2022 Light Commercial Products

Deck 2 of 2

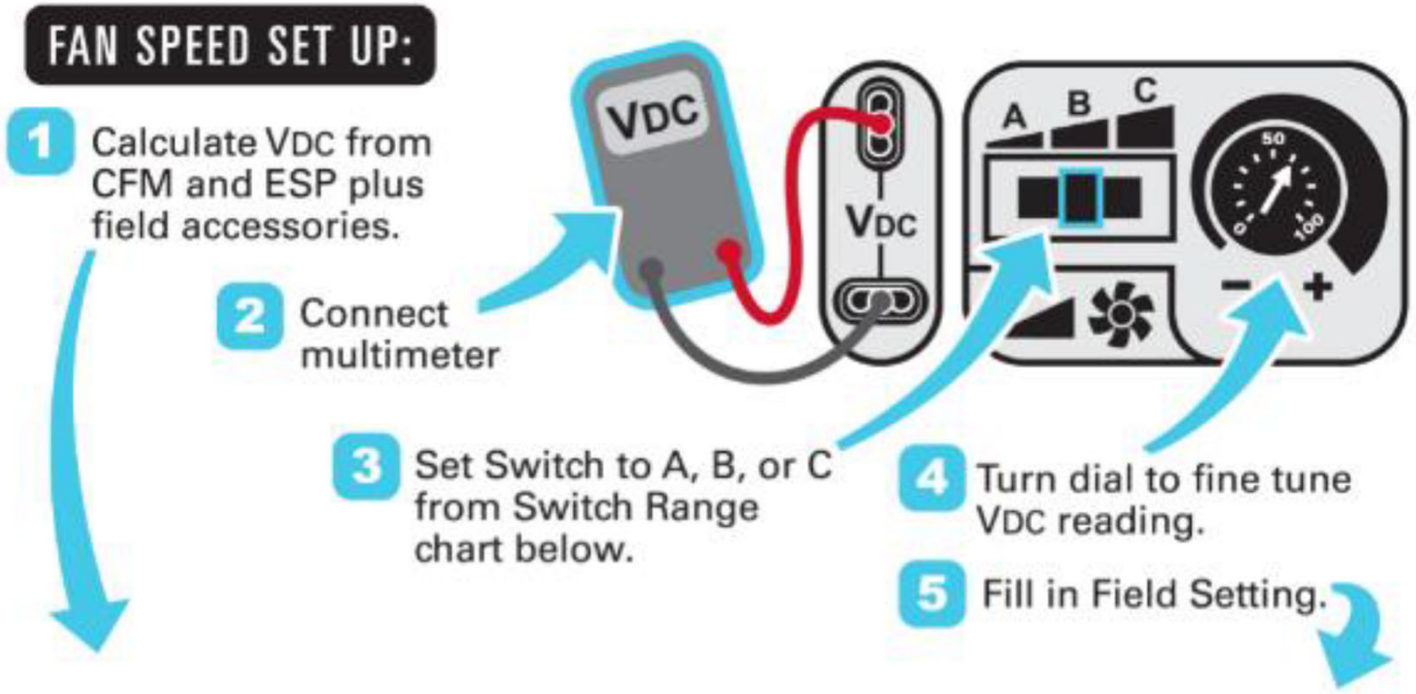
Carrier

CE

bryant
Heating & Cooling Systems

EcoBlue VAF Motor Setup &Troubleshooting

FAN SET UP


FAN SPEED SET UP:
1 Calculate VDC from CFM and ESP plus field accessories.
2 Connect multimeter
3 Set Switch to A, B, or C from Switch Range chart below.
4 Turn dial to fine tune VDC reading.
5 Fill in Field Setting.
VDC
VDC
A
B
C
50
0
100
–
+

DIFFERENT CHARTS PER MODEL

VDC Calculator		ESP in. wg									
		0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
UNIT MODEL NUMBER / CFM	1500	5.4	6.2	6.9	7.5	8.1	8.6	9.1	9.6		
	1625	5.8	6.5	7.1	7.7	8.3	8.8	9.3	9.8		
	1750	6.1	6.8	7.4	8.0	8.5	9.0	9.5	9.9		
	1875	6.5	7.1	7.7	8.2	8.7	9.2	9.7			
	2000	6.8	7.4	7.9	8.5	9.0	9.5	9.9			
	2125	7.2	7.7	8.2	8.7	9.2	9.7				
	2250	7.6	8.0	8.5	9.0	9.5	10.0				
	2375	7.9	8.4	8.8	9.3	9.8					
	2500	8.3	8.7	9.2	9.6						
Field Accessories:											
Economizer		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
1 Stage E Heat		0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2		
2 Stage E Heat		0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3		

Factory Setting:
7.8 VDC

Field Setting:

_____ VDC

Switch Range:

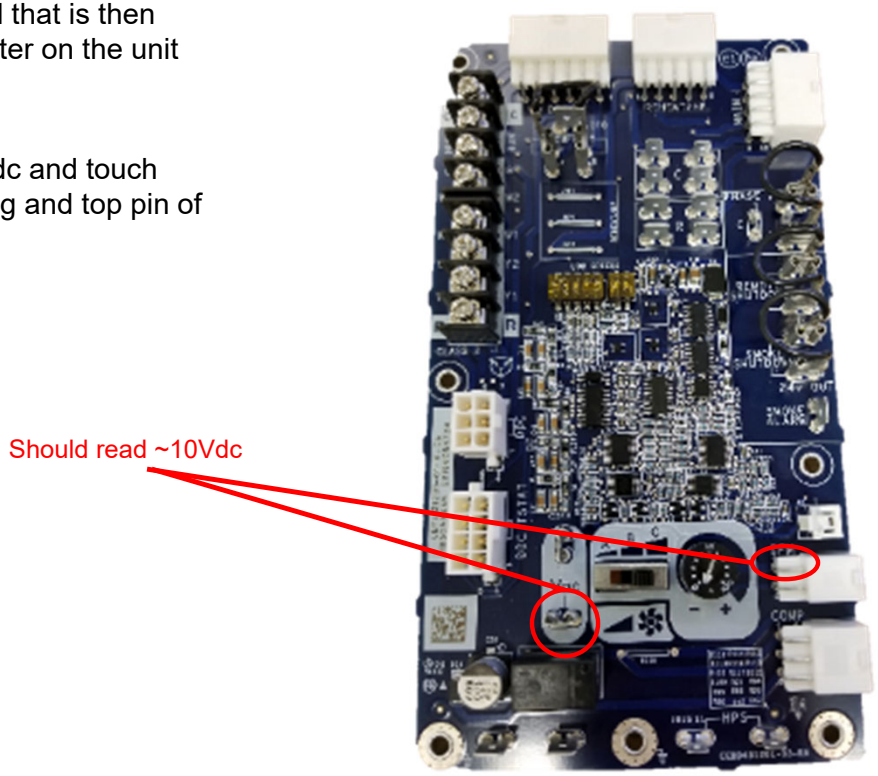
A B C

A	4.1 - 7.5
B	6.9 - 8.7
C	7.7 - 10.0

ADD to Voltage Selected From Above

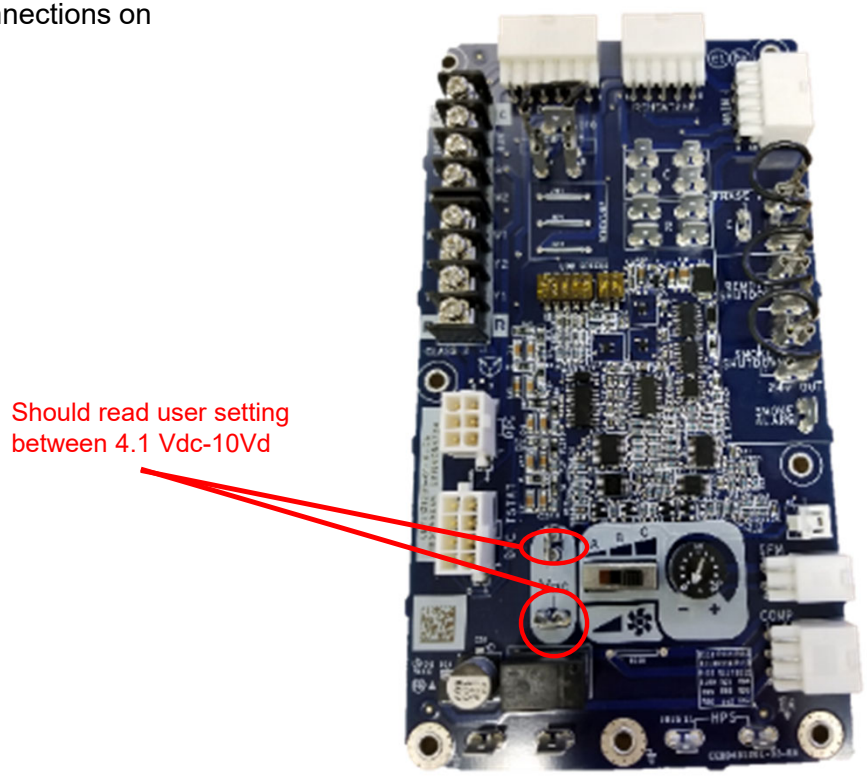
CONFIRM MOTOR 10VDC SIGNAL

- Prism IDF motors supply the 10Vdc source signal that is then adjusted by the “A-B-C” switches and potentiometer on the unit control board for user speed setting
- To confirm 10Vdc from motor, Set Voltmeter to Vdc and touch probes to bottom connection of User speed setting and top pin of IFM plug on the Unit control board
- This should read 10V



CONFIRM USER SPEED SETTING VDC

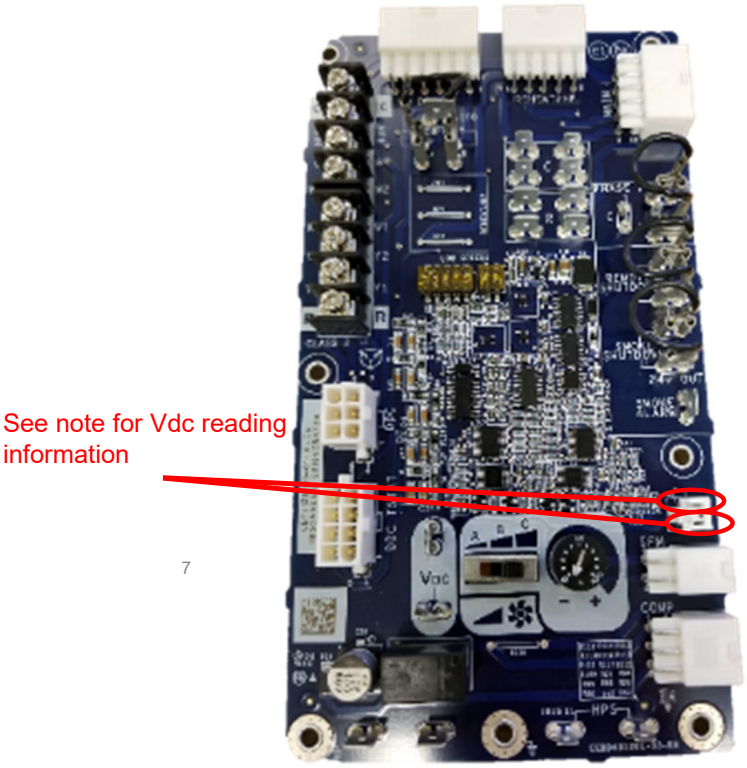
- Set Voltmeter to Vdc and touch probes across connections on User speed setting area of the unit control board
- This should read



CONFIRM BOARD OUTPUT VDC SIGNAL

- Set Voltmeter to Vdc and touch probes across connections on JP1 of the unit control board
- This Vdc reading should match per note below

- NOTE: If you are only using 24V at G to command fan speed for testing, output at these pins will read the values below. This is because some units have a low cool/vent speed setting.
  - FC04-06: 100% of user Vdc setting
  - FC07: 67% of user Vdc setting
  - GC05-06: 75% of user Vdc setting
  - To Confirm 100% fan speed matches user set point you can jump 24V to Y2

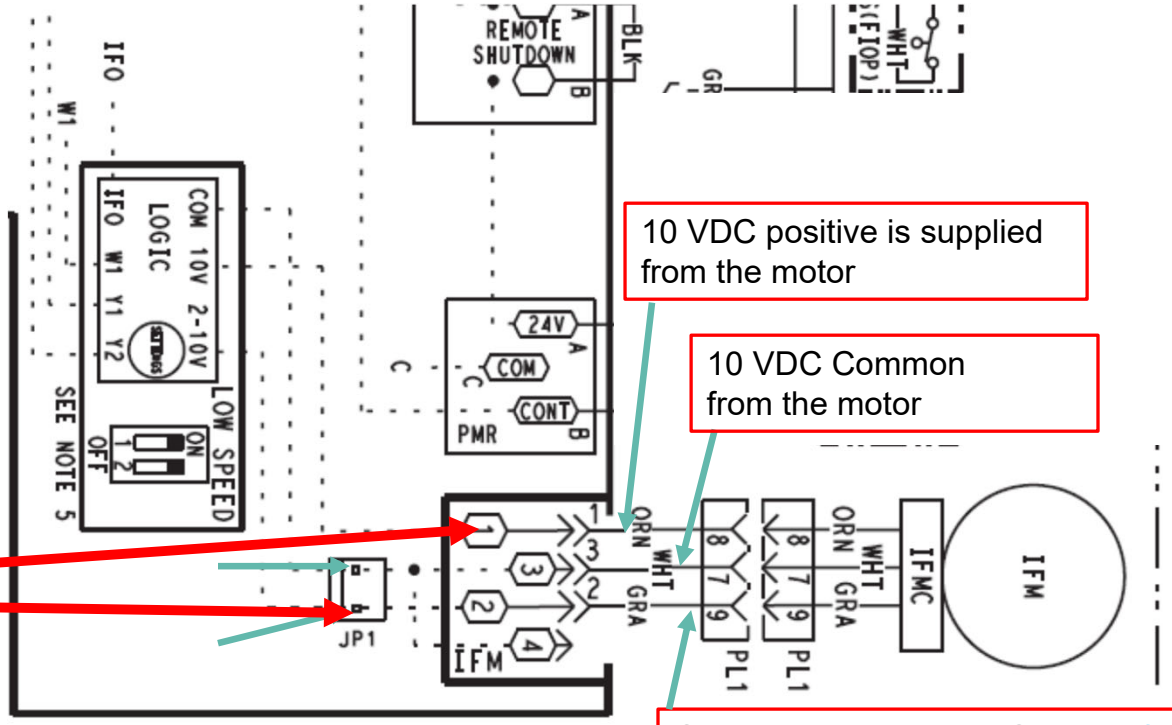


48FC07 WITH A 3-PHASE BLOWER MOTOR

Outputs from the control board to the motor are read at these test pins

Actual view of the control board test pins

Engineering said to check it from should be 10VDC



10 VDC positive is supplied from the motor

10 VDC Common from the motor

Control signal 2-10 VDC output from the control board to motor

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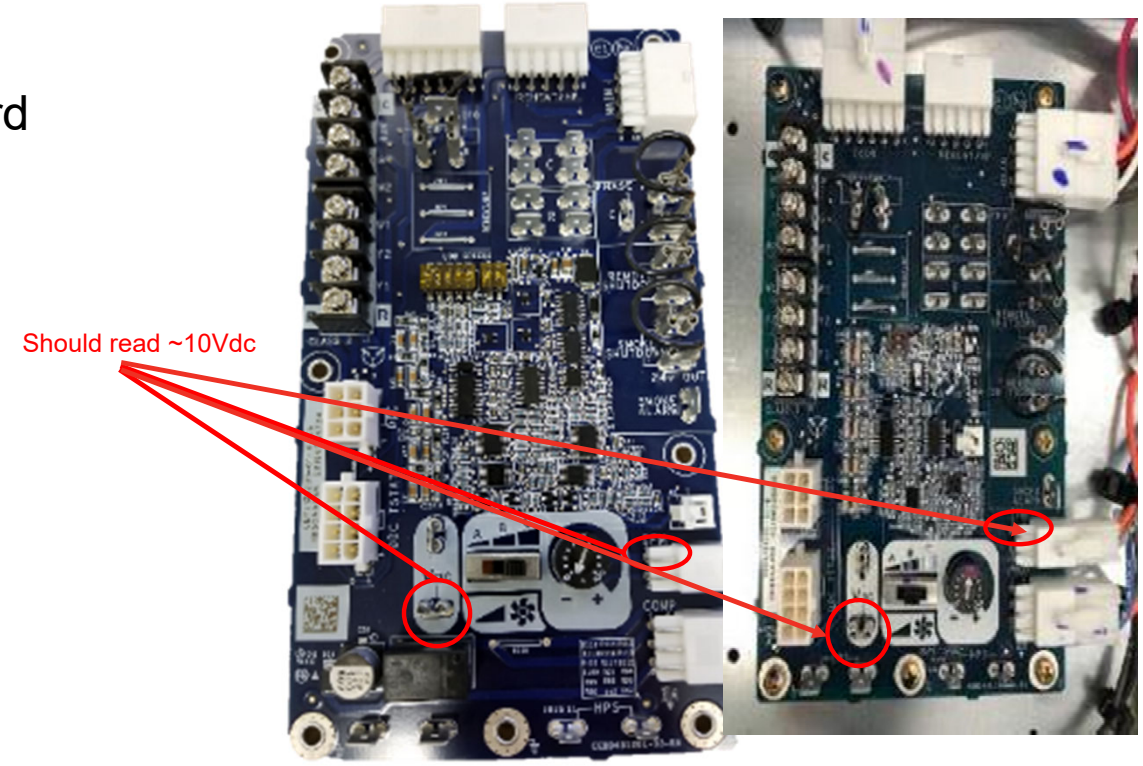
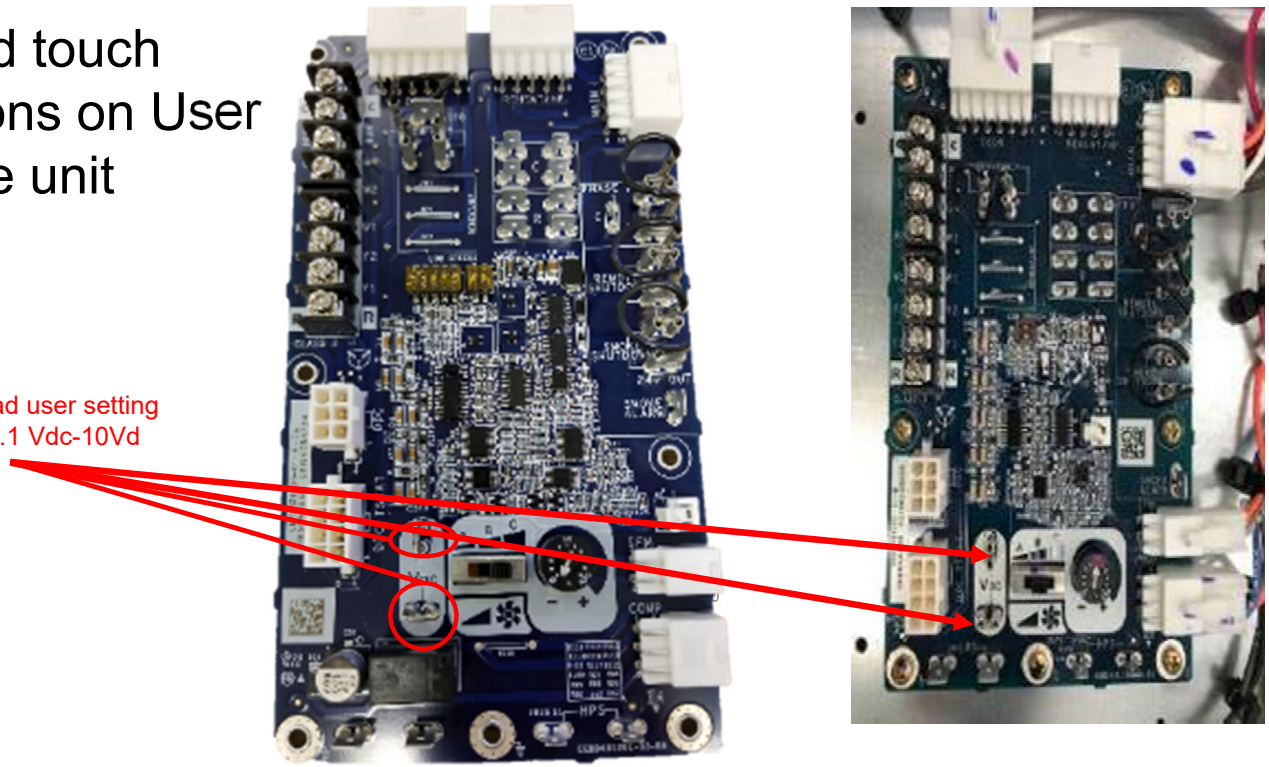


CONFIRM USER SPEED SETTING VDC

- Set Voltmeter to Vdc and touch probes across connections on User speed setting area of the unit control board

- This should read

Should read user setting between 4.1 Vdc-10Vd



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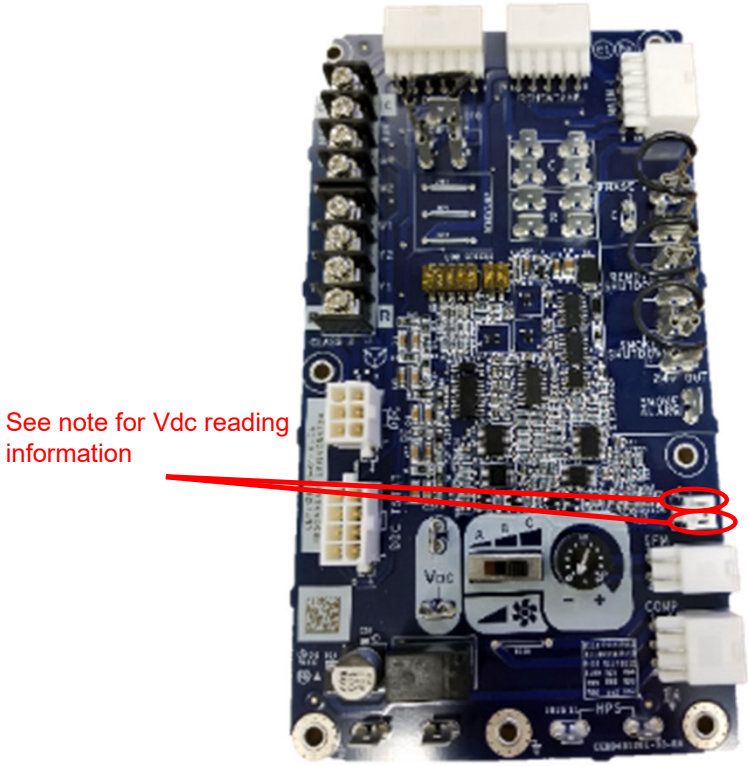


VANE AXIAL SETUP

VANE AXIAL TROUBLESHOOTING

VANE AXIAL REMOVAL

VANE AXIAL DISASSEMBLY

Stage Air Volume - SAV

STAGED AIR VOLUME (SAV)

It’s a marketing term for two speed blower.

- Utilizes either a VFD on belt driven motors
- X13 for direct drive

2-Speed Supply Air Blower / VFD or X-13

Used on two stage refrigerant systems (Y1 & Y2) with a Copeland UltraTech™ Scroll or Larger Units with Two Compressors.

S. A. V. COMPONENTS

- Fan Speed Relay Board(FB)
- VFD with three phase blower motors or ECM motor on single phase Tap Select (X-13)

ASHRAE 90.1 2010 - CALIFORNIA TITLE 24

- During the first stage of cooling operation the VFD will adjust the fan motor to provide 67% of the total cfm established for the unit.

- When a call for the second stage of cooling is required, the VFD will allow the total cfm for the unit established (100%).

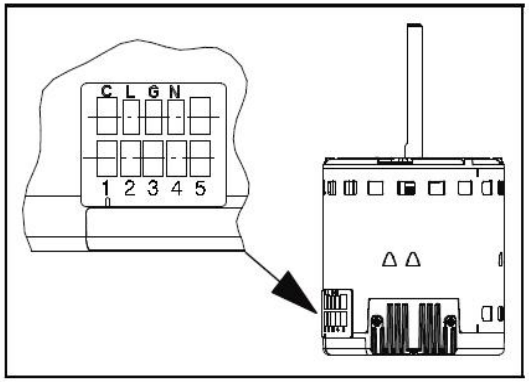
ASHRAE 90.1 2010 - CALIFORNIA TITLE 24

- During the heating mode the VFD will allow total design cfm (100%) operation

- During the ventilation mode the VFD will allow operation to 67% of total cfm.

ABB VFD OR TAP SELECT

- Installation, Setup & Troubleshooting Supplement
- Catalog No: VFD---07SI



C11526

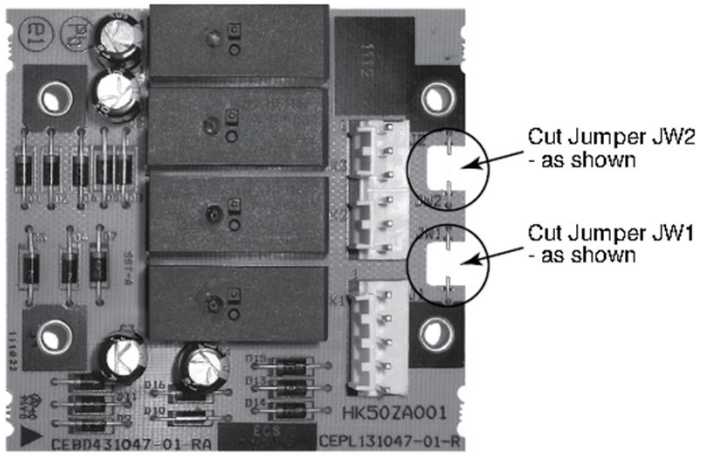
Fig. 1 - Variable Frequency Drive (VFD)

Keypad factory installed on LC's Only
(not factory installed on other models)

Kit # CRDISKIT001A00

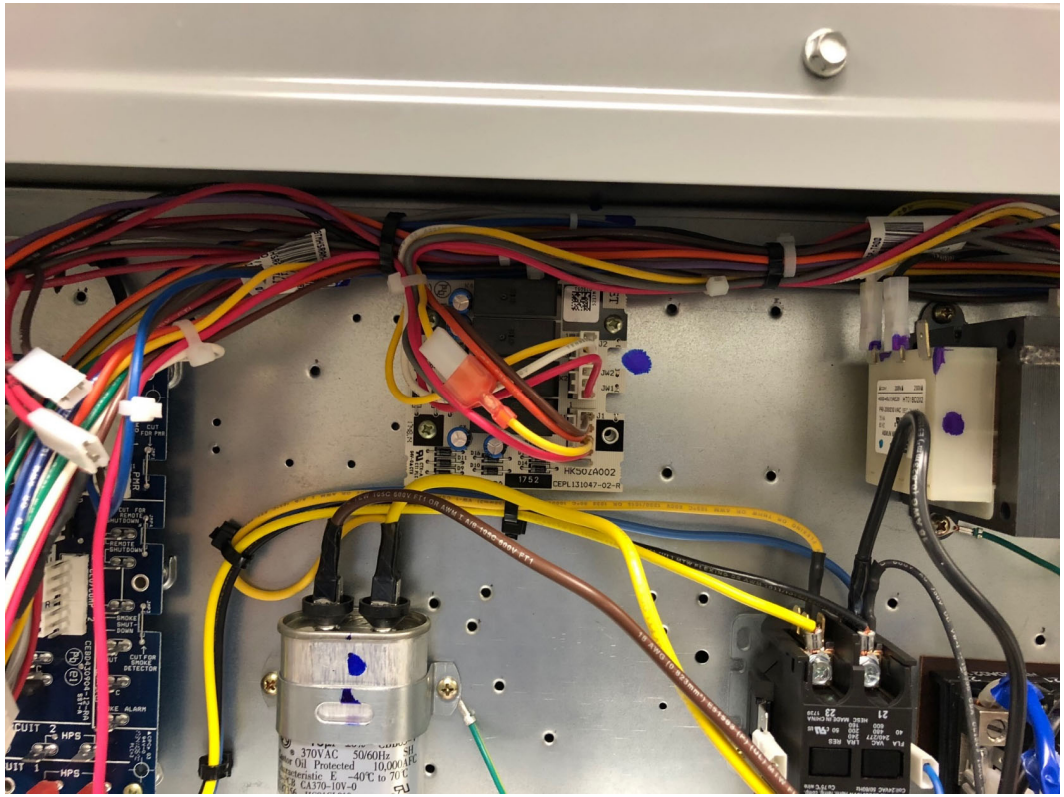
FAN SPEED RELAY BOARD

- Fan Speed Relay Board has relays that control the Two-Speed Supply Fan/VFD



C12004

Fig. 14 - Jumpers JW1 & JW2 Cut for Two-Speed Fan Board Configuration



24 VAC INPUTS TO THE FAN SPEED RELAY BOARD

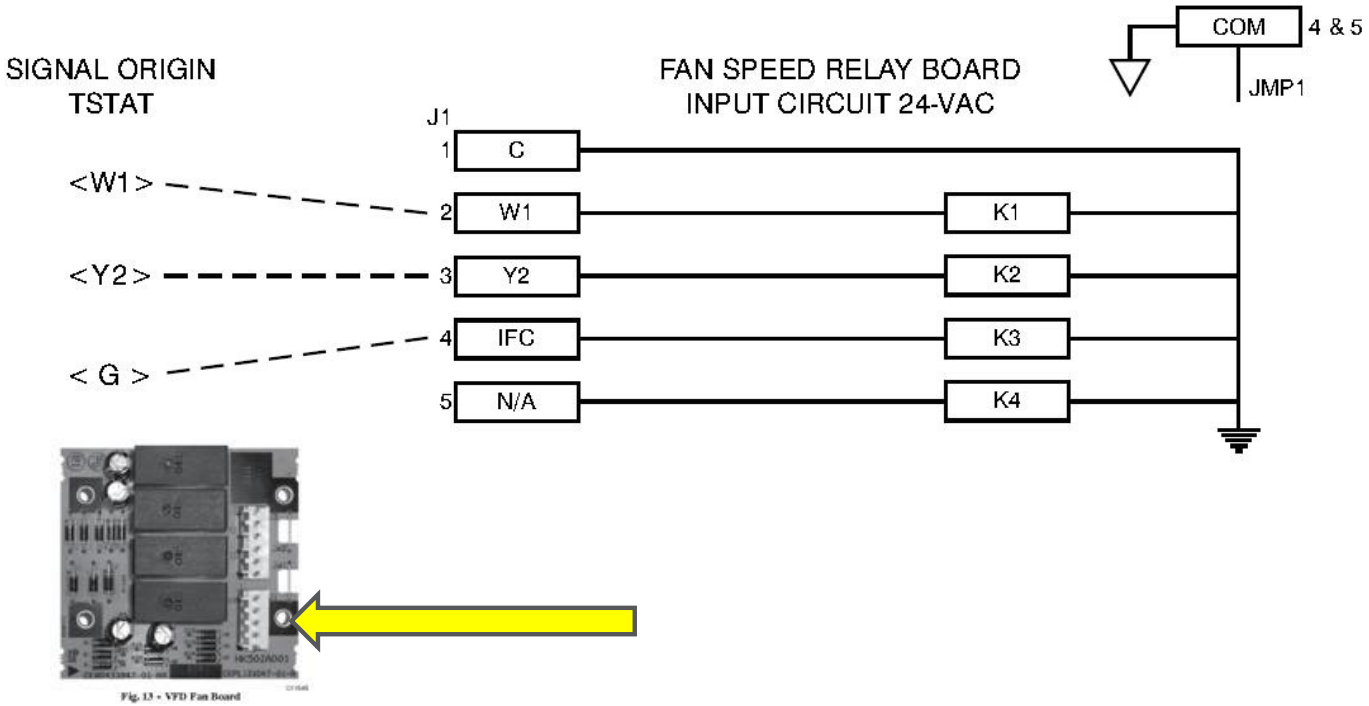
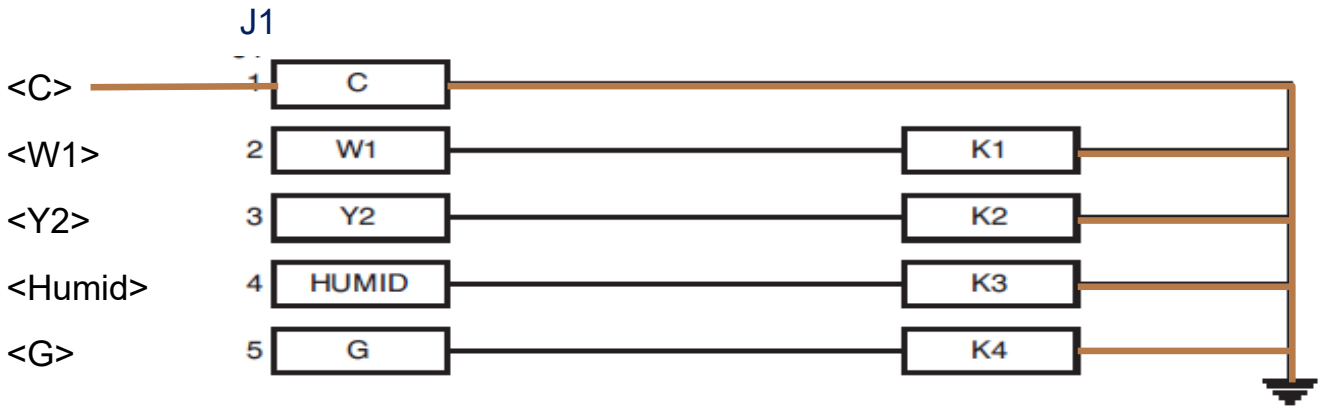


Fig. 13 - VFD Fan Board

24 VDC Outputs from Fan Speed Relay Board to VFD (ACS320)



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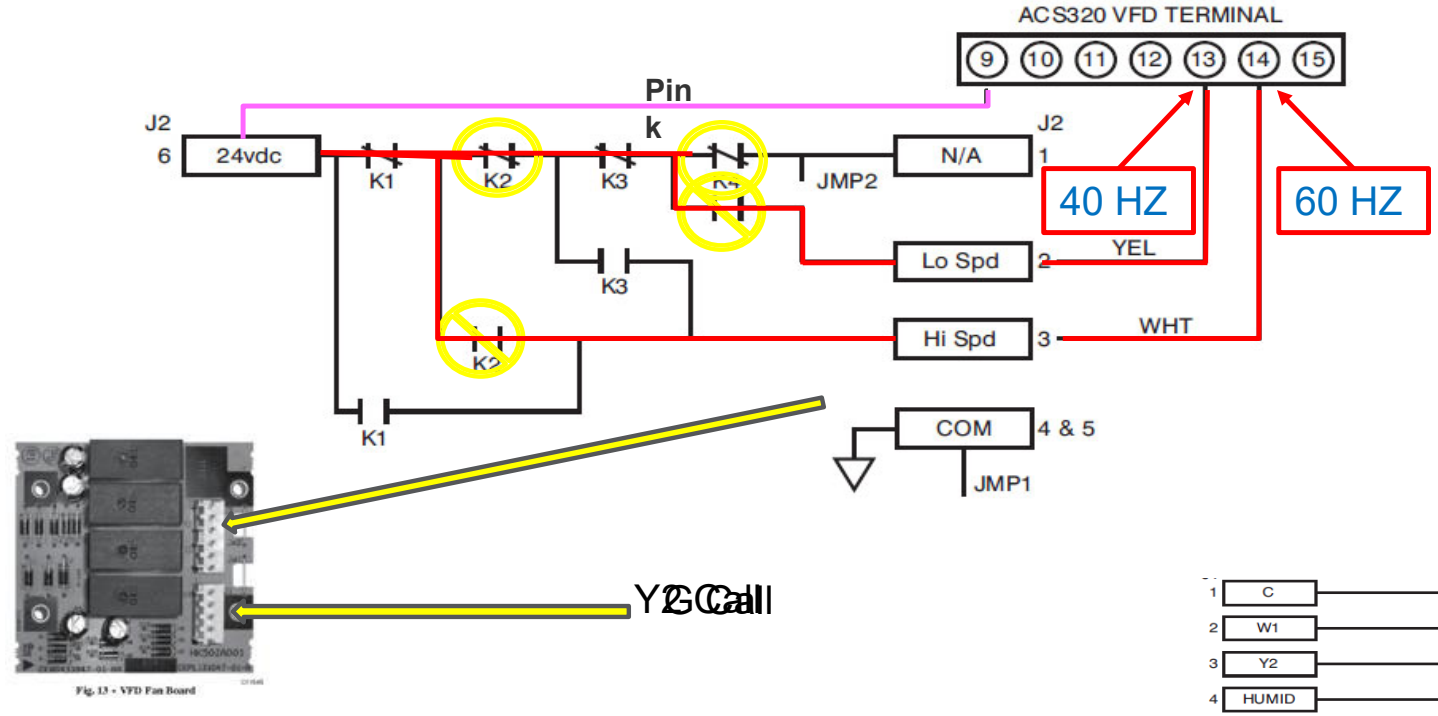
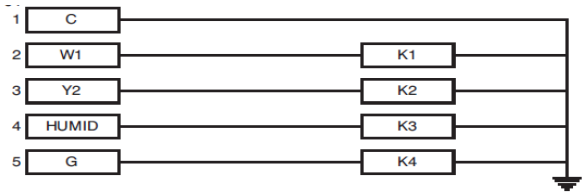




24 VDC Outputs from Fan Speed Relay Board to VFD (ACH550)

Ventilation (Fan only) or Y1

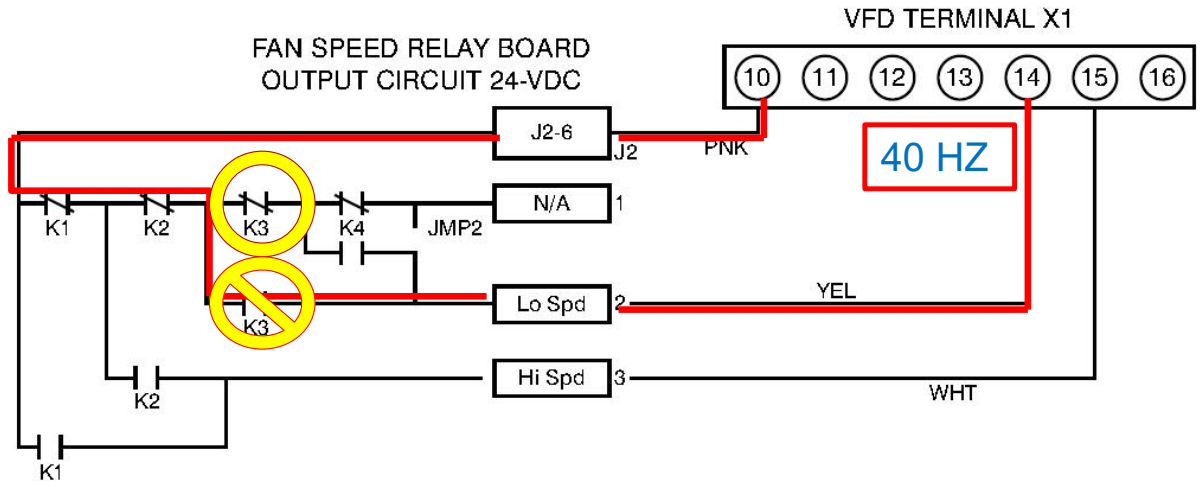
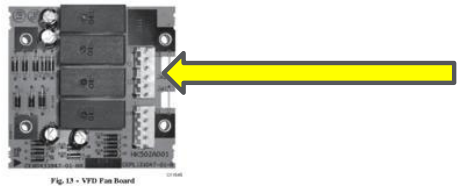


Fig. 15 - Connection Schematic – Fan Speed Relay Board and VFD.

