOOR FAN MOTOR
FIOP	FACTORY INSTALLED OPTIONS	OFR	OUTDOOR FAN RELAY
FS	FLAME SENSOR	OL	OVERLOAD
FSD	FIRE SHUT DOWN	PL	PLUG ASSEMBLY
FU	FUSE	POT	POTENTIOMETER
FPT	FREEZE PROTECTION TSTAT (SWT)	PMR	PHASE MONITOR RELAY
GND	GROUND	QT	QUADRUPLE TERMINAL
GVR	GAS VALVE RELAY	R	RELAY
HGRH	HOT GAS REHEAT	RAT	RETURN AIR TEMP. SEN
HPS	HIGH PRESSURE SWITCH	RDV	REHEAT DISCHARGE VALVE
HS	HALL EFFECT SENSOR	RLV	REHEAT LIQUID VALVE
I	IGNITOR	RMT OCC	REMOTE OCCUPANCY
IAQ	INDOOR AIR QUALITY SENSORS	RS	ROLLOUT SWITCH
IDM	INDUCED DRAFT MOTOR	SAT	SUPPLY AIR TEMP. SENSOR
IDMR	INDUCED DRAFT MOTOR RELAY	SEN	SENSOR
IFC	INDOOR FAN CONTACTOR	SET	SET POINT OFFSET
IFCB	INDOOR FAN CIRCUIT BREAKER	SFS	SUPPLY FAN STATUS
IFM	INDOOR FAN MOTOR	TDR	TIME DELAY RELAY
IFTB	INDOOR FAN TERMINAL BLOCK	TRAN	TRANSFORMER
IGC	INTEGRATED GAS CONTROL		

48TM503239 | H

Fig. AJ — 48HC*A07 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



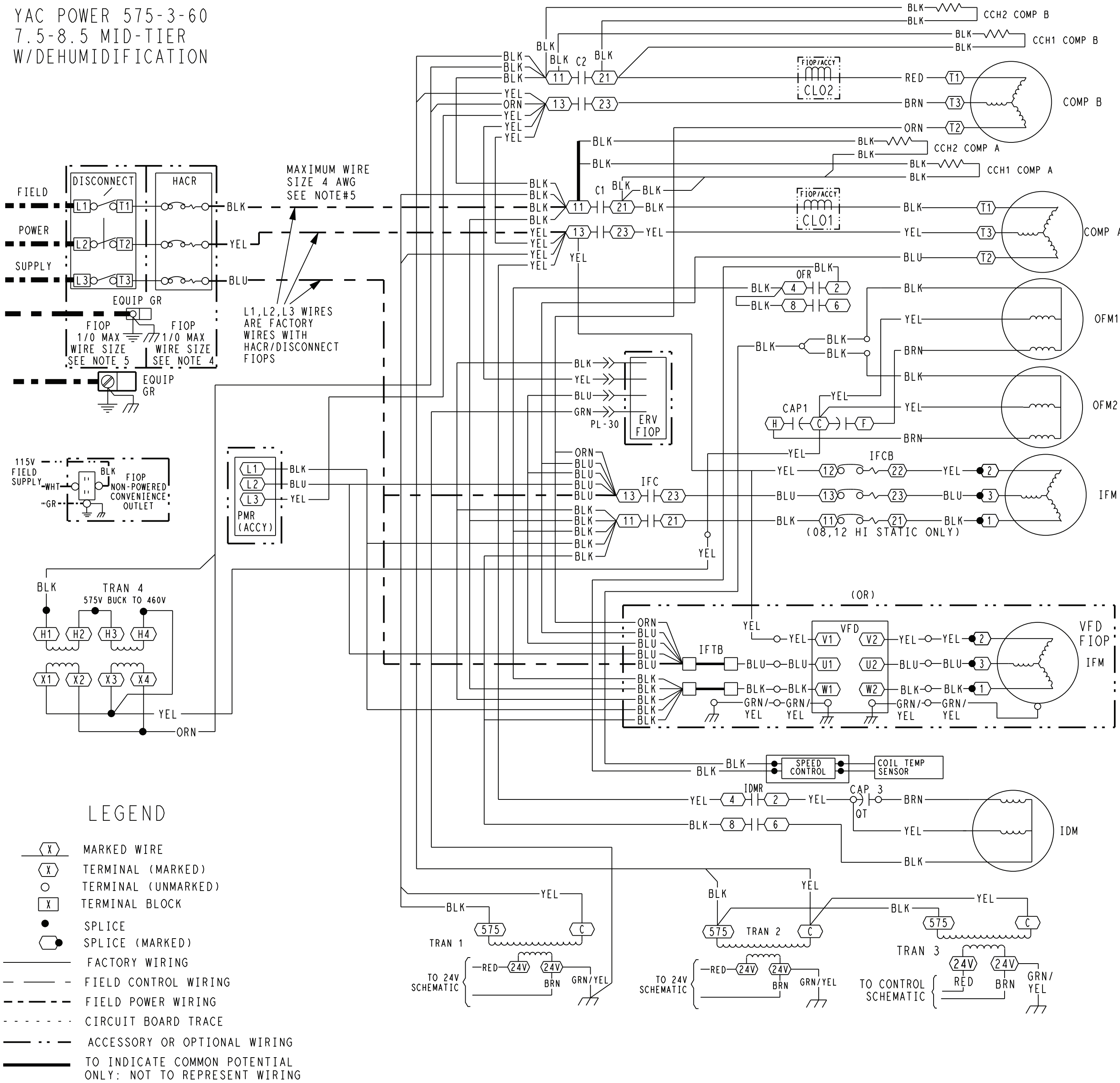
NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTOR.
5. USE COPPER CONDUCTOR ONLY.

				OAQ	OUTDOOR AIR QUALITY
				OAT	OUTDOOR AIR TEMP. SEN
C	CONTACTOR,COMPRESSOR	HPS	HIGH PRESSURE SWITCH	OFM	OUTDOOR FAN MOTOR
CAP	CAPACITOR	HS	HALL EFFECT SENSOR	OFR	OUTDOOR FAN RELAY
CB	CIRCUIT BREAKER	I	IGNITOR	OL	OVERLOAD
CCH	CRANKCASE HEATER	IAQ	INDOOR AIR QUALITY SENSORS	PL	PLUG ASSEMBLY
CCN	CARRIER COMFORT NETWORK	IDM	INDUCED DRAFT MOTOR	POT	POTENTIOMETER
CMP SAFE	COMPRESSOR SAFFETY	IFC	INDOOR FAN CONTACTOR	PMR	PHASE MONITOR RELAY
CLO	COMPRESSOR LOCKOUT	IFCB	INDOOR FAN CIRCUIT BREAKER	QT	QUADRUPLE TERMINAL
COFS	CONDENSATE OVERFLOW SWT	IFM	INDOOR FAN MOTOR	R	RELAY
COMP	COMPRESSOR MOTOR	IFTB	INDOOR FAN TERMINAL BLOCK	RAT	RETURN AIR TEMP. SEN
CLV	COOLING LIQUID VALVE	IGC	INTEGRATED GAS CONTROL	RDV	REHEAT DISCHARGE VALVE
DDC	DIRECT DIGITAL CONTROL	IRH	INDOOR RELATIVE HUMIDITY	RLV	REHEAT LIQUID VALVE
ERV	ENERGY RECOVERY VENTILATOR	JMP	JUMPER	RMT OCC	REMOTE OCCUPANCY
FIOP	FACTORY INSTALLED OPTION	LA	LOW AMBIENT LOCKOUT	RS	ROLLOUT SWITCH
FPT	FREEZE PROTECTION TSTAT	LOOP PWR	CURRENT LOOP POWER	SAT	SUPPLY AIR TEMP. SENSOR
FSD	FIRE SHUT DOWN	LOC	LOSS OF CHARGE (SWITCH)	SEN	SENSOR
FS	FLAME SENSOR	LPS	LOW PRESSURE SWITCH	SET	SET POINT OFFSET
FU	FUSE	LSM	LIMIT SWITCH (MANUAL RESET)	SFS	SUPPLY FAN STATUS
GND	GROUND	LS	LIMIT SWITCH	TDR	TIME DELAY RELAY
GVR	GAS VALVE RELAY	LTLO	LOW TEMP LOCKOUT	TRAN	TRANSFORMER
HGRH	HOT GAS REHEAT	MGV	MAIN GAS VALVE	VFD	VARIABLE FREQUENCY DRIVE

48TM503252 E

Fig. AK — 48HC*D08-D09 YAC Power Diagram — 230/460-3-60 with Humidi-MiZer® System



