48TC04 – 16**
Nominal 3 to 15 Tons
with Puron® (R–410A) Refrigerant

turn to the experts

Service and Maintenance Instructions

TABLE OF 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 the basic maintenance functions of replacing filters. Trained service personnel should perform all other operations.

When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that can apply. Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-ALERT symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be aware of the potential for physical injury hazards.

Understand the signal words **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-ALERT symbol. **DANGER** indicates a hazardous situation which, if not avoided, **will** result in death or severe personal injury. **WARNING** indicates a hazardous situation which, if not avoided, **could** result in death or personal injury. **CAUTION** indicates a hazardous situation which, if not avoided, **could** result in minor to moderate injury or product and property damage. **NOTICE** is used to address practices not related to physical injury. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

IMPORTANT: **Lockout/Tagout 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.**

⚠ CAUTION

CUT HAZARD

Failure to follow this caution can result in personal injury.

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

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Units with convenience outlet circuits can use multiple disconnects. Check convenience outlet for power status before opening unit for service. Locate the disconnect switch and lock it in the open position it. LOCK-OUT/TAGOUT this switch to notify others.

⚠ 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.

⚠ 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.

⚠ WARNING

FIRE, EXPLOSION HAZARD

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

Disconnect gas piping from unit when pressure testing at pressure greater than 0.5 psig. 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 personal injury, death 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 personal injury, death 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.

UNIT ARRANGEMENT AND ACCESS

General

Fig. 1 and Fig. 2 show the general unit arrangement and access locations.

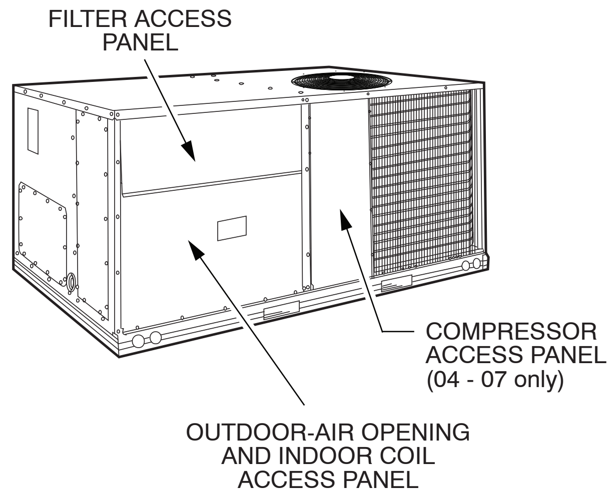


Fig. 1 - Typical Access Panel Locations

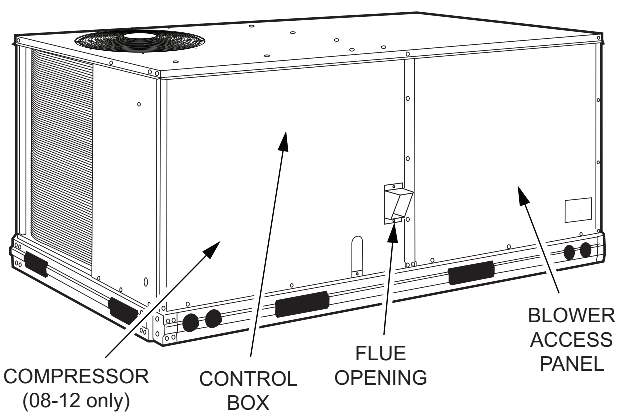


Fig. 2 - Blower Access Panel Location

ROUTINE MAINTENANCE

The following items should be part of a routine maintenance program and should to be checked every month until a specific schedule for each can be identified for this installation:

Quarterly Inspection (& 30 days after initial start)

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

Seasonal Maintenance

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

Air Conditioning

- Ensure condenser fan motor mounting bolts are tight
- Ensure compressor mounting bolts are tight
- Condenser fan blade positioning
- Inspect control box for cleanliness and wiring condition
- Ensure wire terminal are tight
- Check refrigerant charge level
- Clean evaporator coil
- Check evaporator blower motor amperage

Heating

- Ensure heat exchanger flue passageways are clean
- Inspect gas burner condition
- Check gas manifold pressure
- Heating temperature rise

Economizer or Outside Air Damper

- Inspect condition of inlet filters
- 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.

All filters and screens will need to be periodically cleaned or replaced.

Return Air Filters

Return air filters are a 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.

⚠ CAUTION

PERSONAL INJURY HAZARD

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

Dirt and debris can collect on heat exchangers and coils and can cause excessive current used resulting in motor failure.

IMPORTANT: DO NOT OPERATE THE UNIT WITHOUT THESE FILTERS!

Removing the Return Air Filters:

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

Reinstalling the Access Panel:

1. Slide the top of the panel up under the unit's top panel.
2. Slide the bottom flange 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 screens for cleanliness. Remove the screens when cleaning is required. Clean by washing with hot low-pressure water and soft detergent. Replace all screens before restarting the unit. Observe the flow direction arrows on the side of each filter frame when installing.

Economizer Inlet Air Screen

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

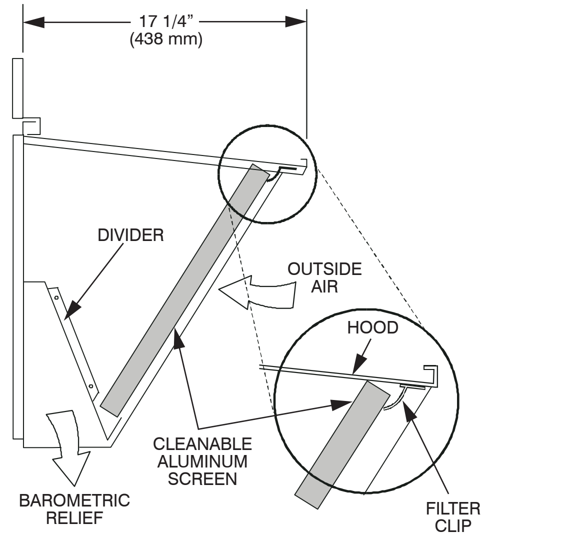


Fig. 3 - Inlet Air Screen Installation

Remove the screen by opening the filter clips. Re-install the filter by placing the screen 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.

Remove the screen by loosening the screws in the top retainer and sliding the retainer up until the filter can be removed. Reinstall by placing the frame in its track, rotating the retainer back down and tightening all screws.

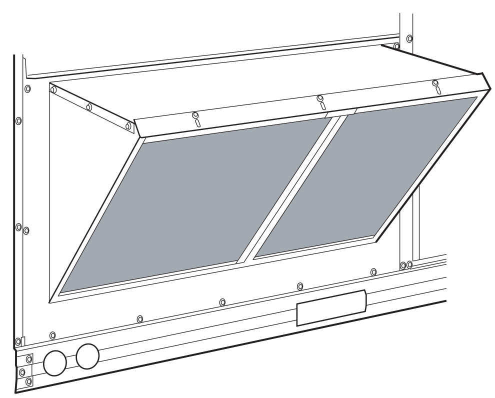


Fig. 4 - Screens Installed on Outdoor-Air Hood (Sizes 7-1/2 to 15 Tons Shown)

MODEL NOMENCLATURE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	8	T	C	D	A	0	4	A	1	A	5	-	0	A	0	A	0

Unit Heat Type
48 – Gas Heat Packaged Rooftop

Series/Model
TC – Standard Efficiency

Heat Size
D – Low heat
E – Medium Heat
F – High Heat
L – Low NO_x, Low Heat
M – Low NO_x, Medium Heat
N – Low NO_x, High Heat
S – Stainless Steel, Low Heat
R – Stainless Steel, Medium Heat
T – Stainless Steel, High Heat

Refrig. Systems Options
A - Standard One Stage Cooling Models
B – Standard One Stage Cooling Models with Humidi-MiZer (04-07 models only)
D – Two Stage Cooling Models 08-16
E – Two Stage Cooling Models 08-16 with Al/Cu condenser Coils and with Humidi-MiZer

Cooling Tons

04 - 3 ton	08 – 7.5 ton	16 – 15 Tons
05 - 4 ton	09 – 8.5 ton	
06 - 5 ton	12 – 10 ton	
07 - 6 ton	14 – 12.5 ton	

Sensor Options
A = None
B = RA Smoke Detector
C = SA Smoke Detector
D = RA + SA Smoke Detector
E = CO2 Sensor
F = RA Smoke Detector and CO2 Sensor
G = SA Smoke Detector and CO2 Sensor
H = RA + SA Smoke Detector and CO2 Sensor

Indoor Fan Options
1 = Standard Static Option
2 = Medium Static Option
3 = High Static Option
C = High Static Option w/ High Effy Motor (Size 16 Only)

Note: On single phase (-3 voltage code) models, the following are not available as a factory installed option:
- Humidi-Mizer
- Coated Coils or Cu Fin Coils
- Louvered Hail Guards
- Economizer or 2 Position Damper
- Powered 115 Volt Convenience Outlet

Not all possible options can be displayed above.

Packaging and Seismic Compliant
0 = Standard
1 = LTL
3 = CA Seismic Compliant
4 = LTL and CA Seismic Compliant Label

Electrical Options
A = None
C = Non-Fused Disconnect
D = Thru-The-Base Connections
F = Non-Fused Disconnect and Thru-The-Base Connections
G = 2-Speed Indoor Fan (VFD) Controller
J = 2 Speed Fan Controller (VFD) and Non-Fused Disconnect
K = 2 Speed Fan Controller (VFD) 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, Unpowered Convenience Outlet
5 = Hinged Panels, Powered Convenience Outlet

Intake / Exhaust Options
A = None
B = Temperature Economizer w/ Barometric Relief
F = Enthalpy Economizer w/ Barometric Relief
K = 2-Position Damper
U = Temp Ultra Low Leak Economizer w/Baro Relief
W = Enthalpy Ultra Low Leak Econo w/Baro Relief

Base unit controls
0 = Electromechanical Controls. Can be used with W7212 EconoMi$er IV (factory or field installed)
1 = PremierLink Controller
2 = RTU Open Multi-Protocol Controller
6 = Electromechanical Controls. Can be used with W7220 EconoMi$er X (factory or field installed)

Design Revision
Factory Assigned

Voltage

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

Coil Options For Round Tube/Plate Fin Condenser Coil Models Only (outdoor-indoor-hailguard)
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 Guards
N = Precoat Al/Cu - Al/Cu – Louvered Hail Guards
P = E-coat Al/Cu - Al/Cu – Louvered Hail Guards
Q = E-coat Al/Cu - E-coat Al/Cu – Louvered Hail Guards
R = Cu/Cu - Al/Cu – Louvered Hail Guards
S = Cu/Cu - Cu/Cu – Louvered Hail Guards

Coil Options For All Aluminum – Novation Condenser Coil Models Only (outdoor-indoor-hailguard)
G = Al/Al – Al/Cu
H = Al/Al – Cu/Cu
J = Al/Al – E-coat Al/Cu
K = E-coat Al/Al – Al/Cu
L = E-coat Al/Al – E-coat Al/Cu
T = Al/Al – Al/Cu, Louvered Hail Guards
U = Al/Al – Cu/Cu, Louvered Hail Guards
V = Al/Al – E-coat Al/Cu, Louvered Hail Guards
W = E-coat Al/Al – Al/Cu, Louvered Hail Guards
X = E-coat Al/Al – E-coat Al/Cu, Louvered Hail Guards

C13211B

SUPPLY FAN (BLOWER) SECTION

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

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

Supply Fan (Belt-Drive)

The supply fan system consists of a forward-curved centrifugal blower wheel on a solid shaft with two concentric type bearings, one on each side of the blower housing. A fixed-pitch driven pulley is attached to the fan shaft and an adjustable-pitch driver pulley is on the motor. The pulleys are connected using a "V" type belt. See Fig. 5.

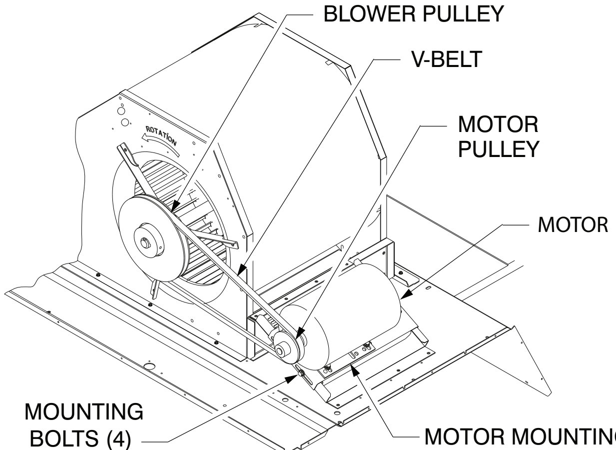


Fig. 5 - Belt Drive Motor Mounting

Belt

Check the belt condition and tension quarterly.

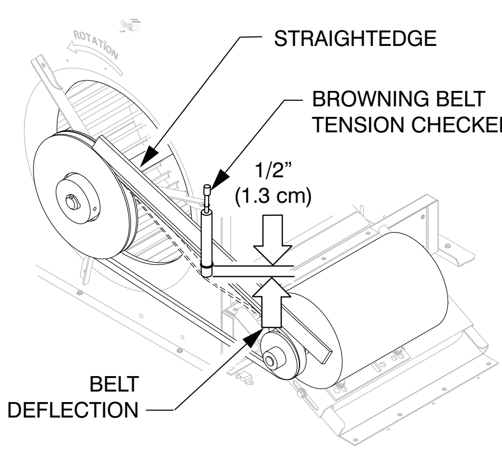


Fig. 6 - Checking Blower Motor Belt Tension

Changing Fan Speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 5.
3. Loosen movable pulley flange setscrew. See Fig. 7.
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew to torque specifications.

Align fan and motor pulleys:

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

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-lbs at a 5/8 -in. (1.6cm) 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. See Fig. 6.

1. Place a straightedge along the belt between the two pulleys.
2. Set the tension checker to the desired tension. Place the large O-ring at that point.
3. Press the tension checker downward on the belt until the large O-ring is at the bottom of the straightedge.
4. Adjust the belt tension as needed.

NOTE: Without the spring-tension tool, place a straight edge across the belt surface at the pulleys, then deflect the belt at mid-span using one finger to a 1/2 -in. deflection.

Adjust belt tension by loosening the motor mounting plate front bolts and rear bolt and sliding the plate toward the fan (to reduce tension) or away from fan (to increase tension). Ensure the blower shaft and the motor shaft are parallel to each other (pulleys aligned). Tighten all bolts securely when finished.

Replacing the belt:

1. Use a belt with same section type or similar size. Do not substitute a "FHP" type belt. When installing the new belt, do not use a tool (screwdriver or pry-bar) to force the belt over the pulley flanges, this will stress the belt and cause a reduction in belt life.
2. Loosen the motor mounting plate front bolts and rear bolts.
3. Push the motor and its mounting plate towards the blower housing as close as possible to reduce the center distance between fan shaft and motor shaft.
4. Remove the belt by gently lifting the old belt over one of the pulleys.

5. Install the new belt by gently sliding the belt over both pulleys and then sliding the motor and plate away from the fan housing until proper tension is achieved.
6. Check the alignment of the pulleys, adjust if necessary.
7. Tighten all bolts.
8. Check the tension after a few hours of runtime and re-adjust as required.

Adjustable-Pitch Pulley on Motor

The motor pulley is an adjustable-pitch type that allows a servicer to implement changes in the fan wheel speed to match as-installed ductwork systems. The pulley consists of a fixed flange side that faces the motor (secured to the motor shaft) and a movable flange side that can be rotated around the fixed flange side that increases or reduces the pitch diameter of this driver pulley. See Fig. 7.

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. Also reset the belt tension after each realignment.

Check the condition of the motor pulley for signs of wear. Glazing of the belt contact surfaces and erosion on these surfaces are signs of improper belt tension and/or belt slippage. Pulley replacement can be necessary.

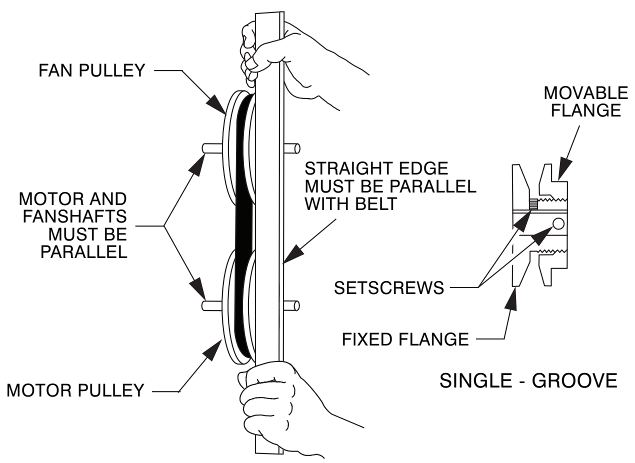


Fig. 7 - Supply-Fan Pulley Adjustment

Bearings

This fan system uses bearings featuring concentric split locking collars. The collars are tightened through a cap screw bridging the split portion of the collar. The cap screw has a Torx T25 socket head. To tighten the locking collar: Hold the locking collar tightly against the inner race of the bearing and torque the cap screw to 55-60 in-lb (6.2-6.8 Nm). See Fig. 8.

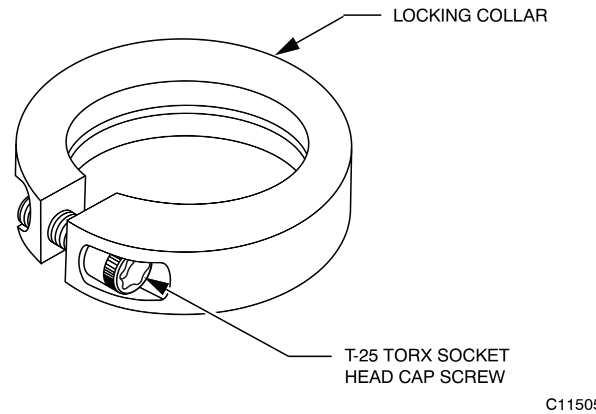


Fig. 8 - Tightening Locking Collar

STAGED AIR VOLUME CONTROL (SAV) - 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 2010standard 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 1. If the unit does not meet that criteria, discard this document.

Table 1 – Model-Size / VFD option Indicator

Model / Sizes	Position in Model Number	VFD FIOP Indicator
48TC / 08-30	17	G, J

Unit Installation with SAV Option

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

NOTICE: The remote VFD keypad is a field-installed option. It is not included as part of the factory-installed VFD option. See Figs. 9, 10 and 11 for locations of the Variable Frequency Drive (VFD) as mounted on the various 48TC models.

48TC

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

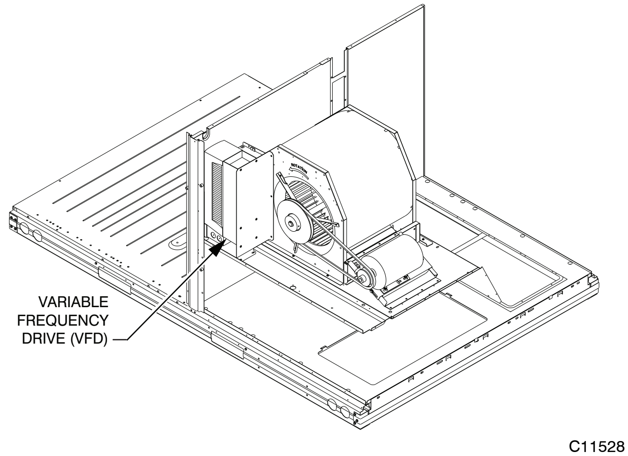


Fig. 9 - VFD Location for 48TC 08 - 09 Units

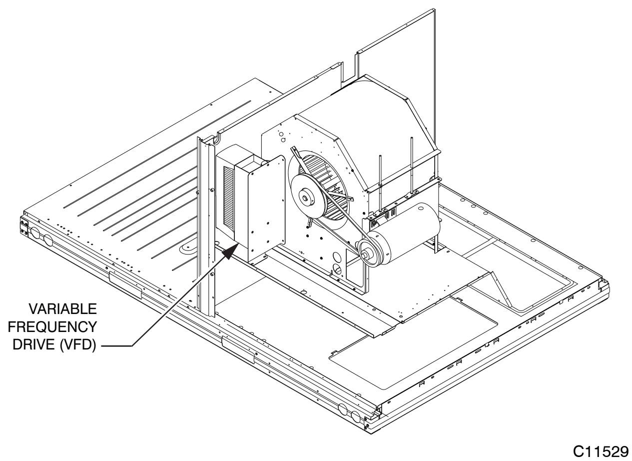


Fig. 10 - VFD Location for 48TC 12-14 Units

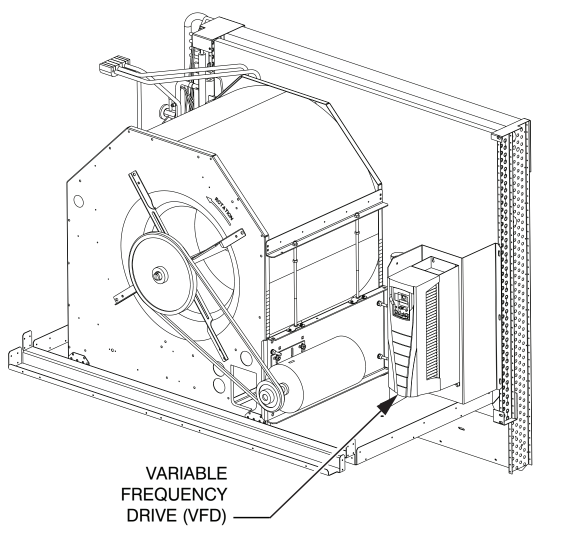


Fig. 11 - VFD Location for 48TC 16 Unit

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."* Have a copy of this manual on hand at start-up.

SUPPLY FAN MOTOR

Replacing the Motor

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

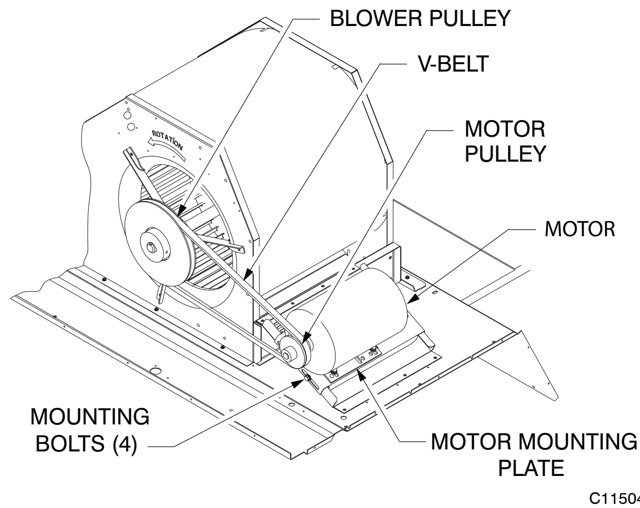


Fig. 12 - Replacing Belt Driven Motor

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

1. Turn off all electrical power to the unit. Use approved lockout/tagout procedures on all electrical power sources.
2. Remove cover on motor connection box.
3. Disconnect all electrical leads to the motor.
4. Loosen four mounting plate bolts.
5. Move motor assembly toward blower assembly.
6. Remove V-belt from blower pulley and motor pulley.
7. Remove four bolts, four flat washers, four lock washers and four nuts attaching the motor mounting plate to the unit. Discard all lock washers.
8. Remove motor and motor mounting plate from unit.
9. Remove four bolts, four flat washers, four lock washers and one external-tooth lock washer attaching motor to the motor mounting plate. Discard all lock washers and external-tooth lock washer.
10. Lift motor from motor mounting plate and set aside.
11. Slide motor mounting band from old motor.
12. Slide motor mounting band onto new motor and set motor onto the motor mounting plate.

13. Inspect variable pitch pulley on old motor for cracks and wear.
14. Remove variable pitch pulley from old motor and attach it to the new motor. Secure the pulley to the motor by tightening the setscrew to the motor shaft.
15. Insert four bolts and flat washers through holes in the motor mounting band into holes on the motor mounting plate.
16. On one bolt, place a new external-tooth lock washer between the motor and motor mounting plate.
17. 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.
18. Install four new lock washers and four nuts on the bolts on the bottom of the motor mounting plate.
19. Do Not tighten the mounting bolts at this time.
20. Install four bolts, four flat washers, four new lock washers and four nuts attaching the motor assembly to the unit.
21. Do Not tighten the mounting bolts at this time.
22. Install motor drive V-belt to motor pulley and blower wheel pulley. See CAUTION below.
23. Align the motor pulley and blower wheel pulley using a straight edge. See Fig. 7.
24. Adjust the V-belt tension using adjustment tool. See Fig. 13.

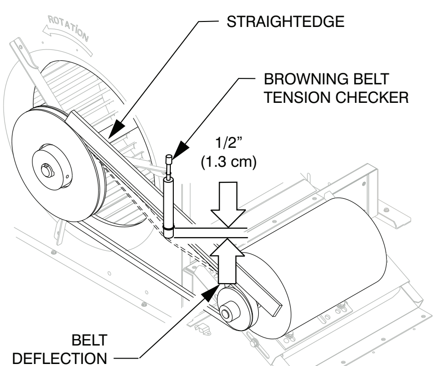


Fig. 13 - Adjusting V-belt Tension

25. Tighten four bolts securing motor to motor mounting plate. Torque four bolts to 120 ± 12 in-lbs (14 ± 1.4 Nm).
26. Tighten four bolts securing motor mounting plate to unit. Torque four bolts to 120 ± 12 in-lbs (14 ± 1.4 Nm).
27. Remove cover on new motor connection box.
28. Re-connect all electrical leads to the motor and replace the connection box cover.
29. Re-connect all electrical power to the unit. Remove lockout tags on all electrical power sources.
30. Start unit and allow to run for a designated period.
31. Shut off unit and make any necessary adjustments to the V-belt tension or the motor and blower wheel pulley alignment.

⚠ 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.

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 fixed fan pulley (larger pitch diameter to reduce wheel speed, smaller pitch diameter to increase wheel speed) or select a new system with both pulleys and matching belt(s).

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

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in equipment damage.

Drive packages cannot be changed in the field. For example: a standard drive cannot be changed to a high static drive. This type of change will alter the unit's certification and could require heavier wiring to support the higher amperage draw of the drive package.

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.

To determine variable pitch pulley diameter perform the following calculation:

1. Determine full open and full closed pulley diameter.
2. Subtract the full open diameter from the full closed diameter.
3. Divide that number by the number of pulley turns open from full closed
   This number is the change in pitch datum per turn open.

EXAMPLE
-Pulley dimensions 2.9 to 3.9 (full close to full open)
-3.9 - 2.9 = 1
-1 divided by 5 (turns from full close to full open)
-0.2 change in pulley diameter per turn open
-2.9 + 0.2 = 3.1-in pulley diameter when pulley closed one turn from full open

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 can be used in this system. Gauge set, hoses, and recovery system must be designed to handle Puron refrigerant. If unsure about equipment, consult the equipment manufacturer.

⚠ 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.

Condenser Coils Size D08-D14

All 48TC units are available with Round Tube/Plate Fin (RTPF) coil construction. 48TC units with size designations D08, D12 and D14 are also available with optional all-aluminum Novation coil construction. Check position 11 on the unit's infomative data plate for coil construction code, then refer to Model Nomenclature on page 5 to confirm this unit's coil construction type.

Novation (MCHX) Condenser Coil

The condenser coil uses new NOVATION® Heat Exchanger Technology or Microchannel Heat Exchanger. Coil (MCHX). This is an all-aluminum construction with louvered fins over single-depth crosstubes. The crosstubes have multiple small passages (microchannels) through which the refrigerant passes from header to header on each end. Tubes and fins are made of aluminum. Connection tube joints are made of copper. The coil can be one-row or two-row. Two-row coils are spaced apart to assist in cleaning. See Fig. 14.

Routine Cleaning of NOVATION Condenser Coil Surfaces

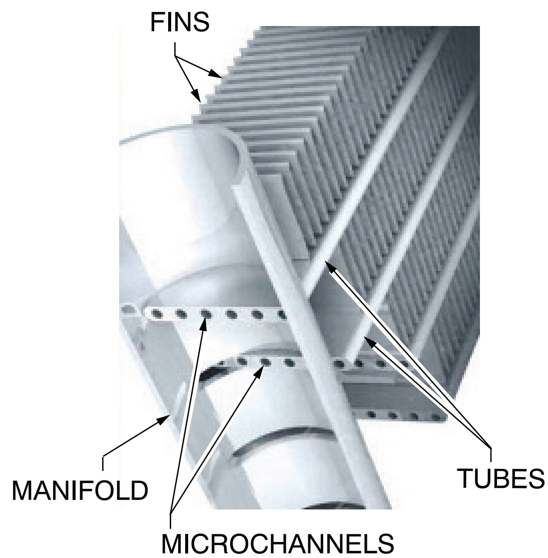
DO NOT clean the NOVATION condenser coil with chemicals. ONLY water is approved as the cleaning solution. Only clean potable water is authorized for cleaning NOVATION condensers. Carefully remove any foreign objects or debris attached to the coil face or trapped within the mounting frame and brackets. Using a high pressure water sprayer, purge any soap or industrial cleaners from hose and/or dilution tank prior to wetting the coil.

⚠ WARNING

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 operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.



C07273B

Fig. 14 - Novation (Microchannel) Coil

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution can result in equipment damage.

DO NOT use Totaline® environmentally sound coil cleaner on the aluminum NOVATION condenser. Damage to the coil can occur. Only clean potable water is authorized for cleaning.

> **⚠ WARNING**
>
> **UNIT OPERATION AND SAFETY HAZARD**
>
> Failure to follow this warning could cause personal injury, death.
>
> Using a high pressure washer (900 psig - 6205 kPa) to clean coils can cause severe injury or death if spray is aimed at service personnel. Do not use a high pressure washer to clean hands and do not direct spray in direction of eyes or other tissue.

Round Tube Plate Fin (RTPF) Condenser Coil

The condenser coil is fabricated with round tube copper hairpins and plate fins of various materials and/or coatings The coil can 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.

Recommended Condenser Coil Maintenance and Cleaning

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

Remove Surface Loaded Fibers

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

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

Periodic Clean Water Rinse

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

Routine Cleaning of Coil Surfaces

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

Avoid use of:

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

Totaline environmentally sound coil cleaner is nonflammable, hypo allergenic, non bacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

One-Row Coil (A04 - A07, B04 only)

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

Two-Row and Three-Row Coils (D08 - D16)

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. 15. To hold top panel open, place coil corner post between top panel and center post. See Fig. 16.

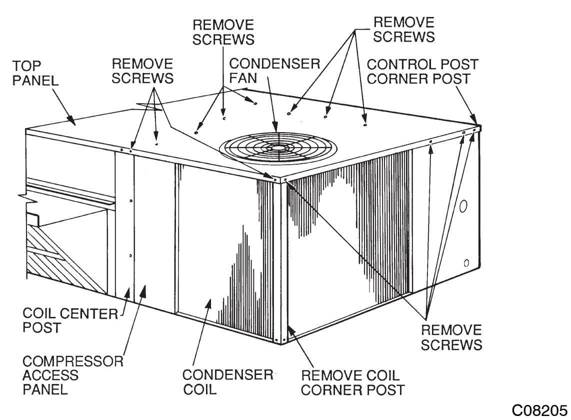


Fig. 15 - Cleaning Condenser Coil

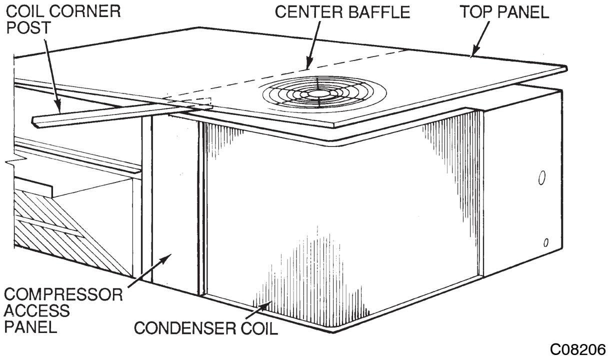


Fig. 16 - Propping Up Top Panel

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 to 4 in. from the inner coil section. See Fig. 17.

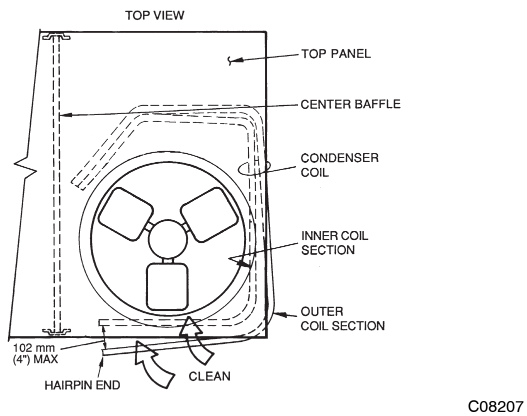


Fig. 17 - Separating Coil Sections

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.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

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

⚠ CAUTION

UNIT DAMAGE HAZARD

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

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

Totaline Environmentally Sound Coil Cleaner Application Equipment

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

Totaline Environmentally Sound Coil Cleaner Application Instructions

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

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

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

Evaporator Coil

Cleaning the Evaporator Coil

1. Turn unit power off. Install lockout tag. Remove evaporator coil access panel.

2. If economizer or two-position damper is installed, remove economizer by disconnecting Molex plug and removing mounting screws.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized garden sprayer. Wash both sides of coil and flush with clean water. For best results, back-flush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

Evaporator Coil Metering Devices

Three different evaporator coil metering systems are used on 48TC sizes 04-16. All units without Humidimizer option use the Acutrol system for evaporator metering. On sizes 04-14 with Humidimizer option, the Acutrol system is used for normal cooling and a series combination of TXV-Acutrol is used in Humidimizer modes. On size 16 with Humidimizer option, the Acutrol system is replaced by a TXV-distributor system; TXV metering is used in all modes. See Fig. 18.

Unit Size	Humidimizer	Evaporator Metering
04−14	NO	Acutrol
04−14	YES	Acutrol + TXV
16	NO	Acutrol
16	YES	TXV

Check this unit's informative data plate for Position 6 value, then compare this value to Model Nomenclature on page 5 to confirm this unit's construction.

The metering devices are multiple fixed-bore devices (Acutrol™) swedged into the horizontal outlet tubes from the liquid header, located at the entrance to each evaporator coil circuit path. These are non-adjustable. Service requires replacing the entire liquid header assembly.

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

THERMOSTATIC EXPANSION VALVE (TXV)

All 48TC units equipped with Humidi-MiZer option include TXV control. On sizes 04-14, the TXV is located in the liquid line between the Reheat Coil and the standard Evaporator Coil (equipped with Acutrol devices). On size 16 units equipped with the Humidi-MiZer option, each evaporator circuit is equipped with a TXV-distributor system; no Acutrols are included.

TXV Operation

The TXV is a metering device that is used in air conditioning systems to adjust to the changing load conditions by maintaining a preset superheat temperature at the outlet of the evaporator coil. See Fig. 20.

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

1. Superheat temperature is sensed by the cap tube sensing bulb on suction the tube at the 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 needle valve on the pin carrier is spring loaded, exerting pressure on the underside of the diaphragm. Therefore, the bulb pressure equals the evaporator pressure (at the outlet of the coil) plus the spring pressure. If the evaporator load increases, the temperature increases at the bulb, which increases the pressure on the topside of the diaphragm, pushing the carrier away from the seat, opening the valve and increasing the flow of refrigerant. The increased refrigerant flow causes increased leaving evaporator pressure which is transferred through the equalizer tube to the underside of the diaphragm. This causes the pin carrier spring pressure to close the TXV valve. The refrigerant flow is effectively stabilized to the load demand with a negligible change in superheat.

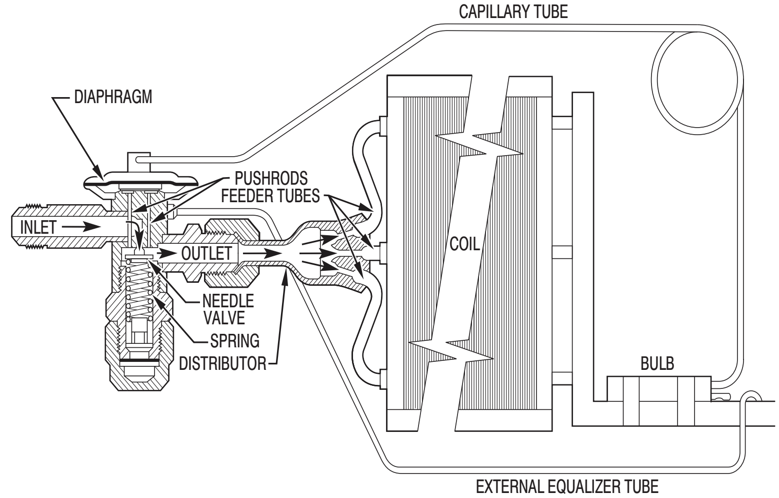


Fig. 18 - Thermostatic Expansion Valve (TXV) Operation

Replacing TXV

⚠ CAUTION

PERSONAL INJURY HAZARD

Failure to follow this caution can result in injury to personnel and damage to components..

Always wear approved safety glasses, work gloves and other recommended Personal Protective Equipment (PPE) when working with refrigerants.

1. Disconnect all AC power to unit. Use approved lockout/tagout procedures.
2. Using gauge set approved for use with Puron (R-410A) refrigerant, recover all refrigerant from the system..
3. Remove TXV support clamp.
4. Disconnect the liquid line at the TXV inlet.
5. Remove the TXV from the distributor.
6. Remove equalizer tube from suction line of coil. Use tubing cutter to cut brazed equalizer line approximately 2-inches (50 mm) above the suction tube.
7. Remove bulb from vapor tube above the evaporator coil header outlet.
8. Install the new TXV avoiding damage to the tubing or the valve when attaching the TXV to the distributor. Protect the TXV against over-temperature conditions y using wet rags and directing the torch flame tip away from the TXV body. Connect the liquid line to the TXV inlet by repeating the above process.
9. Route equalizer tube through suction connection opening (large hole) in fitting panel and install fitting panel in place.
10. Attach the equalizer tube to the suction line. If the replacement TXV has a flare nut on its equalizer line, use a tubing cutter to remove the mechanical flare nut from the equalizer. Then use a coupling to braze the equalizer line to the stub (previous equalizer line) in the suction line.
11. Attach TXV bulb in the same location as the original (in the sensing bulb indent). See Fig. 20.
12. Wrap the bulb in protective insulation and secure using the supplied bulb clamp. See Fig. 19.

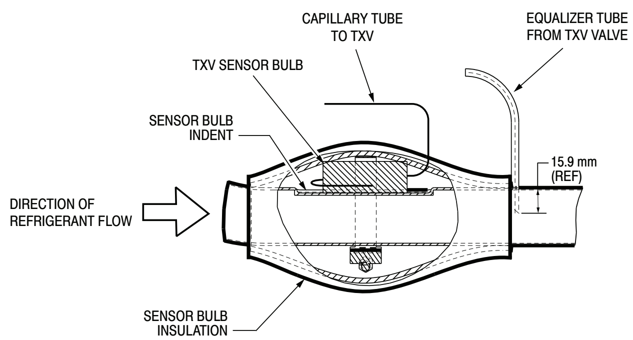
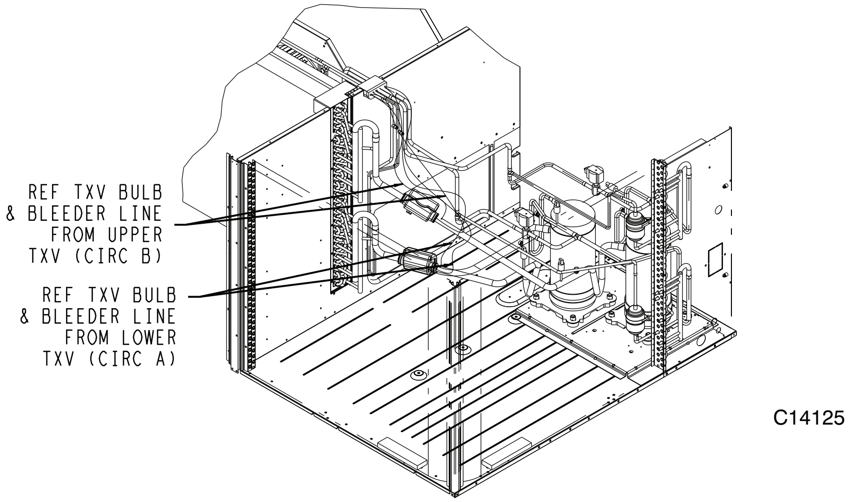
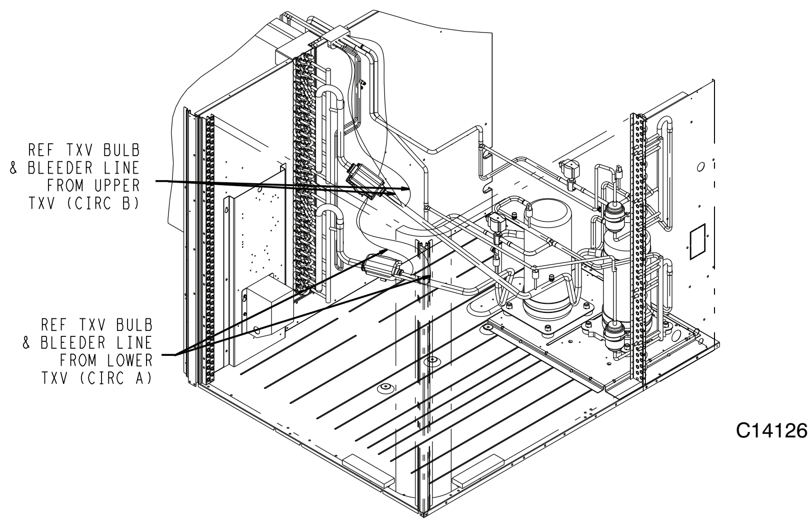


Fig. 19 - TXV Sensor Bulb Insulation

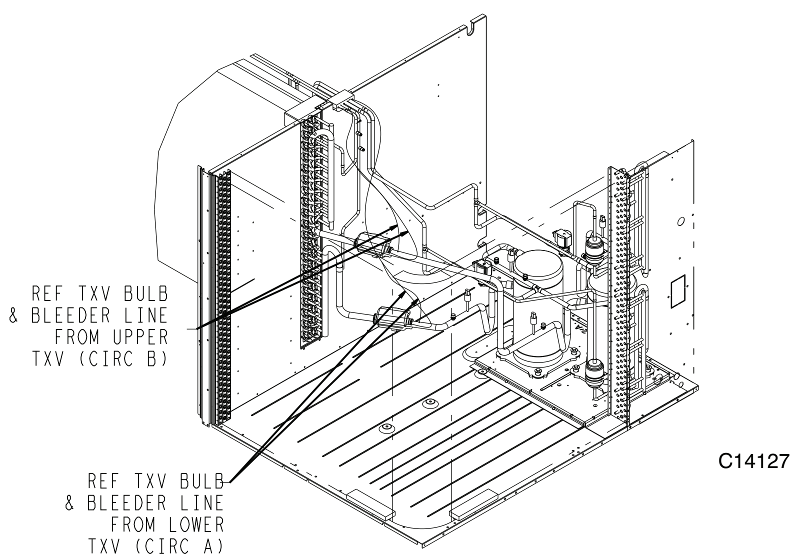
13. Sweat the inlet of TXV marked “IN” to the liquid line. Avoid excessive heat which could damage the TXV valve.
14. Check for leaks.
15. Evacuate system completely and then recharge by weight without powering on the compressor.
16. Remove lockout/tagout on main power switch and restore power to unit.
17. Complete charging procedure.



48TC 7.5 TON 2 COMP REHEAT



48TC 8.5, 10 TON 2 COMP REHEAT



48TC 12.5 TON 2 COMP REHEAT

48TM49900105 P

C14128

Fig. 20 - TXV Sensor Bulb Locations

48TC

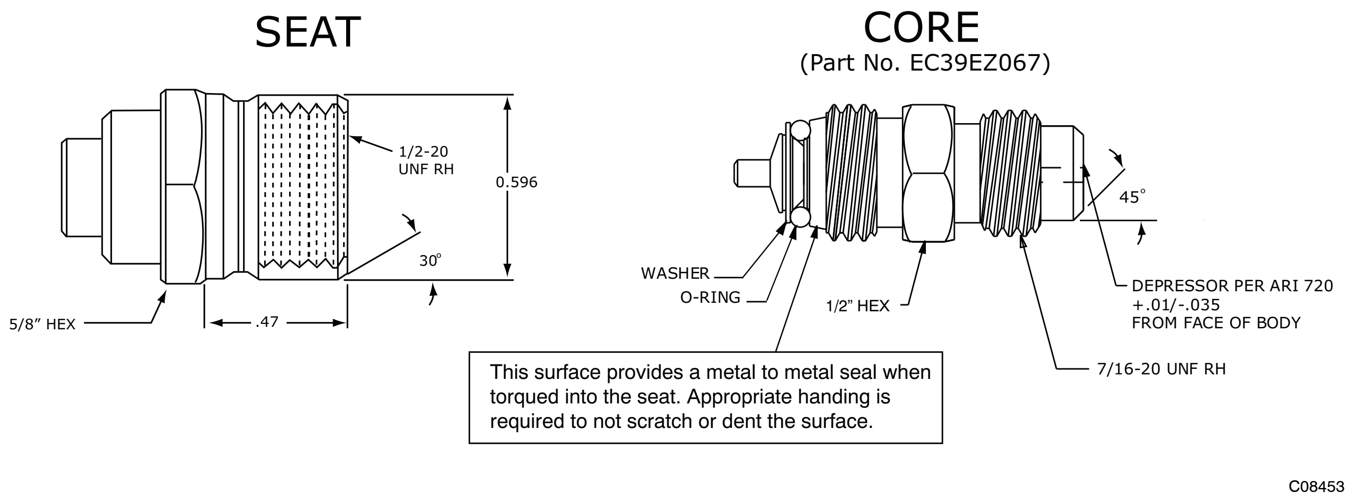


Fig. 21 – CoreMax Access Port Assembly

48TC

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 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. 21.

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 allowing 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–lbs of torque; do not overtighten.

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 gauge manifold; remove liquid from the cylinder, pass it through the metering device at the gauge 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.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

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

No Charge

Use standard evacuating techniques. Evacuate system down to 500 microns and let set for 10 minutes to determine if system has a refrigerant leak. If evacuation level raises to 1100 microns and stabilizes, the system has moisture in it and should be dehydrated per GTAC2–5.

If system continues to rise above 1100 microns, the system has a leak and should be pressurized and leak tested using appropriate techniques as explained in GTAC2–5. After evacuating system, weigh in the specified amount of refrigerant as listed on the unit rating plate.

Low-Charge Cooling

Unit charging charts are used to diagnose and correct incomplete (undercharged) conditions (and overcharged conditions). The unit charging chart specific to this unit is attached to the unit's compressor access panel.

Model 48TC units use two types of charging charts; one type for Base Cooling systems and a different type for most units equipped with Humidi-MiZer systems. Check your unit's info plate to confirm this unit's Model Number and value in Position 6. A Position 6 value of A or D indicates a unit with a base cooling system; see section below for information on using these charts. A Position 6 value of B or E indicates a unit with Humidi-MiZer system; skip to the Humidi-MiZer section below for information on charging these systems.

SIZE DESIGNATION	NOMINAL TONS REFERENCE
04	3
05	4
06	5
07	6
08	7.5
09	8.5
12	10
14	12.5
16	15

EXAMPLE:

Model 48TC*A04

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

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

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

Units with Base Cooling Systems (Position 6 = A or D)

Charging charts for base cooling units (using Acutrol refrigerant metering devices) are based on charging the units to the correct superheat for the various operating conditions. See Tables 2-4 for unit specific charging chart figures.

NOTE: Unit size D14 has two charging charts, based on outdoor coil type installed in this unit. Check the unit infoplate for the value in Position 11, then select the appropriate figures in Table 3.

Accurate pressure gauge and temperature sensing meter(s) are required. Connect the pressure gauge to the service port on the suction line. Mount one temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Locate the second temperature device (thermometer or meter second channel sensor) in front of the largest face on the outdoor coil to measure entering air temperature. Indoor-air flowrate (cfm) must be within the normal operating range of the unit. If a Motormaster head pressure control is on the unit, the output must be jumpered to provide full speed operation on all outdoor fans.

READING THE CHART (EXAMPLE):

Model 48TC*A04

Outdoor Temperature . . . . 85°F (29°C)
Suction Pressure . . . . 140psig (965 kPa
Suction Temperature should be . . . . . 60°F (16°C)

Using the Base Cooling Charging Charts

Read the suction pressure gauge; record the pressure. Read the outdoor ambient temperature and the suction line temperature. Refer to unit chart to determine what suction temperature should be and compare to test reading. If the test suction temperature is higher than the chart value, add refrigerant. If test suction temperature is lower than chart value, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

Alternate method: Plot the test suction temperature (using the X-axis) and test suction pressure (using the Y-axis) on the unit charging chart. Locate the curve for the outdoor ambient temperature. If the plotted test condition point is to the right/below the outdoor ambient temperature curve, add refrigerant. If the plotted test condition is to the left/above the outdoor ambient temperature curve, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted.

Allow the unit to operate for approximately five minutes, then recheck conditions against the charging chart. Repeat the charge adjustment procedure until the plotted test condition falls on the appropriate outdoor ambient charging curve.

When charging procedure is completed, remove the jumper on the Motormaster control if used.

Units with Humidi-Mizer Adaptive Dehumidification System (Model Number Position 6 or B or E)

Charging charts for Humidi-MiZer units except sizes E08-E14 are based on charging the units to the correct liquid temperature for the current discharge pressure condition. Unit sizes E08-E14 use the Base Cooling unit charging charts but with a modified procedure. See instructions below. See Tables 4 (sizes 04-07) and Table 3 (sizes 08-16) for unit specific charging chart figures.

To Use the Cooling Charging Charts, Units with Humidi-Mizer

NOTE: 48TC units equipped with Humidi-MiZer option include a Low Temperature Lockout temperature switch (LTLO) that will prevent operation in Reheat1 or Reheat2 modes at outdoor temperature below 40°F (4.4°C). At outdoor temperature below 40°F (4.4°C), perform charge check using only Cooling mode operation and use the standard cooling charging charts per Tables 2 and 3. Return to site when the temperature is above 45°F (7.2°C) to complete charge checks requiring unit operation in Reheat1 or Reheat2 modes.

48TC

Sizes B04-B07

Refer to charts (Fig. 36-39) to determine the proper leaving condenser liquid temperature at the test condition compressor discharge pressure.

Accurate pressure gauge and temperature sensing meter are required. Connect the pressure gauge to the service port on the discharge line. Mount the temperature sensing device on the liquid line leaving the outdoor coil and insulate it so that outdoor ambient temperature does not affect the reading.

Example (Fig. 36):

Unit B04

Compressor Discharge Pressure 370psig (2550kPA)
Leaving Condenser Liquid Temperature 105°F (40.6°C)

NOTE: When using these Humidi-MiZer charging charts, it is important that the system be operating in Reheat1 mode: cooling thermostat in demand, humidistat in demand. The subcooling/reheat dehumidification coil liquid line solenoid vavle MUST be energized to use the charging charts and the discharge gas reheat solenoid valve must be de-energized (valve closed). The outdoor motor speed controller must be jumpered to run the fan at full speed during charge checking.

Bypass 32LT Motormaster

32LT controller is mounted on a bracket attached to unit base pan beneath the main control box. To bypass the 32LT and run the outdoor fan at full speed:

1. Disconnect power to unit.
2. Remove the 32LT cover to access the splice box.
3. Locate the two line connections with BLK wires.
4. Separate both 32LT BLK leads from control box BLK wire and the BLK wire from OFM.
5. Splice the control box BLK wire to the OFM wire.
6. Restore power to unit.

When the charge check/adjustment procedure is complete, restore the 32LT function by disconnecting unit power, then reversing steps 5 through 2 above, concluding with replacing and securing the 32LT cover. Restore power to the unit.

Charge check and adjustment

Read the discharge pressure gauge; record the pressure. Read the liquid line temperature. Plot the test discharge pressure (using the X-axis) and test liquid temperature (using the Y-axis) on the unit charging chart. If the plotted test condition point is to the left/above the charging curve, add refrigerant. If the plotted test condition is to the right/below the charging curve, carefully recover some of the charge.

Allow the unit to operate in Reheat1 mode for approximately five minutes, then recheck conditions against the charging chart. Repeat the charge adjustment procedure until the plotted test condition falls on the charging curve.

When charging procedure is completed, remove the bypass wiring on the Motormaster control. Readjust the cooling thermostat setting and the humidistat setting to appropriate design setpoints.

Sizes E08-E14

Unit sizes E08 through E14 (two circuit designs) use the same charging chart and general method as discussed above under Base Cooling Units. See Fig. 30-34. During the charge adjustment step, the unit will be run in the Cooling mode; thermostat will be Cool demand, humidistat will be open for no demand. The standard Motormaster head pressure control device will be jumpered to operate all fans at full speed.

Bypass Motormaster Controllers Unit sizes E08-E12

32LT controller is mounted on a bracket attached to unit base pan beneath the main control box. To bypass the 32LT and run both outdoor fans at full speed:

1. Disconnect power to unit.
2. Remove the 32LT cover to access the splice box.
3. Locate the two line connections with BLK wires.
4. Separate both 32LT BLK leads from control box BLK wire and the two BLK wires from OFM1 and OFM2.
5. Splice the control box BLK wire to the two OFM wires.
6. Restore power to unit.

When the charge check/adjustment procedure is complete, restore the 32LT function by disconnecting unit power, then reversing steps 5 through 2 above, concluding with replacing and securing the 32LT cover. Restore power to the unit.

Unit Size E14

Motormaster V (VFD-based) controller provides head pressure control on the size E14 unit. The controller is mounted inside the blower compartment, on the wall to left of blower. Bypassing this controller requires the fabrication of a resistor-wire assembly consisting of a 10k ohm (1/2-watt) resistor and two 20-18 ga. wire leads.

To bypass the Motormaster V and run the outdoor fan at full speed:

1. Disconnect unit power. Lockout/tag-out.
2. Remove MM-V cover to expose the controller terminal strip.
3. Disconnect the Pressure Transducer input wires at terminals 2, 5 and 6.
4. Connect the resistor-wire assembly at terminals 5 and 6. See Fig. 22.
5. Replace cover on MM-V.
6. Check for clearances around the blower and belt.
7. Restore power to unit.

When the charge check/adjustment procedure is complete, restore the Motormaster V function by disconnecting unit power, then reversing steps 5 through 2 above. See Fig. 22

For Pressure Transducer wiring. Replace and secure the controller cover. Check for clearances around the blower and belt. Restore power to the unit.

Charge check and adjustment

Accurate pressure gauge and temperature sensing meter are required. Connect the pressure gauge to the service port on the discharge line. Mount the temperature sensing device on the liquid line leaving the outdoor coil and insulate it so that outdoor ambient temperature does not affect the reading.

Adjust the humidistat setting to highest setpoint possible (no demand). Start/run the unit in base Cooling mode. Check and adjust unit charge for each circuit.

When the test operating conditions for suction line temperature and suction pressure coincide with the current ambient temperature line, switch the unit to Reheat1 mode by adjusting the humidistat setting to a low setpoint. Check that each circuit's CLV is energized and valves are closed. After five minutes of operation in Reheat1 mode, return to Cooling mode by readjusting the humidistat setting to high. Recheck each circuit's charge condition; re-adjust charge if necessary.

When charging procedure is completed, remove the bypass wiring on the Motormaster control. Readjust the cooling thermostat setting and the humidistat setting to appropriate design setpoints.

Size E16

Unit size E16 (two circuit design with TXVs) uses the liquid temperature/discharge pressure charging method. See Fig. 36 to determine the proper leaving condenser liquid temperature at the test condition compressor discharge pressure. During the charge adjustment step, the unit will be run in the Cooling mode; thermostat will be in Cool demand, humidistat will be open for no demand. The standard Motormaster head pressure control device will be bypassed to operate outdoor fan motors OFM1 and OFM2 at full speed. If outdoor temperature is low (causing Low Ambient Staging switch LAS to open), a jumper will be required to energize OFM3.

Accurate pressure gauge and temperature sensing meter are required for each circuit. Connect the pressure gauge to the service port on the discharge line. Mount the temperature sensing device on the liquid line leaving the outdoor coil and insulate it so that outdoor ambient temperature does not affect the reading. Confirm the location of Circuit 1 and Circuit 2 tube locations.

Example (Fig. 36):
Unit E16 Circuit 1
Compressor Discharge Pressure . . 350 psig (2415 kPA)
Leaving Condenser Liquid Temperature . . 95F (34.4C)

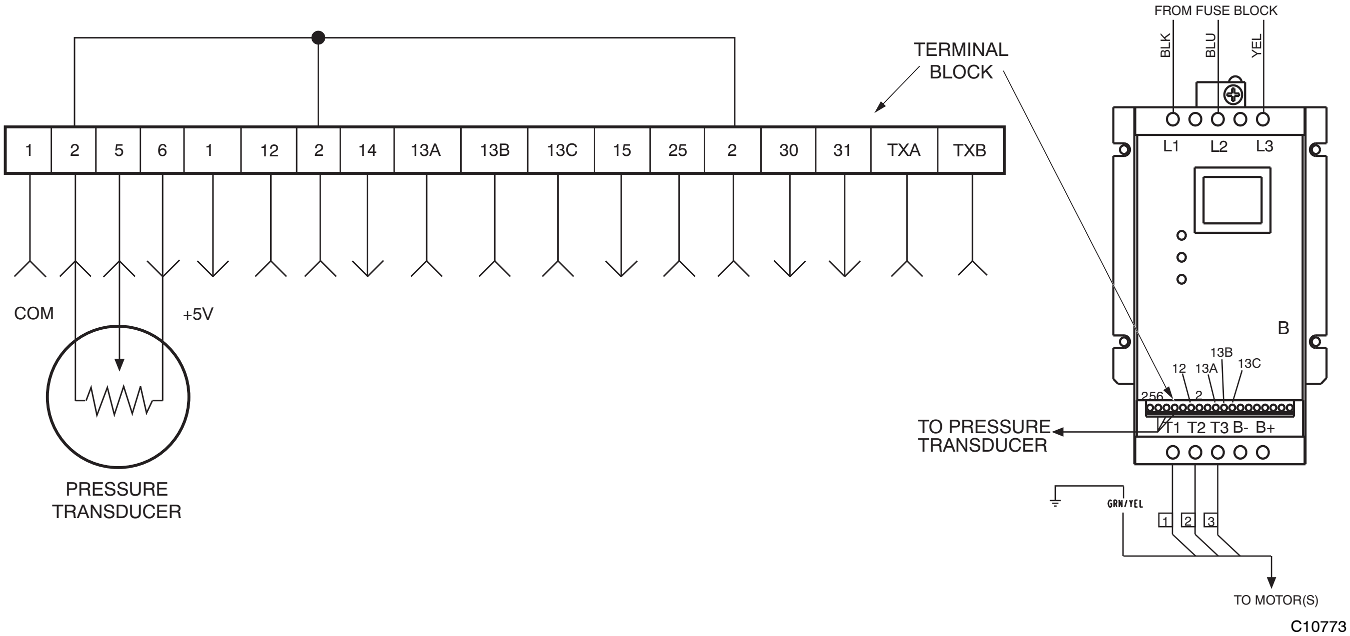


Fig. 22 - MM-V Bypass Conns PT Conns

Bypass Motormaster Controller and LAS

To bypass the 32LT and run outdoor fan motors OFM1 and OFM2 at full speed:

1. Disconnect power to unit.
2. At terminal block TB2-1, disconnect the BLK wire from the 32LT Speed Control device. See Fig. ?“E16”.
3. Fabricate a jumper wire to connect TB2-1 to relay OFR terminal 6.
4. Fabricate a jumper wire to connect TB2-1 to TB2-2.
5. Restore power to unit.
6. On restart, confirm all three outdoor fans are running at full speed.

When the charge check/adjustment procedure is complete, restore the 32LT and fan staging functions by disconnecting unit power, then reversing steps 4 through 2 above. Restore power to the unit.

Charge check and adjustment

Adjust the humidistat setting to highest setpoint possible (no demand). Start/run the unit in base Cooling mode. Check and adjust unit charge for each circuit.