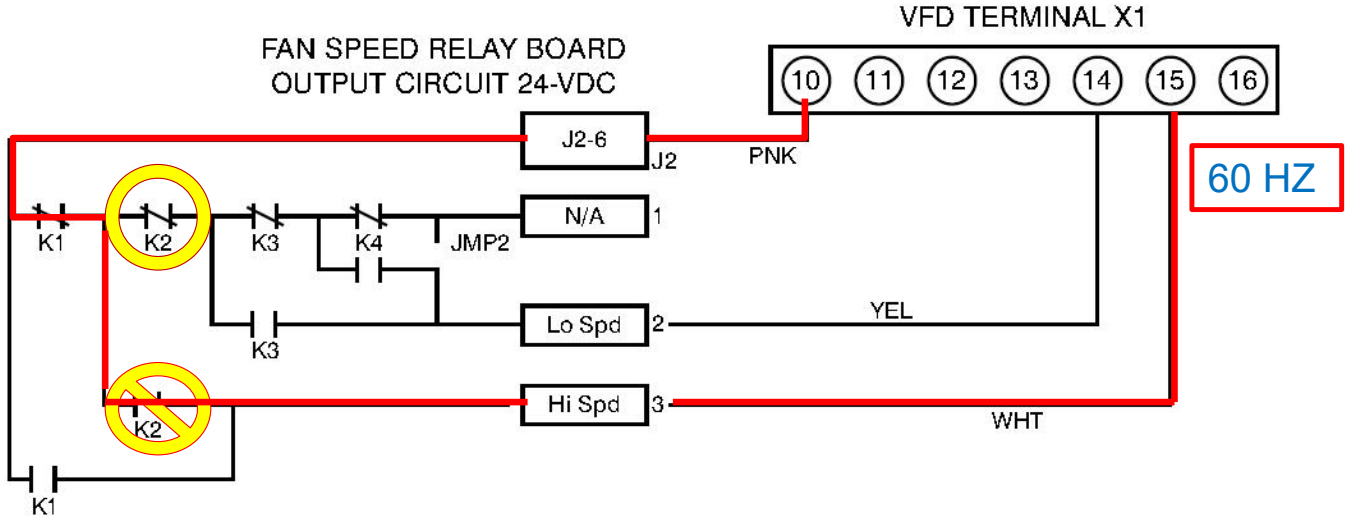
C12005

C12005



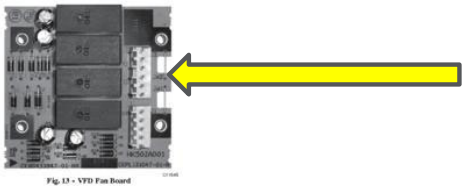
24 VDC Outputs from Fan Speed Relay Board to VFD (ACH550)

Y2 Second Stage Cooling



C12005

Fig. 15 - Connection Schematic – Fan Speed Relay Board and VFD.



RELAY FUNCTIONS

Table 10 – Two-Speed Configuration Logic (Thermostat Control)

INPUT	Relay Coil Status			Controlling Output	Fan Motor Speed
	K1	K2	K3		
G	Off	Off	On	K3	Low (40 Hz)
Y1	Off	Off	On	K3	Low (40 Hz)
Y2	Off	On	On	K2	High (60 Hz)
W1	On	On	On	K1	High (60 Hz)

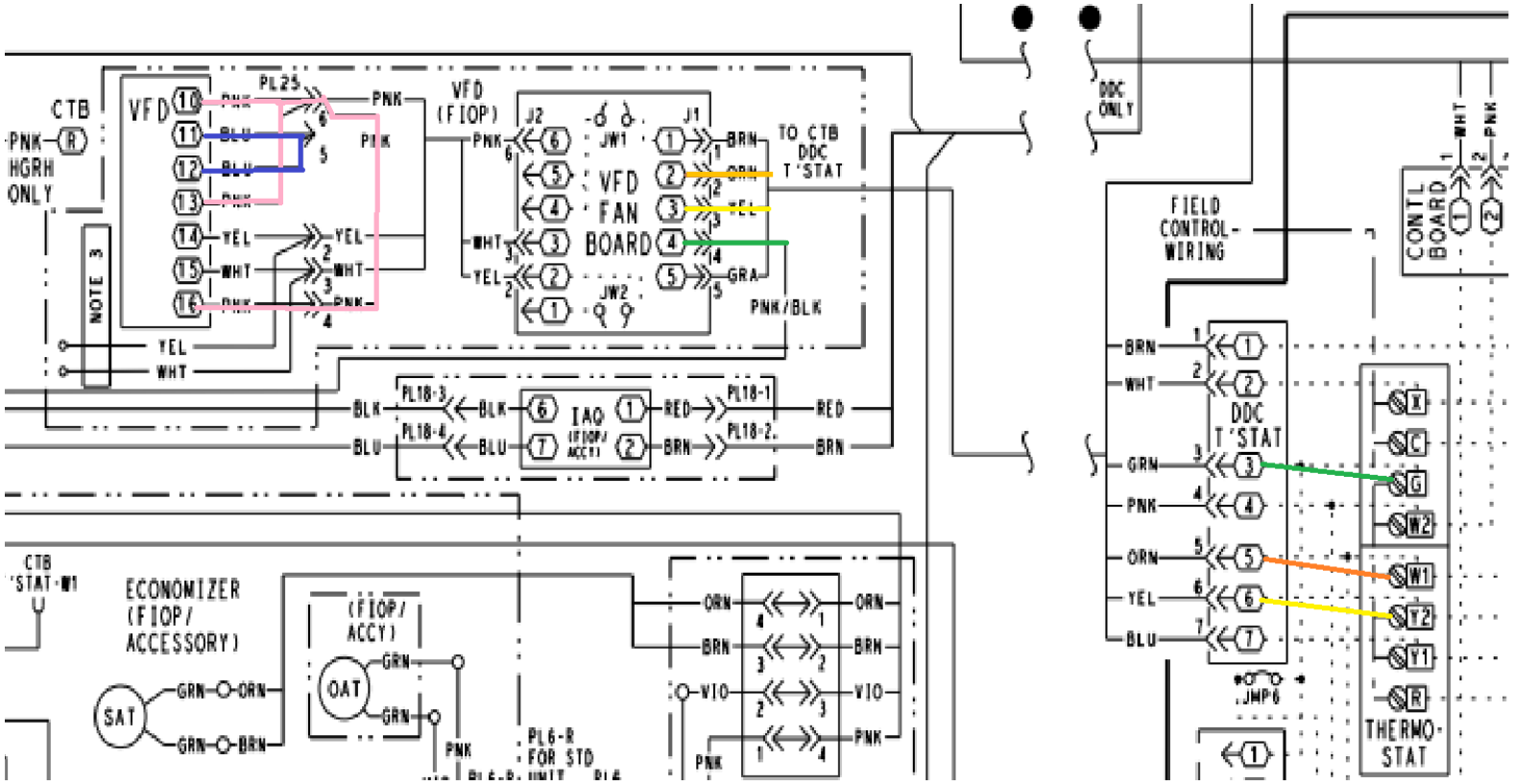
Remember Jumpers JW1 & JW2 must be cut in order to achieve the above relay sequence.

WHY USE A VFD

- A two speed (two winding) blower motor would require the next size motor frame in order to achieve the same CFM. The VFD system can use the smaller standard motor frame.

- The manufacturing cost of a two-speed blower motor may be less than a VFD system but the long-term operating cost of the VFD is less for the customer.

VFD Control Inputs ACH550



ACH550 VERSUS ACS320 (FEATURES)

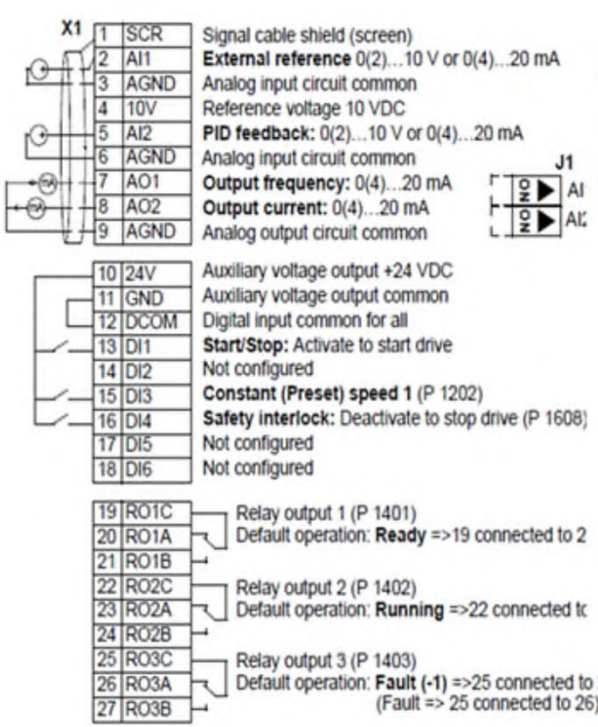
ACS320 Power Range:

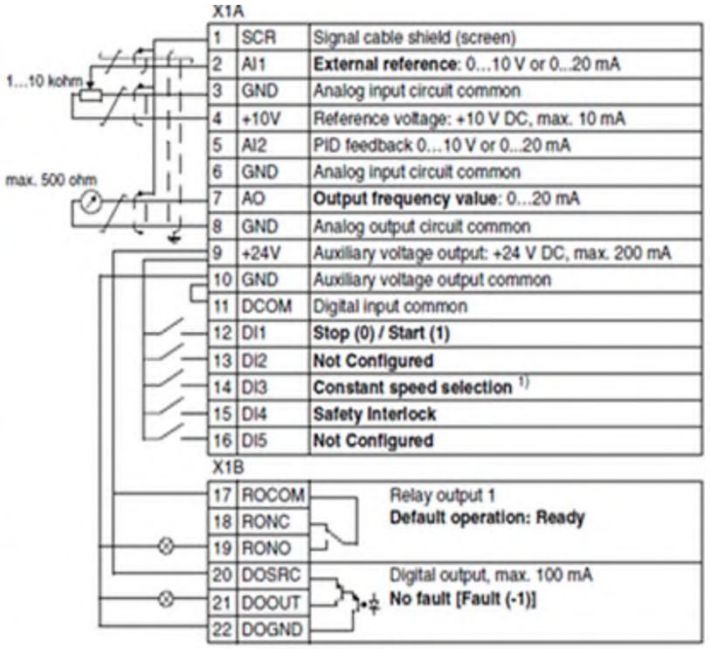
- •Input 1Φ 240Vac, 0.25 – 3 HP
- •Input 3Φ 240Vac, 0.5 – 15 HP
- •Input 3Φ 480Vac, 0.5 – 30 HP
- **Enclosure** – IP20 (Optional IP21 Kit)
- Motor Control – Scalar (V/Hz)
- Output Frequency 0 – 500Hz
- Switching frequency – 4/8/12/16 kHz
- **I/O** 2 AI, 1AO**, 5 DI** (1 PTI freq. input**), 1 RO, 1 DO**
- Fieldbus (built in communications) – BACnet, JCI N2,
- Siemens FLN, Modbus RTU (LonWorks will require a gateway)

ACH550 Power Range:

- •1.0 to 100HP @ 240Vac
- •1.5 to 550HP @ 480Vac
- •2.0 to 150HP @ 600Vac
- **Enclosure** – IP21 (Optional IP54 Kit)
- Motor Control – Scalar (V/Hz) & Vector Mode
- Output Frequency 0 – 500Hz
- Switching frequency – 1/4/8/12kHz
- **I/O** 2 AI, 1AO**, 6 DI** (1 PTI freq. input), **3 RO**
- Fieldbus (built in communications) – BACnet, JCI N2,
- Siemens FLN, Modbus RTU (Optional LonWorks)

ACH550 VERSUS ACS320 (TERMINALS)

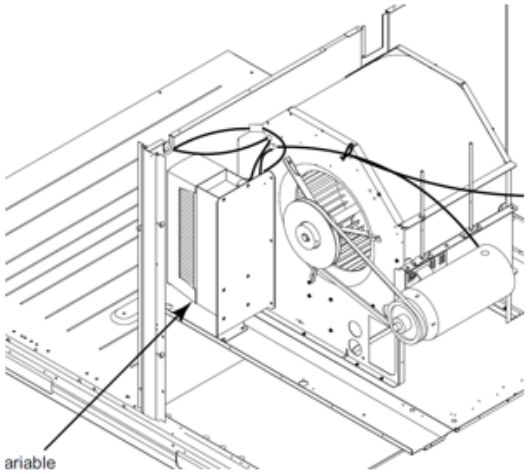


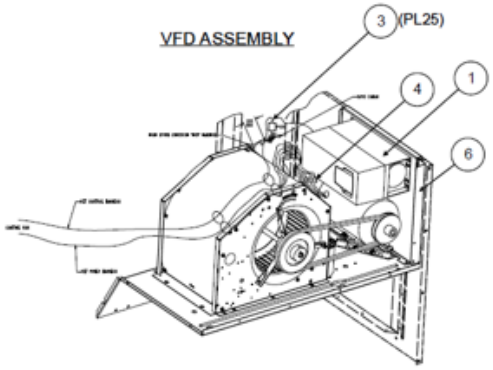


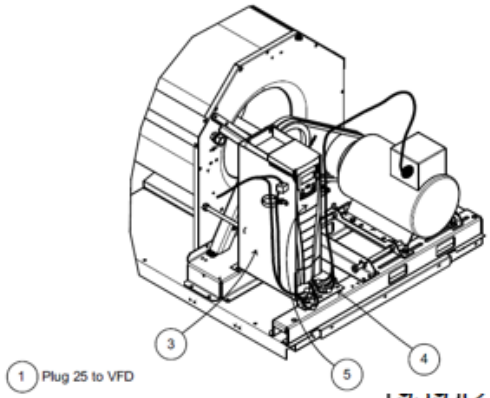
Differences

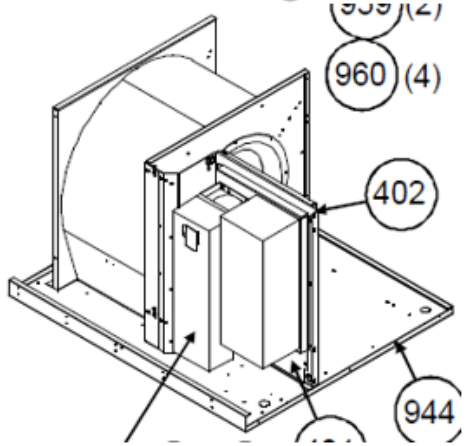
- DI Input Difference (6 Digital in vs 5 Digital In)
- AO Analog out Difference (2 AO vs 1 AO)
- RO Relay Output Difference (3RO vs 1 RO)
- DO Digital Output Difference (Zero DO vs 1 DO)
- **NOTE**: Terminal numbers are different

RTU LOCATION OF VFD

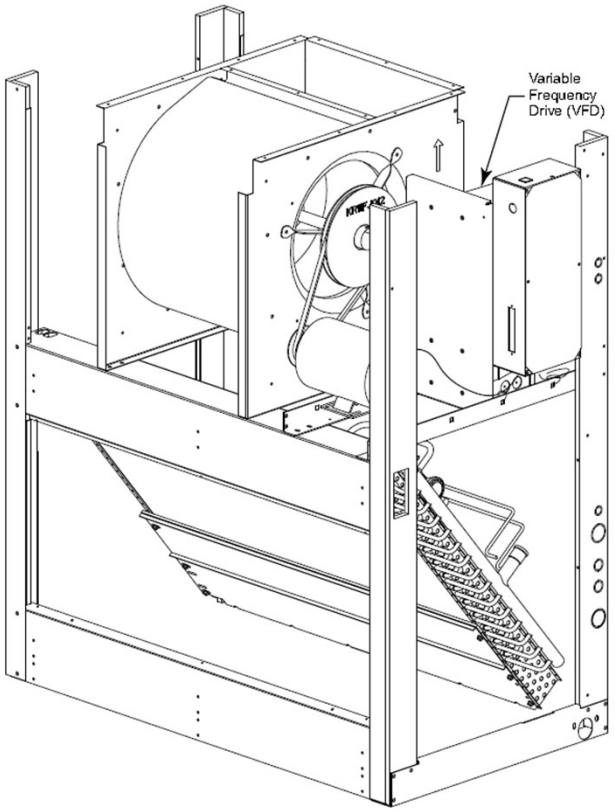








FAN COIL LOCATION OF VFD



C11532

Fig. 8 - VFD Location for the following units: 40RUA/RUS/RUQ 12

DRIVE INPUT PROTECTION DEVICES

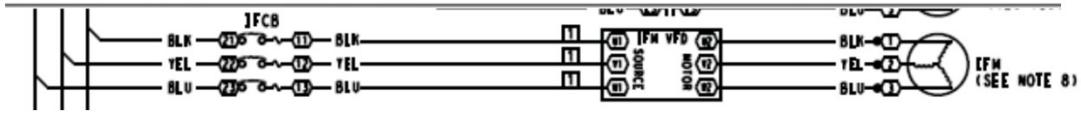
An input disconnect device must be installed between AC input power and the VFD

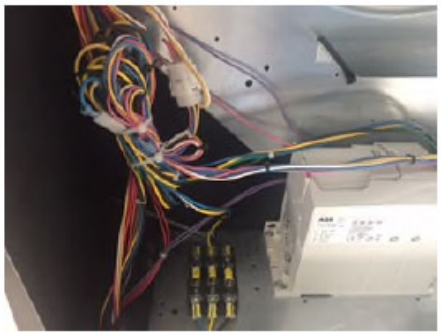
VFDs to be **installed with input fuse protection.**

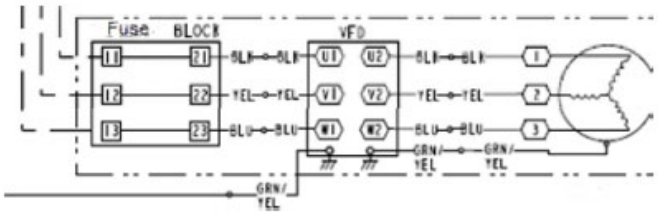
Fast-acting fuses provide rapid protection compared to circuit breakers (limits collateral damage due to a: ground fault, output short, or DC Bus short)

Input Power Specifications

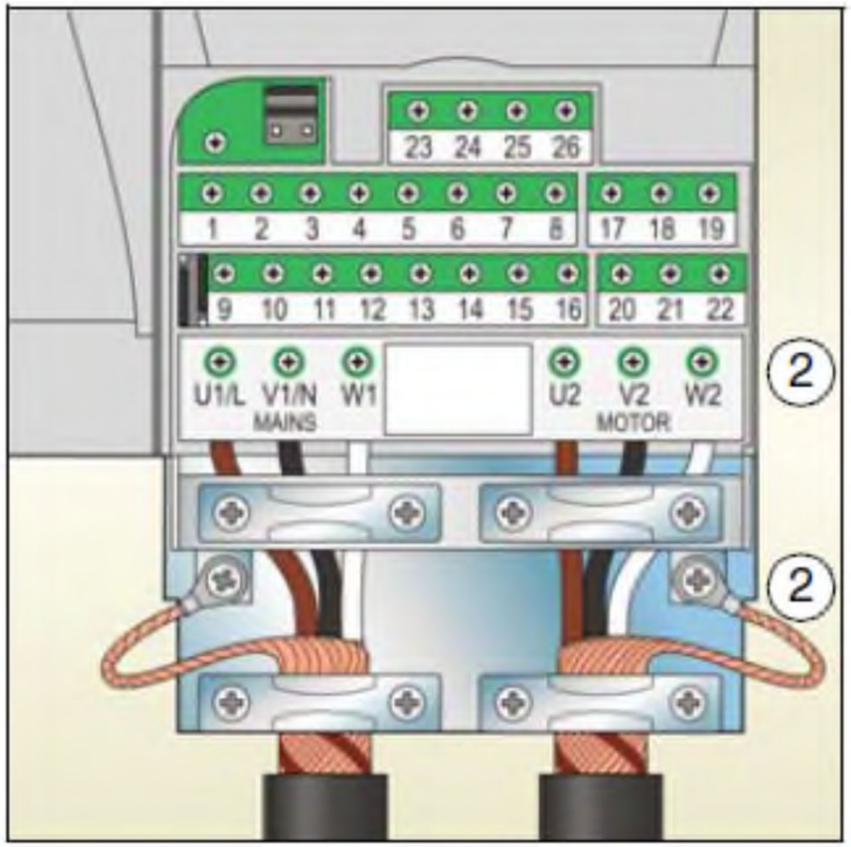
Input Power Connection Specifications	
Prospective short-circuit current (IEC 629)	Maximum allowed prospective short-circuit current in the supply is 100 kA in a second providing that the drive's input power is protected with appropriate fuses. US: 100,000 AIC.







TERMINALS


23 24 25 26
1 2 3 4 5 6 7 8
17 18 19
9 10 11 12 13 14 15 16
20 21 22
U1/L V1/N W1
MAINS
U2 V2 W2
MOTOR
2
2

CFM ADJUSTMENT

Do not adjust VFD speed in order to adjust CFM!

To adjust CFM, you must adjust your blower assembly!

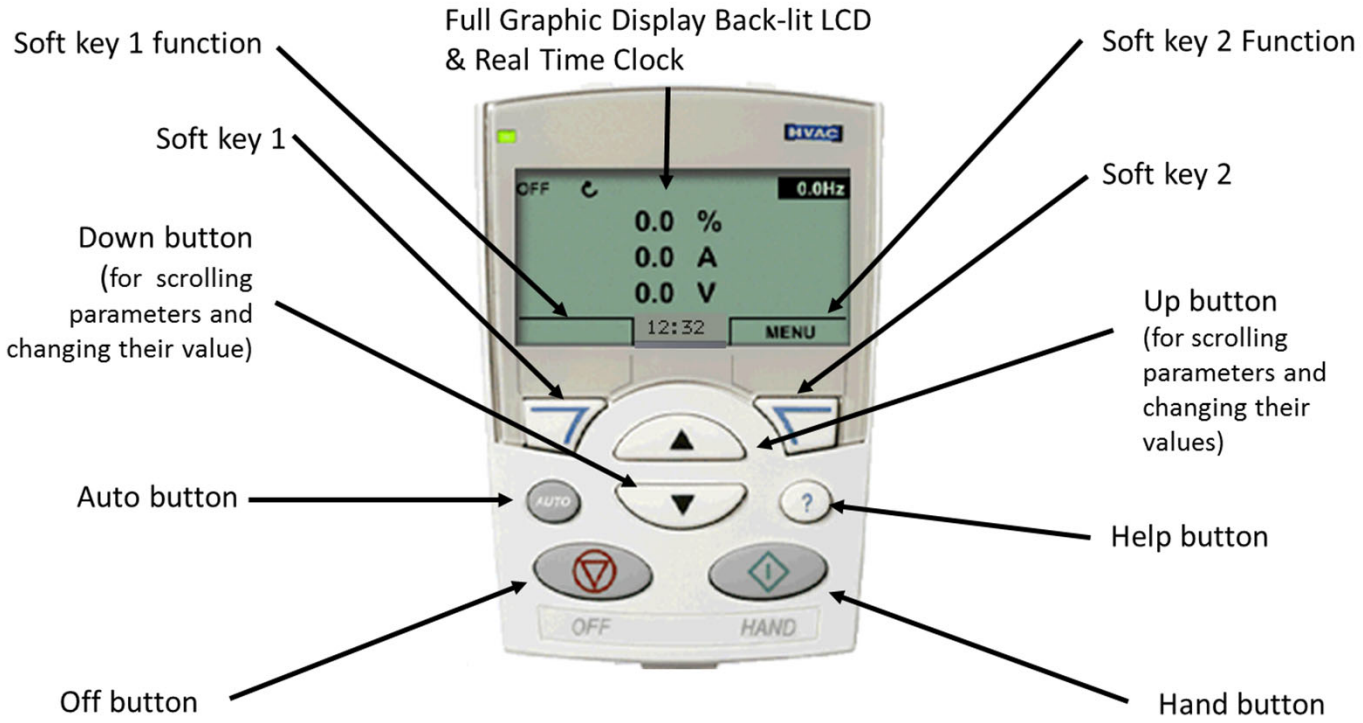
HANDS ON CHECKLIST

- VERIFY DRIVE NUMBER
- VERIFY MOTOR NUMBER
- LOCATE DRIVE AND MOTOR COMBO ON HANDOUT
- CHECK PARAMETERS
- CHANGE AS NEEDED

CONTROL PANEL FEATURES ACH550 AND ACS320

- **Alphanumeric control panel with backlit LCD display**
  - Easy monitoring - four-line display
    - Three selectable actual values displayed simultaneously
  - Supports
    - Start-up Assistant
    - Fault indications and history
    - Local / Remote control
  - Removable: Connection with CAT5 cable
  - Parameter upload/download (copy)
  - Display with 16 languages
  - Context sensitive Help key
  - Real Time clock

CONTROL PANEL – BUTTON FUNCTIONS ACH550 AND ACS320



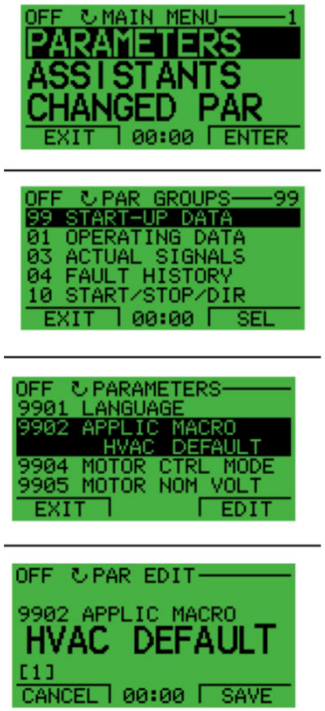
CONTROL PANEL – ASSISTANTS (SAY NO) DO NOT USE

- **Assistants simplify functions of Drive Operation .** (Say no) Do not use

- **Maintenance Assistant**
  - Can be used to insert preventative maintenance functions using run time, motor revolutions or events
- **Diagnostic Assistant**
  - Activated with a fault and provides suggestions to correct fault based on the most common causes

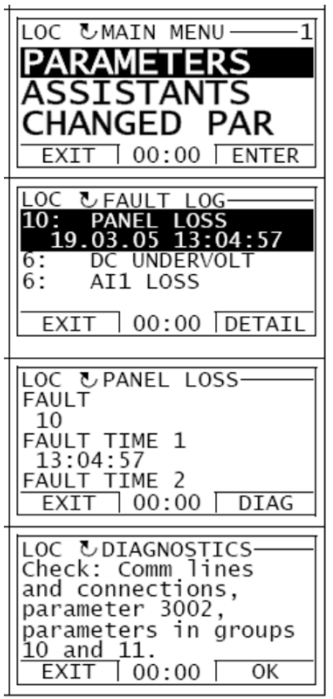
CONTROL PANEL – PARAMETERS MODE

- **Parameters Mode**
  - Allows monitoring of signals in Groups 1,3 & 4 (Read-out Only)
  - Allows monitoring & editing of any parameters in groups 10-99
  - Provides the avenue to commission the drive
  - Start/stop, change direction and change control locations between Hand & Auto



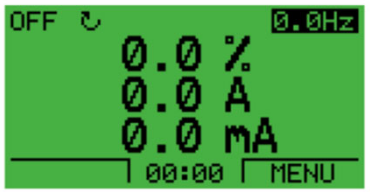
CONTROL PANEL – FAULT LOGGER MODE

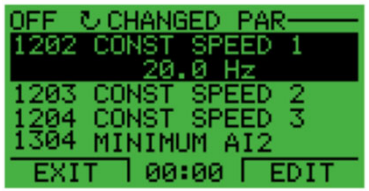
- **Fault Logger Mode**
  - View the drive fault history of a maximum of 10 faults (saves last 3 in memory after a power cycle)
  - View the last 3 faults (saves details on last fault in memory after a power cycle)
  - Provides help text for a given fault
  - Reduces troubleshooting time



CONTROL PANEL – CHANGED PARAMETERS MODE

- **Changed Parameters Mode**
  - Provides the means to view parameters which have been changed with respect to default values for a given macro being utilized
  - Very useful troubleshooting tool
  - Allows user to edit changed parameters as well





VFD SET-UP TABLES

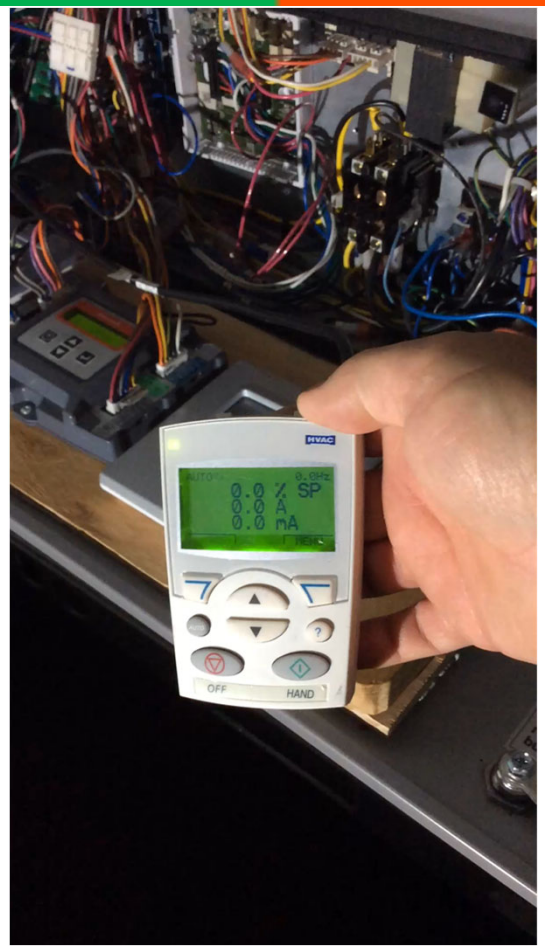
The VFD must be off when programming parameters
The VFD will not allow changes in the auto mode
All Carrier units do not come with VFD keypads

Table 16 – VFD Parameters —
48/50TC 08-14, 50TCQ 08-12, 48/50HC 08-12 and 50HCQ 08-09

VFD Part Number	ABB Part Number	Description	Motor Part Number	Voltage (9905)	Nom Amps (9906)	Motor Nom Freq (9907)	Nom RPM (9908)	Nom HP (9909)	Const Speed Sel (1201)	Const Speed 1 (1202)	Const Speed 2 (1203)	Const Speed 3 (1204)	Relay Out 3 (1403)	Max Amps (2003)	Min Freq (2007)	Max Freq (2008)	Switch Freq (2606)	Start Fcn (2101)	Stop Fcn (2102)	Accel/ Decel (2201)	Accel (2202)	Decel (2203)
HK30WA364	ACH550–U0–012A–2	1.7 HP 230V	HD56FR233	230	5.8	60Hz	1725	1.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.7	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA356	ACH550–U0–012A–2	1.7 HP 460V	HD56FR463	460	2.9	60Hz	1725	1.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	3.3	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA368	ACH550–U0–017A–2	1.7 HP 575V	HD56FR579	575	3.1	60Hz	1725	1.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	3.6	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA352	ACH550–U0–024A–2	2.4 HP 230V	HD56FE653	230	7.9	60Hz	1725	2.4	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	9.1	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA356	ACH550–U0–06A9–4	2.4 HP 460V	HD56FE653	460	4	60Hz	1725	2.4	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.6	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA360	ACH550–U0–06A9–4	2.4 HP 575V	HD56FE577	575	3.4	60Hz	1725	2.4	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	3.9	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA352	ACH550–U0–06A9–4	2.9 HP 230V	HD58FE654	230	9.2	60Hz	1725	2.9	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	10.6	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA356	ACH550–U0–08A8–4	2.9 HP 460V	HD58FE654	460	4.6	60Hz	1725	2.9	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	5.3	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA353	ACH550–U0–012A–4	3.7 HP 230V	HD60FE656	230	11.2	60Hz	1725	3.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	12.9	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA357	ACH550–U0–03A9–6	3.7 HP 460V	HD60FE656	460	5.6	60Hz	1725	3.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.4	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA361	ACH550–U0–06A1–6	3.7 HP 575V	HD58FE577	575	4.2	60Hz	1725	3.7	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	4.8	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA354	ACH550–U0–09A0–6	5.3 HP 230V	HD60FK658	230	13	60Hz	1740	5.3	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	150	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA358	ACH550–U0–07A5–2	5.3 HP 460V	HD60FK658	460	6.4	60Hz	1740	5.3	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	7.4	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec
HK30WA362	ACH550–U0–02A7–6	5.3 HP 575V	HD60FE576	575	5.4	60Hz	1725	5.3	DI 2,3	40Hz	60Hz	60Hz	16 FLT/ Alarm	6.2	0Hz	60Hz	4kHz	Auto	Ramp	Not Sel	30 sec	30 sec

Never use the VFD to adjust airflow! Adjust the sheaves

VFD KEYPAD USE



VFD MAINTENANCE

Heat Sink Cleaning

The heat sink fins accumulate dust from the cooling air. In a normal environment check the heat sink annually, in a dusty environment check more often.