NOTES

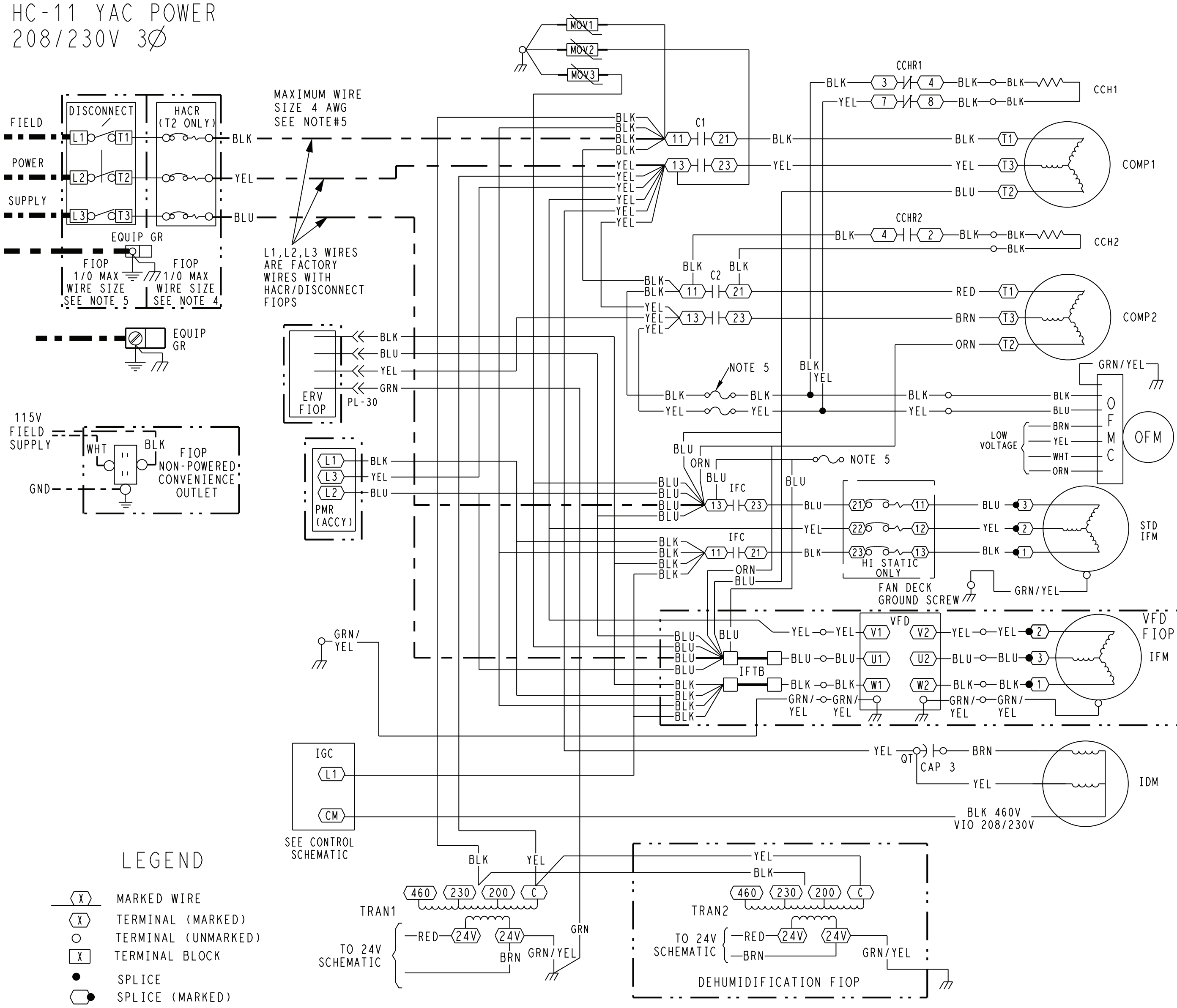
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS.
5. USE COPPER CONDUCTOR ONLY.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCN	CARRIER COMFORT NETWORK
CLO	COMPRESSOR LOCKOUT
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWT
COMP	COMPRESSOR MOTOR
CLV	COOLING LIQUID VALVE
DDC	DIRECT DIGITAL CONTROL
ERV	ENERGY RECOVERY VENTILATOR
FIOP	FACTORY INSTALLED OPTION
FS	FLAME SENSOR
FSD	FIRE SHUT DOWN
FU	FUSE
FPT	FREEZE PROTECTION TSTAT (SWT)
GND	GROUND
GVR	GAS VALVE RELAY
HGRH	HOT GAS REHEAT
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IDMR	INDUCED DRAFT MOTOR RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERMINAL BLOCK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LOC	LOSS OF CHARGE
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LS	LIMIT SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMP LOCKOUT
MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RLV	REHEAT LIQUID VALVE
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
SSV	SUBCOOL SOLENOID VALVE
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

48TM503253 G

Fig. AL — 48HC*D08-D09 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



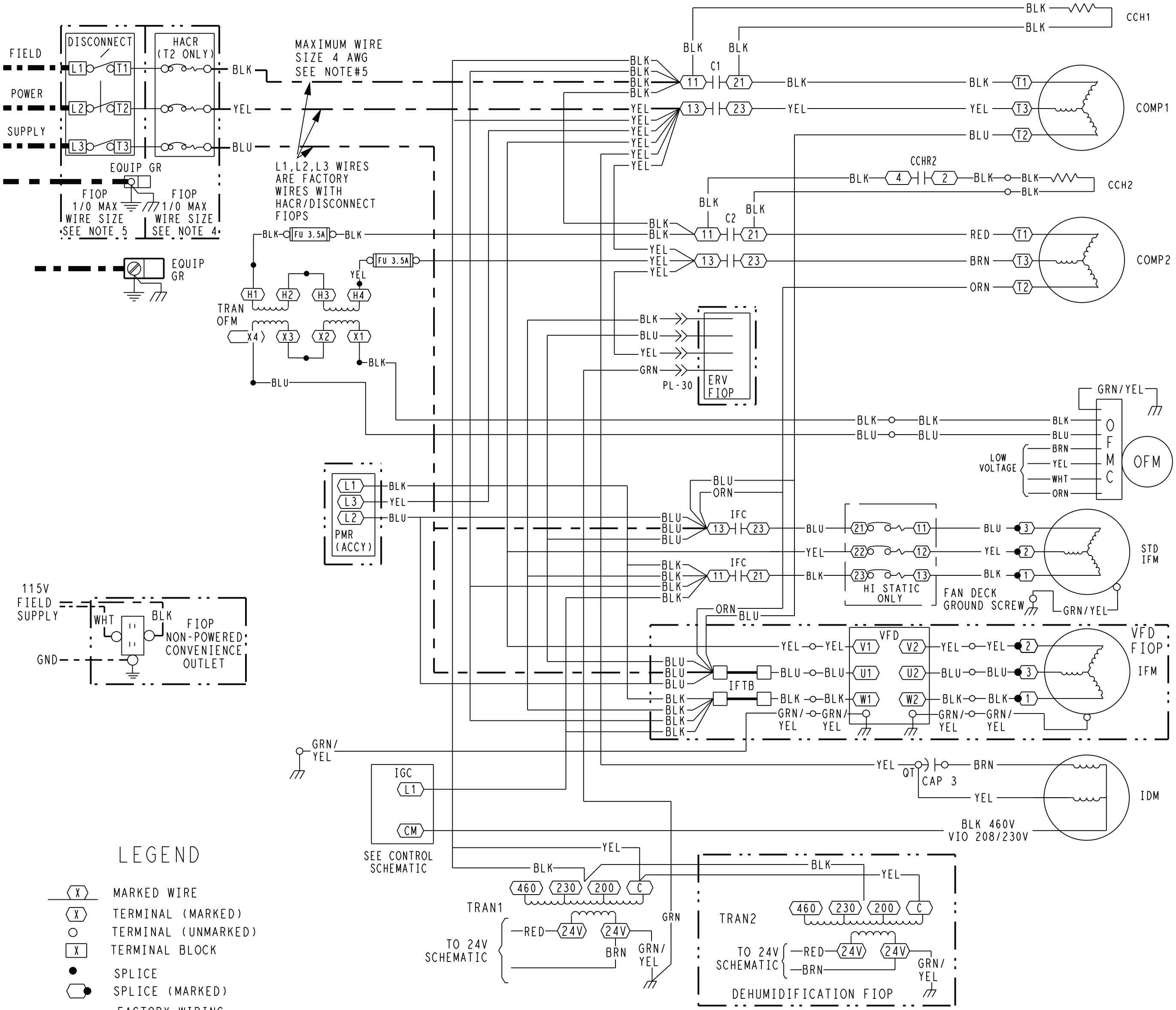
NOTES
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.
5. 30A FUSES USED ON 208/230V ONLY.

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHS	CRANKCASE HEATER SWITCH
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
FPT	FREEZE PROTECTION THERMOSTAT
FR	FAN RELAY
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
HUMR	HUMIDISTAT RELAY
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IFR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERM BLK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAS	LOW AMBIENT SWITCH
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
MGV	MAIN GAS VALVE
MOV	METAL OXIDE VARISTOR
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFMC	OUTDOOR FAN MOTOR CONTROL
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SF	SIGNAL FILTER
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER
TB	TERMINAL BLOCK
VFD	VARIABLE FREQUENCY DRIVE

48TM504181 G

Fig. AM — 48HC*D11 YAC Power Diagram — 208/230-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.

HC-11 YAC POWER
460V 3Ø

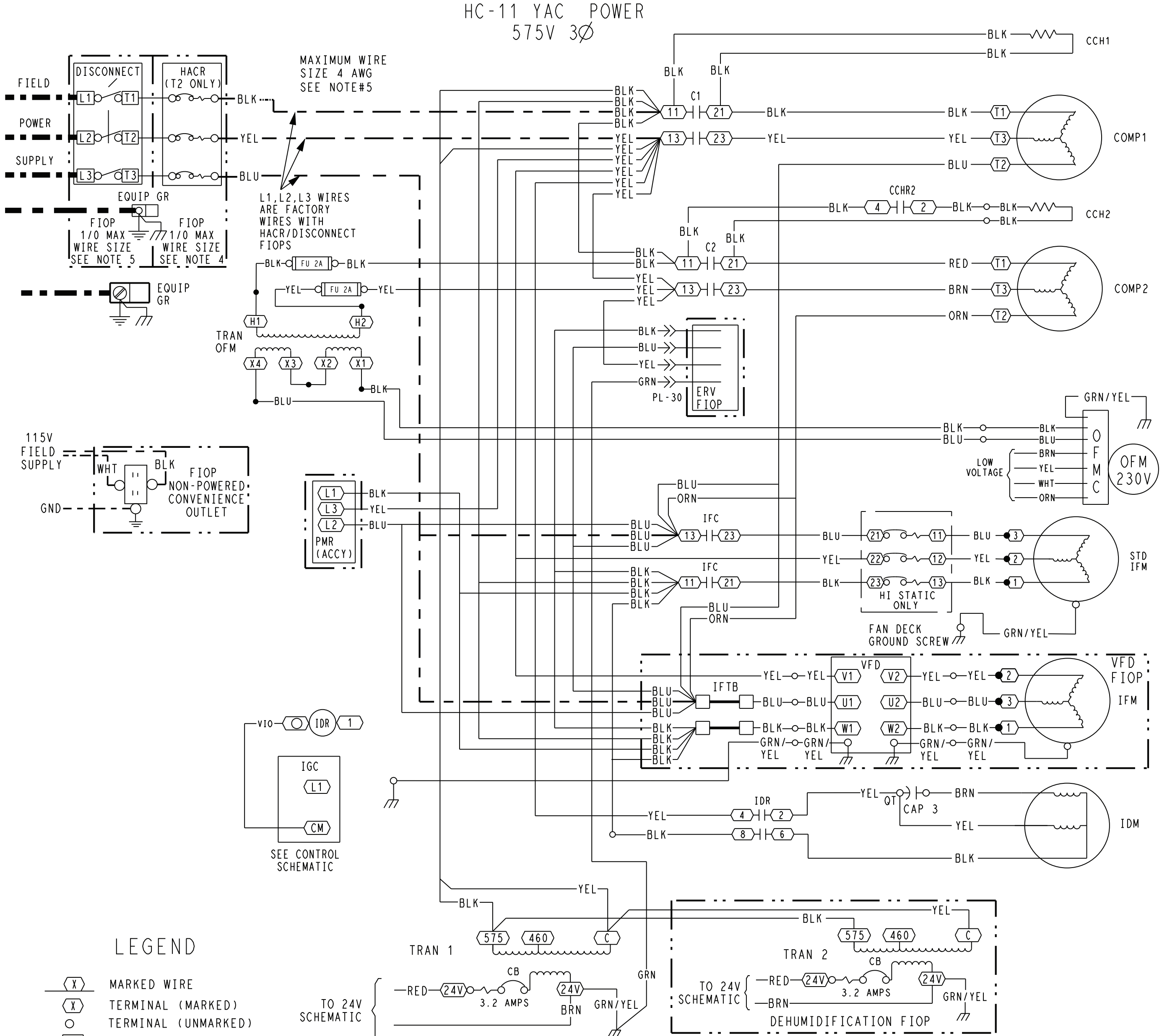
C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRANKCASE HEATER RELAY
CCHS	CRANKCASE HEATER SWITCH
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWT
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DDC	DIRECT DIGITAL CONTROL
ERV	ENERGY RECOVERY VENTILATOR
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FR	FAN RELAY
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IFR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFCB	INDOOR FAN CIRCUIT BREAKER
IFM	INDOOR FAN MOTOR
IFTB	INDOOR FAN TERM BLK
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY

LA	LOW AMBIENT LOCKOUT
LAS	LOW AMBIENT SWITCH
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFM	OUTDOOR FAN MOTOR
OFMC	OUTDOOR FAN MOTOR CONTROL
OFR	OUTDOOR FAN RELAY
OL	OVERLOAD
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SF	SIGNAL FILTER
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER
TB	TERMINAL BLOCK
VFD	VARIABLE FREQUENCY DRIVE

48TM504552 E

Fig. AN — 48HC*D11 YAC Power Diagram — 460-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



LEGEND

- MARKED WIRE
- TERMINAL (MARKED)
- TERMINAL (UNMARKED)
- TERMINAL BLOCK
- SPLICE
- SPLICE (MARKED)
- FACTORY WIRING
- FIELD CONTROL WIRING
- FIELD POWER WIRING
- CIRCUIT BOARD TRACE
- ACCESSORY WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

NOTES

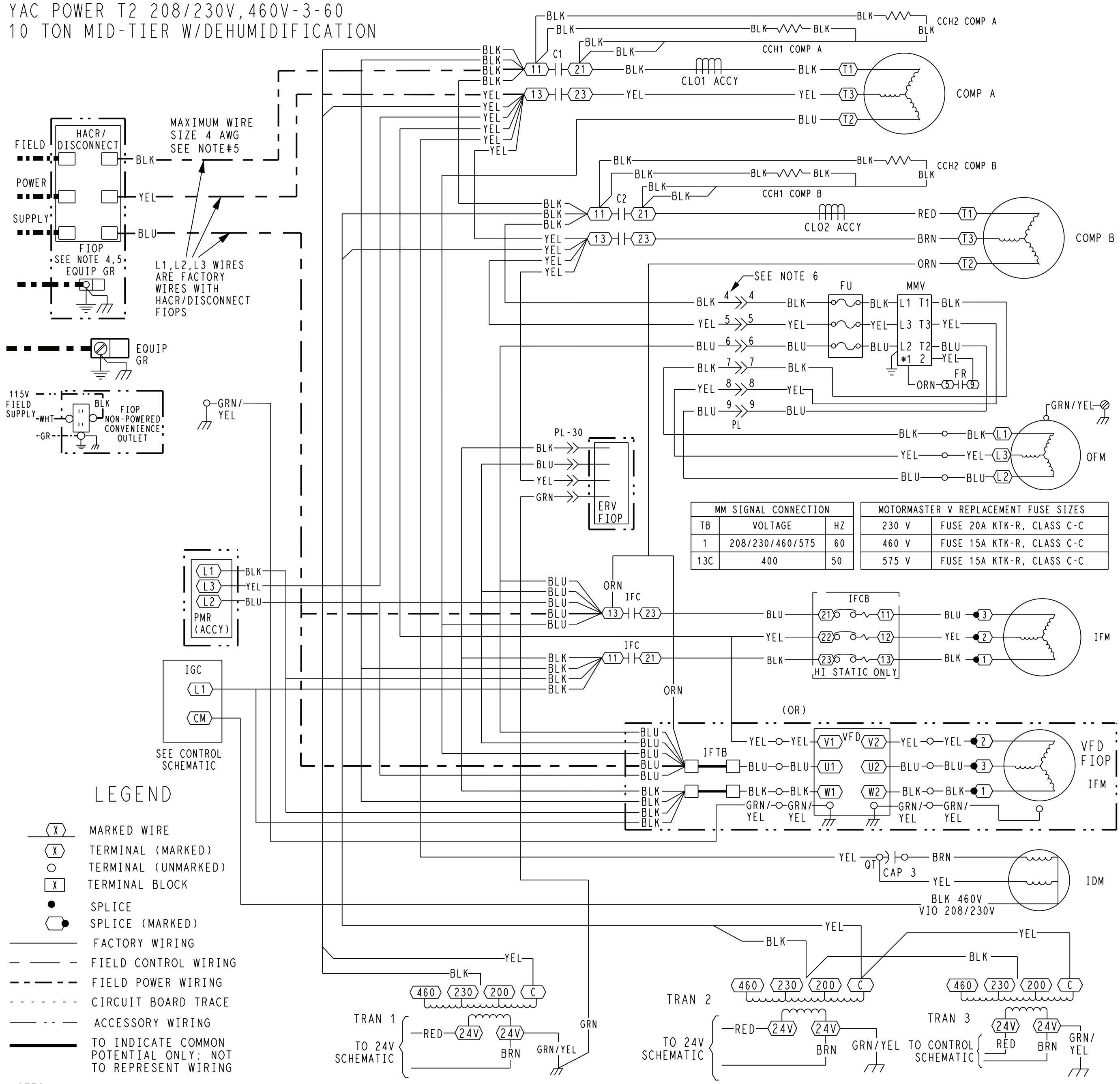
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER CONDUCTOR ONLY.

C	CONTACTOR,COMPRESSOR	IRH	INDOOR RELATIVE HUMIDITY
CAP	CAPACITOR	LA	LOW AMBIENT LOCKOUT
CB	CIRCUIT BREAKER	LAS	LOW AMBIENT SWITCH
CCH	CRANKCASE HEATER	LOOP PWR	CURRENT LOOP POWER
CCHR	CRANKCASE HEATER RELAY	LPS	LOW PRESSURE SWITCH
CCHS	CRANKCASE HEATER SWITCH	LSM	LIMIT SWITCH (MANUAL RESET)
CCN	CARRIER COMFORT NETWORK	MGV	MAIN GAS VALVE
CMP SAFE	COMPRESSOR SAFFETY	OAQ	OUTDOOR AIR QUALITY
COFS	CONDENSATE OVERFLOW SWT	OAT	OUTDOOR AIR TEMP. SEN
COMP	COMPRESSOR MOTOR	OFM	OUTDOOR FAN MOTOR
CTB	CENTRAL TERMINAL BOARD	OFMC	OUTDOOR FAN MOTOR CONTROL
DDC	DIRECT DIGITAL CONTROL	OFR	OUTDOOR FAN RELAY
ERV	ENERGY RECOVERY VENTILATOR	OL	OVERLOAD
FIOP	FACTORY INSTALLED OPTION	PL	PLUG ASSEMBLY
FPT	FREEZE PROTECTION THERMOSTAT	POT	POTENTIOMETER
FR	FAN RELAY	PMR	PHASE MONITOR RELAY
FSD	FIRE SHUT DOWN	QT	QUADRUPLE TERMINAL
FU	FUSE	R	RELAY
GND	GROUND	RAT	RETURN AIR TEMP. SEN
GVR	GAS VALVE RELAY	RMT OCC	REMOTE OCCUPANCY
HPS	HIGH PRESSURE SWITCH	RS	ROLLOUT SWITCH
HS	HALL EFFECT SENSOR	SAT	SUPPLY AIR TEMP. SENSOR
I	IGNITOR	SEN	SENSOR
IAQ	INDOOR AIR QUALITY SENSORS	SET	SET POINT OFFSET
IDM	INDUCED DRAFT MOTOR	SF	SIGNAL FILTER
IFR	INDUCED DRAFT RELAY	SFS	SUPPLY FAN STATUS
IFC	INDOOR FAN CONTACTOR	TDR	TIME DELAY RELAY(WINTER START)
IFCB	INDOOR FAN CIRCUIT BREAKER	TRAN	TRANSFORMER
IFM	INDOOR FAN MOTOR	TB	TERMINAL BLOCK
IFTB	INDOOR FAN TERM BLK	VFD	VARIABLE FREQUENCY DRIVE
IGC	INTEGRATED GAS CONTROL		

48TM504182 E

Fig. AO — 48HC*D11 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



MM SIGNAL CONNECTION		
TB	VOLTAGE	HZ
1	208/230/460/575	60
13C	400	50

MOTORMASTER V REPLACEMENT FUSE SIZES	
230 V	FUSE 20A KTK-R, CLASS C-C
460 V	FUSE 15A KTK-R, CLASS C-C
575 V	FUSE 15A KTK-R, CLASS C-C

NOTES:

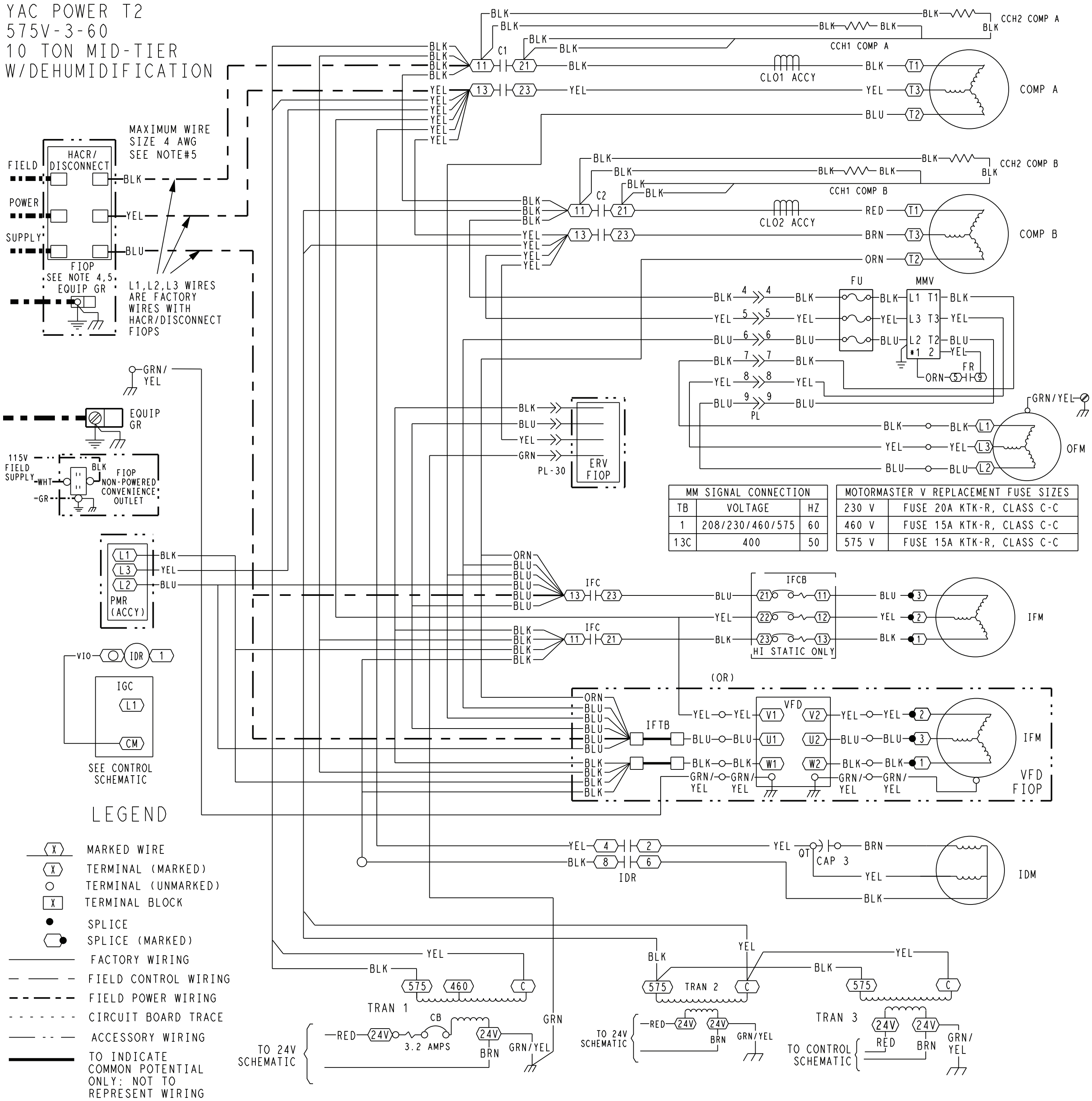
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED. IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 230V UNIT. IF UNIT IS TO BE RUN WITH 208V POWER SUPPLY DISCONNECT BLK WIRE FROM 230V TAP AND CONNECT TO 200V TAP.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTOR. MAX 1/0 FOR HACR.
5. USE COPPER CONDUCTOR ONLY. MAX 1/0 FOR DISCONNECT.
6. PIN NO'S 4, 5 & 6 ARE FOR 460V. FOR 230V THE PIN NO'S ARE 1, 2 & 3 RESPECTIVELY.