Read the discharge pressure gauge; record the pressure. Read the liquid line temperature. Plot the test discharge pressure (using the X-axis) and test liquid temperature (using the Y-axis) on the unit charging chart. If the plotted test condition point is to the left/above the charging curve, add refrigerant. If the plotted test condition is to the right/below the charging curve, carefully recover some of the charge.

Allow the unit to operate in Cooling mode for approximately five minutes, then recheck conditions against the charging chart. Repeat the charge adjustment procedure until the plotted test condition falls on the charging curve.

Change unit mode to Reheat2. Adjust the humidistat to lowest possible setting, then adjust the thermostat to a high setting until there is no demand on Y1. Allow the unit to operate in Reheat2 mode for approximately five minutes, then return the unit to Cooling mode. Recheck conditions against the charging chart. If charge adjustment is necessary, then repeat the steps in this paragraph until no charge adjustment is necessary. When no more charge adjustment is necessary after switching from Reheat2 mode back to Cooling mode, then charge adjustment procedure is complete.

When charging procedure is completed, remove the bypass wiring on the Motormaster control. Readjust the cooling thermostat setting and the humidistat setting to appropriate design setpoints.

COOLING CHARGING CHARTS

Table 2 – Single Compressor
Position 6 = A

Unit Size	Reference Tons	Fig. No.	Figure Title	Source Drw Nbr -- Rev
04	3 Tons	23	Charging Chart, 48TC Size A04	48TM500231 Rev 3.0
05	4 Tons	24	Charging Chart, 48TC Size A05	48TM500232 Rev 3.0
06	5 Tons	25	Charging Chart, 48TC Size A06	48TM500233 Rev 3.0
07	6 Tons	26	Charging Chart, 48TC Size A07	48TM500234 Rev 3.0
08	7.5 Tons	27	Charging Chart, 48TC Size A08	48TM500885 Rev 3.0
09	8.5 Tons	28	Charging Chart, 48TC Size A09	48TM500886 Rev 3.0
12	10 Tons	29	Charging Chart, 48TC Size A12	48TM500887 Rev 3.0

Table 3 – Two Compressor Models
Position 6 = D or E

Unit Size	Reference Tons	Fig. No.	Figure Title	Source Drw Nbr – Rev
08	7.5 Tons	30	Charging Chart, 48TC Size D,E08	48TM501445 Rev 3.0
09	8.5 Tons	31	Charging Chart, 48TC Size D,E09	48TM502362 Rev 2.0
12	10 Tons	32	Charging Chart, 48TC Size D,E12	48TM501446 Rev 3.0
14	12.5 Tons	33	Charging Chart, 48TC Size D,E14 With Round Tube Plate Fin Coil (Position 11 = A B,C,D,E,F,M,N,P,Q,R,S)	RT 48TM502601 Rev A
		34	Charging Chart, 48TC Size D14 With NOVATION Coil (Position 11 = G,H,J,K,L,T,U,V,W,X)	MC 48TM501842 Rev 2
16	15 Tons	35	Charging Chart, 48TC Size D16	50TM501081 Rev A
			Charging Chart, 48TC Size E16 Humidi-MiZer	50TM501081 Rev. A

Table 4 – Single Compressor with Humidi-Mizer
Position 6 = B

Unit Size	Reference Tons	Fig. No.	Figure Title	Source Drw Nbr -- Rev
04	3 Tons	36	Charging Chart, 48TC Size B04 Humidi-MiZer in Reheat1	48TM501619 Rev 02
05	4 Tons	37	Charging Chart, 48TC Size B05 Humidi-MiZer in Reheat1	48TM501865 Rev 02
06	5 Tons	38	Charging Chart, 48TC Size B06 Humidi-MiZer in Reheat1	48TM501866 Rev 02
07	6 Tons	39	Charging Chart, 48TC Size B07 Humidi-MiZer in Reheat1	48TM501867 Rev 02

COOLING CHARGING CHARTS

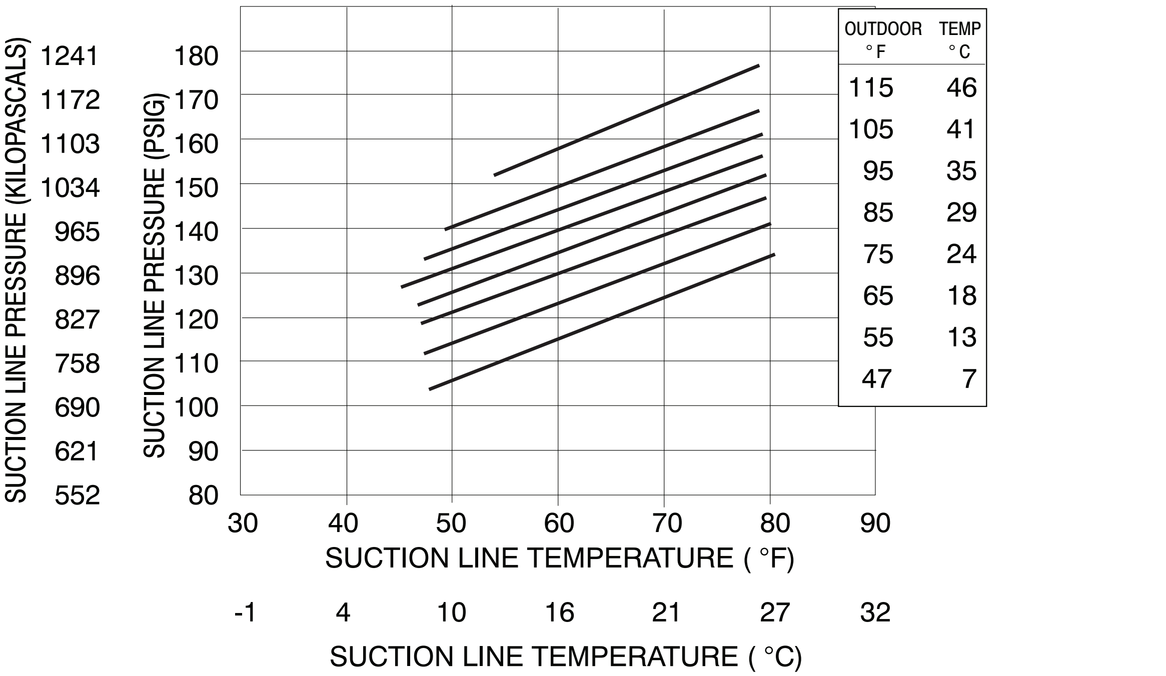


Fig. 23 - Charging Chart, 48TC Size A04

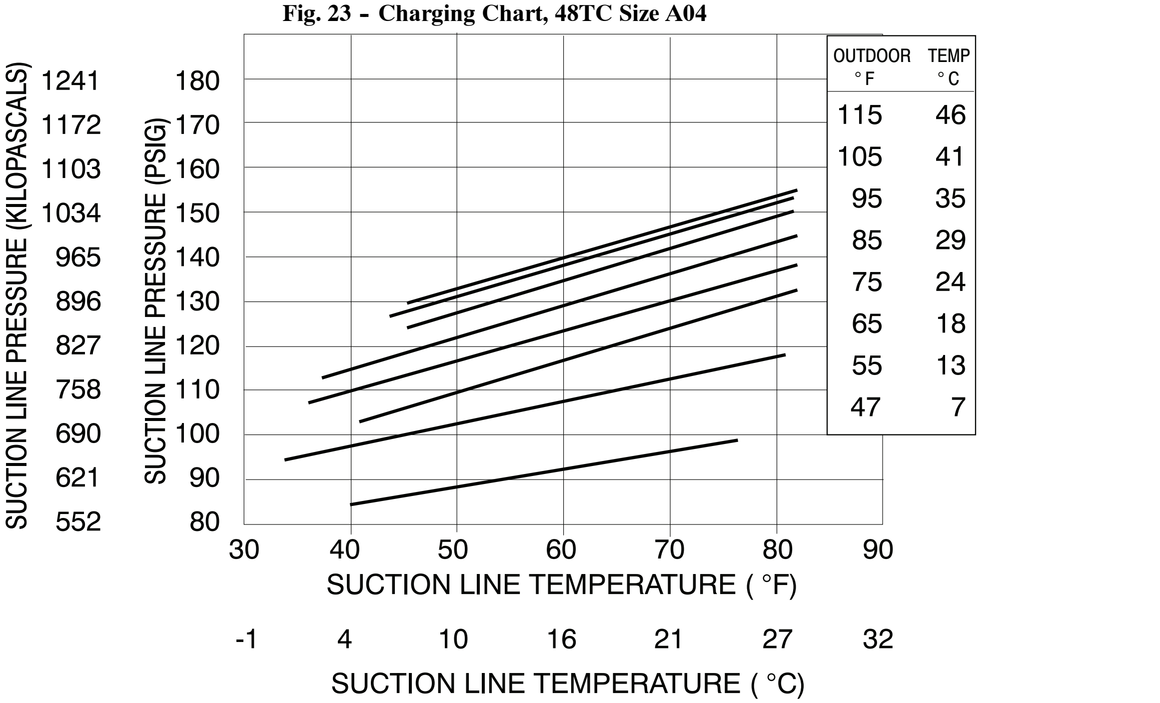


Fig. 24 - Charging Chart, 48TC Size A05

48TC

COOLING CHARGING CHARTS (cont.)

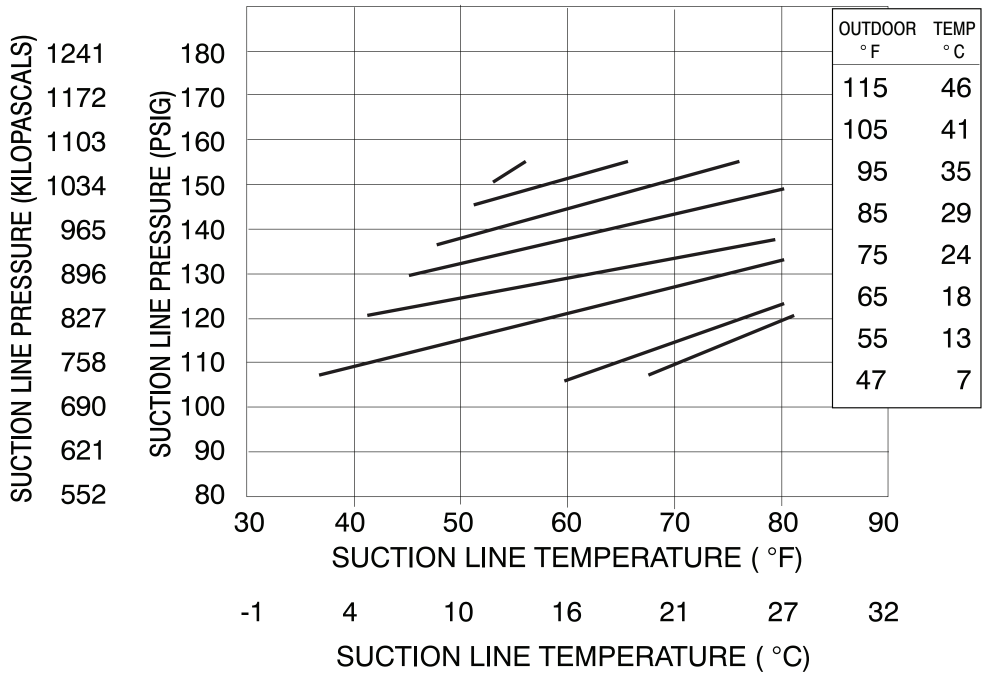


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Fig. 25 - Charging Chart, 48TC Size A06

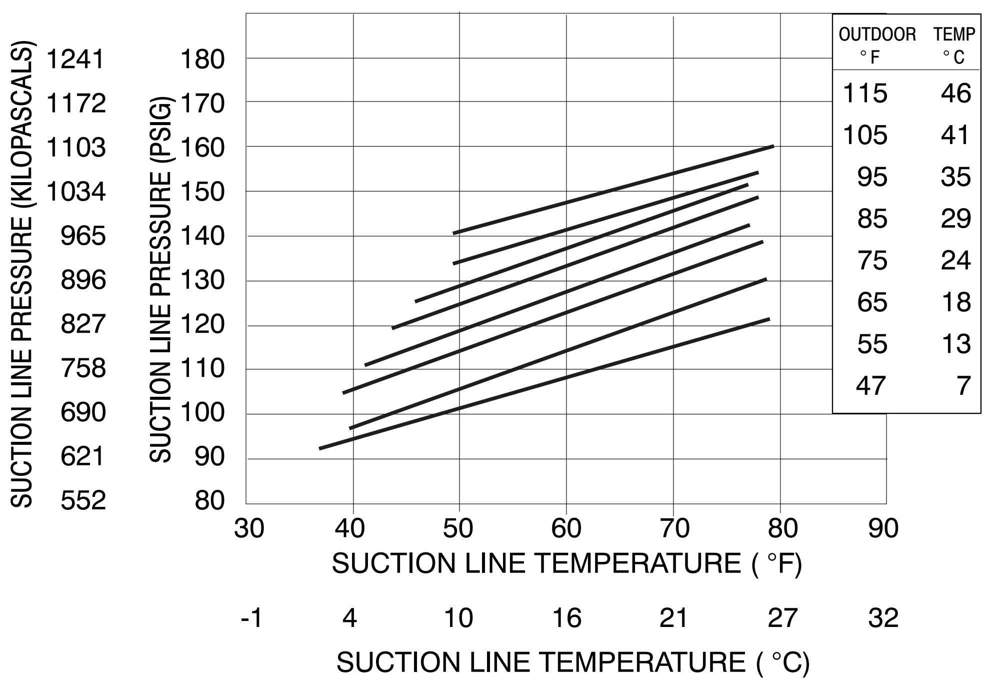

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Fig. 26 - Charging Chart, 48TC Size A07

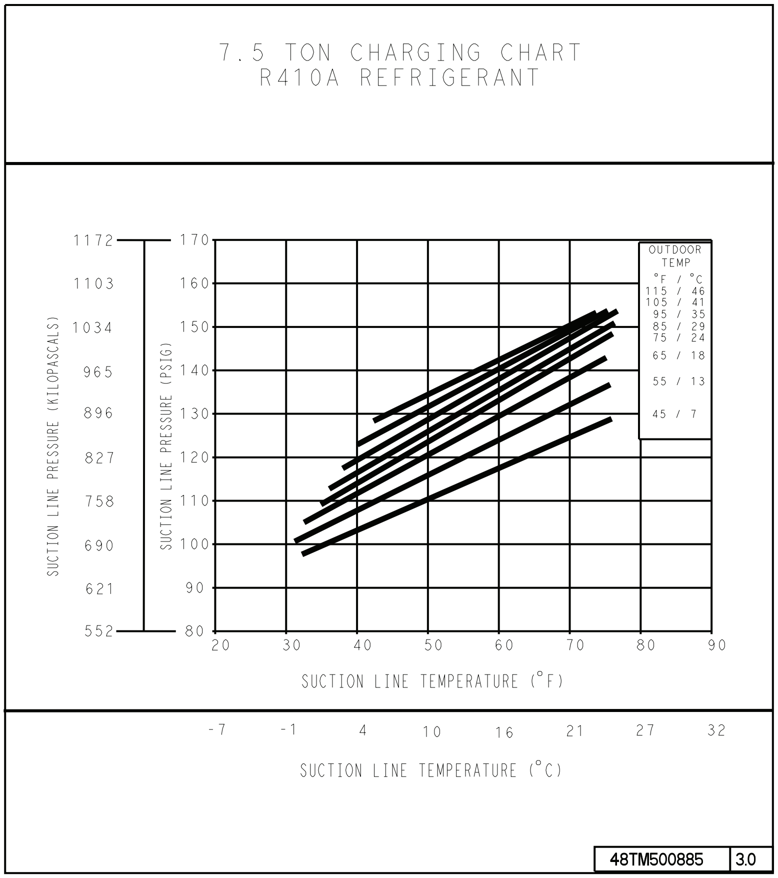

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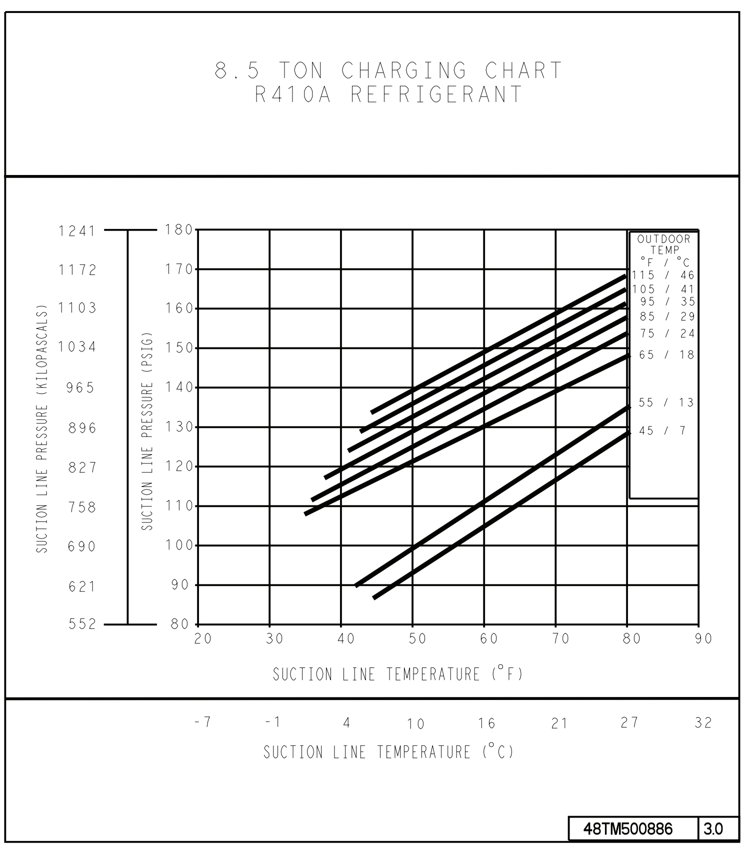
Fig. 27 - Charging Chart, 48TC Size A08



C13221

Fig. 28 - Charging Chart, 48TC Size A09

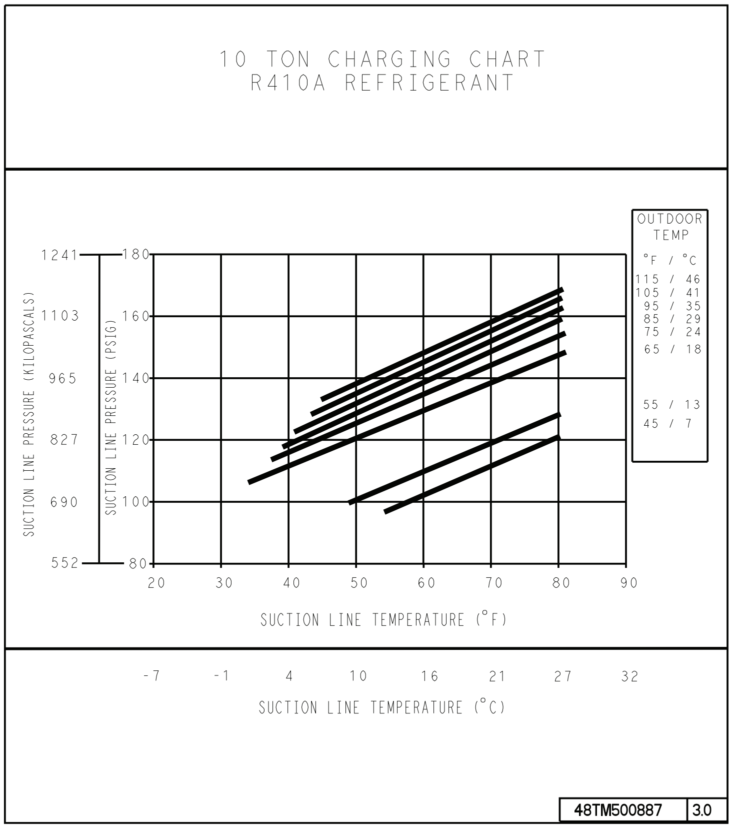


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Fig. 29 - Charging Chart, 48TC Size A12

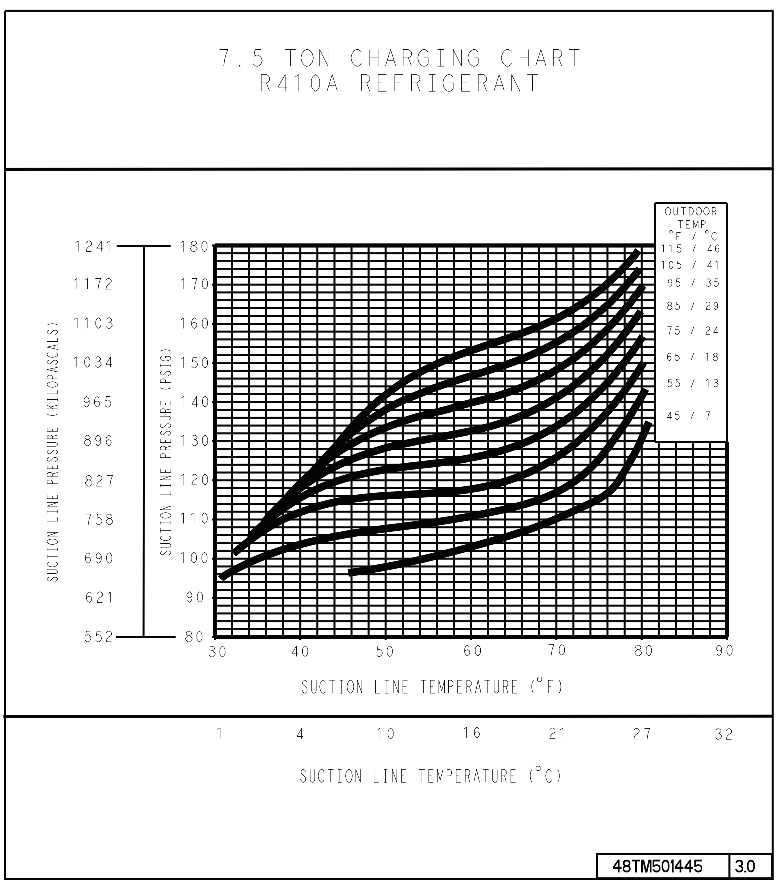

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Fig. 30 - Charging Chart, 48TC Size D,E 08

COOLING CHARGING CHARTS (cont.)

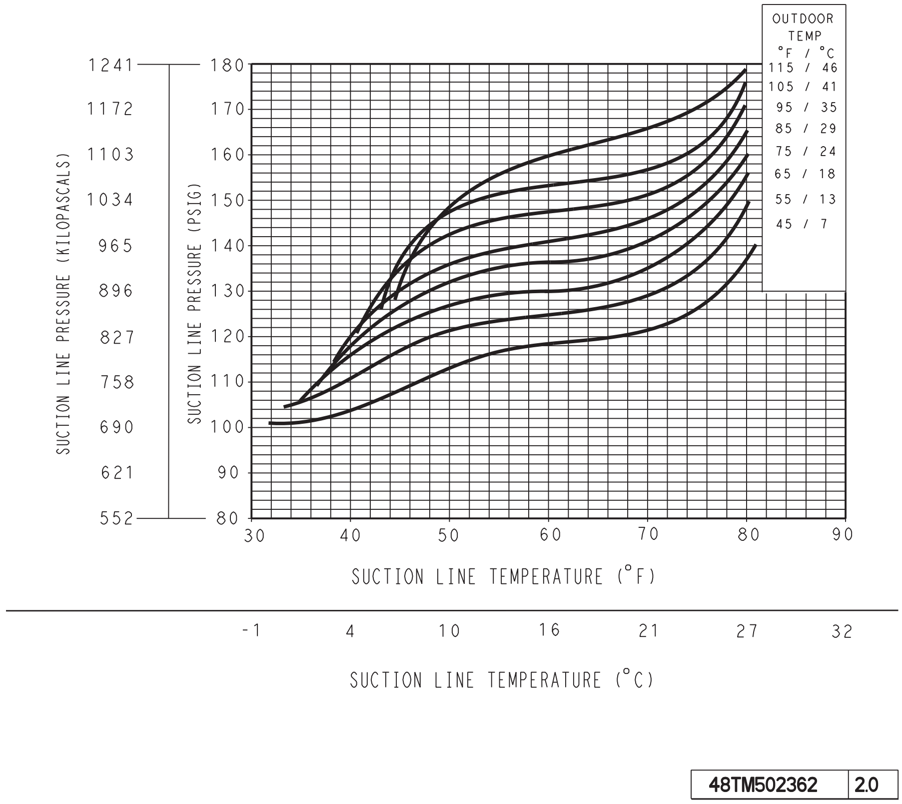

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Fig. 31 - Charging Chart, 48TC Size D, E 09

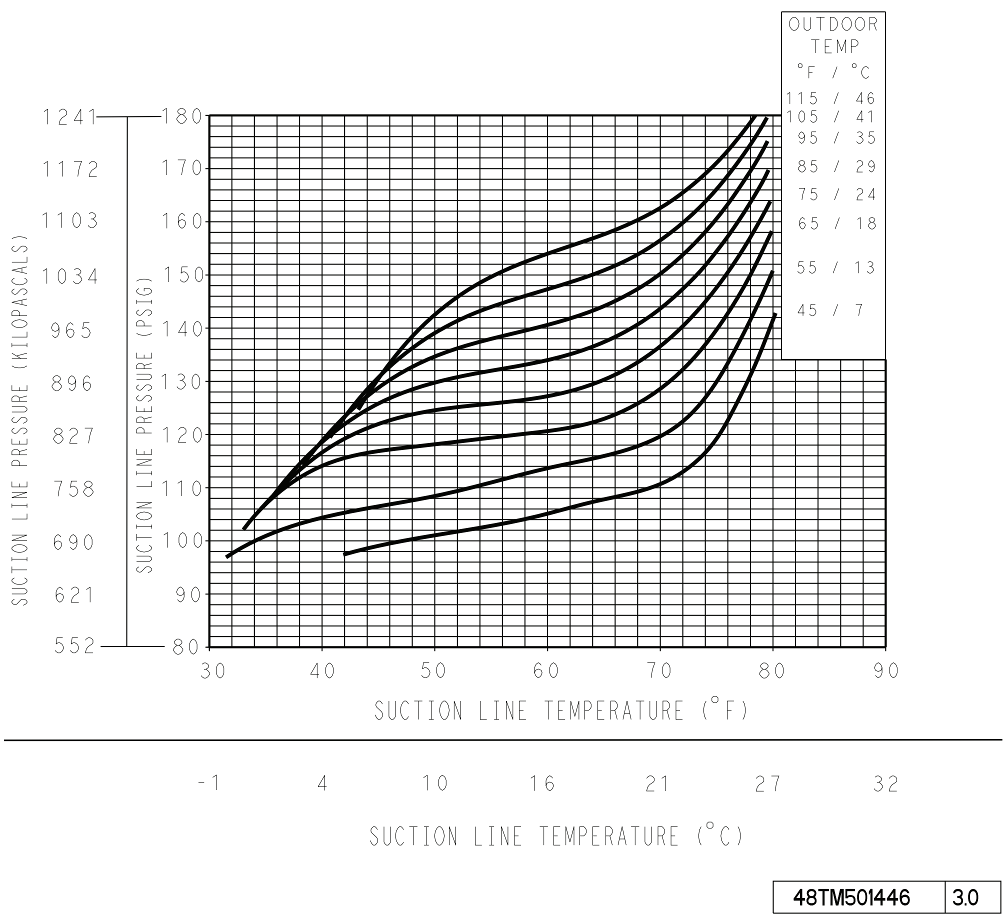

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Fig. 32 - Charging Chart, 48TC Size D, E 12

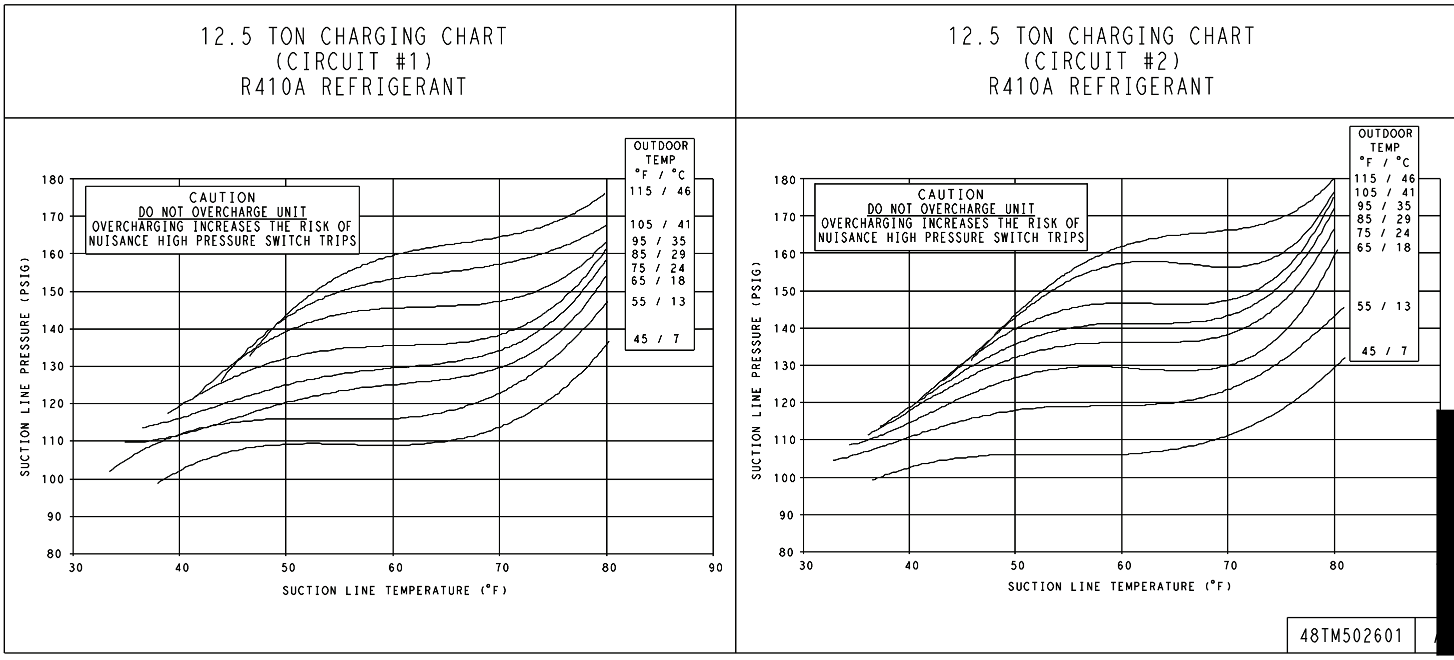

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Fig. 33 - Cooling Charging Charts (12.5 Ton)

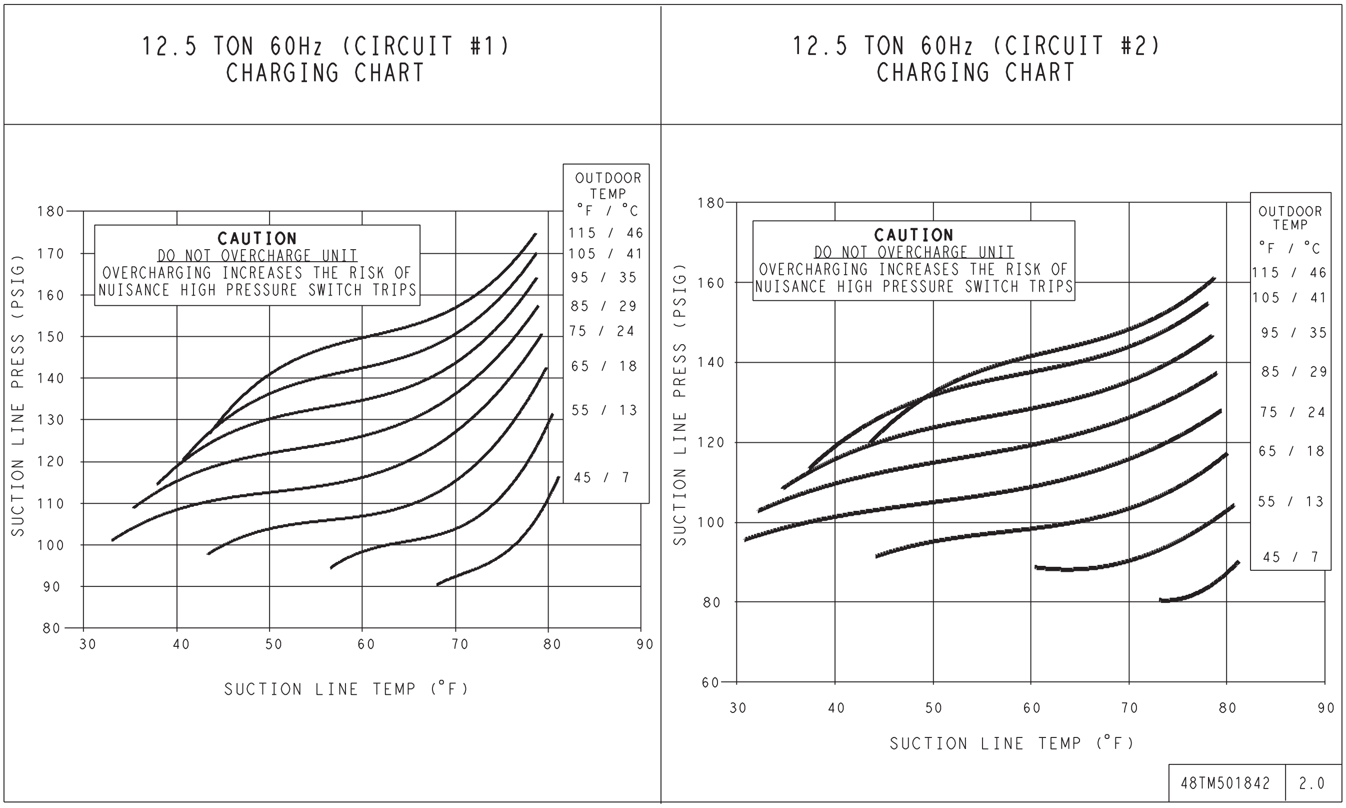

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Fig. 34 - Charging Chart, 48TC Size D14 with Novation Coil

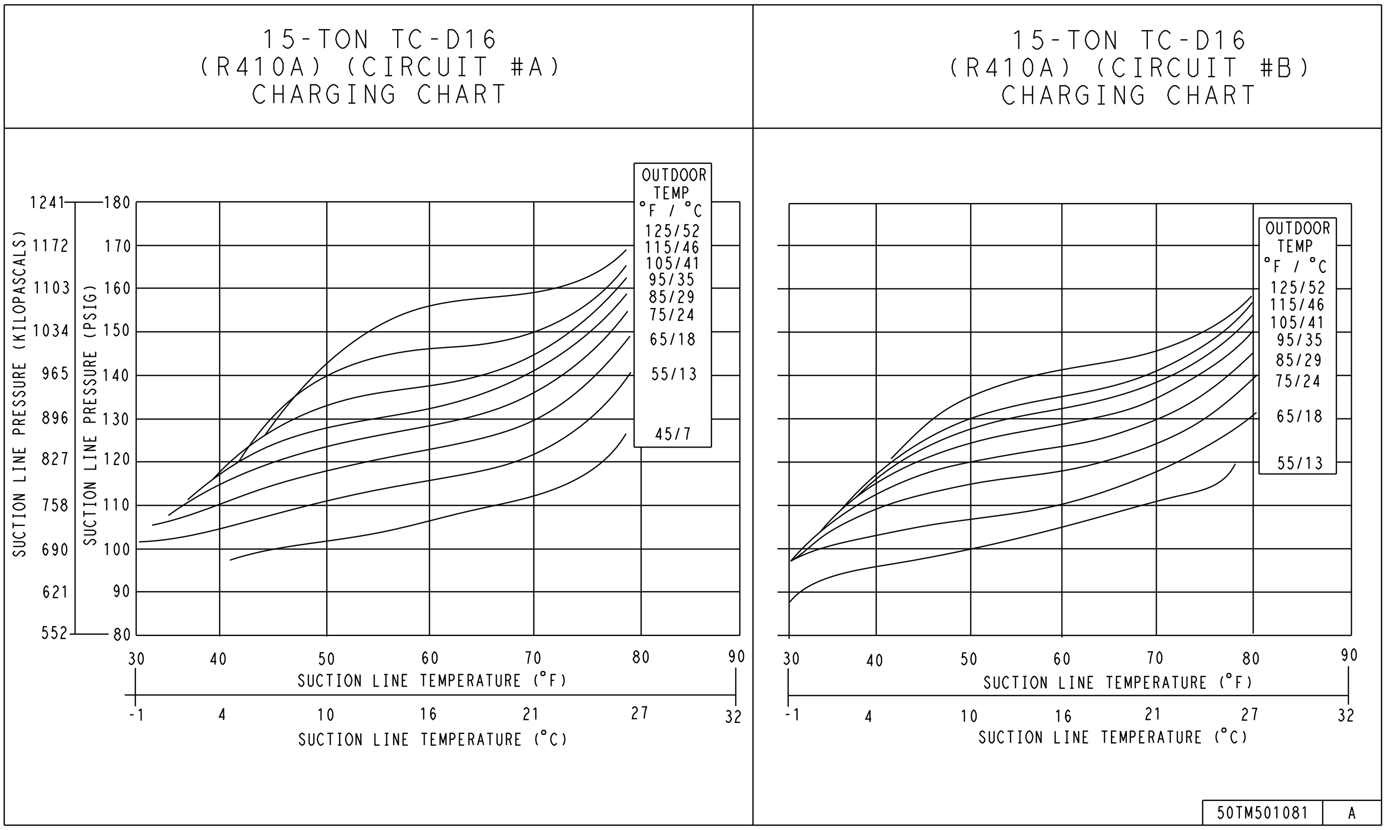

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Fig. 35 - Charging Chart, 48TC Size D16

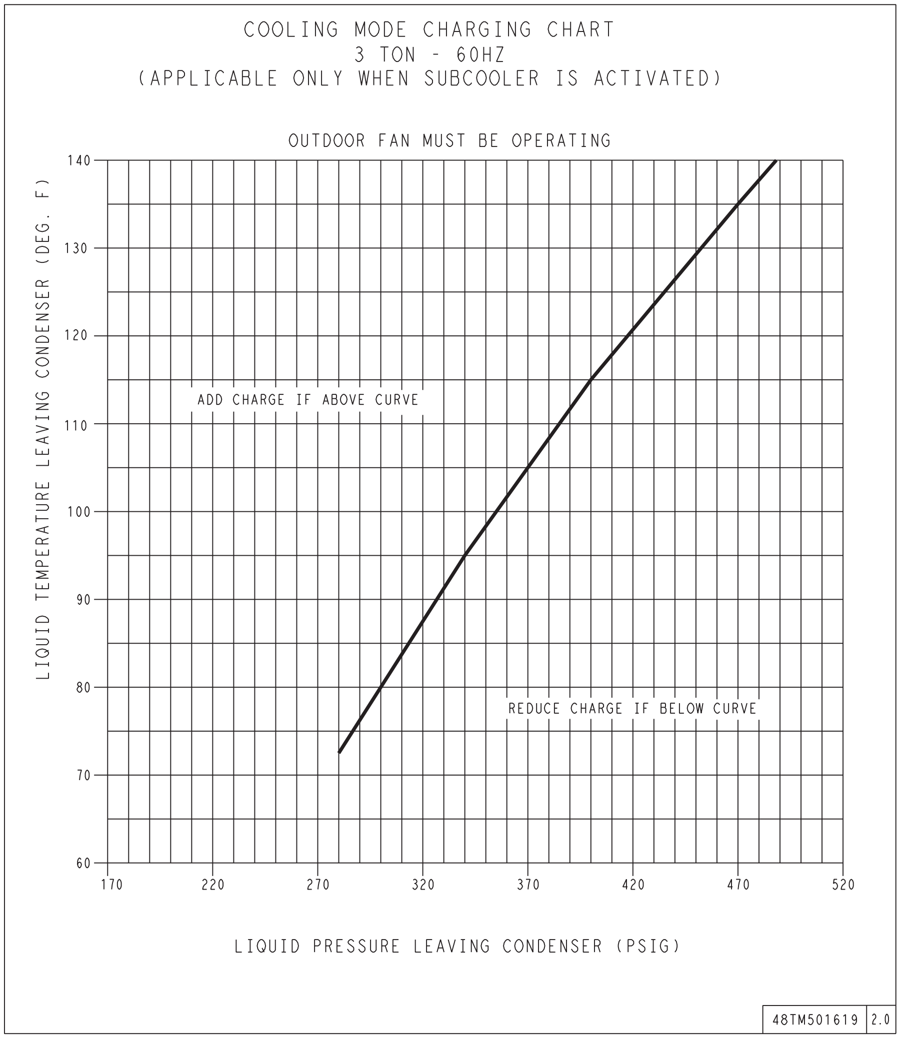

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Fig. 36 - Charging Chart, 48TC Size B04 Humidi-MiZer in Reheat 1

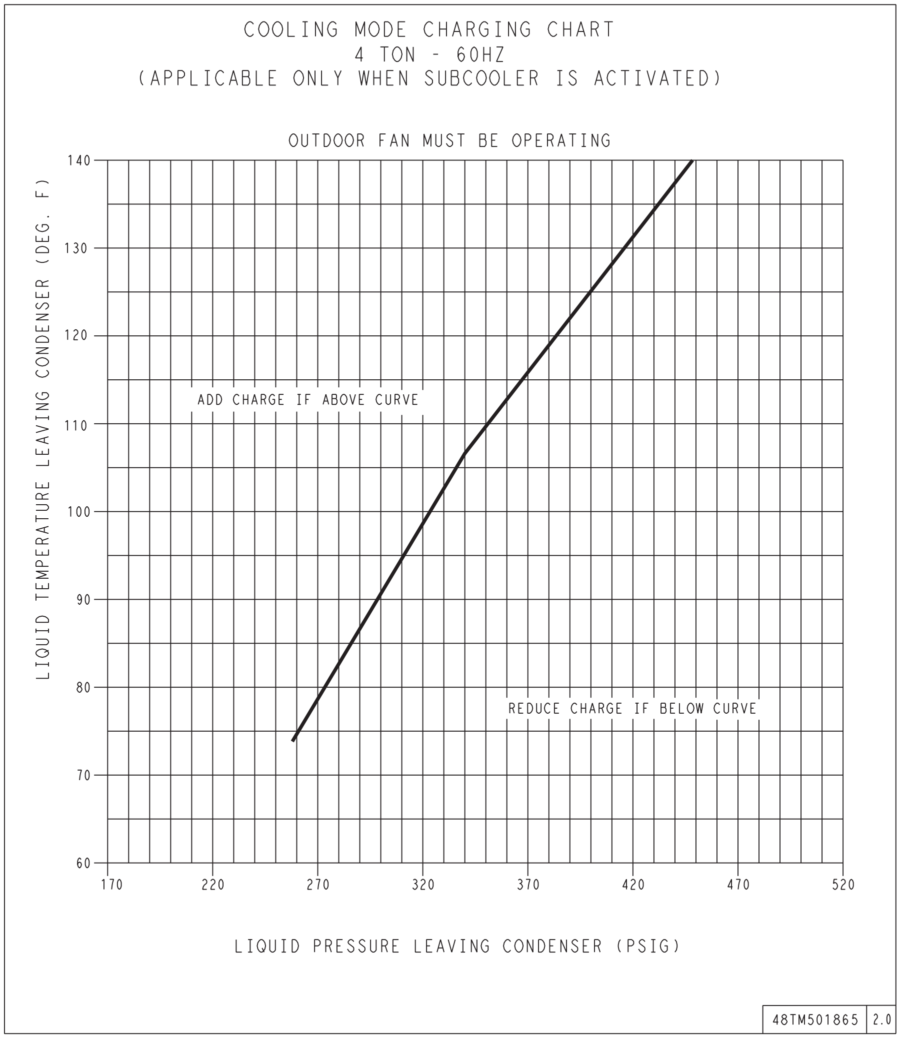

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Fig. 37 - Charging Chart, 48TC Size B05 Humidi-MiZer in Reheat 1

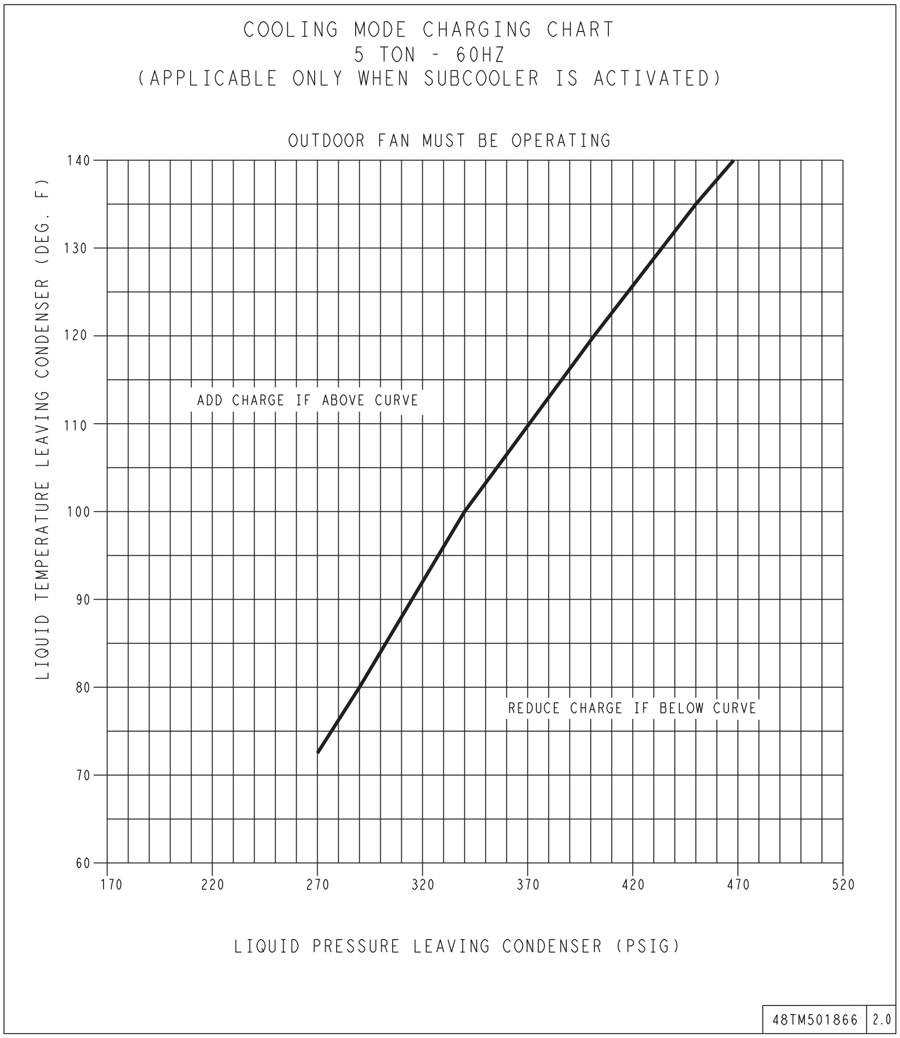

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Fig. 38 - Charging Chart, 48TC Size B06 Humidi-MiZer in Reheat 1

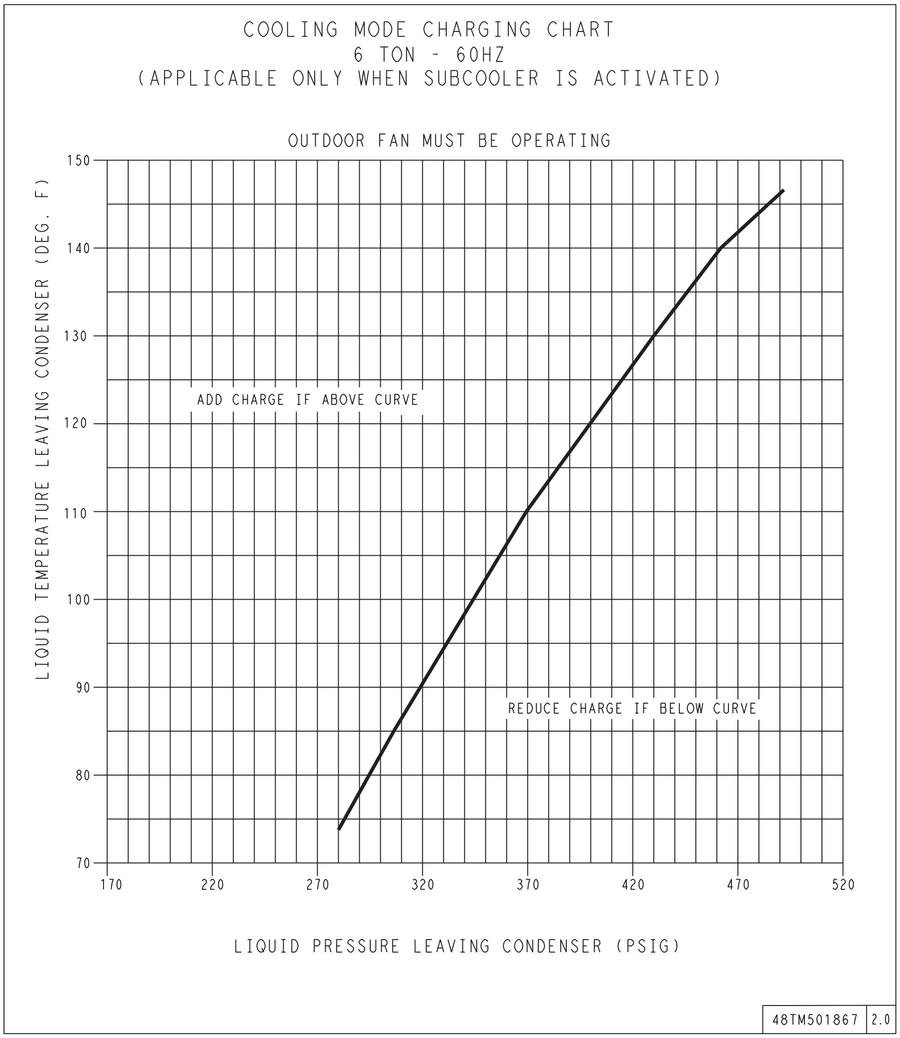

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Fig. 39 - Charging Chart, 48TC Size B07 Humidi-MiZer in Reheat 1

48TC

COMPRESSOR

Lubrication

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

⚠ CAUTION

UNIT DAMAGE HAZARD

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

The compressor is in a Puron® 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.

Compressor Mounting Bolts: Compressor mounting bolts should be periodically inspected for proper tightness. Bolts should be tightened and have the torque set at 65-75 in/lbs (7.3 - 8.5 Nm).

The compressor used with Puron refrigerant contains a POE oil. This oil has a high affinity for moisture. Do not remove the compressor's tube plugs until ready to insert the unit suction and discharge tube ends.

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

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

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

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

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

Filter Drier

Replace the filter drier whenever refrigerant system is exposed to atmosphere. Only use factory specified liquid-line filter driers with working pressures no less than 650 psig (4482 kPa). Do not install a suction-line filter drier in liquid line. A liquid-line filter drier designed for use with Puron (R410) refrigerant and 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. 40.
5. Tighten setscrews 84 in-lbs (9.5 Nm).
6. Replace condenser-fan assembly.

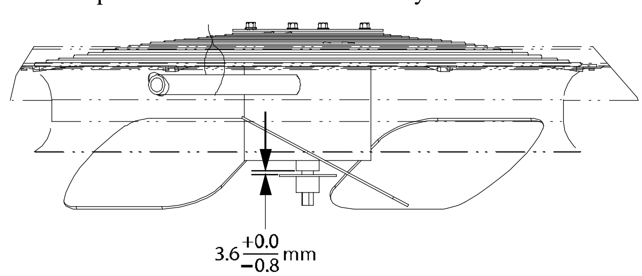

Fig. 40 - Condenser Fan Adjustment

TROUBLESHOOTING COOLING SYSTEM

Refer to Table 5 for Troubleshooting Cooling System topics.

Table 5 – Cooling System Troubleshooting

PROBLEM	CAUSE	REMEDY
Compressor and Condenser Fan Will Not Start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace defective component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor Will Not Start But Condenser Fan Runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace. Tighten loose connections.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, start relay.	Determine cause and replace defective component.
	One leg of three–phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor Cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to to values on nameplate.
	Defective compressor.	Replace defective compressor.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser–fan motor or capacitor.	Replace defective fan motor or capacitor.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor Operates Continuously.	Dirty air filter.	Replace air filter.
	Unit undersized for load.	Decrease load or replace with larger unit.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak; repair and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive Head Pressure.	Dirty air filter.	Replace air filter.
	Dirty condenser coil.	Clean condenser coil.
	Refrigerant overcharged.	Recover excess refrigerant.
	Faulty TXV valve.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV valve and filter drier if stuck open or closed.
	Condenser air restricted or air short–cycling.	Determine cause and correct.
Head Pressure Too Low.	Low refrigerant charge.	Check for leaks; repair and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive Suction Pressure.	High head load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction Pressure Too Low.	Dirty air filter.	Replace air filter.
	Low refrigerant charge.	Check for refrigerant leaks; repair and recharge.
	Faulty TXV valve.	1. Check TXV bulb mounting and secure tightly to suction line and insulate. 2. Replace TXV valve and filter drier if stuck open or closed.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary. Check belt tension on blower.
	Temperature too low in conditioned area.	Reset thermostat.
	Outdoor ambient below 25° F.	Install low–ambient kit.
Evaporator Fan Will Not Shut Off.	Time off delay not finished.	Wait for 30–second off delay.
Compressor Makes Excessive Noise.	Compressor rotating in wrong direction.	Reverse the 3–phase power leads.

CONVENIENCE OUTLETS

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

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

Two types of convenience outlets are offered on 48TC models: Non-powered and unit-powered. Both types provide a 125-volt GFCI (ground-fault circuit-interrupter) duplex receptacle rated at 15-A behind a hinged waterproof access cover, located on the end panel of the unit. See Fig. 41.

Non-powered type: This type requires the field installation of a general-purpose 125-volt 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.

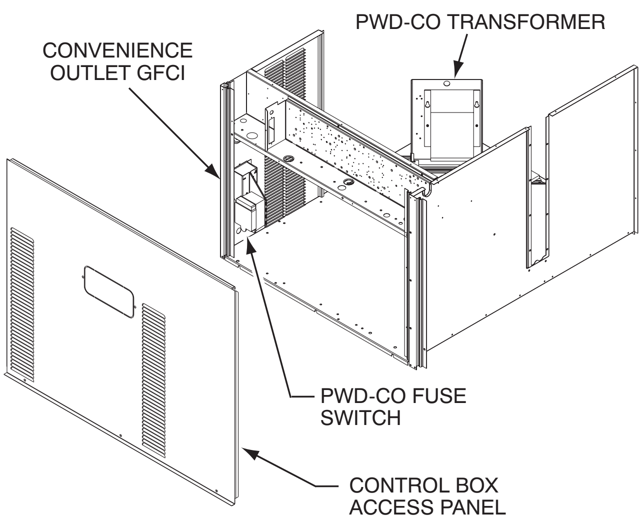

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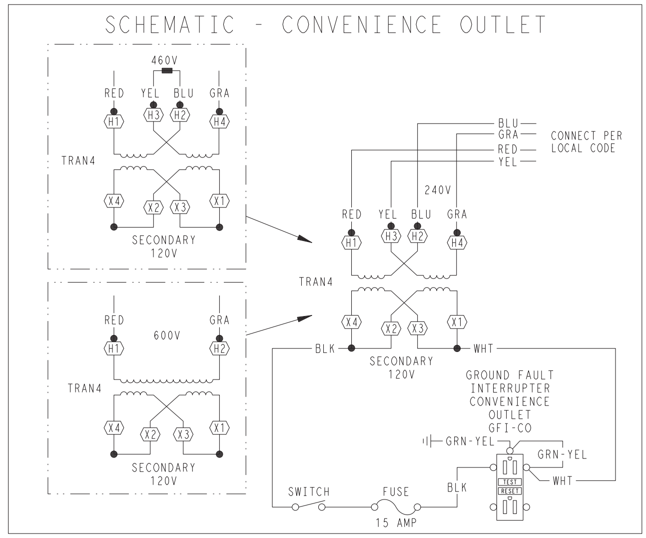
Fig. 41 - Convenience Outlet Location

Unit-powered type: A unit-mounted transformer is factory-installed to stepdown the main power supply voltage to the unit to 115-v at the duplex receptacle. This option also includes a manual switch with fuse, located in a utility box and mounted on a bracket behind the convenience outlet; access is through the unit's control box access panel. See Fig. 41.



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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. 42 - Powered Convenience Outlet Wiring

The primary leads to the convenience outlet transformer are not factory-connected. Selection of primary power source is a customer-option. If local codes permit, the transformer primary leads can be connected at the line-side terminals on a unit-mounted non-fused disconnect or HACR breaker switch; this will provide service power to the unit when the unit disconnect switch or HACR switch is open. Other connection methods will result in the convenience outlet circuit being de-energized when the unit disconnect or HACR switch is open. See Fig. 42.

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

GFCI Maintenance: Periodically test the GFCI receptacle by pressing the TEST button on the face of the receptacle.

1. Press the TEST button on the face of the GFCI receptacle. This should cause the internal GFCI circuit to trip and open the receptacle.
2. Inspect for proper grounding and power line phasing should the GFCI receptacle fail to trip.
3. Repair ground wire connections as needed and correct line phasing.

4. Press the RESET button to clear the tripped condition.

Fuse on powered type: The factory fuse is a Bussman "Fusetron" T-15, non-renewable screw-in (Edison base) type plug fuse.

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

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 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.

⚠ WARNING

ELECTRICAL OPERATION HAZARD

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

Before performing service or maintenance operations on the convenience outlets, LOCK-OUT/TAGOUT all electrical power to the unit.

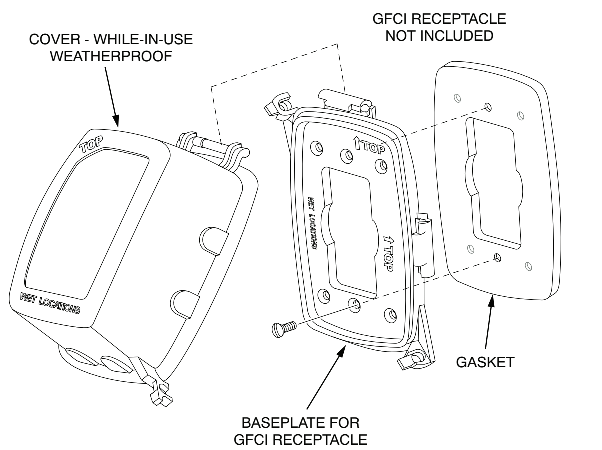

Fig. 43 - Weatherproof Cover Installation

1. Remove the blank cover plate at the convenience outlet. Discard the blank cover.
2. Loosen the two screws at the GFCI duplex outlet, until approximately $^{1}/_{2}$-in (13 mm) under screw heads is exposed.
3. Press the gasket over the screw heads. Slip the backing plate over the screw heads at the keyhole slots and align with the gasket; tighten the two screws until snug. Do not over-tighten.
4. Mount the weatherproof cover to the backing plate as shown in Fig. 43.
5. Remove two slot fillers in the bottom of the cover allowing service tool cords to exit the cover.
6. Check cover installation for full closing and latching.

SMOKE DETECTORS

Smoke detectors are available as factory-installed options on 48TC models. Smoke detectors can be specified for Supply Air only or 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 can be necessary to complete the unit and smoke detector configuration to meet project requirements.

System

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

Controller

The controller, see Fig. 44, includes a controller housing, a printed circuit board, and a clear plastic cover. The controller can be connected to one or two compatible duct smoke sensors. The clear plastic cover is secured to the housing with a single captive screw for easy access to the wiring terminals. The controller has three LEDs (for Power, Trouble and Alarm) and a manual test/reset button (on the cover face).