Use the following procedure to clean the heat sink on AHC550 VFDs:

1. Turn off and lock out unit power.
2. Remove the drive cover (see Fig. 38).
3. Press together the retaining clips on the top cover and lift (see Fig. 39).

VFD MAINTENANCE

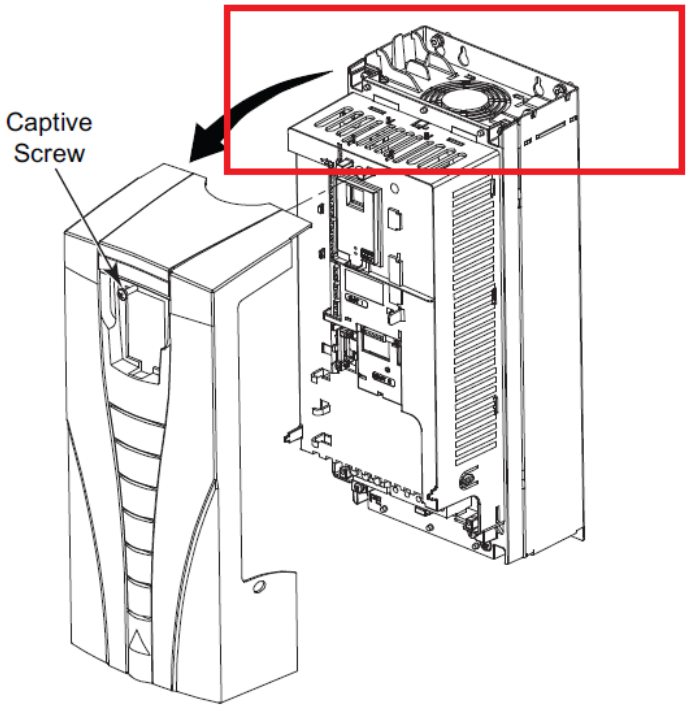


Fig. 38 — Remove ACH550 VFD Front Cover

VFD MAINTENANCE

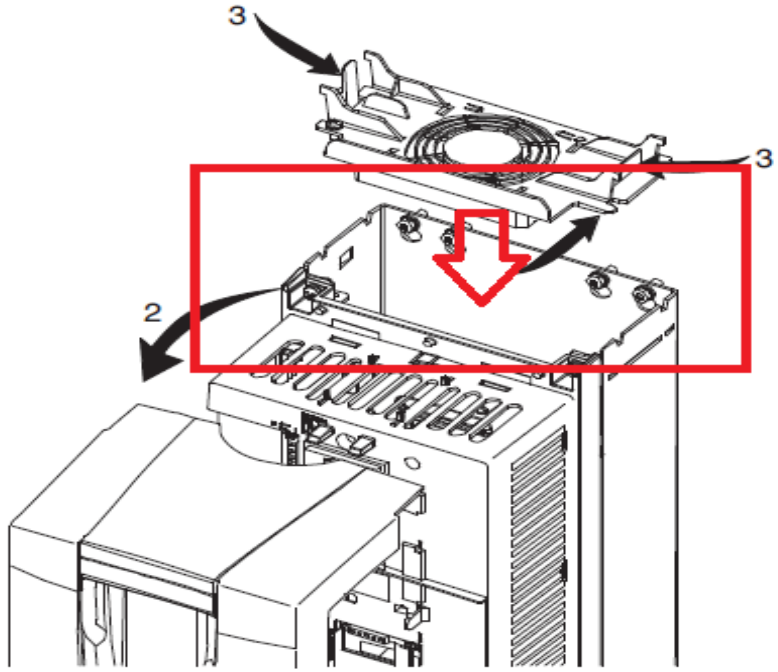


Fig. 39 — Remove Top Cover on ACH550 VFD

4. Blow clean compressed air (not humid) from bottom to top while simultaneously using a vacuum cleaner at the air outlet to trap the dust.
5. Replace the cooling fan.
6. Replace the drive cover.
7. Restore power.

VFD MAINTENANCE

Use the following procedure to clean the heat sink on ASC320 VFDs:

1. Turn off and lock out unit power.
2. Insert a small straight blade screwdriver into the slot and press in to release the top cover as shown in Fig. 40.

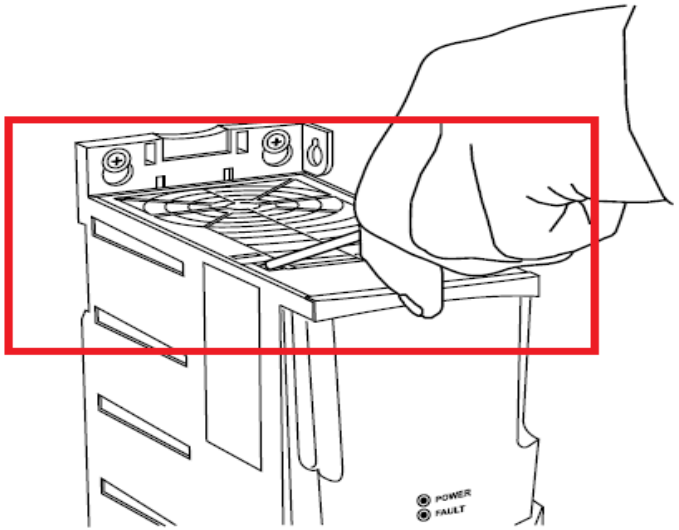


Fig. 40 — Remove Top Cover on ACS320 VFD

3. Blow clean compressed air (not humid) from top of ACS320 while simultaneously using a vacuum cleaner at the base to trap the dust.
4. Replace the top cover.
5. Restore power.

VFD TIC2019-0016

TECHNICAL INFORMATION COMMUNICATION

Quality and Continuous Improvement

Carrier

Number: TIC2019-0016 **Date:** 8/7/2019

Title: ABB VFD Updates

Product Category: Light Commercial

Products Affected
All ABB ACS320 Drives

Technical Information
Parameters Updated to help prevent nuisance VFD shut down.
1611 set to (3)
2603 set to (0)
3102 set to (300.0s)
3103 set to (6)
3104 set to (1 Enable)
2102 set to (1 coast)

Fuses upgraded from the drive minimum current to a current representing the various field reported issues. The changes are reflected in the drive service manuals.

Catalog Number:
Carrier VFD-07SI
Bryant IIVFD-07

Note all of the above changes have been correct at the factory 5018

Useful ABB Drive information:

DO NOT USE THE ASSIST FUNCTION!

DO NOT USE THE DRIVE TO BALANCE THE AIR (CFM)!

Key pads do not come with the OEM drive
1. Before condemning the drive use a key pad to reprogram using factory supplied parameters.

Before programming with the key pad
1. Turn the key pad off to allow programming of the drive. Programming is not possible if left on.

VFD DRIVES

VFD unit for replacement. Wild Leg Power Supply requires a field supplied Delta-WYE transformer

This is less common power supply today but does occur in older city areas. Voltage reading look like this.

L1 to ground 120 volts

L2 to ground 240 volts

L3 to ground 120 volts

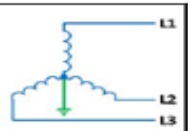
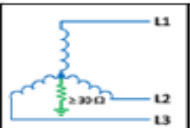
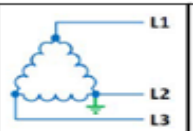
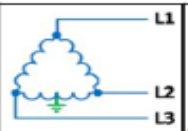
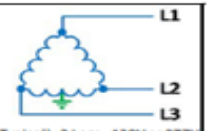
Note: the higher voltage on one leg with normal voltages on the other 2 legs.

VFD DRIVES

VFD vs Power Supply

With new codes pushing the addition of VFDs to our light commercial rooftops, there is a stronger emphasis on determining the power supply of the system before installing the unit. Depending on the power supply, modifications may need to be made in the field to ensure proper operation of the VFD.

Please see the below information on types of power supplies and the changes made to the filter screws on the factory installed VFD or when an isolation transformer is required to be installed. Please also refer to TIC2018-0004 (found on HVACpartners) and to the VFD manufacturer's user manual for additional information.

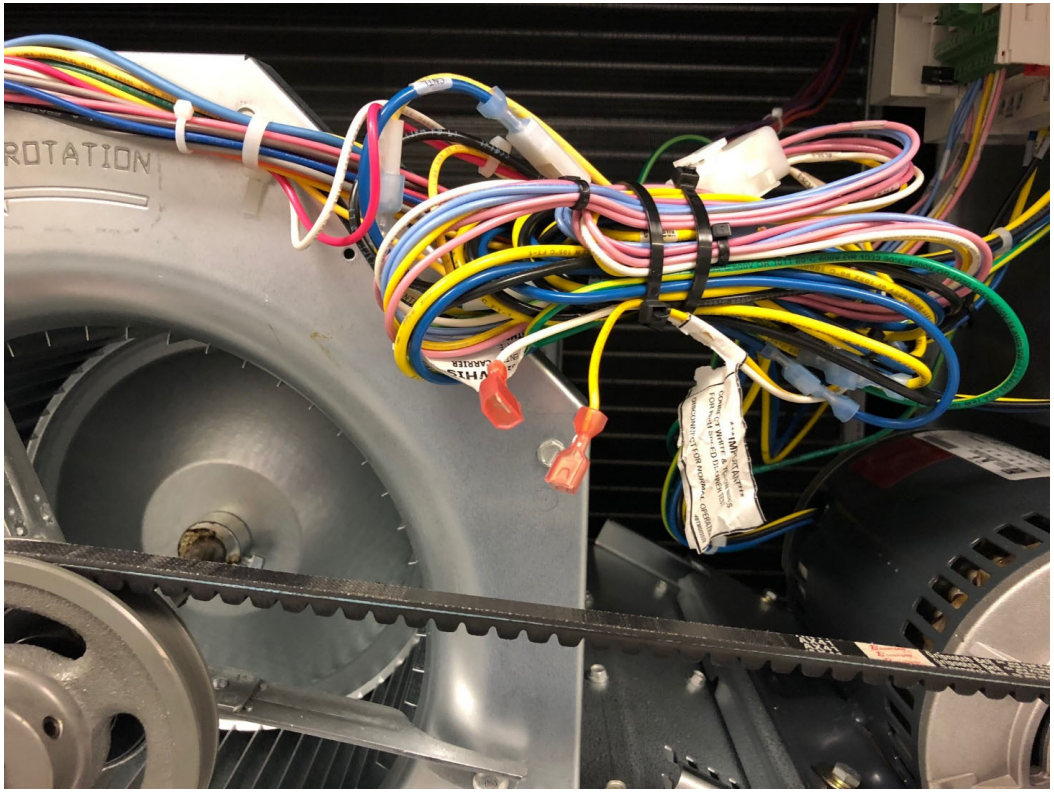
Power Supply Image					
Power Supply Type	Wye Transformer, Symmetrically Grounded	Wye Transformer, High Resistance Ground	Delta Transformer, Corner Grounded (Unsymmetric)	Delta Transformer, Side Grounded (Unsymmetric)	High Leg Delta Transformer, Side Grounded (Unsymmetric)
ABB Drive Changes*	Optional, See Drive Chart	Yes, See Drive Chart	Yes, See Drive Chart[1]	Yes, See Drive Chart	Yes, See Highlight Below and Drive Chart
Danfoss Drive Changes*	No	Yes, See Drive Chart	Yes, See Drive Chart[1]	Yes, See Drive Chart	Yes, See Highlight Below and Drive Chart

*- When measuring voltage between phases of the power supply, the measurement must be within a 2% tolerance in order for the VFD to operate properly.

[1] - To help reduce noise an in-line reactor or isolation Delta-Wye transformer can be installed.

High Leg (Wild-Leg or Stinger-Leg) Power Supply - Installation of an isolation Delta-Wye transformer is required for proper operation of the VFD.

TEST AND BALANCE VFD BYPASS



REPLACEMENT VFD'S

- Replacement VFD's will come with a Remote Keypad
- Parameters will need to be programmed in the replacement VFD

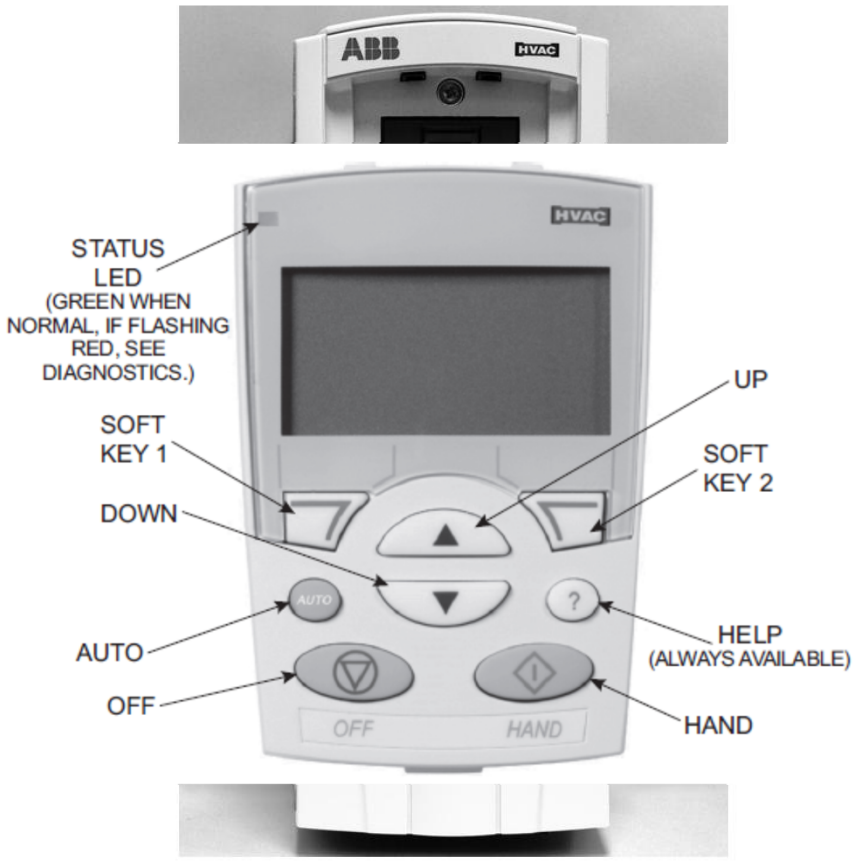
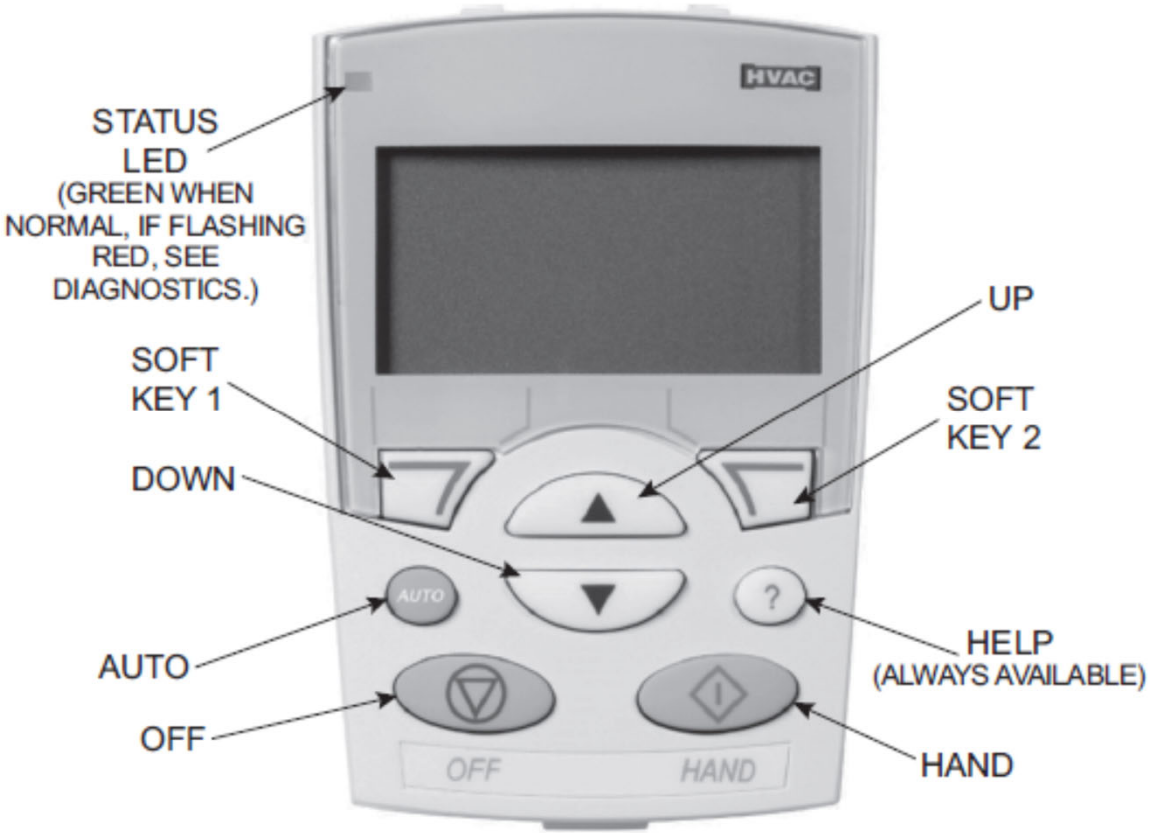


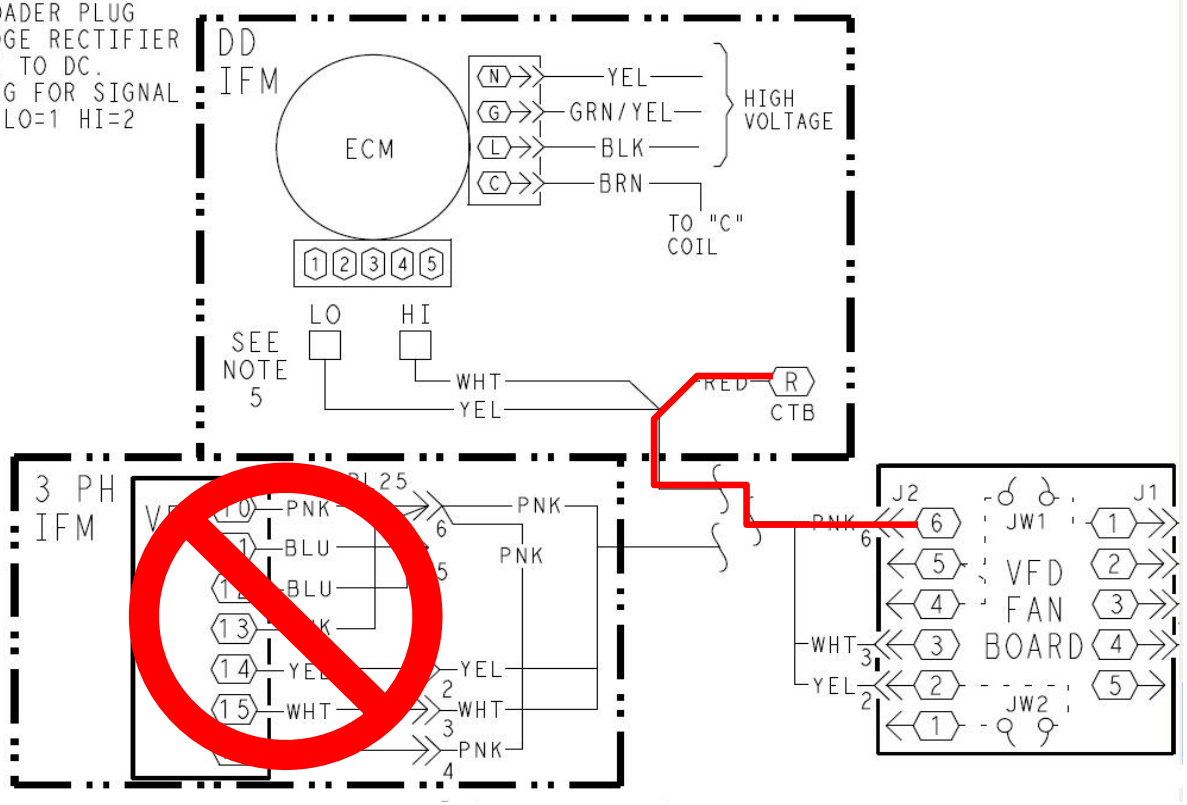
Fig. 1 - Variable Frequency Drive (VFD)

VFD Operation with Remote Keypad

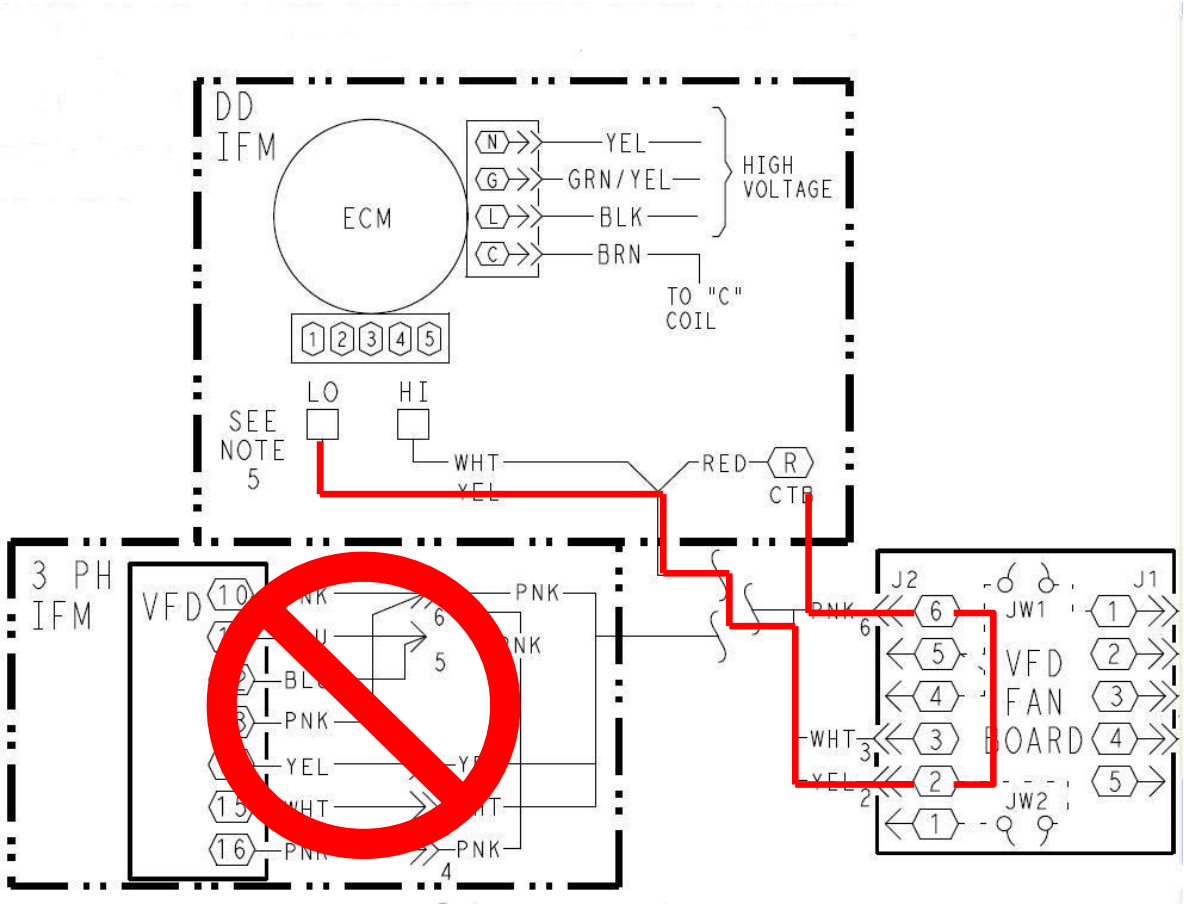


SINGLE PHASE X-13 MOTOR

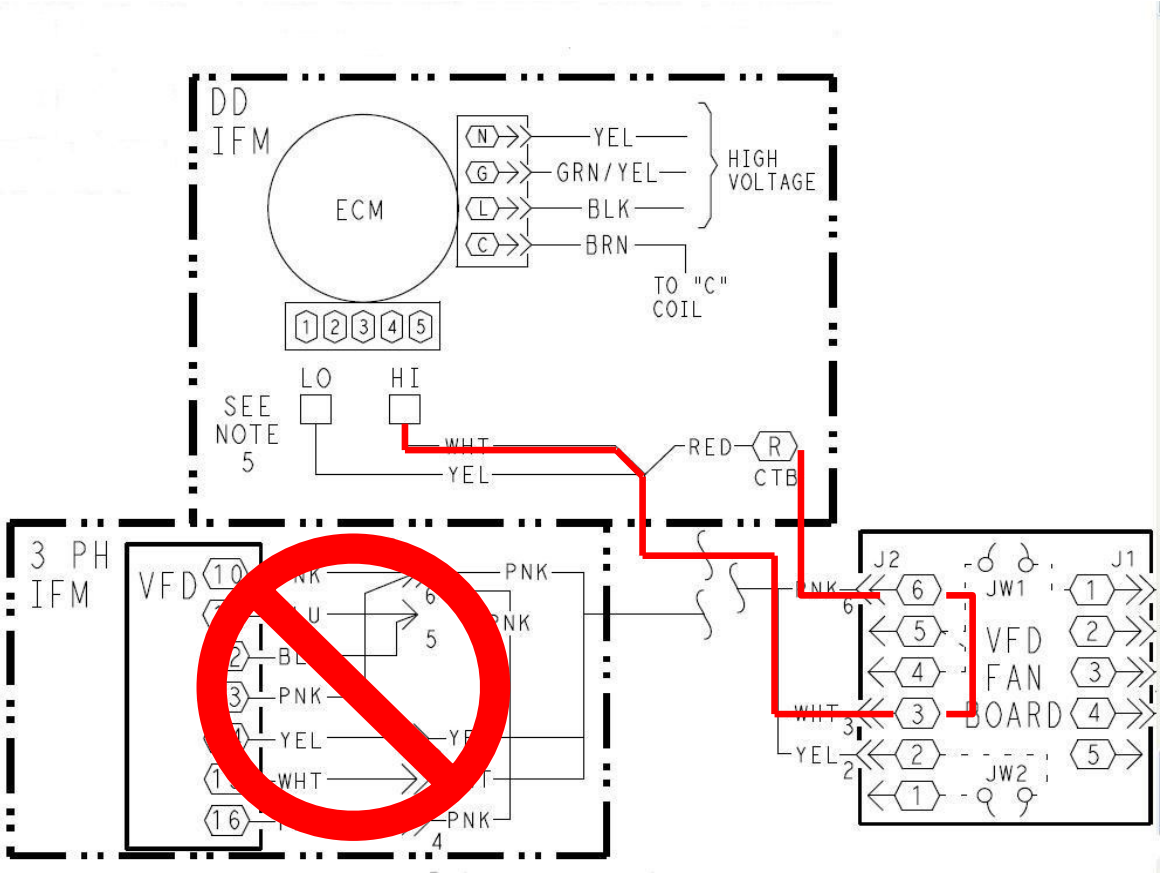
3. IFC OCCURS FOR 208/230 AND 460 VOLT UNIT WITH 3 PHASE INDOOR FAN MOTOR, AND ALL 575 VOLT WITHOUT DIRECT DRIVE INDOOR FAN MOTOR.
4. COMPRESSOR LOADER PLUG CONTAINS BRIDGE RECTIFIER TO CONVERT AC TO DC.
5. FACTORY WIRING FOR SIGNAL CONNECTIONS: LO=1 HI=2



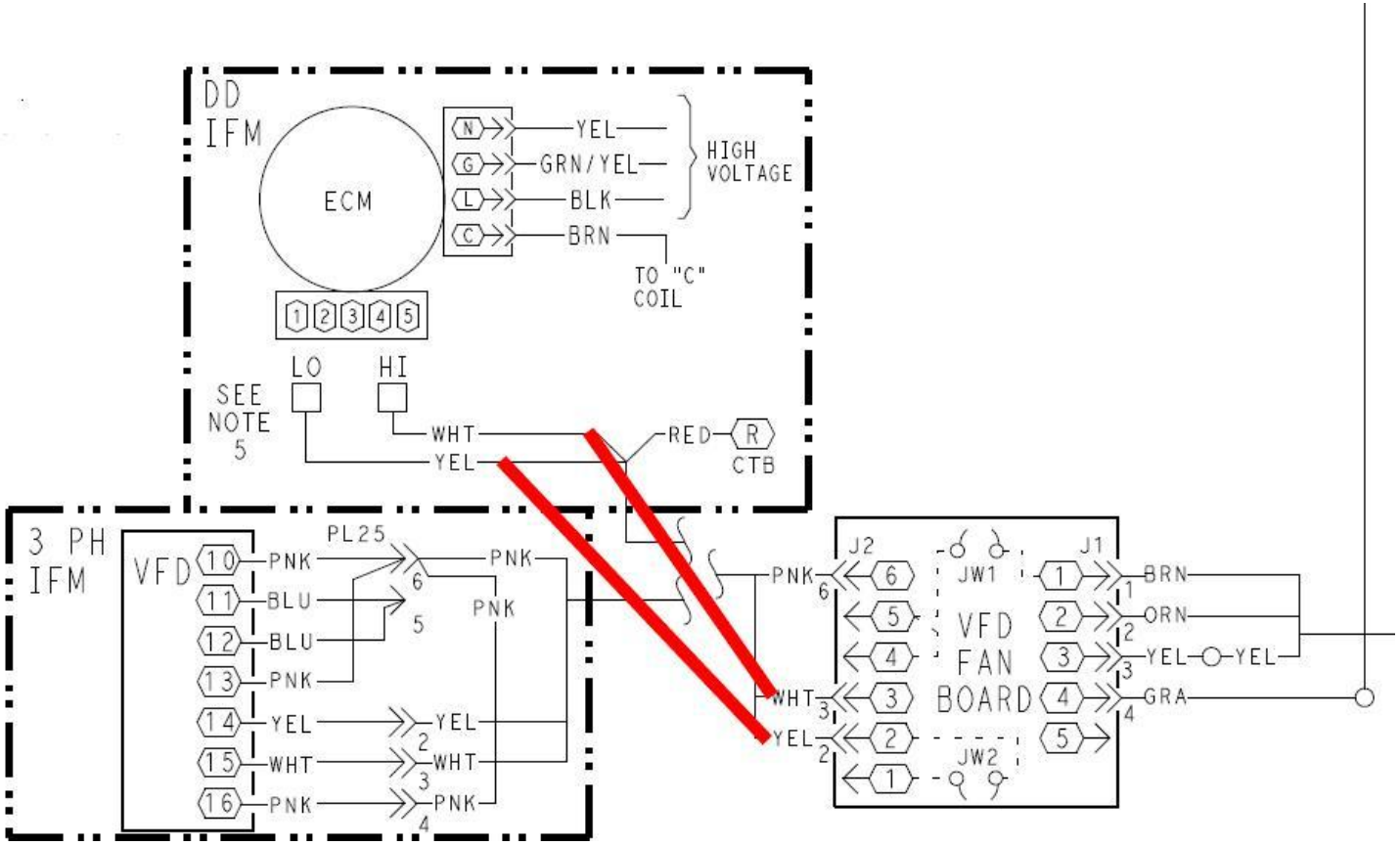
FAN ONLY OR WITH A Y1 X-13 MOTOR



2ND STAGE COOLING Y2 OR W1 HEATING TO X-13 MOTOR



SINGLE PHASE IFMS USE X-13



Properly align the pulleys.