C	CONTACTOR,COMPRESSOR	I	IGNITOR	POT	POTENTIOMETER
CAP	CAPACITOR	IAQ	INDOOR AIR QUALITY SENSORS	PMR	PHASE MONITOR RELAY
CB	CIRCUIT BREAKER	IDM	INDUCED DRAFT MOTOR	PT	PRESSURE TRANSDUCER
CCH	CRANKCASE HEATER	IFR	INDUCED DRAFT RELAY	QT	QUADRUPLE TERMINAL
CCN	CARRIER COMFORT NETWORK	IFC	INDOOR FAN CONTACTOR	R	RELAY
CLO	COMPRESSOR LOCK OUT	IFCB	INDOOR FAN CIRCUIT BREAKER	RAT	RETURN AIR TEMP. SEN
CMP SAFE	COMPRESSOR SAFFETY	IFM	INDOOR FAN MOTOR	RDV	REHEAT DISCHARGE VALVE
COFS	CONDENSATE OVERFLOW SWT	IFTB	INDOOR FAN TERMINAL BLOCK	RLV	REHEAT LIQUID VALVE
COMP	COMPRESSOR MOTOR	IGC	INTEGRATED GAS CONTROL	RMT OCC	REMOTE OCCUPANCY
CLV	COOLING LIQUID VALVE	IRH	INDOOR RELATIVE HUMIDITY	RS	ROLLOUT SWITCH
DDC	DIRECT DIGITAL CONTROL	LA	LOW AMBIENT LOCKOUT	SAT	SUPPLY AIR TEMP. SENSOR
ERV	ENERGY RECOVERY VENTILATOR	LOOP PWR	CURRENT LOOP POWER	SEN	SENSOR
FIOP	FACTORY INSTALLED OPTION	LPS	LOW PRESSURE SWITCH	SET	SET POINT OFFSET
FR	FAN RELAY	LSM	LIMIT SWITCH (MANUAL RESET)	SFS	SUPPLY FAN STATUS
FSD	FIRE SHUT DOWN	MGV	MAIN GAS VALVE	SSV	SUBCOOL SOLENOID VALVE
FU	FUSE	MMV	MOTOR MASTER V CONTROLLER	TDR	TIME DELAY RELAY
GND	GROUND	OAQ	OUTDOOR AIR QUALITY	TRAN	TRANSFORMER
GVR	GAS VALVE RELAY	OAT	OUTDOOR AIR TEMP. SEN	VFD	VARIABLE FREQUENCY DRIVE
HGRH	HOT GAS REHEAT	OFM	OUTDOOR FAN MOTOR		
HPS	HIGH PRESSURE SWITCH	OL	OVERLOAD		
HS	HALL EFFECT SENSOR	PL	PLUG ASSEMBLY		

48TM503255 F

Fig. AP — 48HC*D12 YAC Power Diagram — 230/460-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS



C	CONTACTOR, COMPRESSOR	I	IGNITOR	POT	POTENTIOMETER
CAP	CAPACITOR	IAQ	INDOOR AIR QUALITY SENSORS	PMR	PHASE MONITOR RELAY
CB	CIRCUIT BREAKER	IDM	INDUCED DRAFT MOTOR	PT	PRESSURE TRANSDUCER
CCH	CRANKCASE HEATER	IFR	INDUCED DRAFT RELAY	QT	QUADRUPLE TERMINAL
CCN	CARRIER COMFORT NETWORK	IFC	INDOOR FAN CONTACTOR	R	RELAY
CLO	COMPRESSOR LOCK OUT	IFCB	INDOOR FAN CIRCUIT BREAKER	RAT	RETURN AIR TEMP. SEN
CMP SAFE	COMPRESSOR SAFFETY	IFM	INDOOR FAN MOTOR	RDV	REHEAT DISCHARGE VALVE
COFS	CONDENSATE OVERFLOW SWT	IFTB	INDOOR FAN TERMINAL BLOCK	RLV	REHEAT LIQUID VALVE
COMP	COMPRESSOR MOTOR	IGC	INTEGRATED GAS CONTROL	RMT OCC	REMOTE OCCUPANCY
CLV	COOLING LIQUID VALVE	IRH	INDOOR RELATIVE HUMIDITY	RS	ROLLOUT SWITCH
DDC	DIRECT DIGITAL CONTROL	LA	LOW AMBIENT LOCKOUT	SAT	SUPPLY AIR TEMP. SENSOR
ERV	ENERGY RECOVERY VENTILATOR	LOOP PWR	CURRENT LOOP POWER	SEN	SENSOR
FIOP	FACTORY INSTALLED OPTION	LPS	LOW PRESSURE SWITCH	SET	SET POINT OFFSET
FR	FAN RELAY	LSM	LIMIT SWITCH (MANUAL RESET)	SFS	SUPPLY FAN STATUS
FSD	FIRE SHUT DOWN	MGV	MAIN GAS VALVE	SSV	SUBCOOL SOLENOID VALVE
FU	FUSE	MMV	MOTOR MASTER V CONTROLLER	TDR	TIME DELAY RELAY
GND	GROUND	OAQ	OUTDOOR AIR QUALITY	TRAN	TRANSFORMER
GVR	GAS VALVE RELAY	OAT	OUTDOOR AIR TEMP. SEN	VFD	VARIABLE FREQUENCY DRIVE
HGRH	HOT GAS REHEAT	OFM	OUTDOOR FAN MOTOR		
HPS	HIGH PRESSURE SWITCH	OL	OVERLOAD		
HS	HALL EFFECT SENSOR	PL	PLUG ASSEMBLY		

NOTES:

1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90 C WIRE OR ITS EQUIVALENT.
2. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED. THREE PHASE MOTORS ARE PROTECTED AGAINST PRIMARY SINGLE PHASING CONDITIONS.
3. 208/230V UNIT TRAN IS WIRED FOR 575V UNIT.
4. USE COPPER, COPPER CLAD ALUMINUM OR ALUMINUM CONDUCTORS. MAX 1/0 FOR HACR.
5. USE COPPER CONDUCTOR ONLY. MAX 1/0 FOR DISCONNECT.

48TM503256 | F

Fig. AQ — 48HC*D12 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS

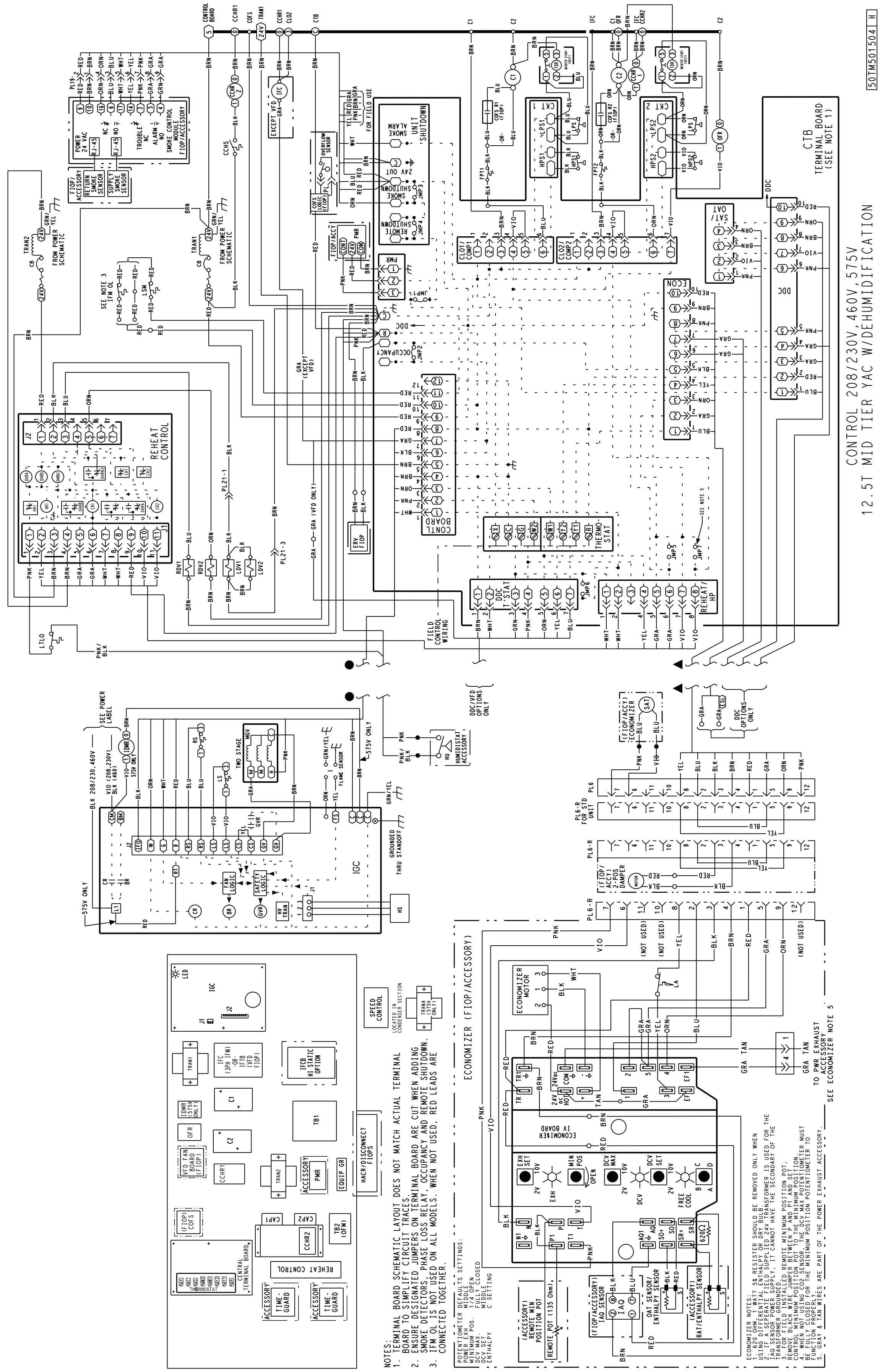


Fig. AR — 48HC*D14 YAC Control Diagram — 230/460/575-3-60 with Humidi-MiZer® System