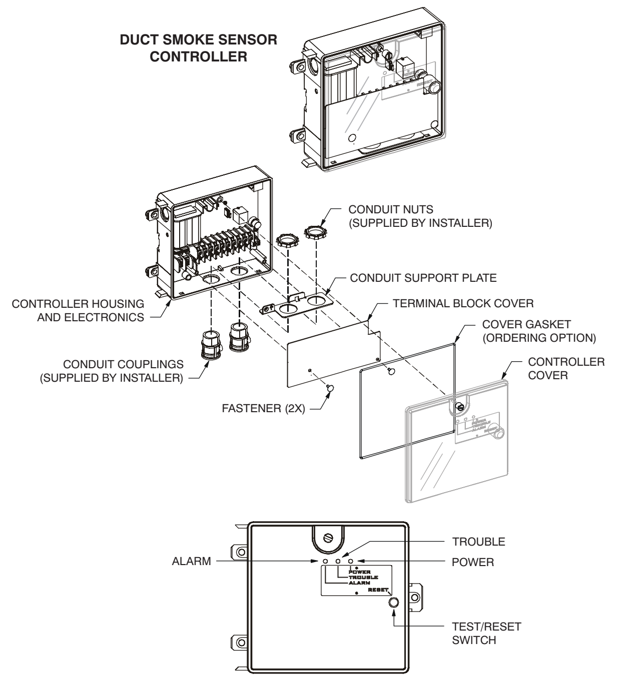

Fig. 44 - Controller Assembly

48TC

Sensor

The sensor, see Fig. 45, 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).

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.

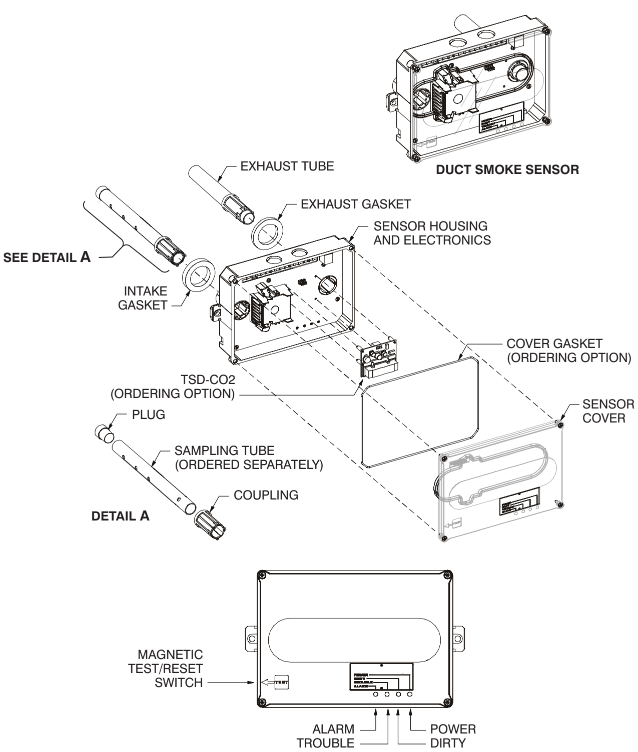

Fig. 45 - Smoke Detector Sensor

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

Smoke Detector Locations

Supply Air — The Supply Air smoke detector sensor is located to the left of the unit's indoor (supply) fan. See Fig. 46. 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.

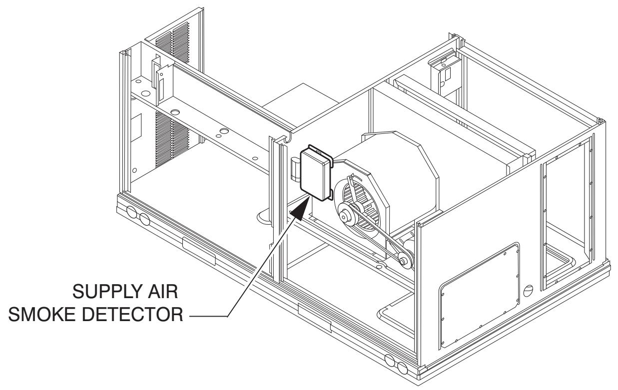

Fig. 46 - Typical Supply Air Smoke Detector Sensor Location

Return Air without Economizer — The sampling tube is located across the return air opening on the unit basepan. See Fig. 47. 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 below.)

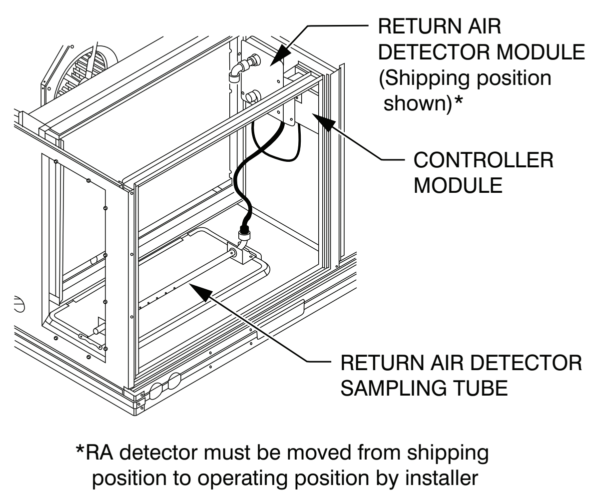

Fig. 47 - Typical Return Air Smoke Detector Location

Return Air with Economizer — The sampling tube is inserted through the side plates of the economizer housing, placing it across the return air opening on the unit basepan. See Fig. 48. 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 below.)

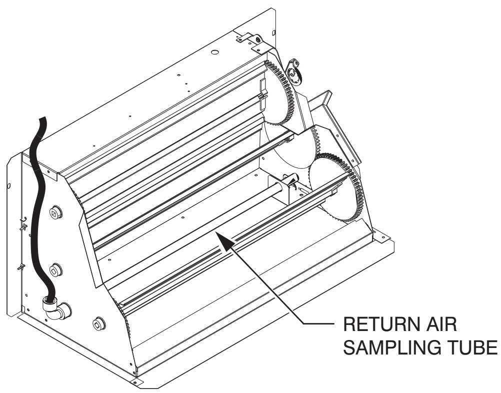

Fig. 48 - Return Air Sampling Tube Location

Completing Installation of Return Air Smoke Sensor:

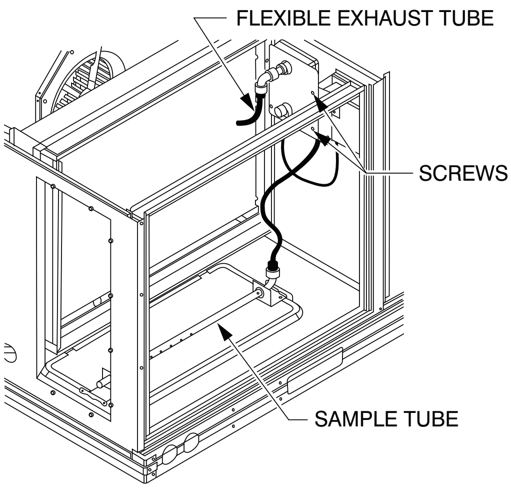

Fig. 49 - Return Air Detector Shipping Position

1. Unscrew the two screws holding the Return Air Sensor detector plate. See Fig. 49. Save the screws.
2. Remove the Return Air Sensor and its detector plate.
3. Rotate the detector plate so the sensor is facing outwards and the sampling tube connection is on the bottom. See Fig. 50.
4. Screw the sensor and detector plate into its operating position using screws from Step 1. Make sure the sampling tube connection is on the bottom and the exhaust tube is on the top. See Fig. 50.
5. Connect the flexible tube on the sampling inlet to the sampling tube on the basepan.
6. For units with an economizer, the sampling tube is integrated into the economizer housing but the connection of the flexible tubing to the sampling tube is the same.

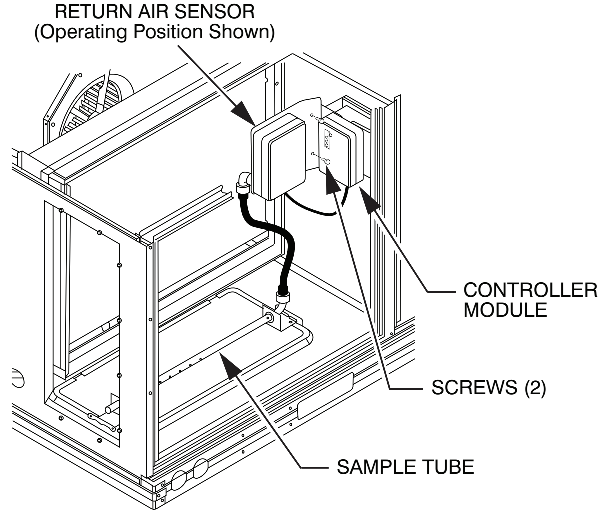

Fig. 50 - Return Air Sensor Operating Position

FIOP Smoke Detector Wiring and Response

All units: FIOP smoke detector is configured to automatically shut down all unit operations when smoke condition is detected. See Fig. 51, Smoke Detector Wiring.

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

Highlight B: Smoke detector AUX1 NC contact set (terminals 6 to 16) will open on smoke alarm condition, de-energizing the ORN conductor.

Highlight C: 24V power signal using the ORN lead is removed at 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 above. In addition:

Highlight D: On smoke alarm condition, the smoke detector AUX1 NO contact will set (terminals 6 to 17) will close, supplying 24 V power to WHT conductor.

Highlight E: WHT lead at Smoke Alarm input on CTB provides 24V 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 Fire Shutdown (FSD) sequence by the PremierLink Controller. FSD status is reported to connected CCN network.

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

Field Use Wires: Six conductors are provided for field use for additional annunciation functions; see Highlight F. See Highlight G for Smoke Detector Alarm and Trouble contacts.

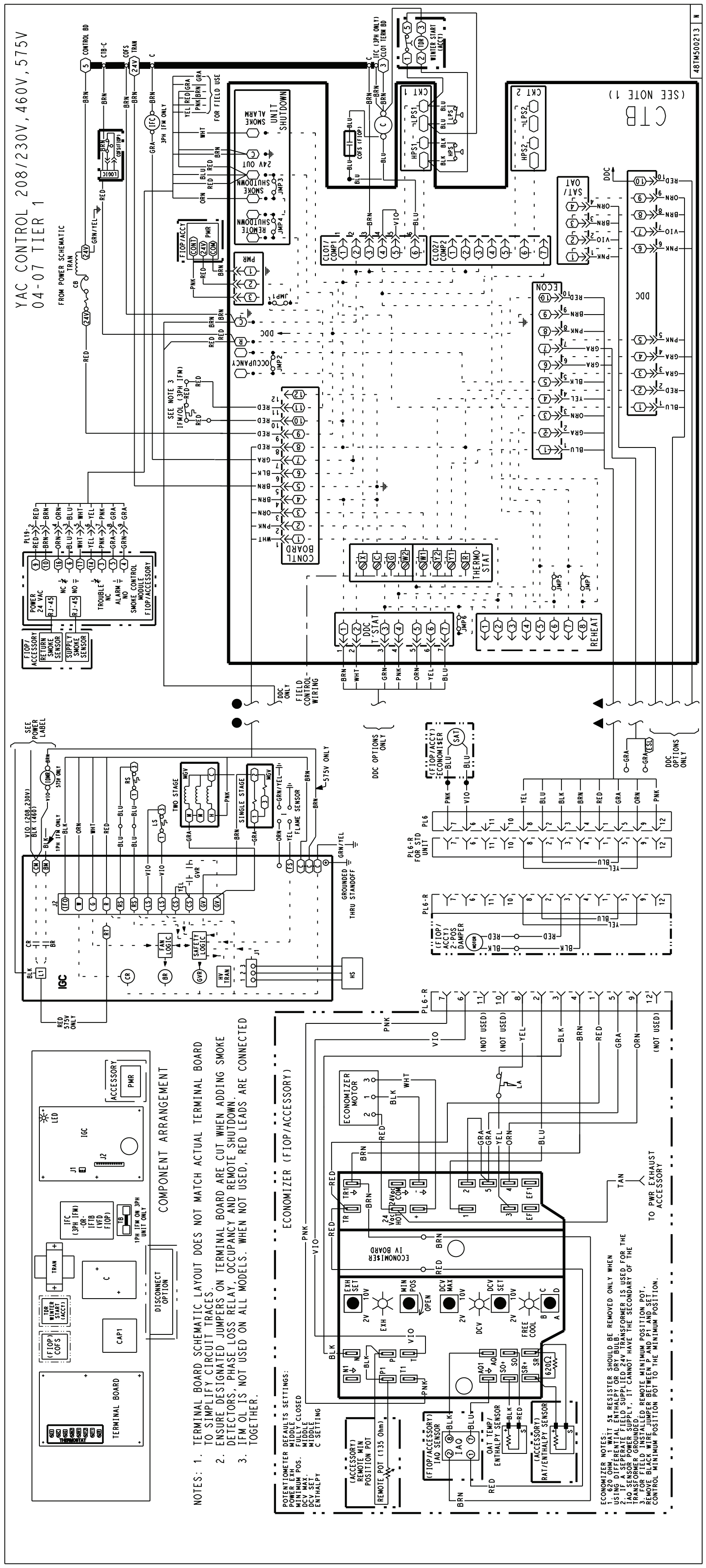

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Fig. 51 – Typical Smoke Detector System Wiring

Table 6 – Smoke Detector Field Use Wires

Wire Color	Unit Source / Smoke Detector Terminals
RED	24VAC (Unit CTB)
BRN	COM, 24VAC (Unit CTB)
GRA (2)	ALARM contact, NO; terminals 4 - 5
YEL	Trouble Contact, NC; terminal 14
PNK	Trouble Contact, NC; terminal 3

Additional Application Data — Refer to Catalog No. HKRNKA-1XA for discussions on additional control features of these smoke detectors including multiple unit coordination.

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 you use a field provided SD-MAG test magnet.

NOTICE: 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.

NOTICE: 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.

NOTICE: 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 7.

NOTICE: 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 7 – 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.

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

Changing the Dirty Sensor Test

By default, the dirty sensor 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.

Configuring 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.

NOTICE: 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. 52 and configured to operate the controller's supervision relay. For more information, see "Changing sensor dirty test operation."

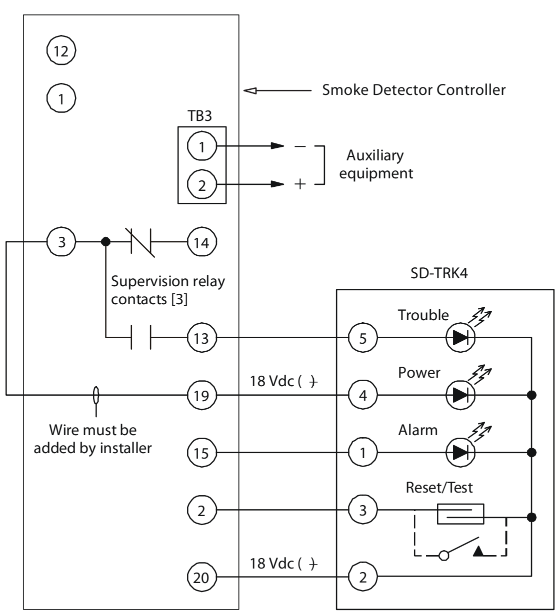

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Fig. 52 - Remote Test/Reset Station Connections

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

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.

NOTICE: 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. 53.

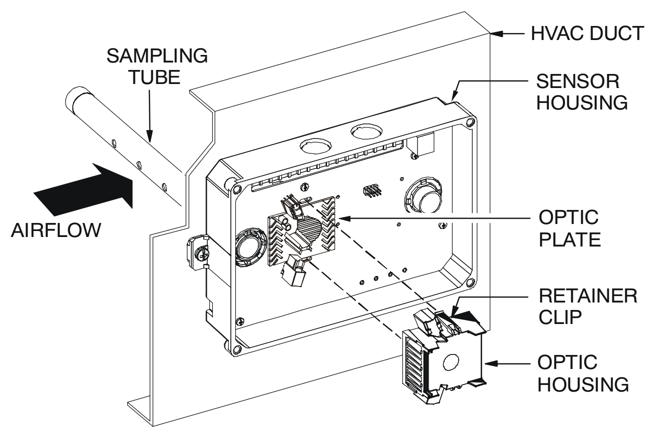

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Fig. 53 - Sensor Cleaning Diagram

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

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

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

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

- The contacts on the controller's supervisory relay switch positions. See Fig. 54.
- If a sensor trouble, the sensor's Trouble LED the controller's Trouble LED turn on.
- If 100% dirty, the sensor's Dirty LED turns on and the controller's Trouble LED flashes continuously.
- If a wiring fault between a sensor and the controller, the controller's Trouble LED turns on but not the sensor's.

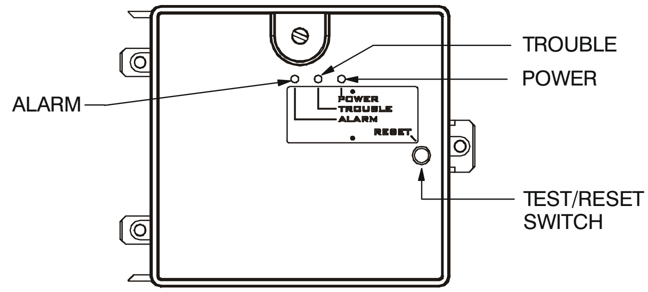


Fig. 54 - Controller Assembly

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

Resetting Alarm and Trouble Condition Trips:

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

Troubleshooting

Controller's Trouble LED is On

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

Table 8 – 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.

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. 52. 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 linebreak motor protection.

Over Temperature

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

High Pressure Switch

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

Low Pressure Switch

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

Evaporator Freeze Protection

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

Supply (Indoor) Fan Motor Protection

Disconnect and lockout power when servicing fan motor.

The standard supply fan motor is equipped with internal overcurrent and overtemperature protection. Protection devices reset automatically.

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

Condenser Fan Motor Protection

The condenser fan motor is internally protected against overtemperature.

Relief Device

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

Control Circuit, 24-V

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

GAS HEATING SYSTEM

⚠ 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. 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).

General

The 48TC gas heating system consists of a tubular heat exchanger assembly, multiple in-shot burners on a manifold with manifold pressure regulating gas valve, an induced draft combustion air fan system, electronic ignition system and safety controls. The heat exchanger tubes are located under the supply fan deck; the burner section is located behind an access panel in the unit's condenser section, under the main control box.

The heat exchanger tubes are large diameter round U-tubes. These tubes are smooth in the primary pass regions and dimpled in the secondary pass regions. See Figs. 60 and 61 for tube assemblies.

On 48TC sizes 04-14, the tubes are arranged in a four-pass flow pattern. The in-shot burners fire into the smooth primary tubes which pass through the heating plenum and return to a combustion plenum above the burner level. In the combustion plenum, the heated gas flow converges into the dimpled secondary tubes. The secondary tubes pass through the length of the heating plenum and return to the induced draft fan inlet next to the burner section.

On 48TC size 16, the tubes are arranged in a two-pass flow pattern. Each tube has a smooth primary tube segment on the bottom pass through the heating plenum and a dimpled secondary tube segment on the top pass as they return to the induced draft fan inlet. Each tube has its own in-shot burner.

The induced draft fan wheel discharges into a flue passage and the flue gases exit out a flue hood on the side of the unit. The flue hood was shipped inside the unit and required mounting by the unit installer.

Ignition and control of the heating system are provided through the unit's Integrated Gas Control (IGC) board. The induced draft fan motor includes a Hall Effect sensor circuit that confirms adequate draft fan wheel speed via the IGC logic. Safety switches include a Roll-out Switch (at the top of the burner compartment) and a limit switch (mounted through the fan deck, over the tubes). See Fig. 55 and Fig. 57.

The 48TC gas heating section is designed for use with Natural Gas (NG) fuel and installed at elevations less than 2000 ft (610 m). Accessory kits are available to adjust the burner firing rates for use at higher elevations with NG and to convert the burners to use liquefied petroleum (LP or Propane) fuel.

See section Orifice Replacement for information in modifying this unit for installation at elevations above 2000 ft (610 m).

The 48TC's gas valve will provide one-stage or two-stages of heating capacity, based on unit size, heating capacity and electrical phase of the unit. See Table 9.

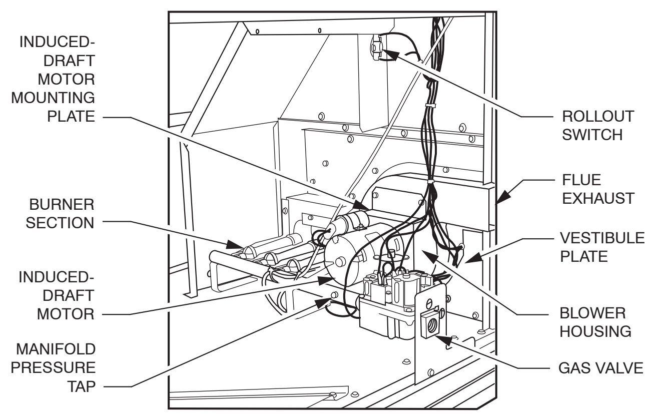


Fig. 55 - Burner Section Details

48TC

Table 9 – Quantity of Heating Stages

MODELS	SIZES	3-PH	1-PH
48TCD, S	04-06	1	1
	07	1	NA
	08-09	1	NA
	12-16	2	NA
48TCE, R	04	2	1
	05-06	1	1
	07	2	NA
	08-16	1	NA
48TCF,T	04	NA	NA
	05-06	2	1
	07	2	NA
	08-16	2	NA
48TCL, M	04-06	1	1
48TCN	04	NA	NA
	05-06	1	1

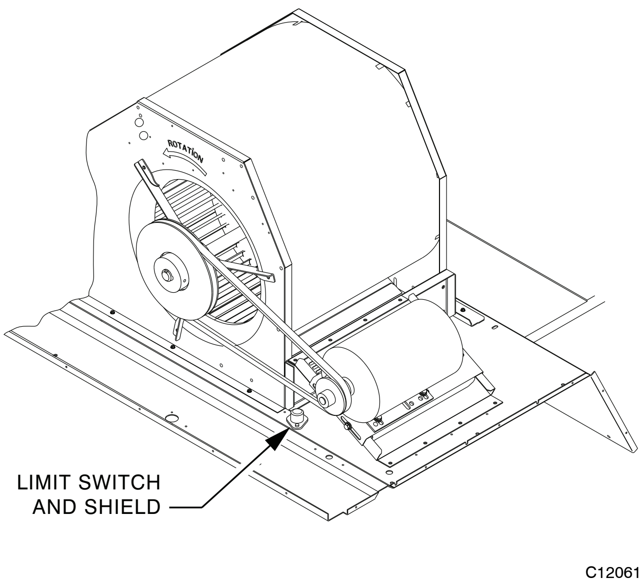


Fig. 56 - SRT Limit Switch Location

Fuel Types and Pressures

Natural Gas — The 48TC unit is factory-equipped for use with Natural Gas 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. Adjust unit gas regulator valve as required or consult local gas utility.

Table 10 – Natural Gas Supply Line Pressure Ranges

MODEL	SIZES	MIN	MAX
48TC	04-14	4.0 in. wg (996 Pa)	13.0 in. wg (3240 Pa)
	16	5.0 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.

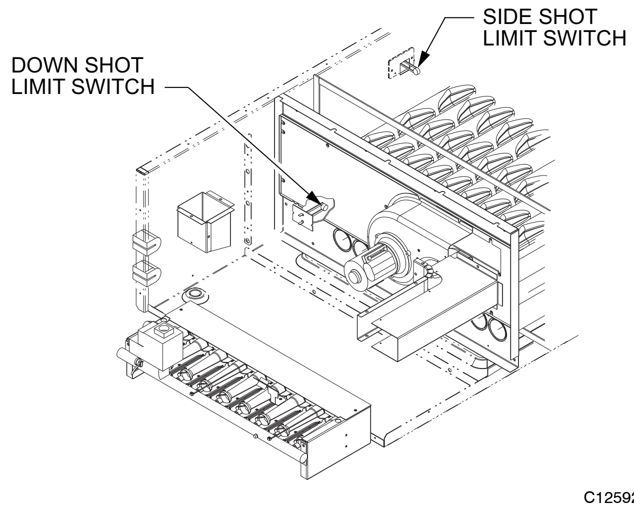


Fig. 57 - Limit Switch Location

Table 11 – Natural Gas Manifold Pressure Ranges

UNIT	SIZES	LOW FIRE+	HIGH FIRE	RANGE
48TCD 48TCS	04-07 08-09	NA	3.5 in. wg (872 Pa)	2.0-5.0 in. wg (Hi) (498-1245 Pa)
	12-14	2.0 (498 Pa)	3.5 (872 Pa)	
	16	2.0 (498 Pa)	3.0 (747 Pa)	
48TCE 48TCR	04-07	1.7 + (423 Pa)	3.5 (872 Pa)	2.0-5.0 in. wg (Hi) (498-1245 Pa)
	08-09	2.0 (498 Pa)	3.5 (872 Pa)	
	12-14	2.0 (498 Pa)	3.5 (872 Pa)	
	16	2.0	3.0	
48TCF 48TCS	05-07	1.7	3.5	2.0-5.0 in. wg (Hi) (498-1245 Pa)
	08-14	2.0	3.5	
	16	2.0	3.0	
48TCL 48TCM 48TCN	All	NA	3.5 in. wg (872 Pa)	

+: Size 04 only
NA: Not Available

Liquid Propane — Accessory packages are available for field-installation that will convert the 48TC 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 12 – Liquid Propane Supply Line Pressure Ranges

UNIT MODEL	UNIT SIZE	MIN	MAX
48TC	04–14	11.0 in. wg (2740 Pa)	13.0 in. wg (3240 Pa)
	16	NA	NA

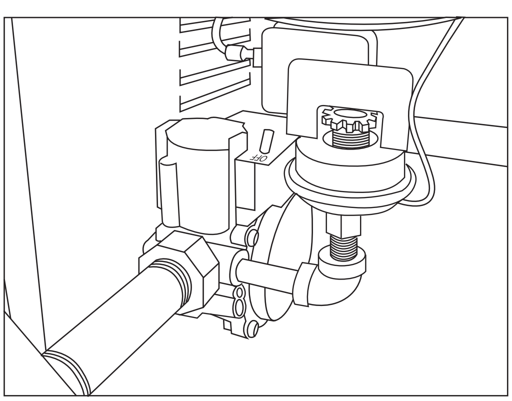
Manifold pressure for LP fuel use must be adjusted to specified range. Follow instructions in the accessory kit to make initial readjustment.

Table 13 – Liquid Propane Manifold Pressure Ranges

UNIT	SIZES	LOW FIRE	HIGH FIRE
48TCD 48TCS	04–07 08–09	NA	10.0 in. wg (2490 Pa)
	12–14	5.7 (1419 Pa)	
	16	6.6. (1643 Pa)	
48TCE 48TCR	04–07	5.0 + (1245 Pa)	10.0 in. wg (2490 Pa)
	08–09	5.7 (1419 Pa)	
	12–14	5.7 (1419 Pa)	
	16	6.6 (1643 Pa)	
48TCF 48TCS	05–07	5.0 (1245 Pa)	10.0 in. wg (2490 Pa)
	08–14	5.0 + (1245 Pa)	
	16	6.6. (1643 Pa)	
48TCL 48TCM 48TCN	04–06	NA	

+: Size 04 only
NA: Not Available

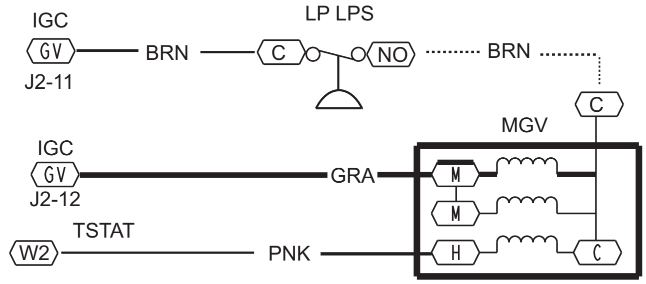
Supply Pressure Switch — The LP conversion kit includes a supply low pressure switch. The switch contacts (from terminal C to terminal NO) will open the gas valve power whenever the supply line pressure drops below the setpoint. See Fig. 58 and Fig. 59. If the low pressure remains open for 15 minutes 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.



C08238

Fig. 58 - LP Low Pressure Switch (Installed)

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.



C08285

Fig. 59 - LP Supply Line Low Pressure Switch Wiring

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. 60.
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 bi-monthly to determine proper cleaning frequency.

To access burner section, slide the sliding burner partition out of the unit.

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 7 screws that attach induced-draft motor housing to vestibule plate. See Fig. 60 and 61.
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. To remove blower from the motor shaft, remove 2 setscrews.
5. To remove motor, remove the 4 screws that hold the motor to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
6. To reinstall, reverse the procedure outlined above.

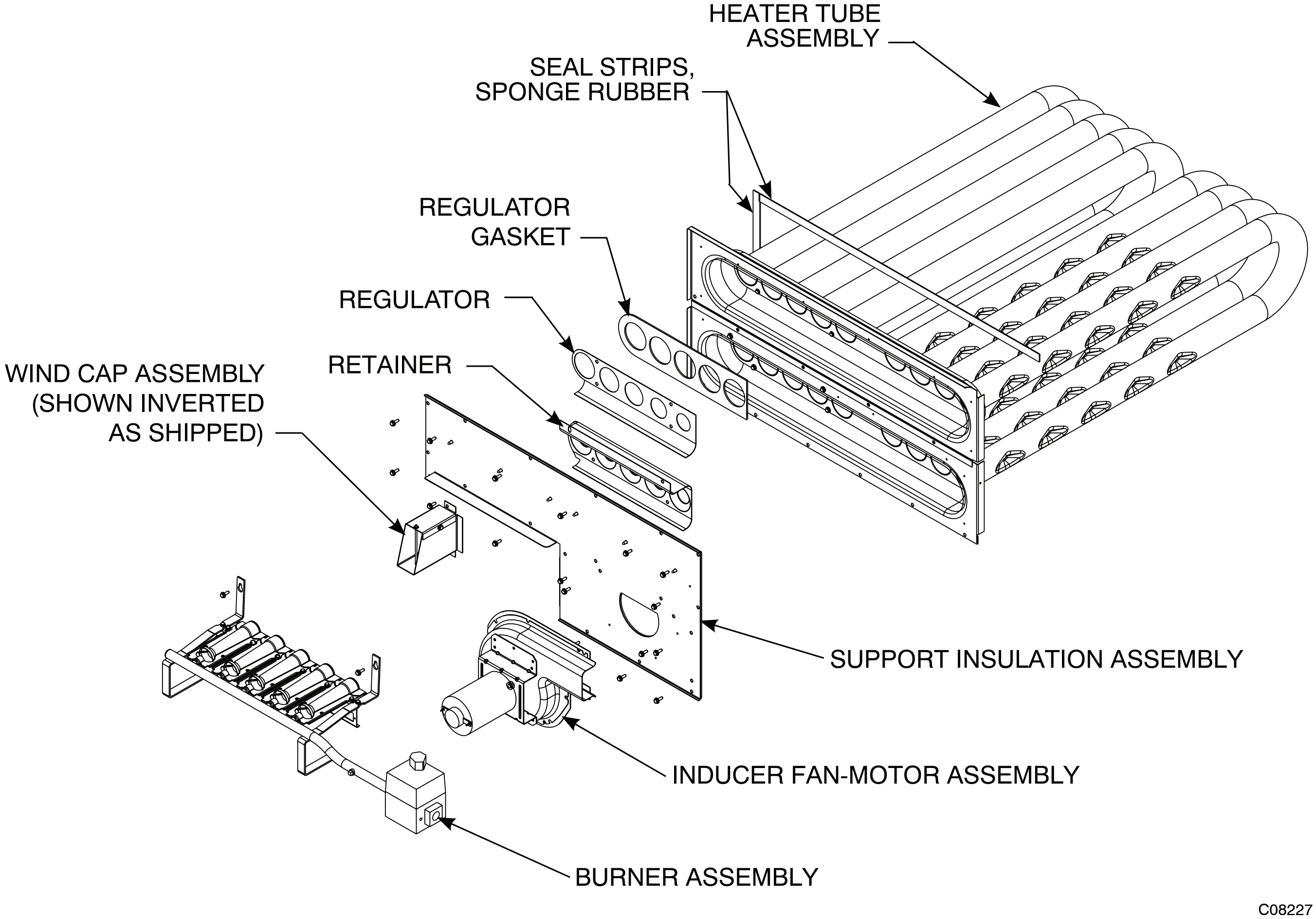


Fig. 60 - Typical Heat Exchanger Assembly Sizes 04-14

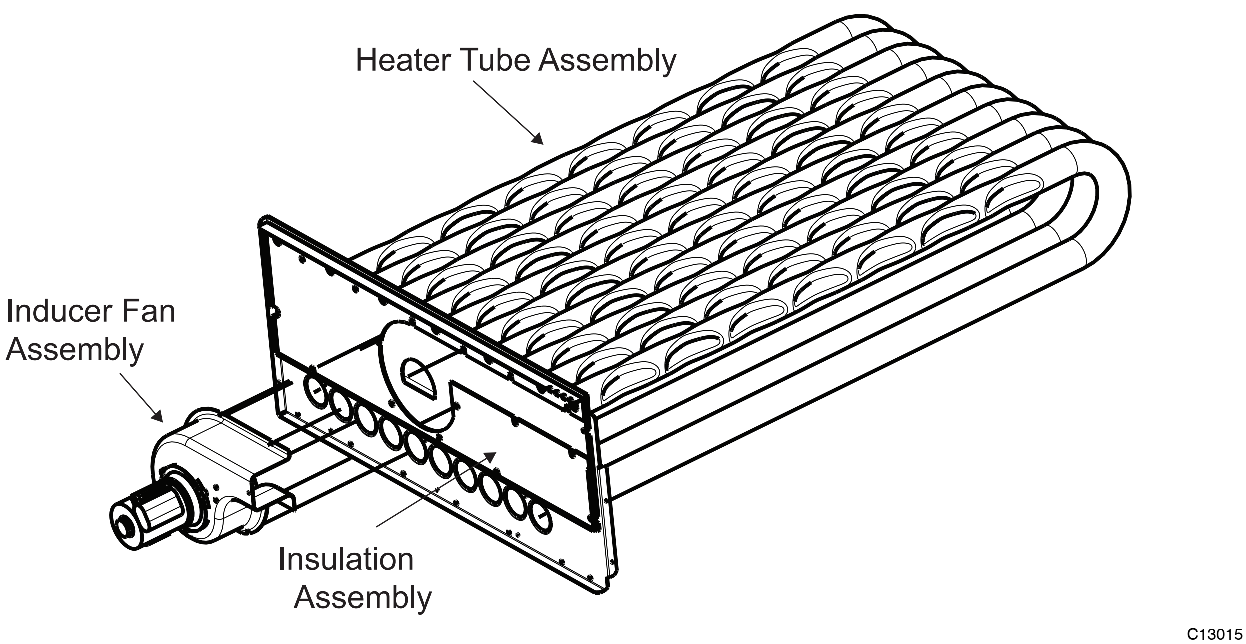


Fig. 61 - Typical Heat Exchanger Assembly Size 16

Burners and Igniters

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

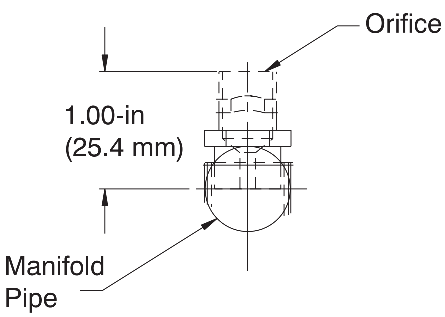
Failure to follow this caution can result in equipment damage.

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. 62 for maximum projection dimension for orifice face to manifold tube.



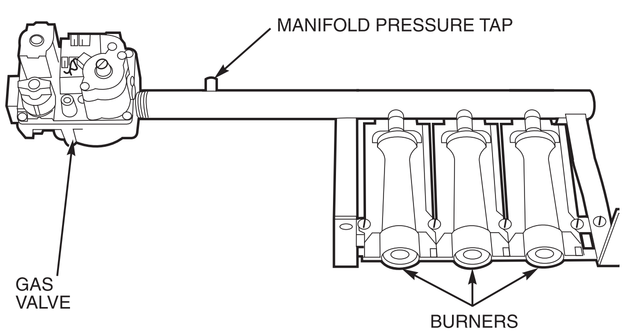
C08211

Fig. 62 - Orifice Projection

Removal and Replacement of Gas Train

See Fig. 55, Fig. 60 and Fig. 63.

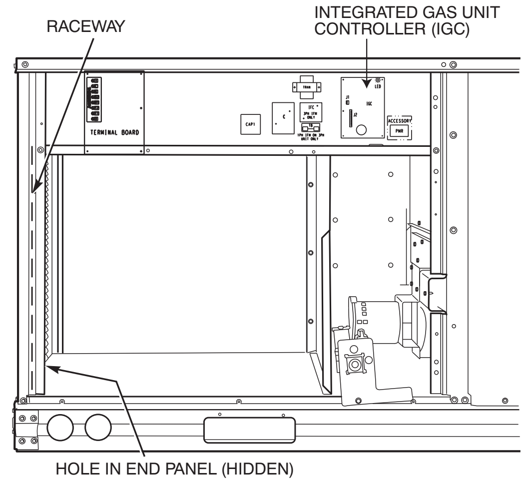
1. Shut off manual gas valve.
2. Shut off power to unit.
3. Slide out burner partition.
4. Disconnect gas piping at unit gas valve.



C06153

Fig. 63 - Burner Tray Details

5. Remove wires connected to gas valve. Mark each wire.
6. Remove igniter wires and sensor wires at the Integrated Gas Unit Controller (IGC). See Fig. 64.



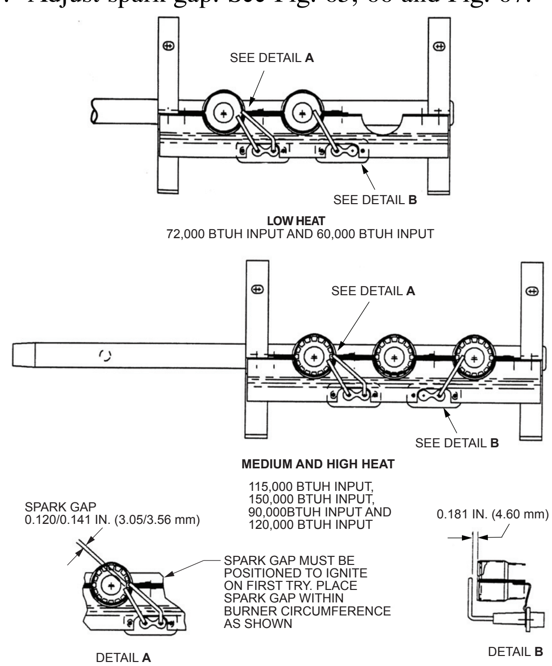
C08454

Fig. 64 - Unit Control Box/IGC Location

7. Remove the 2 screws that attach the burner rack to the vestibule plate. See Fig. 60.
8. Slide the burner tray out of the unit See Fig. 63.
9. To reinstall, reverse the procedure outlined above.

Cleaning and Adjustment

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section, above.
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. 65, 66 and Fig. 67.



C06154

Fig. 65 - Spark Adjustment (04-07)

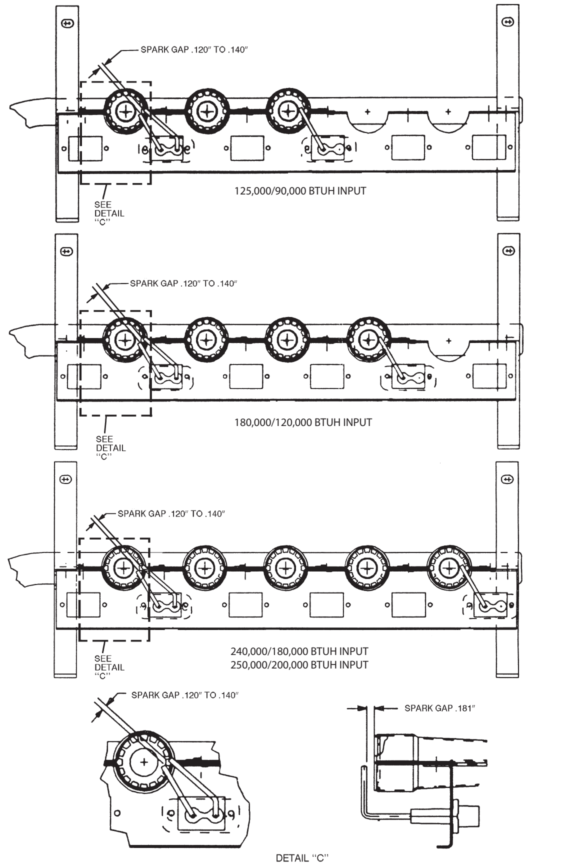


Fig. 66 - Spark Adjustment (08-14)

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. 62.
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, above.

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. 68 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 Table 17 and Table 19.

1. Remove manifold pressure tap plug from manifold and connect pressure gauge or manometer. See Fig. 63.
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. 63.

Limit Switch

Remove blower access panel. Limit switch is located on the fan deck. See Fig. 56.

Burner Ignition

Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box. See Fig. 64. The IGC contains a self-diagnostic LED (light-emitting diode). A single LED (see Fig. 69) 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 14 for an explanation of LED error code descriptions.

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

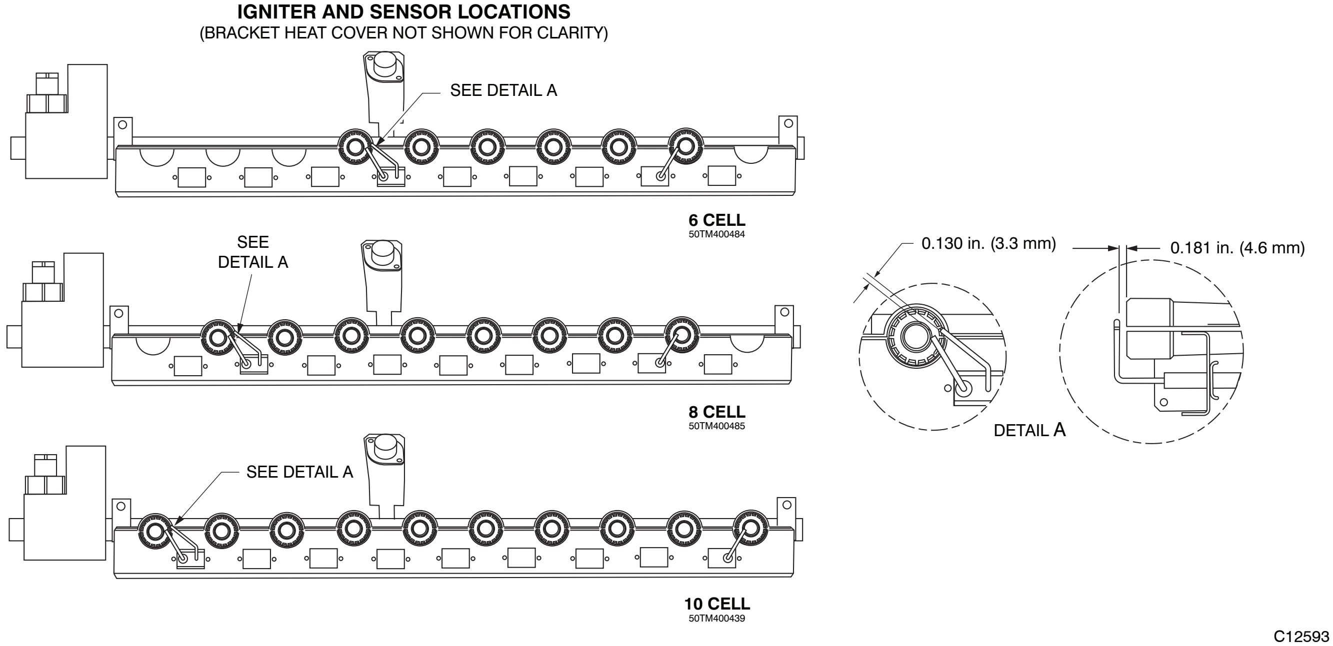


Fig. 67 - Spark Adjustment (Size 16)

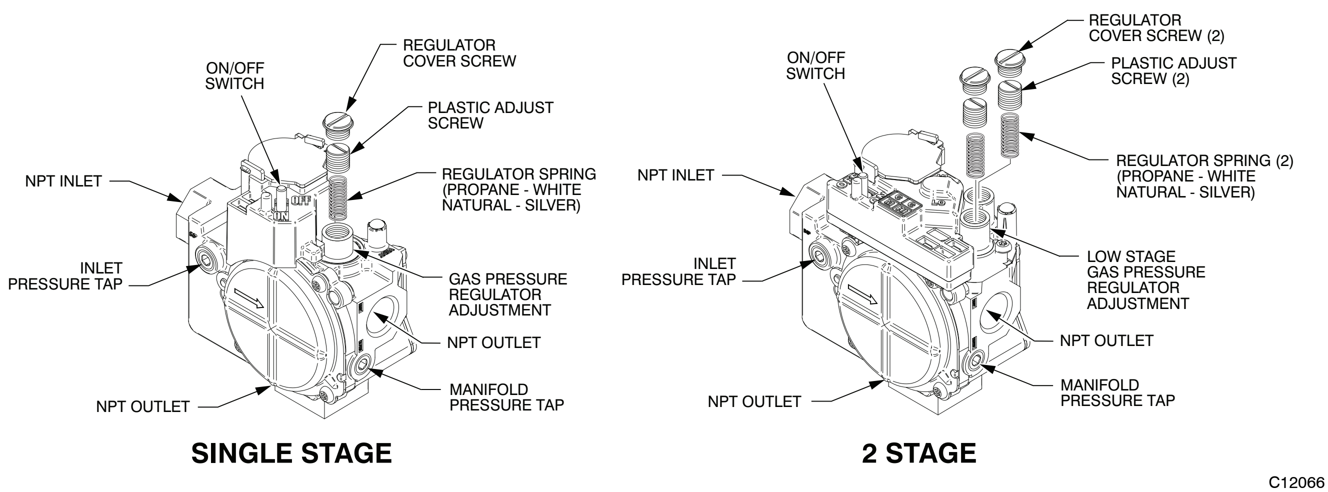


Fig. 68 - Gas Valves

Table 14 – 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

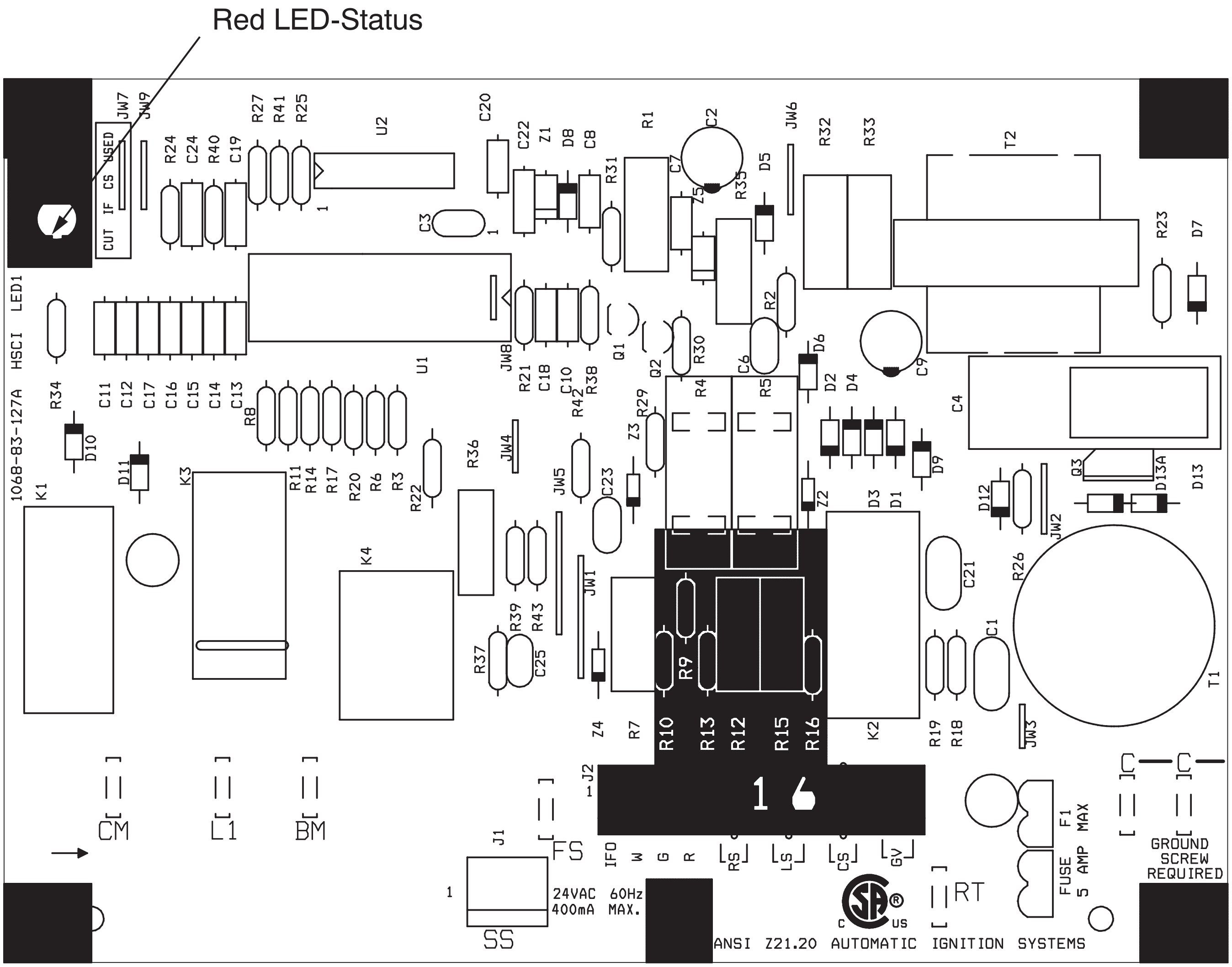
LEGEND
LED – Light Emitting Diode
* . A 3–second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.
† Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Table 24 and Table 25 for additional information.

Orifice Replacement

This unit uses orifice type LH32RFnnn (where nnn indicates orifice reference size). When replacing unit orifices, order the necessary parts through Carrier RCD. See Table 16 for available orifice sizes. See Table 17 through Table 20 for orifice sizes for Natural Gas and LP fuel usage at various elevations above sea level.

Check that each replacement orifice is tight at its threads into the manifold pipe and that orifice projection does not exceed maximum value. See Fig. 62.



C08452

Fig. 69 - Integrated Gas Control (IGC) Board

Table 15 – 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	LCTB	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 16 – Orifice Sizes

ORIFICE DRILL SIZE	CARRIER 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 17 – Altitude Compensation* Low NOx Models 48TC04-06 (L, M, N)

NATURAL GAS ONLY

ELEVATION		NOMINAL HEAT INPUT					
		60k BTUH		90k BTUH		120k BTUH	
Feet	Meters	Orifice Size	Input (btu/hr)	Orifice Size	Input (btu/hr)	Orifice Size	Input (btu/hr)
0 – 2000	0 – 610	38[2]	60,000	38[2]	90,000	32[1]	120,000
2000	610	39[2]	55,200	39[2]	82,800	33[1]	110,400
3000	914	†40	52,800	†40	79,200	33[1]	105,600
4000	1219	†41	50,400	†41	75,600	35[1]	100,800
5000	1524	†41	48,000	†41	72,000	35[1]	96,000
6000	1829	†42	45,600	†42	68,400	36[1]	91,200
7000	2134	†42	43,200	†42	64,800	36[1]	86,400
8000	2438	†43	40,800	†43	61,200	37[2]	81,600
9000	2743	†43	38,400	†43	57,600	38[2]	76,800
10000	3048	44[2]	36,000	44[2]	54,000	†40	72,000
11000	3353	44[2]	33,600	44[2]	50,400	†41	67,200
12000	3658	45[2]	31,200	45[2]	46,800	†42	62,400
13000	3962	47[3]	28,800	47[3]	43,200	†43	57,600
14000	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

Table 18 – Altitude Compensation* Models 48TC04-07 (D, E, F, S, R, T)

NATURAL 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 – 2000	0 – 610	33[1]	72,000	33[1]	115,000	†30	150,000
2000	610	35[1]	66,240	35[1]	105,800	†30	138,000
3000	914	35[1]	63,360	35[1]	101,200	31[1]	132,000
4000	1219	36[1]	60,480	36[1]	96,600	31[1]	126,000
5000	1524	36[1]	57,600	36[1]	92,000	31[1]	120,000
6000	1829	37[2]	54,720	37[2]	87,400	31[1]	114,000
7000	2134	38[2]	51,840	38[2]	82,800	32[1]	108,000
8000	2438	39[2]	48,960	39[2]	78,200	33[1]	102,000
9000	2743	†40	46,080	†40	73,600	33[1]	96,000
10000	3048	†41	43,200	†41	69,000	35[1]	90,000
11000	3353	†42	40,320	†42	64,400	36[1]	84,000
12000	3658	†43	37,440	†43	59,800	37[2]	78,000
13000	3962	†43	34,560	†43	55,200	38[2]	72,000
14000	4267	44[2]	31,680	44[2]	50,600	†40	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

48TC

Table 19 – Altitude Compensation* Models 48TC04-07 (D, E, F, S, R, T)

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 – 2000	0 – 610	51^{4}	72,000	50^{3}	115,000	46^{3}	150,000
2000	610	51^{4}	66,240	51^{4}	105,800	47^{3}	138,000
3000	914	52^{4}	63,360	51^{4}	101,200	47^{3}	132,000
4000	1219	52^{4}	60,480	51^{4}	96,600	48^{3}	126,000
5000	1524	52^{4}	57,600	51^{4}	92,000	48^{3}	120,000
6000	1829	52^{4}	54,720	52^{4}	87,400	48^{3}	114,000
7000	2134	53^{4}	51,840	52^{4}	82,800	49^{3}	108,000
8000	2438	53^{4}	48,960	52^{4}	78,200	49^{3}	102,000
9000	2743	53^{4}	46,080	53^{4}	73,600	50^{3}	96,000
10000	3048	54^{4}	43,200	53^{4}	69,000	50^{3}	90,000
11000	3353	54^{4}	40,320	53^{4}	64,400	51^{4}	84,000
12000	3658	54^{4}	37,440	54^{4}	59,800	51^{4}	78,000
13000	3962	55^{4}	34,560	54^{4}	55,200	52^{4}	72,000
14000	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 20 – Altitude Compensation* Models 48TC08-14 (D, E, F, S, R, T)

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 – 2000	0 – 610	33[1]	72,000	31[1]	125,000	32[1]	150,000	31[1]	180,000	31[1]	224,000	†30	250,000
2000	610	35[1]	66,240	32[1]	115,000	33[1]	138,000	32[1]	165,600	32[1]	206,080	†30	230,000
3000	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
4000	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
5000	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
6000	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
7000	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
8000	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
9000	2743	†40	46,080	37[2]	80,000	37[2]	96,000	37[2]	115,200	37[2]	143,360	33[1]	160,000
10000	3048	†41	43,200	38[2]	75,000	38[2]	90,000	38[2]	108,000	38[2]	134,400	35[1]	150,000
11000	3353	†42	40,320	39[2]	70,000	†40	84,000	39[2]	100,800	39[2]	125,440	36[1]	140,000
12000	3658	†42	37,440	†41	65,000	†40	78,000	†41	93,600	†41	116,480	37[2]	130,000
13000	3962	†43	34,560	†42	60,000	†41	72,000	†42	86,400	†42	107,520	38[2]	120,000
14000	4267	†43	31,680	†43	55,000	†41	66,000	†43	79,200	†43	98,560	†40	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

48TC

PROPANE GAS

Table 21 – Altitude Compensation* Models 48TC08-14 (D, E, F, S, R, T)

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 – 2000	0 – 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
2000	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
3000	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
4000	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
5000	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
6000	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
7000	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
8000	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
9000	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
10000	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
11000	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
12000	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
13000	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
14000	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 22 – Altitude Compensation* Models 48TC16 (D, E, F, S, R, T)

NATURAL GAS

ELEVATION		NOMINAL HEAT INPUT									
		150k BTUH		180k BTUH		240k BTUH		315k BTUH		350k 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 - 2000	0 - 610	37[7]	150,000	37[7]	180,000	37[7]	240,000	†35	315,000	†35	350,000
2000	610	38[7]	138,000	38[7]	165,600	38[7]	220,800	36[7]	289,800	36[7]	322,000
3000	914	39[7]	132,000	39[7]	158,400	39[7]	211,200	36[7]	277,200	36[7]	308,000
4000	1219	39[7]	126,000	39[7]	151,200	39[7]	201,600	37[7]	264,600	37[7]	294,000
5000	1524	40[8]	120,000	40[8]	144,000	40[8]	192,000	37[7]	252,000	37[7]	280,000
6000	1829	41[8]	114,000	41[8]	136,800	41[8]	182,400	38[7]	239,400	38[7]	266,000
7000	2134	42[8]	108,000	42[8]	129,600	42[8]	172,800	39[7]	226,800	39[7]	252,000
8000	2438	42[8]	102,000	42[8]	122,400	42[8]	163,200	40[8]	214,200	40[8]	238,000
9000	2743	43[8]	96,000	43[8]	115,200	43[8]	153,600	41[8]	201,600	41[8]	224,000
10000	3048	43[8]	90,000	43[8]	108,000	43[8]	144,000	42[8]	189,000	42[8]	210,000
11000	3353	†44	84,000	†44	100,800	†44	134,400	43[8]	176,400	43[8]	196,000
12000	3658	†45	78,000	†45	93,600	†45	124,800	43[8]	163,800	43[8]	182,000
13000	3962	†46	72,000	†46	86,400	†46	115,200	†44	151,200	†44	168,000
14000	4267	†47	66,000	†47	79,200	†47	105,600	†45	138,600	†45	154,000

* 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[7]	CRLPELEV007A00
XX[8]	CRLPELEV008A00
XX[9]	CRLPELEV009A00

Table 23 – Altitude Compensation* Models 48TC16 (D, E, F, S, R, T)

PROPANE GAS

ELEVATION		NOMINAL HEAT INPUT									
		150k BTUH		180k BTUH		240k BTUH		252k BTUH		350k 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 - 2000	0 - 610	52[9]	150,000	52[9]	180,000	52[9]	240,000	51[9]	252,000	51[9]	350,000
2000	610	52[9]	138,000	52[9]	165,600	52[9]	220,800	51[9]	231,840	51[9]	322,000
3000	914	53[9]	132,000	53[9]	158,400	53[9]	211,200	52[9]	221,760	52[9]	308,000
4000	1219	53[9]	126,000	53[9]	151,200	53[9]	201,600	52[9]	211,680	52[9]	294,000
5000	1524	53[9]	120,000	53[9]	144,000	53[9]	192,000	52[9]	201,600	52[9]	280,000
6000	1829	53[9]	114,000	53[9]	136,800	53[9]	182,400	52[9]	191,520	52[9]	266,000
7000	2134	53[9]	108,000	53[9]	129,600	53[9]	172,800	53[9]	181,440	53[9]	252,000
8000	2438	54[9]	102,000	54[9]	122,400	54[9]	163,200	53[9]	171,360	53[9]	238,000
9000	2743	54[9]	96,000	54[9]	115,200	54[9]	153,600	53[9]	161,280	53[9]	224,000
10000	3048	54[9]	90,000	54[9]	108,000	54[9]	144,000	54[9]	151,200	54[9]	210,000
11000	3353	55[9]	84,000	55[9]	100,800	55[9]	134,400	54[9]	141,120	54[9]	196,000
12000	3658	55[9]	78,000	55[9]	93,600	55[9]	124,800	54[9]	131,040	54[9]	182,000
13000	3962	55[9]	72,000	55[9]	86,400	55[9]	115,200	55[9]	120,960	55[9]	168,000
14000	4267	†56	66,000	†56	79,200	†56	105,600	55[9]	110,880	55[9]	154,000

* 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[7]	CRLPELEV007A00
XX[8]	CRLPELEV008A00
XX[9]	CRLPELEV009A00

Minimum heating entering air temperature

When operating on first stage heating, the minimum temperature of air entering the dimpled heat exchanger is 50°F (10 °C) continuous and 45°F (7 °C) intermittent for standard heat exchangers and 40°F (4 °C) continuous and 35°F (2 °C) 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. 70.) Set the outdoor-air thermostat at 35°F (2 °C) for stainless steel heat exchangers or 45°F (7 °C) for standard heat exchangers. This temperature setting will bring on the second stage of heat whenever the ambient temperature is below the thermostat setpoint. Indoor comfort can be compromised when heating is initiated using low entering air temperatures with insufficient heating temperature rise.