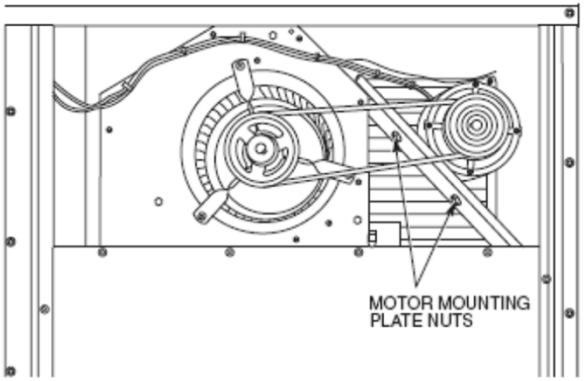
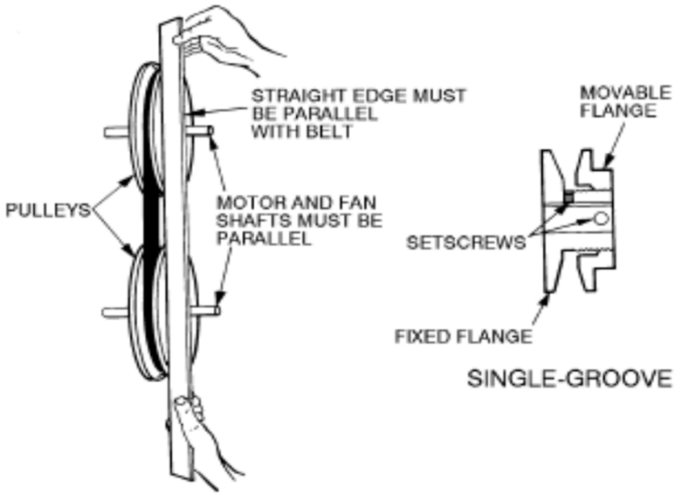


Fig. 40 — Typical Belt-Drive Motor Mounting for Sizes 008,009



Adjustable pulleys are for air balancing only. They should be replaced with a fixed sheave once proper size is determined.

Torque set screws properly. They can come loose and damage the blower assembly. Loose screws on adjustable sheaves WILL results in snapped belts.

You must use a belt tensioner.

Browning

Belt Tension Checker

Power Transmission Solutions
Regal Beloit America, Inc.
7120 New Buffington Road
Florence, KY 41042
Application Engineering: 800 626 2093
www.RegalBeloit.com

FORM
5453E
Revised
November 2017

⚠ WARNING

- Read and follow all instructions carefully.
- Disconnect and lock out power before installation and maintenance. Working on or near energized equipment can result in severe injury or death.
- Do not operate equipment without guards in place. Exposed equipment can result in severe injury or death.

⚠ CAUTION

- Periodic inspections should be performed. Failure to perform proper maintenance can result in premature product failure and personal injury.

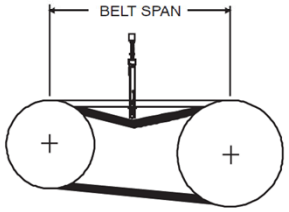
Tensioning V-Belt Drives with a Browning® Tension Checker

General rules of tensioning

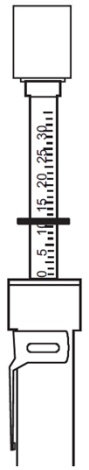
1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24 hours of operation. Checks after jog start or 1-3 minutes of operation, at 8 hours, 24 hours, 100 hours and periodically thereafter are recommended.
3. Overtensioning shortens belt and bearing life.
4. Keep belts free of foreign material that may cause slip.
5. Make v-drive inspection on a periodic basis. Undertensioned belt drives often produce audible squeal noise. Tension when slipping. Never apply belt dressing as this will damage the belt and cause early failure.

Tension Measurement Procedure

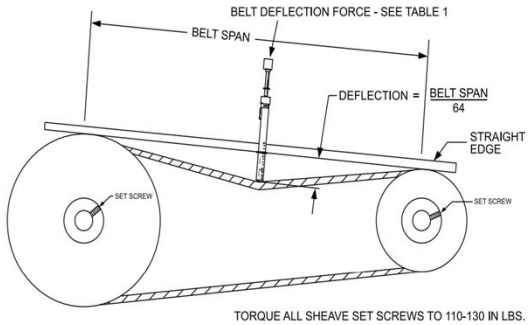
1. Measure the belt span (see sketch).
2. Position bottom of the large o-ring on the span scale at the measured belt span.



Part Number: "Belt Tension Checker"



You must use a belt tensioner to properly tension the belt.



TORQUE ALL SHEAVE SET SCREWS TO 110-130 IN LBS.

BELT CROSS SECTION	SMALLEST SHEAVE DIAMETER	BELT DEFLECTION FORCE (LBS)			
		UNNOTCHED BELTS		NOTCHED BELTS	
		USED	NEW	USED	NEW
A, AX	3.0-3.6	3.7	5.5	4.1	6.1
	3.8-4.8	4.5	6.8	5.0	7.4
	5.0-7.0	5.4	8.0	5.7	8.4
B, BX	3.4-4.2	—	—	4.9	7.2
	4.4-5.6	5.3	7.9	7.1	10.5
	5.8-8.6	6.3	9.4	8.5	12.6

Table 1

BELT CONDITION	TENSION FORCE IN BELT (LBS)
New	100
Used	80

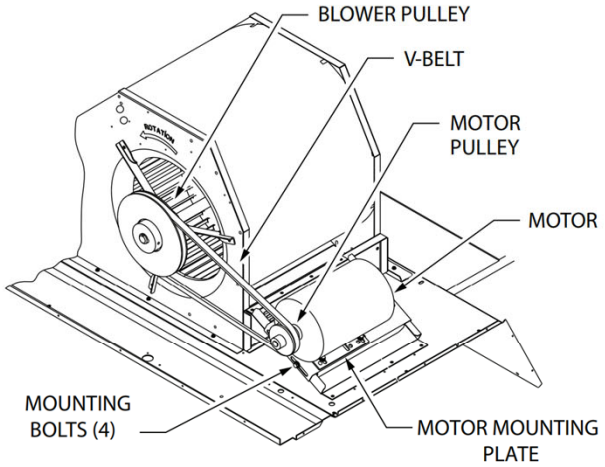


Fig. 114 — Belt Drive Motor Mounting

Pre-Start and Start-Up — This completes the mechanical installation of the unit. Refer to the unit's Service Manual for detailed Pre-Start and Start-Up instructions. Download the latest versions from HVAC Partners (www.hvacpartners.com).

Proper Belt Adjustment

Do not pry/roll the belt onto the pulley with anything! You WILL damage the belt!

To get the belt onto the pulley, adjust the motor mounting plate to allow you to slip the belt onto the pulley by hand. Afterwards, readjust the mounting plate, and tension the belt with a belt tensioner.

Proper Belt Adjustment

Failure to torque set screws, align pulleys, or tension the belt properly WILL result in damage to the blower assembly.

This includes, but is not limited to:

- Broken belts
- Damaged sheaves (melted sheaves if composite).
- Bent motor mounting plate
- Damage to motor shaft, bearings, rotor, or windings leading to motor failure.
- Excessive noise and vibration.
- Damaged (shattered) blower wheels and damage to blower housing.
- Bad reputation, and rejected warranty claims.

Blower Start-up

- **ROTATION CORRECT**
- **CONTINUOUS FAN MODE.**
- **AMPS (DOOR ON)(use data tag)**
- **ANY VIBRATIONS?**

What is your CFM?

- Factory setting is mid range temp rise for heating.
- Small chassis units:
  Pulley is 5 turns open
- Medium chassis units:
  Pulley is 3 turns open.

<u>Do I have enough CFM? How do I check?</u>

Using a Tachometer

BELT DRIVE UNITS

Motor rpm times sheave diameter divided by the blower sheave diameter = blower RPM

Example-

Motor RPM X Motor Sheave \ Blower sheave = Blower wheel RPM

1725 X 3.5 ÷ 6.5” = 928 RPM

3500 X 6” ÷ 15” = 1400 RPM

BELT DRIVE UNITS

Predicted static pressure
Target CFM 3500

48TC12 — 10 TON HORIZONTAL UNIT**
(For more information, see General Fan Performance Notes on page 51.)

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

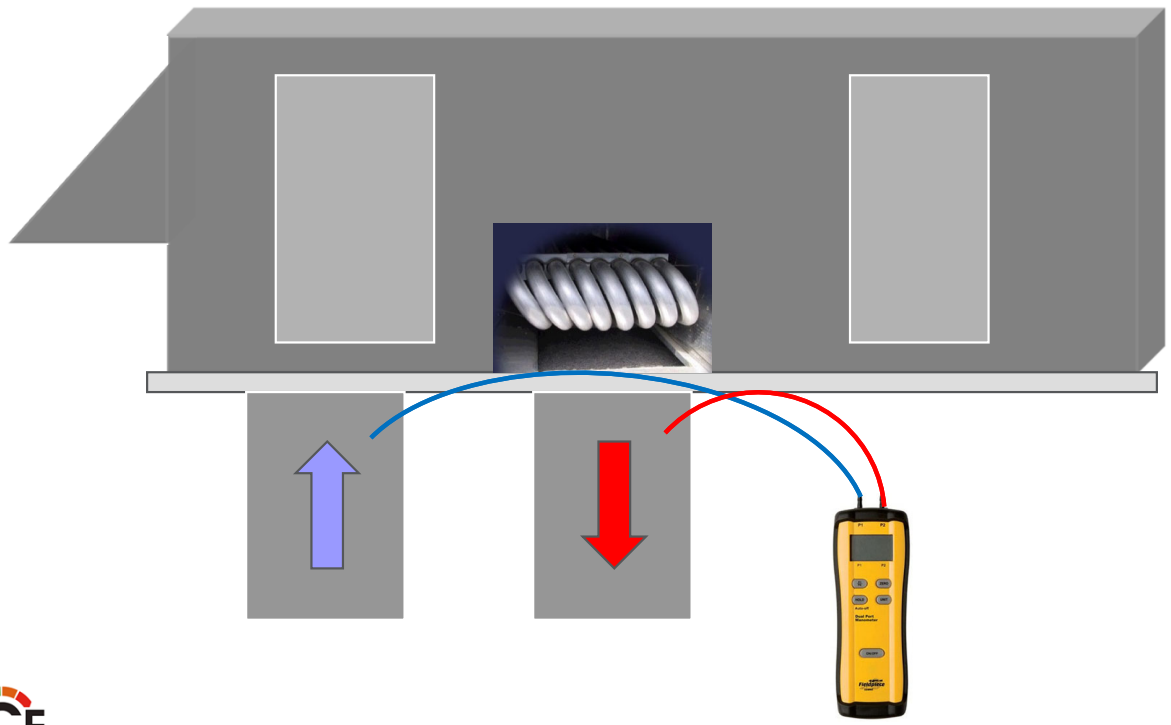
This is RPM of the blower wheel not the motor

BELT DRIVE UNITS

PULLEY ADJUSTMENT — VERTICAL

48TC 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
07	Standard Static	1457	1419	1380	1342	1303	1265	1227	1188	1150	1111	1073
	Medium Static	1518	1484	1449	1415	1380	1346	1311	1277	1242	1208	1173
	High Static	1550	1542	1535	1527	1520	1512	1504	1497	1489	1482	1474
08	Standard Static	747	721	695	670	644	618	592	566	541	515	489
	Medium Static	949	927	906	884	863	841	819	798	776	755	733
	High Static*	1102	1083	1063	1044	1025	1006	986	967	948	928	909
09	Standard Static	733	712	690	669	647	626	604	583	561	540	518
	Medium Static	936	911	887	862	838	813	788	764	739	715	690
	High Static	1084	1059	1035	1010	986	961	936	912	887	863	838
12	Standard Static	838	813	789	764	739	715	690	665	640	616	591
	Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838
	High Static	1240	1218	1196	1175	1153	1131	1109	1087	1066	1044	1022
14	Standard Static	843	824	805	786	767	748	728	709	690	671	652
	Medium Static	1084	1059	1035	1010	986	961	936	912	887	863	838

CHECKING STATIC PRESSURE



Return -.3” wc

+

Supply +.5” wc

= .8” wc Total

NOW TRANSFER THE READINGS TO THE FAN CHART

Table 61 – 48TC12** — **3 PHASE** — **10 TON VERTICAL SUPPLY**

CFM	AVAILABLE EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	616	0.79	689	0.97	757	1.16	821	1.36	882	1.57	939	1.79	994	2.01	1047	2.24	1098	2.47	1147	2.71
3250	655	0.96	724	1.16	788	1.37	849	1.58	907	1.80	962	2.03	1015	2.26	1066	2.50	1115	2.75	1163	3.00
3500	695	1.17	760	1.38	821	1.60	879	1.83	934	2.06	987	2.30	1038	2.54	1088	2.80	1135	3.05	1181	3.32
3750	736	1.41	797	1.63	855	1.86	910	2.10	963	2.35	1014	2.60	1063	2.86	1111	3.12	1157	3.39	1202	3.66
4000	777	1.68	834	1.91	889	2.16	942	2.41	993	2.67	1042	2.93	1090	3.20	1136	3.48	1180	3.76	1224	4.04
4250	818	1.98	873	2.23	925	2.49	976	2.75	1025	3.02	1072	3.30	1118	3.58	1162	3.87	1205	4.16	**1247**	**4.46**
4500	860	2.32	912	2.58	962	2.85	1010	3.13	1057	3.41	1103	3.70	1147	4.00	1190	4.29	1232	4.60	–	–
4750	902	2.69	951	2.97	999	3.26	1046	3.55	1091	3.84	1135	4.14	1177	4.45	–	–	–	–	–	–
5000	944	3.11	991	3.40	1037	3.70	1082	4.00	1125	4.31	1167	4.63	–	–	–	–	–	–	–	–

STD Static – 591–838 RPM, 2.4 Max BHP

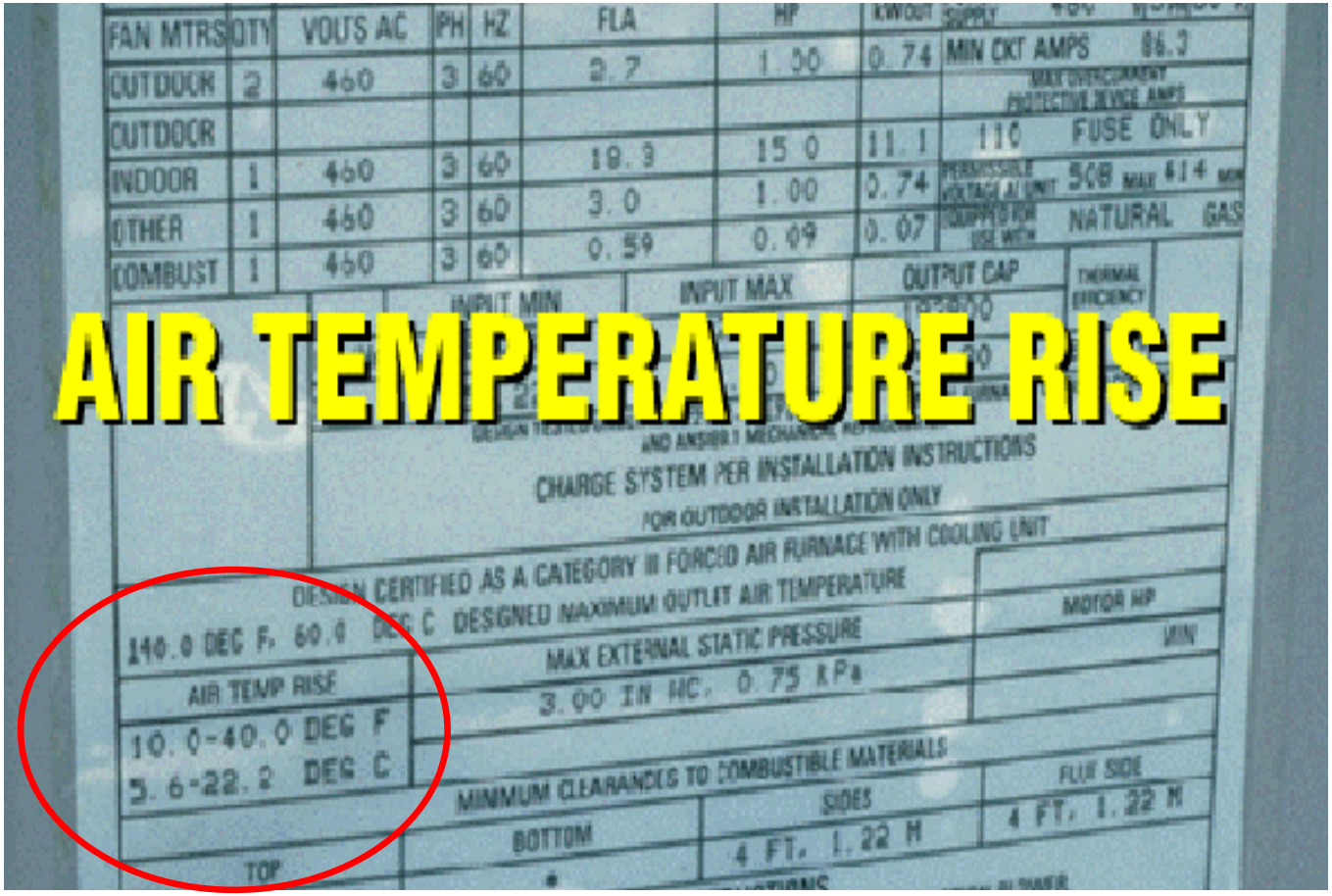
MED Static – 838–1084 RPM, 3.7 Max BHP

HIGH Static – 1022–1240 RPM, 4.7 Max BHP

Bold Face = Field Supplied Drive Required.

For more information, see General Fan Performance Notes on page 64.

You will need to adjust the pulley to get the desired airflow
In this case, since out target was 3500cfm,
we need to open the motor sheave to slow the motor down to 879 RPM
And then re-measure and adjust


AIR TEMPERATURE RISE
FAN MTRS
QTY
VOLTS AC
PH
HZ
FLA
HP
MIN CKT AMPS
86.3
FUSE ONLY
NATURAL GAS
INPUT MIN
INPUT MAX
OUTPUT CAP
CHARGE SYSTEM PER INSTALLATION INSTRUCTIONS
FOR OUTDOOR INSTALLATION ONLY
DESIGN CERTIFIED AS A CATEGORY III FORCED AIR FURNACE WITH COOLING UNIT
140.0 DEG F. 60.0 DEG C DESIGNED MAXIMUM OUTLET AIR TEMPERATURE
AIR TEMP RISE
10.0-40.0 DEG F
5.6-22.2 DEG C
MAX EXTERNAL STATIC PRESSURE
3.00 IN WC. 0.75 kPa
MOTOR HP
MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS
TOP
BOTTOM
SIDES
4 FT. 1.22 M
FLUE SIDE
4 FT. 1.22 M

IS THE TEMPERATURE RISE IN RANGE?

- Is the unit over fired?
- Is the air flow correct?

48/50JC Unit Product Familiarization

48/50 JC UNIT FAMILIARIZATION

COMPRESSOR VFD

- Not typical VFD
- Comprised of 5 components
  - Main drive board
  - Filter board
  - Capacitor board
  - Choke
  - Converter board

Power Supply

All 208/230-v units are factory wired for 230-v power supply. If the 208/230-v unit is to be connected to a 208-v power supply, the transformers must be rewired by moving the wire from the 230-volt connection and moving to the 200-volt terminal on the primary side of the transformer. Refer to unit label diagram for additional information.

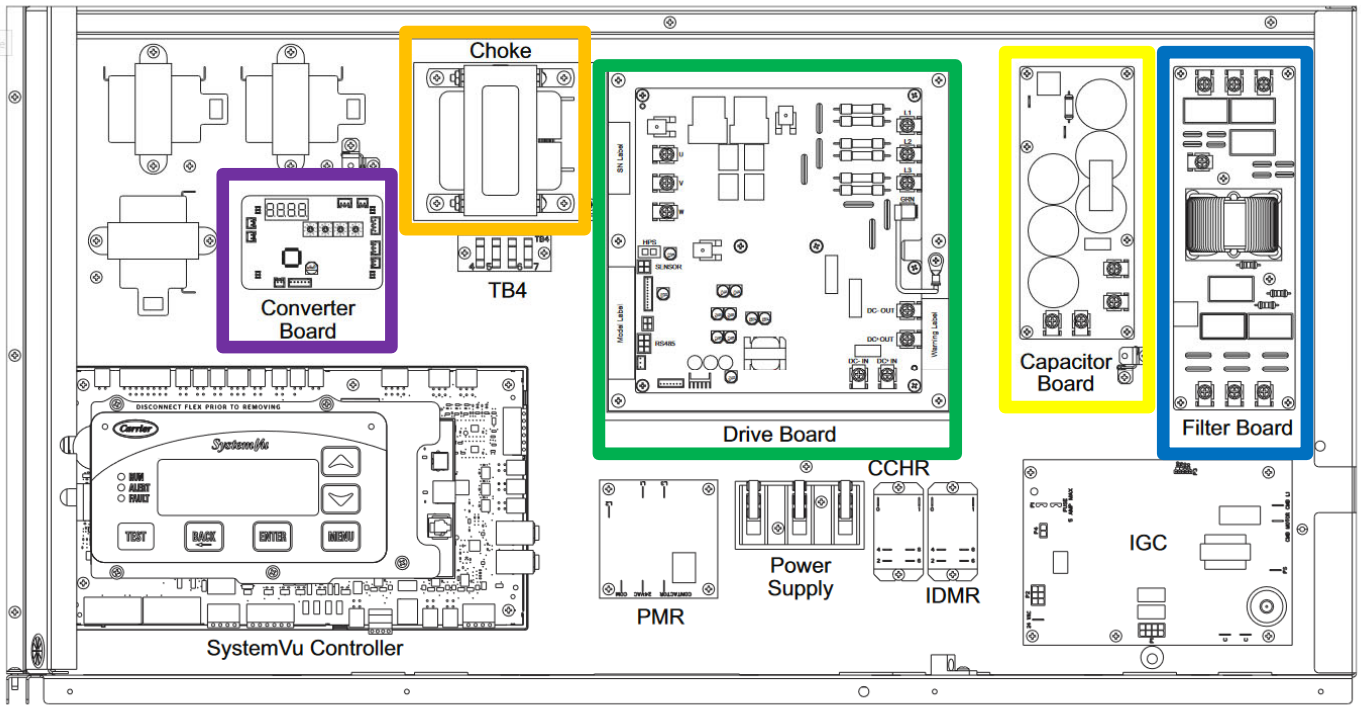
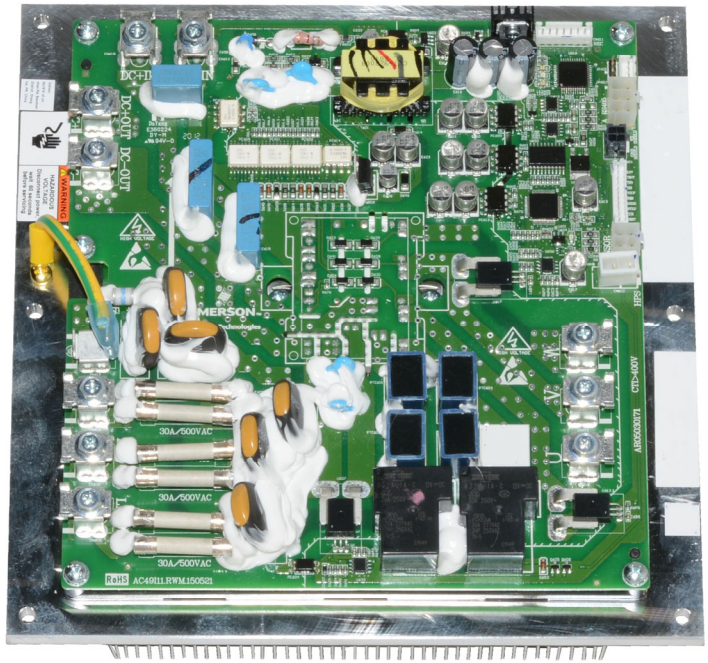


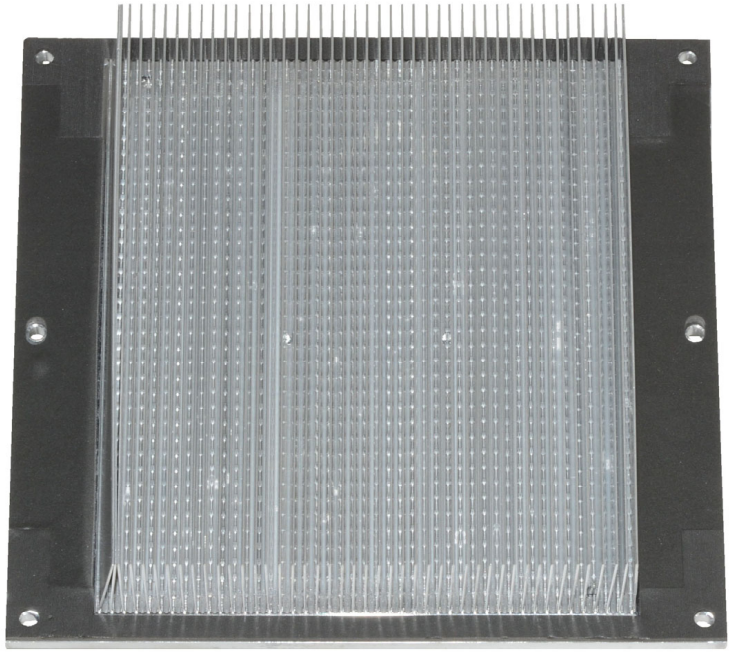
Fig. 29 — Control Box Layout

DRIVE BOARD

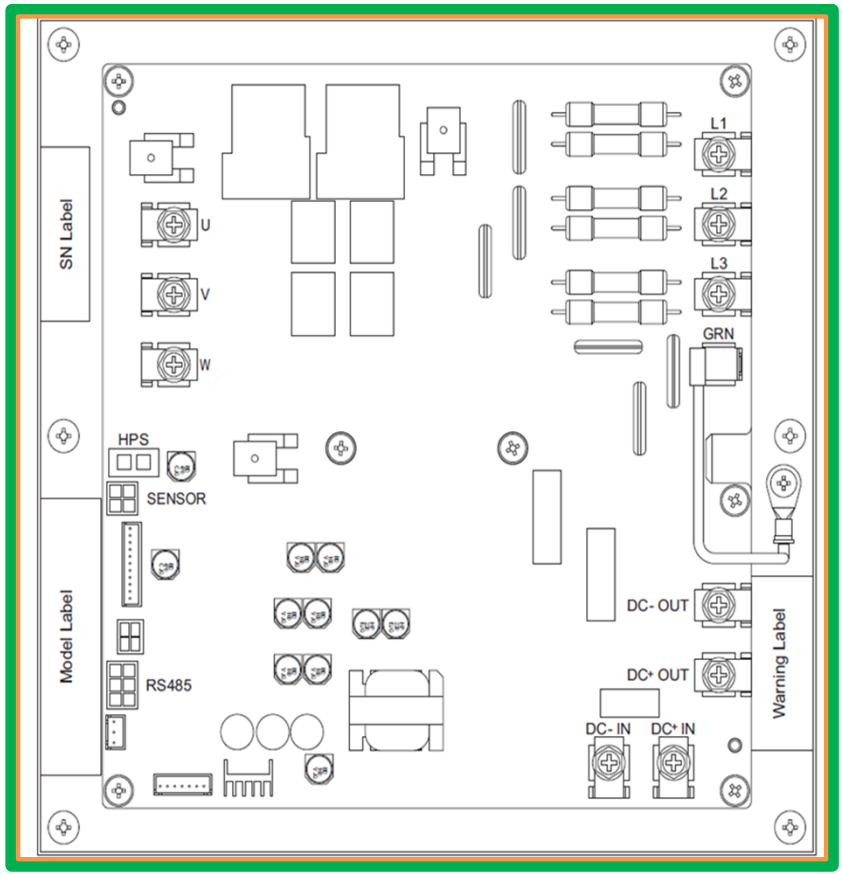
Connection side



Drive board heat sink



DRIVE BOARD



- Drive board is heart of VFD
- Contains safety logic
- Modifies supply voltage to the voltage frequency the compressor needs
- Will reduce compressor speed in high current/temperature situations
- Monitors safeties (HPS & DLT)
- Communicates in Modbus to the converter board.

DRIVE BOARD

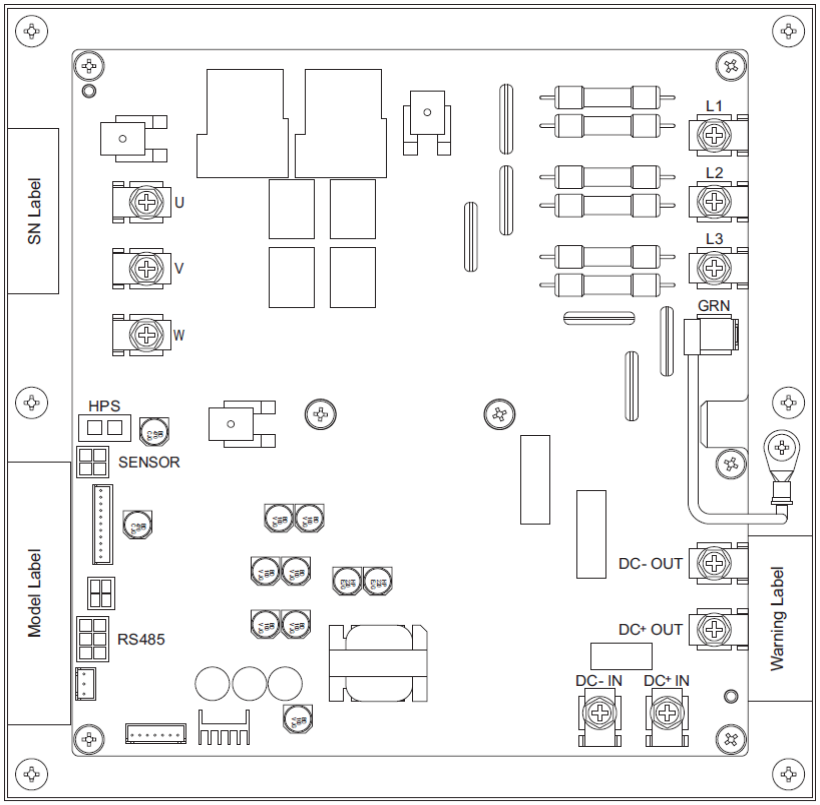


Table 27 — Drive Board Inputs/Outputs

TERMINAL LABEL	DESCRIPTION	TYPE	CONNECTOR
HPS	High Pressure switch input	3.3vdc	2 Pins
SENSOR	DLT sensor input	10k thermistor	Pins 1 and 2 (inner 2 pins)
RS485	Modbus communication with the converter board	RS485 Communication	Pins 1,4, and 5
L1, L2, L3	Supply Power from the filter board	AC high voltage	3x screw terminals
GRN	Supply Ground	Chassis Ground	2x $^{1}/_{4}$-in. Quick Connect
DC+OUT, DC-OUT	DC bus out to capacitor board	DC high voltage	2x $^{1}/_{4}$-in. Quick Connect
DC+IN, DC-IN	DC bus in from the capacitor board	DC high voltage	2x $^{1}/_{4}$-in. Quick Connect
U, V, W	Output to the compressor	AC High voltage	3x screw terminals

CONVERTER/ANALOG BOARD

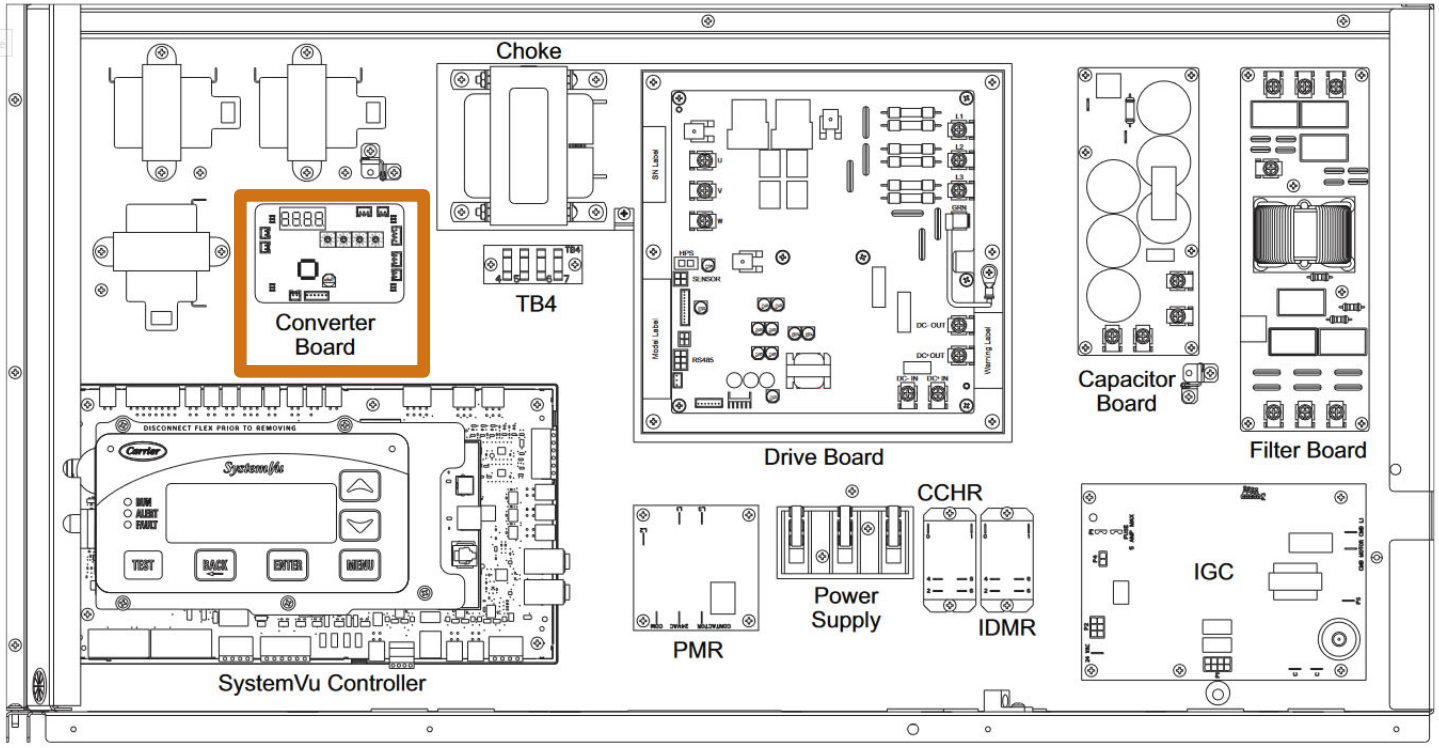


Fig. 29 — Control Box Layout

CONVERTER/ANALOG BOARD

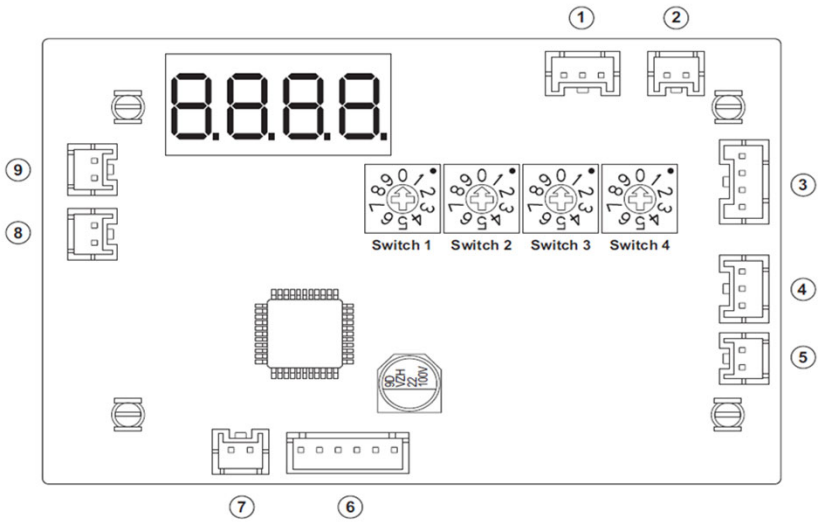


Fig. 31 — Converter Board

- Troubleshooting interface
- Interface between System Vu and VFD
- Converts System Vu control signal to Modbus for drive board
- Configures the drive board
- It will read “IDLE” when in standby waiting for a signal, and the software version “S##.#” will alternate with “IDLE” during standby. It will show the actual compressor running RPM while performing cooling.
- Converter board = Analog board in Epic HR46UR006