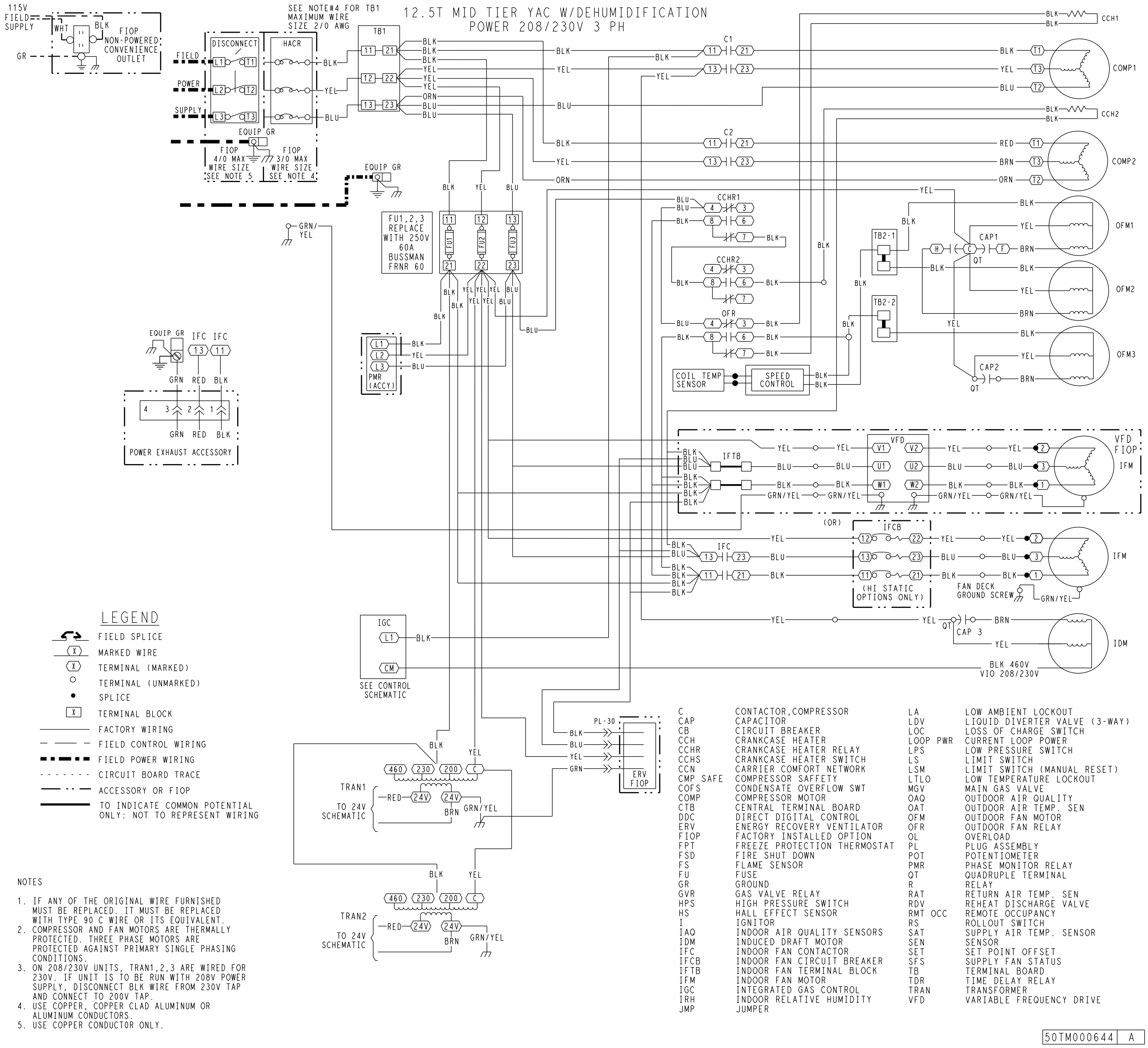


Fig. AS — 48HC*D14 YAC Power Diagram — 208/230-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS

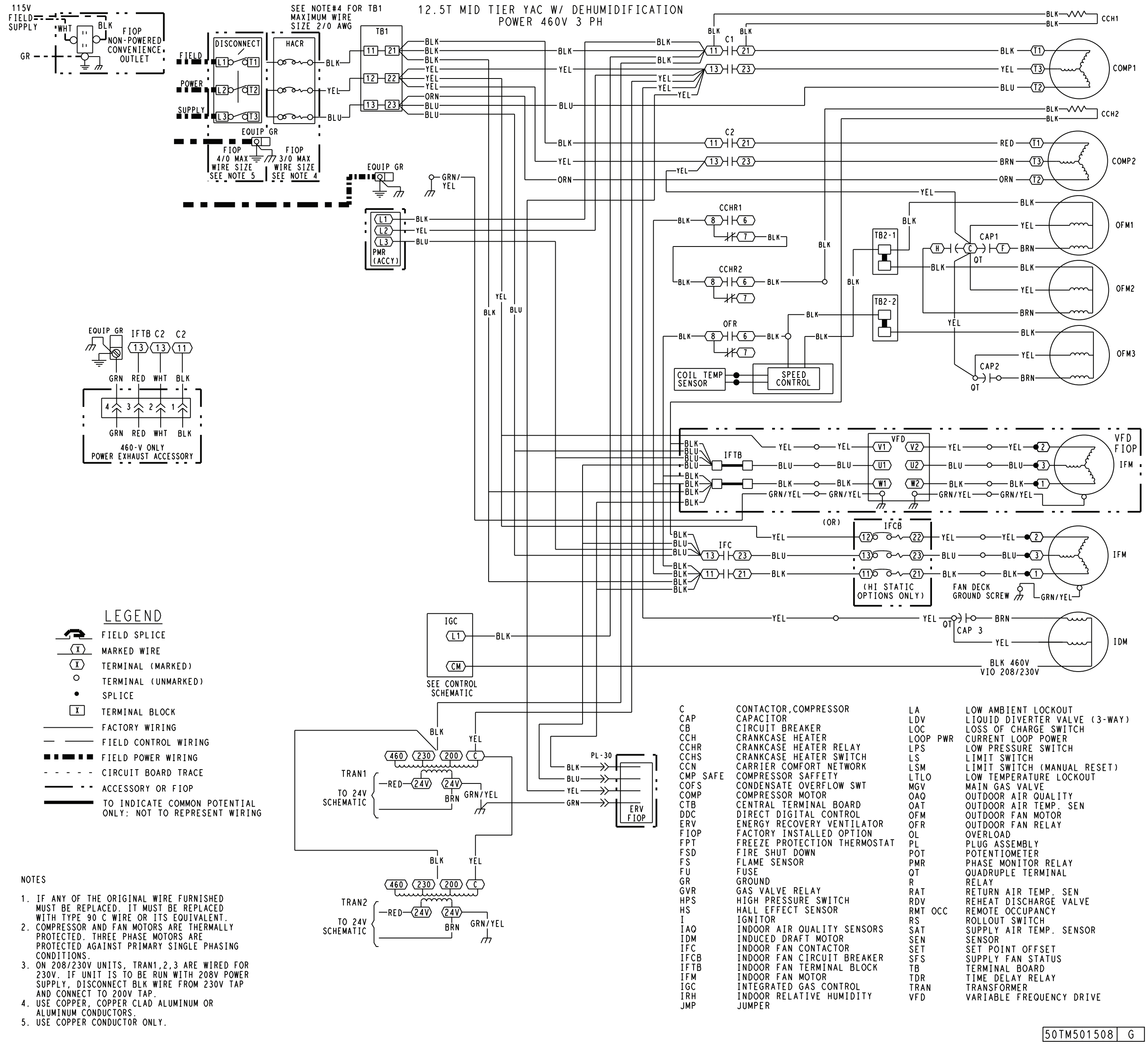


Fig. AT — 48HC*D14 YAC Power Diagram — 460-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS