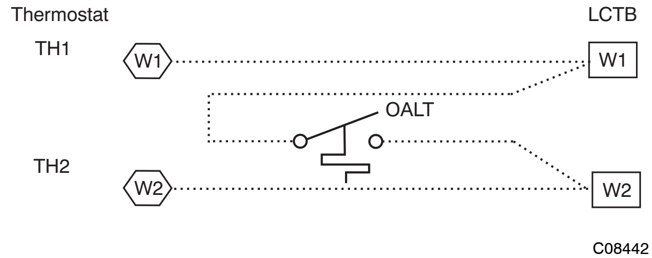


Fig. 70 - OATL Connections

Troubleshooting Heating System

Refer to Table 24 and Table 25 for additional troubleshooting topics.

48TC

Table 24 – 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 25 – 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 nameplate. 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

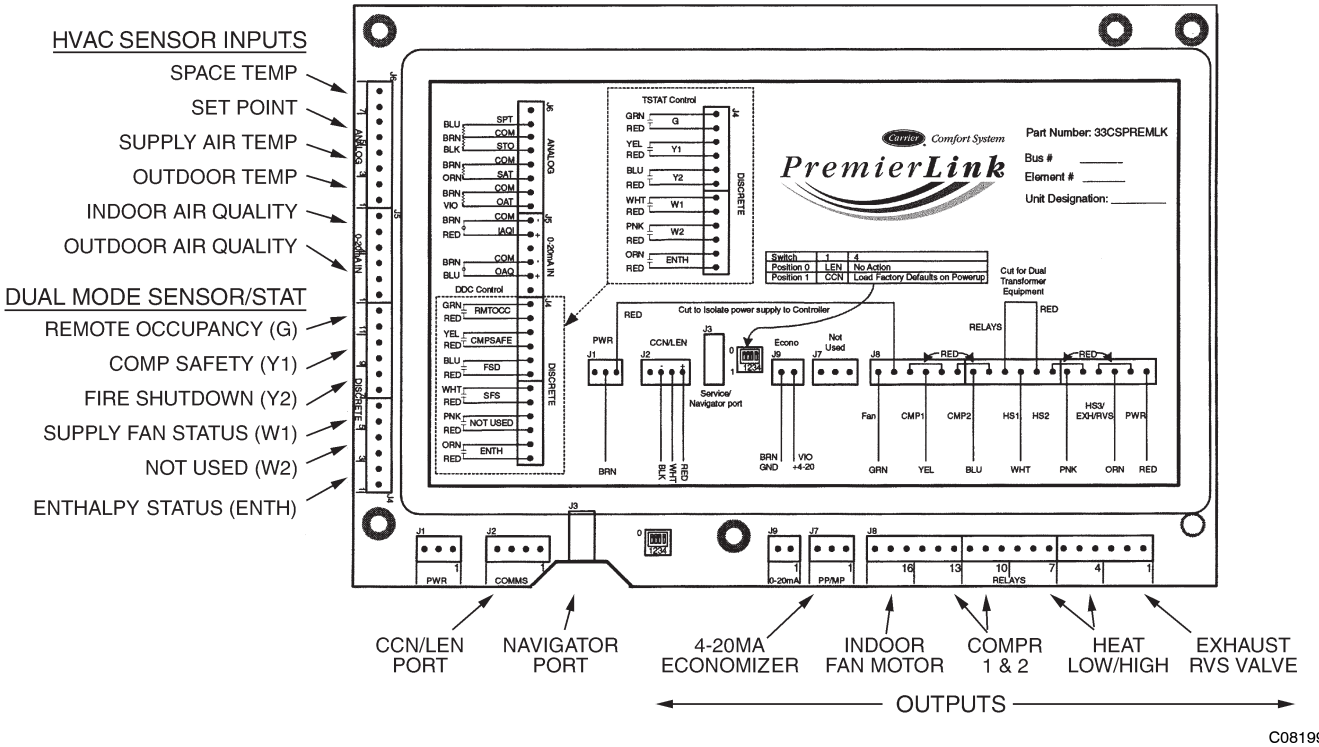


Fig. 71 - PremierLink Controller

The PremierLink Controller (see Fig. 71) is compatible with Carrier Comfort Network® (CCN) devices. This control is designed to allow users the access and ability to change factory-defined settings, thus expanding the function of the standard unit control board. CCN service access tools include System Pilot (TM), Touch Pilot (TM) and Service Tool. (Standard tier display tools Navigator™ and Scrolling Marquee are not suitable for use with latest PremierLink Controller (Version 2.x).)

The PremierLink Controller is factory-mounted in the 48TC unit's main control box to the left of the LCTB. Factory wiring is completed through harnesses connected to the LCTB thermostat. Field connections are made at a 16-pole terminal block (TB1) located on the bottom shelf of the unit control box in front of the PremierLink Controller.

The factory-installed PremierLink Controller includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er 2 package.

Refer to Fig. 71 for PremierLink connection locations.

NOTE: Refer to *PremierLink™ Installation, Start-Up and Configuration Instructions.* Have a copy of this manual available at unit start-up.

RTU-OPEN CONTROL SYSTEM

The RTU Open controller is an integrated component of the Carrier rooftop unit. Its internal application programming provides optimum performance and energy efficiency. RTU Open enables the unit to run in 100% stand-alone control mode, Carrier's I-Vu Open network, or a Third Party Building Automation System (BAS). On-board DIP switches allow you to select your protocol (and baud rate) of choice among the four most popular protocols in use today: BACnet, Modbus, Johnson N2 and LonWorks. See Fig. 72.

The RTU Open control is factory-mounted in the 48TC unit's main control box, to the left of the Light Commercial Terminal Board (LCTB). Factory wiring is completed through harnesses connected to the LCTB. Field connections for RTU Open sensors will be made at the Phoenix connectors on the RTU Open board. The factory-installed RTU Open control includes the supply-air temperature (SAT) sensor. The outdoor air temperature (OAT) sensor is included in the FIOP/accessory EconoMi$er2 package.

SENSORY/ACCESSORY INSTALLATION

There are a variety of sensors and accessories available for the RTU-OPEN. Some of these can be factory or field installed, while others are only field installable. The RTU-OPEN controller may also require connection to a building network system or building zoning system. All field control wiring that connects to the RTU-OPEN must be routed through the raceway built into the corner post of the unit or secured to the unit control box with electrical conduit. The unit raceway provides the UL required clearance between high and low-voltage wiring. Pass the control wires through the hole provided in the corner post, then feed the wires thorough the raceway to the RTU-OPEN. Connect the wires to the removable Phoenix connectors and then reconnect the connectors to the board. See Fig. 72.

IMPORTANT: Refer to the specific sensor or accessory instructions for its proper installation and for rooftop unit installation refer to base unit installation instructions and the unit's wiring diagrams.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

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

Disconnect and lock-out/tagout electrical power before wiring the RTU-OPEN controller.

ADDITIONAL RTU-OPEN INSTALLATION AND TROUBLESHOOTING

Additional installation, wiring and troubleshooting information for the RTU-OPEN Controller can be found in the following manuals: *"Controls, Start-up, Operation and Troubleshooting Instructions,"* and *"RTU Open Installation and Start-up Guide."* Have a copy of these manuals available at unit start-up.

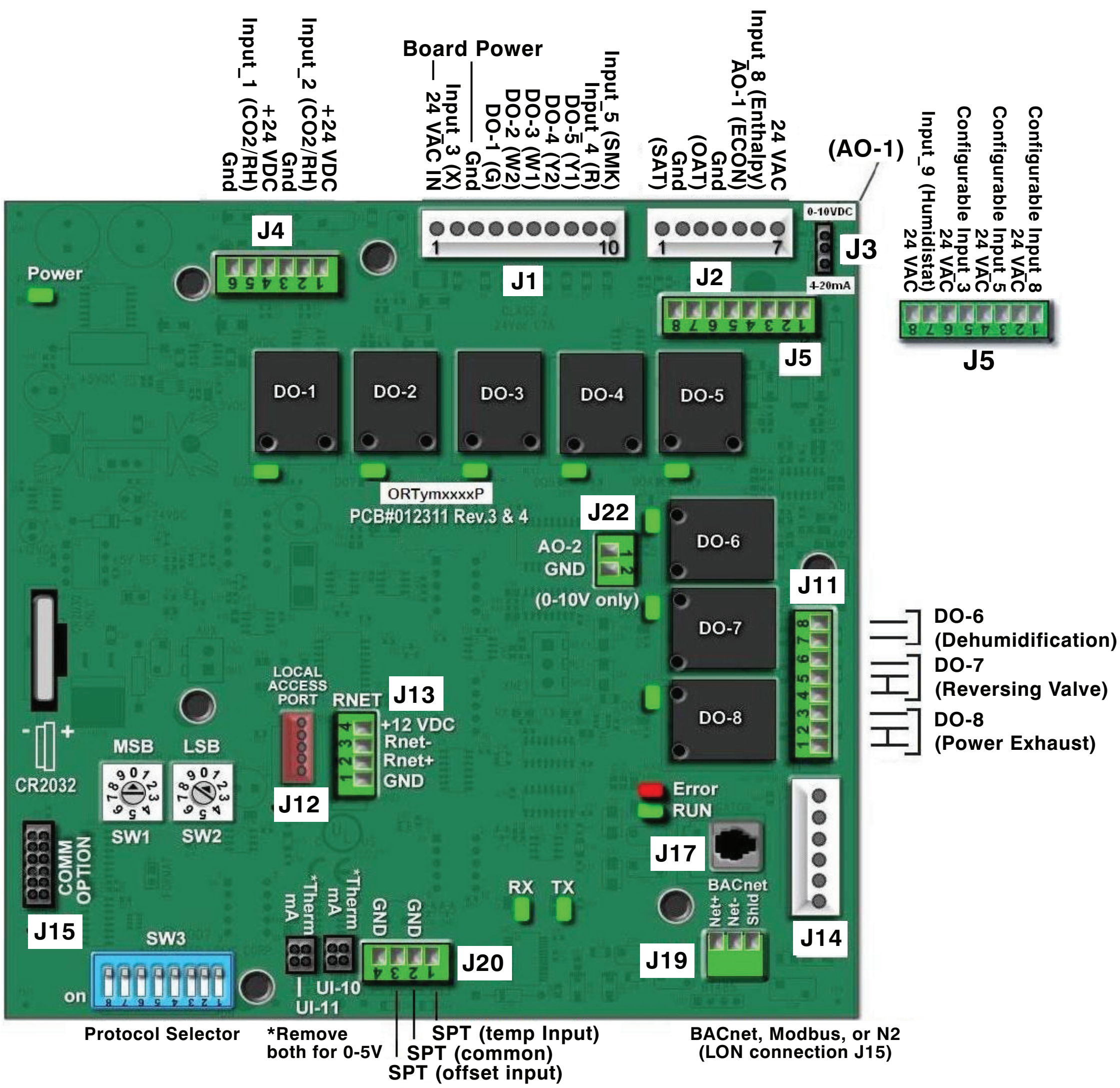


Fig. 72 - RTU-Open Control Module

HUMIDI-MIZER® ADAPTIVE DEHUMIDIFICATION SYSTEM

Units equipped with the factory installed Humidi-MiZer option are capable of providing multiple modes of improved dehumidification as variations of the normal cooling cycle. The Humidi-MiZer option includes additional valves in the liquid line and discharge line of each refrigerant stage, a single-row reheat condenser coil mounted to the evaporator coil and a Motormaster variable-speed control of some or all outdoor fans. Operation of the revised refrigerant stage for each mode is described below.

The Humidi-MiZer system provides three sub-modes of operation: Cooling, Reheat1 and Reheat2.

Normal Cooling Mode - provides a normal ratio of Sensible and Latent Cooling effect from the evaporator coil.

SubCooling Mode (Reheat1) - provides increased Latent Cooling while slightly reducing the Sensible Cooling effect.

Hot Gas Reheat Mode (Reheat2) - provides normal Latent Cooling but with no or minimum Sensible Cooling effect delivered to the space.

The Reheat1 and Reheat2 modes are available when the unit is not in a Heating mode and when the Low Ambient Lockout switch is closed.

Unit Sizes 04 - 07 (Type 1 - Single Stage Cooling)

Normal Cooling Mode: When there is only a single cooling demand with thermostat Y1 calling, the single circuit will operate in Normal Cooling Mode. The Cooling Liquid Valve (CSV) is Normally Open (NO) and energized. The Reheat Discharge Valve, DSV, is Normally Closed (NC) and remains closed during the Cooling Mode. See Fig. 74.

Subcooling (Reheat 1) Mode: When the unit is operating in the Cooling Mode (the space temperature is above the set-point, with Y1 calling) and the space humidity also above its set-point, the Humidistat will close and the unit operation will shift to Reheat1 (Subcooling) Mode.

The CSV is energized and closed, blocking the liquid flow around the Humidi-MiZer coil. The liquid flow then passes through the Humidi-MiZer, a Metering Device (TXV) and a Acutrol® metering device before entering the Evaporator Coil. The increased subcooling causes the Evaporator Coil surface temperature to decrease, while increasing the unit's Latent Cooling effect. The DSV valve remains de-energized and closed. See Fig. 75.

Hot Gas Reheat (Reheat 2) Mode: When there is only a dehumidification demand (the Humidistat is above its set-point but no thermostat Y1 call), the unit will operate in Reheat2 mode. The Supply Fan Motor and the Compressor will be energized through the Reheat Control Board (RCB) logic. See Fig. 73. The CSV is energized and closed blocking liquid flow around the Humidi-MiZer Coil. The DSV valve is also energized and opened allowing bypassed discharge gas to mix with liquid while entering the Humidi-MiZer coil. The additional heat from the bypassed discharge gas offsets the Sensible Cooling effect from the evaporator coil during the Reheat2 Mode. See Fig. 76.

If the space temperature drops during a Reheat2 Mode until the Heating Thermostat W1 closes, the W1 signal is received by the RCB. The RCB logic de-energizes the compressors, the CLV valve and the DLV valve. The compressor and solenoid valves will remain in these conditions until the Heating Mode demand ends. If the humidistat is still above the set-point after the heating ends, the unit will restart in Reheat2 Mode.

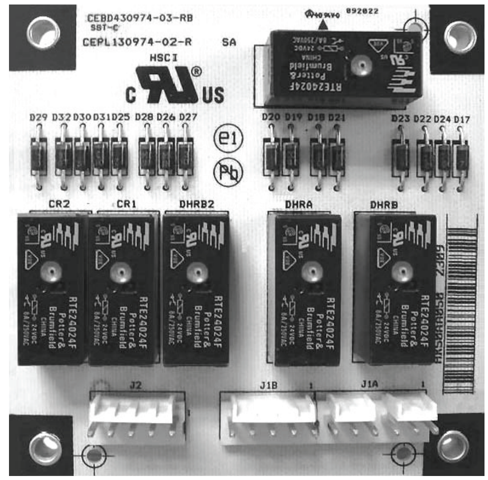


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Fig. 73 - Reheat Control Board (RCB)

Unit Sizes 08 - 14 (Type 1 - Dual Stage Cooling)

NOTE: Unit sizes 08-12 and size 14 use different designations in the wiring and piping schematics for Cooling Solenoid and Discharge Solenoid valves.

VALVE TYPE	SIZES 08-12	SIZE 14
Cooling Solenoid	CSV1,2	CLV1,2
Discharge Solenoid	DSV1,2	RDV1,2

Normal Cooling Mode: When there is only a cooling demand (Thermostat Y1 alone or with Y2), one or both circuits will operate in Normal Cooling Mode. The CSV1 and CSV2 (on size 14, CLV1 and CLV2)valves are de-energized and open allowing liquid to flow around the Humidi-MiZer coil and directly to the unit's TXVs and Evaporator Coil. The Reheat Discharge Valves, DSV1 and DSV2, (on size 14, RDV1 and RDV2) are de-energized and remain closed during the Cooling Mode. See Fig. 74 for illustration of each circuit's operation.

Subcooling (Reheat 1) Mode: When the unit is operating in a full-load Cooling Mode (space temperature above set-point and both thermostats Y1 and Y2 calling) and the space humidity is above its set-point, the humidistat will close and the unit operation will shift to Reheat1 (Subcooling). The CSV1 and CSV2 (or CLV1 and CLV2) valves, become energized and closed, redirecting the liquid flow into the Humidi-MiZer coil. The increased subcooling causes the evaporator coil surface temperature to decrease, while increasing the unit's Latent Cooling effect. The DSV1 and DSV2 (or RDV1 and RDV2) valves, remain de-energized and closed. See Fig. 75 for illustration of each circuit's operation.

Hot Gas Reheat (Reheat 2) Mode: When the unit is operating in a part-load Cooling Mode (space temperature above the set-point, and only Y1 calling) and the space humidity is also above its set-point, the humidistat will close and the unit operation will shift to Reheat1 (Subcooling) in Circuit 1 (as described above) and Reheat2 (Dehumidification) in Circuit 2 (as described below).

When there is only dehumidification demand (humidistat is above set-point but no Y1 call), both circuits will operate in Reheat2 mode. The supply fan motor and both compressors will be energized through the Reheat Control Board logic. All solenoids are energized; Cooling Liquid valves are closed and Discharge bypass valves open. All liquid flow and the bypassed discharge gases are directed into the Humidi-MiZer coil circuits. See Fig. 76 for illustration of each circuit's operation in Reheat2.

If the space temperature drops during a Reheat2 Mode until the Heating Thermostat W1 closes, the W1 signal is received by the RCB. The RCB logic de-energizes the compressors, the Cooling Solenoid valves and the Discharge Solenoid valves. The compressors and solenoid valves will remain in these conditions until the Heating Mode demand ends. If the humidistat is still above the set-point after the heating ends, the unit will restart in Reheat2 Mode.

Unit Size 16 (Type 3 - Dual Stage Cooling)

Normal Cooling Mode: When there is only a cooling demand (thermostat Y1 alone or with Y2), one or both circuits will operate in normal Cooling Mode. Both solenoid valves in both circuits are de-energized. The LDV1 and LDV2 valves are 3-way valves with a Normally Open (NO) port and a Normally Closed (NC) port. In the Cooling Mode, the liquid flows out of the Normally Open (NO) port and into the TXVs on the evaporator coil. The RDV1 and RDV2 valves are Normally Closed (NC) and remain closed during the Cooling Mode. See Fig. 77.

Subcooling (Reheat 1) Mode: When the unit is operating in a full-load Cooling Mode (with the space temperature above the set-point, and both Y1 and Y2 calling) and the space humidity is also above its set-point, the humidistat will close and the unit operation will shift to Reheat1 (Subcooling).The LDV1 and LDV2 3-way valves will become energized, causing the valves to close their Normally Open (NO) ports, open their Normally Closed (NC) ports redirecting all liquid flow into the Humidi-MiZer coil circuits. The increased subcooling causes the evaporator coil surface temperature to decrease, thus increasing the unit's Latent Cooling effect. The RDV1 and RDV2 valves remain de-energized and closed. See Fig. 78.

Hot Gas Reheat (Reheat 2) Mode: When the unit is operating in a part-load Cooling Mode (with the space temperature above the set-point, but only Y1 calling) and the space humidity is also above its set-point, the humidistat will close and the unit operation will shift to Reheat1 (Subcooling) in Circuit 1 and Reheat2 (Dehumidification) in Circuit 2. The LDV1 and LDV2 3-way valves and the RDV2 valve becomes energized; valve RDV1 remains de-energized and closed. Circuit 1 will operate in Reheat1 as described above. Circuit 2 will operate in Reheat2 as described below. See Fig. 79.

When there is only dehumidification demand (humidistat is above set-point but no Y1 call), both circuits will operate in Reheat2 mode. The supply fan motor and both compressors will be energized through the Reheat Control Board logic. All solenoids are energized; valves LDV1 and LDV2 close their Normally Open (NO) ports and open their Normally Closed (NC) ports and discharge bypass valves RDV1 and RDV2 open. All liquid flow and the bypassed discharge gases are directed into the Humidi-MiZer coil circuits.

If the space temperature drops during a Reheat2 Mode until the Heating Thermostat W1 closes, the W1 signal is received by the RCB. The RCB logic de-energizes the compressors, the Liquid Diverting Solenoid valves and the Reheat discharge Solenoid valves. The compressor and solenoid valves will remain in these conditions until the Heating Mode demand ends. If the humidistat is still above the set-point after the heating ends, the unit will restart in Reheat2 Mode.

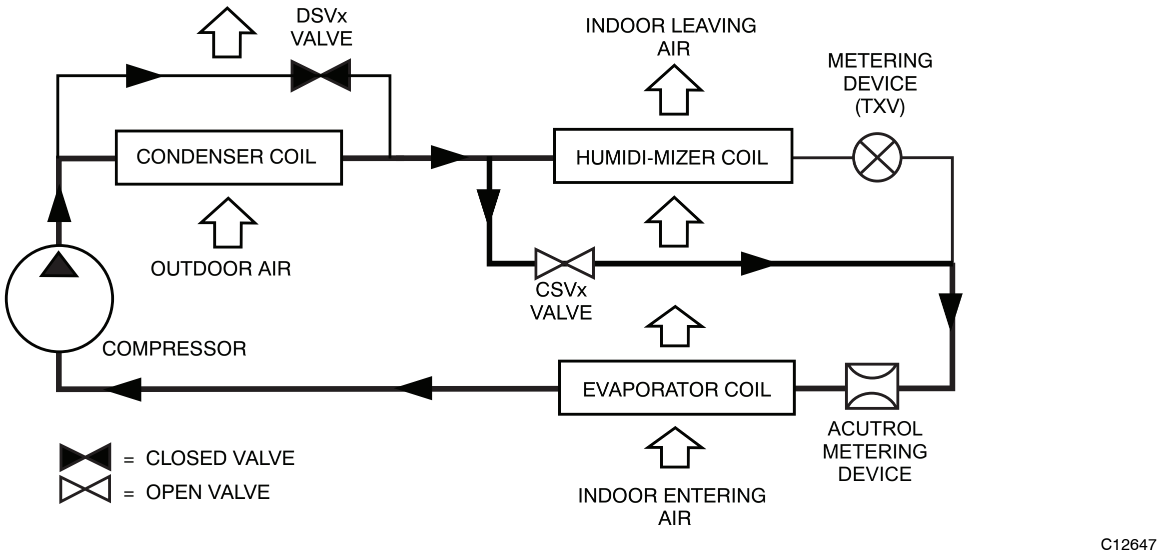


Fig. 74 - Normal Cooling Mode (Sizes 04 / 07 - Type 1) - Humidi-MiZer® System with Single Stage Cooling (Sizes 08-14 have two parallel circuits)

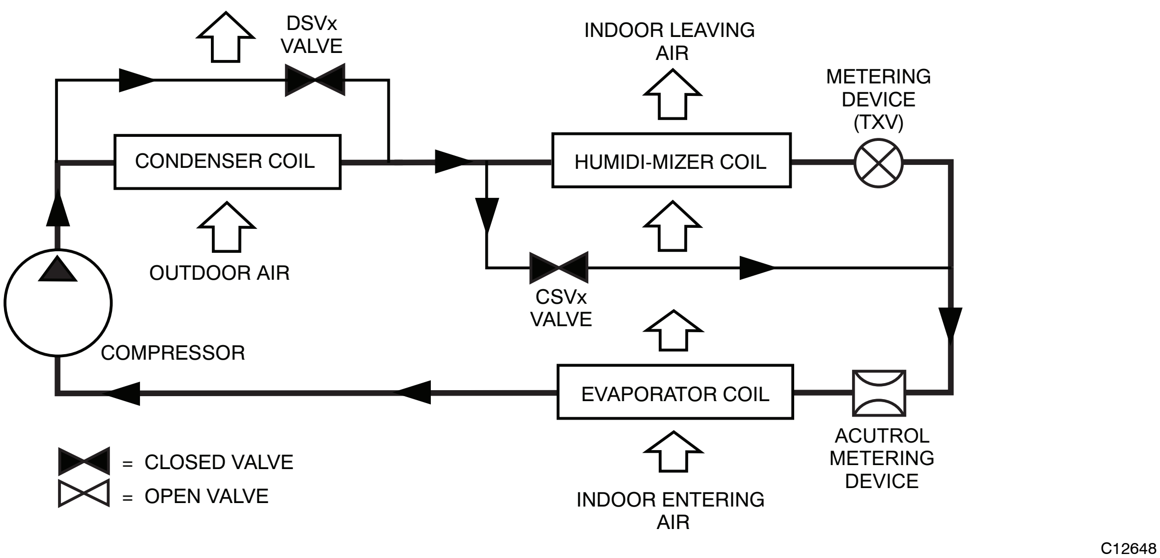


Fig. 75 - Subcooling (Reheat 1) Mode (Sizes 04 / 07 - Type 1) - Humidi-MiZer® System with Single Stage Cooling (Sizes 08-14 have two parallel circuits)

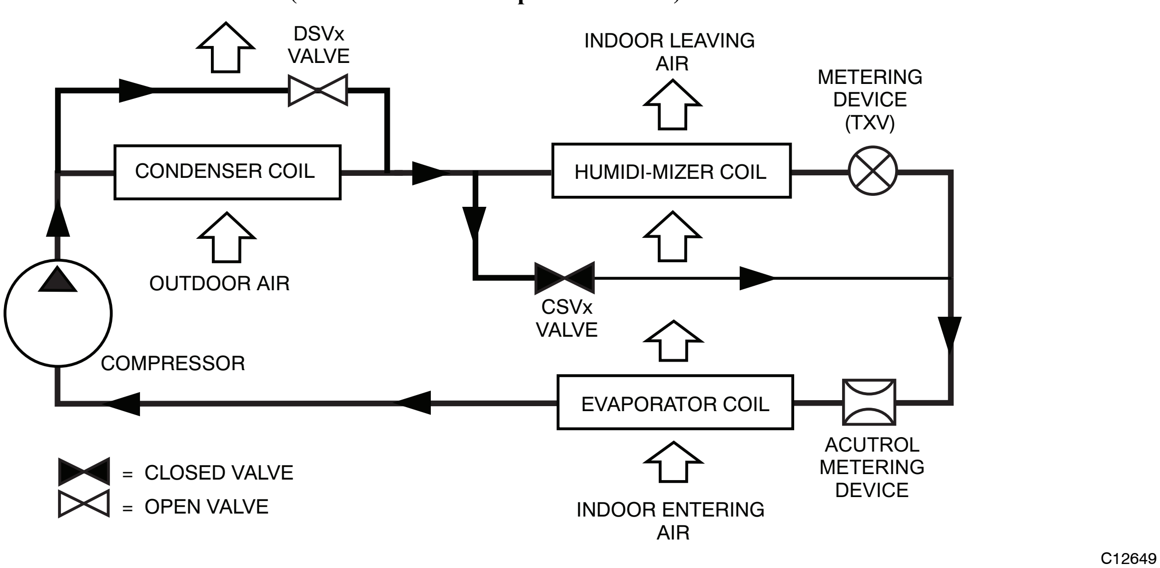


Fig. 76 - Hot Gas Reheat (Reheat 2) Mode (Sizes 04 / 07-Type 1) - Humidi-MiZer® System with Single Stage Cooling (Sizes 08-14 have two parallel circuits)

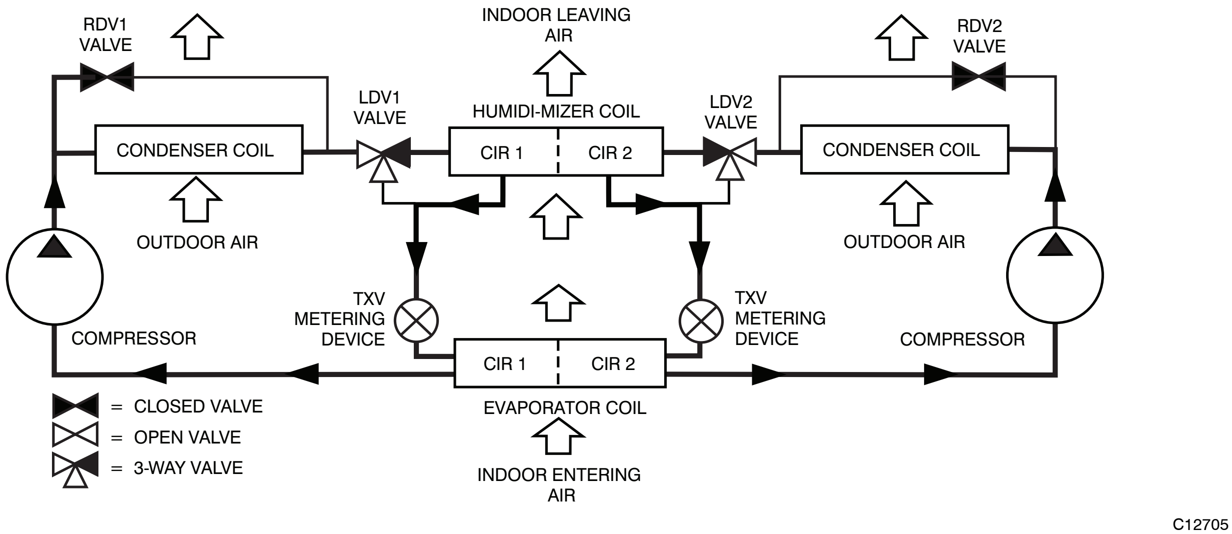


Fig. 77 - Normal Cooling Mode (Sizes 16: Type 3) - Humidi-MiZer® System with Dual Stage Cooling

48TC

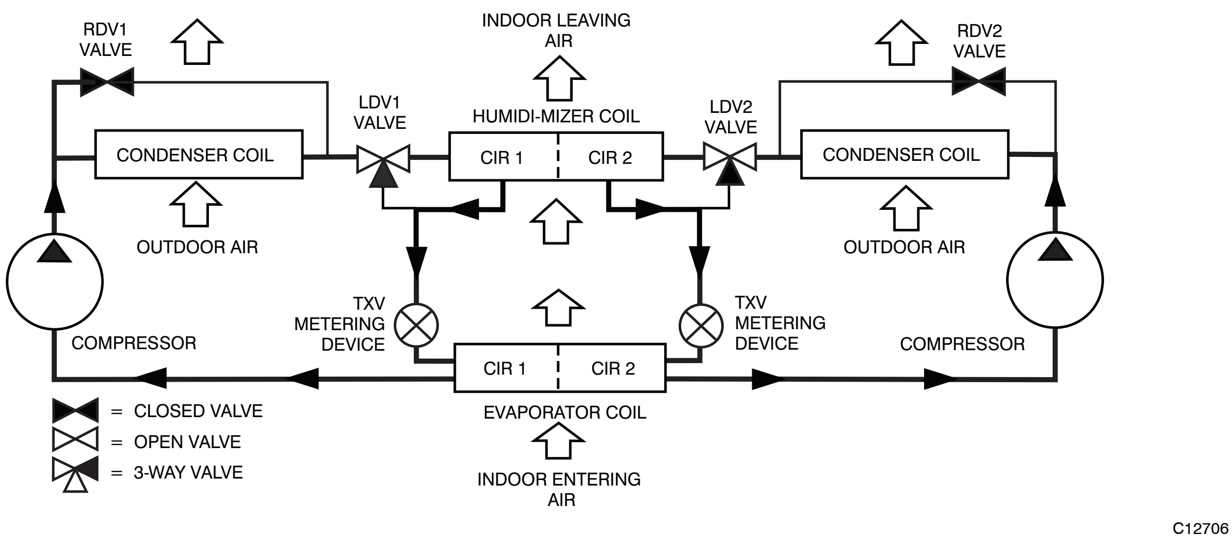


Fig. 78 - Subcooling (Reheat 1) Mode (Sizes 16: Type 3) - Humidi-MiZer® System with Dual Stage Cooling

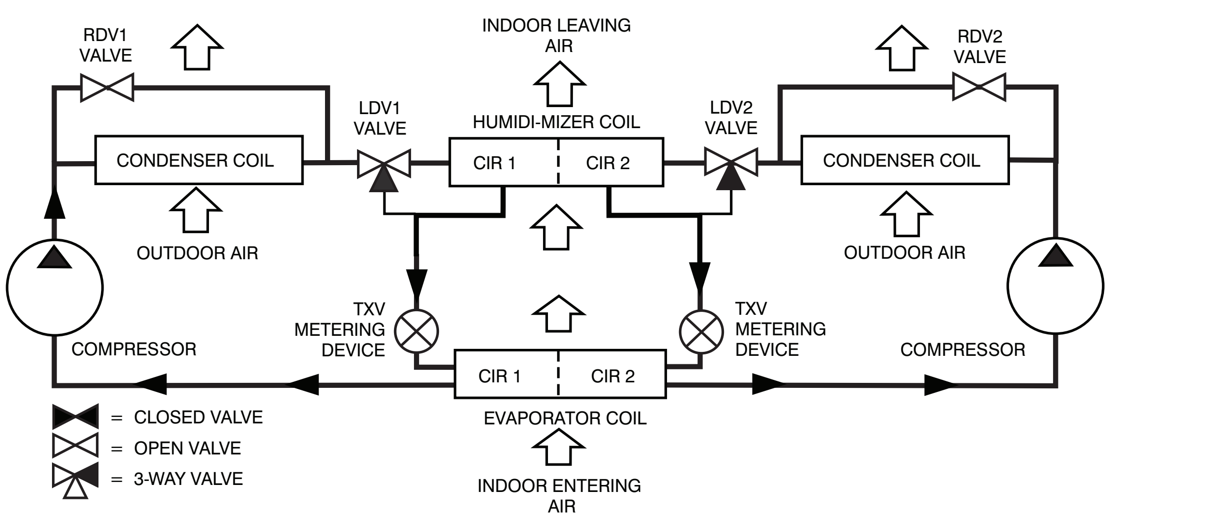
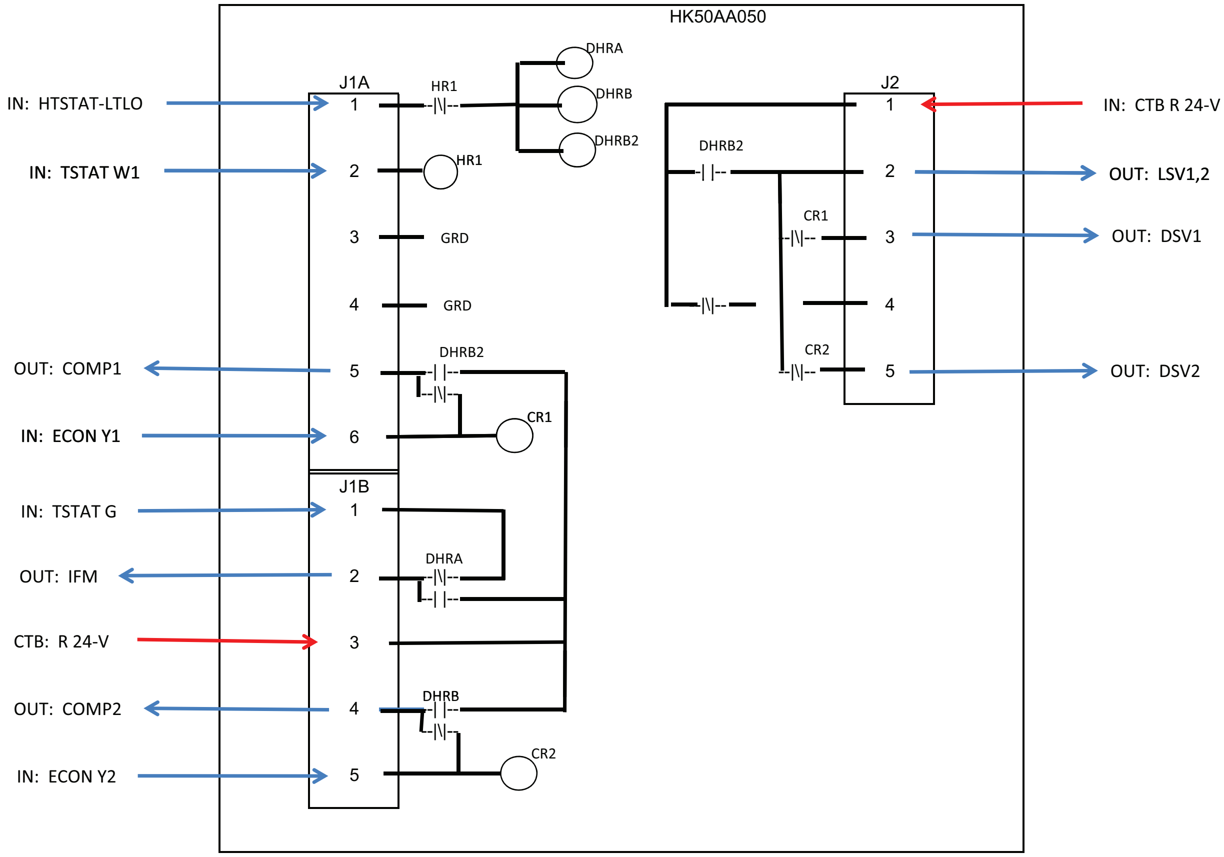


Fig. 79 - Hot Gas Reheat (Reheat 2) Mode (Sizes 16: Type 3) - Humidi-MiZer® System with Dual Stage Cooling



LEGEND

COMP -- COMPRESSOR
CR -- COOLING RELAY (24-VDC COIL, COM TO GROUND)
DHR -- DEHUMIDIFICATION RELAY (24-VDC COIL)
DSV -- DISCHARGE LINE SOLENOID VALVE
ECON -- ECONOMIZER
GRD -- GROUND
HR -- HEATING RELAY (24-VDC COIL)
HSTAT -- HUMIDISTAT
IFM -- INDOOR/SUPPLY FAN MOTOR
LSV -- LIQUID (3-WAY) SOLENOID VALVE
LTLO -- LOW TEMPERATURE LOCKOUT

C13274

Fig. 80 - Reheat Control Board Schematic

48TC

Table 26 – 48TC 04-14 TYPE 1 Humidi-MiZer: REHEAT CONTROL Board I/O

RCB INPUT POINT NAME	TYPE	CONNECTION (PIN NUMBER)	UNIT CONNECTION	NOTE
Humidistat/LTLO	DI, 24-vac	J1A-1 (1)	LTLO	
Thermostat W1	DI, 24-vac	J1A-2 (2)	CTB-REHEAT-4	
Econ Y1	DI, 24-vac	J1A-6 (6)	CTB-REHEAT-5	
Thermostat G	DI, 24-vac	J1B-1 (7)	CTB-REHEAT-1	
24-V Power (J1)	24-vac	J1B-3 (9)	CTB-R	
24-V Power (J2)	24-vac	J2-1	CTB-R TRAN2-24V	1-circ only 2-circ only
Econ Y2	DI, 24-vac	J1B-5 (11)	CTB-REHEAT-7	2-circ only
RCB OUTPUT POINT NAME	**TYPE**	**CONNECTION (PIN NUMBER)**	**UNIT CONNECTION**	**NOTE**
COMP1	DO, 24-vac	J1A-5 (5)	CTB-HEAT-6	
IFM	DO, 24-vac	J1B-2 (8)	CTB-REHEAT-2	
COMP2	DO, 24-vac	J1B-4 (10)	CTB-REHEAT-8	2-circ only
CSV (1,2)	DO, 24-vac	J2-2	FPT (BLK) FPT1,2	1-circ only 2-circ only
DSV1	DO, 24-vac	J2-3	DSV DSV1 RDV1	1-circ only 2-circ only Size 14
NOT LSV (NC)	DO, 24-vac	J2-4		not used
DSV2	DO, 24-vac	J2-5	DSV2 RDV2	2-circ only Size 14

Legend:

COMP	Compressor
CSV	Cooling Liquid Valve
CTB	Control Terminal Board
DI	Discrete Input (switch)
DO	Discrete Output (switch)
DSV	Discharge (gas) Solenoid Valve
Econ	Economizer
FPT	Freeze Protection Thermostat
IFM	Indoor (Supply) Fan Motor
LTLO	Low Temperature Lockout
RDV	Reheat Discharge (gas) Valve (load designation, size 14 only)
REHEAT	Connection Strip REHEAT (on CTB)

Table 27 – 48TC 04-07 Control Inputs / Unit Modes / RCB Outputs Summary
1-CIRCUIT:

CONTROL INPUTS				MODE		OUTPUTS, REHEAT BOARD/VALVES				
Y1	W1	G	HUM/ LTLO			COMP1	IFM	CSV	NOT LSV	DSV
OFF	OFF	ON	OFF	Normal	Fan	OFF	ON	OFF	NA	OFF
ON	OFF	ON	OFF	Normal	Cool	ON	ON	OFF		OFF
OFF	ON	X	OFF	Normal	Heat1	OFF	ON	OFF		OFF
OFF	OFF	ON	ON	Reheat2	Dehumidify	ON	ON	ON		ON
ON	OFF	ON	ON	Reheat1	Cool/ Subcool-Dehumidify	ON	ON	ON		OFF
OFF	ON	X	ON	Heat Override	Heat1	OFF	ON	OFF		OFF

Table 28 – 48TC 08-14 Control Inputs / Unit Modes / RCB Outputs Summary
2-CIRCUIT:

CONTROL INPUTS					MODE		OUTPUTS, RCB BOARD/VALVES							
Y1	Y2	W1	G	HUM/ LTLO			COMP1	COMP2	IFM	CSV1 (CLV1#)	CSV2 (CLV2#)	NOT LSV	DSV1 (RDV1#)	DSV2 (RDV2#)
OFF	OFF	OFF	ON	OFF	Normal	Fan	OFF	OFF	ON	OFF	OFF	NA	OFF	OFF
ON	OFF	OFF	ON	OFF	Normal	Cool1	ON	OFF	ON	OFF	OFF		OFF	OFF
ON	ON	OFF	ON	OFF	Normal	Cool2	ON	ON	ON	OFF	OFF		OFF	OFF
OFF	OFF	ON	X	OFF	Normal	Heat1	OFF	OFF	ON	OFF	OFF		OFF	OFF
OFF	OFF	OFF	ON	ON	Reheat2	Dehumidify	ON	ON	ON	ON	ON		ON	ON
ON	OFF	OFF	ON	ON	Reheat1 Cir1/ Reheat2 Cir 2	Cool1/Subcool- Dehumidify	ON	ON	ON	ON	ON		OFF	ON
ON	ON	OFF	ON	ON	Reheat1 Cir1 and Cir 2	Cool1 and Cool2/ Subcool- Dehumidify	ON	ON	ON	ON	ON		OFF	OFF
OFF	OFF	ON	X	ON	Heat Override	Heat1	OFF	OFF	ON	OFF	OFF		OFF	OFF
OFF	OFF	ON +W2	X	ON	Heat Override	Heat1 and Heat2	OFF	OFF	ON	OFF	OFF		OFF	OFF

Size 14 Designations Only

Table 29 – 48TC 16 Humidi-MiZer: REHEAT CONTROL Board I/O

RCB Input Point Name	Type	Connection Pin Nbr (Fig #)	Unit Connection	Note
Humidistat/LTLO	DI, 24-vac	J1A-1 (1)	LTLO	
Thermostat W1	DI, 24-vac	J1A-2 (2)	CTB-REHEAT-4	
Econ Y1	DI, 24-vac	J1A-6 (6)	CTB-REHEAT-5	
Thermostat G	DI, 24-vac	J1B-1 (7)	CTB-REHEAT-1	
24-V Power (J1)	24-vac	J1B-3 (9)	CTB-R	
24-V Power (J2)	24-vac	J2-1	TRAN2-24V	
Econ Y2	DI, 24-vac	J1B-5 (11)	CTB-REHEAT-7	
RCB Output Point Name	**Type**	**Connection Pin Nbr (Fig #)**	**Unit Connection**	**Note**
COMP1	DO, 24-vac	J1A-5 (5)	CTB-HEAT-6	
IFM	DO, 24-vac	J1B-2 (8)	CTB-REHEAT-2	
COMP2	DO, 24-vac	J1B-4 (10)	CTB-REHEAT-8	
CSV (1,2)	DO, 24-vac	J2-2	LDV1,2	
DSV1	DO, 24-vac	J2-3	RDV1	
NOT LSV (NC)	DO, 24-vac	J2-4		Not used
DSV2	DO, 24-vac	J2-5	RDV2	

Legend:

COMP	Compressor
CSV	Cooling Solenoid Valve (output)
CTB	Control Terminal Board
DI	Discrete Input (switch)
DO	Discrete Output (switch)
DSV	Discharge (gas) Solenoid Valve (output)
Econ	Economizer
FPT	Freeze Protection Thermostat
IFM	Indoor (Supply) Fan Motor
LDV	Liquid Solenoid Valve (device)
LTLO	Low Temperature Lockout
RDV	Reheat Discharge (gas) Valve (device)
REHEAT	Connection Strip REHEAT (on CTB)

Table 30 – 48TC 16 Control Inputs / Unit Modes / Reheat Control Board (Valves) Outputs Summary 2-Circuit:

CONTROL INPUTS					MODE		OUTPUTS, REHEAT BOARD (UNIT VALVE)							
Y1	Y2	W1	G	HUM/ LTLO			COMP1	COMP2	IFM	CSV1 (LDV1)	CSV2 (LDV2)	DSV NOT	DSV1 (RDV1)	DCV2 (RDV2)
OFF	OFF	OFF	ON	OFF	NORMAL	FAN	OFF	OFF	ON	OFF	OFF	NA	OFF	OFF
ON	OFF	OFF	ON	OFF	NORMAL	COOL1	ON	OFF	ON	OFF	OFF		OFF	OFF
ON	ON	OFF	ON	OFF	NORMAL	COOL2	ON	ON	ON	OFF	OFF		OFF	OFF
OFF	OFF	ON	X	OFF	NORMAL	HEAT1	OFF	OFF	ON	OFF	OFF		OFF	OFF
OFF	OFF	OFF	ON	ON	REHEAT	DEHUMIDIFY	ON	ON	ON	ON	ON		ON	ON
ON	OFF	OFF	ON	ON	SUBCOOL CIR1/ REHEAT CIR 2	COOL1/ SUBCOOL-DEHUMIDI-FY	ON	ON	ON	ON	ON		OFF	ON
ON	ON	OFF	ON	ON	SUBCOOL CIR1 AND CIR 2	COOL1 AND COOL2/ SUBCOOL-DEHUMIDI-FY	ON	ON	ON	ON	ON		OFF	OFF
OFF	OFF	ON	X	ON	HEAT OVERRIDE	HEAT1	OFF	OFF	ON	OFF	OFF		OFF	OFF
OFF	OFF	ON +W2	X	ON	HEAT OVERRIDE	HEAT1 AND HEAT2	OFF	OFF	ON	OFF	OFF		OFF	OFF

Table 31 – Humidi-MiZer Start-up

Step	Response / Comment
Check CTB for JMP5,6,7	JMP5,6,7 must be cut and open
Open Humidistat contacts	
Start unit in Cooling (close Y1)	Observe and record suction pressure, discharge pressure, evaporator entering air temperature and liquid temperature at outlet of reheat coil. Confirm correct rotation for compressor. Check for correct ramp-up of outdoor fan motor as condenser coil warms.
Check unit charge per charging chart	(Jumper 32LT temperature sensor during this check. Remove jumper when completed.)
Switch unit to High-Latent mode (Subcooler) by closing Humidistat with Y1 closed	Observe: Reduction in suction pressure (5 to 7 psi expected) Discharge pressure unchanged Liquid temperature drops to 50-55 F range LSV solenoid energized, valve closes
Switch unit to DEHUMID (Reheat) by opening Y1	Observe: Suction pressure increases to normal cooling level Discharge pressure decreases (35 to 50 psi) (limited by Motormaster) Liquid temperature returns to normal cooling level LSV solenoid energized, valve closes DSV solenoid energized, valve opens
With unit in DEHUMID mode, close W1	Compressor and outdoor fan stop LSV and DSV solenoids de-energized
Open W1, restore unit to DEHUMID mode	
Open Humidistat input	Compressor and outdoor fan stop LSV and DSV solenoids de-energized
Restore setpoints for thermostat and Humidistat	

Table 32 – Humidi-MiZer® Reheat Control Board I/O

POINT NAME	TYPE	CONNECTION PIN NUMBER	UNIT CONNECTION	NOTE
Humidistat/LTLO	DI, 24VAC	J1A−1 (1)	LTLO	
Thermostat W1	DI, 24VAC	J1A−2 (2)	CTB−REHEAT−4	
Econ Y1	DI, 24VAC	J1A−6 (6)	CTB−REHEAT−5	
Thermostat G	DI, 24VAC	J1B−1 (7)	CTB−REHEAT−1	
24V Power (J1)	24VAC	J1B−3 (9)	CTB−R	
24V Power (J2)	24 VAC	J2−1	CTB−R	
Econ Y2	DI, 24VAC	J1B−5 (11)	CTB−REHEAT−7	2−circuit only
COMP1	DO, 24VAC	J1A−5 (5)	CTB−HEAT −6	
IFM	DO, 24VAC	J1B−4 (8)	CTB−REHEAT−2	
COMP2	DO, 24VAC	J1B−4 (10)	CTB−REHEAT−8	
LSV	DO, 24VAC	J2−2	FTP (BLK)	
DSV1	DO, 24VAC	J2−3	DSV	
NOT LSV	DO, 24VAC	J2−4		2−circuit only
DSV2	DO, 24VAC	J2−5		2−circuit only

LEGEND
COMP– Compressor
CTB . – Control Terminal Board
DI . . . – Discrete Input (switch)
DO . . – Discrete Output (switch)
DSV . – Discharge (gas) Solenoid Valve

Table 33 – Humidi-MiZer® Troubleshooting

PROBLEM	CAUSE	SOLUTION
Reheat1 (Subcooling) Mode Will Not Activate	No Dehumidification Demand.	See *“No Dehumidification Demand”* below.
	Outdoor temperature too low.	Compare outdoor temperature to LTLO setting. Normal operation.
	General Cooling Mode problem.	See Cooling Service Troubleshooting.
	Faulty Reheat Control Board (RCB) relay operation.	See *“Reheat Control Board (RCB) Relay Operation”* below.
	Cooling Liquid Valve open.	See *“Cooling Liquid Valves Operation”* below.
Reheat2 (Hot Gas Reheat) Mode Will Not Activate	No Dehumidification Demand.	See *“No Dehumidification Demand”* below.
	Outdoor temperature too low.	Compare outdoor temperature to LTLO setting. Subcooling (Reheat1) operation.
	General Cooling Mode problem.	See Cooling Service Troubleshooting.
	Faulty Reheat Control Board (RCB) relay operation.	See *“Reheat Control Board (RCB) Relay Operation”* below.
	Cooling Liquid Valve open.	See *“Cooling Liquid Valves”* below.
	Reheat Discharge Valve closed.	See *“Reheat Discharge Valve (RDV) ”* below.
No Dehumidification Demand	Relative humidity set-point is too high - Humidistat.	Check/decrease setting on accessory Humidistat.
	No humidity signal.	Check wiring at RCB: Pin J1A-1 Check Humidistat or Humidity Sensor Check Low Temperature Lockout (LTLO) switch status and wiring.
Reheat Control Board (RCB) Relay Operation	No 24V signal to input terminals.	Check wiring at RCB: Pin J1A-1 Check Low Temperature Lockout (LTLO) switch status and wiring.
		Check wiring and voltage at RCB: Pin J2-1 Check Control Terminal Board (CTB): Terminal R Check TRAN primary, secondary circuit breaker Check TRAN2 primary, secondary circuit breaker (when used). Check wiring.
	24V signal to input terminal J1A-2.	Check for Thermostat Heating Demand (W1). If YES, normal operation. if NO, check wiring.
	No power to output terminals.	Replace faulty Reheat Control Board (RCB).
	Relay outputs do not change state.	Replace faulty Reheat Control Board (RCB).
Cooling Liquid Valves Operation **CSV (Sizes 04-12) (Type 1):** **Open in Cool (De-energized)** **Close in Reheat1 and Reheat2 (Energized)** **CLV (Size 14) (Type 2):** **Open in Cool (De-energized)** **Close in Reheat1 and Reheat2 (Energized)** **LDV: 3-way (Size 16) (Type 3):** **NO: Open in Cool (De-energized)** **Close in Reheat 1 and Reheat 2 (Energized)** **NO: Close in Cool (De-energized) Open in Reheat 1 and Reheat 2 (Energized)**	Reheat1 or Reheat2 will not activate. Check RCB Pin J2-2 for 24V Check RCB Pin J2-2 for 0V Check RCB Pin J2-2 for 24V	See *“Reheat Control Board (RCB) Relay Operation”*.
	Solenoid Coil Burnout (CLV, LDV)	Check continuous voltage is less than 10%. Check under-voltage is less than 10% Check for missing coil assembly parts. Check for damaged valve enclosing tube.
	Stuck valve.	Replace CLV valve. Replace Filter Drier.
Reheat Discharge Valve Operation	Reheat2 will not activate DSV, DSV1, RDV, RDV1: Check for RCB Pin J2-5 for 24V. DSV2, RDV2: Check for RCB Pin J2-5 for 24V.	See *“Reheat Control Board (RCB) Relay Operation”*
Supply (Indoor) Fan Motor Not Running in Reheat2 Mode	Reheat Control board: No Input on RCB pin J1B-4. RCB Relay failure at output RCB pin JB-2	See *“Reheat Control Board (RCB) Relay Operation”*.

Table 33 - Humidi-MiZer® Troubleshooting (cont)

PROBLEM	CAUSE	SOLUTION
Compressor Not Running in Reheat2 Mode.	Reheat Control board: No Input on RCB pin J1B-4. RCB Relay failure at output RCB pins J1A-5 and J1B-1.	See *"Reheat Control Board (RCB) Relay Operation"*.
Low Latent Capacity in Subcooling or Hot Gas Reheat Modes.	Cooling Liquid Valve open or leaking.	See *"Cooling Liquid Valves Operation"* above.
Low Sensible Capacity in Normal Cool or Subcooling Reheat Modes.	Reheat Discharge Valve open or leaking.	See *"Reheat Discharge Valve (RDV)"* above.
Low Suction Pressure and high Superheat During Normal Cooling Mode.	General Cooling Mode Problem.	See Cooling Service Troubleshooting.
	Reheat Discharge Valve open or leaking.	See *"Reheat Discharge Valve (RDV)"* above.
Low Suction Pressure and High Discharge Pressure During Reheat1 and Reheat2 (Type 1).	TXV in Humidi-MiZer coil not controlling superheat.	Check TXV operation or mounting. Repair or replace.
Loss of Compressor Superheat Conditions in Reheat1 and Reheat2 Modes (Type 1).	TXV in Humidi-MiZer coil not controlling superheat.	Check TXV bulb mounting. Secure bulb tightly to suction line and cover with proper insulation. Replace TXV if stuck closed or open.
Reheat Discharge Valve Cycling On/Off.	Hot Gas Reheat mode low suction pressure limit.	Normal operation during Mixed Circuit Subcooling and Hot Gas Reheat Modes at Lower Outdoor Temperatures.
Circuit 2 Will Not Operate With Circuit 1 Off.	Normal Operation. Motormaster outdoor fan control requires operation of Circuit 1.	None.

Econon – Economizer
FPT – Freeze Protection Thermostat
IFM – Indoor (Supply) Fan motor
LSV – Liquid Solenoid Valve
LTLO – Low Temperature Lockout
REHEAT – Connection Strip REHEAT (on CTB)

Table 34 – Inputs/Modes/Outputs Summary

Y1	Y2	W1	G	HUM/ LTLO	MODE		COMP1	COMP2	IFM	LSV1	LSV2	LSV NOT	DSV1	DSV2
OFF	OFF	OFF	ON	OFF	Normal	Fan	OFF	OFF	ON=G	OFF	OFF	ON=R	OFF	OFF
ON	OFF	OFF	On	OFF	Normal	Cool1	ON=Y1	OFF	ON=G	OFF	OFF	ON=R	OFF	OFF
ON	ON	OFF	ON	OFF	Normal	Cool2	0N=Y2	ON	ON=G	OFF	OFF	ON=R	OFF	OFF
OFF	OFF	ON	X	OFF	Normal	Heat 1	OFF	OFF	ON=G	OFF	OFF	ON=R	OFF	OFF
OFF	OFF	OFF	ON	ON	Reheat	Dehumidify	ON	ON	ON=G	ON	ON	OFF	ON=R	ON=R
ON	OFF	OFF	ON	ON	Subcool Cir1/ Reheat Cir2	Cool1 and Cool2/Subcool– Dehumidify	ON	ON	ON=G	ON	ON	OFF	OFF	ON=R
ON	ON	OFF	ON	ON	Subcool Cir1 and Cir2	Cool1 and Cool2/Subcool– Dehumidify	ON	ON	ON=G	ON	ON	OFF	OFF	OFF
OFF	OFF	ON	X	ON	Heat Over-ride	Heat 1	OFF	OFF	ON=G	OFF	OFF	ON=R	OFF	OFF
OFF	OFF	ON+ W2	X	ON	Heat Over-ride	Heat 1 and 2	OFF	OFF	ON=G	OFF	OFF	ON=R	OFF	OFF

Table 35 – Normal Cooling Specifications

Demand and Mode			Outputs					Valves		
Circuit Demand	Space Humidity	Circuit Mode (A/B)	Indoor Fan (IDF)	Compressor (CMP.x)	Outdoor Fan	Cooling Reheat Control (CRC)	Reheat2 Valve (RH2.x)	Valve CV.x	Valve RH1.x	Valve RH2.x
Y1	Low	COOL1 Off	ON	CMP.A – ON CMP.B – OFF	On (32LT)	OFF	OFF	OFF (Open)	ON (Closed)	OFF (Closed)
Y1 + Y2	Low	COOL2	ON	CMP.A – ON CMP.B – ON	ON (32 LT)	OFF	OFF OFF	OFF (Open)	ON (Closed) On (Closed)	OFF (Closed)
Y1 + Y2	High	REHEAT1 Both	ON	CMP.A – ON CMP.B – ON	On (32LT)	ON	OFF OFF	ON (Closed) (Both)	OFF (Open) (Both)	OFF (Closed) (Both)
NONE	High	REHEAT2 Both	ON	CMP.A – ON CMP.B – ON	On (32LT)	ON	ON ON	ON (Closed) (Both)	OFF (Open) (Both)	On (Open) (Both)

ECONOMIZER SYSTEMS

The 48TC units may be equipped with a factory-installed or accessory (field-installed) economizer system. Two types are available: with a logic control system (EconoMi$er IV) and without a control system (EconoMi$er2). See Fig. 81 and Fig. 82 for component locations on each type. See Fig. 83 and Fig. 84 for economizer section wiring diagrams.

Both 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 your economizer on your unit.