CONVERTER/ANALOG BOARD - INPUTS AND OUTPUTS

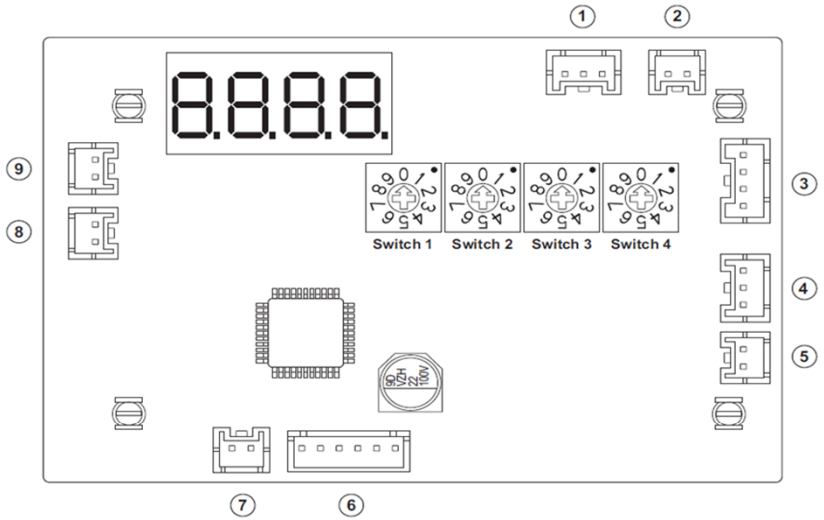
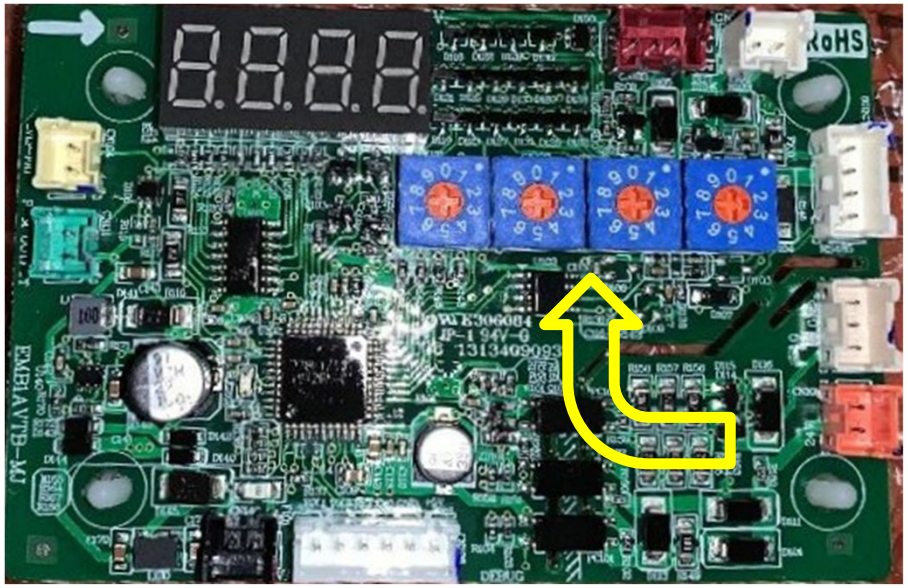


Fig. 31 — Converter Board

REFERENCE NUMBER	DESCRIPTION	TYPE	CONNECTOR
1	Not used	—	—
2	Not used	—	—
3	Modbus communication with the drive board	RS485 Communication	Pins 1,2, and 3
4	Input control from SystemVu	PWM signal	Pins 1 and 3
5	Start/Stop input	24vac	Pins 1 and 2
6	Not used	—	—
7	Power supply	24vac	Pins 1 and 2
8	Not used	—	—
9	Not used	—	—

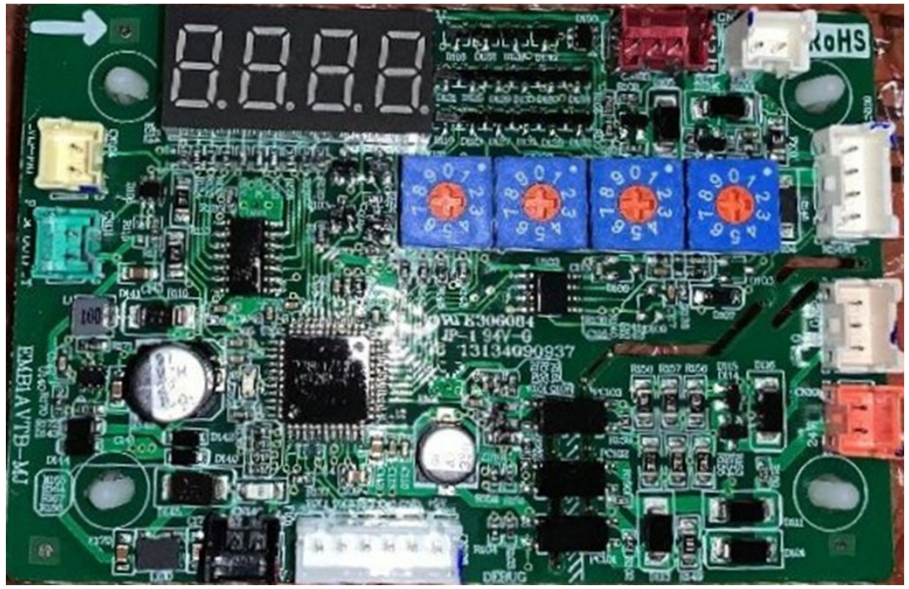
CONVERTER/ANALOG BOARD



- Provides configurations to drive board
- Four rotary switches
- Required settings are on unit schematic

Size	Switch 1	Switch 2	Switch 3	Switch 4
04 (3Ton)	3	3	1	1
05 (4Ton)	3	4	1	1
06 (5Ton)	3	5	5	1

CONVERTER/ANALOG BOARD FOLDBACK STATUS DISPLAY

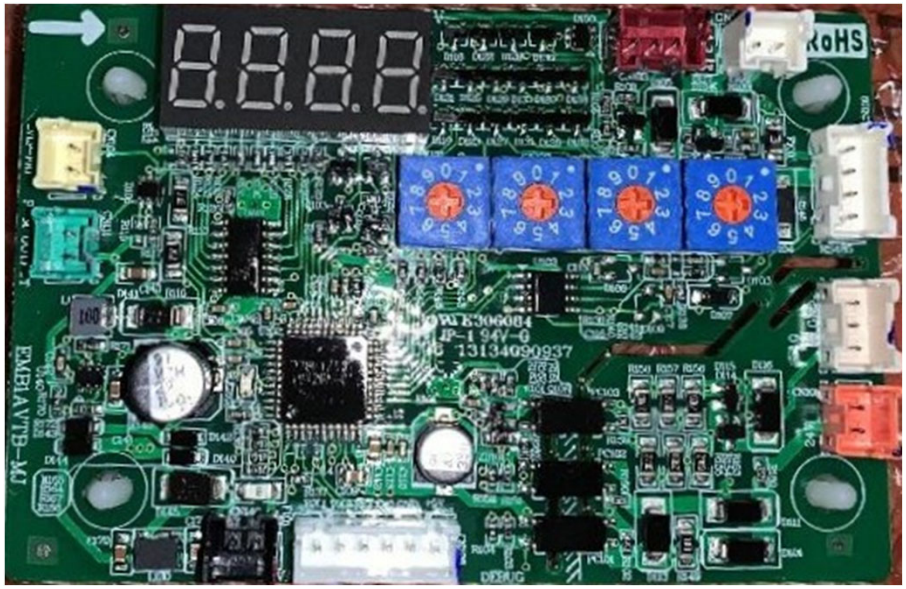


- Drive board is “folding back” to protect compressor
- Running RPM will alternate with Sd## code

Table 15 — Converter Board Foldback Codes

FOLDBACK CODE	FOLDBACK DESCRIPTION
Sd01	Configuration Status (EEPROM/FLASH)
Sd02	Speed Foldback Flag (Output Voltage Limit)
Sd03	PFC Temperature Foldback Status
Sd04	AC Input Current Foldback Status
Sd05	Compressor Phase Current Foldback Status
Sd06	Compressor Power Module Temperature Foldback Status
Sd07	DLT Temperature Foldback Status
Sd08	Output Capacity Foldback Status
Sd09	Autosaved Data Status
Sd10	Speed Foldback Flag (Torque Limit)

CONVERTER/ANALOG BOARD ERROR STATUS DISPLAY



- Error codes start with E-
- If the drive board is folding back the speed to protect the current, the running RPM will alternate with “Sd##” where the number indicates the reason for fold back.
- See Service and Maintenance Instructions for codes

FILTER BOARD

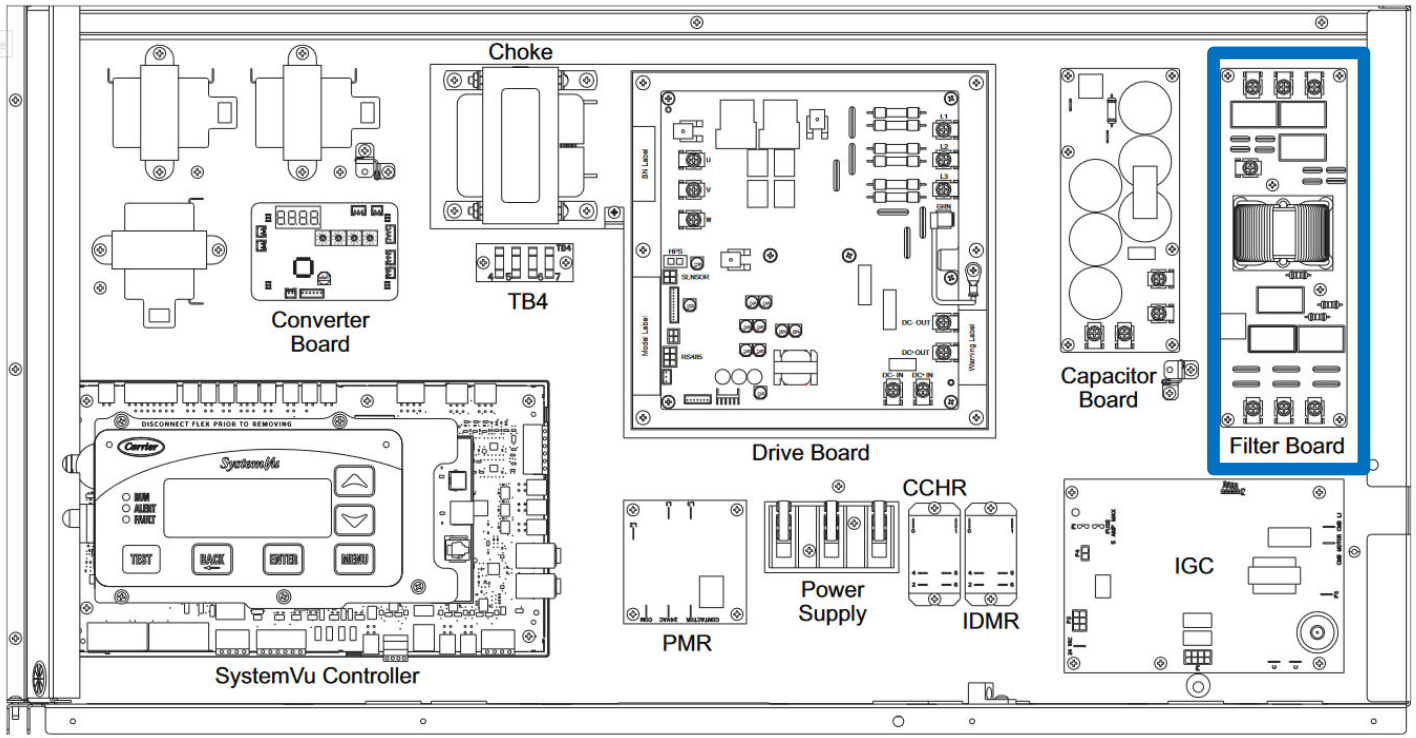


Fig. 29 — Control Box Layout

FILTER BOARD

- Filter board supports drive board
- Assists in filtering “noise” and voltage spikes
- For troubleshooting make sure the AC voltage is the same going into the board and coming out of the board.

TERMINAL LABEL	DESCRIPTION	TYPE	CONNECTOR
L1_IN, L2_IN, L3_IN	Supply Power	AC High voltage	3x screw terminals
GRN	Supply Ground	Chassis Ground	1x screw terminal
L1_OUT, L2_OUT, L3_OUT	Supply Power to Drive board	AC High voltage	3x screw terminals

CHOKE

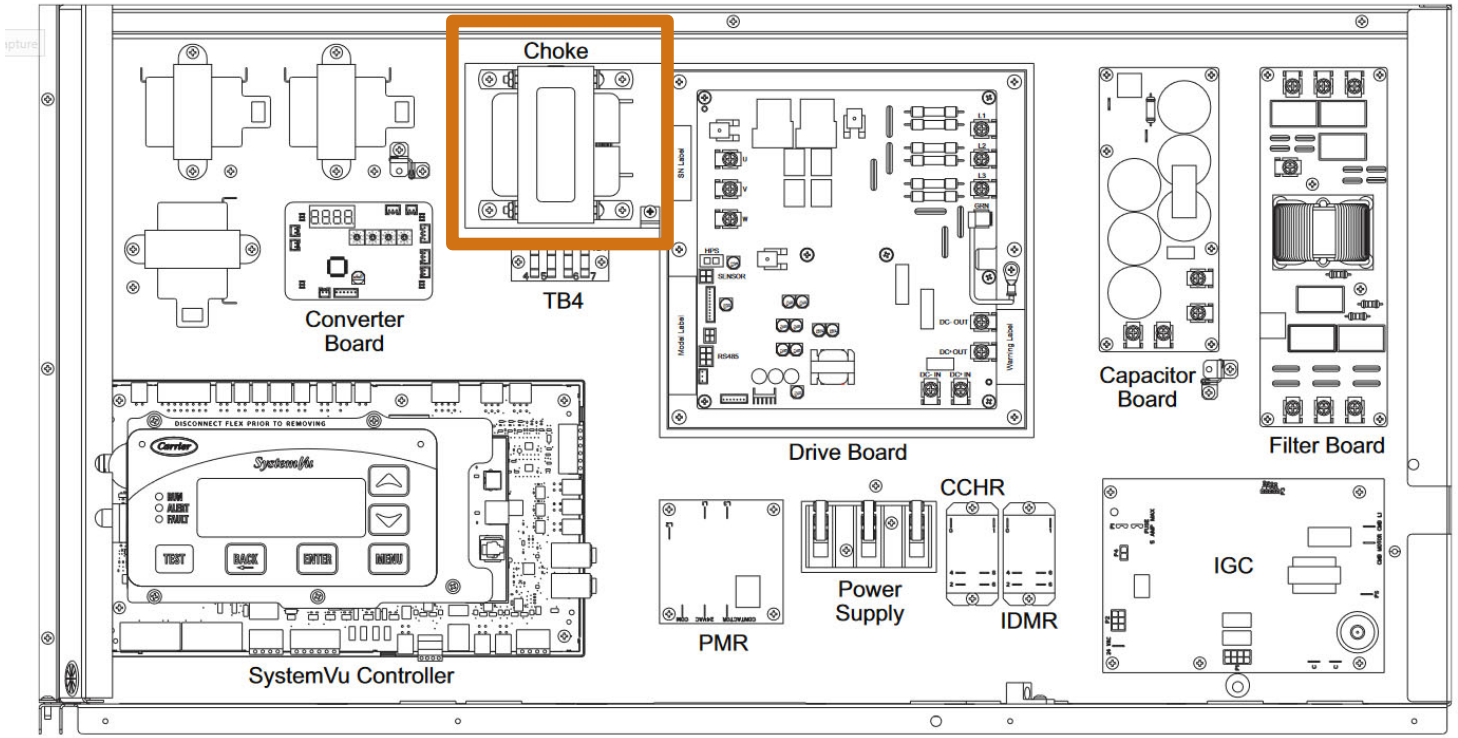


Fig. 29 — Control Box Layout

CHOKE

- Heaviest component protecting DC bus
- Between DC output of drive board & DC input of capacitor board
- It is not direction sensitive so the wires can be swapped. Make sure the voltage is the same leaving the drive board as entering the capacitor board.

CAPACITOR BOARD

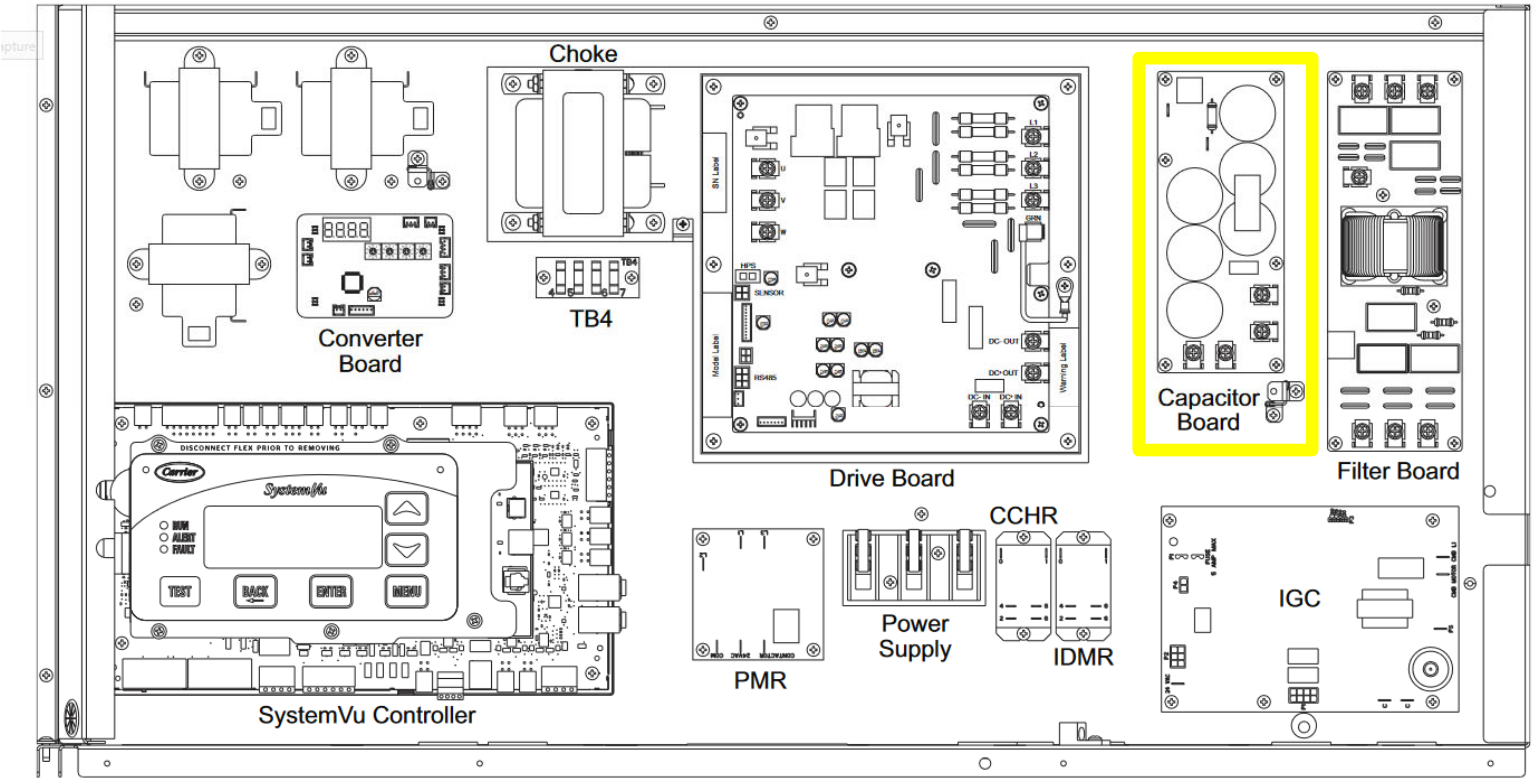


Fig. 29 — Control Box Layout

CAPACITOR BOARD

- Stabilizes DC bus used by drive board
- Polarity sensitive
- DC IN is High DC voltage in from the drive board
- DC Out is High DC voltage TO the drive board
- Entering and leaving voltage is the same.

CAPACITOR BOARD SERVICE

- Look for bulged capacitors

- SAFETY WARNING
  - Power down for 5 minutes
  - LED off before servicing/removing

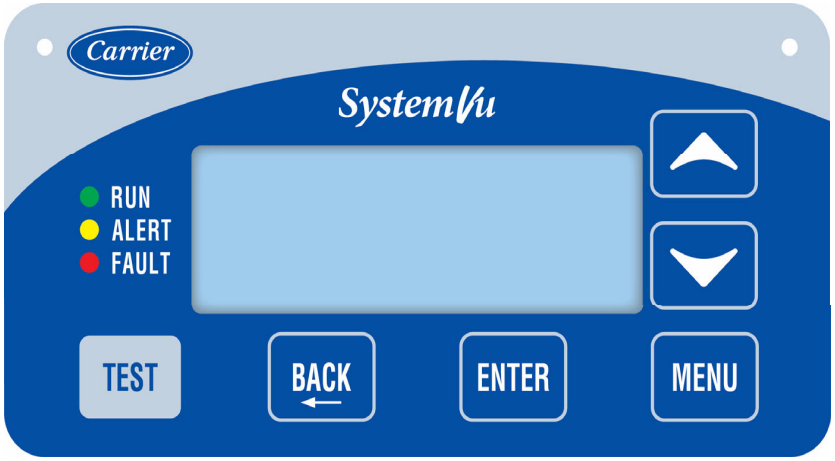
COMPRESSOR

- Use test mode to check for proper rotation
- Rotation incorrect
  - Controls stop compressor
  - Alarm Circuit A Reverse Rotation

- Fix reverse rotation
  - Power down/lock out tag out
  - Switch two leads Compressor VFD output to compressor
  - Swapping unit incoming power will not change rotation

System Vu

SYSTEM VU



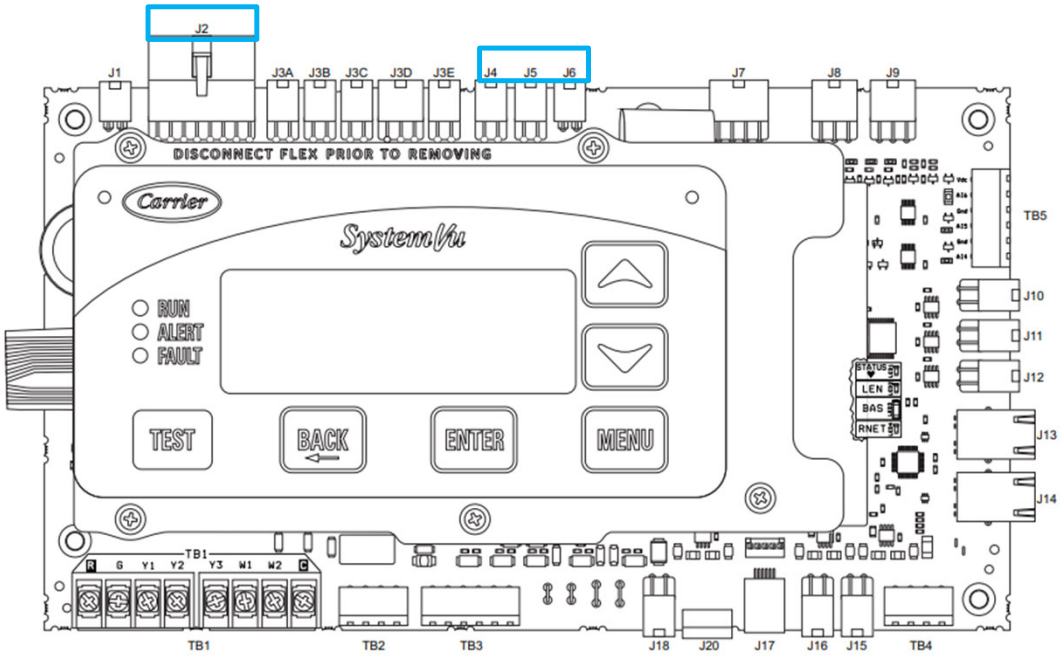
- 4 lines 30 characters per line
- 6 Buttons
- Backlight
- Same basic operation as Marquee/Navigator
- 3 LEDs showing high level status (traffic light model)

#	Button(s)	Commands
1	Up (▲)	Move Up
2	Down (▼)	Move Down
3	Enter	Advance/Select
4	Back	Go Back
5	Menu	Main Menu
6	Test	Test Menu
7	Hold Up (▲)	Move Up Quickly
8	Hold Down (▼)	Move Down Quickly
9	Up & Down	Point Force Clear
10	Enter & Back	Expansion of Item
11	Hold Menu for 5 seconds	Short Cut to Language Select
12	Hold Back for 5 seconds	Standby Screen/Logout
13	Hold Test for 5 seconds	Toggle Backlight Disable Timer

- ➢ First key press always turns on the backlight if it is off

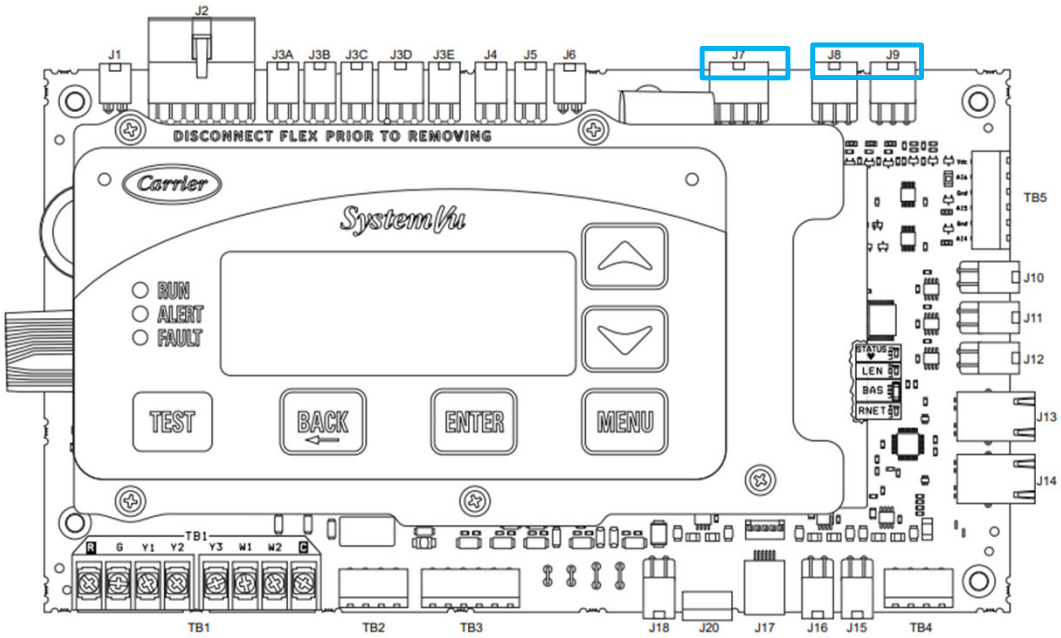
SYSTEM VU
MAIN BASE BOARD INPUTS

- J2 Transformer 1 (1 & 8)
- J4 Digital Configurable drain pan (1-4)
- J5 Digital Configurable fire shutdown (1-4)
- J6 Digital GC fan request (48 series) (1-2)



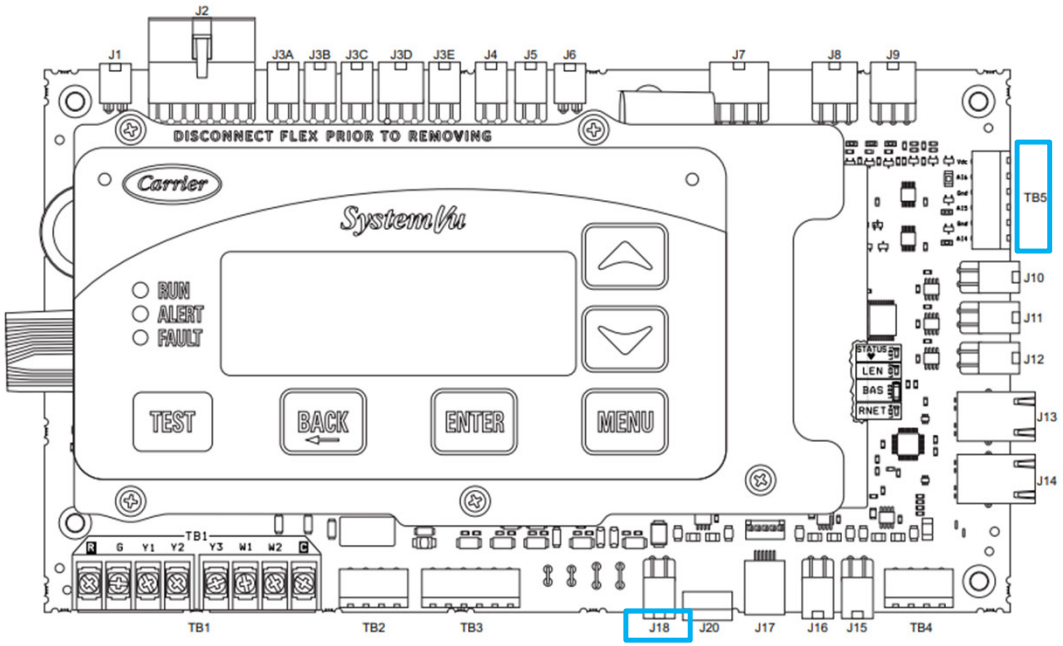
SYSTEM VU
MAIN BASE BOARD INPUTS

- J7 Economizer Analog
  - Actuator position (3 & 8)
  - Configurable IAQ level (1 &5-6)
  - Configurable Outdoor Air RH (2 & 6-7)
- J8 Thermistors 10K
  - Supply air temp (1 & 4)
  - Return air temp (2 & 5)
  - Outdoor air temp (3 & 6)
- J9 Transducers 0-5 vdc
  - Cir A suction press (1-2 & 5)
  - Circuit A discharge press (4-3 & 6)



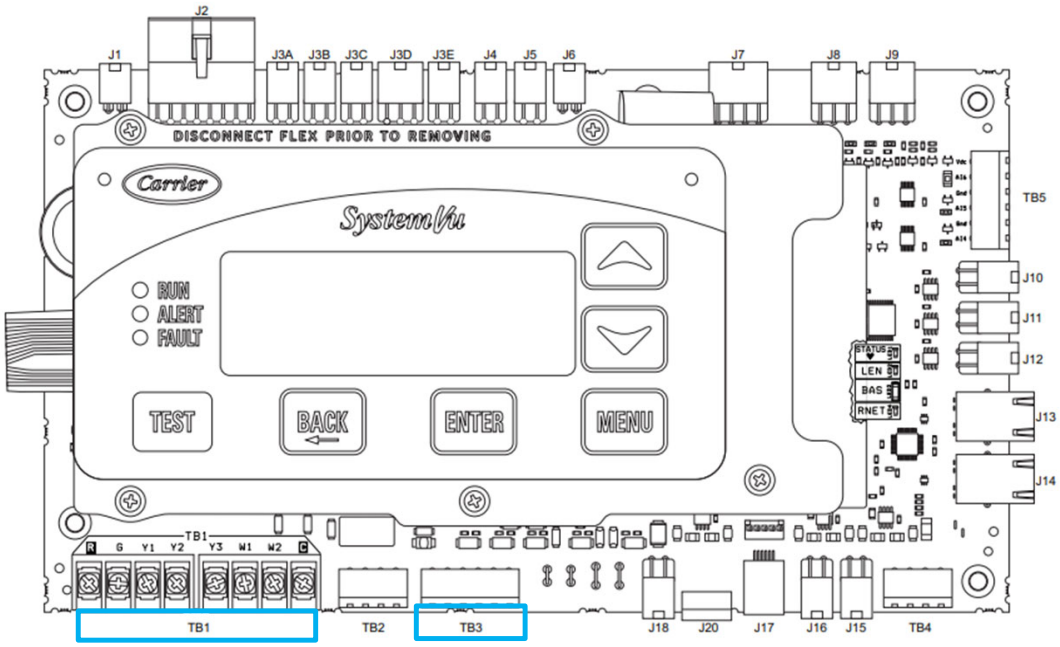
SYSTEM VU
MAIN BASE BOARD INPUTS

- TB5
  - Configurable 0-20 mA (4-6)
  - Slider offset thermistor 10K (2-3)
  - Space temp thermistor 10K (1-2)
- J18
  - Indoor fan limit switch (2 & 4 & not shown quick connects 1-2)
  - Configurable (1 & 3 & not shown quick connects 3-4)