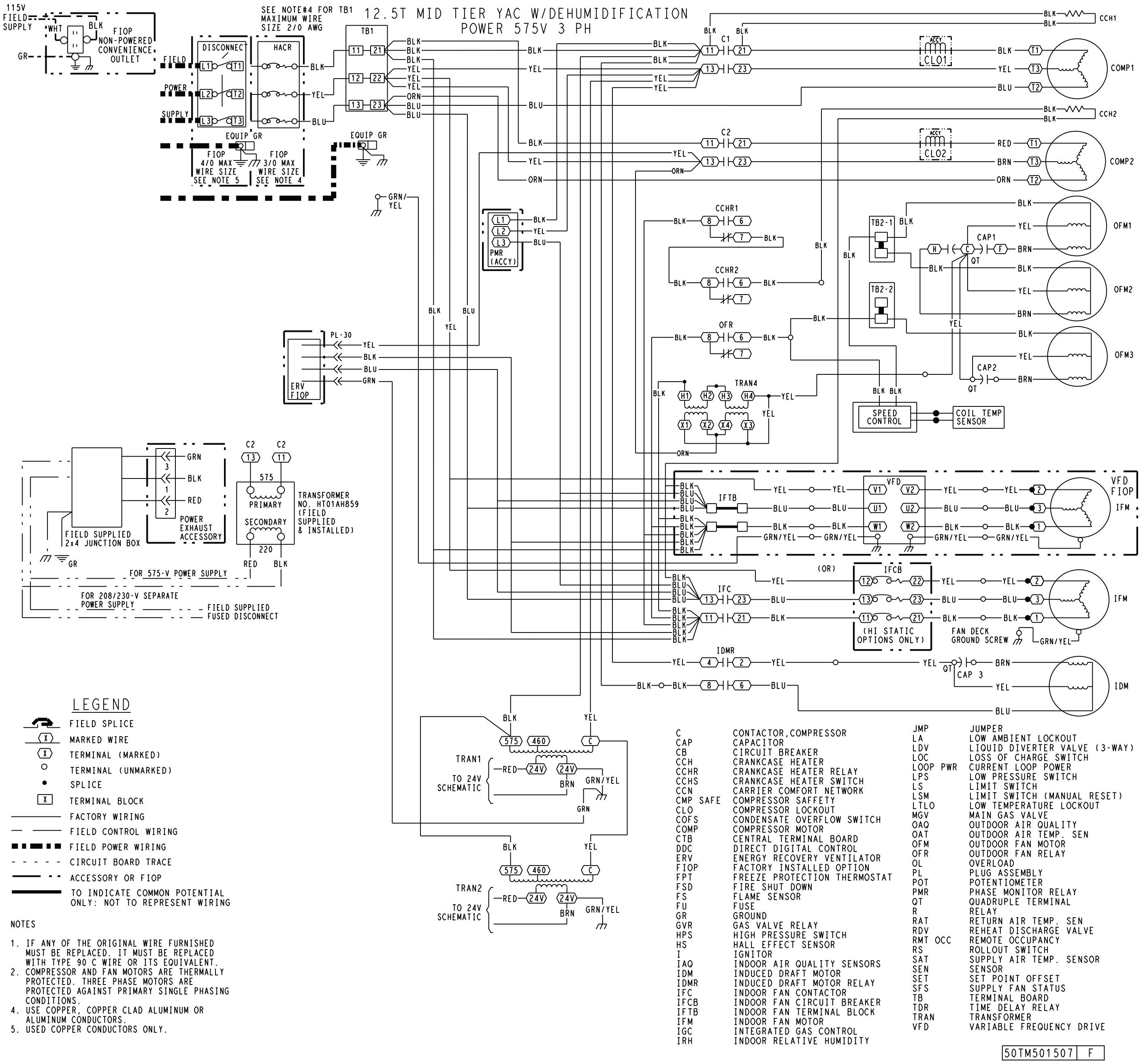


Fig. AU — 48HC*D14 YAC Power Diagram — 575-3-60 with Humidi-MiZer® System

APPENDIX D — WIRING DIAGRAMS

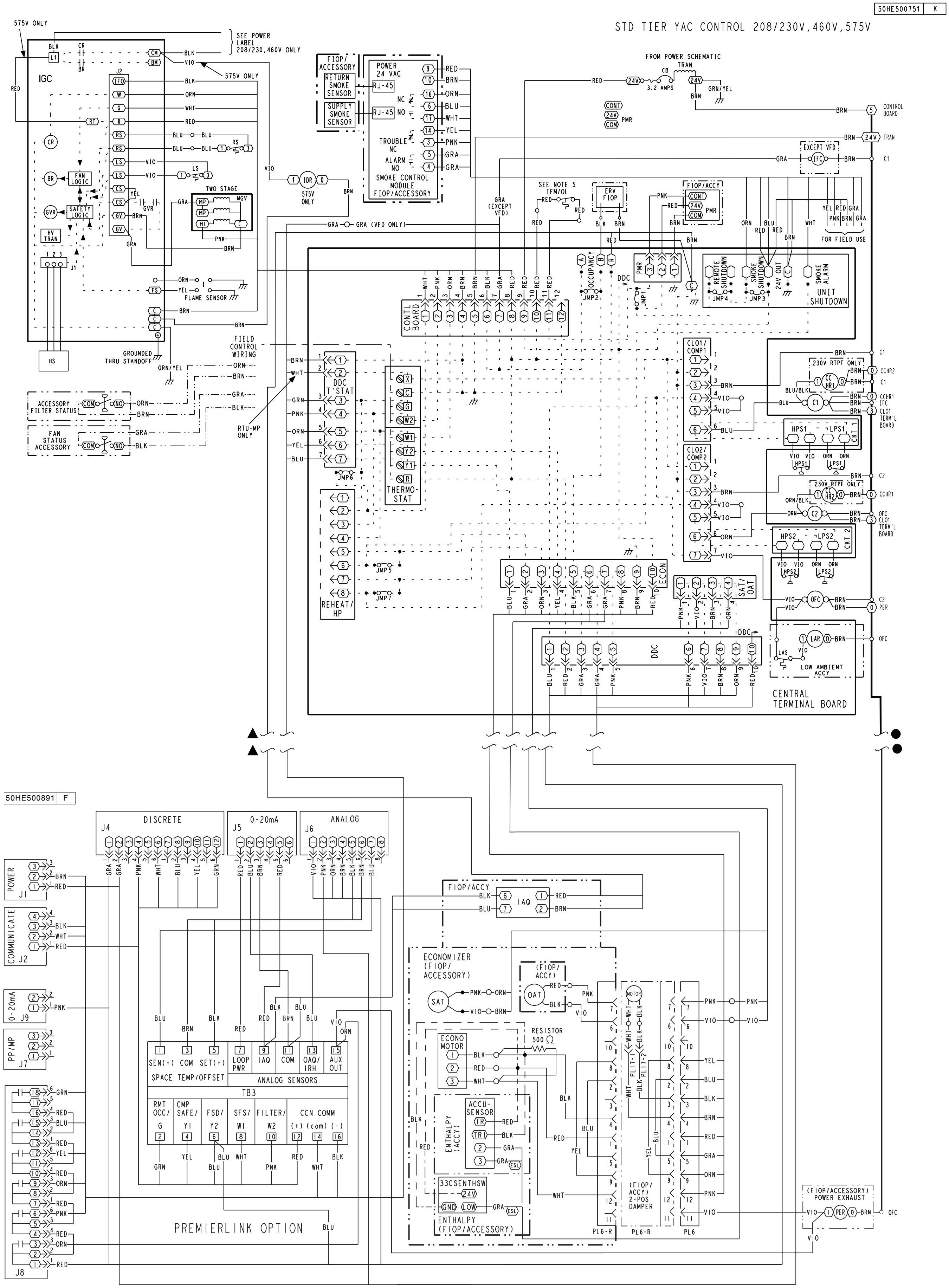


Fig. AV — YAC Direct Digital System Control Wiring Diagram System

APPENDIX D — WIRING DIAGRAMS

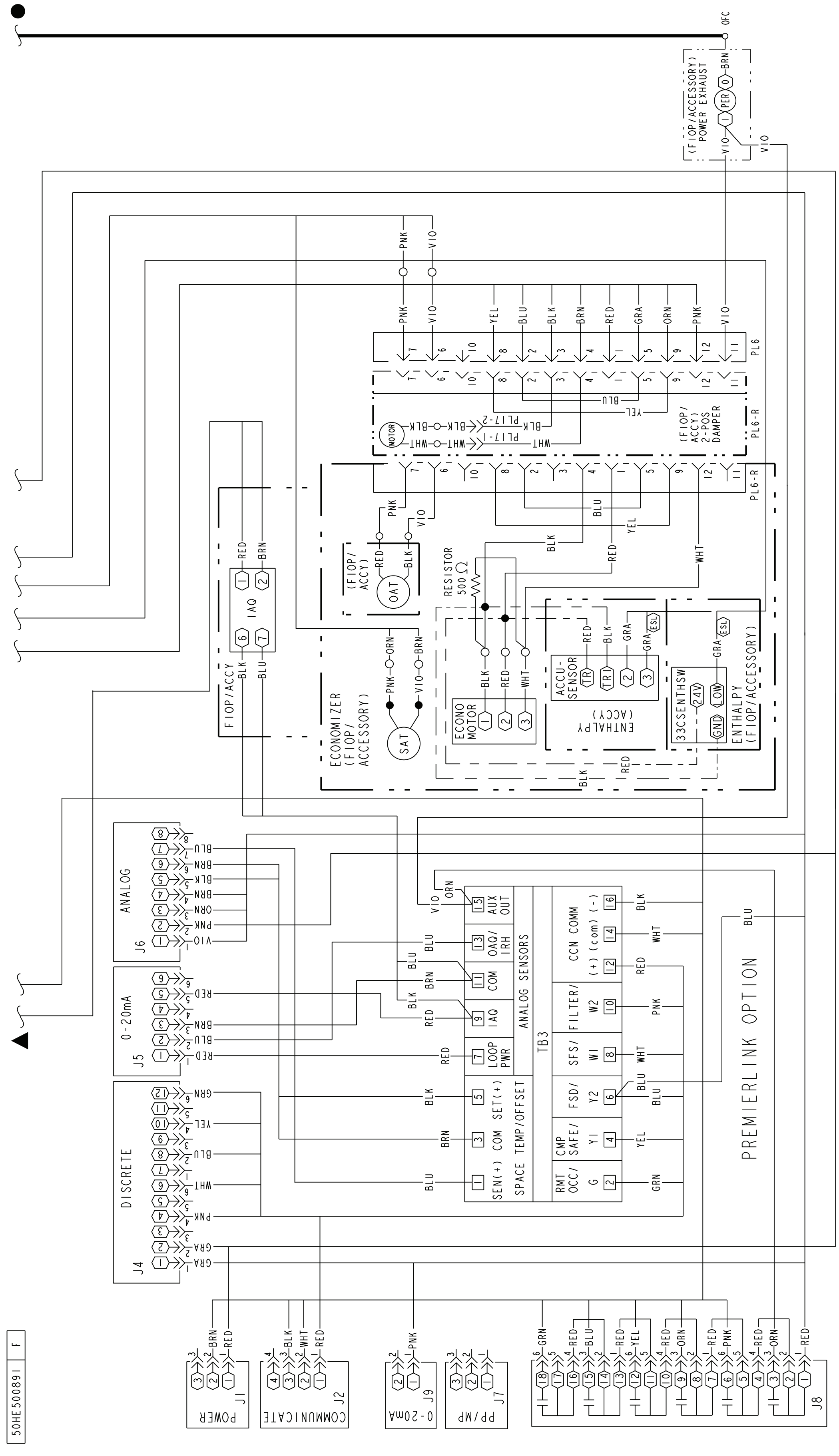
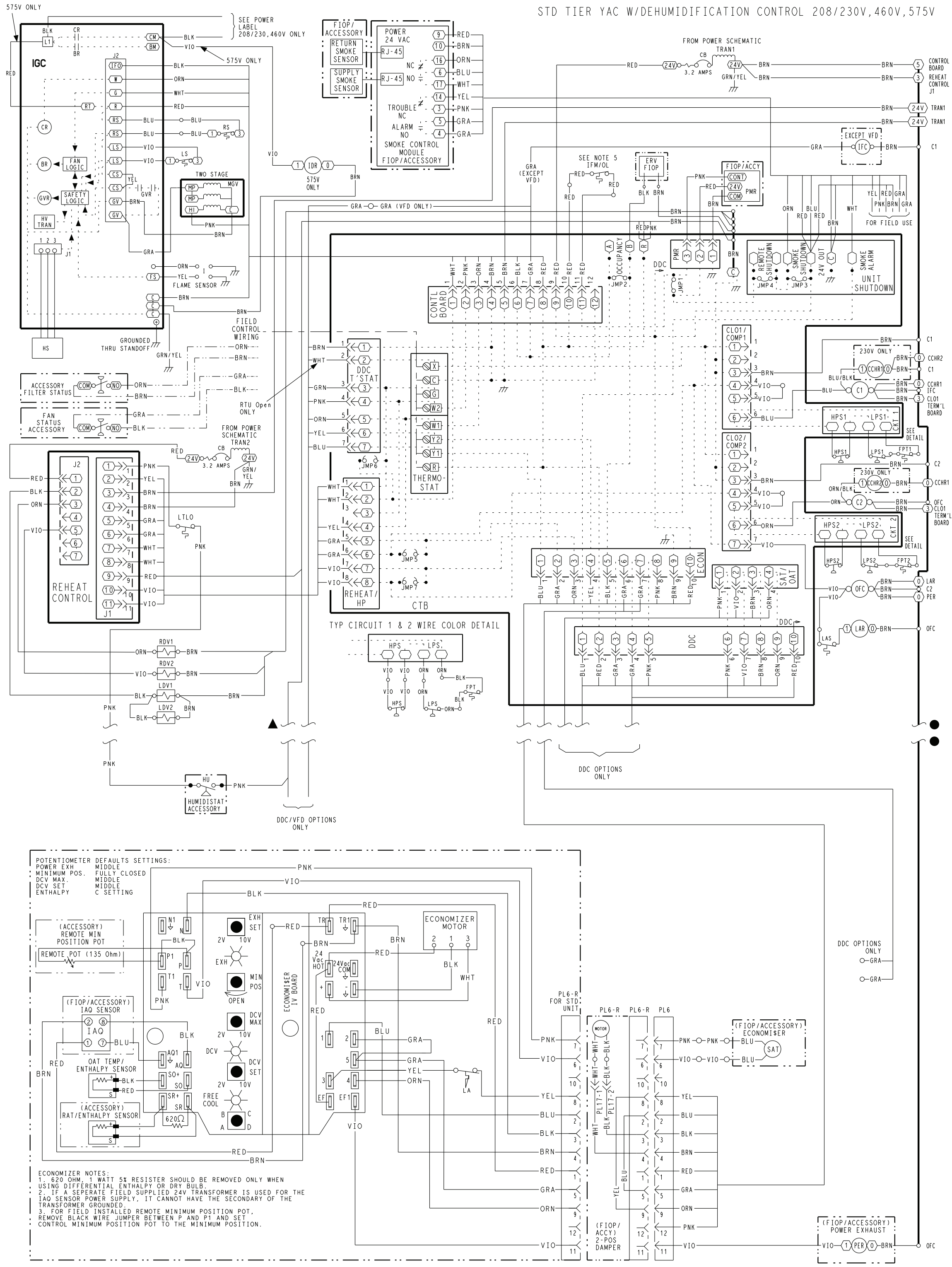