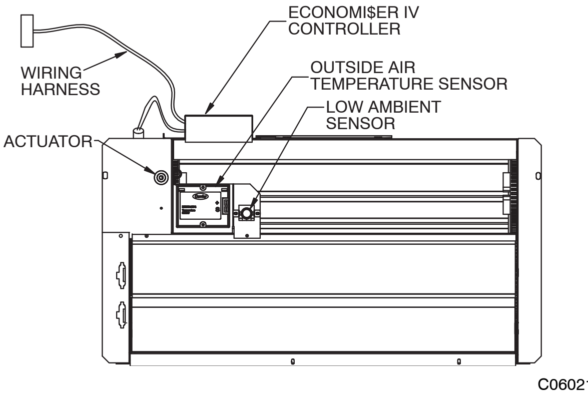


Fig. 81 - EconoMi$er IV Component Locations

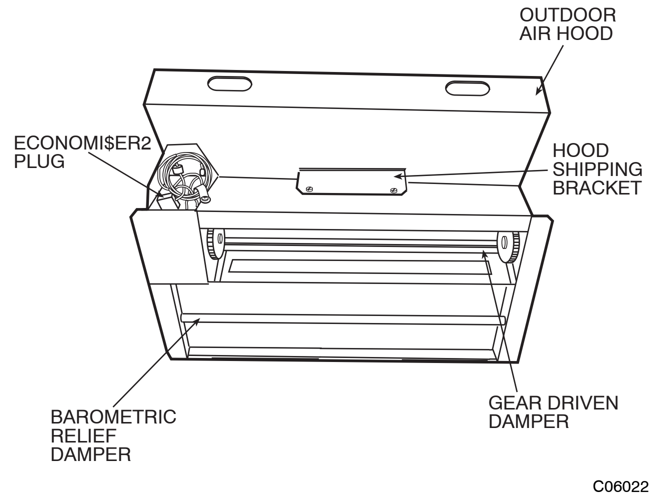
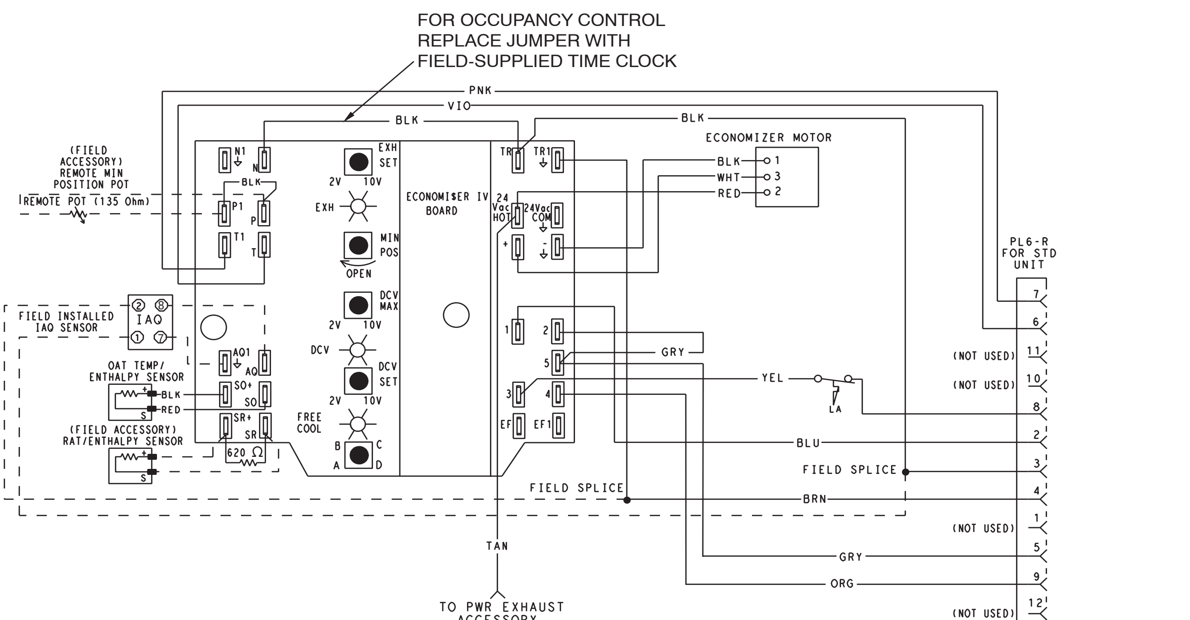


Fig. 82 - EconoMi$er2 Component Locations



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.

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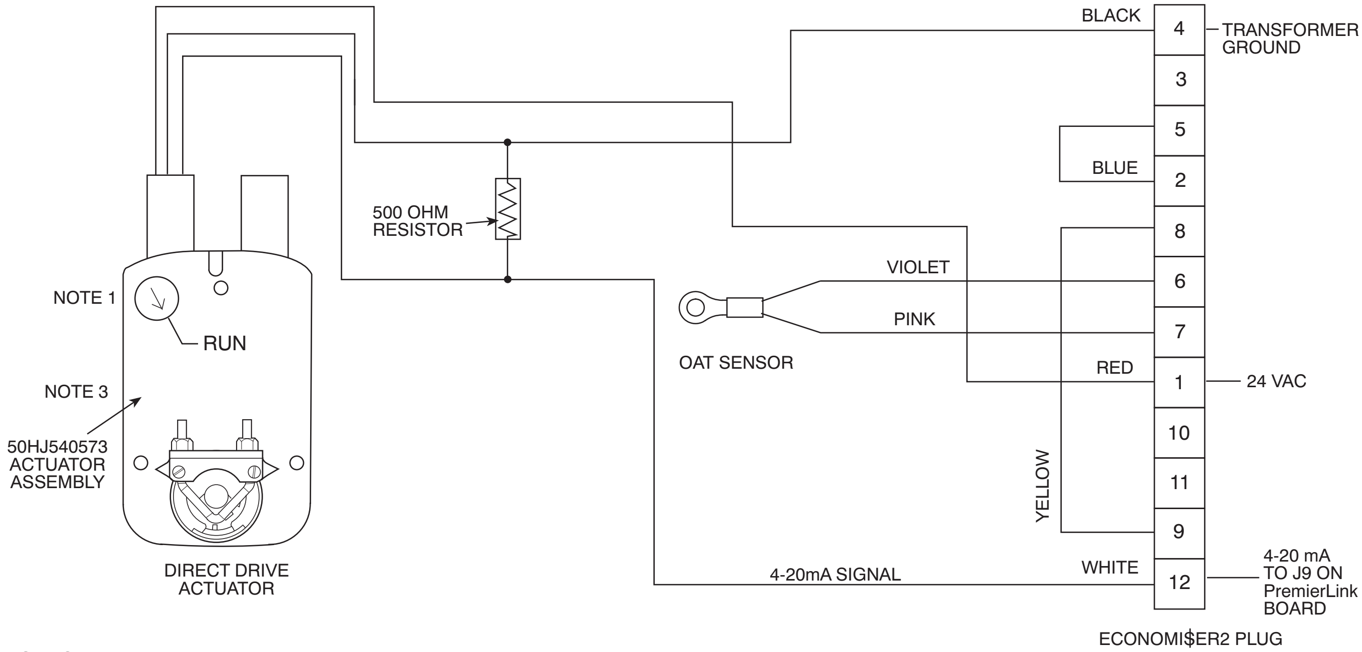
Fig. 83 - EconoMi$er IV Wiring



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.

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Fig. 84 - EconoMi$er2 with 4 to 20 mA Control Wiring

48TC

Table 36 – EconoMi$er IV Input/Output Logic

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

* For single enthalpy control, the module compares outdoor enthalpy to the ABCD setpoint.
† 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).

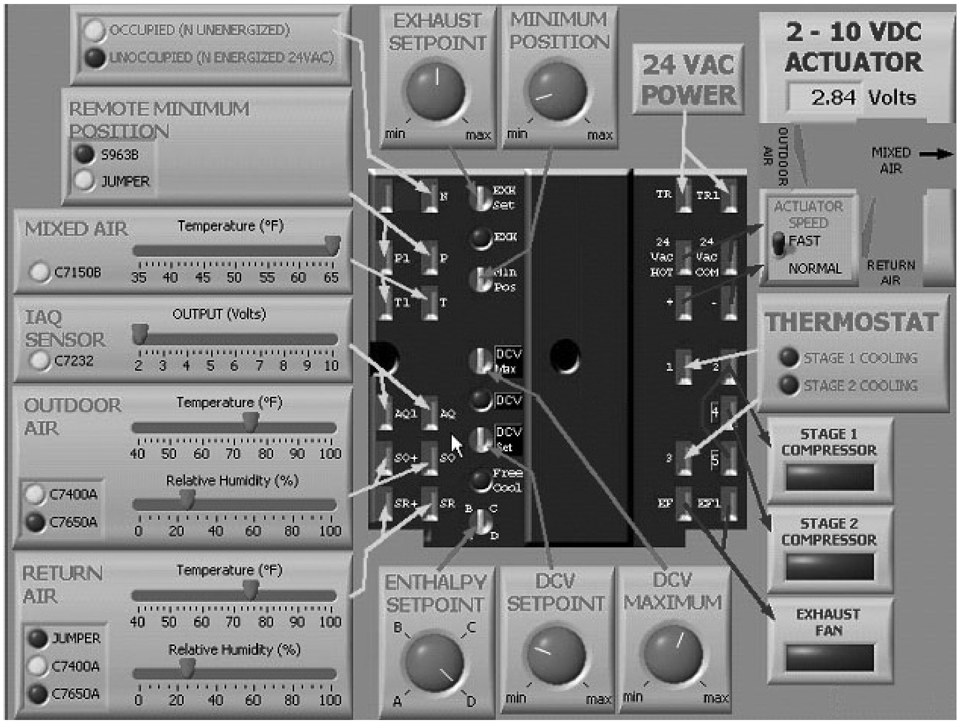

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Fig. 85 - EconoMi$er IV Functional View

EconoMi$er IV Standard Sensors

Table 36 provides a summary of EconoMi$er IV. Troubleshooting instructions are enclosed. A functional view of the EconoMi$er is shown in Fig. 84. Typical settings, sensor ranges, and jumper positions are also shown. An EconoMi$er IV simulator program is available from Carrier to help with EconoMi$er IV training and troubleshooting.

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. 86. The operating range of temperature measurement is 40° to 100°F (4° to 38°C). See Fig. 88.

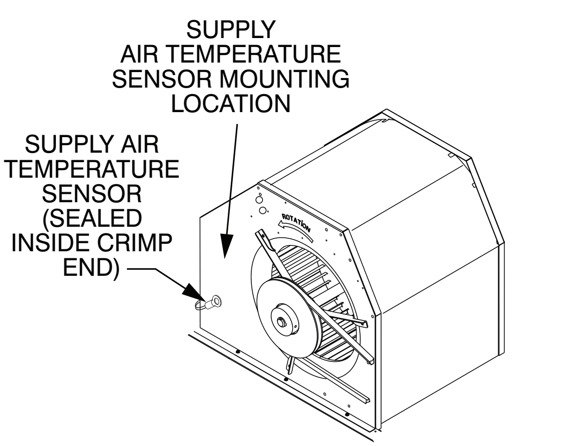

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Fig. 86 - Supply Air Sensor Location

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. 86. This sensor is factory installed. The operating range of temperature measurement is 0° to 158°F (-18° 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. 81.

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. 84 for wiring information.

Determine the EconoMi$er IV control mode before set up of the control. Some modes of operation may require different sensors. See Table 37. The EconoMi$er IV is supplied from the factory with a supply-air temperature sensor and an outdoor- air temperature sensor. This allows for operation of the EconoMi$er IV with outdoor air dry bulb changeover control. Additional accessories can be added to allow for different types of changeover control and operation of the EconoMi$er IV and unit.

Outdoor Dry Bulb Changeover

The standard controller is shipped from the factory configured for outdoor dry bulb changeover control. The outdoor air and supply air temperature sensors are included as standard. For this control mode, the outdoor temperature is compared to an adjustable setpoint selected on the control. If the outdoor-air temperature is above the setpoint, the EconoMi$er IV will adjust the outside air dampers to minimum position. If the outdoor-air temperature is below the setpoint, 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 setpoint potentiometer will be on. The changeover temperature setpoint is controlled by the free cooling setpoint potentiometer located on the control. See Fig. 87. The scale on the potentiometer is A, B, C, and D. See Fig. 88 for the corresponding temperature changeover values.

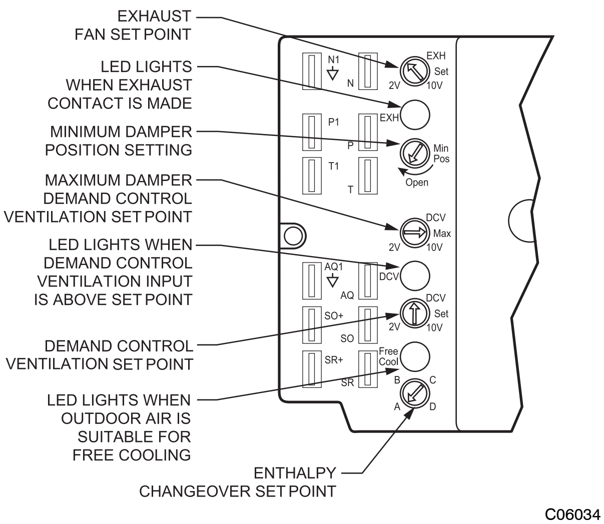

Fig. 87 - EconoMi$er IV Controller Potentiometer and LED Locations

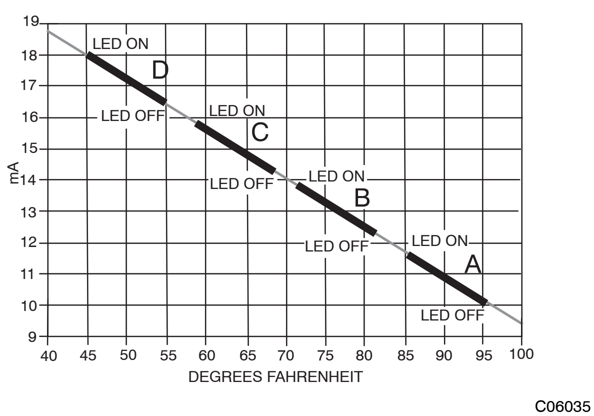

Fig. 88 - Outside Air Temperature Changeover Setpoints

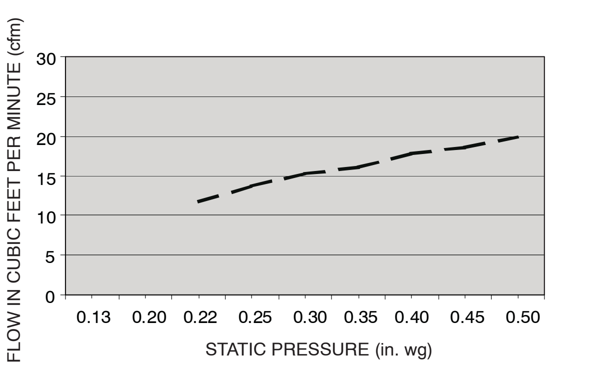

Fig. 89 - Outdoor-Air Damper Leakage

Differential Dry Bulb Control

For differential dry bulb control the standard outdoor dry bulb sensor is used in conjunction with an additional accessory dry bulb sensor (part number CRTEMPSN002A00). The accessory sensor must be mounted in the return airstream. See Fig. 90. Wiring is provided in the EconoMi$er IV wiring harness.
See Fig. 83.

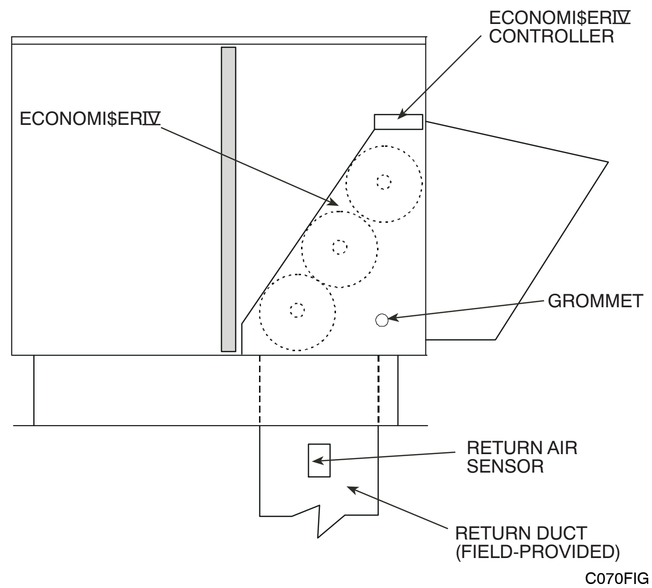

Fig. 90 - Return Air Temperature or Enthalpy Sensor Mounting Location

In this mode of operation, the outdoor-air temperature is compared to the return-air temperature and the lower temperature airstream is used for cooling. When using this mode of changeover control, turn the enthalpy setpoint potentiometer fully clockwise to the D setting. See Fig. 87.

Outdoor Enthalpy Changeover

For enthalpy control, accessory enthalpy sensor (part number HH57AC078) is required. Replace the standard outdoor dry bulb temperature sensor with the accessory enthalpy sensor in the same mounting location. See Fig. 90. When the outdoor air enthalpy rises above the outdoor enthalpy changeover setpoint, the outdoor-air damper moves to its minimum position. The outdoor enthalpy changeover setpoint is set with the outdoor enthalpy setpoint potentiometer on the EconoMi$er IV controller. The setpoints are A, B, C, and D. See Fig.91. The factory-installed 620-ohm jumper must be in place across terminals S_R and SR+ on the EconoMi$er IV controller.

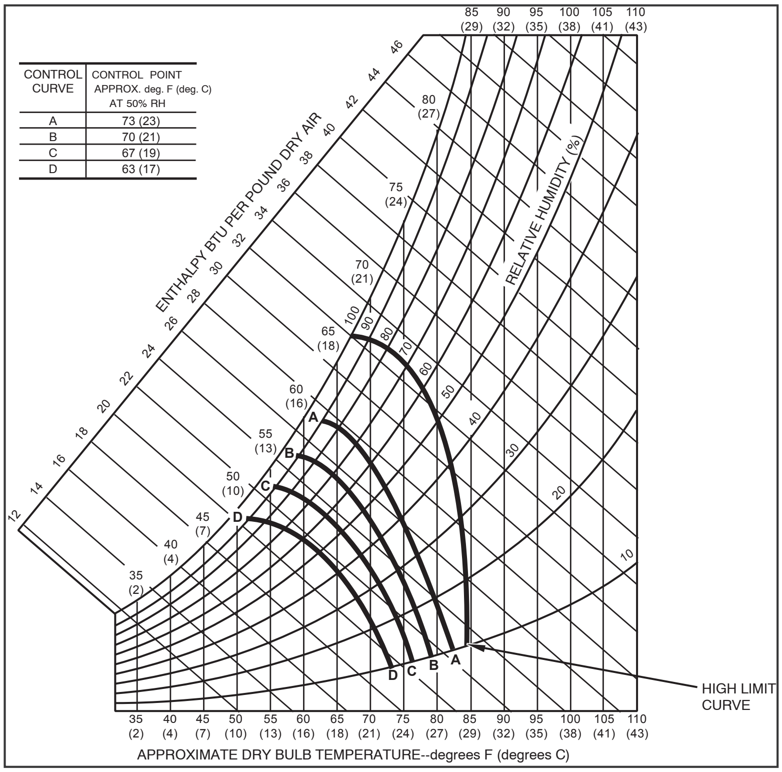

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Fig. 91 - Enthalpy Changeover Setpoints

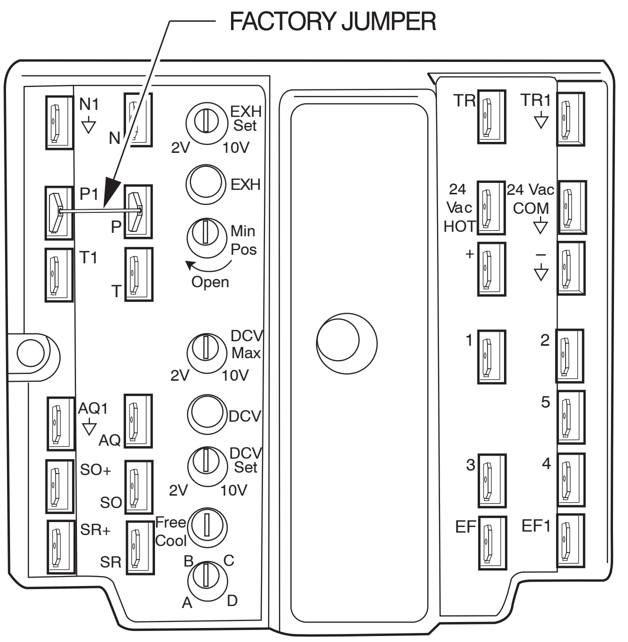

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Fig. 92 - EconoMi$er IV Control

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. 81. Mount the return air enthalpy sensor in the return air duct. See Fig. 90. Wiring is provided in the EconoMi$er IV wiring harness. See Fig. 81. The outdoor enthalpy changeover setpoint is set with the outdoor enthalpy setpoint potentiometer on the EconoMi$er IV controller. When using this mode of changeover control, turn the enthalpy setpoint potentiometer fully clockwise to the D setting.

Indoor Air Quality (IAQ) Sensor Input

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

Mount the accessory IAQ sensor according to manufacturer specifications. The IAQ sensor should be wired to the AQ and AQ1 terminals of the controller. Adjust the DCV potentiometers to correspond to the DCV voltage output of the indoor air quality sensor at the user-determined setpoint. See Fig. 93.

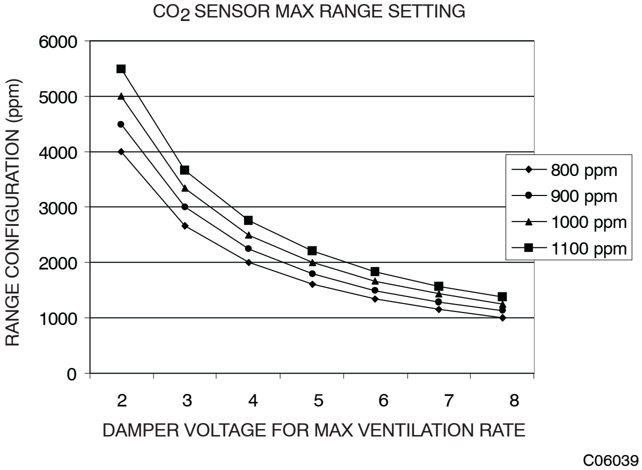


Fig. 93 - CO_2 Sensor Maximum Range Settings

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 Setpoint Adjustment

The exhaust setpoint will determine when the exhaust fan runs based on damper position (if accessory power exhaust is installed). The setpoint is modified with the Exhaust Fan Setpoint (EXH SET) potentiometer. See Fig. 87. The setpoint 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. 87. 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:

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

   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 .10) + (75 x .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. 92 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$er IV damper is desirable when requiring additional temporary ventilation. If a field-supplied remote potentiometer is wired to the EconoMi$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. 92.

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 24V signal from terminal N), the EconoMi$er IV will be in unoccupied mode.

Demand Control Ventilation (DCV)

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

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

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

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.

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

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. 93 to determine the maximum setting of the CO_2 sensor. For example, an 1100 ppm setpoint relates to a 15 cfm per person design. Use the 1100 ppm curve on Fig. 93 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$er IV controller will output the 6.7 volts from the CO_2 sensor to the actuator when the CO_2 concentration in the space is at 1100 ppm. The DCV setpoint may be left at 2 volts since the CO_2 sensor voltage will be ignored by the EconoMi$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.

Table 37 – 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.

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 setpoint, and exhaust potentiometers fully counterclockwise (CCW).
10. Set DCV maximum position potentiometer fully clockwise (CW).
11. Set enthalpy potentiometer to D.
12. Apply 24 VAC power 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$er IV preparation procedure has been performed.
2. Ensure terminals AQ and AQ1 are open. The LED for both DCV and Exhaust should be off. The actuator should be fully closed.
3. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The LED for both DCV and Exhaust should turn on. The actuator should drive to between 90 and 95% open.
4. Turn the Exhaust potentiometer CW until the Exhaust LED turns off. The LED should turn off when the potentiometer is approximately 90%. The actuator should remain in position.
5. Turn the DCV setpoint potentiometer CW until the DCV LED turns off. The DCV LED should turn off when the potentiometer is approximately 9-v. The actuator should drive fully closed.
6. Turn the DCV and Exhaust potentiometers CCW until the Exhaust LED turns on. The exhaust contacts will close 30 to 120 seconds after the Exhaust LED turns on.
7. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

DCV Minimum and Maximum Position

To check the DCV minimum and maximum position:

1. Make sure EconoMi$er IV preparation procedure has been performed.
2. Connect a 9-v battery to AQ (positive node) and AQ1 (negative node). The DCV LED should turn on. The actuator should drive to between 90 and 95% open.
3. Turn the DCV Maximum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.
4. Turn the DCV Maximum Position potentiometer to fully CCW. The actuator should drive fully closed.
5. Turn the Minimum Position potentiometer to midpoint. The actuator should drive to between 20 and 80% open.

6. Turn the Minimum Position Potentiometer fully CW. The actuator should drive fully open.
7. Remove the jumper from TR and N. The actuator should drive fully closed.
8. Return EconoMi$er IV settings and wiring to normal after completing troubleshooting.

Supply-Air Sensor Input

To check supply-air sensor input:

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

EconoMi$er IV Troubleshooting Completion

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

1. Disconnect power at TR and TR1.
2. Set enthalpy potentiometer to previous setting.
3. Set DCV maximum position potentiometer to previous setting.
4. Set minimum position, DCV setpoint, 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 24 VAC power to terminals TR and TR1.

PRE-START-UP

⚠ WARNING

PERSONAL INJURY HAZARD

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

1. Follow recognized safety practices and wear approved Personal Protective Equipment (PPE), including safety glasses and gloves when checking or servicing refrigerant system.
2. Do not use a torch to remove any component. System contains oil and refrigerant under pressure. To remove a component, wear PPE and proceed as follows:
   a. Shut off all electrical power to unit. Apply applicable Lock-out/Tagout 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 Lock-out/Tagout 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. Inspect the RTU-OPEN's Alarms for initial insight to any potential issues. Refer to the following manual: *"Controls, Start-up, Operation and Troubleshooting Instructions."* Inspect the SAT sensor for relocation as intended during installation. Inspect special wiring as directed below.

48TC

Gas Piping

Check gas piping for leaks.

> ⚠ **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. 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 .
>
> Refer to the User's Information Manual provided with this unit for more details.
> 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, or use any phone in your building.
> **IMMEDIATELY call your gas supplier. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.**

Return-Air Filters

Ensure correct filters are installed in unit (see Appendix I - 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" 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 gauges 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 setpoint 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 Table 16 through Table 20 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 setpoints from a zone sensor or terminal control module. During start-up, the Carrier software can also be used to verify communication with PremierLink controller.

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

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

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

FASTENER TORQUE VALUES

Table 38 – Torque Values

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 I. PHYSICAL DATA

Table 39 – PHYSICAL DATA (COOLING) 3 - 6 TONS

		48TC*A04	48TC*A05	48TC*A06	48TC*A07
Refrigeration System					
	# Circuits / # Comp. / Type	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll	1 / 1 / Scroll
	Puron® refrig. (R–410A) (lbs–oz)	5–10	8–8	10–11	14–2
	Humidi–MiZer Puron® refrig. charge A/B (lbs – oz)	8–11	14–13	16–0	22–5
	Metering Device	Acutrol	Acutrol	Acutrol	Acutrol
	High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low–press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117
	Compressor Capacity Staging (%)	100%	100%	100%	100%
Evap. Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	2 / 15	2 / 15	4 / 15	4 / 15
	Total Face Area (ft^2)	5.5	5.5	5.5	7.3
	Condensate Drain Conn. Size	3/4–in	3/4–in	3/4–in	3/4–in
Evap. Fan and Motor					
Standard Static 1 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	–
	Max BHP	1.2	1.2	1.2	–
	RPM Range	560–854	560–854	770–1175	–
	Motor Frame Size	48	48	48	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
Medium Static 1 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	–
	Max BHP	1.2	1.2	1.5	–
	RPM Range	770–1175	770–1175	1035–1466	–
	Motor Frame Size	48	48	56	–
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	–
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	–
Standard Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	1.7	2.4
	RPM Range	560–854	560–854	770–1175	1073–1457
	Motor Frame Size	48	48	48	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	10 x 10
Medium Static 3 phase	Motor Qty / Drive Type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
	Max BHP	1.7	1.7	2.4	2.9*
	RPM Range	770–1175	770–1175	1035–1466	1173–1518
	Motor Frame Size	48	48	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	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
	Max BHP	2.4	2.4	2.9	3.7
	RPM Range	1035–1466	1035–1466	1303–1687	1474–1788
	Motor Frame Size	56	56	56	56
	Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
	Fan Diameter (in)	10 x 10	10 x 10	10 x 10	10 x 10
Cond. Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	1 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	14.6	16.5	16.5	21.3
Humidi–MiZer Coil					
	Material (Tube/Fin)	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Rows..Fins/in.	1 / 17	2 / 17	2 / 17	2 / 17
	Total Face Area (ft^2)	3.9	3.9	3.9	5.2
Cond. fan / motor					
	Qty / Motor Drive Type	1/ Direct	1/ Direct	1/ Direct	1/ 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 # / Size (in)	2 / 16 x 25 x 2	2 / 16 x 25 x 2	2 / 16 x 25 x 2	4 / 16 x 16 x 2
	OA inlet screen # / Size (in)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

NOTE: Humidi–MiZer is not available with Novation condenser coil models, only Round Tube / Plate Fin (RTPF).

* 575V motor utilizes 3.7 BHP.

– Not applicable

48TC

Table 40 – PHYSICAL DATA (HEATING) 3 - 6 TONS

		48TC**04	48TC**05	48TC**06	48TC**07
Gas Connection					
	# of Gas Valves	1	1	1	1
	Nat. gas supply line press (in. w.g.)/ (PSIG)	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47	4 –13 / 0.18 – 0.47
	LP supply line press (in. w.g.) / (PSIG)	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47	11 –13 / 0.40 – 0.47
Heat Anticipator setting (Amps)					
	1st stage	0.14	0.14	0.14	0.14
	2nd stage	0.14	0.14	0.14	0.14
Natural Gas Heat					
LOW	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	1 / 2
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature Rise	25 – 55	25 – 55	20 – 55	15 – 55
MED	# of stages / # of burners (total)	1 or 2 / 3	1 / 3	1 / 3	1 / 3
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature Rise	55 – 85	35 – 65	30 – 65	25 – 65
HIGH	# of stages / # of burners (total)	–	1 or 2 / 3	1 or 2 / 3	2 / 3
	Connection Size	–	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	–	195 / 115	195 / 115	195 / 115
	Temperature Rise	–	50 – 80	40 – 80	35 – 80
Liquid Propane Heat					
LOW	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	1 / 2
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature Rise	25 – 55	25 – 55	20 – 55	15 – 55
MED	# of stages / # of burners (total)	1 or 2 / 3	1 / 3	1 / 3	1 / 3
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	195 / 115
	Temperature Rise	55 – 85	35 – 65	30 – 65	25 – 65
HIGH	# of stages / # of burners (total)	–	1 or 2 / 3	1 or 2 / 3	2 / 3
	Connection Size	–	1/2–in NPT	1/2–in NPT	1/2–in NPT
	Rollout switch opens / closes	–	195 / 115	195 / 115	195 / 115
	Temperature Rise	–	50 – 80	40 – 80	35 – 80
Low NOx Gas Heat					
LOW	# of stages / # of burners (total)	1 / 2	1 / 2	1 / 2	–
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	–
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	–
	Temperature Rise	20 – 50	20 – 50	15 – 50	–
MED	# of stages / # of burners (total)	1 / 3	1 / 3	1 / 3	–
	Connection Size	1/2–in NPT	1/2–in NPT	1/2–in NPT	–
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115	–
	Temperature Rise	30 – 60	30 – 60	25 – 60	–
HIGH	# of stages / # of burners (total)	–	1 / 3	1 / 3	–
	Connection Size	–	1/2–in NPT	1/2–in NPT	–
	Rollout switch opens / closes	–	195 / 115	195 / 115	–
	Temperature Rise	–	40 – 70	35 – 70	–

– Not applicable

Table 41 – PHYSICAL DATA (COOLING) 7.5 - 8.5 TONS

		48TC*A08	48TC*D08	48TC*A09	48TC*D09
Refrigeration System					
	# Circuits / # Comp. / Type	1 / 1 / Scroll	2 / 2 / Scroll	1 / 1 / Scroll	2 / 2 / Scroll
	RTPF models R–410a charge A/B (lbs – oz)	13 – 12	8 – 5 / 8 – 2	15 – 4	10 – 5 / 10 – 12
	Alternate (MCHX) R–410a charge A/B (lbs – oz)		4 – 6 / 4 – 6		
	Alternate (Humidi–MiZer) R–410a charge A/B (lbs – oz)		13 – 3 / 13 – 3		16 – 13 / 16 – 13
	Metering device	Acutrol	Acutrol	Acutrol	Acutrol
	High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
	Low–press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117
	Compressor Capacity Staging (%)	100%	50% / 100%	100%	50% / 100%
Evap. Coil					
	Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
	Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	3 / 15	3 / 15	3 / 15	3 / 15
	Total face area (ft^2)	8.9	8.9	11.1	11.1
	Condensate drain conn. size	3/4–in	3/4–in	3/4–in	3/4–in
Humidi–MiZer Coil					
	Material	–	Cu / Al	–	Cu / Al
	Coil type	–	3/8–in RTPF	–	3/8–in 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	489–747	489–747	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	2.9*	2.9*	2.4	2.4
	RPM range	733–949	733–949	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	4.7	4.7	3.7	3.7
	RPM range	909–1102	909–1102	838–1084	838–1084
	Motor frame size	14	14	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–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
	Rows / FPI	2 / 17	2 / 17	2 / 17	2 / 17
	Total face area (ft2)	20.5	20.5	21.4	25.1
Alternate (MCHX) Cond. Coil					
	Material	–	Al / Al	–	–
	Coil type	–	Novation™	–	–
	Rows / FPI	–	1 / 20	–	–
	Total face area (ft2)	–	20.5	–	–
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 # / Size (in)	4 / 16 x 20 x 2	4 / 16 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2
	OA inlet screen # / Size (in)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1

NOTE: Humidi–MiZer is not available with Novation condenser coil models, only Round Tube/Plate Fin (RTPF).

* 575V motor utilizes 3.7 BHP

– Not applicable

APPENDIX I. PHYSICAL DATA (cont.)

Table 42 – PHYSICAL DATA (COOLING) 10 - 15 TONS

	48TC*A12	48TC*D12	48TC*D14	48TC*D16
Refrigeration System				
# Circuits / # Comp. / Type	1 / 1 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll	2 / 2 / Scroll
RTPF models R–410a charge A/B (lbs – oz)	20 – 0	10 – 5 / 10 – 3	11 – 0 / 11 – 6	15–14/16–12
Alternate (MCHX) R–410a charge A/B (lbs – oz)	–	6 – 0 / 6 – 0	7 – 6 / 8 – 0	–
Alternate (Humidi–MiZer) R–410a charge A/B (lbs – oz)	–	16 – 10 / 16 – 0	17 – 10 / 18 – 3	–
Metering device	Acutrol	Acutrol	Acutrol	Acutrol
High–press. Trip / Reset (psig)	630 / 505	630 / 505	630 / 505	630 / 505
Low–press. Trip / Reset (psig)	54 / 117	54 / 117	54 / 117	54 / 117
Compressor Capacity Staging (%)	100%	50% / 100%	50% / 100%	50% / 100%
Evap. Coil				
Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
Rows / FPI	4 / 15	4 / 15	4 / 15	3 / 15
Total face area (ft^2)	11.1	11.1	11.1	17.5
Condensate drain conn. size	3/4–in	3/4–in	3/4–in	3/4–in
Humidi–MiZer Coil				
Material	–	Cu / Al	Cu / Al	
Coil type	–	3/8–in RTPF	3/8–in RTPF	
Rows / FPI	–	2 / 17	2 / 17	
Total face area (ft^2)	–	8.4	8.4	
Evap. fan and motor				
Standard Static 3 phase: Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
Standard Static 3 phase: Max BHP	2.4	2.4	2.9*	2.9*
Standard Static 3 phase: RPM range	591–838	591–838	652–843	507–676
Standard Static 3 phase: Motor frame size	56	56	56	56
Standard Static 3 phase: Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Standard Static 3 phase: Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
Medium Static 3 phase: Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
Medium Static 3 phase: Max BHP	3.7	3.7	3.7	3.7
Medium Static 3 phase: RPM range	838–1084	838–1084	838–1084	627–851
Medium Static 3 phase: Motor frame size	56	56	56	56
Medium Static 3 phase: Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
Medium Static 3 phase: Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
High Static 3 phase: Motor Qty / Drive type	1 / Belt	1 / Belt	1 / Belt	1 / Belt
High Static 3 phase: Max BHP	4.7	4.7	4.7	6.1
High Static 3 phase: RPM range	1022–1240	1022–1240	1022–1240	776–955
High Static 3 phase: Motor frame size	14	14	14	S184T
High Static 3 phase: Fan Qty / Type	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal	1 / Centrifugal
High Static 3 phase: Fan Diameter (in)	15 x 15	15 x 15	15 x 15	18 x 18
Cond. Coil				
Material	Cu / Al	Cu / Al	Cu / Al	Cu / Al
Coil type	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF	3/8–in RTPF
Rows / FPI	2 / 17	2 / 17	3 / 17	2 / 17
Total face area (ft2)	25.1	25.1	25.1	2 @ 23.1
Alternate (MCHX) Cond. Coil				
Material	–	Al / Al	Al / Al	–
Coil type	–	Novation™	Novation™	–
Rows / FPI	–	1 / 20	2 / 20	–
Total face area (ft2)	–	25.1	25.1	–
Cond. fan / motor				
Qty / Motor drive type	2 / direct	2 / direct	1 / direct	3 / direct
Motor HP / RPM	1/4 / 1100	1/4 / 1100	1 / 1175	1/4 / 1100
Fan diameter (in)	22	22	30	22
Filters				
RA Filter # / Size (in)	4 / 20 x 20 x 2	4 / 20 x 20 x 2	4 / 20 x 20 x 2	6 / 18 x 24 x 2
OA inlet screen # / Size (in)	1 / 20 x 24 x 1	1 / 20 x 24 x 1	1 / 20 x 24 x 1	2 / 24 x 27 x 1 (vert.) 1 / 30 x 39 x 1 (horiz)

NOTE: Humidi–MiZer is not available with Novation condenser coil models, only Round Tube/Plate Fin (RTPF) up to 16 size.

* 575V motor utilizes 3.7 BHP

– Not applicable

Table 43 – PHYSICAL DATA (HEATING) 7.5 - 10 TONS

		48TC**08	48TC**09	48TC**12
Gas Connection				
	# of Gas Valves	1	1	1
	Nat. gas supply line press (in. w.g.)/ (PSIG)	4 – 13 / 0.18 – 0.47	4 – 13 / 0.18 – 0.47	4 – 13 / 0.18 – 0.47
	LP supply line press (in. w.g.) / (PSIG)	11 – 13 / 0.40 – 0.47	11 – 13 / 0.40 – 0.47	11 – 13 / 0.40 – 0.47
Heat Anticipator setting (Amps)				
	1st stage	0.14	0.14	0.14
	2nd stage	0.14	0.14	0.14
Natural Gas Heat				
LOW	# of stages / # of burners (total)	1 / 3	1 / 3	2 / 4
	Connection Size	1/2–in NPT	1/2–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	20 – 50	20 – 50	25 – 65
MED	# of stages / # of burners (total)	2 / 4	2 / 4	2 / 5
	Connection Size	3/4–in NPT	3/4–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	35 – 65	30 – 65	30 – 65
HIGH	# of stages / # of burners (total)	2 / 5	2 / 5	2 / 5
	Connection Size	3/4–in NPT	3/4–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	45 – 75	40 – 75	35 – 70
Liquid Propane Heat				
LOW	# of stages / # of burners (total)	1 / 3	1 / 3	2 / 4
	Connection Size	1/2–in NPT	1/2–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	20 – 50	20 – 50	25 – 65
MED	# of stages / # of burners (total)	2 / 4	2 / 4	2 / 5
	Connection Size	3/4–in NPT	3/4–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	35 – 65	30 – 65	30 – 65
HIGH	# of stages / # of burners (total)	2 / 5	2 / 5	2 / 5
	Connection Size	3/4–in NPT	3/4–in NPT	3/4–in NPT
	Rollout switch opens / closes	195 / 115	195 / 115	195 / 115
	Temperature Rise	45 – 75	40 – 75	35 – 70
Low NOx Gas Heat				
LOW	# of stages / # of burners (total)	–	–	–
	Connection Size	–	–	–
	Rollout switch opens / closes	–	–	–
	Temperature Rise	–	–	–
MED	# of stages / # of burners (total)	–	–	–
	Connection Size	–	–	–
	Rollout switch opens / closes	–	–	–
	Temperature Rise	–	–	–
HIGH	# of stages / # of burners (total)	–	–	–
	Connection Size	–	–	–
	Rollout switch opens / closes	–	–	–
	Temperature Rise	–	–	–

– Not applicable

Table 44 – PHYSICAL DATA (HEATING) 12.5 - 15 TONS

		48TC**14	48TC**16
Gas Connection			
	# of Gas Valves	1	1
	Nat. gas supply line press (in. w.g.)/ (PSIG)	4 – 13 / 0.18 – 0.47	5 – 13 / 0.18 – 0.47
	LP supply line press (in. w.g.) / (PSIG)	11 – 13 / 0.40 – 0.47	11 – 13 / 0.40 – 0.47
Heat Anticipator setting (Amps)			
	1st stage	0.14	0.14
	2nd stage	0.14	0.14
Natural Gas Heat			
LOW	# of stages / # of burners (total)	2 / 4	2 / 6
LOW	Connection Size	3/4–in NPT	3/4–in NPT
LOW	Rollout switch opens / closes	195 / 115	225 / 145
LOW	Temperature Rise	25 – 65	20 – 55
MED	# of stages / # of burners (total)	2 / 5	2 / 8
MED	Connection Size	3/4–in NPT	3/4–in NPT
MED	Rollout switch opens / closes	195 / 115	225 / 145
MED	Temperature Rise	30 – 65	25 – 60
HIGH	# of stages / # of burners (total)	2 / 5	2 / 10
HIGH	Connection Size	3/4–in NPT	3/4–in NPT
HIGH	Rollout switch opens / closes	195 / 115	225 / 145
HIGH	Temperature Rise	35 – 70	35 – 65
Liquid Propane Heat			
LOW	# of stages / # of burners (total)	2 / 4	2 / 6
LOW	Connection Size	3/4–in NPT	3/4–in NPT
LOW	Rollout switch opens / closes	195 / 115	225 / 145
LOW	Temperature Rise	25 – 65	20 – 55
MED	# of stages / # of burners (total)	2 / 5	2 / 8
MED	Connection Size	3/4–in NPT	3/4–in NPT
MED	Rollout switch opens / closes	195 / 115	225 / 145
MED	Temperature Rise	30 – 65	25 – 60
HIGH	# of stages / # of burners (total)	2 / 5	2 / 10
HIGH	Connection Size	3/4–in NPT	3/4–in NPT
HIGH	Rollout switch opens / closes	195 / 115	225 / 145
HIGH	Temperature Rise	35 – 70	35 – 65
Low NOx Gas Heat			
LOW	# of stages / # of burners (total)	–	–
LOW	Connection Size	–	–
LOW	Rollout switch opens / closes	–	–
LOW	Temperature Rise	–	–
MED	# of stages / # of burners (total)	–	–
MED	Connection Size	–	–
MED	Rollout switch opens / closes	–	–
MED	Temperature Rise	–	–
HIGH	# of stages / # of burners (total)	–	–
HIGH	Connection Size	–	–
HIGH	Rollout switch opens / closes	–	–
HIGH	Temperature Rise	–	–

– Not applicable

48TC

APPENDIX II. FAN PERFORMANCE

General Fan Performance Notes:

1. Interpolation is permissible. Do not extrapolate.
2. External static pressure is the static pressure difference between the return duct and the supply duct plus the static pressure caused by any FIOPs or accessories.
3. Tabular data accounts for pressure loss due to clean filters, unit casing, and wet coils. Factory options and accessories may add static pressure losses.
4. The Fan Performance tables offer motor/drive recommendations. In cases when two motor/drive combinations would work, Carrier recommended the lower horsepower option.
5. For information on the electrical properties of Carrier's motors, please see the Electrical information section of this book.

APPENDIX II. FAN PERFORMANCE (cont.)

48TC

Table 45 – 48TC04 1 PHASE 3 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	553	0.14	681	0.22	782	0.32	870	0.42	948	0.53
975	575	0.16	700	0.25	801	0.35	888	0.46	965	0.57
1050	597	0.18	720	0.28	820	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	839	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1275	667	0.27	783	0.38	879	0.50	963	0.63	1038	0.76
1350	691	0.30	805	0.42	900	0.55	983	0.68	1057	0.82
1425	715	0.34	827	0.47	920	0.60	1002	0.74	1076	0.88
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95

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
900	1019	0.64	1084	0.76	1146	0.89	**1203**	**1.02**	**1258**	**1.16**
975	1036	0.69	1101	0.81	1162	0.94	**1219**	**1.08**	–	–
1050	1053	0.74	1118	0.86	**1179**	**1.00**	**1236**	**1.14**	–	–
1125	1071	0.79	1135	0.92	**1196**	**1.06**	**1253**	**1.20**	–	–
1200	1089	0.84	1153	0.98	**1213**	**1.12**	–	–	–	–
1275	1107	0.90	1171	1.04	**1231**	**1.19**	–	–	–	–
1350	1126	0.96	**1189**	**1.11**	–	–	–	–	–	–
1425	1144	1.03	**1208**	**1.18**	–	–	–	–	–	–
1500	1163	1.10	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.2 HP

Medium static 770–1175 RPM, 1.2 HP

Table 46 – 48TC04 1 PHASE 3 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	567	0.15	688	0.22	786	0.30	871	0.37	947	0.44
975	591	0.17	710	0.26	807	0.34	891	0.42	966	0.49
1050	615	0.20	732	0.29	828	0.38	911	0.47	985	0.55
1125	641	0.23	755	0.33	849	0.42	931	0.52	1005	0.61
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1275	693	0.29	802	0.41	893	0.53	974	0.63	1046	0.74
1350	719	0.33	826	0.46	916	0.58	995	0.70	1067	0.81
1425	746	0.38	850	0.51	939	0.64	1017	0.76	1088	0.89
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96

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
900	1016	0.51	1080	0.57	1139	0.64	**1195**	**0.71**	**1249**	**0.77**
975	1034	0.57	1098	0.64	1157	0.72	**1213**	**0.79**	**1266**	**0.86**
1050	1053	0.63	1116	0.71	**1176**	**0.79**	**1231**	**0.87**	**1284**	**0.95**
1125	1073	0.70	1135	0.79	**1194**	**0.87**	**1250**	**0.96**	**1302**	**1.04**
1200	1093	0.77	1155	0.87	**1213**	**0.96**	**1268**	**1.05**	**1321**	**1.14**
1275	1113	0.85	1174	0.95	**1232**	**1.05**	**1287**	**1.15**	–	–
1350	1133	0.92	**1194**	**1.03**	**1252**	**1.14**	–	–	–	–
1425	1154	1.01	**1215**	**1.12**	–	–	–	–	–	–
1500	1175	1.09	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.2 HP

Medium static 770–1175 RPM, 1.2 HP

Table 47 – 48TC04 3 PHASE 3 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	553	0.14	681	0.22	782	0.32	870	0.42	948	0.53
975	575	0.16	700	0.25	801	0.35	888	0.46	965	0.57
1050	597	0.18	720	0.28	820	0.38	906	0.49	983	0.61
1125	620	0.21	741	0.31	839	0.42	925	0.54	1001	0.66
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1275	667	0.27	783	0.38	879	0.50	963	0.63	1038	0.76
1350	691	0.30	805	0.42	900	0.55	983	0.68	1057	0.82
1425	715	0.34	827	0.47	920	0.60	1002	0.74	1076	0.88
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95

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
900	1019	0.64	1084	0.76	1146	0.89	1203	1.02	1258	1.16
975	1036	0.69	1101	0.81	1162	0.94	1219	1.08	1274	1.22
1050	1053	0.74	1118	0.86	1179	1.00	1236	1.14	1290	1.28
1125	1071	0.79	1135	0.92	1196	1.06	1253	1.20	1307	1.35
1200	1089	0.84	1153	0.98	1213	1.12	1270	1.27	1324	1.42
1275	1107	0.90	1171	1.04	1231	1.19	1287	1.34	1341	1.50
1350	1126	0.96	1189	1.11	1249	1.26	1305	1.42	1358	1.58
1425	1144	1.03	1208	1.18	1267	1.34	1323	1.50	1376	1.66
1500	1163	1.10	1226	1.25	1285	1.41	1341	1.58	1394	1.75

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

Boldface indicates field supplied drive is required.

Standard static 560−854 RPM, 1.7 HP max

Medium static 770−1175 RPM, 1.7 HP max

High static 1035−1466 RPM, 2.4 HP max

Table 48 – 48TC04 3 PHASE 3 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	567	0.15	688	0.22	786	0.30	871	0.37	947	0.44
975	591	0.17	710	0.26	807	0.34	891	0.42	966	0.49
1050	615	0.20	732	0.29	828	0.38	911	0.47	985	0.55
1125	641	0.23	755	0.33	849	0.42	931	0.52	1005	0.61
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1275	693	0.29	802	0.41	893	0.53	974	0.63	1046	0.74
1350	719	0.33	826	0.46	916	0.58	995	0.70	1067	0.81
1425	746	0.38	850	0.51	939	0.64	1017	0.76	1088	0.89
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96

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
900	1016	0.51	1080	0.57	1139	0.64	1195	0.71	1249	0.77
975	1034	0.57	1098	0.64	1157	0.72	1213	0.79	1266	0.86
1050	1053	0.63	1116	0.71	1176	0.79	1231	0.87	1284	0.95
1125	1073	0.70	1135	0.79	1194	0.87	1250	0.96	1302	1.04
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1275	1113	0.85	1174	0.95	1232	1.05	1287	1.15	1339	1.25
1350	1133	0.92	1194	1.03	1252	1.14	1307	1.25	1358	1.35
1425	1154	1.01	1215	1.12	1272	1.24	1326	1.35	1378	1.46
1500	1175	1.09	1235	1.22	1292	1.34	1346	1.46	1397	1.58

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

Boldface indicates field supplied drive is required.

Standard static 560−854 RPM, 1.7 HP max

Medium static 770−1175 RPM, 1.7 HP max

High static 1035−1466 RPM, 2.4 HP max

48TC

Table 49 – 48TC05 1 PHASE 4 TON HORIZONTAL SUPPLY**

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1300	675	0.28	790	0.40	886	0.52	969	0.65	1044	0.78
1400	707	0.33	819	0.45	913	0.58	996	0.72	1070	0.86
1500	740	0.38	849	0.52	941	0.66	1023	0.80	1096	0.95
1600	773	0.45	879	0.59	970	0.73	1050	0.88	1123	1.04
1700	807	0.52	910	0.67	999	0.82	1078	0.98	1150	1.14
1800	841	0.59	942	0.75	1029	0.91	1106	1.08	–	–
1900	875	0.68	974	0.85	1059	1.02	1135	1.19	–	–
2000	910	0.77	1006	0.95	1090	1.13	1165	1.31	–	–

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1200	1089	0.84	1153	0.98	**1213**	**1.12**	–	–	–	–
1300	1113	0.92	**1177**	**1.06**	–	–	–	–	–	–
1400	1138	1.01	**1201**	**1.15**	–	–	–	–	–	–
1500	1163	1.10	–	–	–	–	–	–	–	–
1600	**1189**	**1.20**	–	–	–	–	–	–	–	–
1700	–	–	–	–	–	–	–	–	–	–
1800	–	–	–	–	–	–	–	–	–	–
1900	–	–	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–

Available External Static Pressure (in. wg)

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.2 HP
Medium static 770–1175 RPM, 1.2 HP

Table 50 – 48TC05 1 PHASE 4 TON VERTICAL SUPPLY**

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1300	701	0.31	810	0.43	901	0.54	981	0.65	1053	0.76
1400	737	0.36	842	0.49	931	0.62	1010	0.74	1081	0.86
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96
1600	810	0.49	909	0.65	994	0.79	1070	0.94	1140	1.08
1700	847	0.57	943	0.73	1027	0.89	1101	1.05	1170	1.20
1800	885	0.66	978	0.83	1060	1.00	1133	1.16	–	–
1900	923	0.75	1014	0.94	1093	1.11	1165	1.29	–	–
2000	962	0.85	1049	1.05	–	–	–	–	–	–

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1200	1093	0.77	1155	0.87	**1213**	**0.96**	**1268**	**1.05**	**1321**	**1.14**
1300	1119	0.87	**1181**	**0.98**	**1239**	**1.08**	**1294**	**1.18**	–	–
1400	1147	0.98	**1208**	**1.09**	–	–	–	–	–	–
1500	1175	1.09	–	–	–	–	–	–	–	–
1600	–	–	–	–	–	–	–	–	–	–
1700	–	–	–	–	–	–	–	–	–	–
1800	–	–	–	–	–	–	–	–	–	–
1900	–	–	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–

Available External Static Pressure (in. wg)

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.2 HP
Medium static 770–1175 RPM, 1.2 HP

Table 51 – 48TC05 — 3 PHASE — 4 TON HORIZONTAL SUPPLY**

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1200	643	0.23	762	0.34	859	0.46	944	0.58	1020	0.71
1300	675	0.28	790	0.40	886	0.52	969	0.65	1044	0.78
1400	707	0.33	819	0.45	913	0.58	996	0.72	1070	0.86
1500	740	0.38	849	0.52	841	0.66	1023	0.80	1096	0.95
1600	773	0.45	879	0.59	970	0.73	1050	0.88	1123	1.04
1700	807	0.52	910	0.67	999	0.82	1078	0.98	1150	1.14
1800	841	0.59	942	0.75	1029	0.91	1106	1.08	1177	1.25
1900	875	0.68	974	0.85	1059	1.02	1135	1.19	1205	1.37
2000	910	0.77	1006	0.95	1090	1.13	1165	1.31	1234	1.49

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1200	1089	0.84	1153	0.98	1213	1.12	1270	1.27	1324	1.42
1300	1113	0.92	1177	1.06	1237	1.21	1293	1.36	1347	1.52
1400	1138	1.01	1201	1.15	1261	1.31	1317	1.47	1370	1.63
1500	1163	1.10	1226	1.25	1285	1.41	1341	1.58	1394	1.75
1600	1189	1.20	1252	1.36	1310	1.53	1365	1.70	1418	1.87
1700	1216	1.31	1277	1.48	1335	1.65	1390	1.83	1442	2.01
1800	1242	1.42	1303	1.60	1361	1.78	1415	1.96	**1467**	**2.15**
1900	1270	1.55	1330	1.73	1387	1.92	1441	2.11	**1493**	**2.30**
2000	1297	1.68	1357	1.87	1414	2.07	**1467**	**2.26**	–	–

Available External Static Pressure (in. wg)

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

- Standard static 560–854 RPM, 1.7 HP max
- Medium static 770–1175 RPM, 1.7 HP max
- High static 1035–1466 RPM, 2.4 HP max

Table 52 – 48TC05 — 3 PHASE — 4 TON VERTICAL SUPPLY**

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1200	666	0.26	778	0.37	871	0.47	952	0.57	1025	0.67
1300	701	0.31	810	0.43	901	0.54	981	0.65	1053	0.76
1400	737	0.36	842	0.49	931	0.62	1010	0.74	1081	0.86
1500	773	0.42	875	0.57	963	0.70	1040	0.84	1110	0.96
1600	810	0.49	909	0.65	994	0.79	1070	0.94	1140	1.08
1700	847	0.57	943	0.73	1027	0.89	1101	1.05	1170	1.20
1800	885	0.66	978	0.83	1060	1.00	1133	1.16	1200	1.32
1900	923	0.75	1014	0.94	1093	1.11	1165	1.29	1231	1.46
2000	962	0.85	1049	1.05	1127	1.24	1198	1.42	1263	1.61

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1200	1093	0.77	1155	0.87	1213	0.96	1268	1.05	1321	1.14
1300	1119	0.87	1181	0.98	1239	1.08	1294	1.18	1346	1.28
1400	1147	0.98	1208	1.09	1265	1.21	1320	1.32	1371	1.43
1500	1175	1.09	1235	1.22	1292	1.34	1346	1.46	1397	1.58
1600	1204	1.21	1263	1.35	1320	1.48	1373	1.61	1424	1.74
1700	1233	1.34	1292	1.49	1348	1.63	1401	1.77	1451	1.91
1800	1262	1.48	1321	1.64	1376	1.79	1428	1.94	**1479**	**2.09**
1900	1293	1.63	1350	1.79	1405	1.96	1457	2.12	**1506**	**2.28**
2000	1323	1.79	1380	1.96	1434	2.13	**1486**	**2.31**	–	–

Available External Static Pressure (in. wg)

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

- Standard static 560–854 RPM, 1.7 HP max
- Medium static 770–1175 RPM, 1.7 HP max
- High static 1035–1466 RPM, 2.4 HP max

Table 53 – 48TC06 1 PHASE 5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	800	0.39	904	0.49	999	0.60	1087	0.72	1169	0.85
1625	849	0.48	947	0.59	1038	0.70	1122	0.83	1201	0.96
1750	899	0.59	992	0.70	1078	0.82	1159	0.95	1235	1.08
1875	950	0.70	1038	0.82	1120	0.95	1198	1.08	1271	1.22
2000	1001	0.84	1085	0.96	1163	1.09	1238	1.23	1309	1.38
2125	1053	0.99	1133	1.12	1208	1.26	1280	1.40	–	–
2250	1106	1.16	1182	1.29	1254	1.44	–	–	–	–
2375	1159	1.34	1231	1.49	–	–	–	–	–	–
2500	–	–	–	–	–	–	–	–	–	–

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	1247	0.98	1320	1.13	1390	1.28	1457	1.44	–	–
1625	1276	1.10	1348	1.24	1416	1.40	–	–	–	–
1750	1308	1.22	1377	1.38	–	–	–	–	–	–
1875	1342	1.37	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–
2125	–	–	–	–	–	–	–	–	–	–
2250	–	–	–	–	–	–	–	–	–	–
2375	–	–	–	–	–	–	–	–	–	–
2500	–	–	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.2 HP

Medium static 770–1175 RPM, 1.2 HP

Table 54 – 48TC06 1 PHASE 5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	848	0.42	968	0.55	1069	0.68	1158	0.80	1238	0.94
1625	897	0.51	1013	0.65	1111	0.79	1198	0.93	1277	1.07
1750	947	0.61	1059	0.76	1155	0.91	1240	1.06	1318	1.21
1875	997	0.72	1105	0.89	1199	1.05	1283	1.21	1359	1.37
2000	1048	0.85	1153	1.03	1244	1.20	1326	1.37	–	–
2125	1100	1.00	1201	1.19	1290	1.37	–	–	–	–
2250	1152	1.16	1250	1.36	–	–	–	–	–	–
2375	1205	1.34	–	–	–	–	–	–	–	–
2500	–	–	–	–	–	–	–	–	–	–

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	1312	1.07	1380	1.20	1445	1.34	**1506**	**1.48**	–	–
1625	1350	1.21	1418	1.35	**1482**	**1.50**	–	–	–	–
1750	1390	1.36	–	–	–	–	–	–	–	–
1875	–	–	–	–	–	–	–	–	–	–
2000	–	–	–	–	–	–	–	–	–	–
2125	–	–	–	–	–	–	–	–	–	–
2250	–	–	–	–	–	–	–	–	–	–
2375	–	–	–	–	–	–	–	–	–	–
2500	–	–	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.2 HP

Medium static 770–1175 RPM, 1.2 HP

Table 55 – 48TC06 — 3 PHASE — 5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	800	0.39	904	0.49	999	0.60	1087	0.72	1169	0.85
1625	849	0.48	947	0.59	1038	0.70	1122	0.83	1201	0.96
1750	899	0.59	992	0.70	1078	0.82	1159	0.95	1235	1.08
1875	950	0.70	1038	0.82	1120	0.95	1198	1.08	1271	1.22
2000	1001	0.84	1085	0.96	1163	1.09	1238	1.23	1309	1.38
2125	1053	0.99	1133	1.12	1208	1.26	1280	1.40	1348	1.55
2250	1106	1.16	1182	1.29	1254	1.44	1323	1.59	1389	1.74
2375	1159	1.34	1231	1.49	1300	1.64	1367	1.80	1430	1.96
2500	1212	1.55	1281	1.70	1348	1.86	1412	2.02	1473	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	1247	0.98	1320	1.13	1390	1.28	1457	1.44	1522	1.61
1625	1276	1.10	1348	1.24	1416	1.40	1481	1.56	1544	1.73
1750	1308	1.22	1377	1.38	1444	1.53	1507	1.70	1569	1.87
1875	1342	1.37	1409	1.52	1473	1.69	1536	1.86	1596	2.03
2000	1377	1.53	1442	1.69	1505	1.86	1565	2.03	1624	2.21
2125	1414	1.71	1477	1.87	1538	2.04	1597	2.22	1654	2.40
2250	1452	1.91	1514	2.08	1573	2.25	1630	2.43	1686	2.62
2375	1492	2.12	1551	2.30	1609	2.48	1665	2.66	**1719**	**2.85**
2500	1533	2.36	1591	2.54	1647	2.73	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560 – 854 RPM, 1.7 HP max

Medium static 770 – 1175 RPM, 1.7 HP max

High static 1035 – 1466 RPM, 2.4 HP max

Table 56 – 48TC06 — 3 PHASE — 5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	848	0.42	968	0.55	1069	0.68	1158	0.80	1238	0.94
1625	897	0.51	1013	0.65	1111	0.79	1198	0.93	1277	1.07
1750	947	0.61	1059	0.76	1155	0.91	1240	1.06	1318	1.21
1875	997	0.72	1105	0.89	1199	1.05	1283	1.21	1359	1.37
2000	1048	0.85	1153	1.03	1244	1.20	1326	1.37	1401	1.54
2125	1100	1.00	1201	1.19	1290	1.37	1370	1.55	1444	1.73
2250	1152	1.16	1250	1.36	1336	1.55	1415	1.75	1487	1.94
2375	1205	1.34	1299	1.55	1384	1.76	1460	1.96	1532	2.17
2500	1258	1.54	1349	1.76	1431	1.98	1506	2.20	1576	2.41

CFM	Available External Static Pressure (in. wg)									
	1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1500	1312	1.07	1380	1.20	1445	1.34	1506	1.48	1564	1.62
1625	1350	1.21	1418	1.35	1482	1.50	1542	1.64	1600	1.79
1750	1390	1.36	1457	1.51	1520	1.67	1580	1.83	1637	1.98
1875	1430	1.53	1496	1.69	1559	1.86	1618	2.02	1675	2.19
2000	1471	1.72	1536	1.89	1598	2.06	1657	2.24	**1713**	**2.41**
2125	1513	1.92	1577	2.10	1638	2.28	**1696**	**2.47**	**1752**	**2.65**
2250	1555	2.13	1619	2.33	1679	2.52	**1736**	**2.72**	1791	2.91
2375	1598	2.37	1661	2.57	**1720**	**2.78**	–	–	–	–
2500	1642	2.63	**1704**	**2.84**	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560 – 854 RPM, 1.7 HP max

Medium static 770 – 1175 RPM, 1.7 HP max

High static 1035 – 1466 RPM, 2.4 HP max

Table 57 – 48TC07 3 PHASE 6 TON HORIZONTAL SUPPLY**

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1800	913	0.64	1010	0.80	1098	0.98	1178	1.16	1252	1.35
1950	972	0.78	1065	0.96	1148	1.14	1226	1.34	1298	1.54
2100	1032	0.95	1120	1.14	1200	1.33	1275	1.54	1345	1.75
2250	1093	1.14	1177	1.34	1254	1.55	1325	1.76	1393	1.98
2400	1155	1.36	1234	1.57	1308	1.78	1377	2.01	1443	2.24
2550	1217	1.60	1293	1.82	1363	2.05	1430	2.28	1494	2.53
2700	1280	1.87	1352	2.10	1420	2.34	1484	2.59	1546	2.84
2850	1343	2.17	1412	2.42	1477	2.67	1539	2.93	1599	3.19
3000	1406	2.50	1472	2.76	1535	3.03	1595	3.29	1653	3.57

Available External Static Pressure (in. wg)

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1800	1322	1.56	1388	1.77	1451	1.98	1510	2.21	1568	2.44
1950	1366	1.75	1430	1.97	1491	2.20	1550	2.43	1606	2.67
2100	1411	1.97	1473	2.20	1533	2.43	1590	2.67	1645	2.92
2250	1457	2.21	1518	2.45	1576	2.69	1632	2.94	1686	3.20
2400	1505	2.48	1564	2.73	1621	2.98	1676	3.24	1729	3.51
2550	1554	2.78	1612	3.03	1667	3.30	1721	3.57	–	–
2700	1604	3.10	1660	3.37	1715	3.64	–	–	–	–
2850	1656	3.46	1710	3.74	–	–	–	–	–	–
3000	–	–	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

Table 58 – 48TC07 3 PHASE 6 TON VERTICAL SUPPLY**

Available External Static Pressure (in. wg)

CFM	0.2 RPM	0.2 BHP	0.4 RPM	0.4 BHP	0.6 RPM	0.6 BHP	0.8 RPM	0.8 BHP	1.0 RPM	1.0 BHP
1800	967	0.63	1075	0.80	1170	0.97	1255	1.13	1333	1.28
1950	1029	0.77	1132	0.96	1223	1.14	1306	1.32	1382	1.49
2100	1091	0.93	1189	1.14	1278	1.33	1358	1.52	1433	1.71
2250	1154	1.11	1248	1.33	1333	1.55	1411	1.75	1484	1.96
2400	1218	1.32	1308	1.55	1390	1.78	1466	2.01	1537	2.23
2550	1283	1.55	1369	1.80	1448	2.05	1521	2.29	1590	2.52
2700	1348	1.80	1431	2.07	1507	2.33	1578	2.59	1645	2.84
2850	1414	2.09	1493	2.37	1566	2.65	1636	2.92	1701	3.19
3000	1479	2.40	1556	2.70	1627	3.00	1694	3.29	1757	3.57

Available External Static Pressure (in. wg)

CFM	1.2 RPM	1.2 BHP	1.4 RPM	1.4 BHP	1.6 RPM	1.6 BHP	1.8 RPM	1.8 BHP	2.0 RPM	2.0 BHP
1800	1406	1.43	1475	1.58	1540	1.72	1601	1.87	1660	2.00
1950	1454	1.65	1521	1.82	1585	1.98	1645	2.13	1703	2.29
2100	1502	1.89	1568	2.07	1631	2.25	1690	2.42	1747	2.59
2250	1552	2.15	1617	2.35	1678	2.54	1737	2.73	–	–
2400	1603	2.44	1666	2.65	1727	2.86	1784	3.06	–	–
2550	1655	2.75	1717	2.98	1776	3.20	–	–	–	–
2700	1709	3.09	1769	3.33	1827	3.57	–	–	–	–
2850	1763	3.45	–	–	–	–	–	–	–	–
3000	–	–	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

APPENDIX II. FAN PERFORMANCE (cont.)