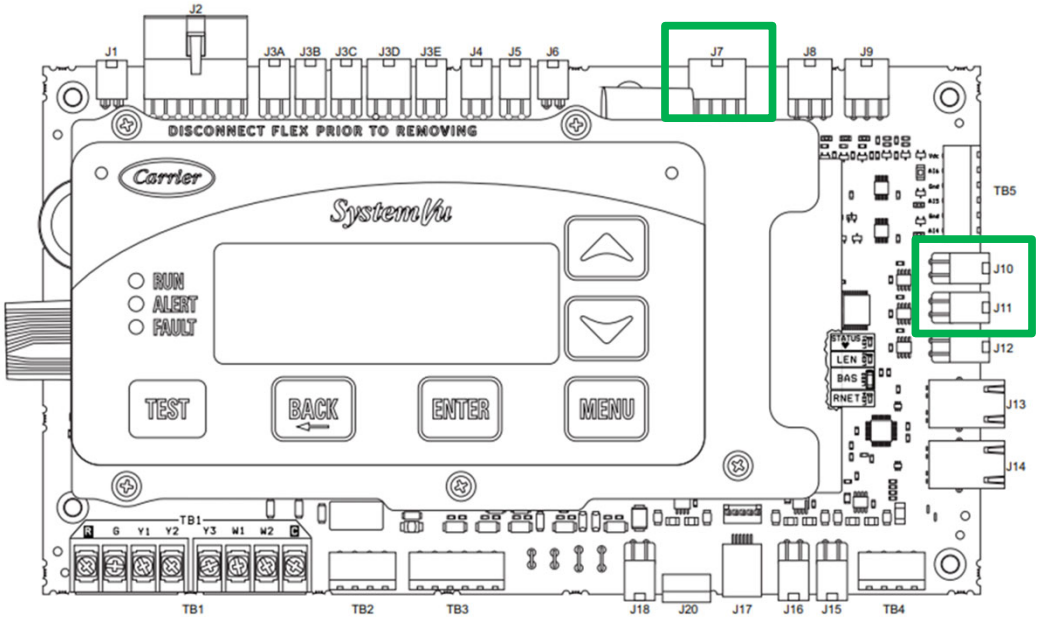
SYSTEM VU
MAIN BASE BOARD INPUTS

- TB3
  - Filter status – FIOP or field installed (1–2)
  - Configurable (3-4)
  - Configurable f/phase monitor (5-6)
- TB1
  - Stat connections
  - Humidistat configurable field installed Y3



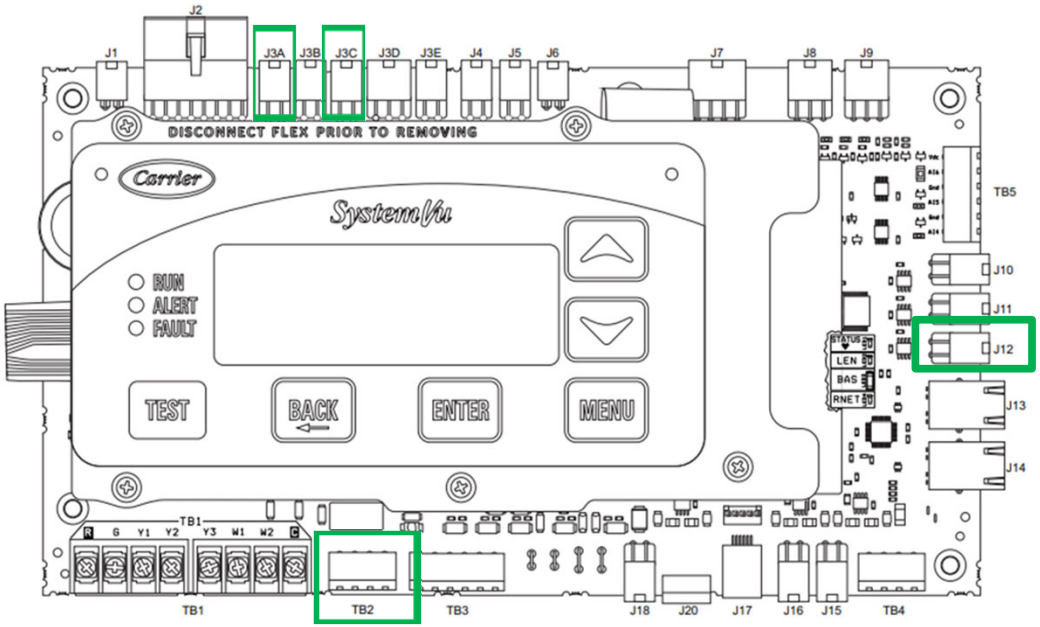
SYSTEM VU
MAIN BASE BOARD OUTPUTS

- J7 Economizer Analog
  - Economizer command 0-20 mA (4 & 8)
- J10 Indoor PWM fan command RPM (1-4)
- J11 Outdoor PWM fan command RPM (1-4)



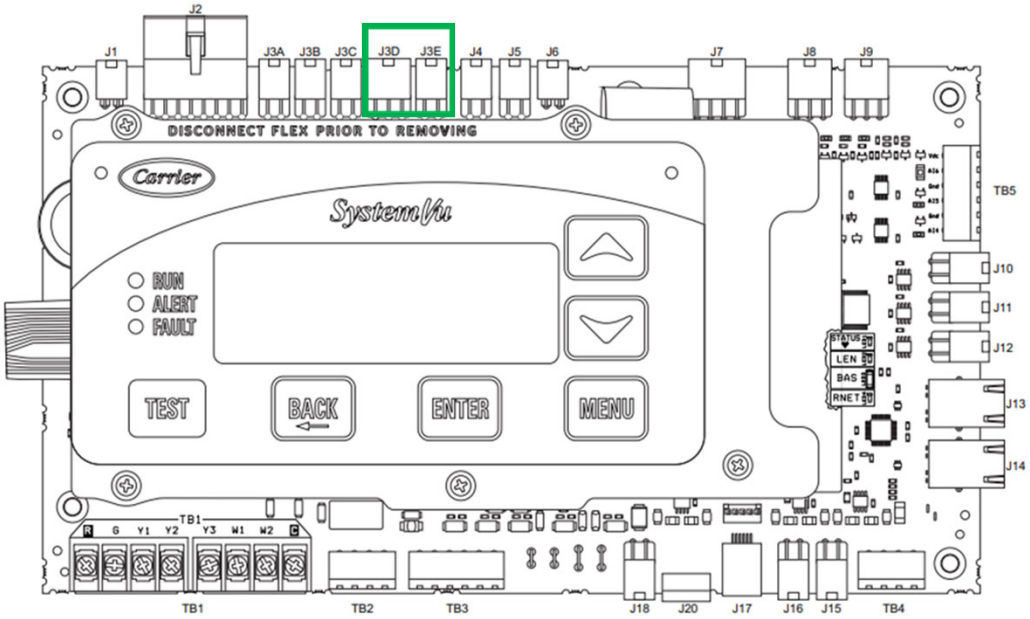
SYSTEM VU
MAIN BASE BOARD OUTPUTS

- J12 PWM Compressor RPM Command
  - To converter board (1-4)
- TB2 Configurable for alarm relay (3 & 4)
- J3A Crankcase heater relay (1 & 3)
- J3C When applicable Power Exhaust (1-4)



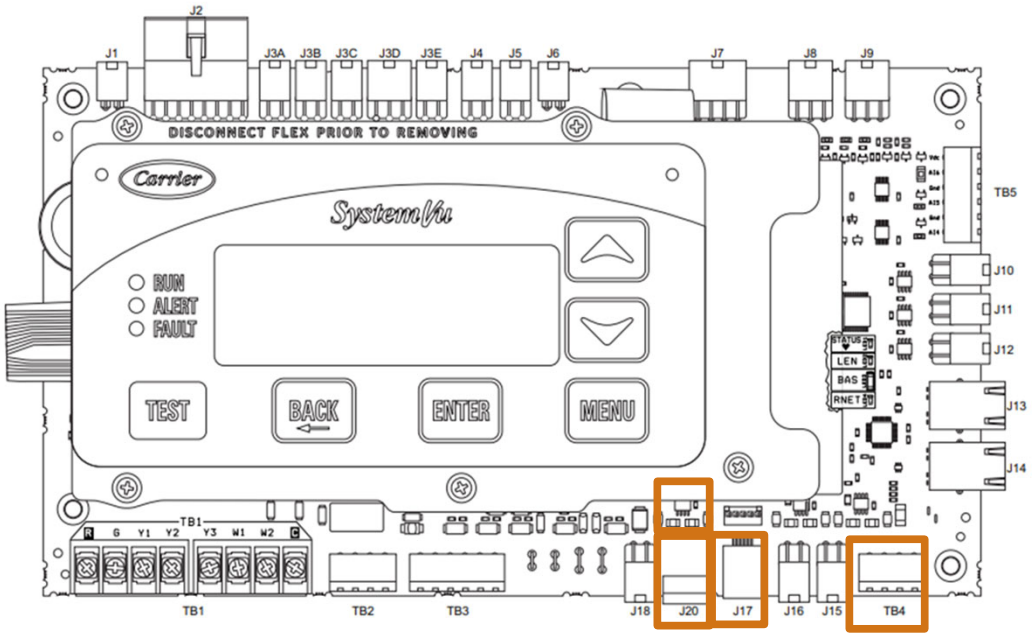
SYSTEM VU
MAIN BASE BOARD OUTPUTS

- J3D Humidi-mizer reheat
  - Reheat discharge valve (1 & 4)
  - Reheat liquid valve (2 &5)
  - Cooling liquid valve (3 & 6)
- J3E Heat electric or gas
  - Stage 1 relay (2 & 4)
  - Stage 2 relay (1 & 3)

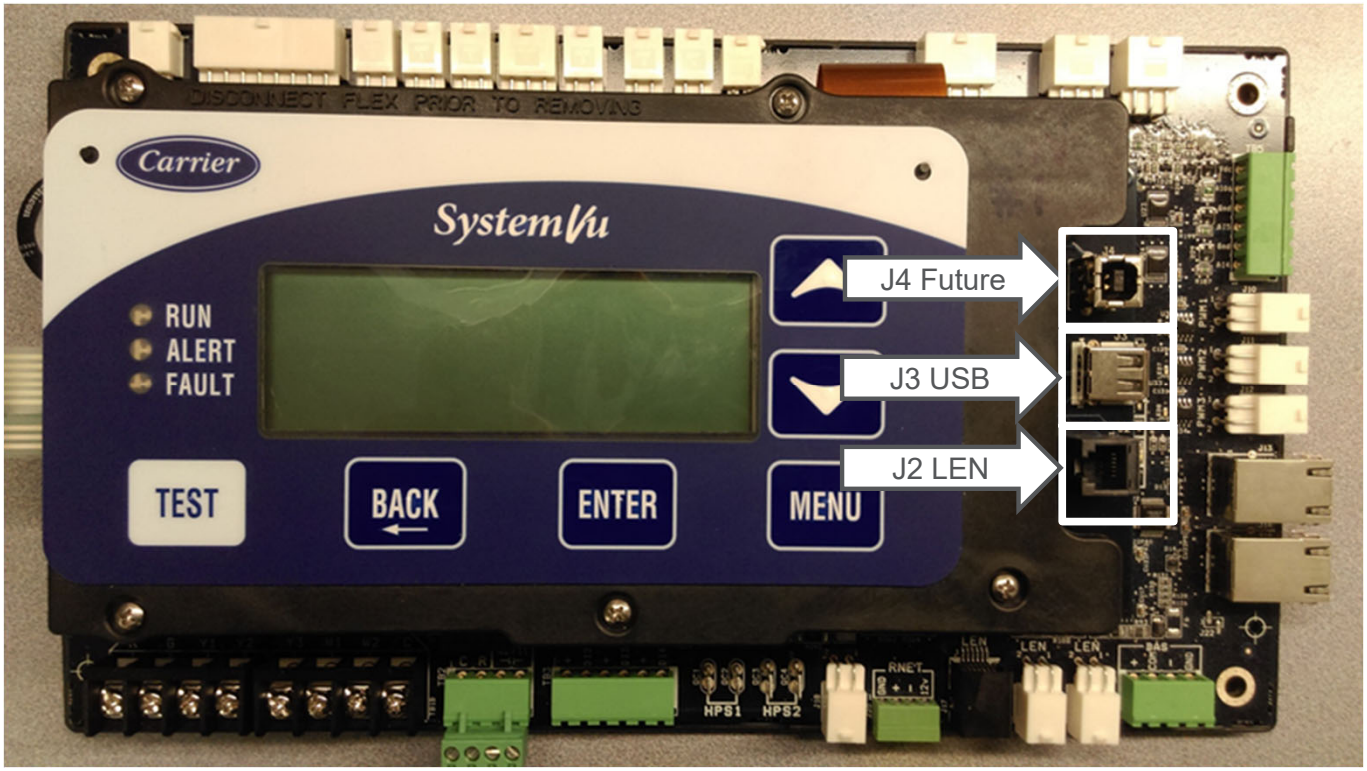


SYSTEM VU
MAIN BASE BOARD COMMUNICATION

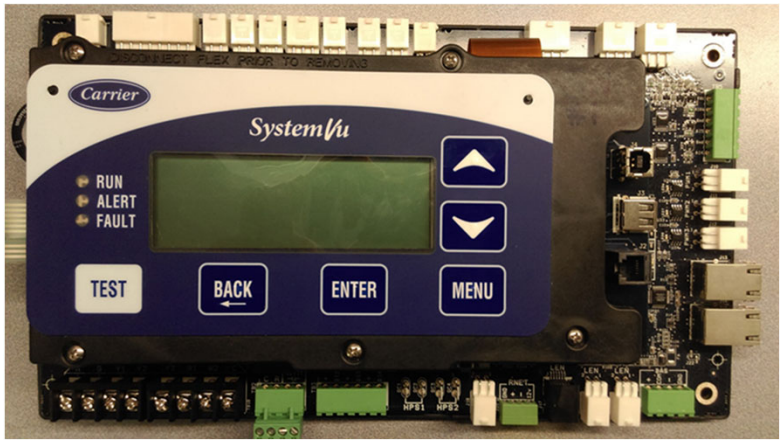
- TB4 Building Automation System BAS (1-4)
  - CCN or BAC Net
- J17 Local Equipment Network LEN
- J20 RNET sensors (1-4)
- J24 RNET service access (1-5)



SYSTEM VU
MAIN BASE BOARD DISPLAY CONNECTIONS



SYSTEM VU QUICK SETUP MENU



SYSTEMVU DISPLAY	EXPANDED NAME	RANGE	DEFAULT
QUICK SETUP CONFIG	QUICK SETUP CONFIG MENU		
DATE	Current Date	MM/DD/YYYY	
TIME	Clock Hour and Minute	HH:MM	
STARTUP DELAY	Unit Startup Delay	10 to 600	30
UNIT CONTROL TYPE	Unit Control Type	0=TSTAT, 1=SPACE SEN, 2=RAT SEN	0
THERMOSTAT TYPE	Thermostat Hardware Type	0=CONV 2C2H, 1=DIGI 2C2H, 2=CONV 3C2H, 3=DIGI 3C2H	2
DIRTY FILTER TIME	Change Filter Timer	0 to 9999	600
HEATING STAG QTY	Number of Heating Stages	1 to 2	2*
VENT METHOD	Ventilation Method	0=NONE 1=ECON 2=2POS DMPR 3=ERV 4=ECON ERV	0*
FREECOOL MAX OAT	Free Cooling Max OAT	0 to 90	65
FIRE SW CHANNEL	Fire Switch Channel	0=None, 1=MBB DI12, 2=MBB DI13, 3=MBB DI14, 4=MBB DI02, 5=MBB DI03 6=MBB DI05, 7-MBB Y3	0*
COOL DESIGN SPEED	Cooling Design Point Spd	0 to 3000	1864*
IDF VENT SPD	IDF Vent Speed	0 to 3000	900*
IDF HEAT SPD	IDF Heat Speed	0 to 3000	2100*
QUICK SET CHKLIST	QUICK SETUP CHECKLIST	0=Undone, 1=View, 2=Done	0

CONTROL SET POINT AND CONFIGURATION LOG

MODEL NO: _____ SOFTWARE VERSION: _____

SERIAL NO: _____ MBB: CESR131651-_____

DATE: _____

TECHNICIAN: _____

INDICATE UNIT SETTINGS BELOW

CONTROL TYPE: Thermostat/T-55 Space Temp./T-56 Space Temp./T-59 Space Temp.

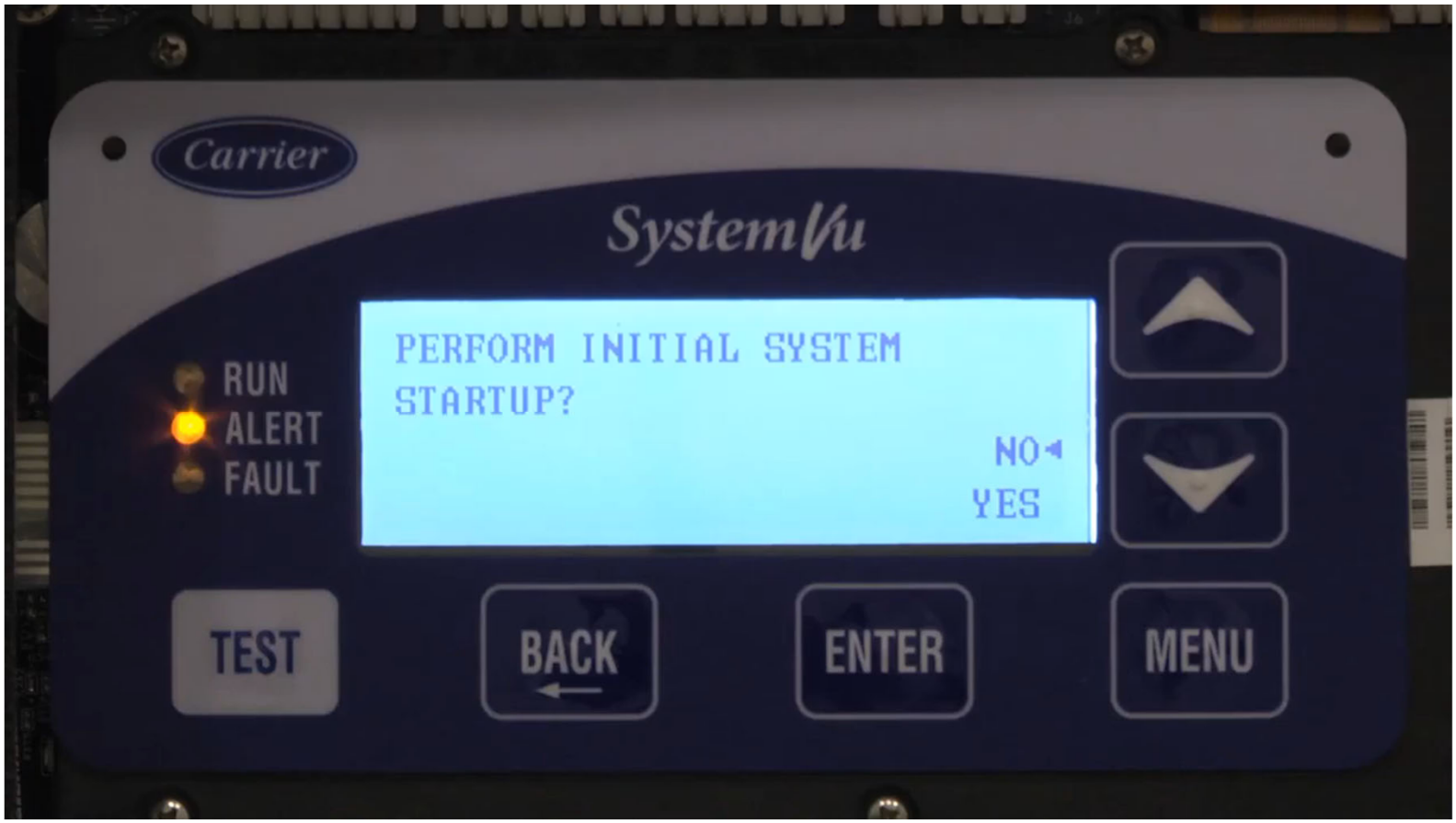
SETPOINT: Cooling Occupied: _____ Unoccupied: _____

Heating Occupied: _____ Unoccupied: _____

SETTINGS - MAIN MENU LAYOUT

DISPLAY TEXT	EXPANDED DISPLAY TEXT	VALUES	UNITS	DEFAULT	POINT	ENTRY
SETTINGS	SETTINGS MENU					
SPACE SET POINTS	Space Setpoints Adjustment Menu					
OCC COOL SETPOINT	Occupied Cool Setpoint	55 to 80	°F	78	OCSP	
OCC HEAT SETPOINT	Occupied Heat Setpoint	55 to 80	°F	68	OHSP	
UNOCC COOL SETPNT	Unoccupied Cool Setpoint	65 to 95	°F	85	UCSP	
UNOCC HEAT SETPNT	Unoccupied Heat Setpoint	40 to 80	°F	60	UHSP	
HEAT-COOL SP GAP	Heat-Cool Setpoint Gap	2 to 10	°F	5	HCSP_GAP	
SPT SLIDER RANGE	SPT Offset Range (+/-)	0 to 5	°F	5	SPTO_RNG	
OCC SPRH SETPOINT	Occupied SPRH Setpoint	0 to 100	%	50	SPRH_OSP	
UNOCC SPRH SET PT	Unoccupied SPRH Setpoint	0 to 100	%	80	SPRH_USP	
SPRH RH DEADBAND	Space RH Deadband	2 to 20	%	8	SPRH_DB	
SA TEMPERING SP	SA tempering Set point	30 to 80	°F	55	SATEMPSP	
TEMP DEMAND CONFIG	Temperature Demand Configuration menu					
LOW COOL DMD ON	Low Cool Demand On	-1 to 2	°F	0.5	DMDLCON	
HIGH COOL DMD ON	High Cool Demand On	0.5 to 20	°F	1.5	DMDHCON	
LOW COOL DMD OFF	Low Cool Demand Off	-1 to 2	°F	-0.5	DMDLCOFF	

SYSTEM VU START UP



SYSTEM VU CONTROL TYPE

FIELD CONTROL WIRING

The 48JC unit comes standard with SystemVu controls. An external space sensor or conventional thermostat is required (field-supplied).

SPACE TEMPERATURE SENSOR (SPT)

There are 2 types of space temperature sensors available from Carrier, resistive input non-communicating (T-55, T-56 and T-59) and Rnet communicating (ZS) sensors. Each type has a variety of options consisting of: timed override button, set point adjustment, a LCD screen, combination of humidity or CO_2 sensing and communication tie in. Space temperature can be also be written to from a building network or zoning system.

Fig. 38 shows the wiring connections from the accessory space temperature sensors to the SystemVu MBB.

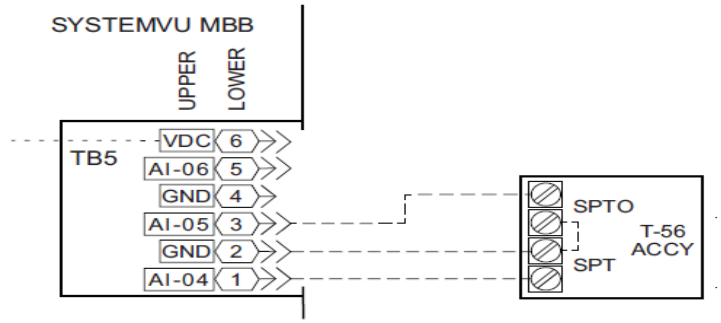


Fig. 38 — Typical Low Voltage SPT Connections

Space Temperature Sensor (T-56)

The T-56 space temperature sensor (part no. 33ZCT56SPT) is a field-installed accessory. This sensor includes a sliding scale on the front cover that permits an occupant to adjust the space temperature set point remotely. The T-56 sensor also includes an override button on the front cover to allow occupants to override the unoccupied schedule (if programmed).

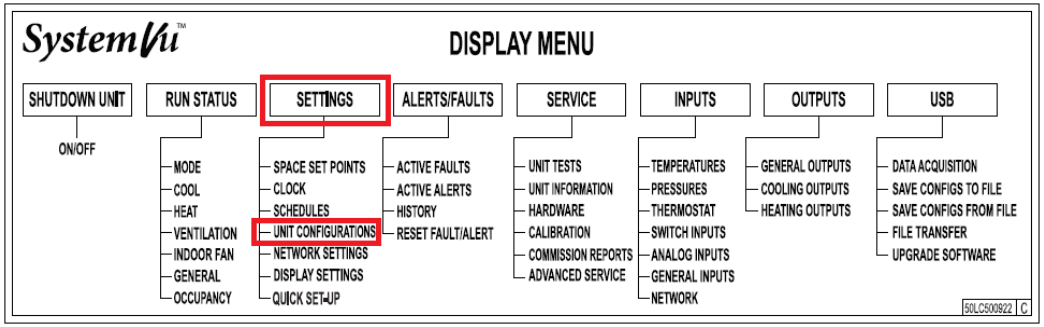
TB5-1 . . . . . Sensor Input
TB5-2 . . . . . Sensor Common
TB5-3 . . . . . Setpoint Offset Input

SYSTEM VU CONTROL TYPE

Space Temperature Sensor Control - Direct Wired (T-55 or T-56 or T-59)

Wire accessory space temperature sensor(s) to the T-55 terminals on the field connection terminal board located at the unit control box. Refer to Space Mounted Sensors section (page 58) for additional information.

The Unit Control Type configuration, (***UNIT CONTROL TYPE***) must be set to Space Sensor (1).



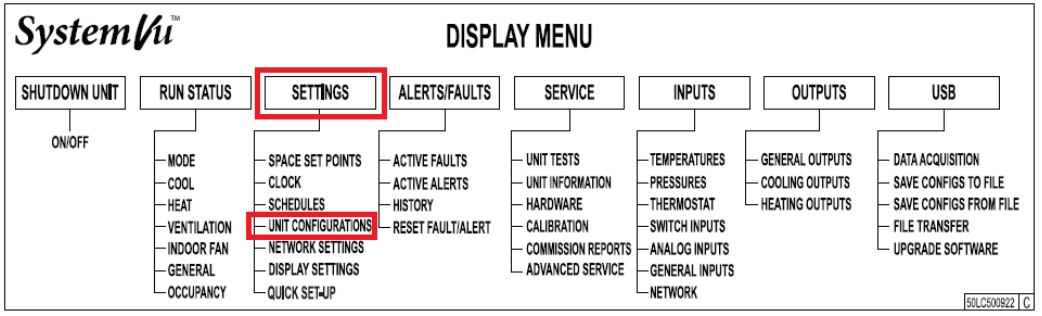
Thermostat Control

Wire accessory thermostat to the corresponding R, Y1, Y2, W1, W2, and G terminals on the Main Base board.

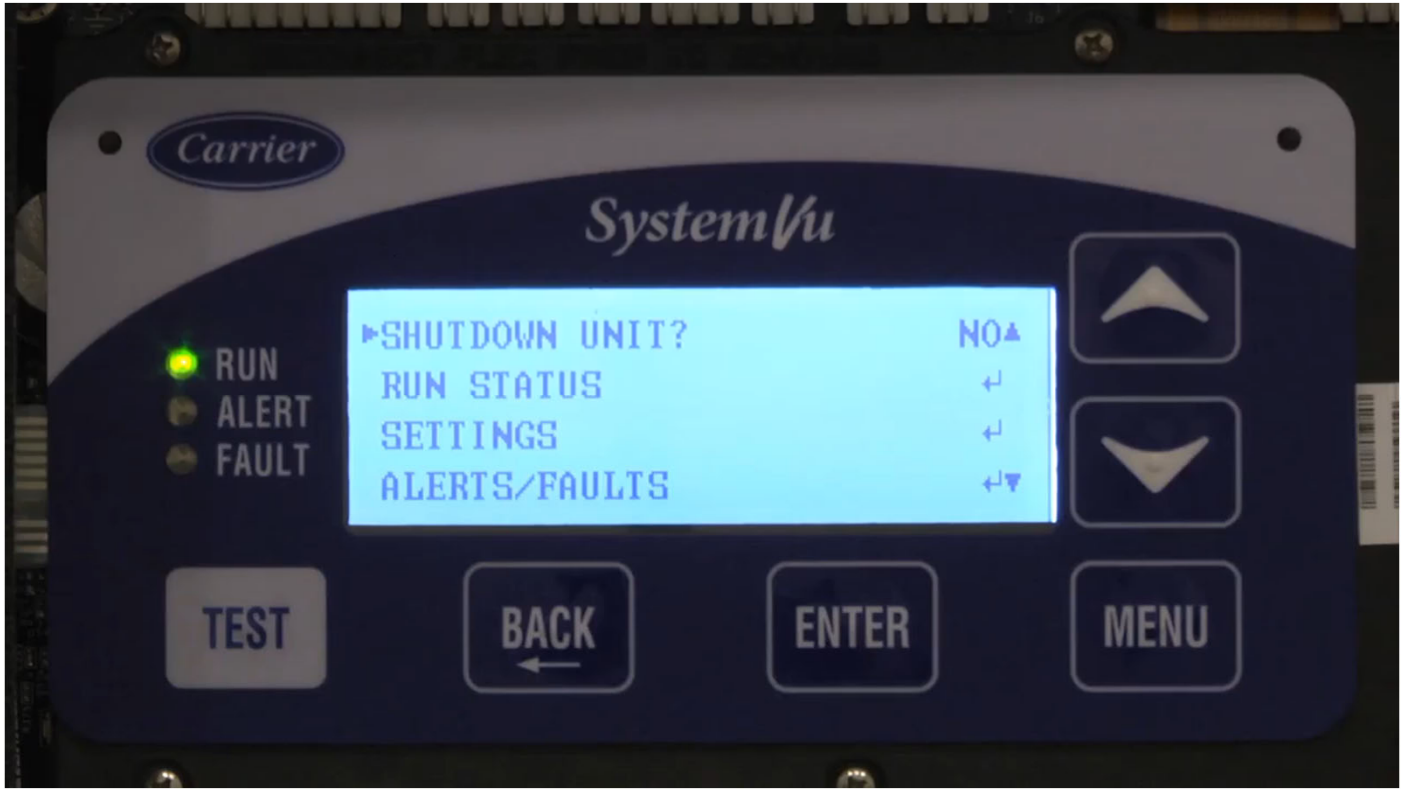
The Unit Control Type configuration, (***UNIT CONTROL TYPE***) default value is for thermostat (0) so there is no need to configure this item.

The Thermostat Hardware Type, (***THERMOSTAT TYPE***) selects the unit response to the thermostat inputs above.

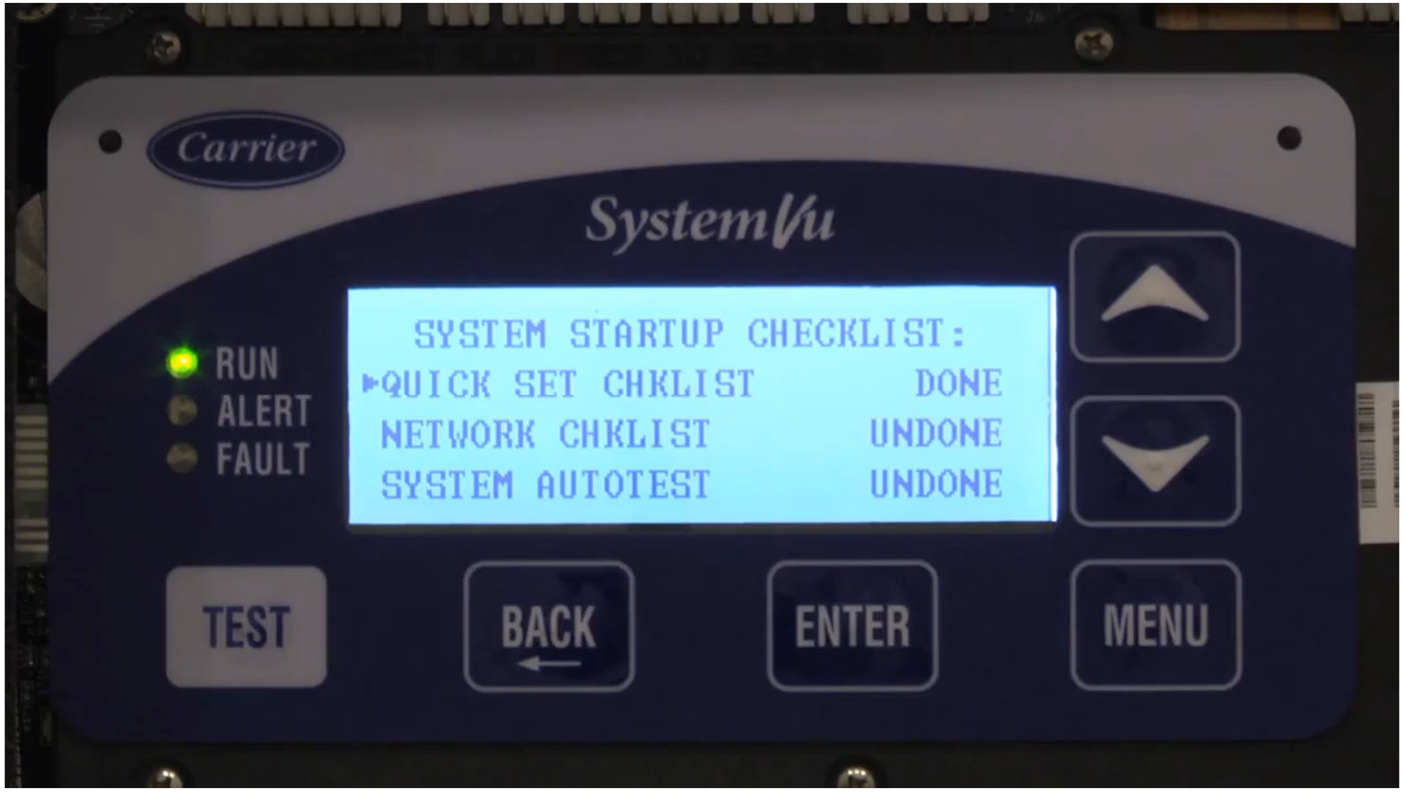
NOTE: May not be compatible with heat anticipator thermostats.



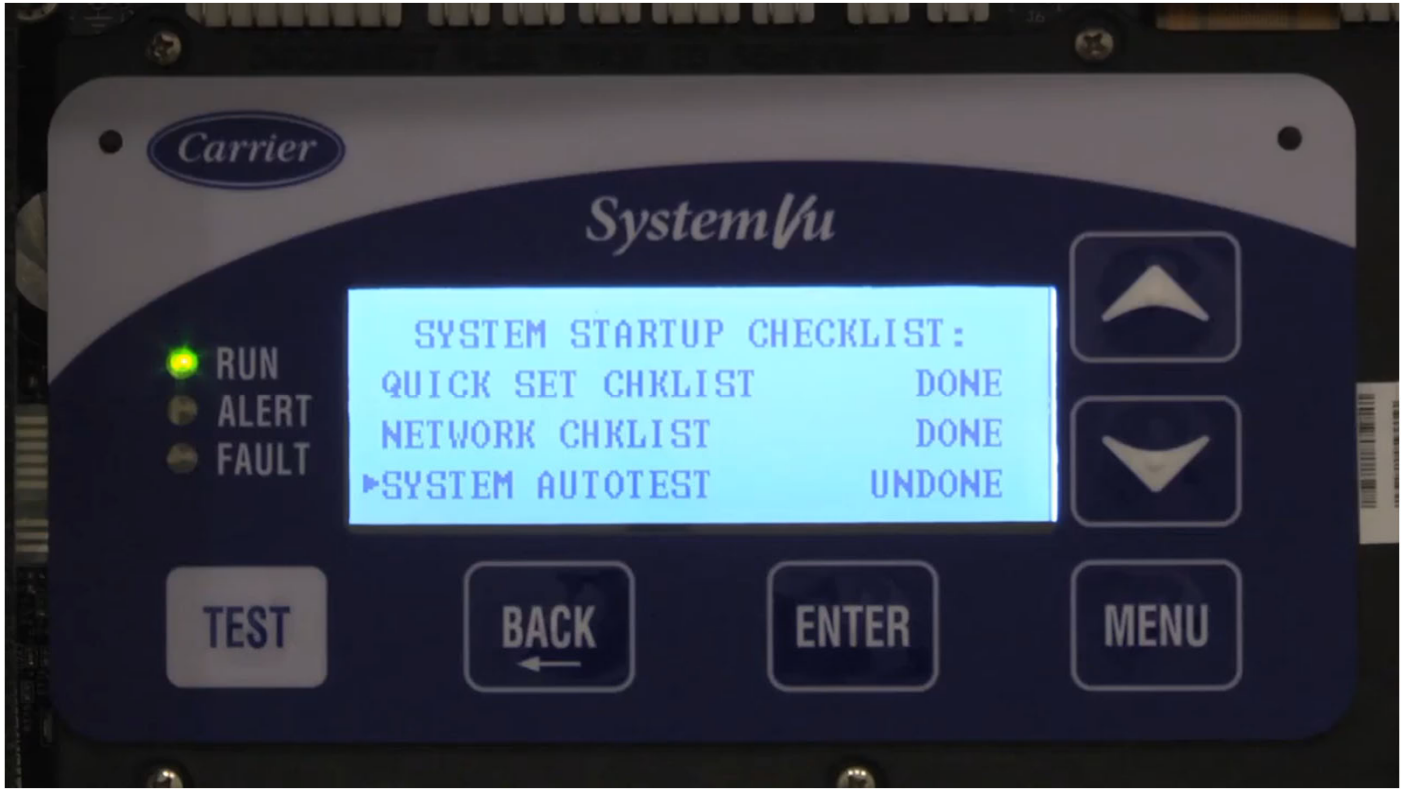
SYSTEM VU CONTROL TYPE



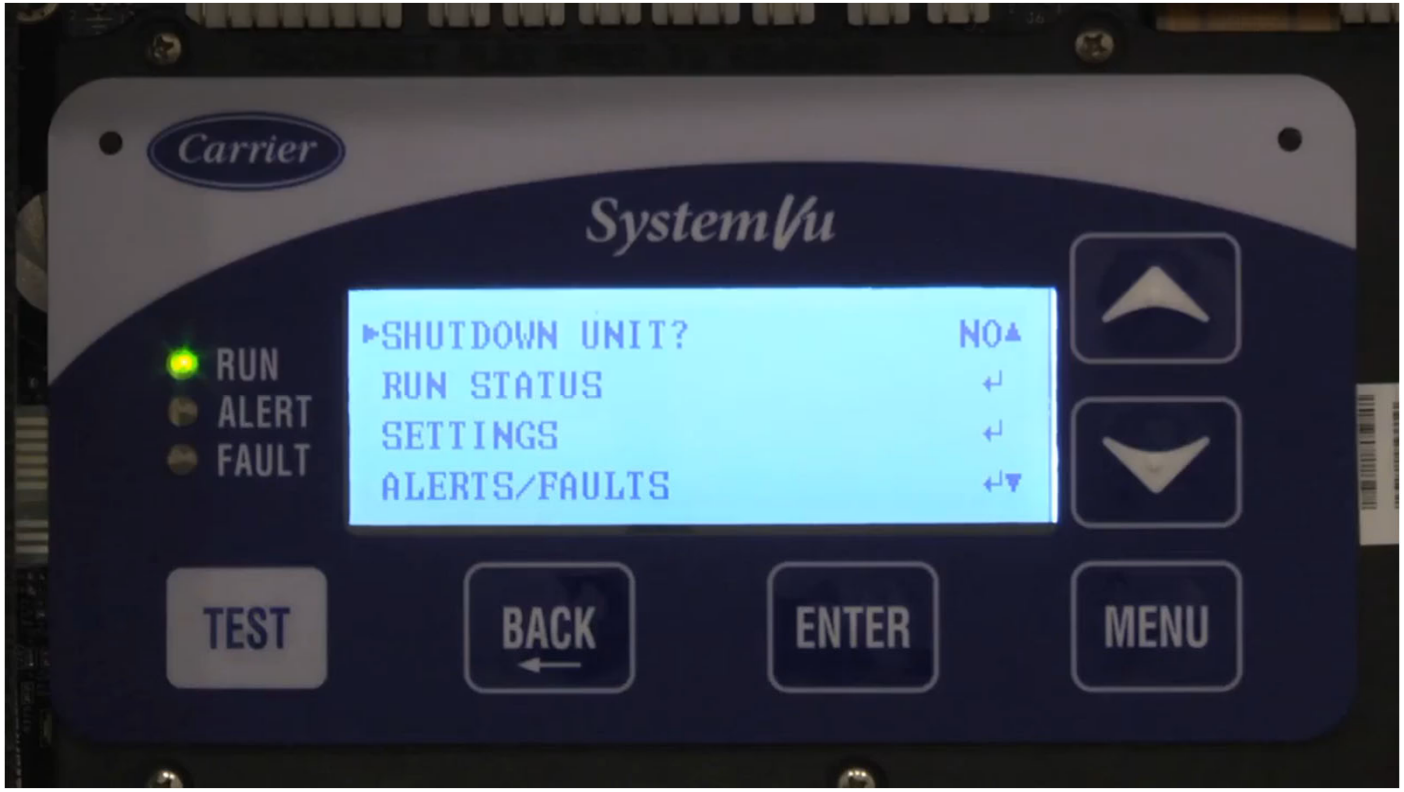
NETWORK CHECKLIST



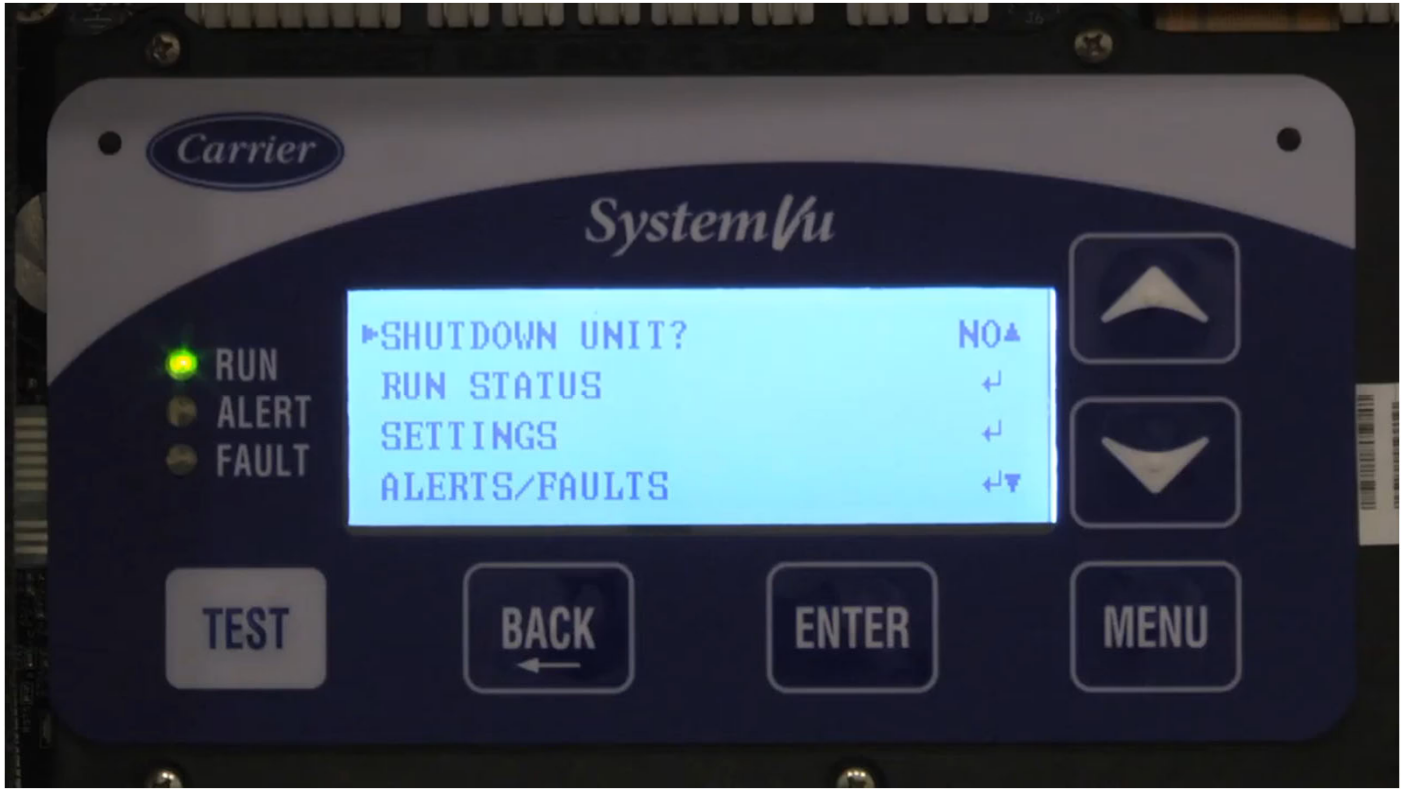
SYSTEM AUTO TEST



SYSTEM VU INDOOR FAN SET-UP

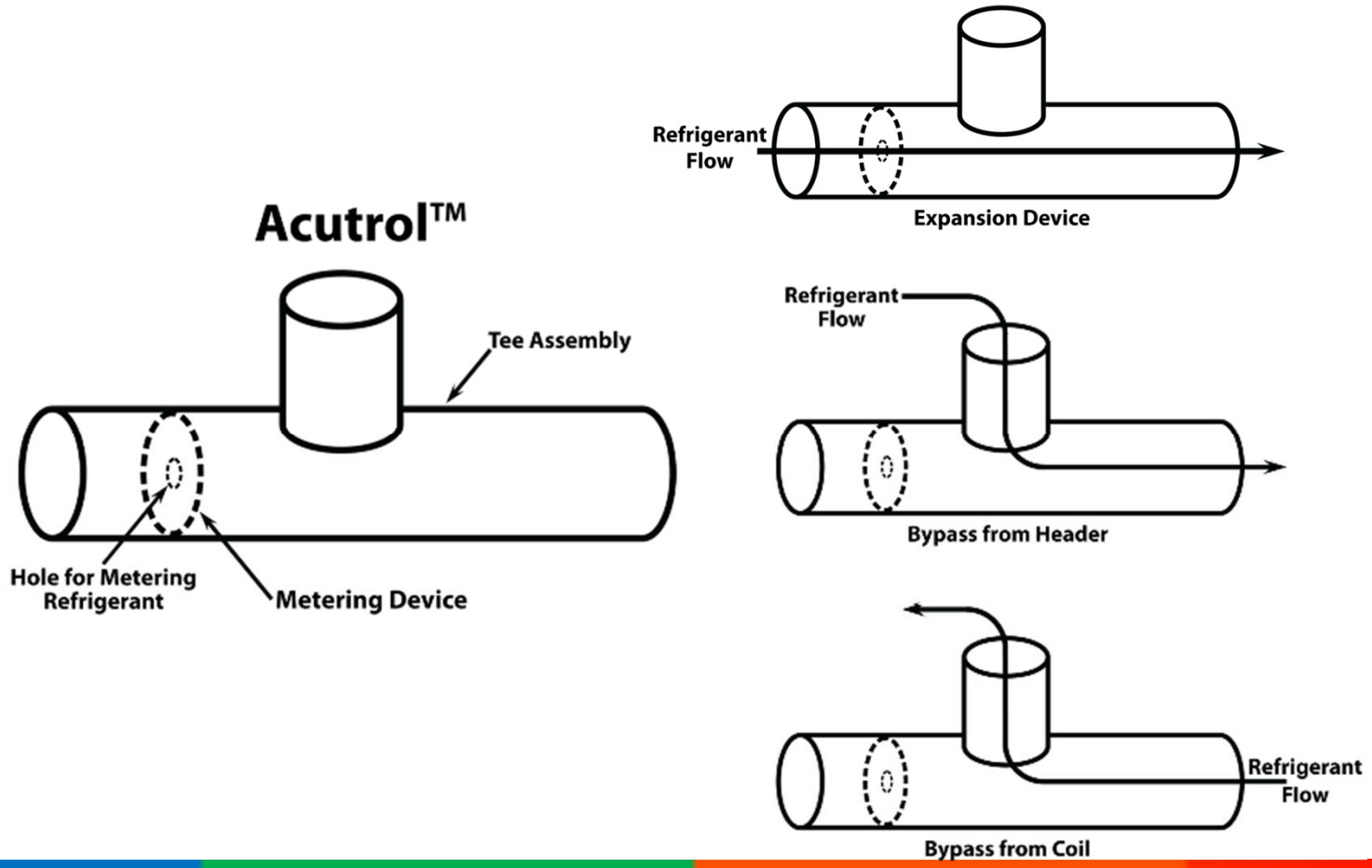


48/50JC SYSTEM VU ECONOMIZER MIN. POS.

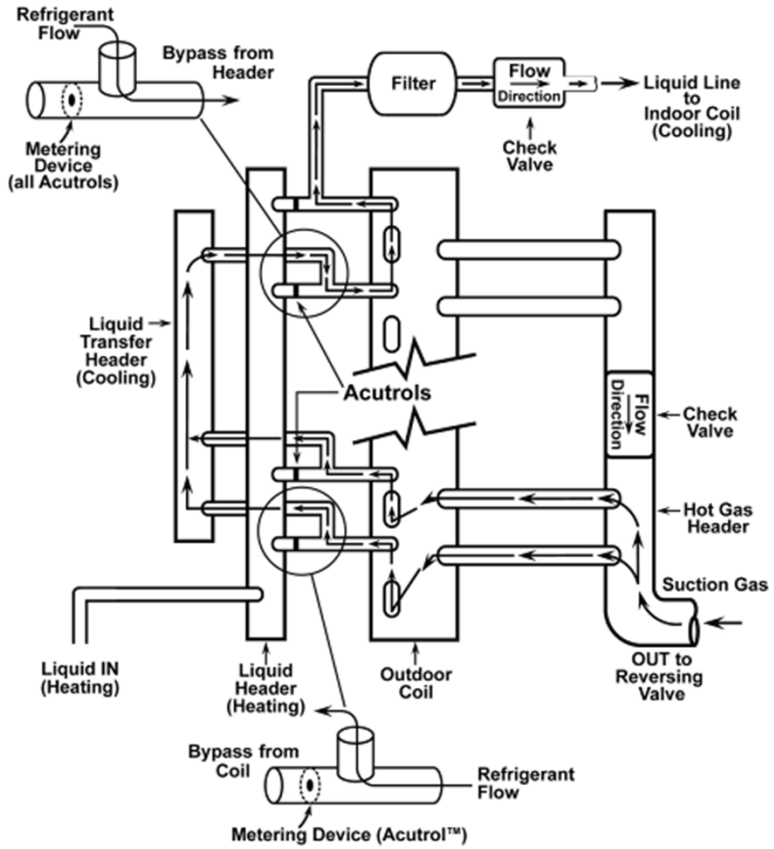


Metering Devices

ACUTROL™ TEE ASSEMBLY

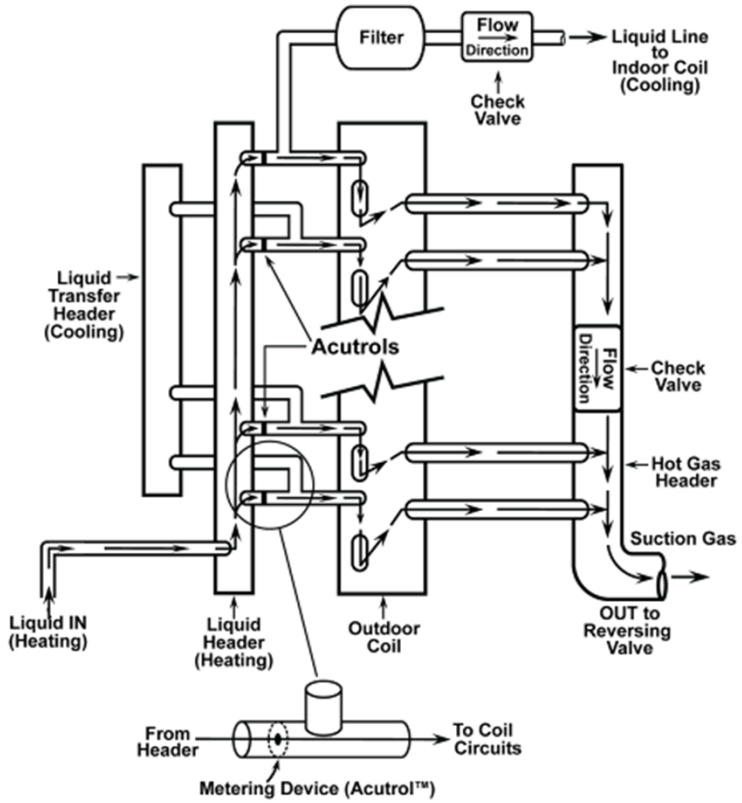


COIL ASSEMBLY – COOLING



COOLING CYCLE
OUTDOOR COIL

COIL ASSEMBLY – HEATING



HEATING CYCLE
OUTDOOR COIL

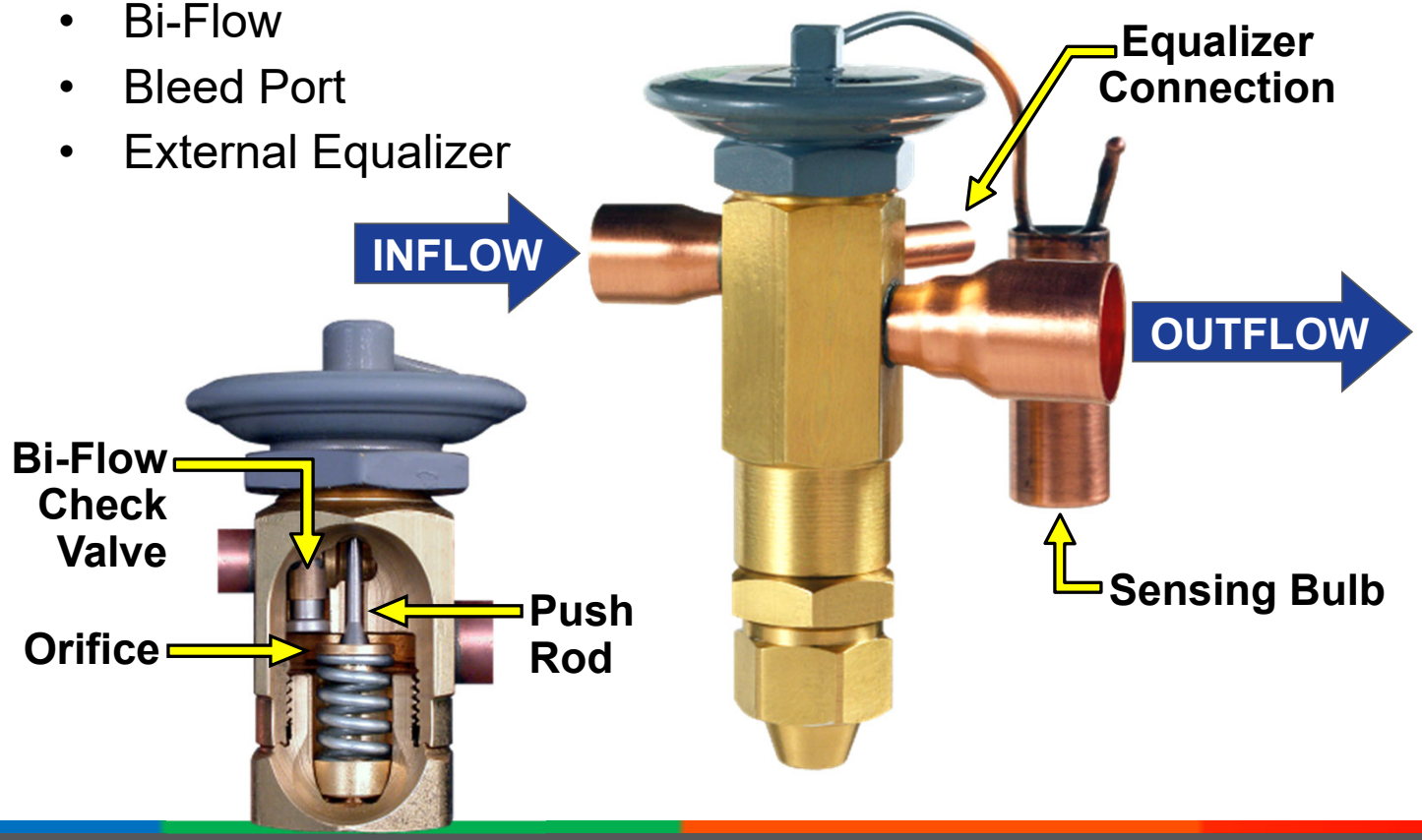
ACUTROL™ TROUBLESHOOTING

- Disable fan motor
- Start unit in desired mode
- Observe coil frosting pattern
- Frosting should develop uniformly
- Non-uniform frosting may indicate a plugged, damaged, or missing orifice

THERMOSTATIC EXPANSION VALVE

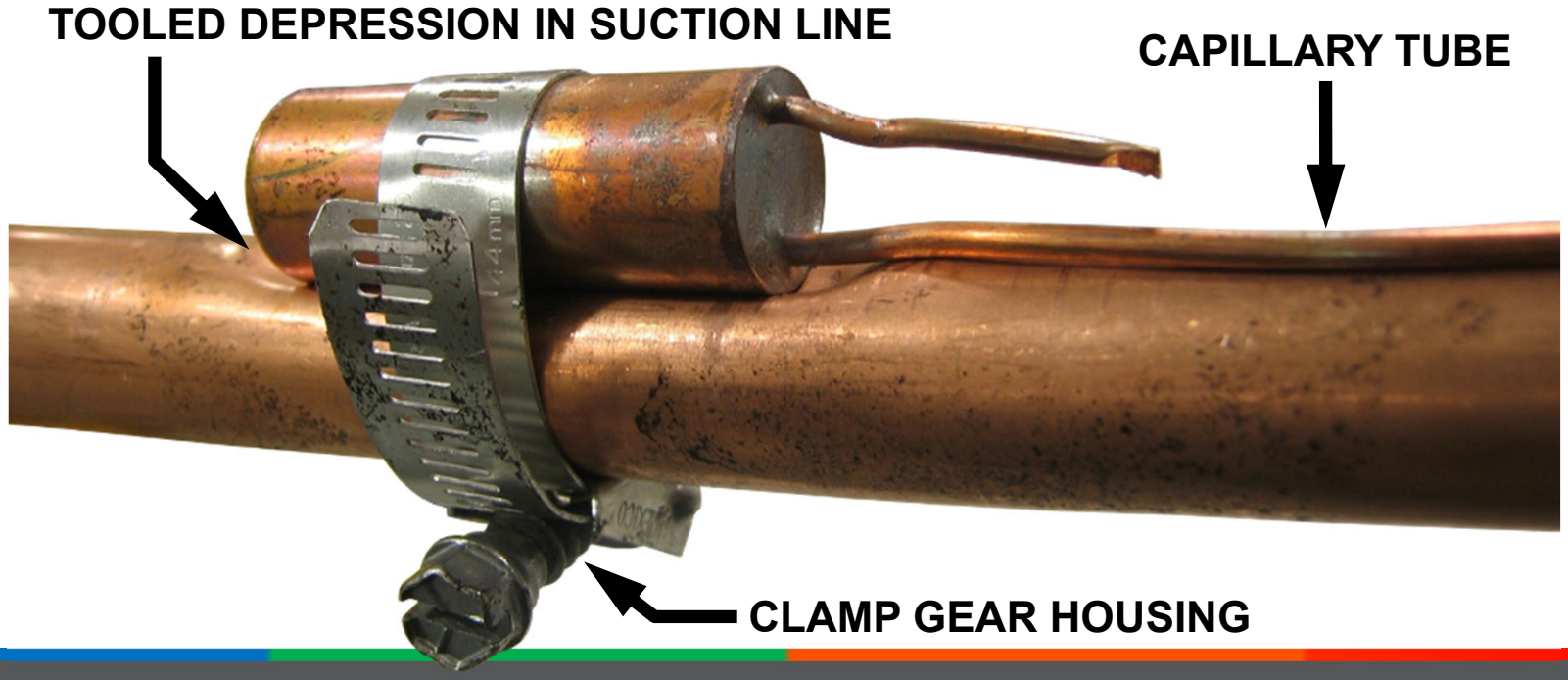
TXV for Ultra-High Efficiency Units:

- Bi-Flow
- Bleed Port
- External Equalizer

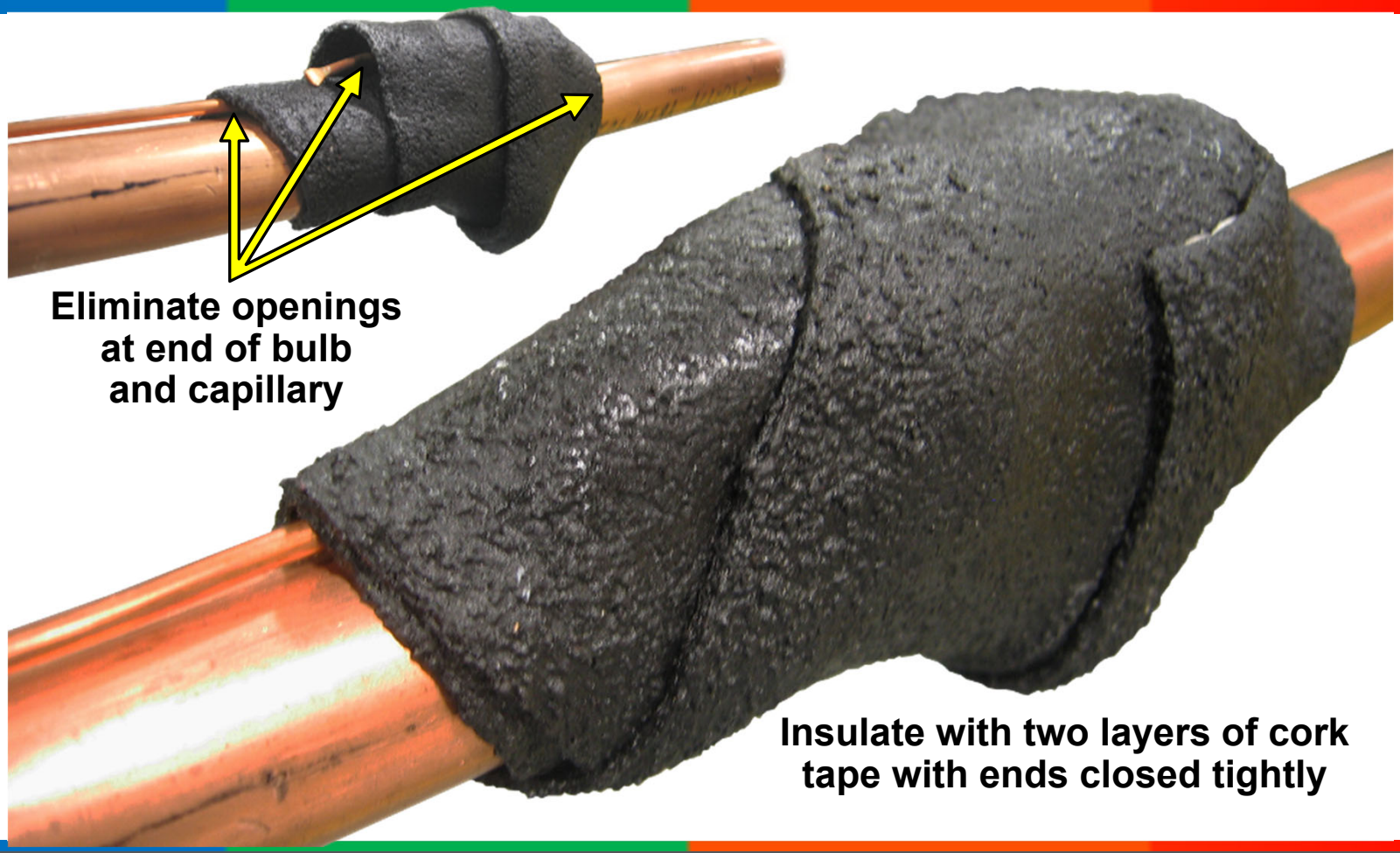


LOCATING THE TXV BULB

- TXV bulb centered axially in suction line tooled depression
- Do not position clamp's gear housing over the bulb radius
- Locate the bulb's capillary against the suction tube

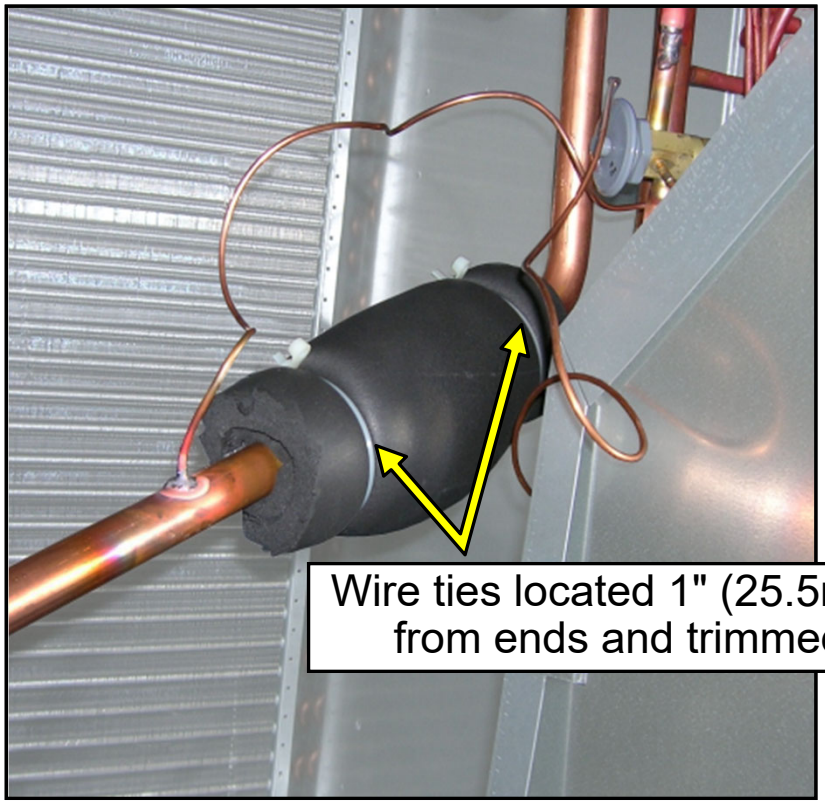


INSULATING THE TXV BULB WITH CORK TAPE



INSULATING THE TXV BULB WITH FOAM RUBBER

- Wrap bulb and cork tape with two layers of foam rubber insulation
- Secure the ends of the foam rubber insulation with two wire ties



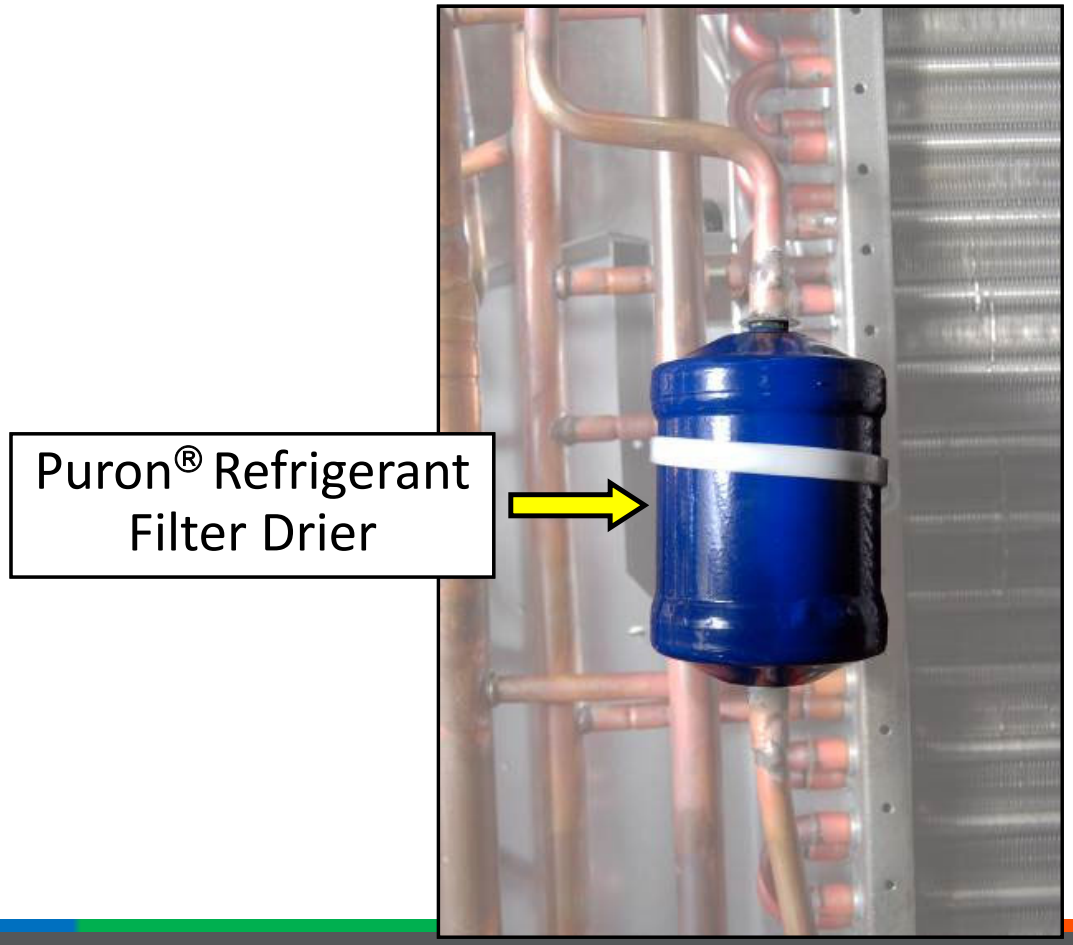
System Repairs

REPLACING SEALED SYSTEM COMPONENTS

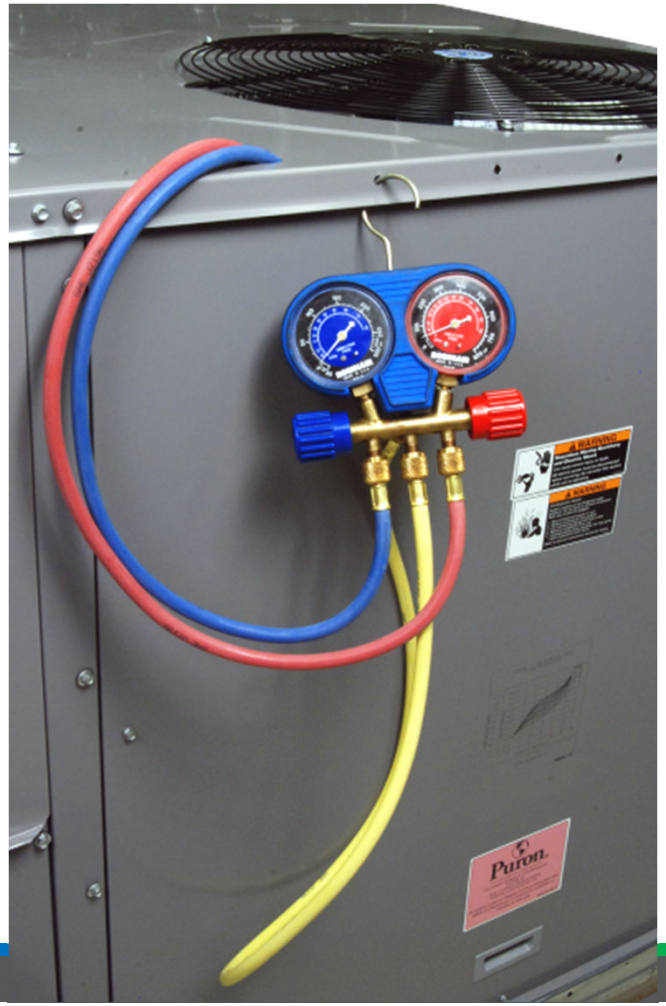
USE ONLY FACTORY SPECIFIED REPLACEMENT PARTS

If other non-specified parts are used, a potential safety hazard may be created.

PURON® REFRIGERANT FILTER DRIER

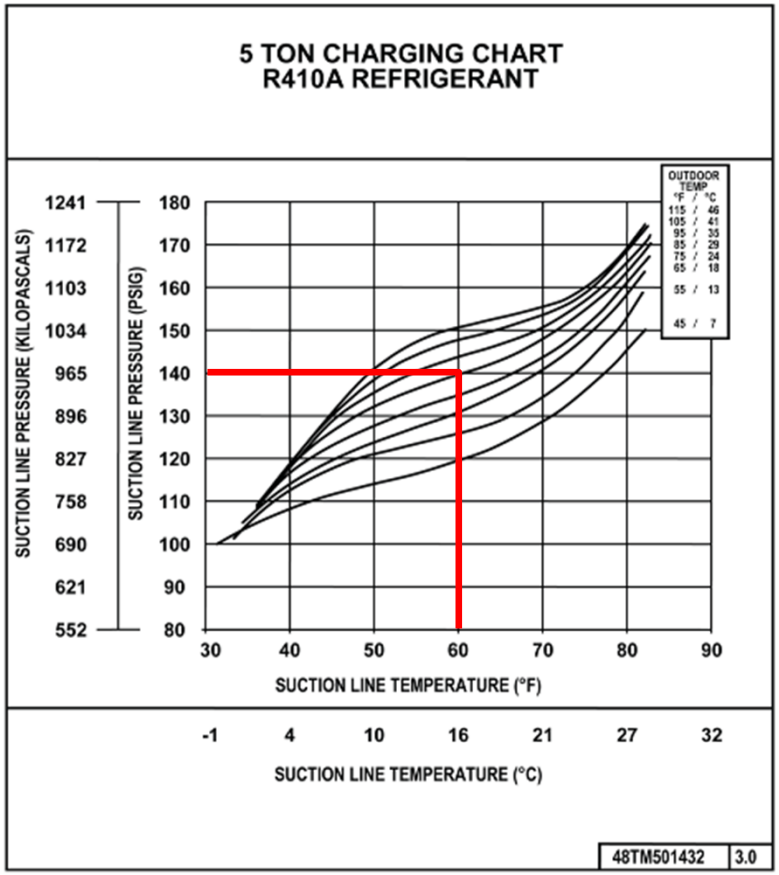


STABILIZE SYSTEM

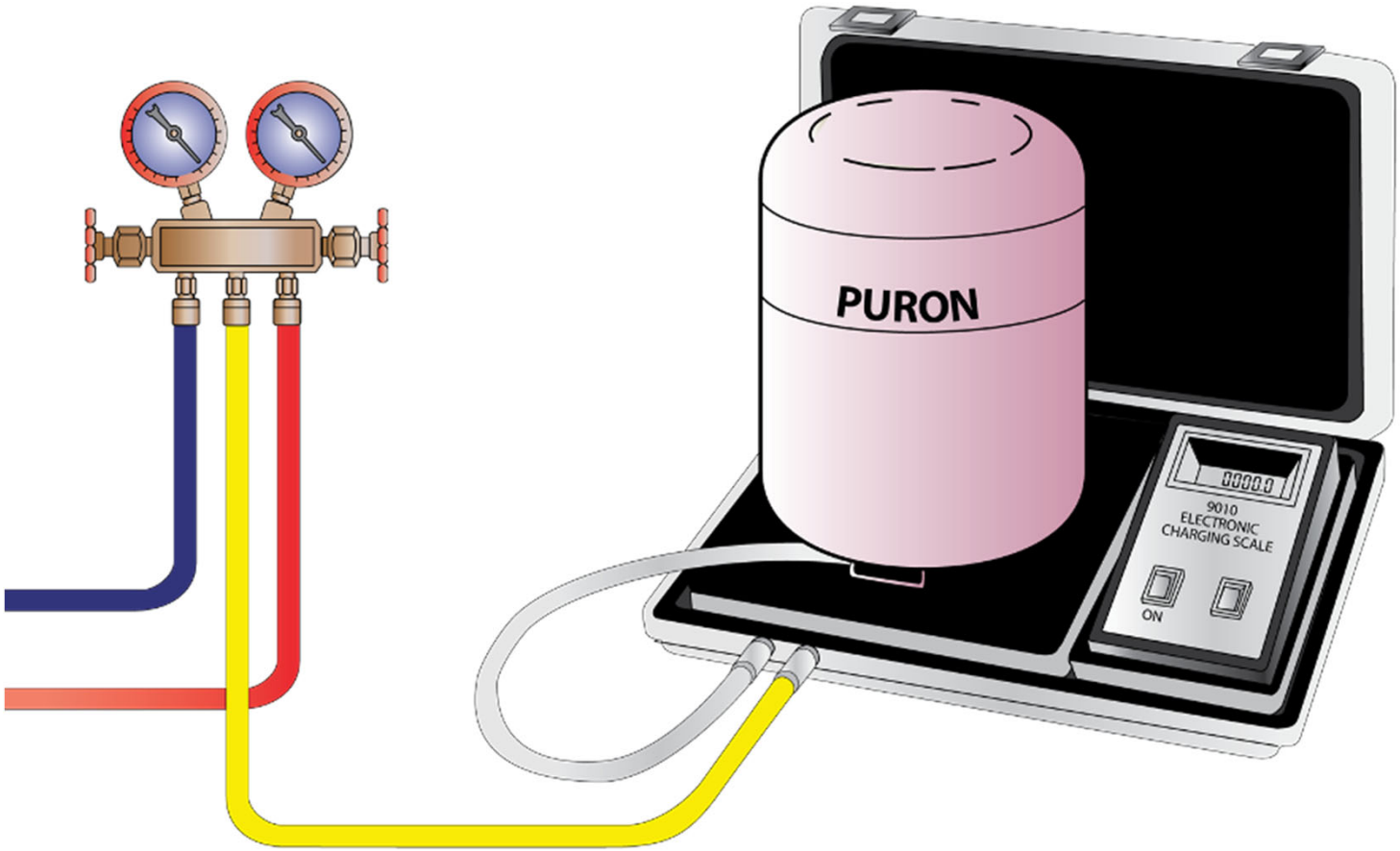


- Use charging charts in COOLING MODE
- Charge conditions to be checked:
  - Outdoor Temperature
  - Suction Pressure
  - Suction Line Temperature (use digital probe thermometer)
- Use accurate gage manifold to check pressures
- Front access panels should be in place for accurate readings
- Route hoses through hole in panel of compressor section
- Allow to operate 15 minutes to stabilize for accurate readings

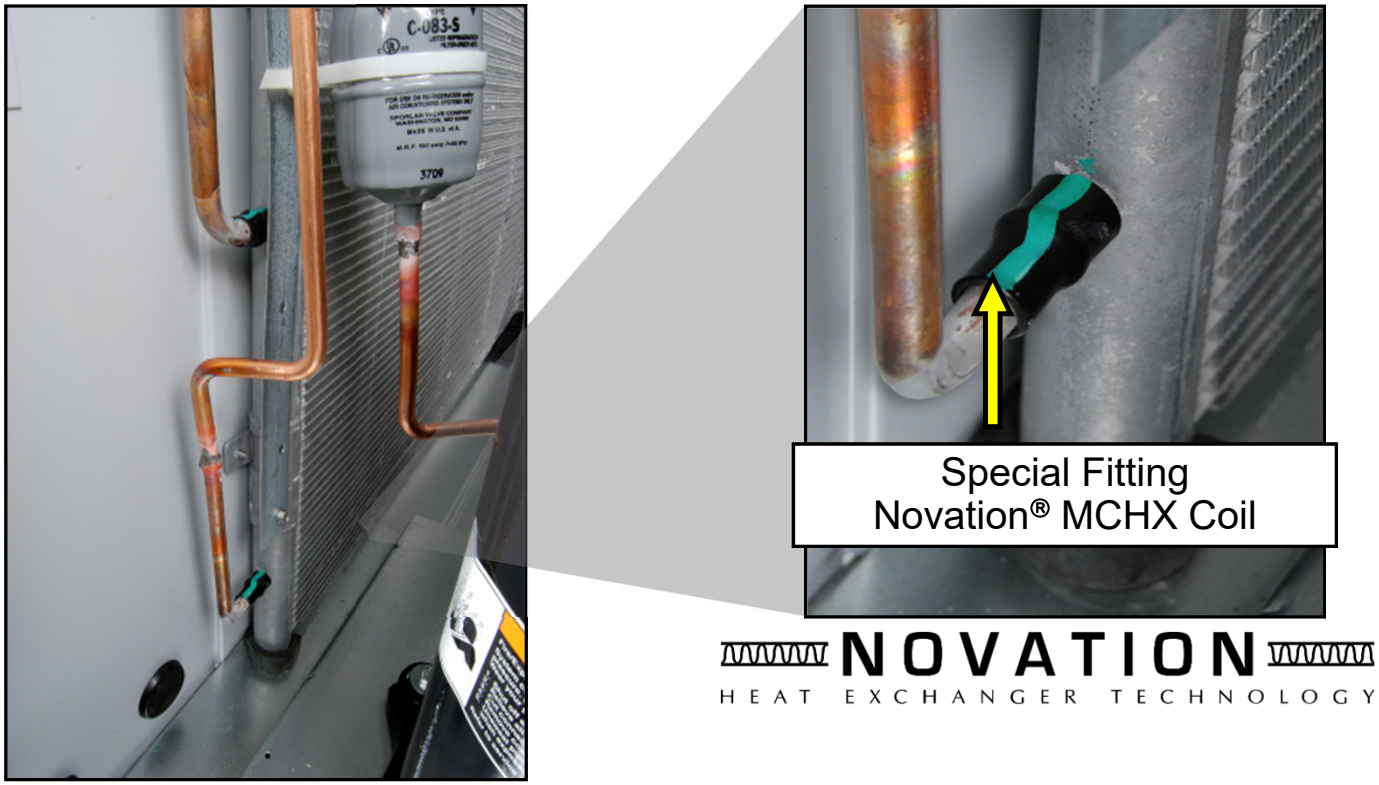
USING THE COOLING CHARGING CHART



WEIGH-IN CHARGE HEAT PUMP HEATING



NOVATION® MCHX CONDENSER COILS



NOVATION™ RCD REPAIR KIT

- 50TJ660007

- Note:
  If refrigerant system is open, then replace liquid line drier

INSTRUCTIONS

Carrier
A United Technologies Company

99TA526347 (for RCD use only)

Instruction Sheet Number: **99TA526347**

Description: MCHX COIL REPAIR PROCEDURE

Author: Engineering

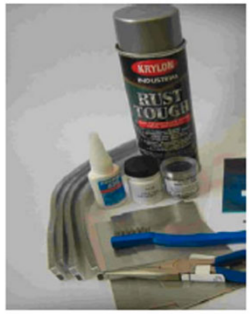
Date: January 15, 2007

[redacted]

DESCRIPTION	PART NUMBER	QTY
Solder wire	30XA680004	1
Non-corrosive Flux	30XA680005	1
Aluminum Air Center	30XA680006	1
Instant Adhesive	30XA680007	1
Heat Shield w/slot	30XA680003	3
Heat Shield w/o slot	30XA680002	3
Long nose pliers	KLE-D314-8	1
Bristle brush	B-4	1
Instructions	99TA526347	1

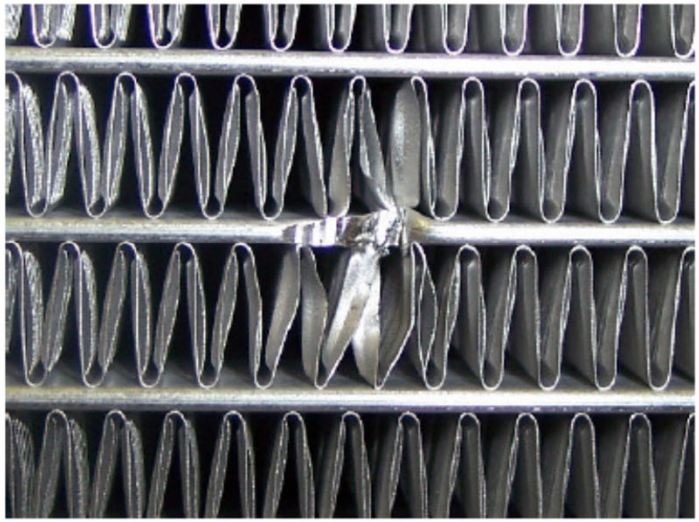
Not included:

Paint	30XA680001
Torch	TUR-0386-1293
MAPP Gas	TUR-0916-0009



REPAIR PROCEDURES

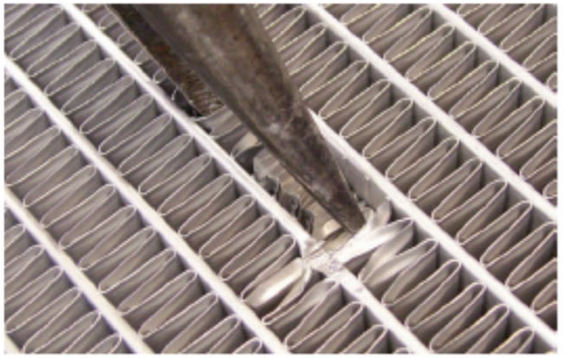
- **Step 1**
  - Locate the damaged area and verify the leak site using standard leak detection practices.
  - Note: The tube construction is capable of withstanding mild impacts as long as the impact is not sharp and does not cut into the tube.

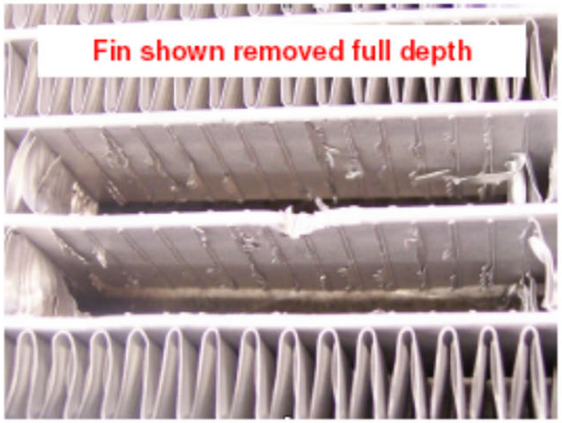


REPAIR PROCEDURES (CONTINUED)

- **Step 2**
  - It is not necessary to remove the fins to repair the coil. In cases where fins must be removed to access the repair area, use the following procedure.
  - Using needle nose pliers, remove the fins above and below the tube needing repair. Remove the fins approximately 1”either side of the repair location.
  - Note: Remove the fin by grabbing them with the long nose pliers and slowly tearing the fin away from the tube.
  - Advice: Remove the fin only to a depth sufficient to make the repair while retaining the best cosmetic appearance when viewing the repair from the opposite side.

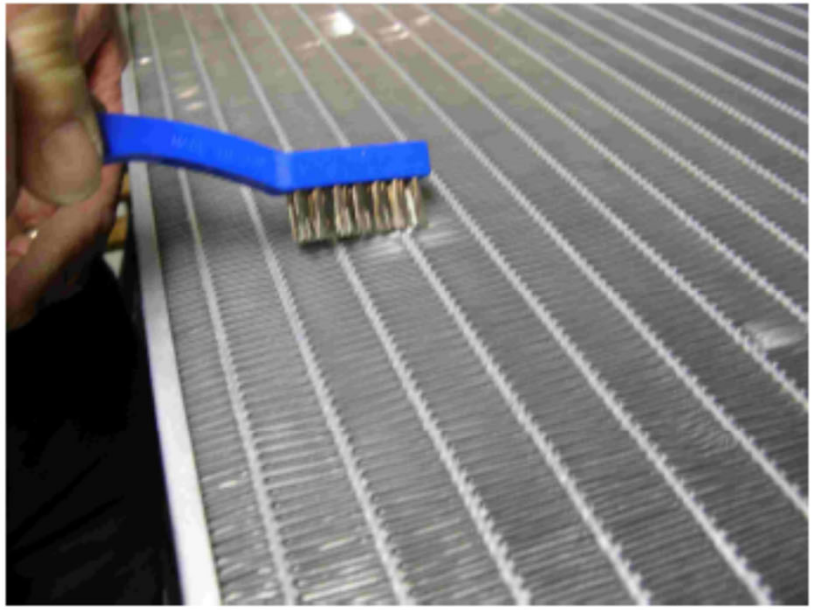
Note: Use caution when working with sharp objects around the refrigerant tubes





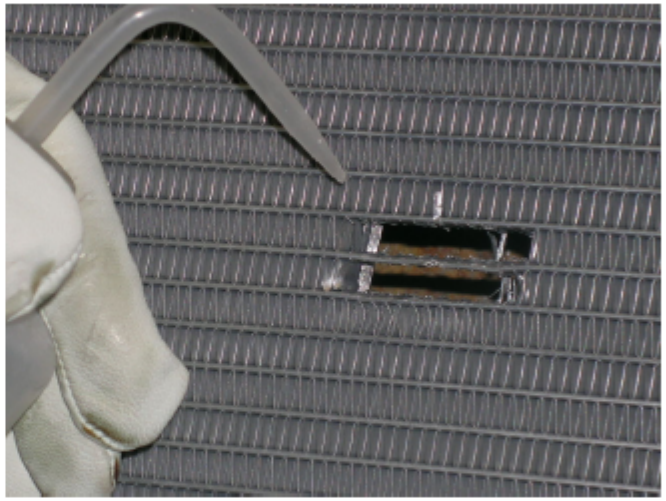
REPAIR PROCEDURES (CONTINUED)

- Step 3
  - Remove all foreign debris around the damaged area with a small stainless bristle brush. Avoid contaminating the damaged area.



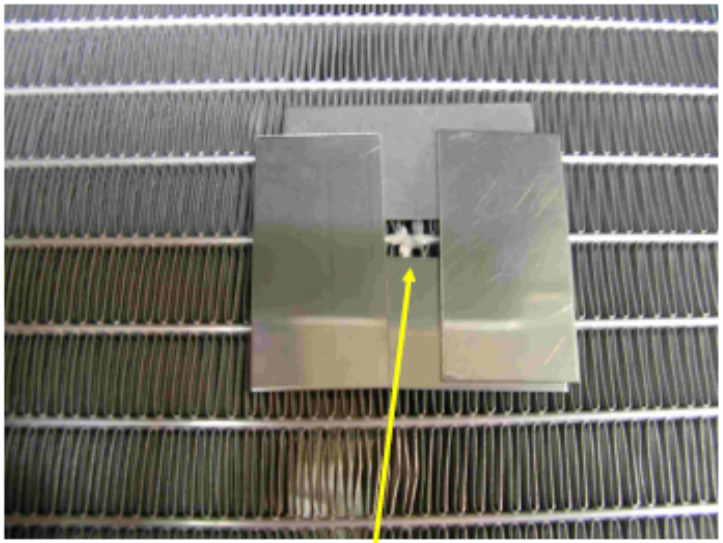
REPAIR PROCEDURES (CONTINUED)

- **Step 4 (Optional)**
  - Step 4 is optional depending on the condition of the coil
  - Thoroughly clean repair area with mild soap and water (dish soap).
  - Thoroughly rinse the area with clean water.
  - Using a MAPP gas torch, carefully evaporate any remaining water
  - Repeat washing, rinse and drying procedure if necessary.
  - Heat from the torch should eliminate all moisture and contaminates.
  - To ensure no moisture remains in the coil, after the repair is complete, place a vacuum on the system to evaporate any remaining moisture.



REPAIR PROCEDURES (CONTINUED)

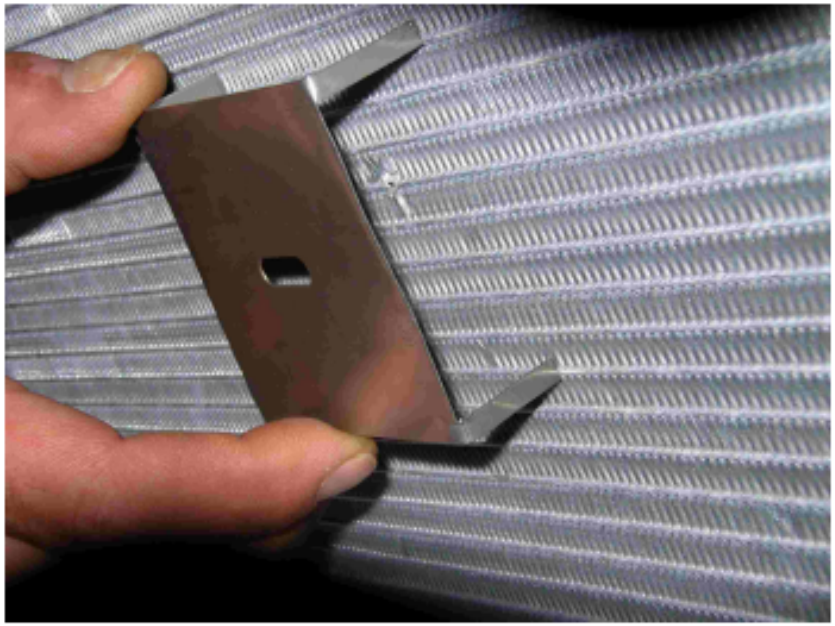
- **Step 5**
  - Place metal mask material (heat shield) around the damaged area to protect adjacent tubes and air centers.



Tube Nose Repair

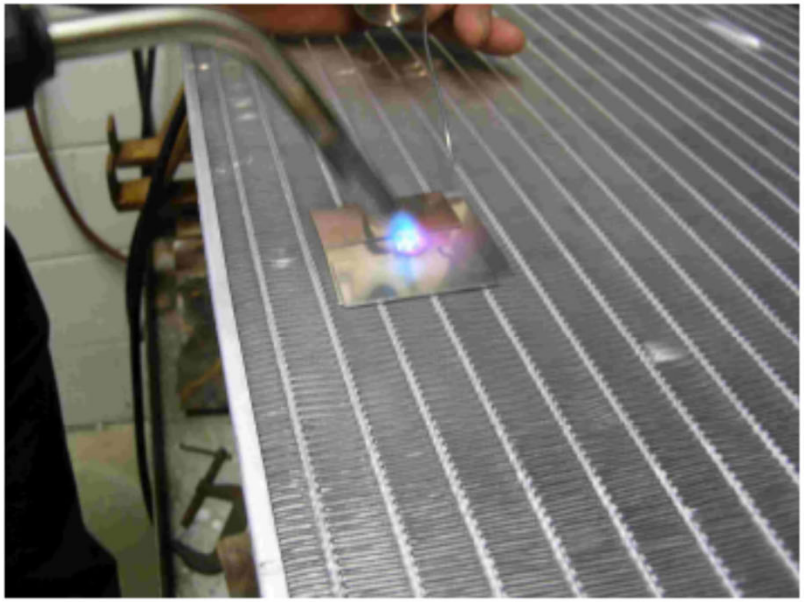
REPAIR PROCEDURES (CONTINUED)

- Step 6
- Repairing an angled coil:
  - Cut tabs into the mask material long enough to extend completely through the core (greater than 1”).
  - Mount the mask on to the core using the tabs to hold in place



REPAIR PROCEDURES (CONTINUED)

- **Step 7**
  - Adjust the torch tip to a neutral or rich carburizing (low oxygen) flame (450°-500°C)
  - Apply heat to the edge of the damaged area.
  - Place the end of the solder wire against the damage and gradually heat the edge of the tube and mask area parallel to the damage until the solder wicks into to the core tube ports.
  - Allow to cool and remove the masks.
  - The core tube walls are very thin, and it's possible to burn through the tube wall if excessive heat is applied.

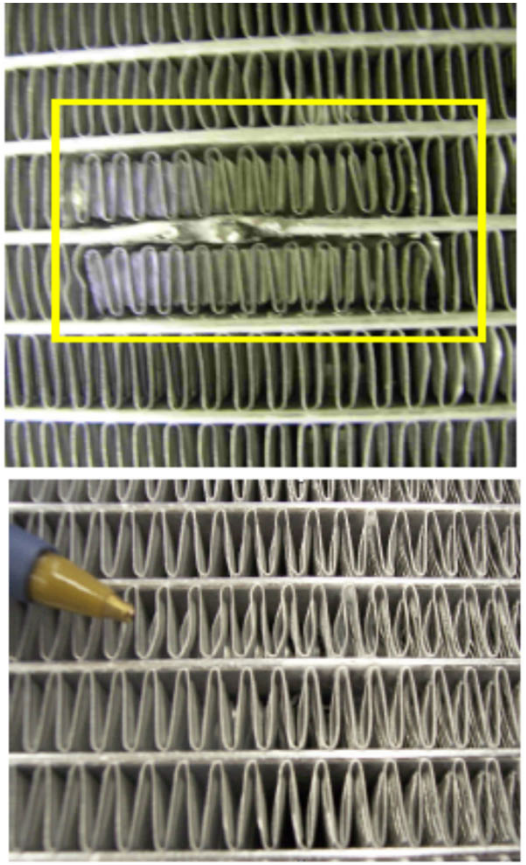


REPAIR PROCEDURES (CONTINUED)

- Step 8
  - Once the repair area has sufficiently cooled, prepare the coil for leak test
  - Complete leak testing the repaired area per established industry standards to ensure repair was successful.

REPAIR PROCEDURES (CONTINUED)

- **Step 9 (Optional)**
  - Replace air center if removed.
  - Using tin snip or shears, cut a portion of replacement air center equal to the length and width previously removed. Apply instant adhesive (LOCTITE 430) to hold the replaced air center in place.
  - Picture 2 shows the core after repair from the reverse side taking advantage of the advice referred to in step #2 above.



SYSTEM BURNOUT

Mild Burnout

Little or no odor

Compressor oil slightly discolored

Acid test is negative

Treated as a mechanical failure

Replace filter drier

Severe Burnout

Strong pungent odor

Compressor oil very dark

Acid test is positive

System will have to be cleaned

SEVERE SYSTEM BURNOUT

- Recover refrigerant
- Replace failed compressor
- Recharge the circuit with fresh oil
- Install suction line filter drier
- Leak check, evacuate, and recharge system
- Operate compressors
- Replace filter drier core
- Perform additional acid tests

System Maintenance

ONE MONTH/THREE MONTH MAINTENANCE

Every Month

Check coils for debris

Check indoor air filter

Every Three Months

Check all refrigerant joints and valves for leaks

Check all fans and motors and clean blower wheel

Check crankcase heater operation

Check indoor air filters

Check indoor coil, drain pan and trap

Check filter drier pressure drop

TWELVE MONTH MAINTENANCE

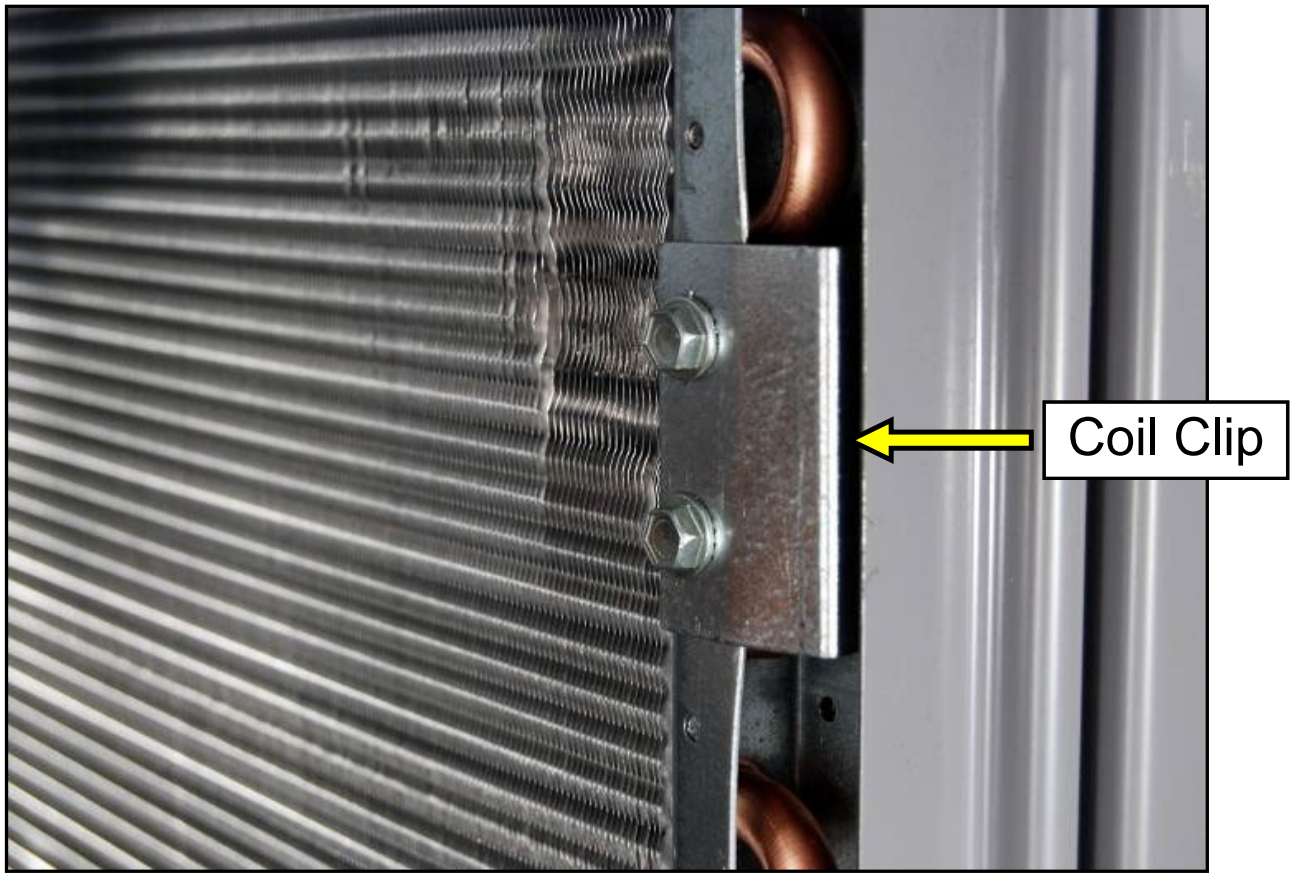
- Check all electrical connections
- Inspect all contractors and relays
- Check condenser fans
- Check refrigerant charge
- Check defrost thermostat (PHP)

CONDENSER COILS

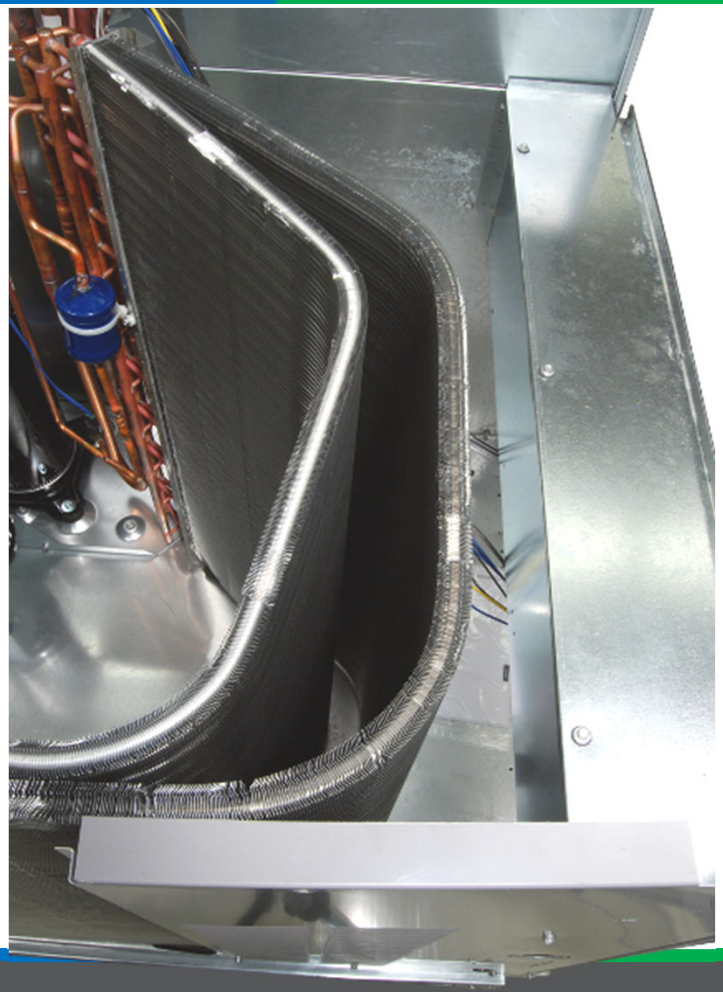
To remove top cover:

- Remove screws along top cover perimeter
- Remove screws securing condenser fan guard to top cover
- Remove condenser fan motor assembly with fan guard
  - Turn it over and lay flat on top cover
- Disconnect three motor leads to control box
- Move cover to gain access to condenser coil

OUTDOOR COIL SECTION



CLEANING COPPER TUBE/ALUMINUM FIN CONDENSER TUBE



- Use vacuum cleaner or soft bristle brush
- Clean fibers before using water rinse
- Rinse coils regularly in coastal locations
- Clean monthly
- Use environmentally sound cleaners
- DO NOT use harmful chemicals
- Clean Novation® MCHX coils with water only

CLEANING NOVATION® MCHX COILS

CLEANING NOVATION® MCHX CONDENSER COILS:

- NEVER use chemicals for coil cleaning
- Remove foreign objects from face of coil
- Purge tank and hose of cleaners
- Saturate coil with water from top to bottom
- Do not exceed 900 psig or a 45° angle
- Reduce pressure and use caution in air centers
- Allow water to drain and check for refrigerant leaks

Note: When reinstalling hail guard, DO NOT install screws into unused holes in top cover (will damage coil)

NOVATION
HEAT EXCHANGER TECHNOLOGY