Fig. AW — PremierLink™ System Control Wiring Diagram System

APPENDIX D — WIRING DIAGRAMS



NOTES

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

C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCHR	CRFANKCASE HEATER RELAY
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWITCH
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DDC	DIRECT DIGITAL CONTROL
ERV	ENERGY RECOVERY VENTILATOR
FIOP	FACTORY INSTALLED OPTION
FPT	FREEZE PROTECTION THERMOSTAT
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
GVR	GAS VALVE RELAY
HPS	HIGH PRESSURE SWITCH
HS	HALL EFFECT SENSOR
HU	HUMIDISTAT
I	IGNITOR
IAQ	INDOOR AIR QUALITY SENSORS
IDM	INDUCED DRAFT MOTOR
IDR	INDUCED DRAFT RELAY
IFC	INDOOR FAN CONTACTOR
IFM	INDOOR FAN MOTOR
IGC	INTEGRATED GAS CONTROL
IRH	INDOOR RELATIVE HUMIDITY
LA	LOW AMBIENT LOCKOUT
LAR	LOW AMBIENT RELAY
LAS	LOW AMBIENT SWITCH
LDV	LIQUID DIVERTER VALVE (3-WAY)
LOOP PWR	CURRENT LOOP POWER
LPS	LOW PRESSURE SWITCH
LSM	LIMIT SWITCH (MANUAL RESET)
LTLO	LOW TEMPERATURE LOCK OUT
MGV	MAIN GAS VALVE
OAQ	OUTDOOR AIR QUALITY
OAT	OUTDOOR AIR TEMP. SEN
OFC	OUTDOOR FAN CONTACTOR
OFM	OUTDOOR FAN MOTOR
OFTB	OUTDOOR FAN TERMINAL BLOCK
OLR	OVERLOAD RELAY
PER	POWER EXHAUST RELAY
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RDV	REHEAT DISCHARGE VALVE
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
RTPF	ROUND TUBE PLATE FIN CONDENSER COIL
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY
TRAN	TRANSFORMER
VFD	VARIABLE FREQUENCY DRIVE

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Fig. AX — PremierLink™ System Control Wiring Diagram with Humidi-MiZer® System