Table 59 – 48TC08 3 PHASE 7.5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	505	0.52	586	0.73	657	0.97	722	1.22	782	1.50
2438	533	0.62	610	0.85	679	1.09	742	1.36	800	1.65
2625	562	0.74	635	0.98	701	1.23	762	1.51	819	1.81
2813	591	0.88	661	1.13	725	1.39	783	1.68	839	1.98
3000	621	1.03	688	1.29	749	1.57	806	1.87	859	2.18
3188	652	1.21	715	1.48	774	1.77	829	2.07	881	2.40
3375	682	1.40	743	1.68	800	1.98	853	2.30	903	2.63
3563	713	1.61	772	1.91	826	2.22	878	2.55	927	2.89
3750	745	1.85	801	2.15	853	2.48	903	2.82	951	3.18

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
2250	838	1.81	891	2.12	941	2.46	988	2.82	1033	3.19
2438	854	1.96	906	2.28	955	2.63	1001	2.99	1046	3.37
2625	872	2.12	922	2.46	970	2.81	1016	3.17	1060	3.56
2813	890	2.31	940	2.65	986	3.01	1031	3.38	1074	3.77
3000	910	2.51	958	2.86	1004	3.23	1048	3.61	1090	4.01
3188	930	2.74	977	3.10	1022	3.47	1065	3.86	**1107**	**4.26**
3375	951	2.99	997	3.35	1041	3.74	1083	4.13	**1124**	**4.54**
3563	973	3.26	1018	3.63	1061	4.02	1103	4.43	–	–
3750	996	3.55	1040	3.93	1082	4.34	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.7 HP max

Medium static 770–1175 RPM, 1.7 HP max

High static 1035–1466 RPM, 2.4 HP max

Table 60 – 48TC08 3 PHASE 7.5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	513	0.54	595	0.76	665	1.01	728	1.27	786	1.56
2438	541	0.65	620	0.89	688	1.14	750	1.42	806	1.71
2625	570	0.77	645	1.02	712	1.29	772	1.58	827	1.88
2813	600	0.91	672	1.18	736	1.46	794	1.76	848	2.07
3000	629	1.07	699	1.35	761	1.64	818	1.95	871	2.28
3188	660	1.25	726	1.54	787	1.85	842	2.17	894	2.51
3375	690	1.45	754	1.75	813	2.07	867	2.41	917	2.76
3563	721	1.67	783	1.98	840	2.32	892	2.67	941	3.03
3750	752	1.91	812	2.24	867	2.59	918	2.95	966	3.32

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	839	1.86	889	2.18	935	2.52	980	2.87	1022	3.23
2438	858	2.02	907	2.35	953	2.70	997	3.06	1039	3.43
2625	878	2.20	926	2.54	972	2.89	1015	3.26	1056	3.64
2813	899	2.40	946	2.75	991	3.11	1033	3.49	1074	3.88
3000	920	2.62	966	2.98	1010	3.35	1052	3.74	1093	4.14
3188	942	2.86	987	3.23	1031	3.61	1072	4.01	**1112**	**4.42**
3375	964	3.12	1009	3.50	1052	3.89	1093	4.30	–	–
3563	988	3.41	1032	3.80	1074	4.20	**1114**	**4.61**	–	–
3750	1011	3.71	1054	4.11	1096	4.53	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.7 HP max

Medium static 770–1175 RPM, 1.7 HP max

High static 1035–1466 RPM, 2.4 HP max

Table 61 – 48TC**09 3 PHASE 8.5 TON HORIZONTAL SUPPLY

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2550	497	0.48	579	0.61	651	0.75	717	0.90	777	1.05
2763	524	0.58	602	0.72	671	0.87	735	1.03	794	1.19
2975	551	0.70	626	0.86	693	1.01	754	1.18	812	1.35
3188	580	0.84	651	1.00	716	1.17	775	1.34	831	1.52
3400	609	1.00	677	1.17	739	1.35	797	1.53	851	1.71
3613	638	1.17	703	1.35	763	1.54	819	1.73	871	1.93
3825	668	1.37	730	1.56	788	1.76	842	1.96	893	2.16
4038	698	1.59	758	1.79	813	2.00	866	2.20	915	2.42
4250	728	1.83	786	2.04	839	2.26	890	2.47	938	2.70

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	833	1.21	886	1.38	936	1.56	984	1.74	1029	1.93
2763	849	1.36	900	1.53	950	1.72	996	1.90	1041	2.10
2975	865	1.52	916	1.70	964	1.89	1010	2.09	1054	2.29
3188	883	1.70	933	1.89	980	2.09	1025	2.29	1068	2.50
3400	902	1.90	950	2.10	996	2.30	1041	2.51	1083	2.73
3613	921	2.13	969	2.33	1014	2.54	1057	2.76	**1099**	**2.98**
3825	941	2.37	988	2.58	1032	2.80	1075	3.02	**1116**	**3.25**
4038	963	2.63	1008	2.86	1051	3.08	**1093**	**3.31**	**1133**	**3.55**
4250	984	2.92	1029	3.15	1071	3.39	**1112**	**3.63**		–

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

Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

Table 62 – 48TC**09 3 PHASE 8.5 TON VERTICAL SUPPLY

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2550	526	0.51	600	0.65	666	0.79	727	0.93	783	1.07
2763	557	0.62	627	0.77	690	0.92	749	1.08	804	1.23
2975	588	0.75	655	0.91	716	1.08	772	1.24	825	1.40
3188	621	0.90	684	1.07	743	1.25	797	1.42	848	1.60
3400	653	1.06	714	1.25	770	1.44	822	1.62	872	1.81
3613	687	1.25	744	1.45	798	1.65	849	1.84	897	2.04
3825	720	1.45	775	1.67	827	1.88	876	2.09	922	2.30
4038	754	1.69	807	1.91	856	2.13	904	2.35	949	2.57
4250	788	1.94	839	2.17	886	2.41	932	2.64	976	2.88

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	836	1.20	886	1.34	934	1.48	979	1.61	1022	1.74
2763	855	1.37	904	1.52	950	1.67	995	1.82	1037	1.97
2975	875	1.56	923	1.72	968	1.88	1012	2.04	1053	2.20
3188	897	1.77	943	1.94	987	2.11	1030	2.29	1071	2.46
3400	919	1.99	964	2.18	1007	2.36	1049	2.55	**1089**	**2.73**
3613	943	2.24	986	2.44	1029	2.63	1069	2.83	**1108**	**3.02**
3825	967	2.51	1010	2.71	1051	2.92	**1090**	**3.13**	**1129**	**3.34**
4038	992	2.80	1034	3.02	1074	3.24	**1112**	**3.46**	**1150**	**3.68**
4250	1018	3.11	1058	3.34	**1097**	**3.57**		–	–	–

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

Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

APPENDIX II. FAN PERFORMANCE (cont.)

Table 63 – 48TC12 3 PHASE 10 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
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	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

Table 64 – 48TC12 3 PHASE 10 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
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	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

APPENDIX II. FAN PERFORMANCE (cont.)

Table 65 – 48TC14 3 PHASE 12.5 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	639	0.98	713	1.20	781	1.43	843	1.65	901	1.88
3750	683	1.23	753	1.47	817	1.71	877	1.96	933	2.21
4063	728	1.52	794	1.78	855	2.04	912	2.31	966	2.57
4375	774	1.85	836	2.13	894	2.41	949	2.70	1001	2.98
4688	820	2.23	879	2.53	935	2.83	987	3.14	1037	3.44
5000	867	2.66	923	2.98	976	3.30	1026	3.63	1074	3.95
5313	914	3.15	967	3.49	1018	3.83	1066	4.17	1112	4.52
5625	962	3.69	1012	4.05	1061	4.42	–	–	–	–
5938	1009	4.30	1058	4.68	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

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	955	2.12	1007	2.35	1056	2.59	1103	2.83	1148	3.08
3750	985	2.46	1035	2.71	1083	2.97	1129	3.23	1173	3.49
4063	1017	2.84	1066	3.12	1112	3.39	1157	3.67	1200	3.95
4375	1050	3.27	1097	3.56	1142	3.86	1186	4.15	1228	4.45
4688	1084	3.75	1130	4.06	1174	4.37	1216	4.68	–	–
5000	1120	4.28	1164	4.61	–	–	–	–	–	–
5313	–	–	–	–	–	–	–	–	–	–
5625	–	–	–	–	–	–	–	–	–	–
5938	–	–	–	–	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.7 HP max

Medium static 770–1175 RPM, 1.7 HP max

High static 1035–1466 RPM, 2.4 HP max

Table 66 – 48TC14 3 PHASE 12.5 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3438	685	1.12	751	1.32	813	1.54	871	1.76	927	1.99
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35
4063	787	1.75	844	1.99	898	2.24	951	2.49	1001	2.75
4375	839	2.14	892	2.40	943	2.67	993	2.94	1041	3.21
4688	891	2.60	941	2.87	990	3.15	1037	3.44	1082	3.73
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31
5313	997	3.69	1042	4.00	1085	4.32	1128	4.64	–	–
5625	1051	4.34	1093	4.67	–	–	–	–	–	–
5938	–	–	–	–	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

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	981	2.23	1032	2.47	1082	2.72	1130	2.97	1177	3.23
3750	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4063	1049	3.02	1097	3.29	1142	3.57	1186	3.85	1230	4.14
4375	1087	3.49	1132	3.78	1176	4.08	1218	4.37	**1260**	**4.68**
4688	1126	4.03	1169	4.33	1211	4.64	–	–	–	–
5000	1167	4.63	–	–	–	–	–	–	–	–
5313	–	–	–	–	–	–	–	–	–	–
5625	–	–	–	–	–	–	–	–	–	–
5938	–	–	–	–	–	–	–	–	–	–
6250	–	–	–	–	–	–	–	–	–	–

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

Boldface indicates field supplied drive is required.

Standard static 560–854 RPM, 1.7 HP max

Medium static 770–1175 RPM, 1.7 HP max

High static 1035–1466 RPM, 2.4 HP max

Table 67 – 48TC16 3 PHASE 15 TON VERTICAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	487	0.98	552	1.26	610	1.55	665	1.86	718	2.20
4875	515	1.18	578	1.49	633	1.80	685	2.13	735	2.47
5250	544	1.42	604	1.75	657	2.09	707	2.43	754	2.78
5625	572	1.68	631	2.05	682	2.40	730	2.76	775	3.13
6000	601	1.98	657	2.37	707	2.75	753	3.13	797	3.52
6375	630	2.31	684	2.73	733	3.13	777	3.53	819	3.94
6750	659	2.68	711	3.12	759	3.55	802	3.98	843	4.40
7125	689	3.09	739	3.55	785	4.01	827	4.46	867	4.91
7500	718	3.53	766	4.02	811	4.51	852	4.98	891	5.46

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
4500	769	2.56	819	2.95	866	3.36	912	3.79	957	4.24
4875	784	2.84	831	3.23	877	3.65	921	4.09	**964**	**4.54**
5250	800	3.16	845	3.56	889	3.98	932	4.43	**974**	**4.89**
5625	819	3.52	862	3.93	903	4.36	944	4.81	**985**	**5.28**
6000	839	3.92	880	4.34	920	4.77	**959**	**5.23**	**997**	**5.70**
6375	860	4.36	899	4.79	937	5.23	**975**	**5.70**	–	–
6750	882	4.84	920	5.28	957	5.74	–	–	–	–
7125	904	5.36	941	5.82	–	–	–	–	–	–
7500	928	5.93	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

Table 68 – 48TC16 3 PHASE 15 TON HORIZONTAL SUPPLY**

CFM	Available External Static Pressure (in. wg)									
	0.2		0.4		0.6		0.8		1.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4500	479	0.97	540	1.23	596	1.50	651	1.80	703	2.13
4875	508	1.19	566	1.47	619	1.75	670	2.06	719	2.39
5250	537	1.43	592	1.73	643	2.03	691	2.35	737	2.69
5625	566	1.71	619	2.03	667	2.35	713	2.68	757	3.03
6000	596	2.02	646	2.36	692	2.70	736	3.05	778	3.41
6375	625	2.36	674	2.73	718	3.09	760	3.46	800	3.83
6750	655	2.75	701	3.14	744	3.52	785	3.91	824	4.30
7125	685	3.17	729	3.58	771	3.99	810	4.40	848	4.81
7500	715	3.64	758	4.07	798	4.50	836	4.93	872	5.36

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
4500	755	2.48	805	2.87	853	3.28	900	3.72	945	4.17
4875	768	2.75	815	3.14	862	3.55	907	3.99	951	4.45
5250	783	3.06	828	3.45	872	3.86	916	4.30	**958**	**4.77**
5625	800	3.40	843	3.80	885	4.21	926	4.66	**967**	**5.12**
6000	819	3.79	860	4.19	900	4.61	939	5.06	**978**	**5.53**
6375	840	4.23	878	4.63	916	5.06	954	5.51	**991**	**5.98**
6750	861	4.70	898	5.12	935	5.56	**971**	**6.01**	–	–
7125	884	5.23	919	5.66	–	–	–	–	–	–
7500	907	5.79	–	–	–	–	–	–	–	–

NOTE: For more information, see General Fan Performance Notes.
Boldface indicates field supplied drive is required.
Standard static 560–854 RPM, 1.7 HP max
Medium static 770–1175 RPM, 1.7 HP max
High static 1035–1466 RPM, 2.4 HP max

Table 69 – PULLEY ADJUSTMENT

UNIT		MOTOR/DRIVE COMBO	MOTOR PULLEY TURNS OPEN (RPM)										
			0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
04	1 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
04	1 phase	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
04	3 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
04	3 phase	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
04	3 phase	High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
05	1 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
05	1 phase	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
05	3 phase	Standard Static	854	825	795	766	736	707	678	648	619	589	560
05	3 phase	Medium Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
05	3 phase	High Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
06	1 phase	Standard Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
06	1 phase	Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
06	3 phase	Standard Static	1175	1135	1094	1054	1013	973	932	892	851	811	770
06	3 phase	Medium Static	1466	1423	1380	1337	1294	1251	1207	1164	1121	1078	1035
06	3 phase	High Static	1687	1649	1610	1572	1533	1495	1457	1418	1380	1341	1303
07	3 phase	Standard Static	1457	1419	1380	1342	1303	1265	1227	1188	1150	1111	1073
07	3 phase	Medium Static	1518	1484	1449	1415	1380	1346	1311	1277	1242	1208	1173
07	3 phase	High Static	1788	1757	1725	1694	1662	1631	1600	1568	1537	1505	1474
08	3 phase	Standard Static	747	721	695	670	644	618	592	566	541	515	489
08	3 phase	Medium Static	949	927	906	884	863	841	819	798	776	755	733
08	3 phase	High Static	1102	1083	1063	1044	1025	1006	986	967	948	928	909
09	3 phase	Standard Static	733	712	690	669	647	626	604	583	561	540	518
09	3 phase	Medium Static	936	911	887	862	838	813	788	764	739	715	690
09	3 phase	High Static	1084	1059	1035	1010	986	961	936	912	887	863	838
12	3 phase	Standard Static	838	813	789	764	739	715	690	665	640	616	591
12	3 phase	Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
12	3 phase	High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022
14	3 phase	Standard Static	843	824	805	786	767	748	728	709	690	671	652
14	3 phase	Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
14	3 phase	High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022
16	3 phase	Standard Static	676	659	642	625	608	592	575	558	541	524	507
16	3 phase	Medium Static	851	829	806	784	761	739	717	694	672	649	627
16	3 phase	High Static	955	937	919	901	883	866	848	830	812	794	776

NOTE: Do not adjust pulley further than 5 turns open.
– Factory settings

APPENDIX III. WIRING DIAGRAMS

Table 70 – Wiring Diagrams - Refrigeration System

STANDARD				HUMIDI–MIZER™	
SIZE	**VOLTAGE**	**CONTROL**	**POWER**	**CONTROL**	**POWER**
A04/A05/A06	208/230–1–60	48TM500213 L	48TM500749 M		
	208/230–3–60	48TM500213 L	48TM500748 N		
	460–3–60	48TM500213 L	48TM500748 N		
	575–3–60	48TM500213 L	48TM500215 P		
A07	208/230–1–60	48TM500213 L	48TM500749 M		
	208/230–3–60	48TM500213 L	48TM500748 N		48TM502159 I
	460–3–60	48TM500213 L	48TM500748 N		48TM502159 I
	575–3–60	48TM500213 L	48TM500215 P		
A08/A09/A12	208/230–3–60	48TM500929 Q	48TM500803 N	N/A	N/A
	460–3–60	48TM500929 Q	48TM500803 N	N/A	N/A
	575–3–60	48TM500929 Q	48TM500804 Q	N/A	N/A
B04/A05/A06	208/230–1–60			48TM501618 H	48TM502160 I
	208/230–3–60			48TM501618 H	48TM502159 I
	460–3–60			48TM501618 H	48TM502159 I
	575–3–60			48TM501618 H	48TM501809G
B07	208/230–1–60			48TM502160 I	48TM502160 I
	208/230–3–60			48TM501618 F	48TM502159 I
	460–3–60			48TM501618 F	48TM502159 I
	575–3–60			48TM501618 F	48TM501809G
D08/D09/D12	208/230–3–60	48TM501325 L	48TM501326 L		
	460–3–60	48TM501325 L	48TM501326 L		
	575–3–60	48TM501325 L	48TM501327 N		
D14	208/230–3–60	48TM501379 M	48TM501380 K		
	460–3–60	48TM501379 M	48TM501380 K		
	575–3–60	48TM501379 M	48TM501381 K		
D16	208/230–3–60	50TM501232 F	50TM501234F		
	460–3–60	50TM501232 F	50TM501234 F		
	575–3–60	50TM501232F	50TM501233 E		50TM501309 F
E08/E09/E12	208/230–3–60			48TM502386 H	48TM502388 H
	460–3–60			48TM502386 H	48TM502388 H
	575–3–60			48TM502386 H	48TM502389 H
E14	208/230–3–60			48TM502603 M	48TM502604 L
	460–3–60			48TM502603 M	48TM502604 L
	575–3–60			48TM502603 M	48TM502605 L
E16	208/230–3–60			50TM501304 F	50TM501307 F
	460–3–60			50TM501304 F	50TM501307 F
	575–3–60			50TM501304 F	50TM501309 F
CONTROLS OPTIONS					
04–14 **16**	PremierLink*	48TM500984 M 50TM500941 D	—	—	—
04–14 **16**	RTU–Open*	48TM503309 C 50TM500940 E	—	48TM503309 C 50TM500940 E	—
08–14 **16**	W7220/ 2–SPEED IFM	50TM501304 F 50TM501581 F	—	50TM501304 F 50TM501581 F	—

NOTE: Component arrangement on Control; Legend on Power Schematic

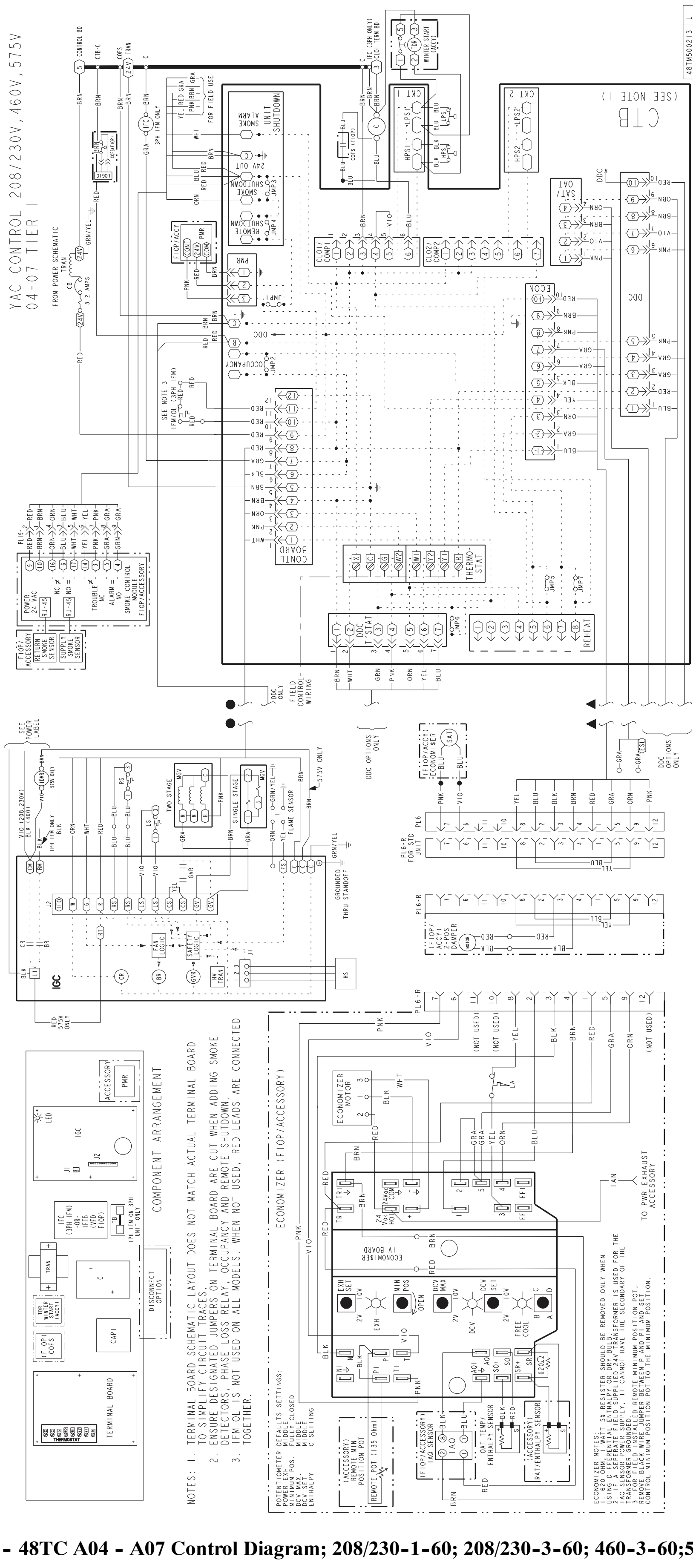
* Controls Options control labels overlay a portion of the base unit control label. The base unit label drawing and the control option drawing are required to provide a complete unit control diagram.

48TC

TABLE OF WIRING DIAGRAM FIGURE NUMBERS

UNIT MODELS	DIAGRAM TYPE	FIGURE NUMBER
UNITS WITH STANDARD REFRIGERATION SYSTEM		
48TC A04-07	Control Power, 208/230-1-60 Power, 208/230-3-60, 460-3-60 Power, 575-3-60	94 103 104 105
48TC A08-12	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	95 106 107
48TC D08-12	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	96 108 109
48TC D14	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	97 110 111
48TC D16	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	98 119 120
UNITS WITH HUMIDI–MIZER SYSTEM		
48TC B04-07	Control Power, 208/230-1-60 Power, 208/230-3-60, 460-3-60 Power, 575-3-60	99 112 113 114
48TC E08-12	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	100 115 116
48TC E14	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	101 117 118
48TC E16	Control Power, 208/230-3-60, 460-3-60 Power, 575-3-60	102 121 122
CONTROLS OPTIONS CONTROL DIAGRAMS		
PREMIERLINK	48TC A04-07 A08-12 D08-14	123
	48TC D16	124
RTU-OPEN	48TC A04–07 A08–12 B04–07 D08–14 E08–14	125
	16	126
W7220/SAV	48TC D08-14 E08-14	127
	48TC D16 E16	128

APPENDIX III. WIRING DIAGRAMS

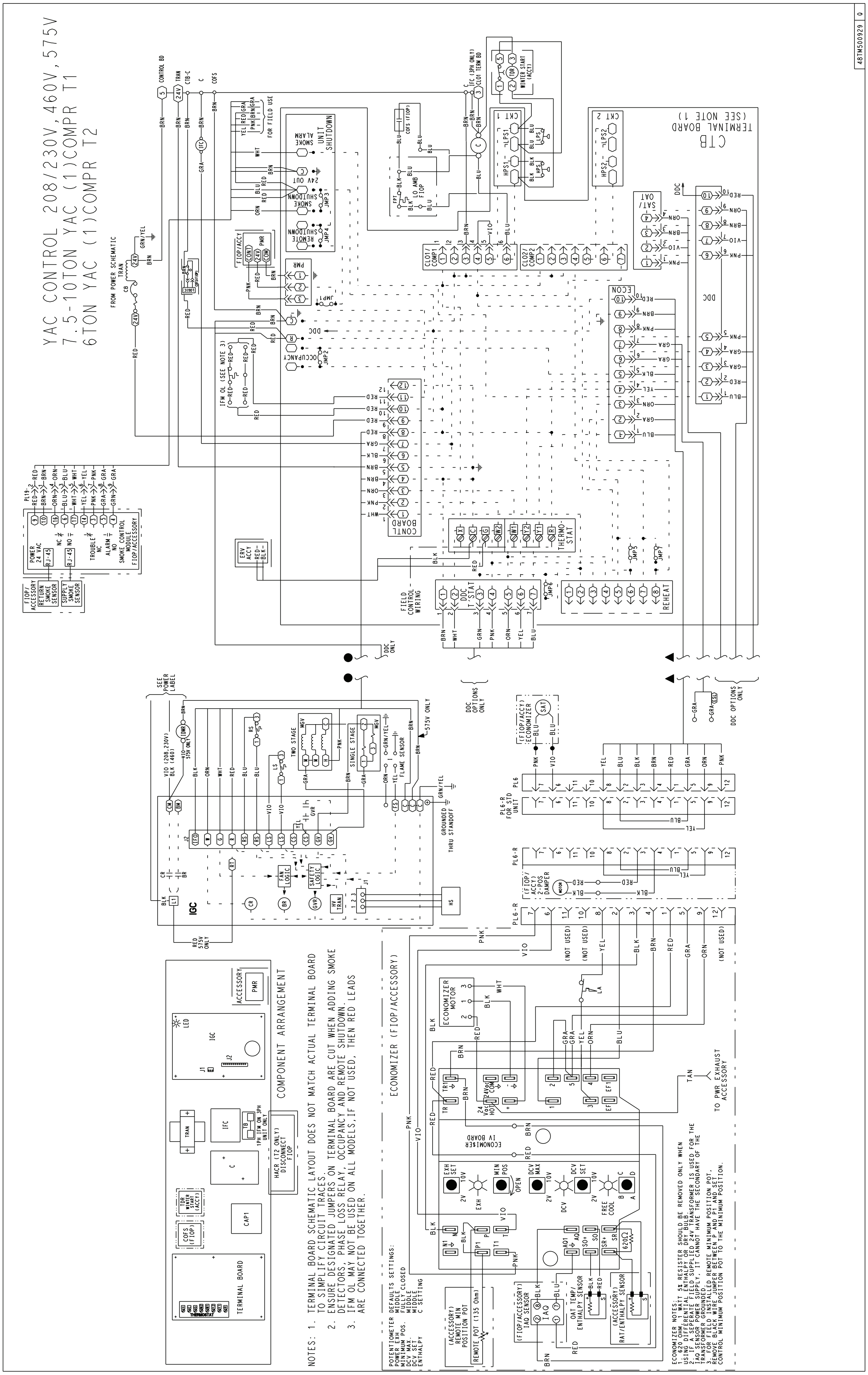


C12408

Fig. 94 - 48TC A04 - A07 Control Diagram; 208/230-1-60; 208/230-3-60; 460-3-60;575-3-60

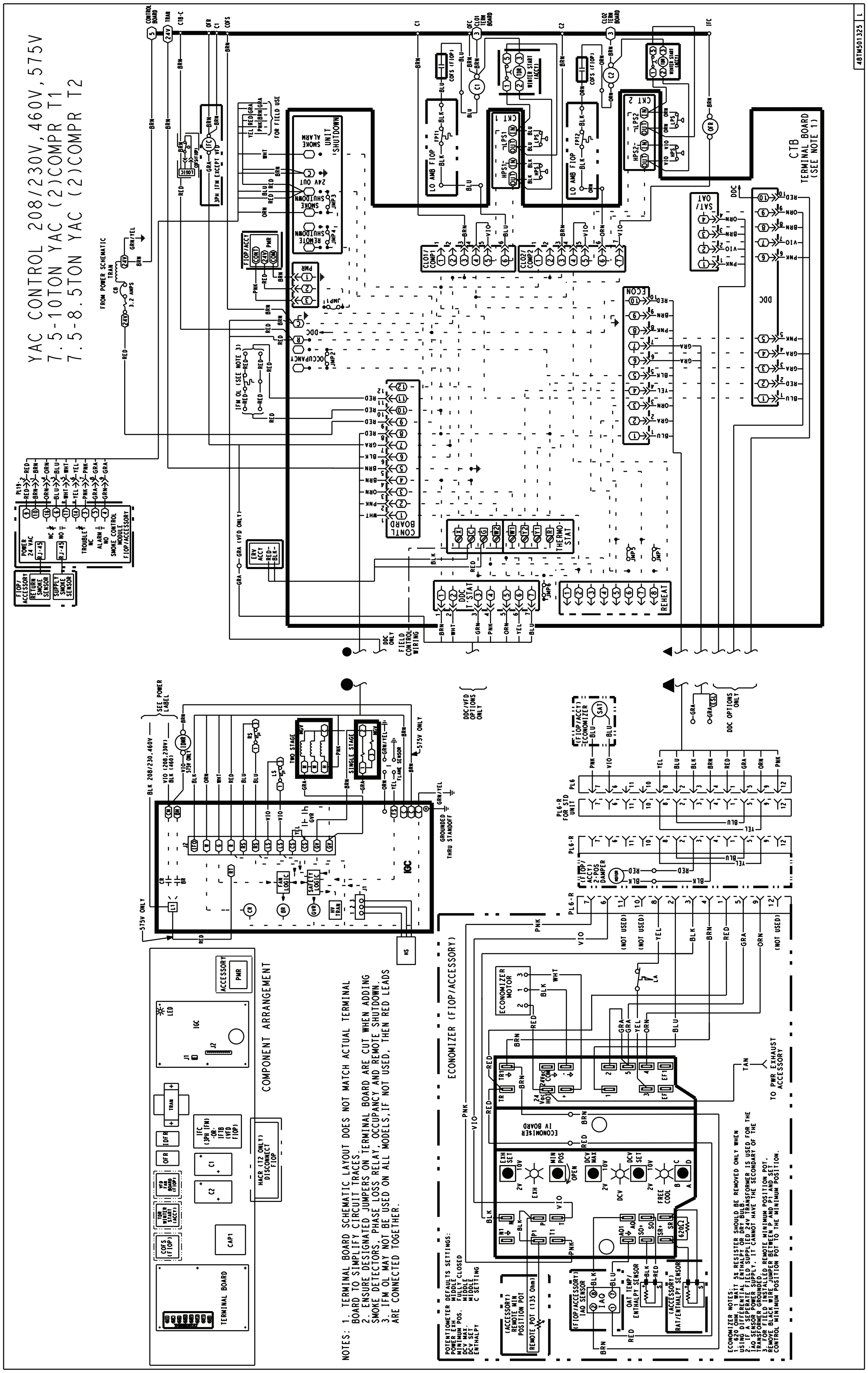
48TC

APPENDIX III. WIRING DIAGRAMS



C14065

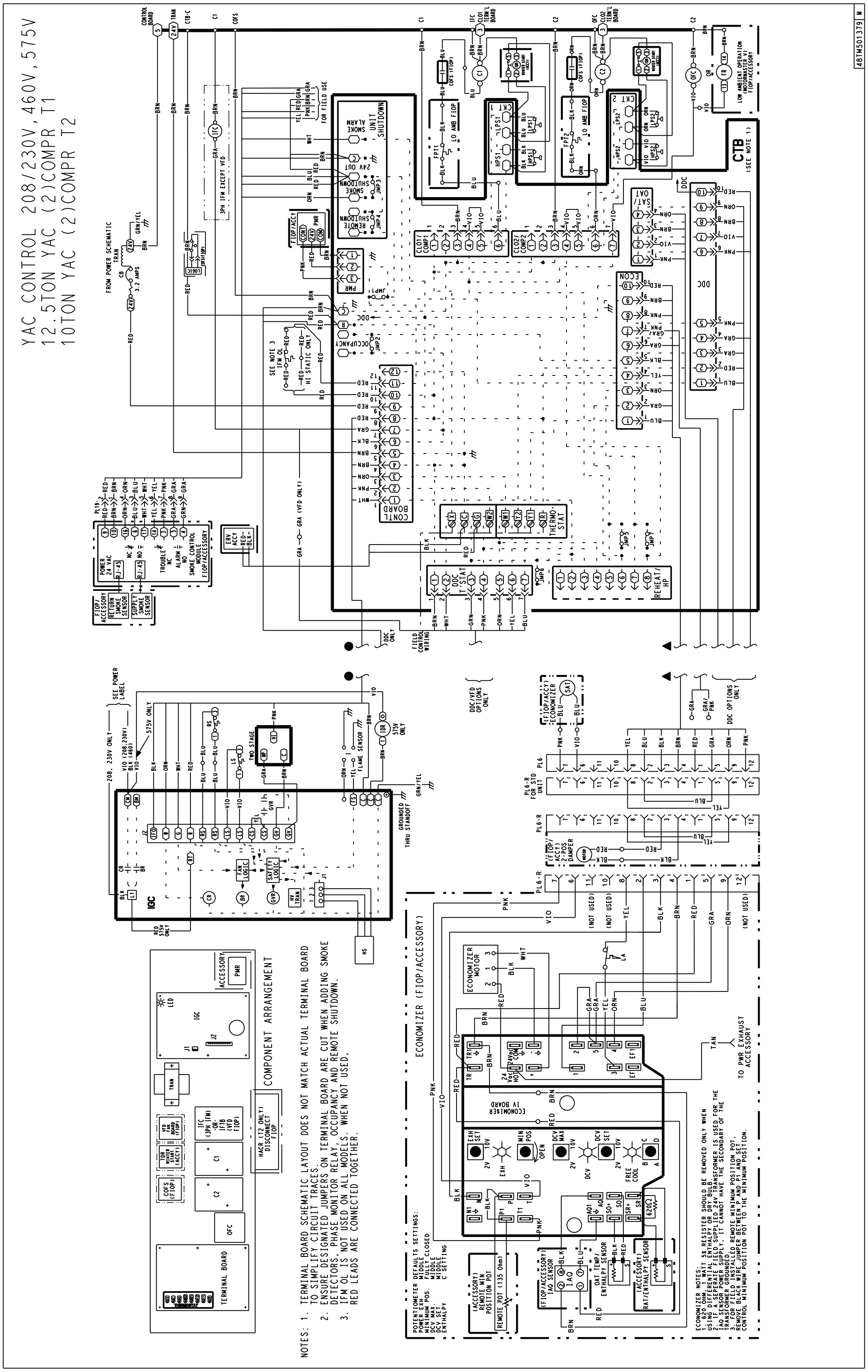
Fig. 95 - 48TC A08 - A12 Control Diagram; 208/230-3-60; 460-3-60;575-3-60



C13240

Fig. 96 – 48TC D08–D12 Control Diagram; 208/230–3–60; 460–3–60;575–3–60

APPENDIX III. WIRING DIAGRAMS



C13241

Fig. 97 - 48TC D14 Control Diagram; 208/230-3-60; 460-3-60;575-3-60

APPENDIX III. WIRING DIAGRAM LIST

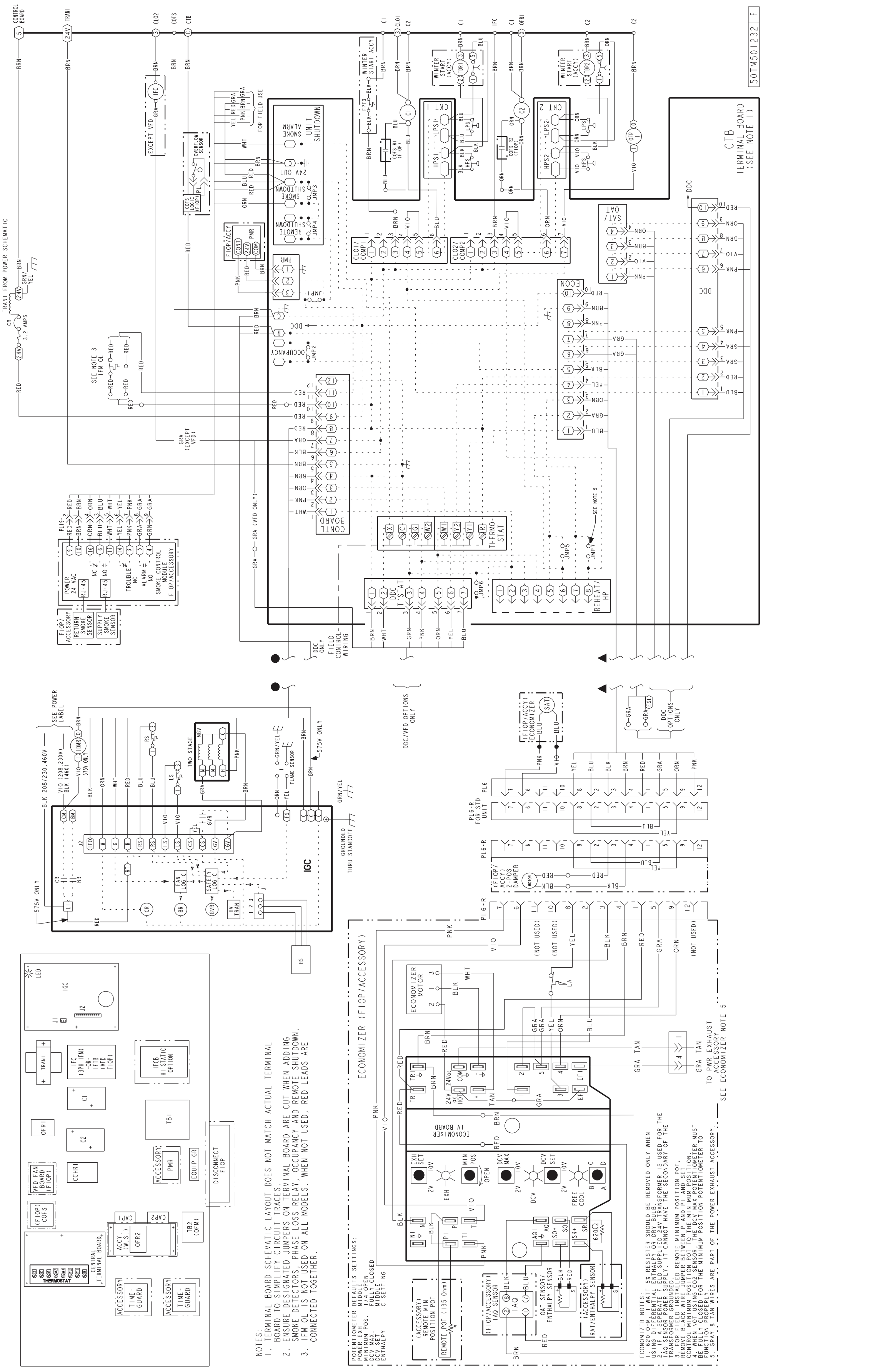
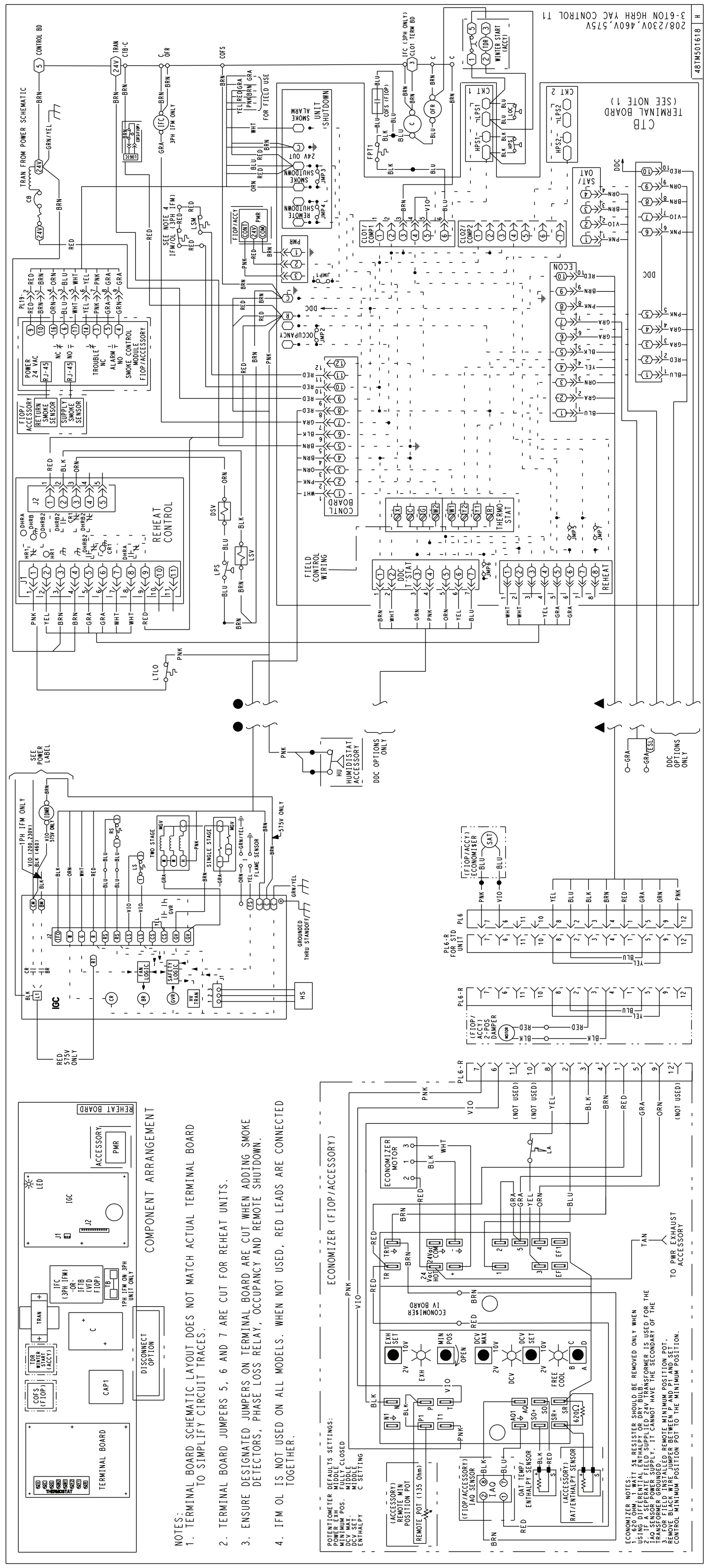


Fig. 98 - 48TC D16 Control Diagram; 208/230-3-60; 460/575-3-60

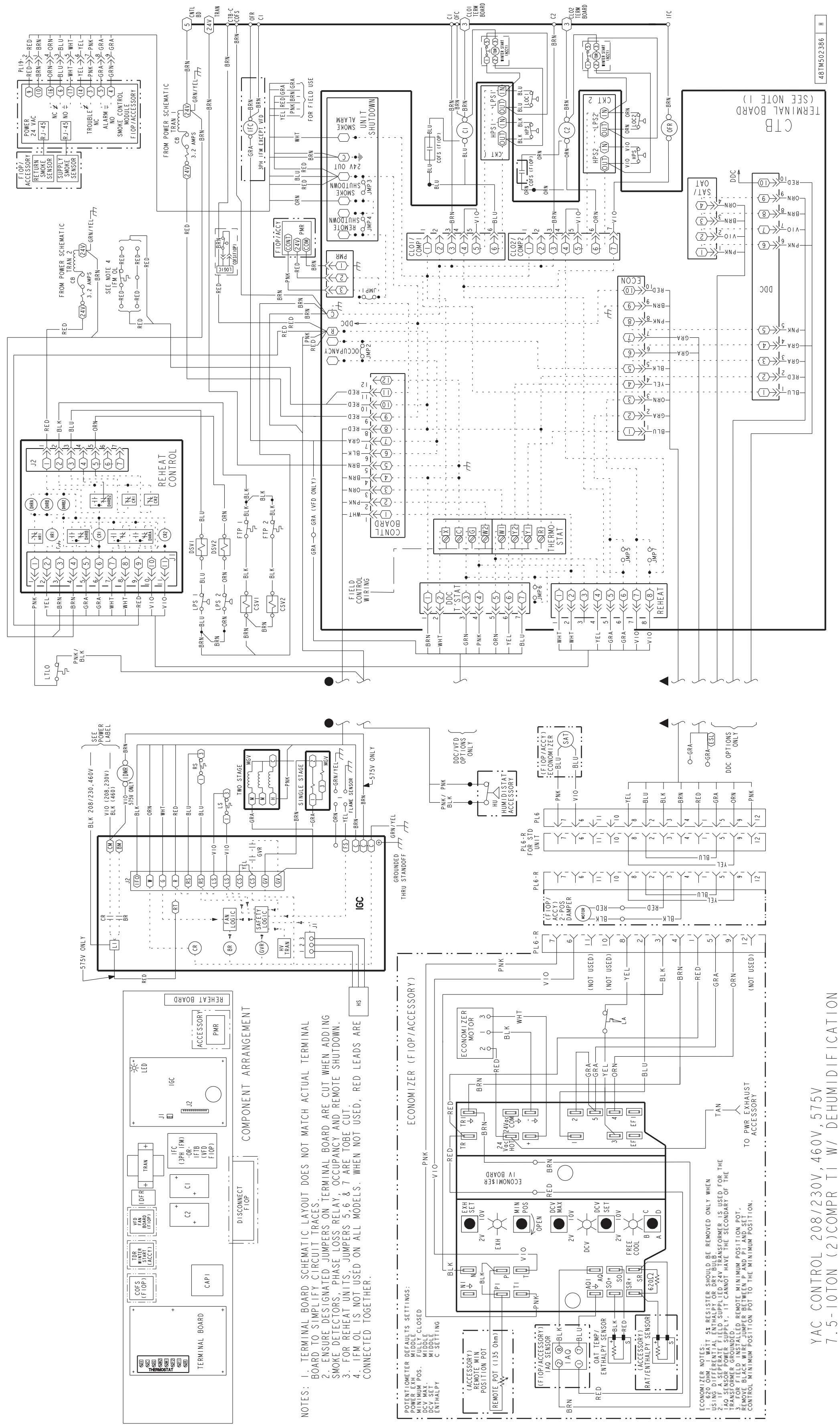
APPENDIX III. WIRING DIAGRAM LIST



C14066

Fig. 99 - 48TC B04-B07 Control Diagram; 208/230-3-60; 460/575-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST



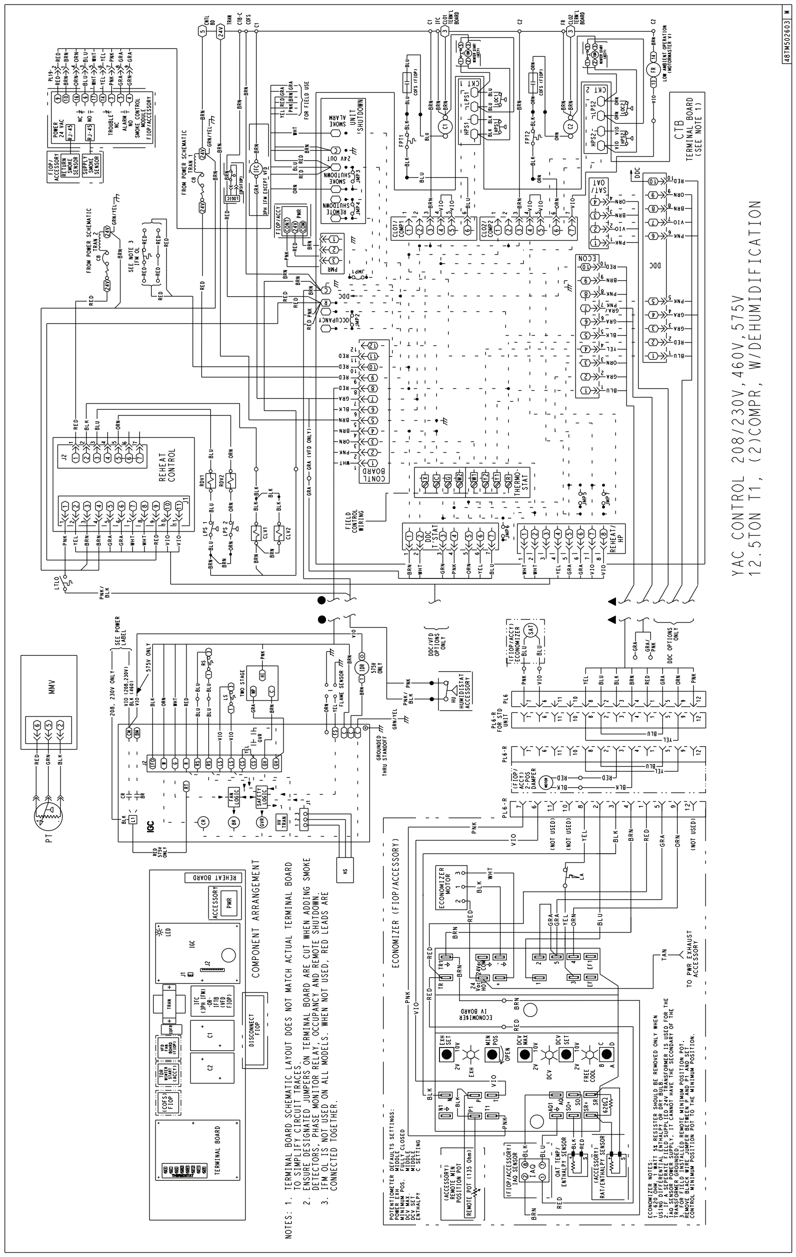
C12425

Fig. 100 - 48TC E08-E12 Control Diagram; 208/230-3-60; 460/575-3-60 with Humidi-MiZer™

48TC

APPENDIX III. WIRING DIAGRAM LIST

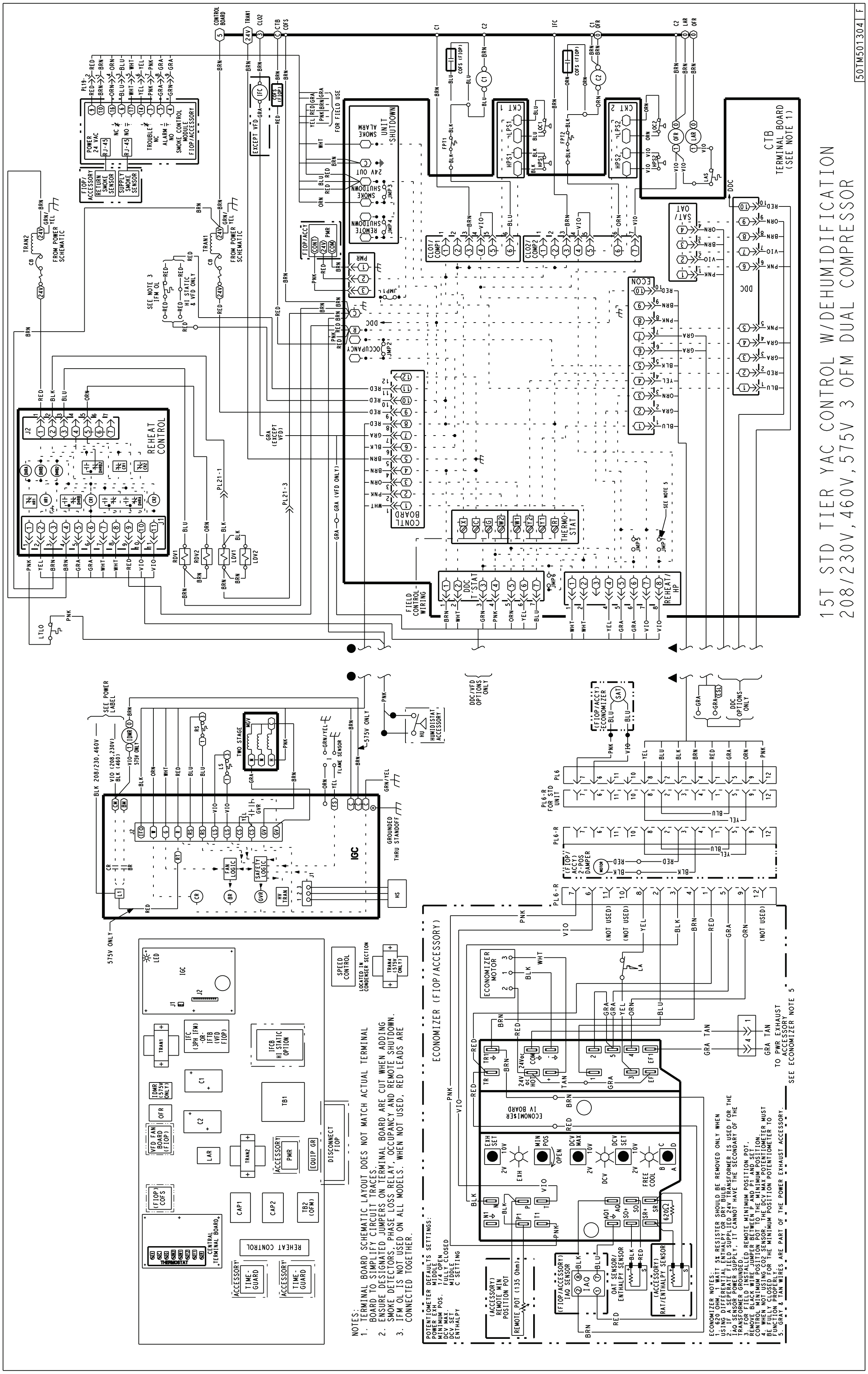
48TC



C14062

Fig. 101 - 48TC E14 Control 208/230-3-60, 460-3-60, 575-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST

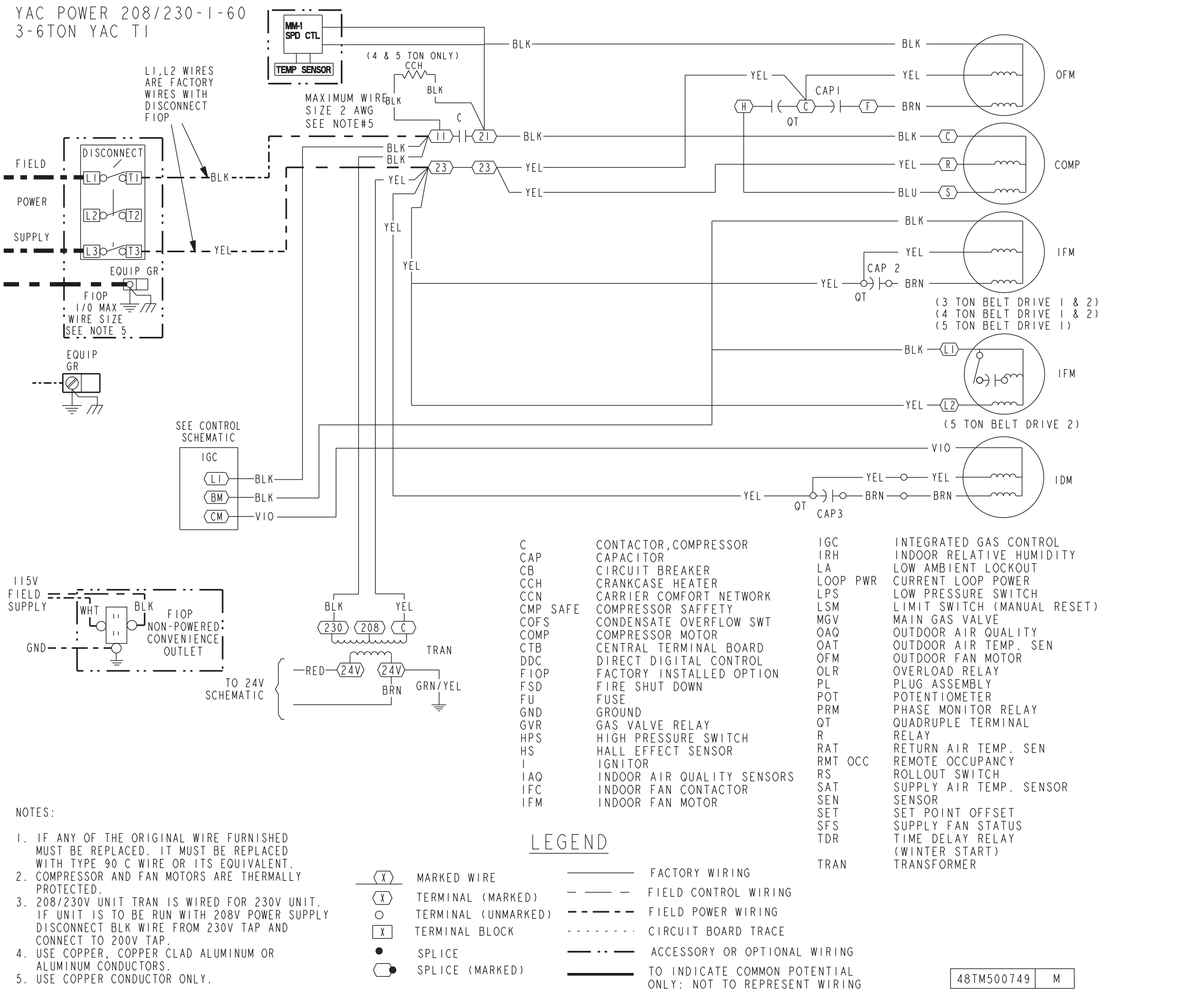


C13243

Fig. 102 - 48TC E16 Control Diagram; 208/230-3-60; 460/575-3-60 with Humidi-MiZer™

48TC

APPENDIX III. WIRING DIAGRAMS



C12413

Fig. 103 - 48TC A04-A07 Power Diagram; 208/230-1-60

48TC

APPENDIX III. WIRING DIAGRAMS

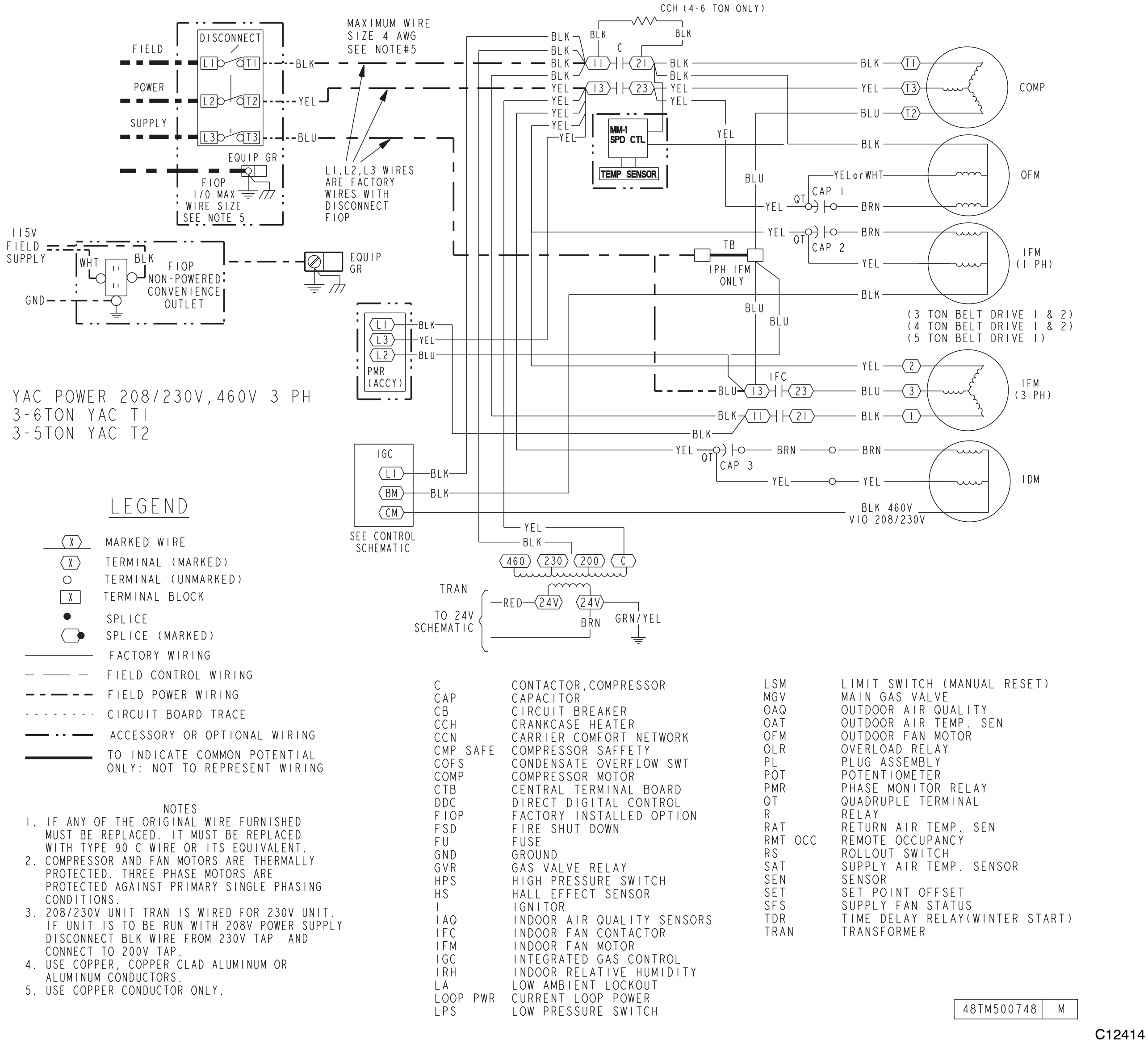
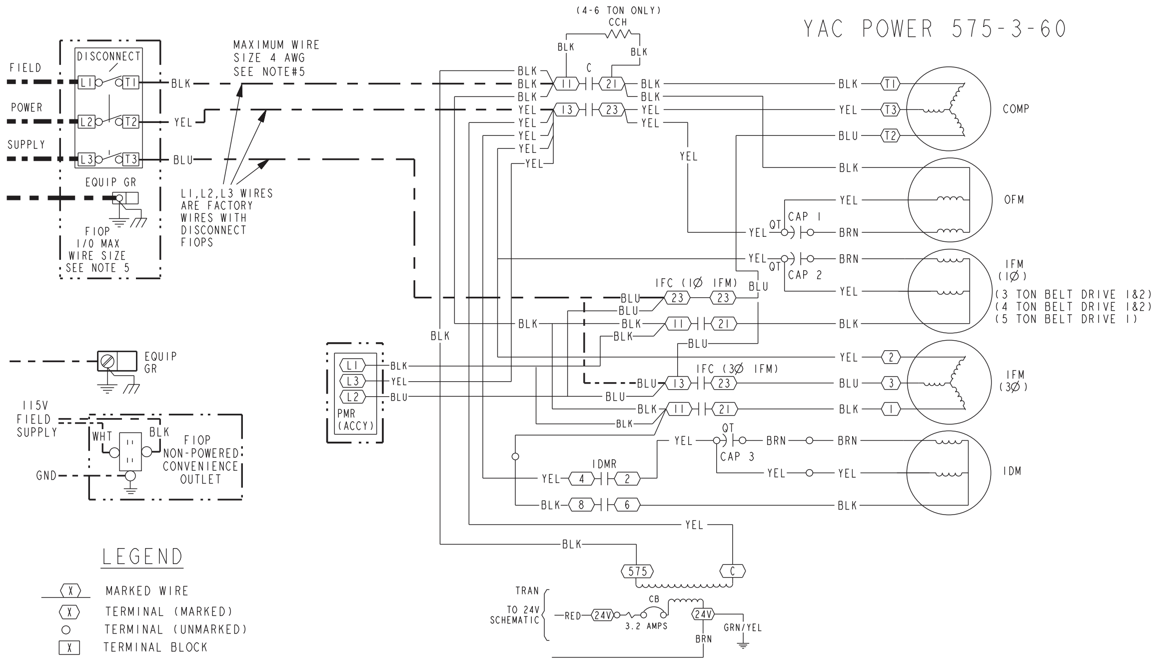


Fig. 104 - 48TC A04-A07 Power Diagram; 208/230-3-60; 460-3-60

48TC

APPENDIX III. WIRING DIAGRAM LIST



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.

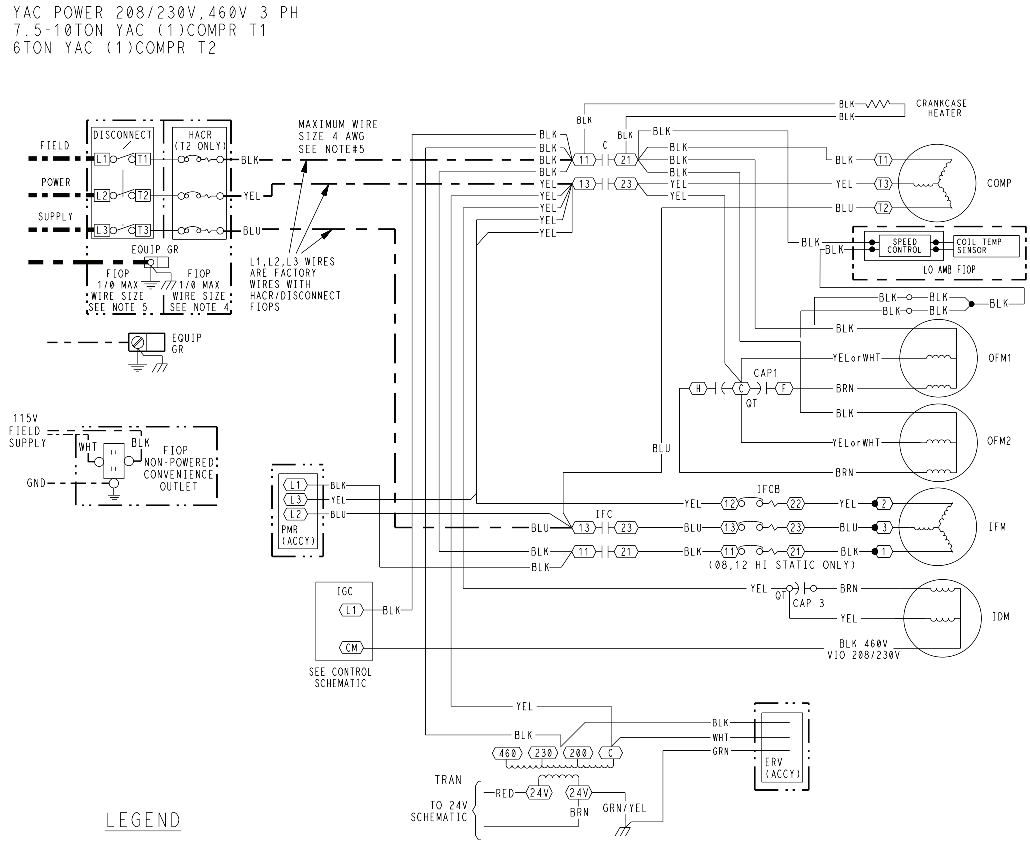
C	CONTACTOR,COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CCH	CRANKCASE HEATER
CCN	CARRIER COMFORT NETWORK
CMP SAFE	COMPRESSOR SAFFETY
COFS	CONDENSATE OVERFLOW SWT
COMP	COMPRESSOR MOTOR
CTB	CENTRAL TERMINAL BOARD
DDC	DIRECT DIGITAL CONTROL
FIOP	FACTORY INSTALLED OPTION
FSD	FIRE SHUT DOWN
FU	FUSE
GND	GROUND
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
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
OLR	OVERLOAD RELAY
PL	PLUG ASSEMBLY
POT	POTENTIOMETER
PMR	PHASE MONITOR RELAY
QT	QUADRUPLE TERMINAL
R	RELAY
RAT	RETURN AIR TEMP. SEN
RMT OCC	REMOTE OCCUPANCY
RS	ROLLOUT SWITCH
SAT	SUPPLY AIR TEMP. SENSOR
SEN	SENSOR
SET	SET POINT OFFSET
SFS	SUPPLY FAN STATUS
TDR	TIME DELAY RELAY(WINTER START)
TRAN	TRANSFORMER

48TM500215 | P

C12415

Fig. 105 - 48TC A04-A07 Power Diagram; 575-3-60

APPENDIX III. 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 OR OPTIONAL WIRING
- TO INDICATE COMMON POTENTIAL ONLY: NOT TO REPRESENT WIRING

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		

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.

48TM500803	N

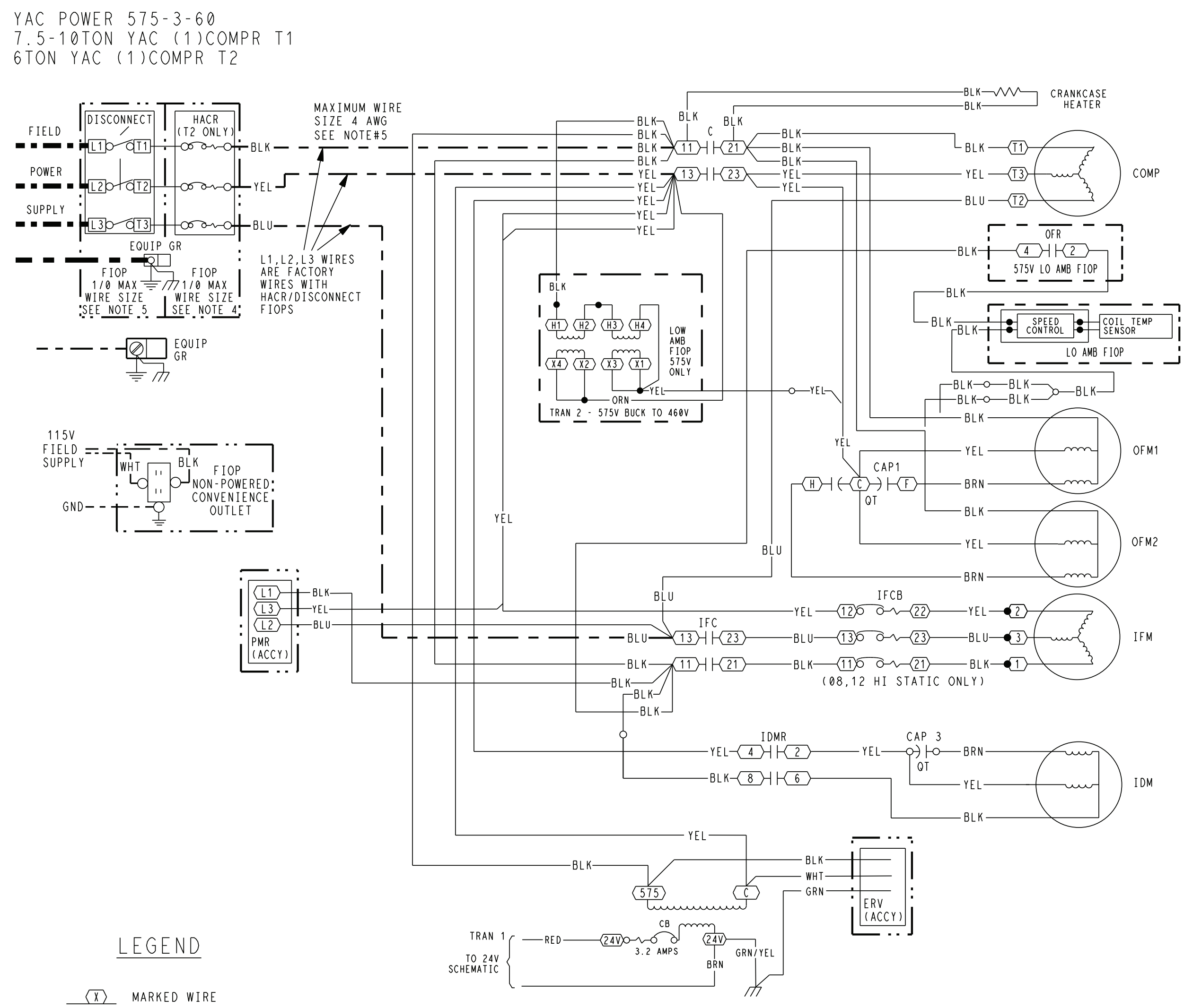
C13245

Fig. 106 - 48TC A08-A12 Power Diagram; 208/230-3-60; 460-3-60

48TC

APPENDIX III. WIRING DIAGRAM LIST

48TC



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	MGV	MAIN GAS VALVE
CAP	CAPACITOR	OAQ	OUTDOOR AIR QUALITY
CB	CIRCUIT BREAKER	OAT	OUTDOOR AIR TEMP. SEN
CCH	CRANKCASE HEATER	OFM	OUTDOOR FAN MOTOR
CCN	CARRIER COMFORT NETWORK	OL	OVERLOAD
CMP SAFE	COMPRESSOR SAFFETY	PL	PLUG ASSEMBLY
COFS	CONDENSATE OVERFLOW SWT	POT	POTENTIOMETER
COMP	COMPRESSOR MOTOR	PMR	PHASE MONITOR RELAY
CTB	CENTRAL TERMINAL BOARD	QT	QUADRUPLE TERMINAL
DDC	DIRECT DIGITAL CONTROL	R	RELAY
ERV	ENERGY RECOVERY VENTILATOR	RAT	RETURN AIR TEMP. SEN
FIOP	FACTORY INSTALLED OPTION	RMT OCC	REMOTE OCCUPANCY
FSD	FIRE SHUT DOWN	RS	ROLLOUT SWITCH
FU	FUSE	SAT	SUPPLY AIR TEMP. SENSOR
GND	GROUND	SEN	SENSOR
GVR	GAS VALVE RELAY	SET	SET POINT OFFSET
HPS	HIGH PRESSURE SWITCH	SFS	SUPPLY FAN STATUS
HS	HALL EFFECT SENSOR	TDR	TIME DELAY RELAY(WINTER START)
I	IGNITOR	TRAN	TRANSFORMER
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)		

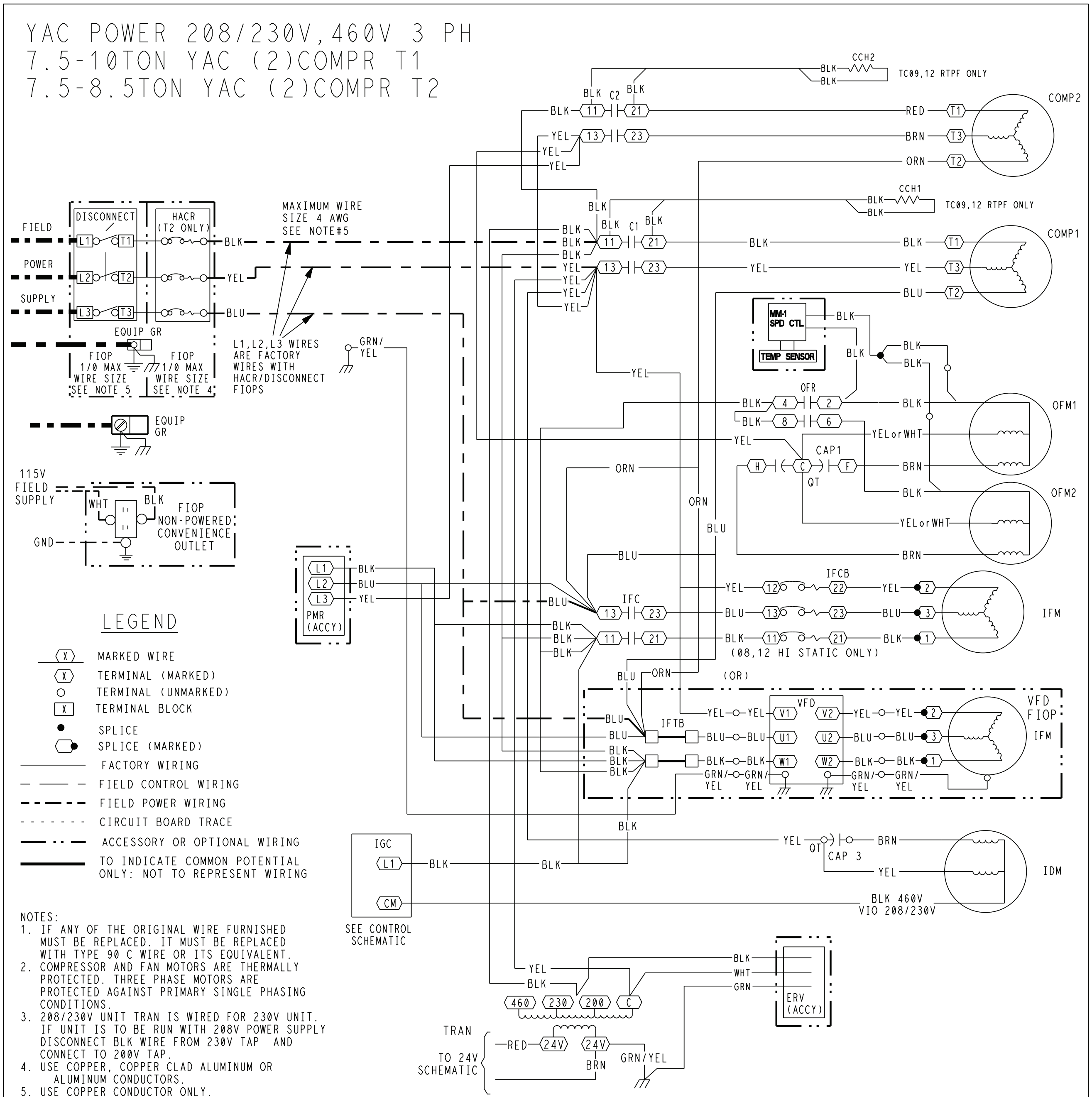
NOTES:

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.

48TM500804 | Q

C13246

Fig. 107 - 48TC A08-A12 Power Diagram; 575-3-60



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				

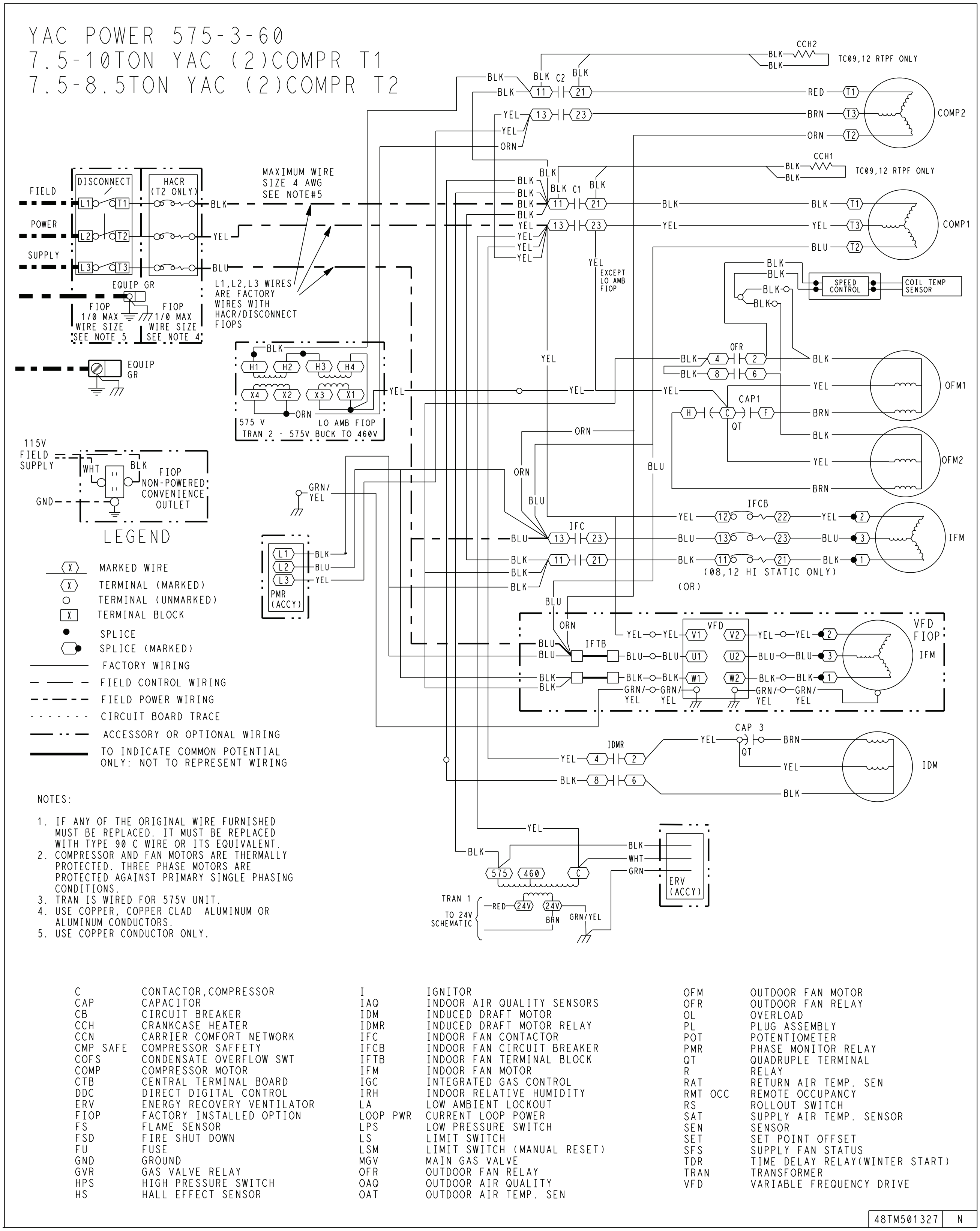
48TM501326 L

C13484

Fig. 108 - 48TC D08-D12 Power Diagram; 208/230-3-60; 460-3-60

48TC

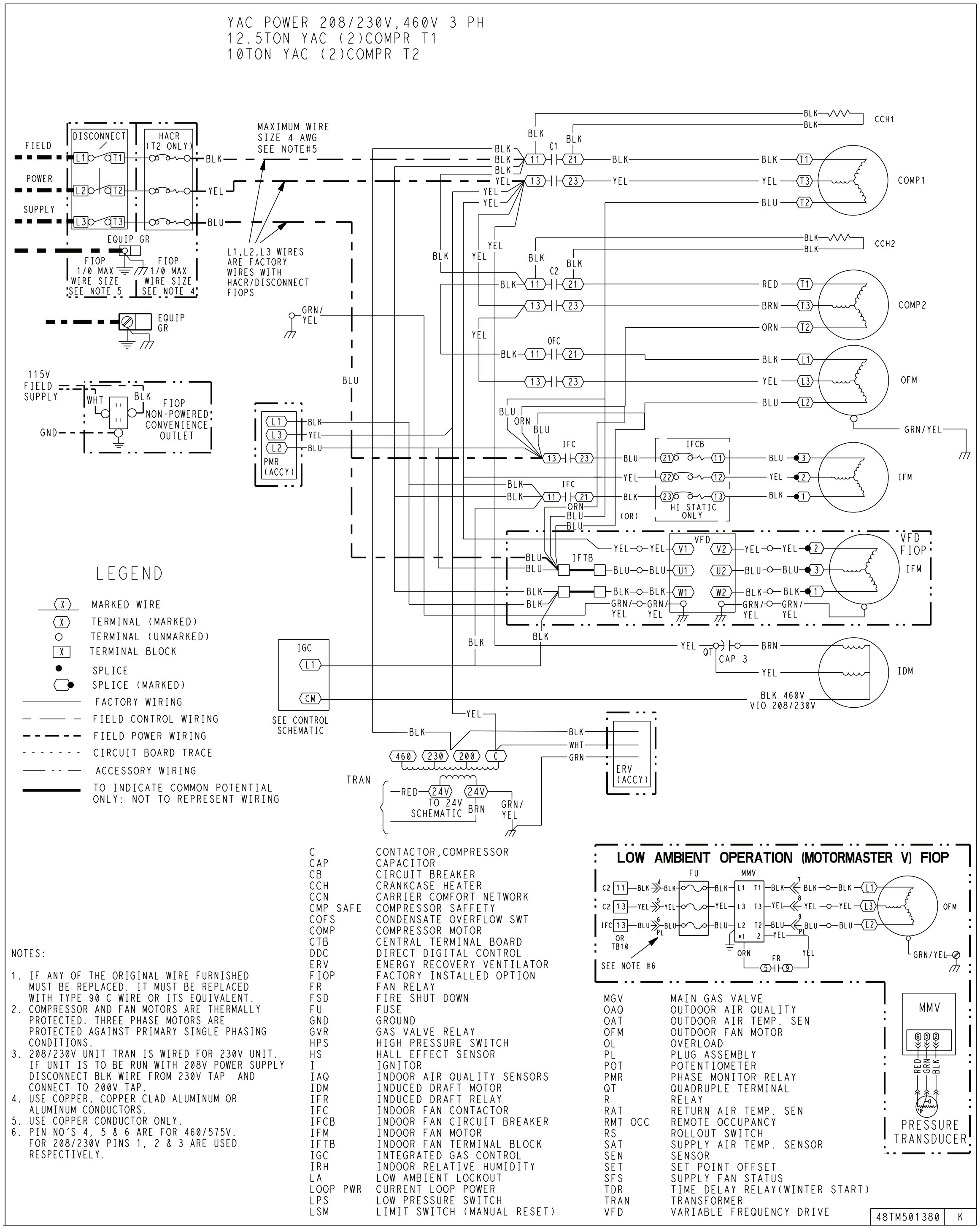
APPENDIX III. WIRING DIAGRAM LIST



C13247

Fig. 109 - 48TC D08-D12 Power Diagram; 575-3-60

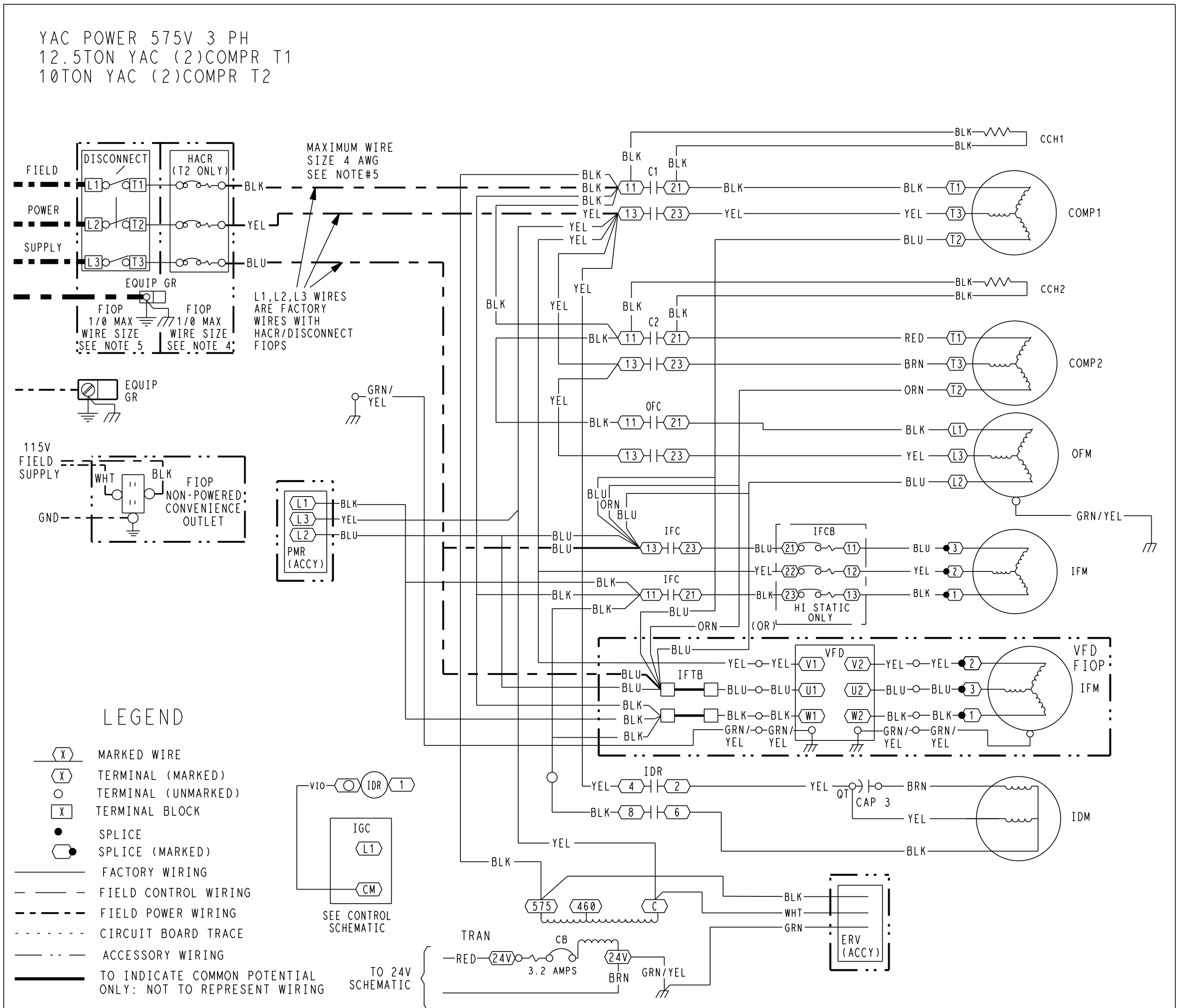
APPENDIX III. WIRING DIAGRAMS

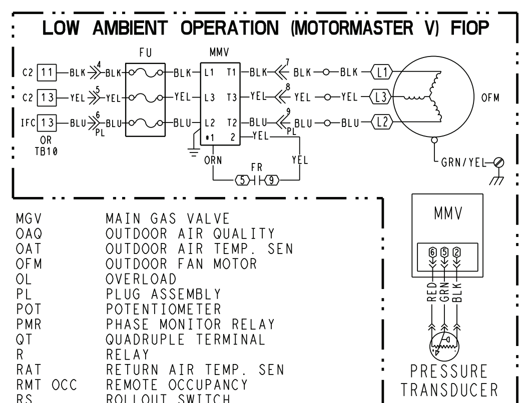


C13248

Fig. 110 - 48TC D14 Power Diagram; 208/230-3-60; 460-3-60

APPENDIX III. WIRING DIAGRAM LIST





C	CONTACTOR,COMPRESSOR	MGV	MAIN GAS VALVE
CAP	CAPACITOR	OAQ	OUTDOOR AIR QUALITY
CB	CIRCUIT BREAKER	OAT	OUTDOOR AIR TEMP. SEN
CCH	CRANKCASE HEATER	OFM	OUTDOOR FAN MOTOR
CCN	CARRIER COMFORT NETWORK	OL	OVERLOAD
CMP SAFE	COMPRESSOR SAFETY	PL	PLUG ASSEMBLY
COFS	CONDENSATE OVERFLOW SWT	POT	POTENTIOMETER
COMP	COMPRESSOR MOTOR	PMR	PHASE MONITOR RELAY
CTB	CENTRAL TERMINAL BOARD	QT	QUADRUPLE TERMINAL
ERV	ENERGY RECOVERY VENTILATOR	R	RELAY
DDC	DIRECT DIGITAL CONTROL	RAT	RETURN AIR TEMP. SEN
FIOP	FACTORY INSTALLED OPTION	RMT OCC	REMOTE OCCUPANCY
FR	FAN RELAY	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	VFD	VARIABLE FRQUENCY DRIVE
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)		

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.

48TM501381 K

C13249

Fig. 111 - 48TC D14 Power Diagram; 575-3-60

APPENDIX III. WIRING DIAGRAMS

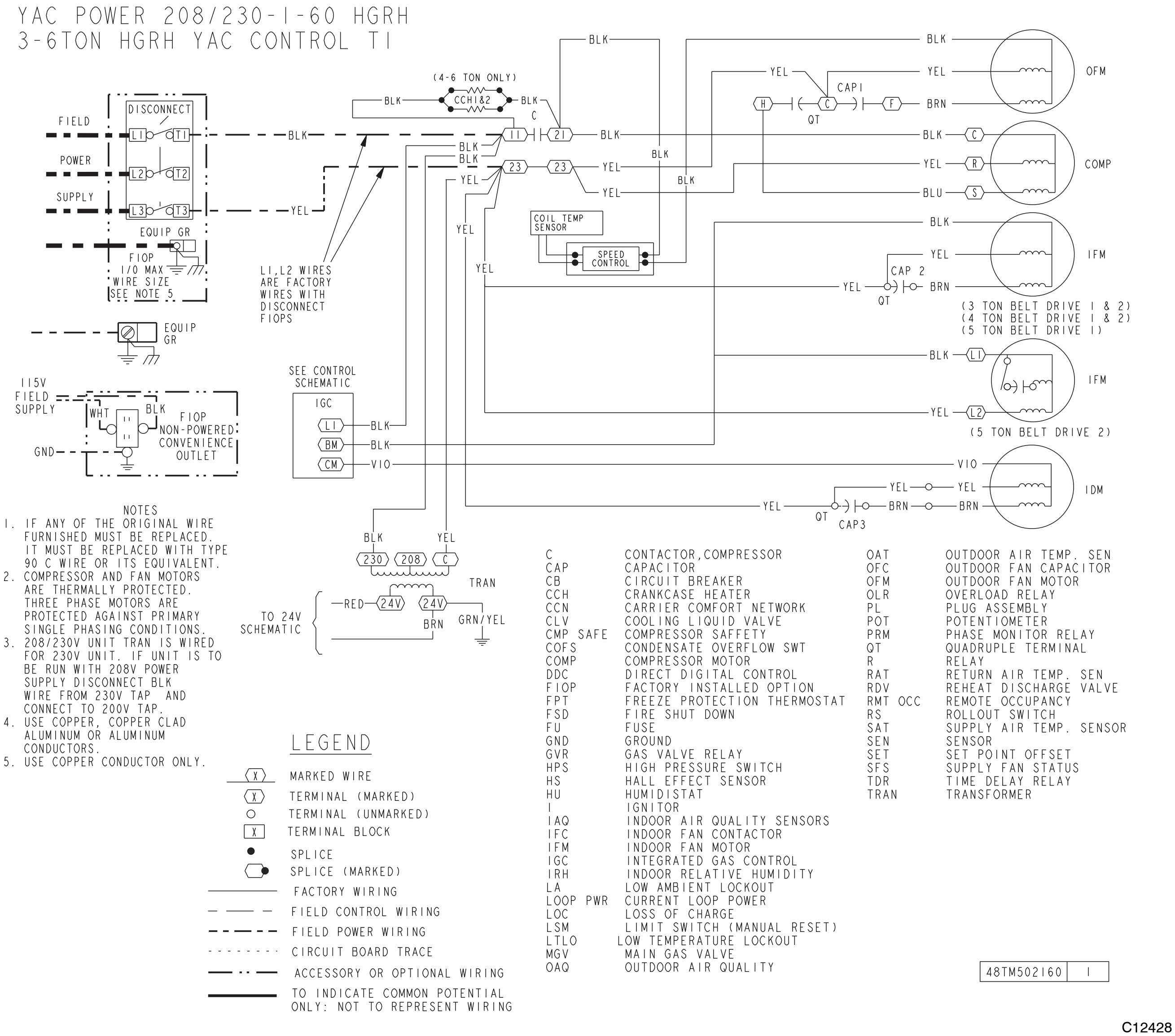
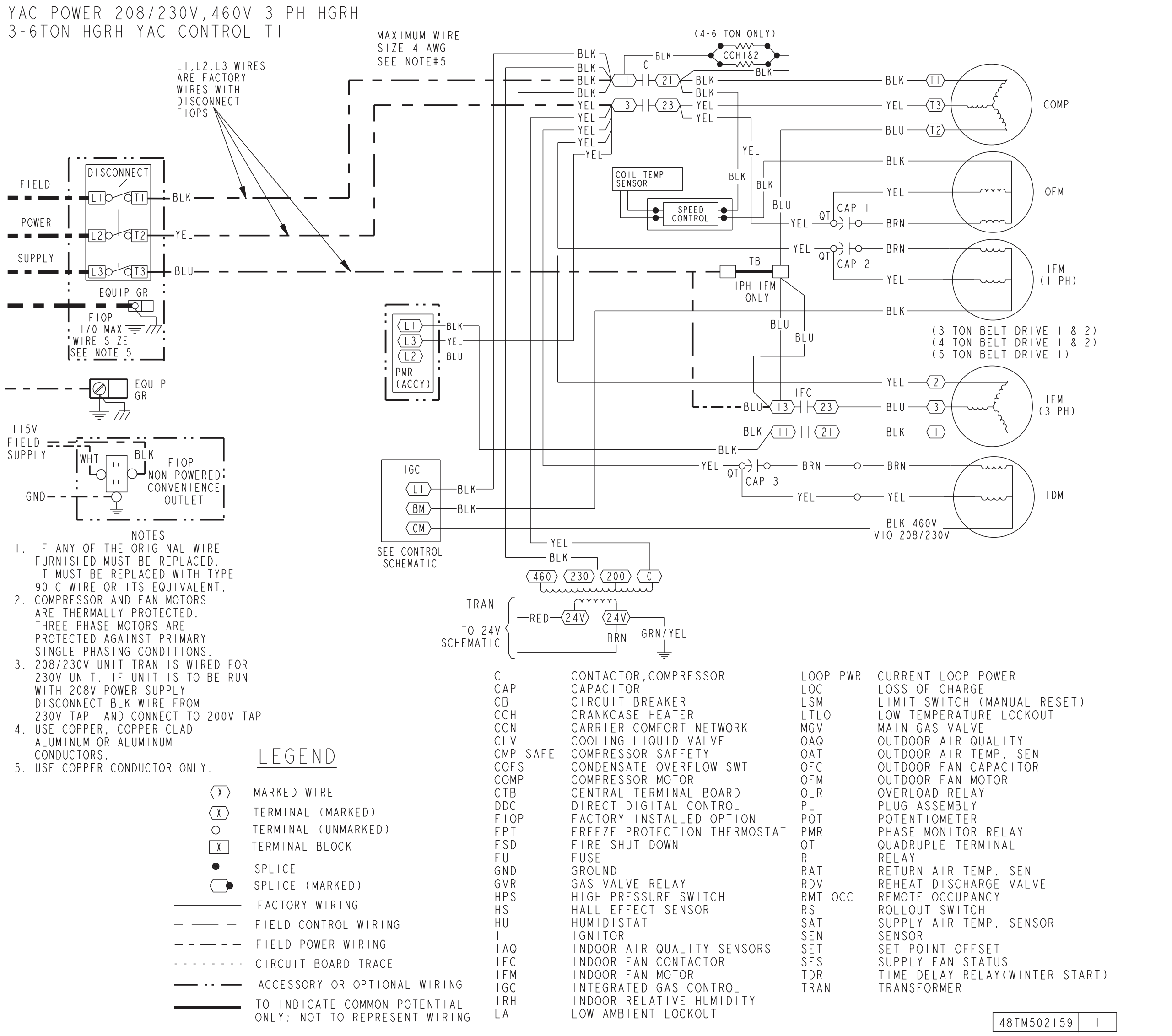


Fig. 112 - 48TC B04-B07 Power Diagram; 208/230-1-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST

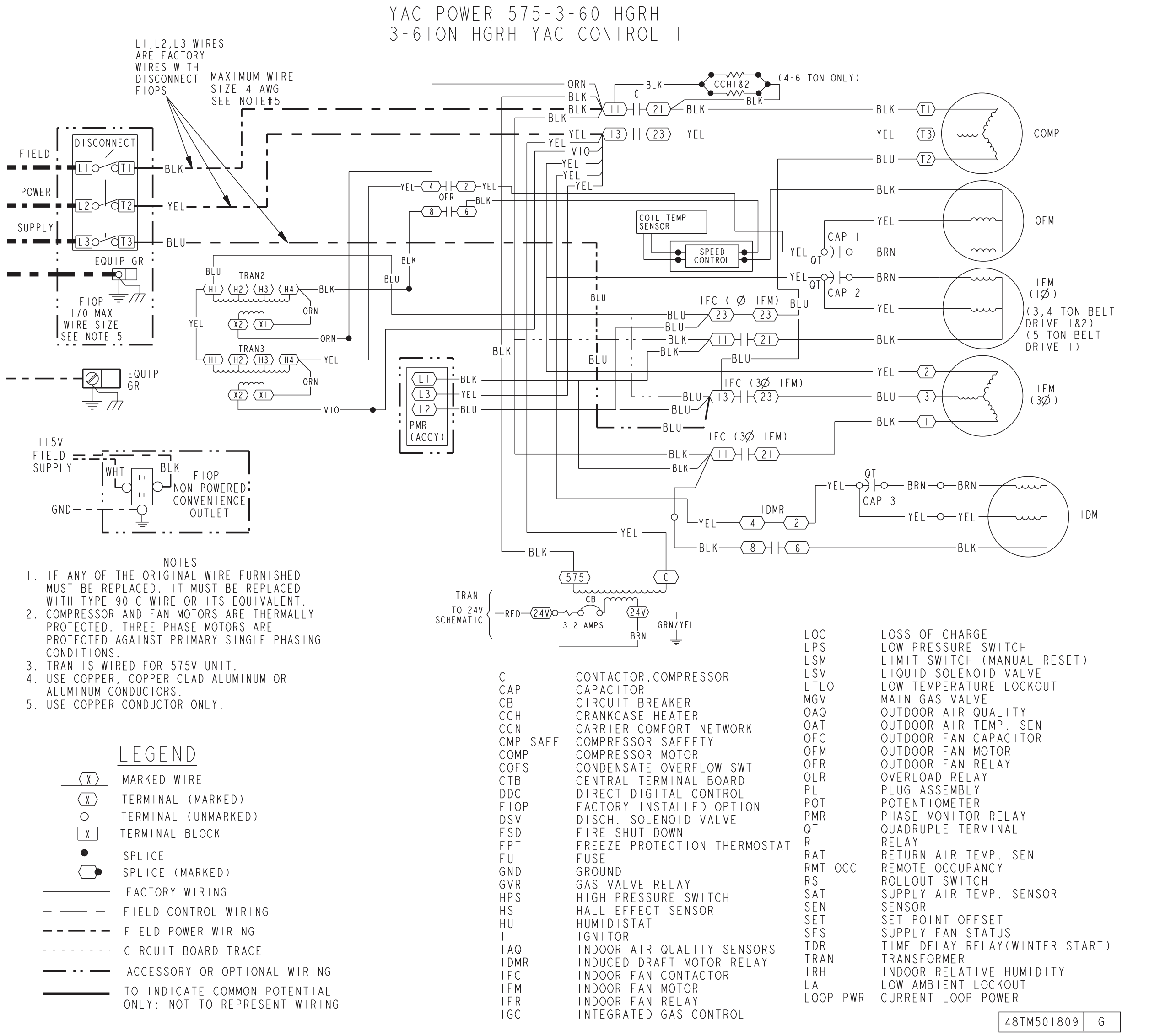


C12429

Fig. 113 - 48TC B04-B07 Power Diagram; 208/230-3-60; 460-3-60 with Humidi-MiZer™

48TC

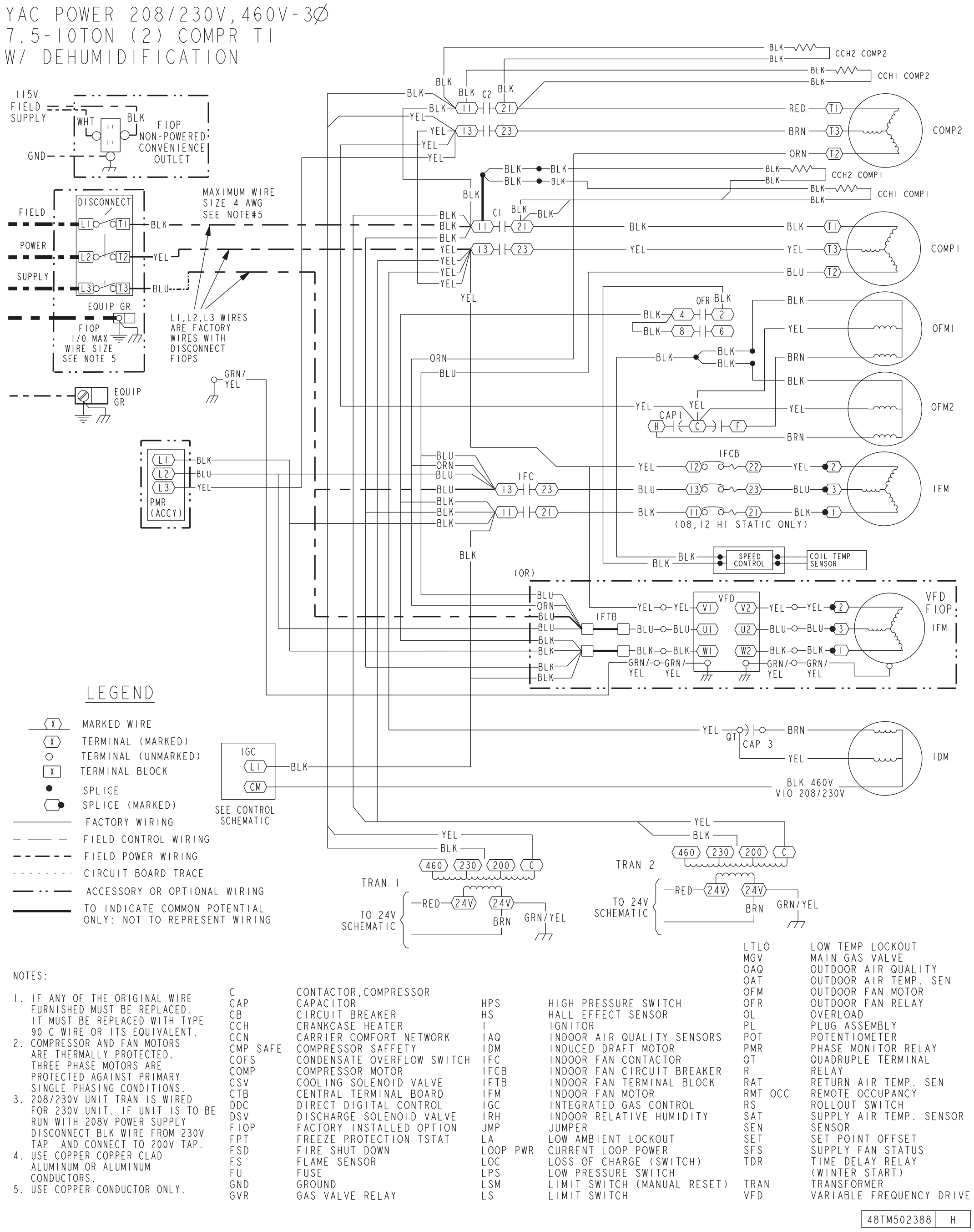
APPENDIX III. WIRING DIAGRAM LIST



C12430

Fig. 114 - 48TC B04-B07 Power Diagram; 575-3-60 with Humidi-MiZer™

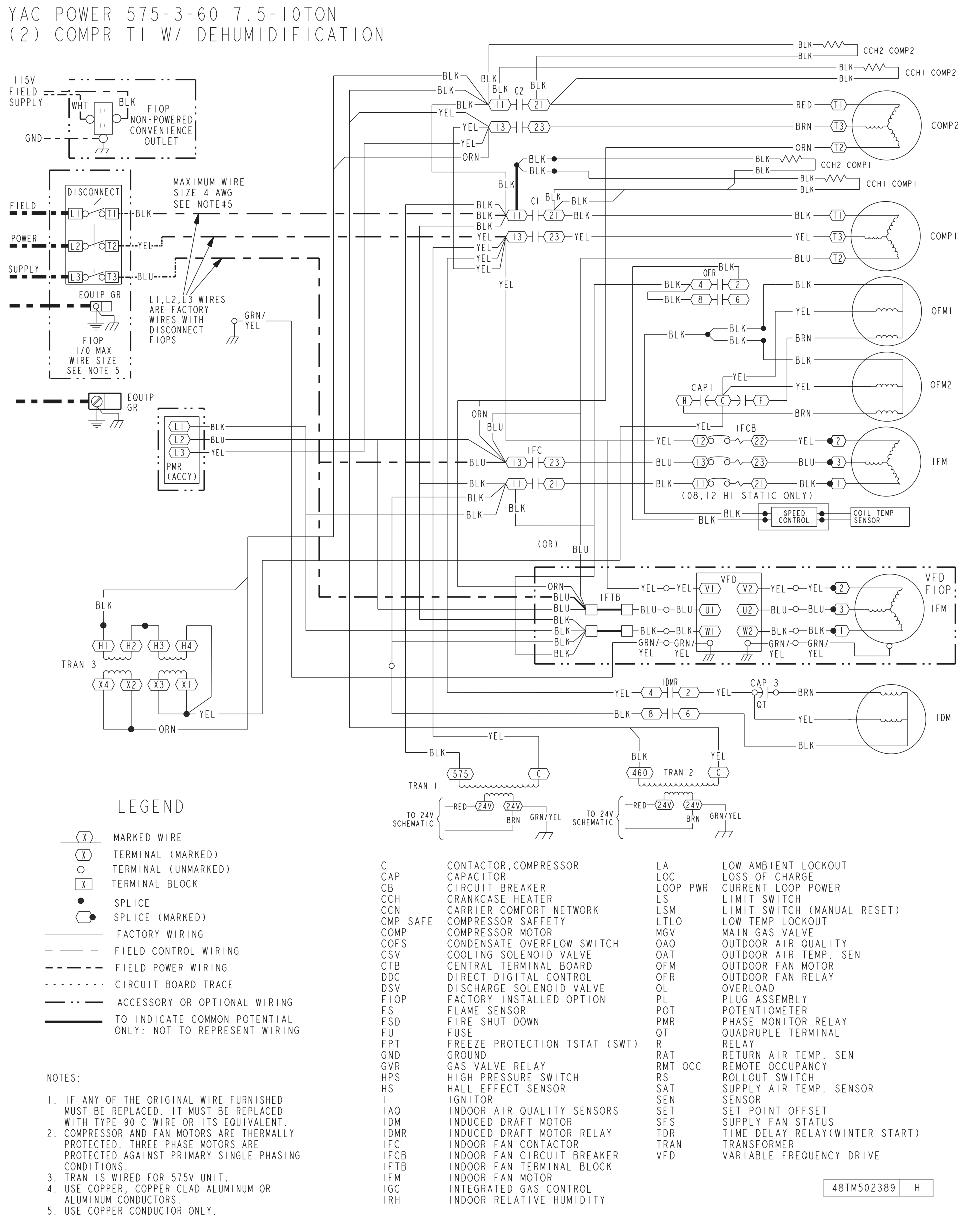
APPENDIX III. WIRING DIAGRAMS



C12432

Fig. 115 - 48TC E08-E12 Power Diagram; 208/230-3-30; 460-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST

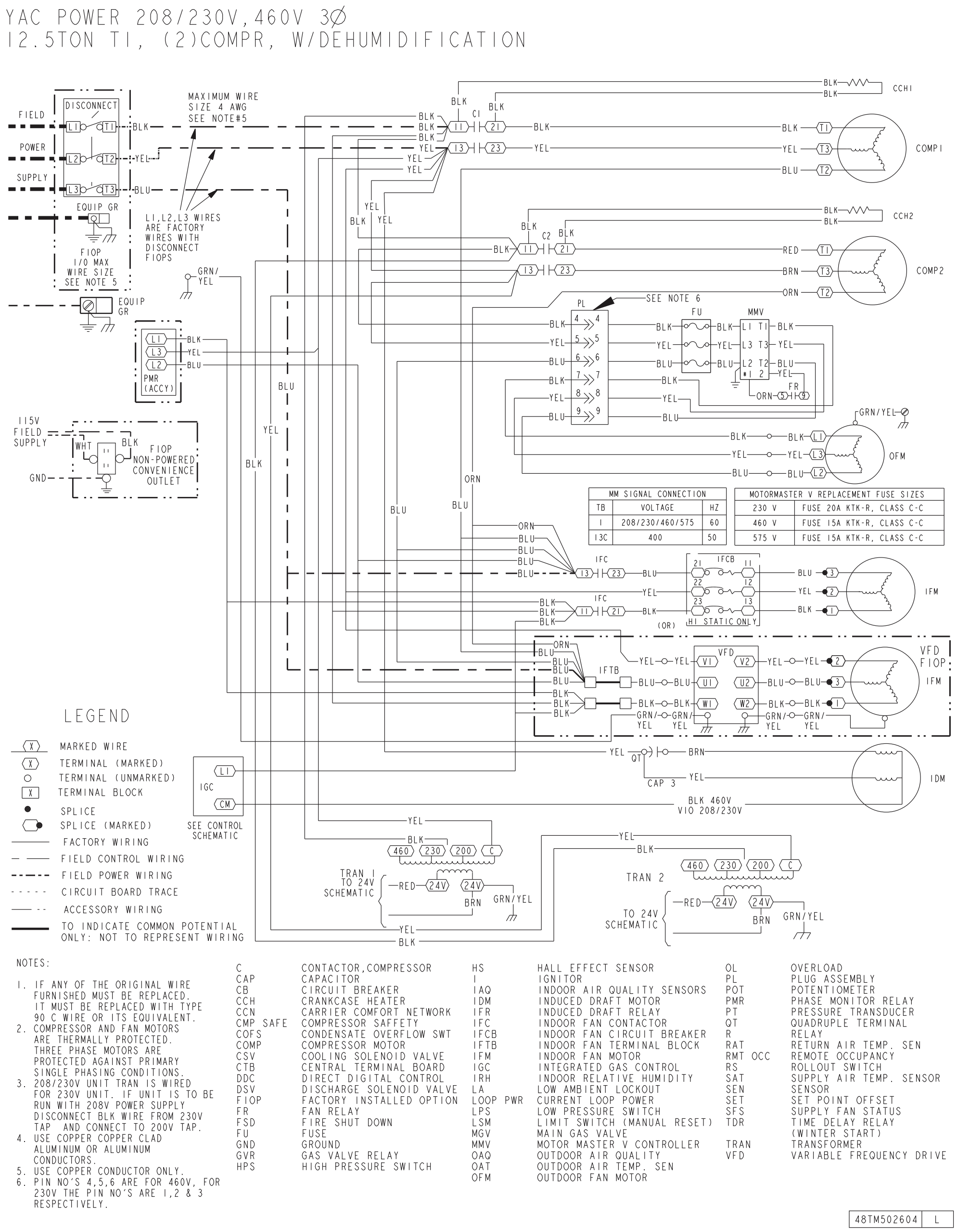


C12433

Fig. 116 - 48TC E08-E12 Power Diagram; 575-3-60 with Humidi-MiZer™

48TC

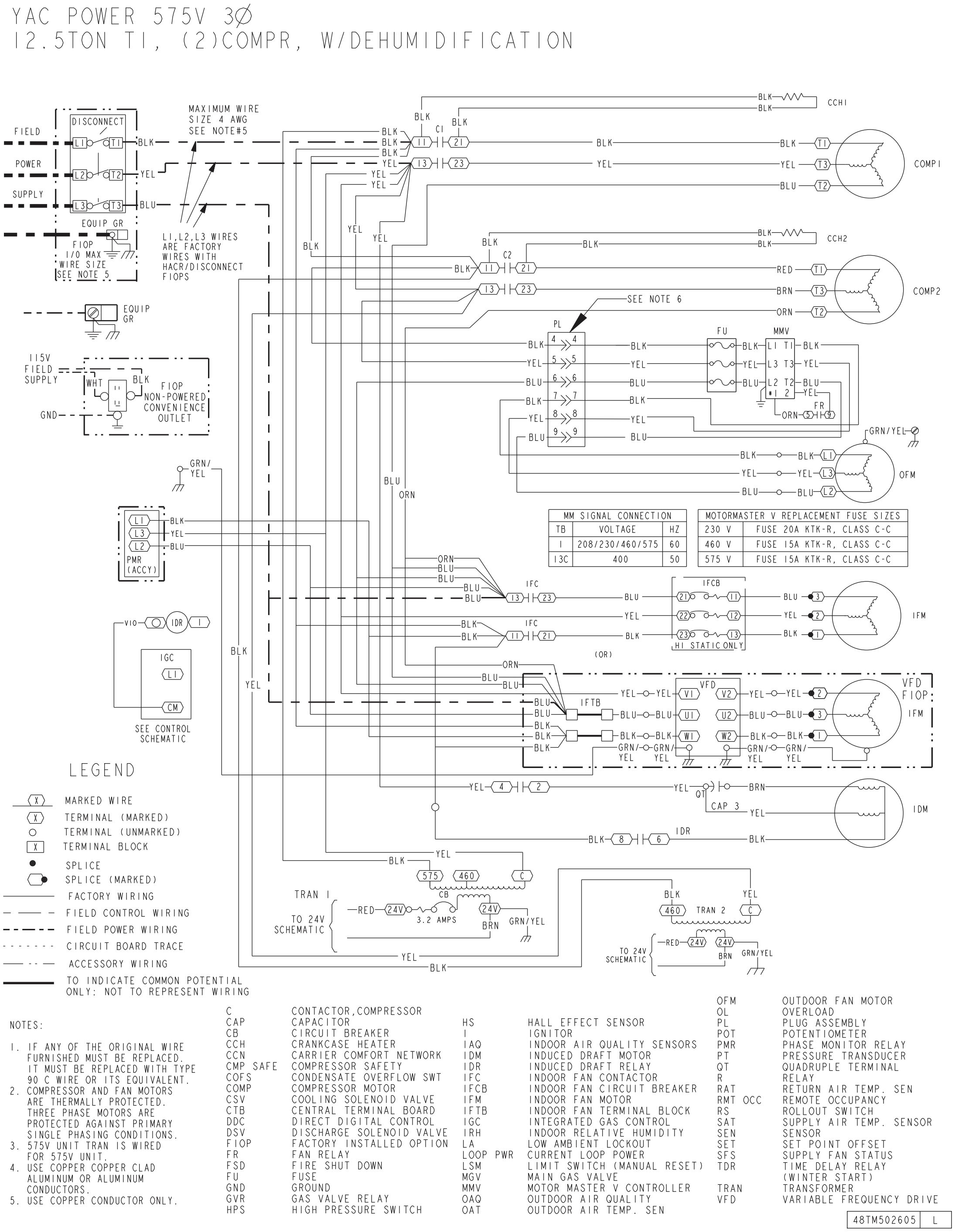
APPENDIX III. WIRING DIAGRAMS



C12434

Fig. 117 - 48TC E14 Power Diagram; 208/230-3-60; 460-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST

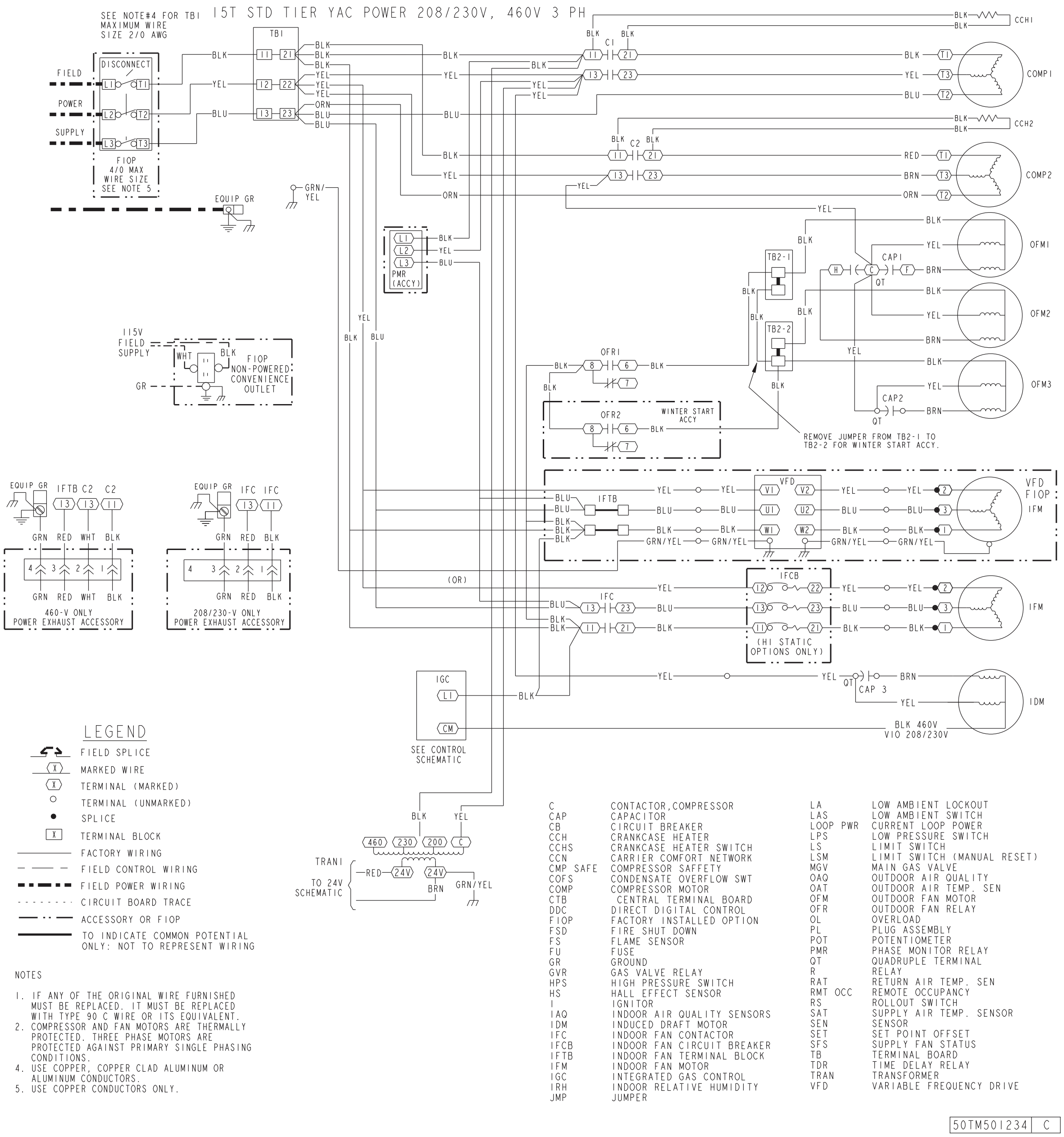


C12435

Fig. 118 - 48TC E14 Power Diagram; 575-3-60 with Humidi-MiZer™

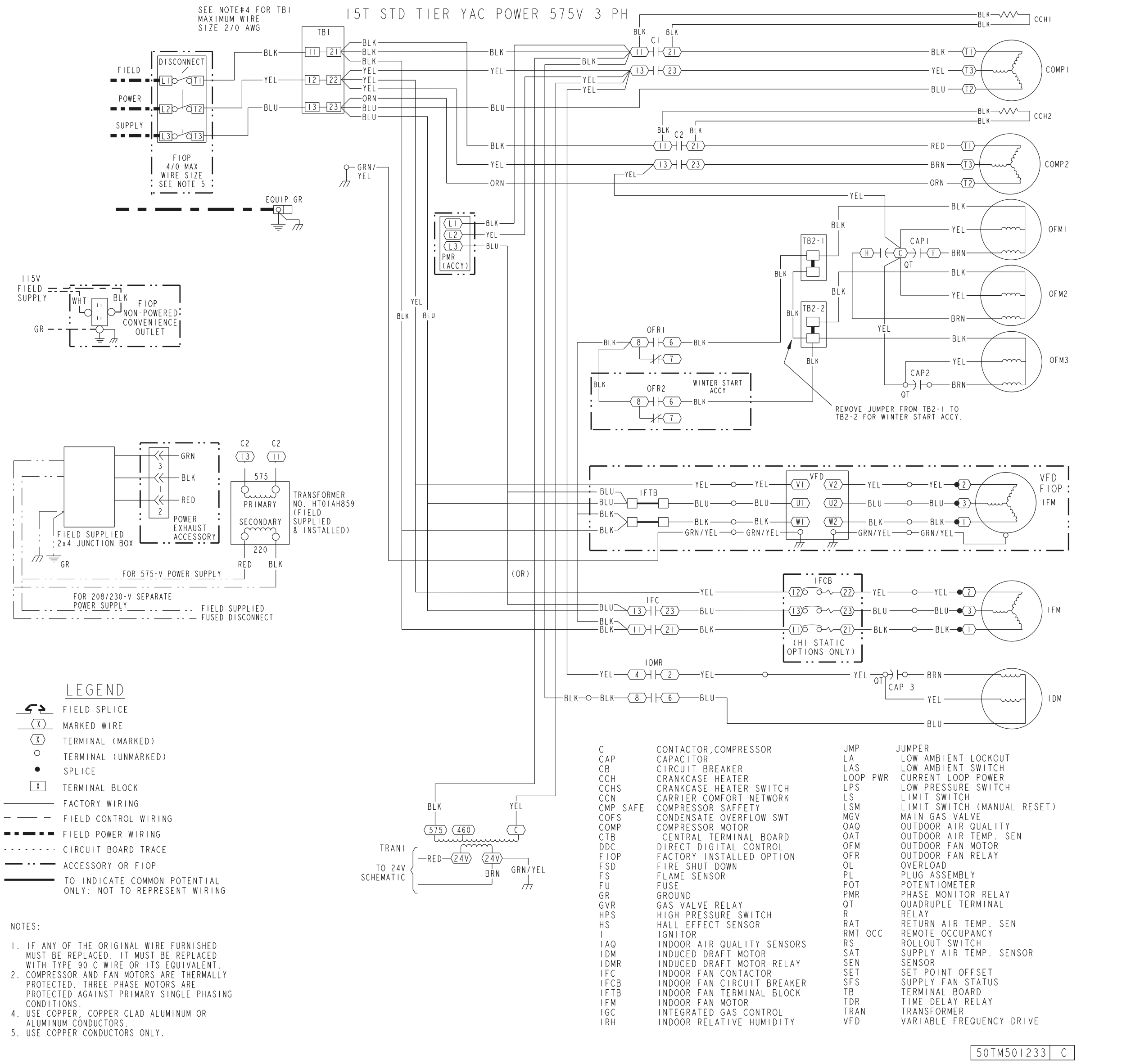
48TC

APPENDIX III. WIRING DIAGRAM LIST



C12422

Fig. 119 - 48TC D16 Power Diagram; 208/230-3-60; 460-3-60

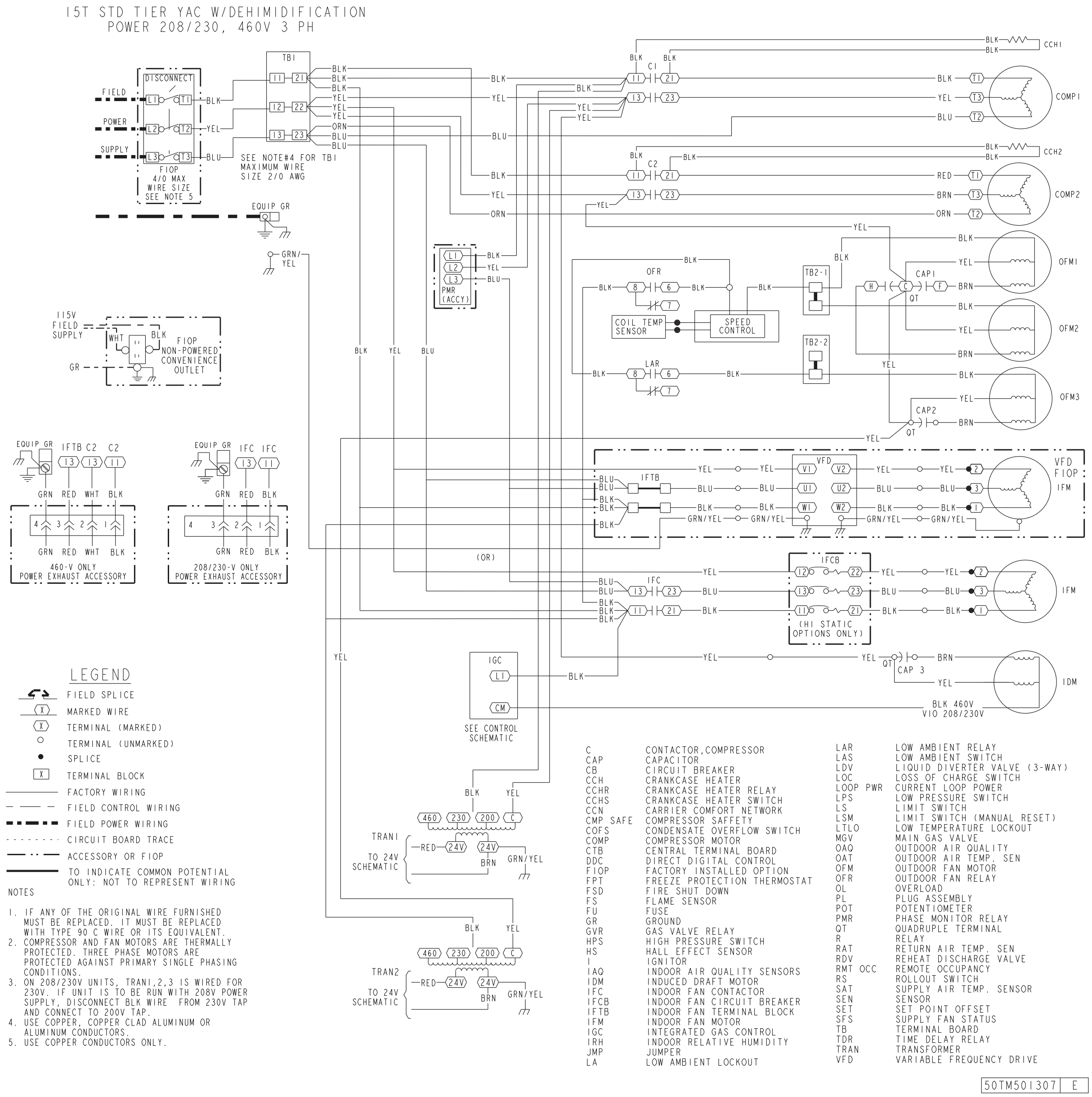


C12423

Fig. 120 - 48TC D16 Power Diagram; 575-3-60

48TC

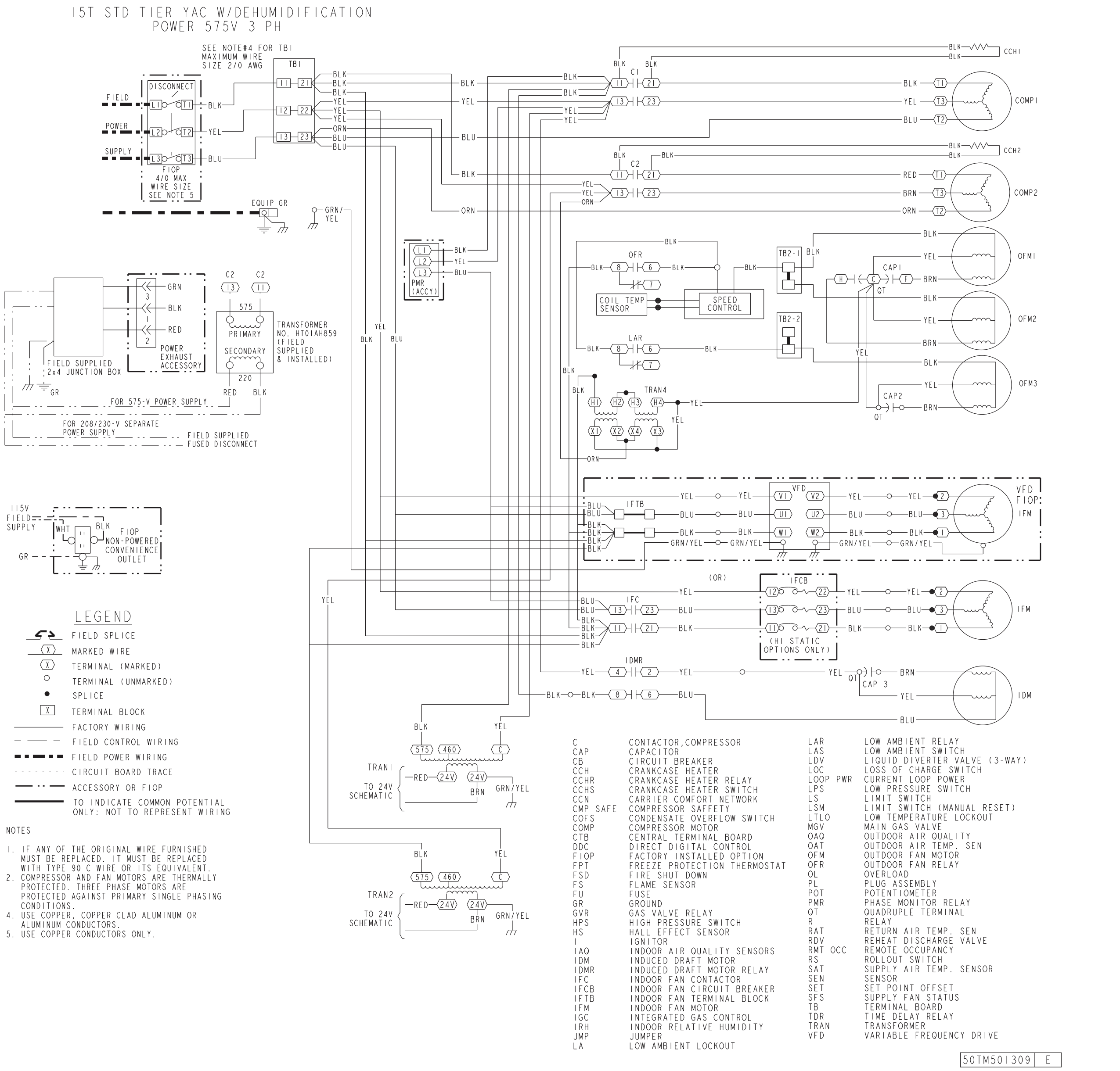
APPENDIX III. WIRING DIAGRAM LIST



C12436

Fig. 121 – 48TC E16 Power Diagram; 208/230-3-60; 460-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAMS



C12437

Fig. 122 - 48TC E16 Power Diagram; 575-3-60 with Humidi-MiZer™

APPENDIX III. WIRING DIAGRAM LIST

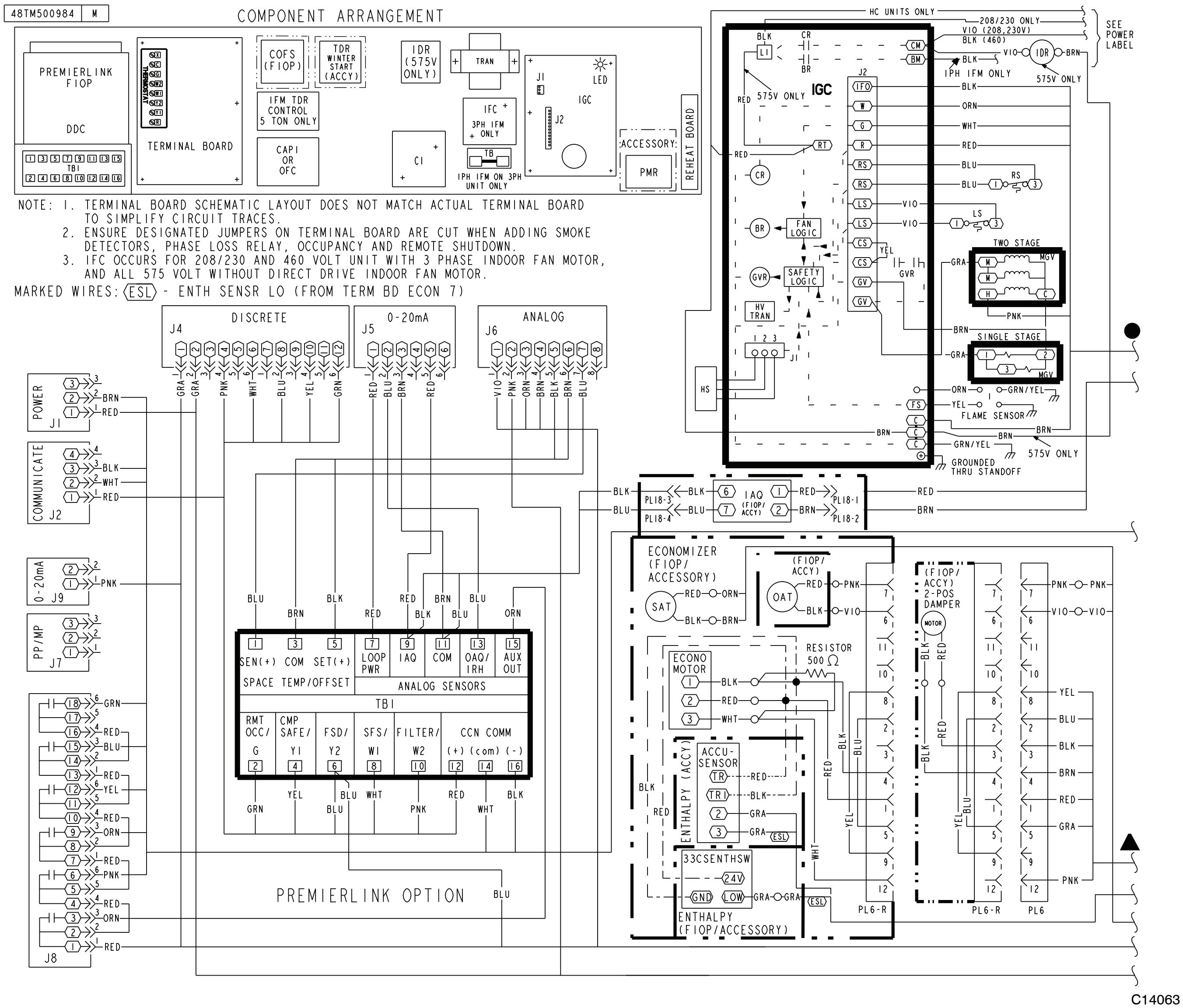


Fig. 123 - 48TC A04-12, D08-14 PremierLink Control Diagram

APPENDIX III. WIRING DIAGRAM LIST

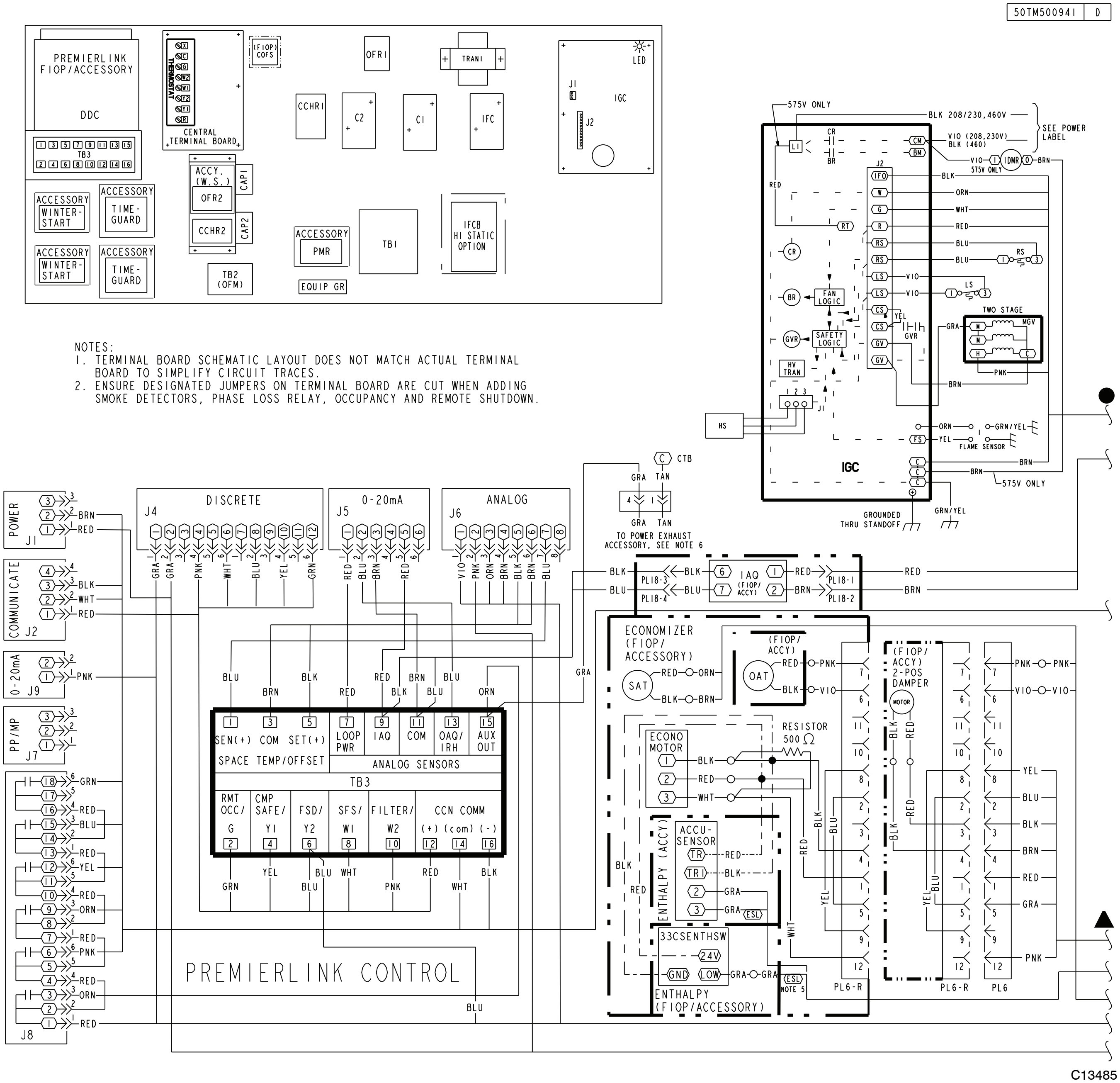


Fig. 124 – 48TC 16 PremierLink Control Diagram

48TC

APPENDIX III. WIRING DIAGRAM LIST

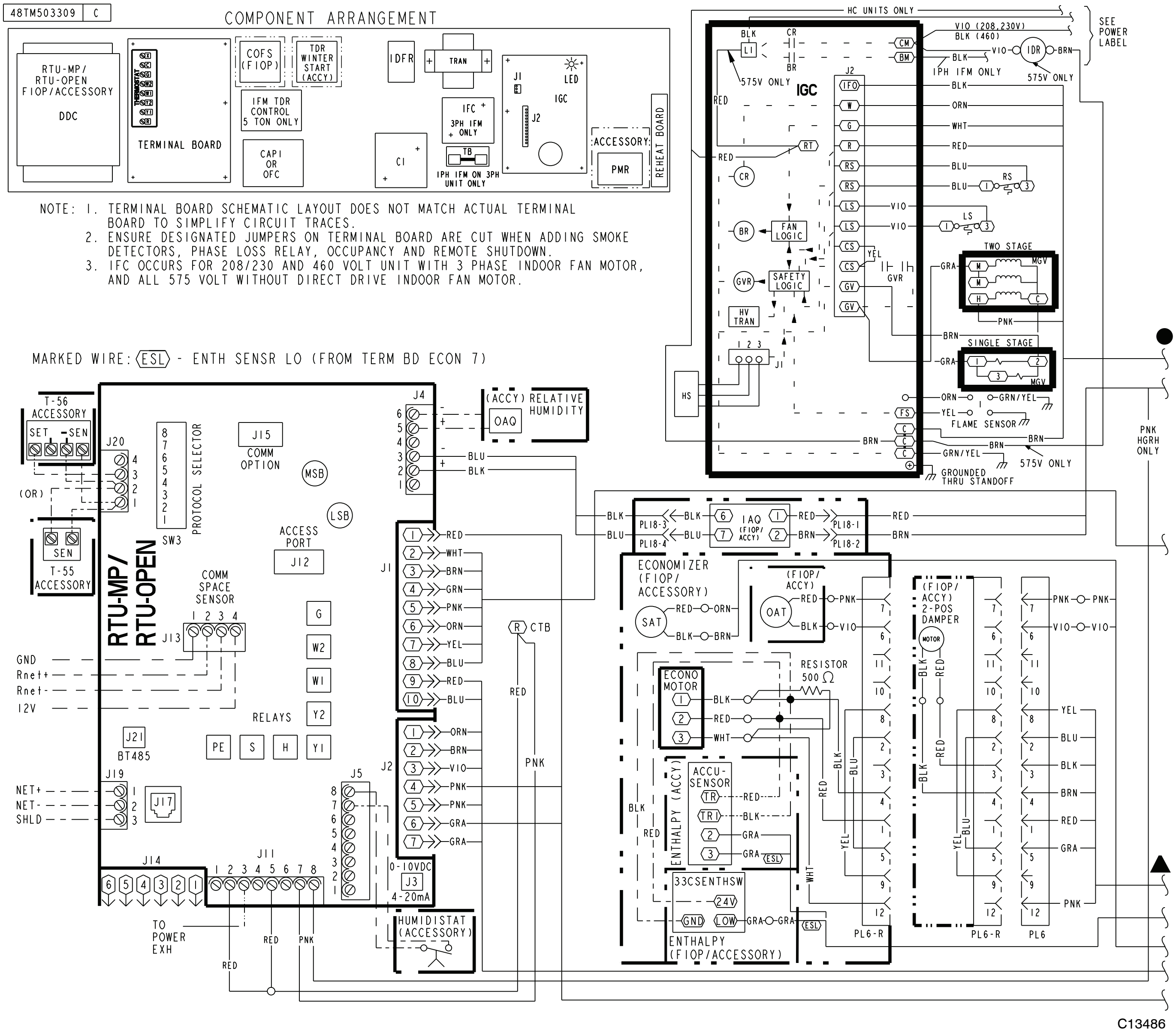


Fig. 125 - 48TC A04-07, A08-12, B04-07, D08-14, E08-14 RTU Open Control Diagram

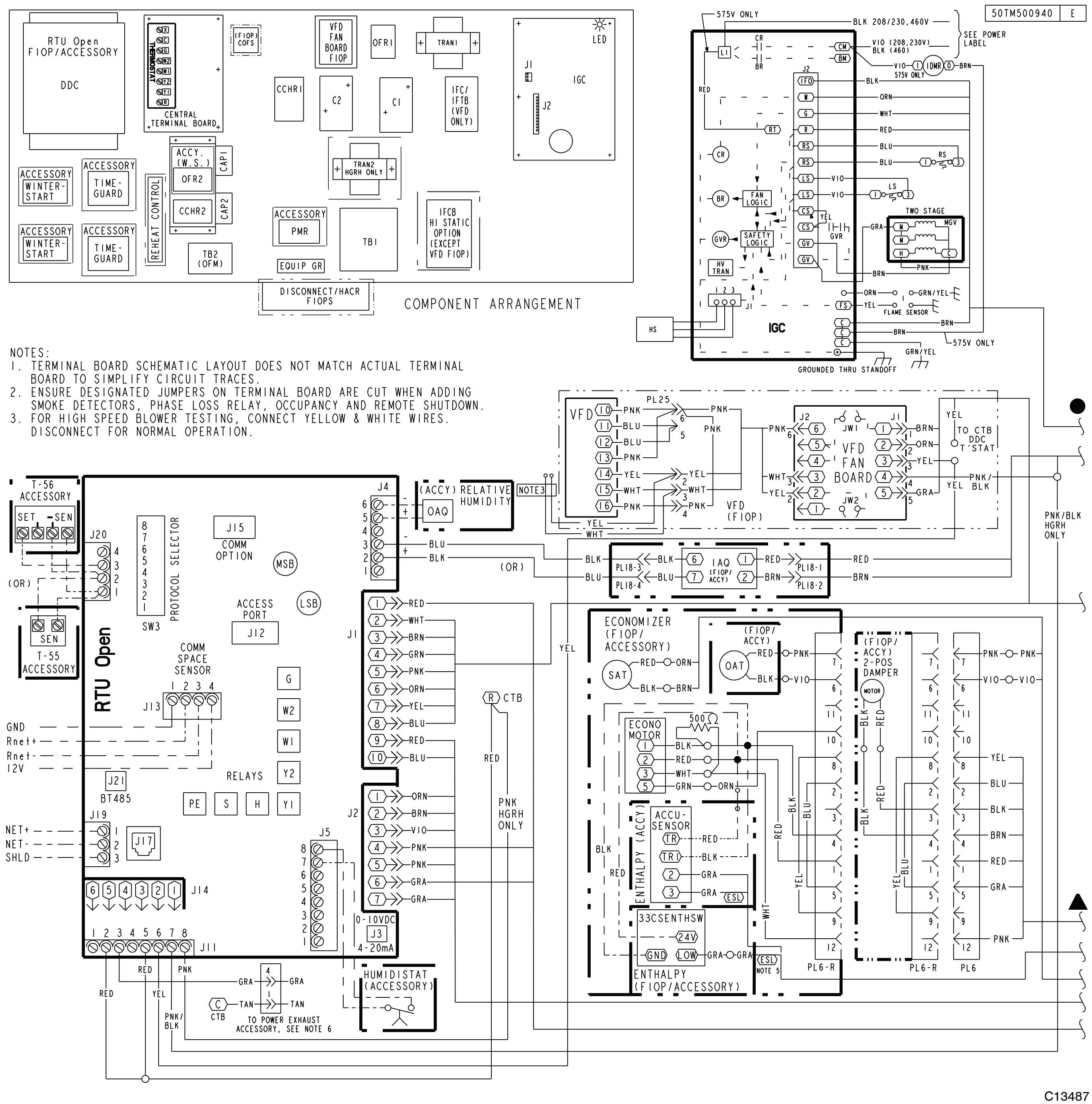
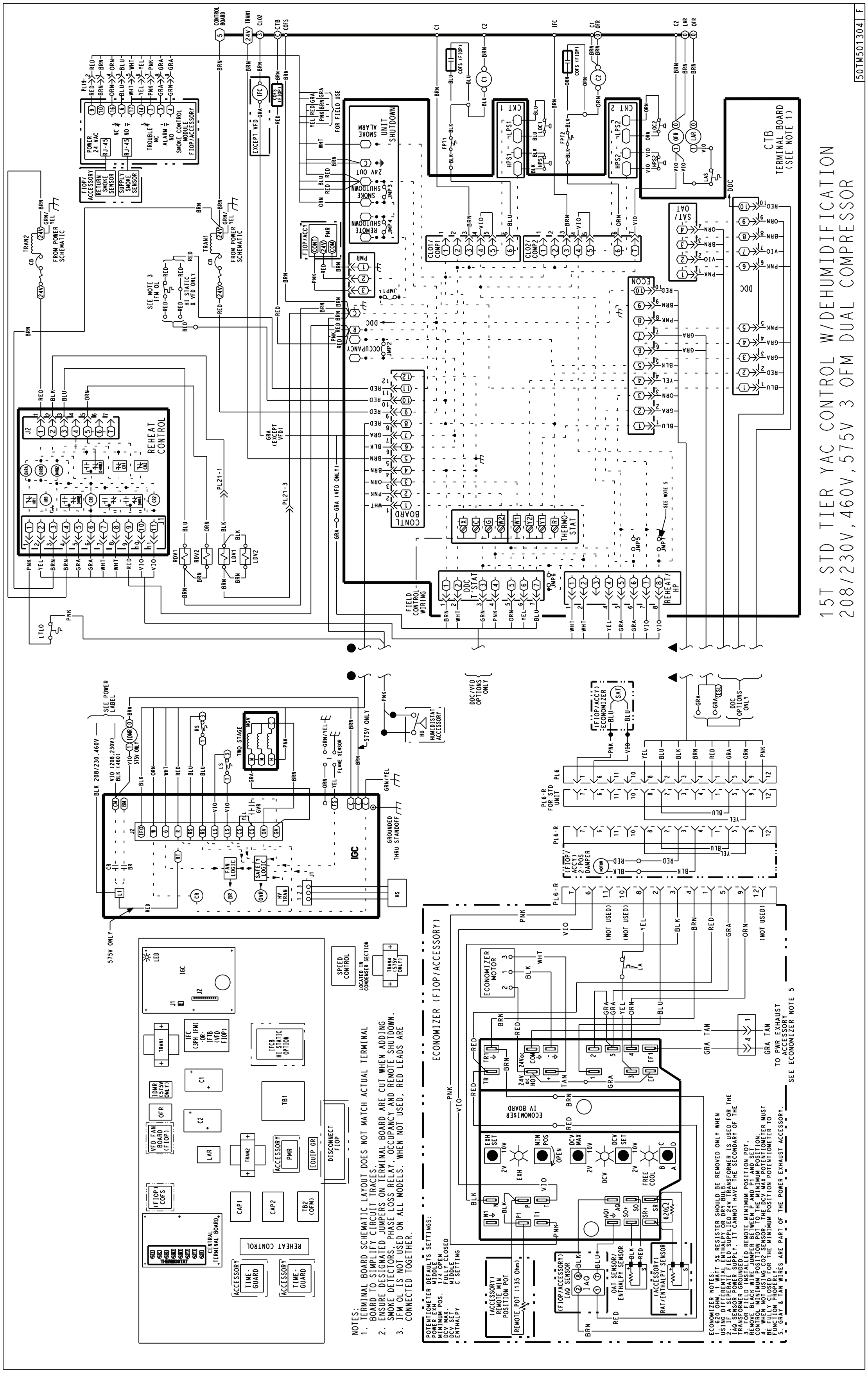


Fig. 126 - 48TC 16 RTU-Open Control Diagram

APPENDIX III. WIRING DIAGRAM LIST

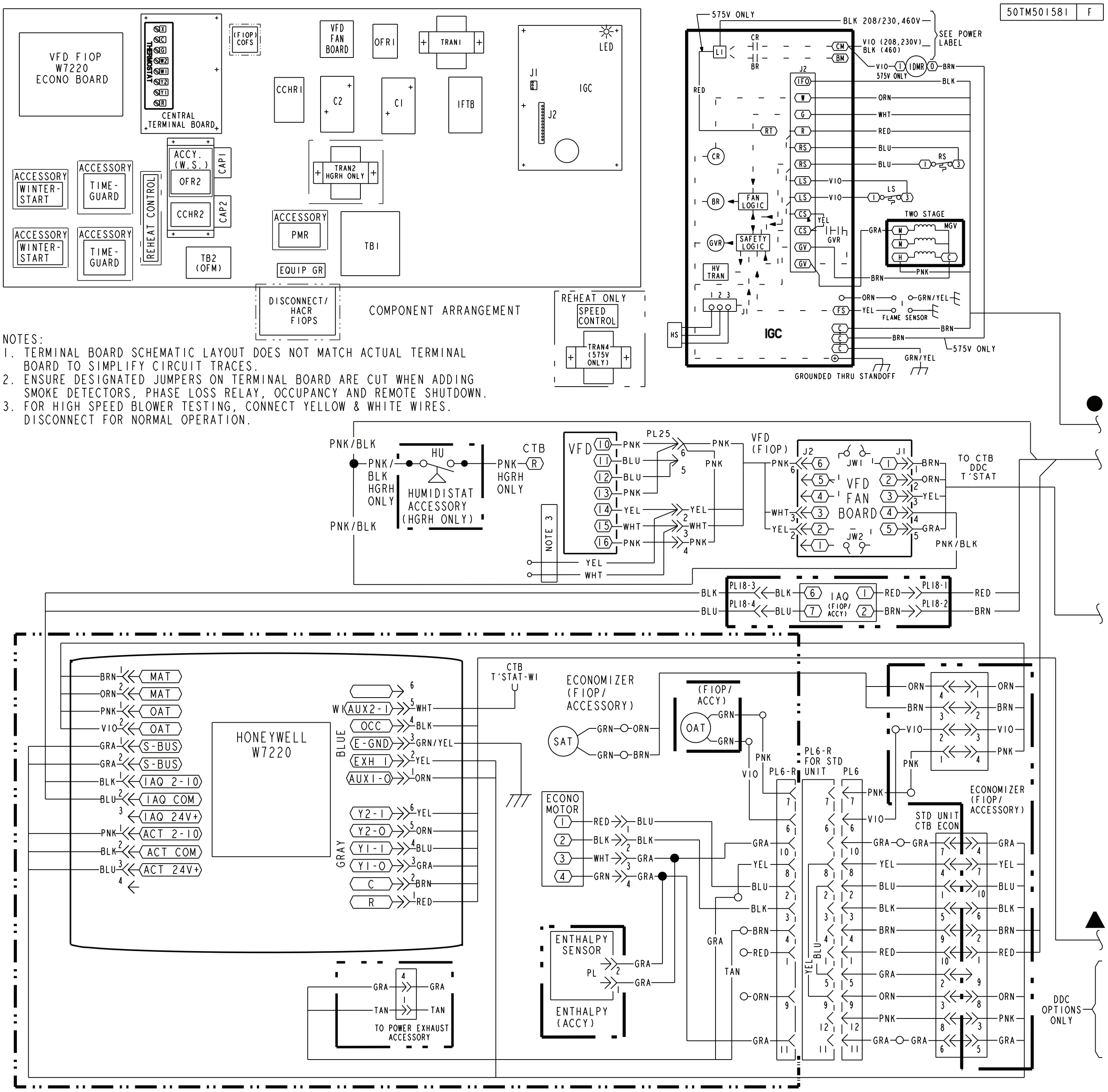
48TC



C14124

Fig. 127 - 48TC D08-14, E08-14 W7220/2-Speed IFM

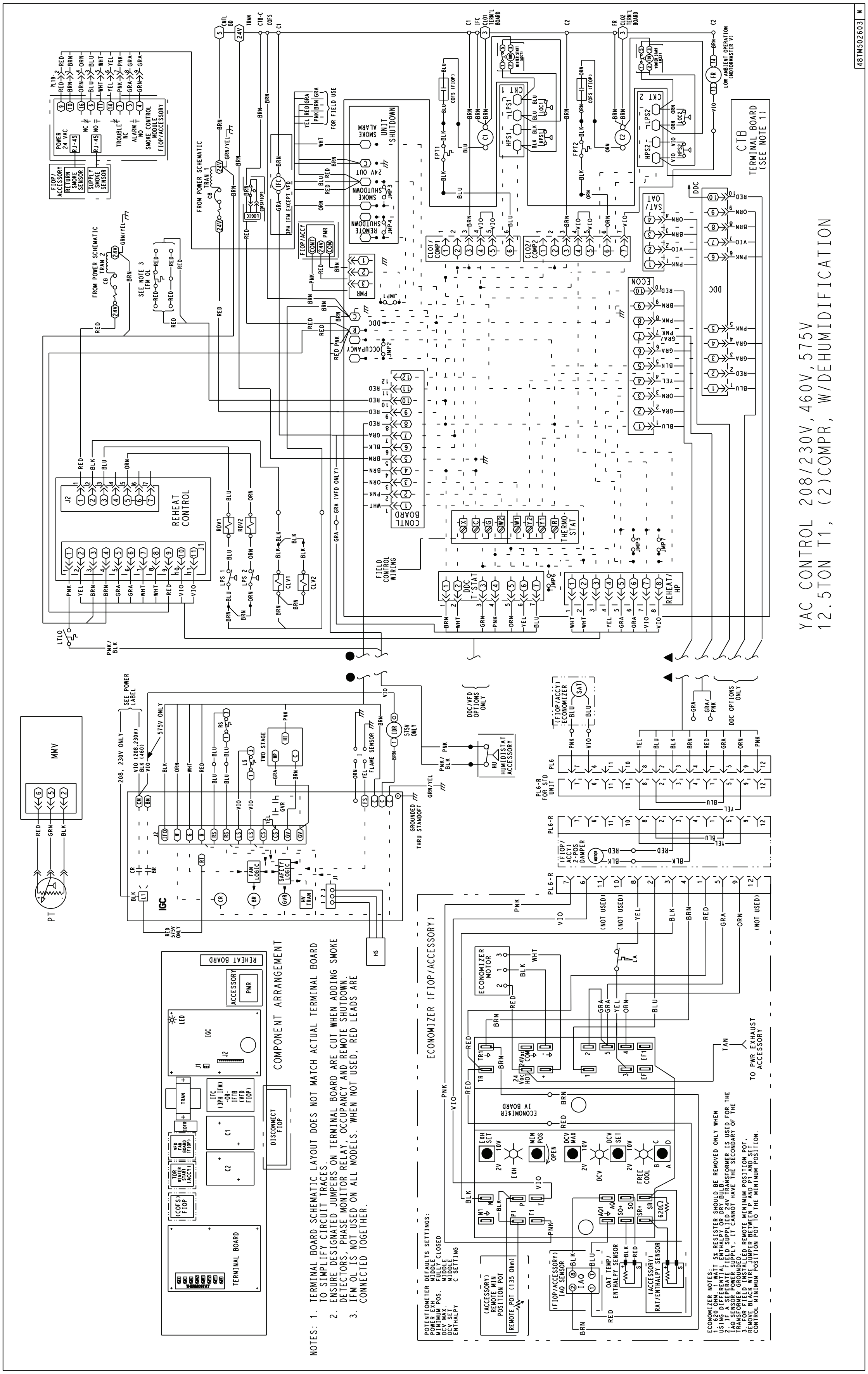
APPENDIX III. WIRING DIAGRAM LIST



C13489

Fig. 128 - 48TC D16, E16 W7220/2-Speed IFM Control Diagram

APPENDIX III. WIRING DIAGRAMS



C14062

Fig. 129 - 48TC E-14 Control Diagram: 208/230-3-60:460-3-60;575-3-60

APPENDIX IV. MOTORMASTER SENSOR LOCATIONS

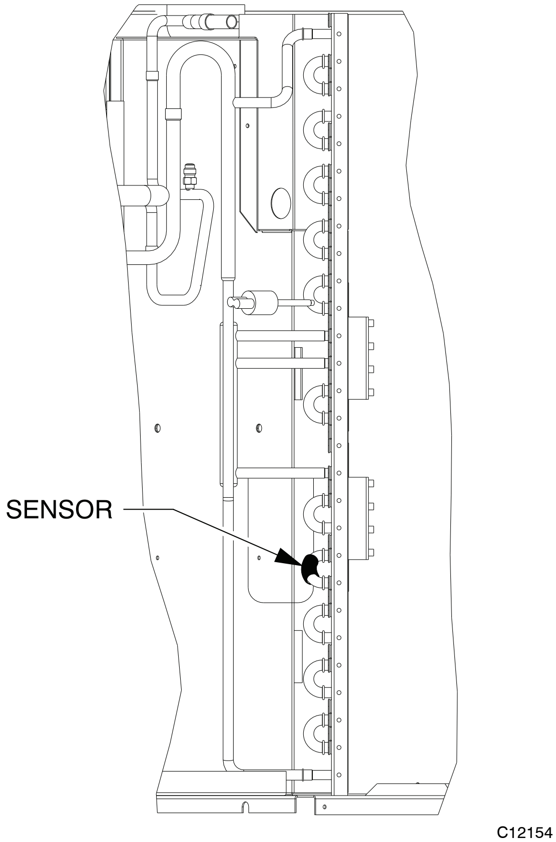


Fig. 130 - 48TC04 Motormaster Sensor Location**

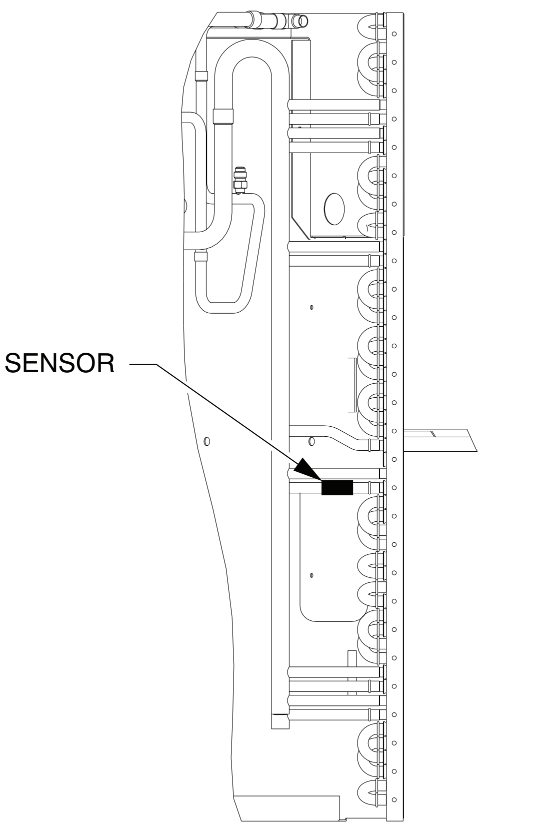


Fig. 131 - 48TC05/06 Motormaster Sensor Location**

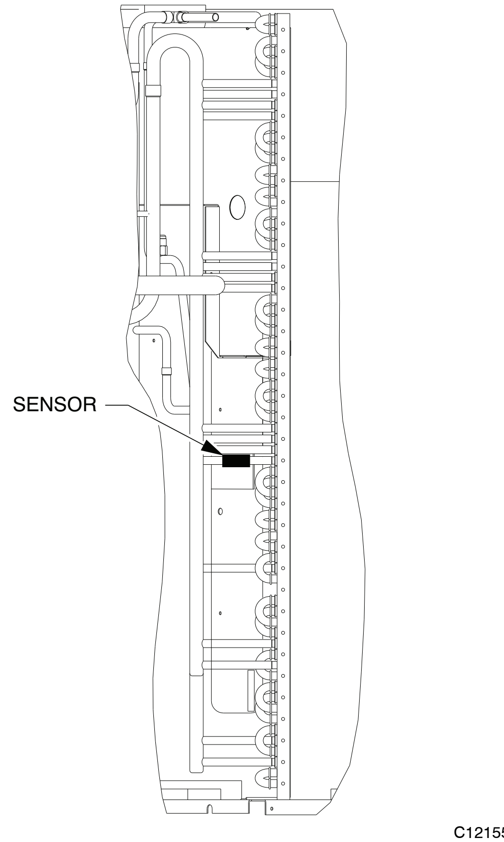


Fig. 132 - 48TC07 Motormaster Sensor Location**

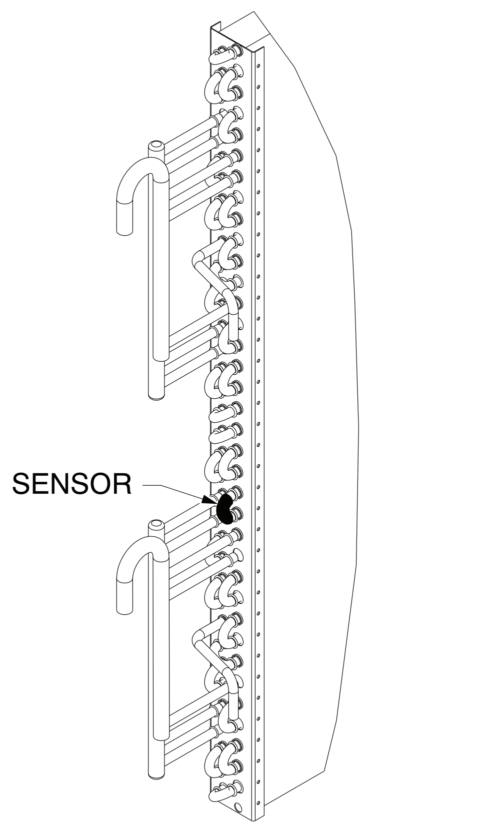


Fig. 133 - 48TC08 Motormaster Sensor Location**

48TC

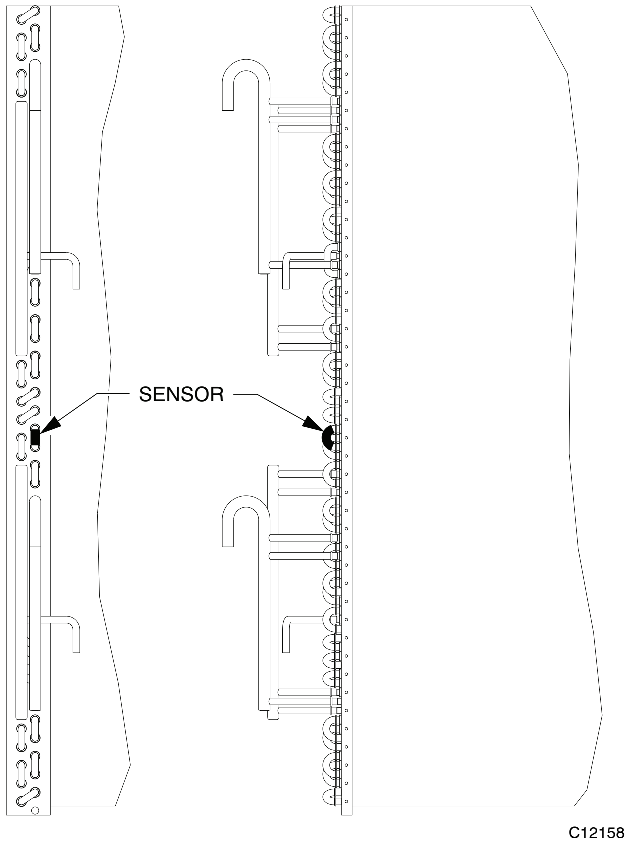


Fig. 134 - 48TC**09 Motormaster Sensor Location

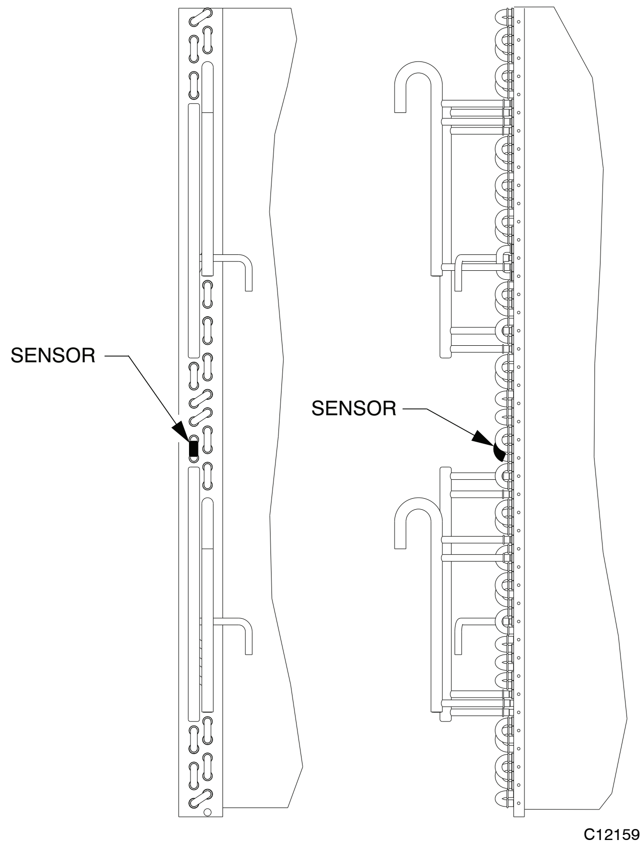


Fig. 135 - 48TC**12 Motormaster Sensor Location

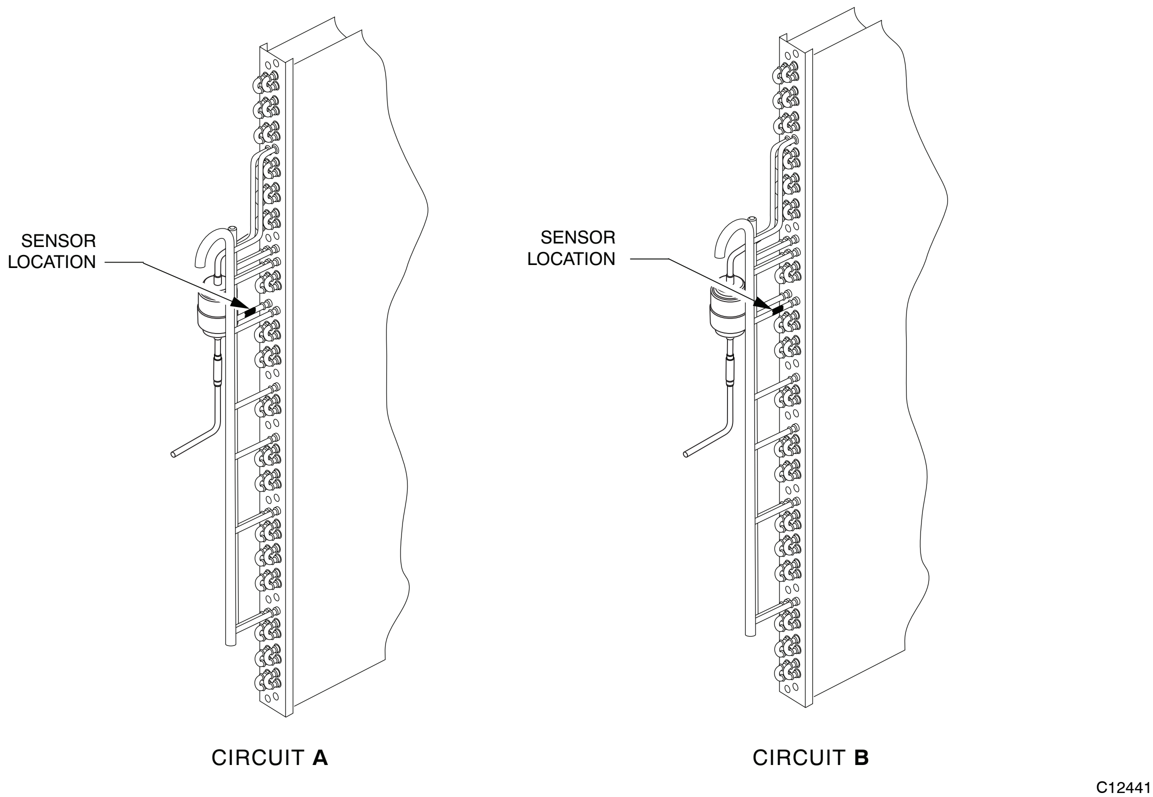


Fig. 136 - 48TC**16 Motormaster Sensor Location

NOTE: Motormaster Sensor location for 48TC**14 is unavailable.

Edition Date: 05/14

Catalog No: 48TC-4-16-01SM

Replaces: 48TC-2SM & 48TC-3SM

UNIT START-UP CHECKLIST

I. PRELIMINARY INFORMATION:

MODEL NO.:______________________________ SERIAL NO: ______________________________

DATE:______________________________ TECHNICIAN: ______________________________

BUILDING LOCATION:______________________________

II. PRE-START-UP (insert check mark in box as each item is completed):

☐ VERIFY THAT ALL PACKAGING MATERIALS HAVE BEEN REMOVED FROM UNIT
☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS
☐ VERIFY THAT FLUE HOOD IS INSTALLED
☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS
☐ CHECK TO ENSURE NO WIRES ARE TOUCHING REFRIGERANT TUBING OR SHARP EDGES
☐ CHECK GAS PIPING FOR LEAKS
☐ CHECK THAT RETURN-AIR FILTER IS CLEAN AND IN PLACE
☐ VERIFY THAT UNIT INSTALLATION IS LEVEL
☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE AND VERIFY SETSCREW IS TIGHT
☐ VERIFY PULLEY ALIGNMENT AND BELT TENSION ARE CORRECT

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	________	L2-L3	________	L3-L1	________
COMPRESSOR AMPS	L1	________	L2	________	L2	________
INDOOR FAN AMPS	L1	________	L2	________	L2	________

TEMPERATURES

OUTDOOR-AIR TEMPERATURE	________	DB	________	WB
RETURN-AIR TEMPERATURE	________	DB	________	WB
COOLING SUPPLY AIR	________	DB	________	WB
GAS HEAT SUPPLY AIR	________	DB		

PRESSURES

GAS INLET PRESSURE	________	IN. WG		
GAS MANIFOLD PRESSURE	________	IN. WG (LOW FIRE)	________	IN. WG (HI FIRE)
REFRIGERANT SUCTION	________	PSIG	________	TEMP °F
REFRIGERANT DISCHARGE	________	PSIG	________	TEMP °F

☐ VERIFY REFRIGERANT CHARGE USING CHARGING CHARTS
☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR IS ROTATING IN CORRECT DIRECTION

48TC

Edition Date: 05/14

Catalog No: 48TC−4−16−01SM

Replaces: 48TC−2SM & 48TC−3SM