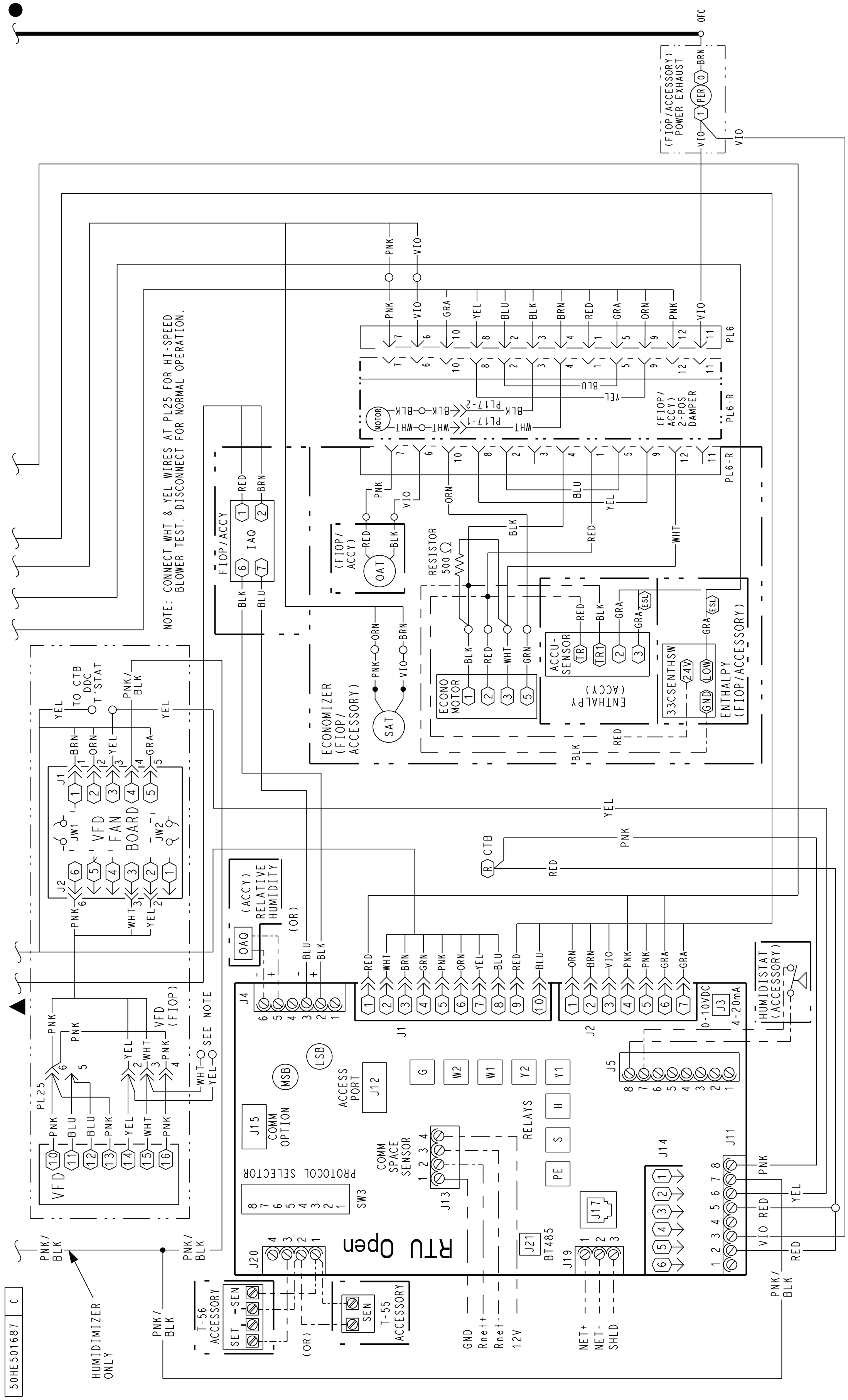

Fig. AY — RTU-Open Wiring Diagram

APPENDIX E — MOTORMASTER SENSOR LOCATIONS

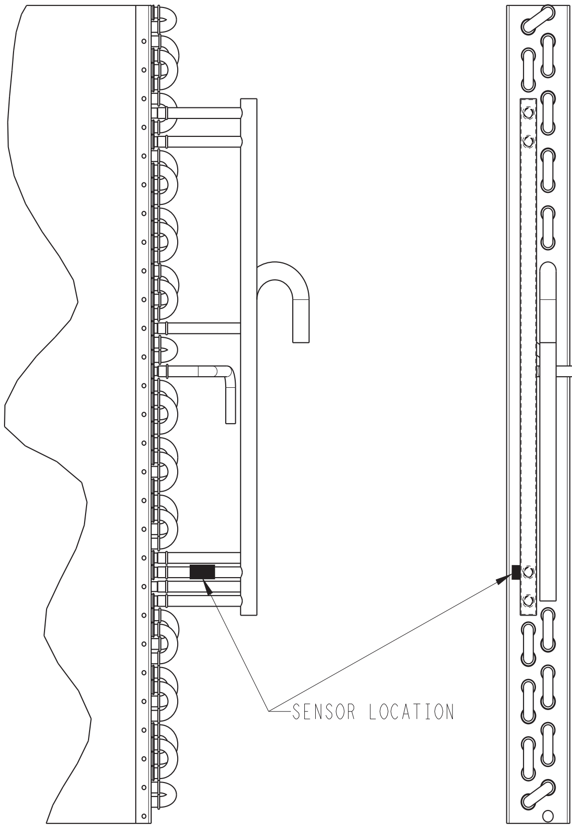

Fig. AZ — 48HC*A04 Outdoor Circuiting

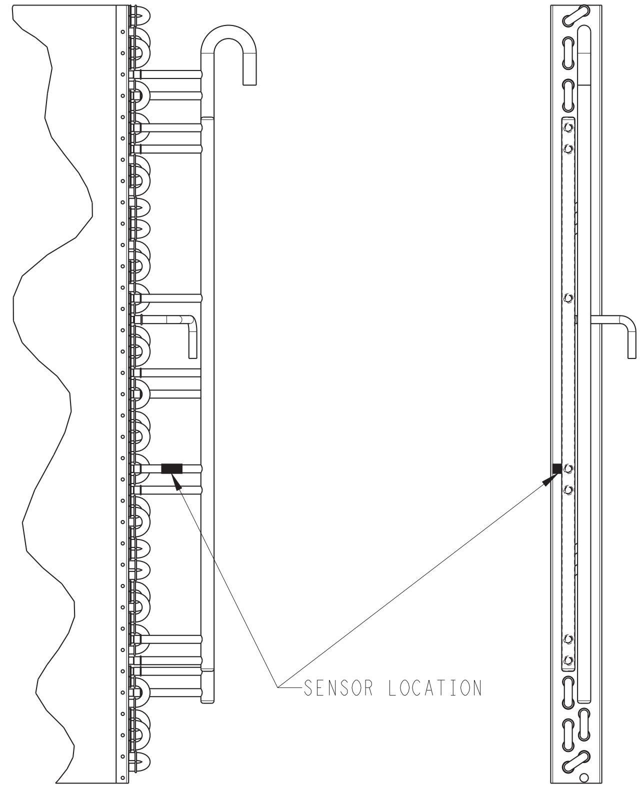

Fig. BB — 48HC*A07 and 48HC*D07 Outdoor Circuiting

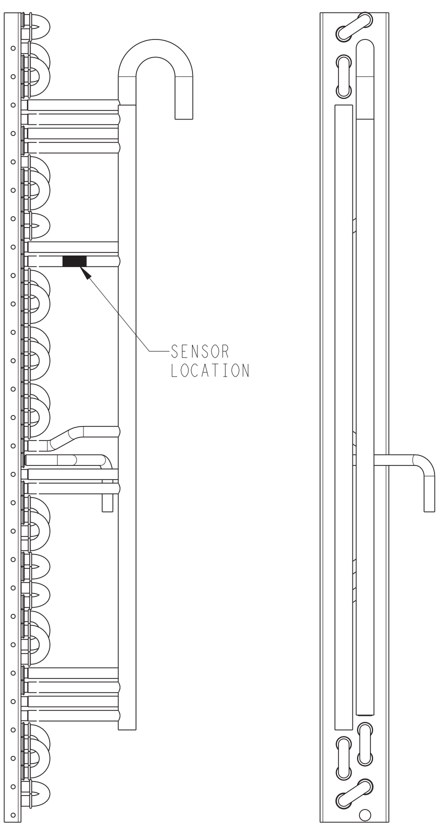

Fig. BA — 48HC*A05/06 Outdoor Circuiting

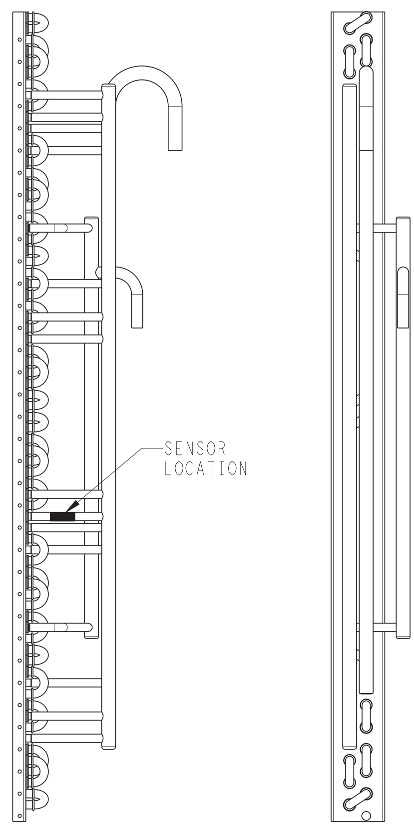

Fig. BC — 48HC*A08 Outdoor Circuiting

APPENDIX E — MOTORMASTER SENSOR LOCATIONS

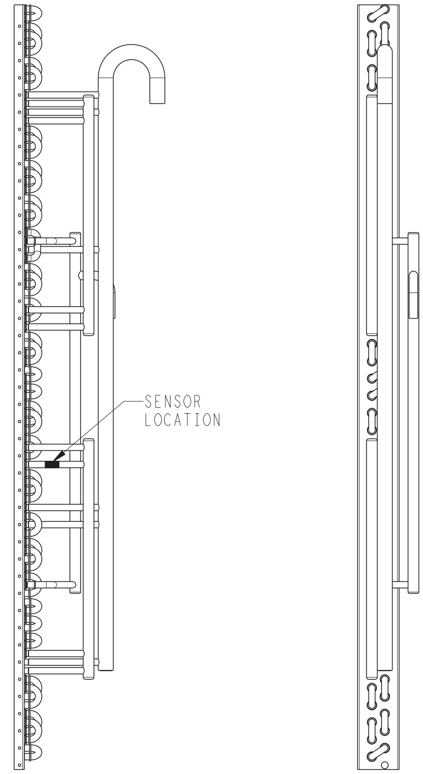

Fig. BD — 48HC*A09 Outdoor Circuiting

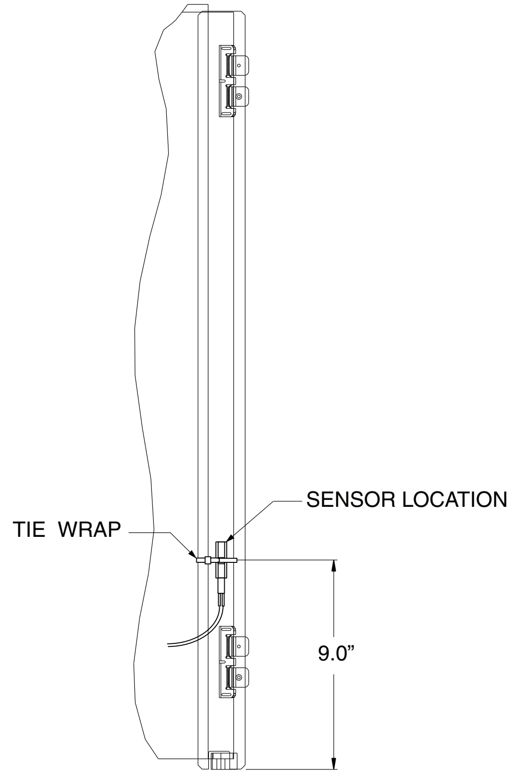

Fig. BF — 48HC*D08 Motormaster Sensor Location — Novation® Coils (MCHX)

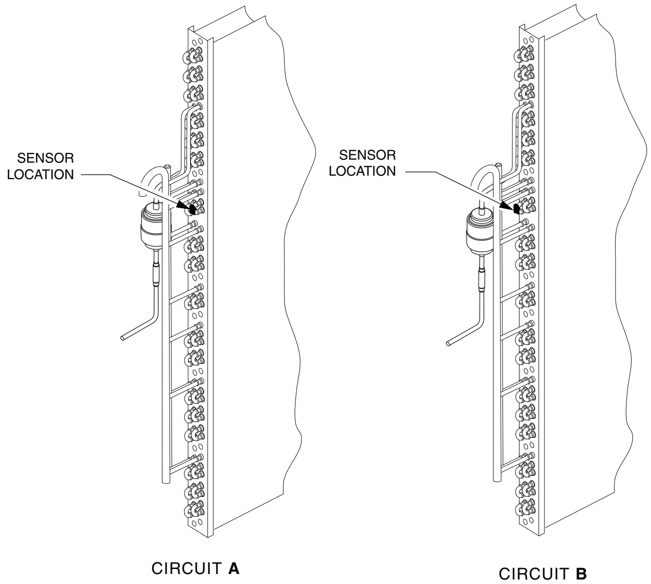

Fig. BE — 48HC*D14 Outdoor Circuiting (Circuit A and Circuit B)

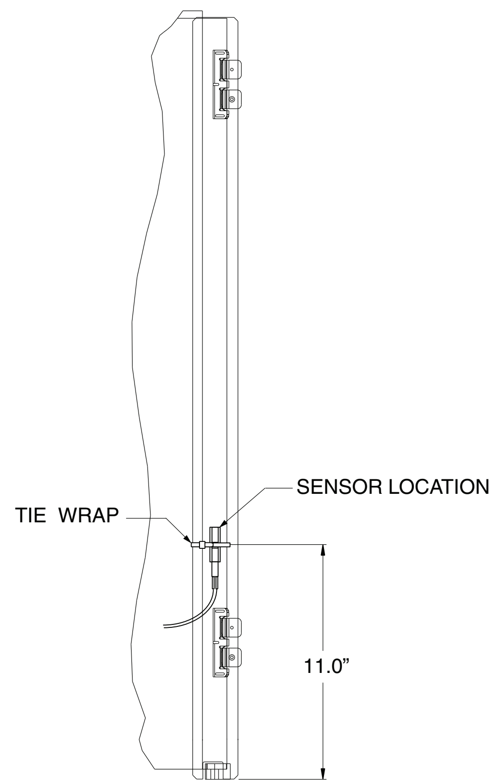

Fig. BG — 48HC*D12 Motormaster Sensor Location — Novation Coils (MCHX)

UNIT START-UP CHECKLIST

(Remove and use for 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 Service and Maintenance Instructions document.

I. PRELIMINARY INFORMATION:

MODEL NO. ________________________________

JOB NAME __________________________________

SERIAL NO ____________________________________

ADDRESS __________________________________

START-UP DATE _____________________________

TECHNICIAN ___________________________________

ADDITIONAL ACCESSORIES

____

II. PRE-START-UP

Verify that all packaging materials have been removed from unit (Y/N) _____

Verify installation of outdoor air hood (Y/N) _____

Verify installation of flue exhaust and inlet hood (Y/N) _____

Verify that condensate connection is installed per instructions (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 fan sheaves are aligned and belts are properly tensioned (Y/N) _____

Verify that scroll compressors are rotating in the correct direction (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 _____________
Supply Fan Amps	L1 _____________	L2 _____________	L3 _____________

TEMPERATURES

Outdoor Air Temperature	_____________ °F DB (Dry Bulb)	_____________ °F WB (Wet Bulb)
Return Air Temperature	_____________ °F DB	_____________ °F WB (Wet Bulb)
Cooling Supply Air Temperature	_____________ °F	

PRESSURES

Refrigerant Suction	CIRCUIT A _____________ PSIG
	CIRCUIT B _____________ PSIG
Refrigerant Discharge	CIRCUIT A _____________ PSIG
	CIRCUIT B _____________ PSIG

Verify Refrigerant Charge using Charging Charts (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) _____

REPEAT PROCESS FOR 2 COMPRESSOR SYSTEMS.

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE