Carrier 30RC 020-060 Variable Speed Fan Control Installation Guide

Contents

Carrier 30RC 020-060 Variable Speed Fan Control Installation Guide

30RC 020-060,
38RCS 025-050,
38RCD 025-060
Greenspeed® Variable Speed Fan Control

Installation Instructions

Part No: 30RC70004901, 30RC70005001, 30RC70005101, 30RC70005301, 30RC70005401, 30RC70005501, 30RC70005701, 30RC70005801, 30RC70005901

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location.

Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

Untrained personnel can perform basic maintenance functions, such as cleaning coils. All other operations should be performed by trained service personnel. Qualified installers and service technicians are required to have been trained on the following topics when installing and servicing air-conditioning equipment with A2L refrigerant such as R-32:

1. Explosive potential of A2L refrigerants
2. Potential ignition sources
3. Safety measures for unventilated and ventilated rooms or enclosures
4. Refrigerant detectors
5. Concept of sealed components and sealed enclosures according to IEC 60079-15:2010
6. Correct work procedures for the following:
   a. Commissioning
   b. Maintenance
   c. Repair
   d. Decommissioning
   e. Disposal

See Controls and Troubleshooting Guide for complete guidelines.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

1. Follow all safety codes.
2. Keep quenching cloth and fire extinguisher nearby when brazing.
3. Wear safety glasses and work gloves.
4. Use care in handling, rigging, and setting bulky equipment.

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may cause radio interference. It has been tested and found to com ply with the limits of a Class A computing device pursuant to International Standard in North America EN 61000-2/3, which are designed to provide reasonable protection against such interference when operated in a commer cial environment.

⚠ CAUTION

This system uses an A2L refrigerant (R-32) which have higher pressures than R-22 and other refrigerants. No other refrigerant can be used in this system. Failure to use gauge set, hoses, and recovery systems designed to handle refrigerant R-32 may result in equipment damage or personal injury. Refer to Check Refrigerant Circuit section of the 30RC or 38RC chiller installation instructions for guidelines on proper A2L refrigerant handling and equipment used for A2L refrigerant. If unsure about equipment, consult the equipment manufacturer.

⚠ WARNING

This product can expose you to chemicals including lead and lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to **www.P65Warnings.ca.gov**.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been ex posed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be com

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil
e. Carefully un-sweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

GENERAL

This book contains instructions for the installation of the Greenspeed Variable Speed Fan Control.

The Greenspeed accessory uses a single variable frequency drive (VFD) to control the speed of the condenser fans. All fans will operate at the same speed. This can reduce energy usage and noise at off design conditions. The VFD is controlled on the unit LEN bus. The PIC6 controller on the unit monitors all pressure and temperature inputs to determine the most efficient and stable fan speed. Typically the fan speed will increase with high ambient temperature to reduce head pressure. Opposite is true for lower ambient temperatures.

This accessory will also allow the unit to run down to –20°F ambient with the addition of the wind baffle accessory. At low ambient conditions, high winds can have a detrimental effect on head pressure control. The wind baffles prevent wind from blowing across the condenser coil to alleviate this issue.

IMPORTANT: Wind baffles are required for ambient temperatures below 35°F if wind velocity is anticipated to be greater than 5 mph (8 km/h).

Table 1 — Greenspeed® Accessory Usage

PART NO.	MODEL/UNIT SIZES	VOLTAGE
30RC70004901	30RC 020-030	230
30RC70005001	30RC 035-050	
30RC70005101	30RC 055, 060	
30RC70005301	38RC 025,030	380/460
30RC70005401	38RC 035-050	
30RC70005501	38RC 055, 060	
30RC70005701	38RC 025,030	575
30RC70005801	38RC 035-050	
30RC70005901	38RC 055, 060	

Inspect Shipment

Inspect contents of the accessory package before installing. File a claim with the shipping company if there is shipping damage. Contact your local Carrier Representative if any parts are missing. See Table 1 for Greenspeed accessory usage. See Table 2 for VFD Usage and Table 3 for accessory package contents.

Table 2 — VFD Usage

30RC/38RC UNIT SIZE	VOLTAGE	FAN DRIVE PART NO.
020	208/230	HR46ZP007
	380	HR46ZP008
	460	HR46ZP008
	575	HR46ZP003
025	208/230	HR46ZP007
	380	HR46ZP008
	460	HR46ZP008
	575	HR46ZP003
030	208/230	HR46ZP007
	380	HR46ZP008
	460	HR46ZP008
	575	HR46ZP003
035	208/230	HR46ZQ001
	380	HR46ZR001
	460	HR46ZR001
	575	HR46ZQ002
040	208/230	HR46ZQ001
	380	HR46ZR001
	460	HR46ZR001
	575	HR46ZQ002
045	208/230	HR46ZQ001
	380	HR46ZR001
	460	HR46ZR001
	575	HR46ZQ002
050	208/230	HR46ZQ001
	380	HR46ZR001
	460	HR46ZR001
	575	HR46ZQ002
055	208/230	HR46ZS001
	380	HR46ZS005
	460	HR46ZS005
	575	HR46ZR003
060	208/230	HR46ZS001
	380	HR46ZS005
	460	HR46ZS005
	575	HR46ZR003

Table 3 — Accessory Package Contents

ACCESSORY	VOLTAGE	PART NUMBER	QTY	DESCRIPTION
30RC70004901 30RC70005301 30RC70005701 (20-30 Ton)	230/380/460/575	30RCHSCALXCA10	1	LEN Cable
		38AP404952	3	Conduit
		38AP504900	1	Drive Mounting Plate
		38AP504273	1	Drive Enclosure
		38APMACBFG-A00	1	Terminal Block Shroud
		See Table 2.	1	Fan (VFD)
		38APHLSBF1-A00	1	OFM-1 Harness (25-60 Ton)
		38APHLSSF2-A00	1	OFM-2 Harness (40-60 Ton)
		38APHSCSFV-A01	1	Low Ambient Harness (10-15 Ton)
		AL04AU166	4	No. 8, 1/2 in. long Trilobe
		AL01AU168	2	No. 8, 3/4 in. long Trilobe
		HY84DA022	1	3 Pole 600-v Terminal Block
		00PPN500000302A	6	Mounting Hardware - Drive (6 mm)
		AL56ZA003	30	Mounting Hardware - Sheet Metal
		AA06BR200	6	Mounting Hardware - 5/16 x 1
		AU02AB202	6	Mounting Hardware - Washer
		38AP504929	1	Grill
		30-6ASI	1	Instructions
30RC70005001 (35-50 Ton)	230	38AP504954	1	Drive Mounting Plate
		38AP504972	1	Drive Enclosure
		2004592371	1	RH Side Adapter Plate (35-60 Ton Only)
		2004606726	1	LH Side Adapter Plate (35-60 Ton Only)
		2004590453	1	Top Adapter Plate (35-60 Ton Only)
		30RCHSCALXCA30	1	LEN Cable
		38AP404952	3	Conduit
		See Table 2.	1	Fan (VFD)
		38APHLSBF1-A00	1	OFM-1 Harness (40-60 Ton)
		38APHLSSF2-A00	1	OFM-2 Harness (40-60 Ton)
		38APHLSMF3-A00	1	OFM-3 Harness (40-60 Ton)
		38APHSCSFV-A21	1	Greenspeed® Harness (230-v, 35-60 Ton)
		HY10JK040	3	Class J Quick Blow Fuse (40A 600-v)
		JT60060	3	Class J Fuse Holder (35-60A 600-v)
		AL04AU166	4	No. 8, 1/2 in. long Trilobe
		HW60HH006	1	1.00 in. Conduit Clamp
		38APPAAAAA-A00	1	1 in. x 12 in. Varnish Cloth
		AL01AU168	2	No. 8, 3/4 in. long Trilobe
		HY84DA022	1	Terminal Block (3 Pole, 600-v)
		00PPN500000302A	6	Mounting Hardware - Drive (6 mm)
		AL56ZA003	35	Mounting Hardware - Sheet Metal
		AA06BR200	6	Mounting Hardware - 5/16 x 1
		AU02AB202	6	Mounting Hardware - Washer
		38AP504929	1	Grill
		30-6ASI	1	Instructions

ACCESSORY	VOLTAGE	PART NUMBER	QTY	DESCRIPTION
30RC70005401, 30RC70005801 (35-50 Ton)	460/380/575	38AP504954	1	Drive Mounting Plate
		38AP504972	1	Drive Enclosure
		2004592371	1	RH Side Adapter Plate (35-60 Ton Only)
		2004606726	1	LH Side Adapter Plate (35-60 Ton Only)
		2004590453	1	Top Adapter Plate (35-60 Ton Only)
		30RCHSCALXCA30	1	LEN Cable
		38AP404952	3	Conduit
		See Table 2.	1	Fan (VFD)
		38APHLSBF1-A00	1	OFM-1 Harness (40-60 Ton)
		38APHLSSF2-A00	1	OFM-2 Harness (40-60 Ton)
		38APHLSMF3-A00	1	OFM-3 Harness (40-60 Ton)
		38APHSCSFV-A11	1	Greenspeed® Harness (35-60 Ton)
		HY10JK025	3	Class J Quick Blow Fuse 25A 600-v
		JT60030	3	1-30A 600-v Class J Fuse Holder
		AL04AU166	4	No. 8, 1/2 in. long Trilobe
		HW60HH006	1	1.00 in. Conduit Clamp
		38APPAAAAA-A00	1	1 in. x 12 in. Varnish Cloth
		AL01AU168	2	No. 8, 3/4 in. long Trilobe
		HY84DA022	1	Terminal Block (3 Pole 600-v)
		00PPN500000302A	6	Mounting Hardware - Drive (6 mm)
		AL56ZA003	35	Mounting Hardware - Sheet Metal
		AA06BR200	6	Mounting Hardware - 5/16 x 1
		AU02AB202	6	Mounting Hardware - Washer
		38AP504929	1	Grill
		30-6ASI	1	Instructions

30RC70005101 (55-60 Ton)	230	38AP504954	1	Drive Mounting Plate
		38AP504972	1	Drive Enclosure
		2004592371	1	RH Side Adapter Plate (35-60 Only)
		2004606726	1	LH Side Adapter Plate (35-60 Only)
		2004590453	1	Top Adapter Plate (35-60 Only)
		30RCHSCALXCA30	1	LEN Cable
		38AP404952	3	Conduit
		38APHLSBF1-A00	1	OFM-1 Harness (40-60 Ton)
		38APHLSSF2-A00	1	OFM-2 Harness (40-60 Ton)
		38APHLSMF3-A00	1	OFM-3 Harness (40-60 Ton)
		38APHLSMF4-A00	1	OFM-4 Harness (40-60 Ton)
		38APHSCSFV-A21	1	Greenspeed® Harness (230-v, 35-60 Ton)
		HY10JK040	3	Class J Quick Blow Fuse (40A, 600-v)
		JT60060	3	Class J Fuse Holder (35-60A, 600-v)
		AL04AU166	4	No. 8, 1/2 in. long Trilobe
		HW60HH006	1	1.00 in. Conduit Clamp
		38APPAAAAA-A00	1	1 in. x 12 in. Varnish Cloth
		AL01AU168	2	No. 8, 3/4 in. long Trilobe
		HY84DA022	1	Terminal Block (3 Pole 600-v)
		00PPN500000302A	6	Mounting Hardware - Drive (6 mm)
		AL56ZA003	35	Mounting Hardware - Sheet Metal
		AA06BR200	6	Mounting Hardware - 5/16 x 1
		AU02AB202	6	Mounting Hardware - Washer
		38AP504929	1	Grill
		30-6ASI	1	Instructions

ACCESSORY	VOLTAGE	PART NUMBER	QTY	DESCRIPTION
30RC70005501, 30RC70005901 (55-60 Ton)	460/380/575	38AP504954	1	Drive Mounting Plate
		38AP504972	1	Drive Enclosure
		2004592371	1	RH Side Adapter Plate (35-60 Only)
		2004606726	1	LH Side Adapter Plate (35-60 Only)
		2004590453	1	Top Adapter Plate (35-60 Only)
		30RCHSCALXCA30	1	LEN Cable
		38AP404952	3	Conduit
		38APHLSBF1-A00	1	OFM-1 Harness (40-60 Ton)
		38APHLSSF2-A00	1	OFM-2 Harness (40-60 Ton)
		38APHLSMF3-A00	1	OFM-3 Harness (40-60 Ton)
		38APHLSMF4-A00	1	OFM-4 Harness (40-60 Ton)
		38APHSCSFV-A11	1	Greenspeed® Harness (35-60 Ton)
		HY10JK025	3	Class J Quick Blow Fuse (25A, 600-v)
		JT60030	3	Class J Fuse Holder (1-30A, 600-v)
		AL04AU166	4	No. 8 1/2 in. long Trilobe
		HW60HH006	1	1.00 in. Conduit Clamp
		38APPAAAAA-A00	1	1 in. x 12 in. Varnish Cloth
		AL01AU168	2	No. 8 3/4 in. long Trilobe
		HY84DA022	1	3 Pole 600-v Terminal Block
		00PPN500000302A	6	Mounting Hardware - Drive (6 mm)
		AL56ZA003	35	Mounting Hardware - Sheet Metal
		AA06BR200	6	Mounting Hardware - 5/16 x 1
		AU02AB202	6	Mounting Hardware - Washer
		38AP504929	1	Grill
		30-6ASI	1	Instructions

INSTALLATION

Step 1 — Install Wind Baffle Accessory Kit

If the chiller is expected to run in ambient temperatures below 35°F and winds above 5 mph are expected, a wind baffle accessory kit is required. See below for part numbers that require the wind baffle accessory kit.

- 30RA-900—065 (sizes 020, 035, 040)
- 30RA-900—066 (sizes 020, 030, 045-060)

NOTE: Unit sizes 035-060 require two kits.

Step 2 — Mount the VFD

Verify the drive nameplate rating versus the unit nameplate rating for correct voltage range. Check the VFD part number from Table 2.

Remove panel on side of unit where VFD will be mounted. This panel can be discarded. See Fig. 1.

Mount VFD to VFD mounting bracket using 6 mm thread form ing screw. Attach drive enclosure to mounting plate using sheet metal screw. See Fig. 2.

Connect 3 conduit assemblies to the 3 holes on the side of the en closure. Conduit nut should be on the inside of the enclosure, to wards the VFD, and conduit should be outside of the enclosure.

Place drive inside unit enclosure and mount to unit base. Use 5/16 x 1 screws for VFD mounting plate and sheet metal screw for enclosure. On most units the VFD assembly can be rotated to fit through the VFD opening in the unit side panel. On some of the smaller units where internal piping may interfere with this proce- dure, the side panel of the unit should be removed. If removing the side panel, brace the weight of the control panel to prevent dam age to the center post of the unit. The VFD assembly enclosure will be flush with side panel on 20-30 ton units after mounting. On 35-60 ton units, the enclosure will mount with a 1 in. gap between the enclosure and the side panel.

⚠ CAUTION

Internal refrigerant tubing is under high pressure. Do not damage piping while mounting VFD assembly. Serious injury may occur.

20-30 TON UNITS

Fasten drive enclosure to unit side panel using sheet metal screws.

35-60 TON UNITS

Use spacer brackets to mount VFD assembly to unit side panel. Attach with sheet metal screws. See Fig. 3.

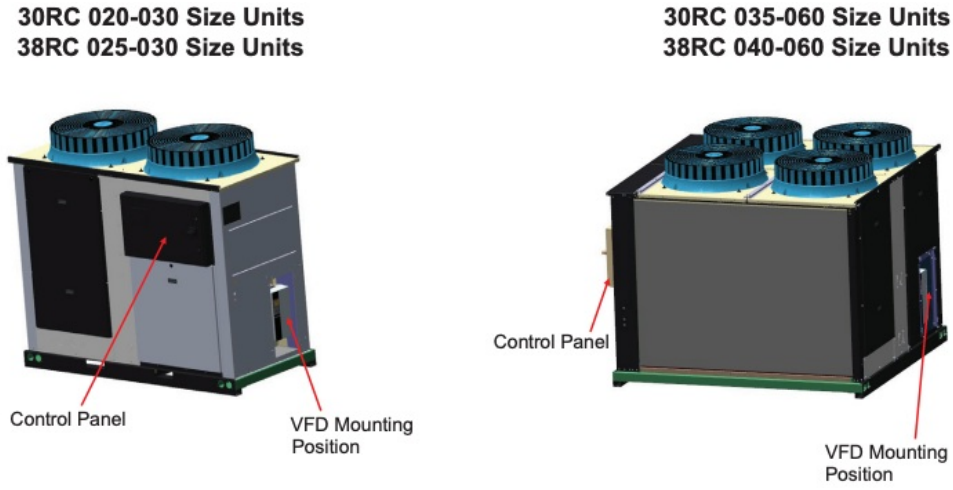


Fig. 1 — Drive Mounting Location

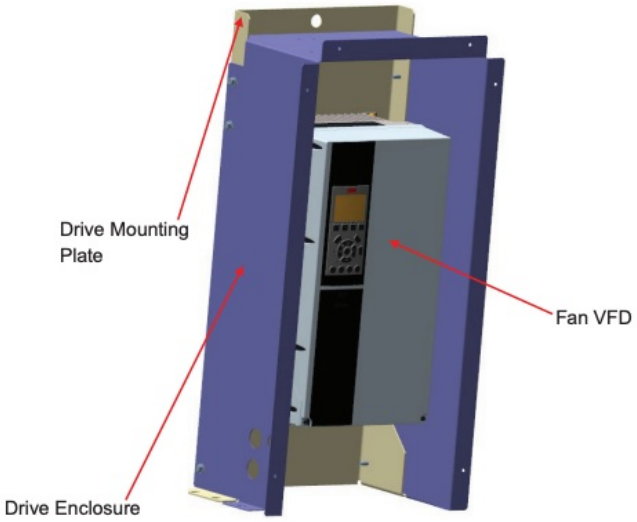


Fig. 2 — Drive to Enclosure Assembly

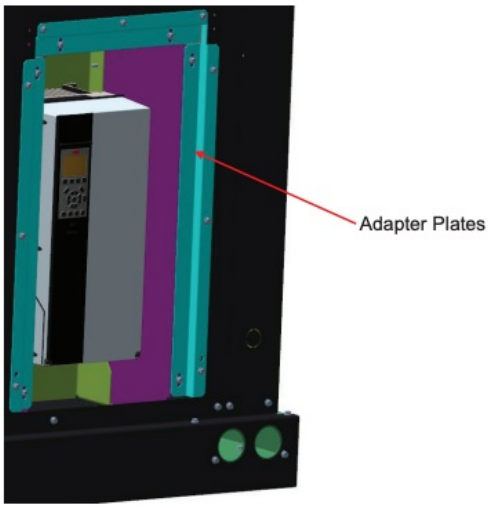


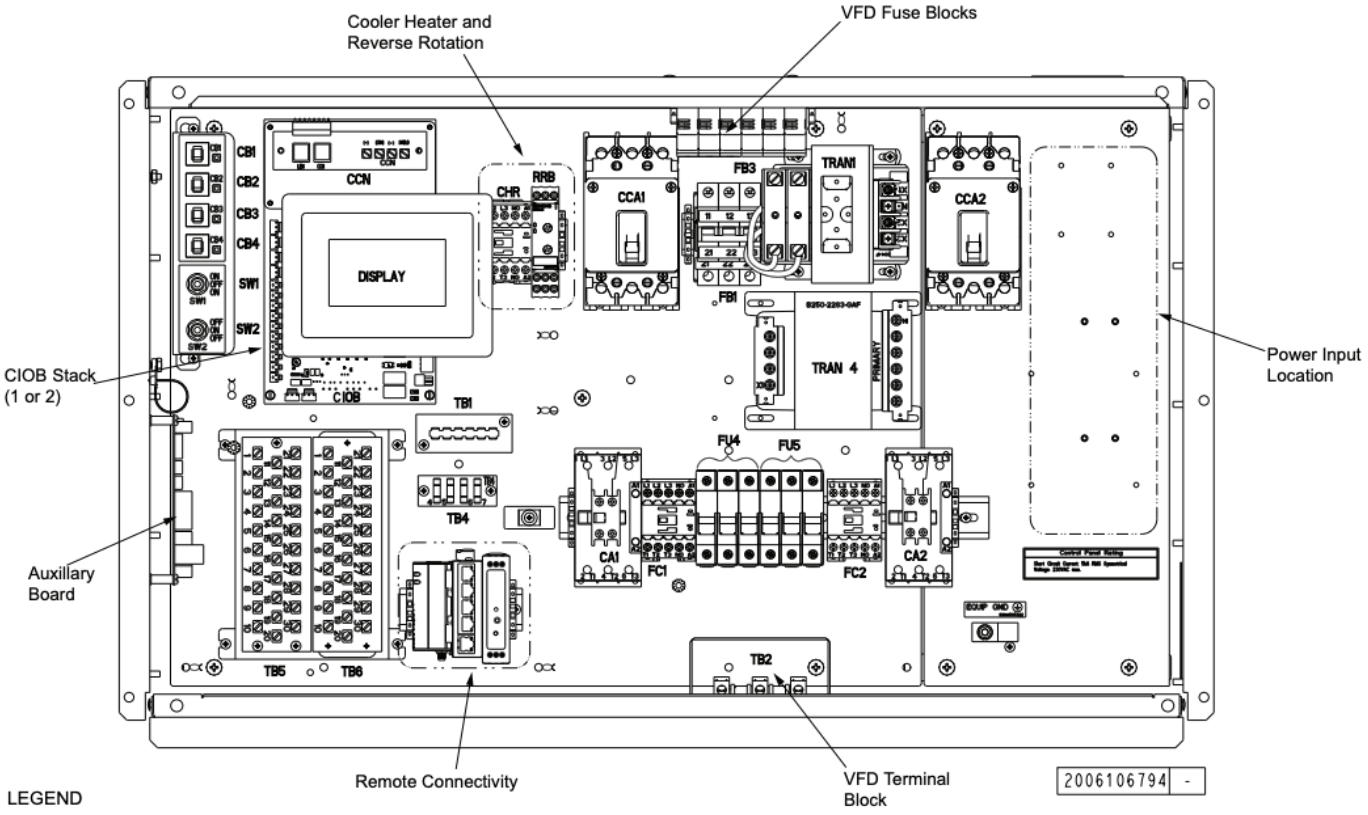
Fig. 3 — VFD Assembly to Unit Side Panel (35-60 Ton)

Step 3 — Control Panel Wiring

1. Mount fuse block, terminal block, and terminal block cover per panel layout. See Fig. 4 and 5. Wiring for 20-30 ton units will require fuse blocks and fuses that already exist in the panel. Fan contactors may be removed if more panel space is needed. If contactors are removed, remove any power wires attached to them. Control wires may be cut and terminated to assure they cannot ground to panel.
2. Replace fan motor cables with cables supplied. Connect con trol box end to VFD terminal block installed in “Mount the VFD” on page 6. See Fig. 6 for identification of fan motor designations. Use wire ties to secure fan wire routing. At fan motor, ensure a drip loop is created when routing the wire to the motor. See Fig. 7.
3. Install Greenspeed harness between control panel and VFD. This consists of two cables. One cable takes power from the
4. Install communication cable (LEN) between control panel and VFD. Connect per markings on the harness. Ground the shield at the VFD. Do not ground it in the control panel. Do not run communication cable with power wires to the VFD. This could cause interference with the communication signal.
5. Install fuses into fuse block. See Table 4.

Table 4 — Fuse Replacement

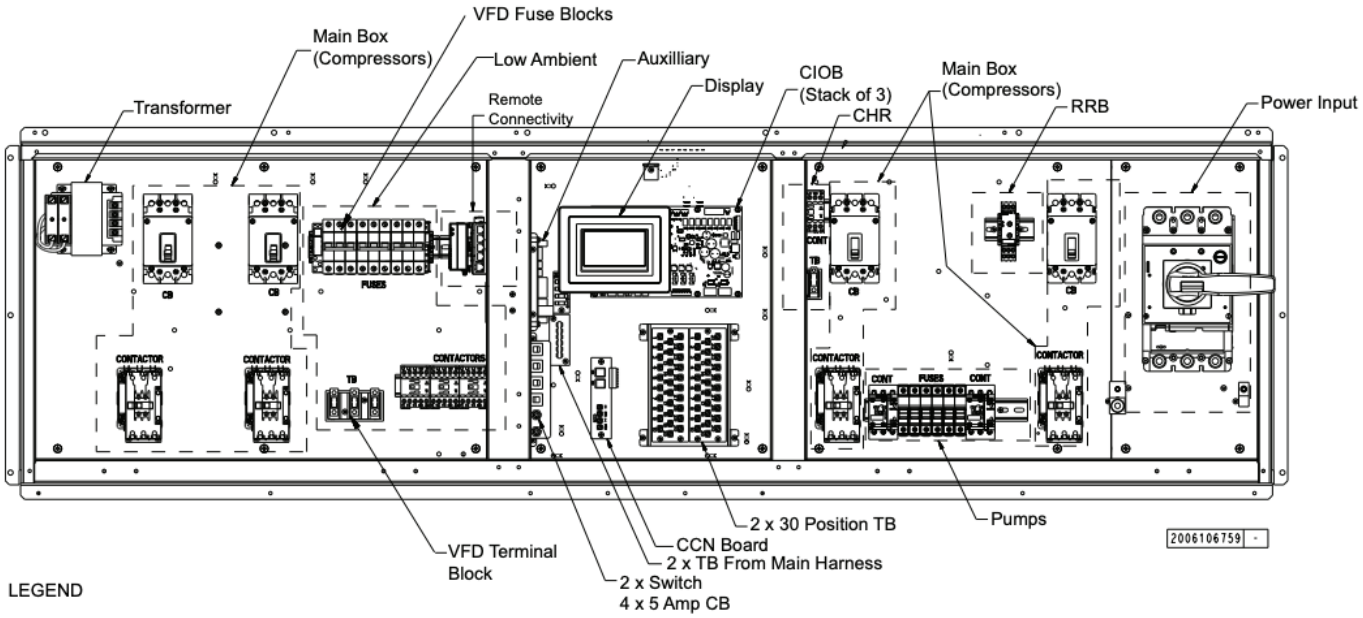
FUSE REPLACEMENT TABLE FOR FB1/FB2			
UNIT SIZE	VOLTAGE	FUSE	FUSE BLOCK
020-030	208/230	LP-CC-20	FB1/FB2
	380		
	460		
	575		
035-050	208/230	LP-CC-20	
	380		
	460		
	575		
055-060	208/230	FNQ-R-30	
	380	FNQ-R-20	
	460	FNQ-R-17-1/2	
	575	FNQ-R-15	



LEGEND

CB — Circuit Breaker
CCN — Carrier Comfort Network
CHR — Evaporator Heater Relay
CIOB — Carrier Input/Output Board
FB — Fuse Block
FC — Fan Contactor
FU — Fuse
RRB — Reverse Rotation Board/Phase Monitor
TRAN — Transformer
TB — Terminal Block
SW — Switch

Fig. 4 — Control Panel Layout (20-30 Ton)



LEGEND

CCN — Carrier Comfort Network
CB — Circuit Breaker
CIOB — Carrier Input/Output
CHR — Evaporator Heater Relay
RRB — Reverse Rotation Board/Phase Monitor
VFD — Variable Frequency Drive

Fig. 5 — Control Panel Layout (35-60 Ton)

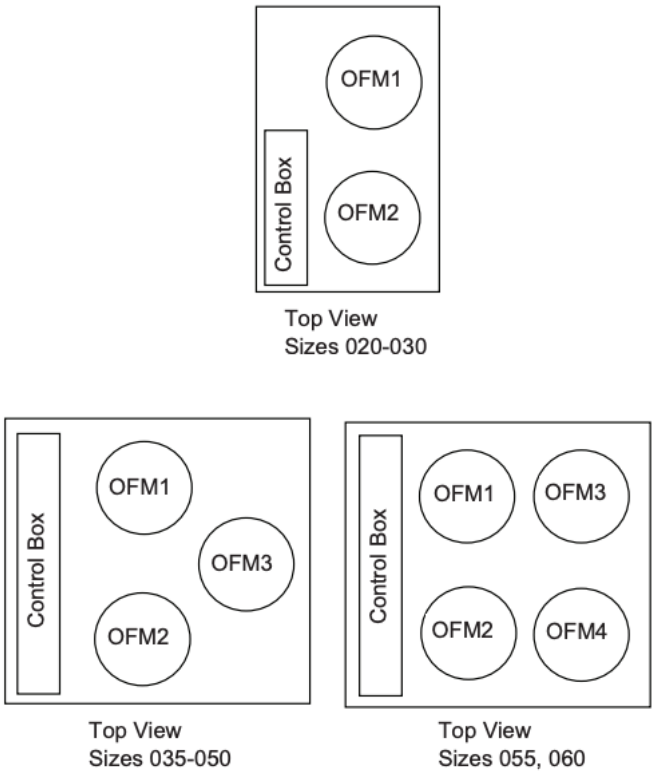


Fig. 6 — Condenser Fan Layout

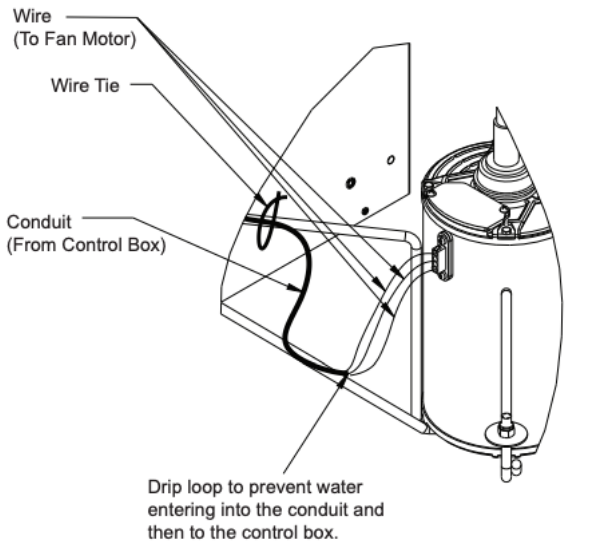


Fig. 7 — Fan Motor Wiring Connection Routing

Step 4 — Setup

Once all wiring is terminated and all covers are back in place, power unit. See Fig. 8-10.

Set the address on the variable frequency drive (VFD) to 184. (Pa- rameter 8-31 = 184) This will allow the controller to send correct operating parameters to the VFD. See Fig. 9.

At the PIC6 controller, configure the unit for Greenspeed control.

(***MainMenu→Configuration→Factory→vfan_sel =1)***.

NOTE: This will require a reboot of the controller.

IMPORTANT: The control power must be cycled with the correct VFD address and correct controller configuratio n before the variable speed fans will operate.

In the controller menu go to Quick Test1 (***MainMenu→Quick Test1***). Enable the quick test menu. Scroll down to Q-VFAN. Enter 50 to drive fans to 50%. Fans should start and run at 30 Hz. This confirms the fan VFD is operational. Enter 0 for Q-VFAN and disable quick test. See Fig. 8.

Install grill over VFD opening. Unit is now ready for operation.

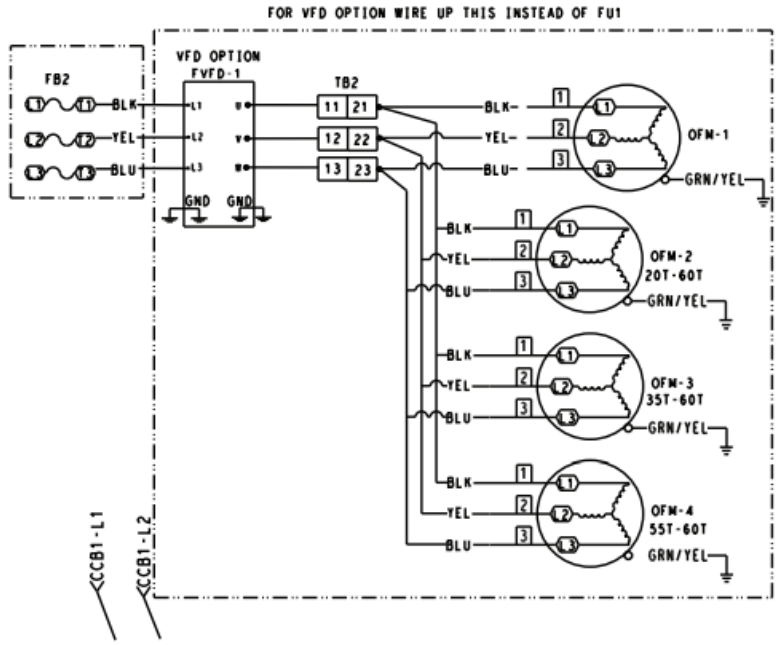
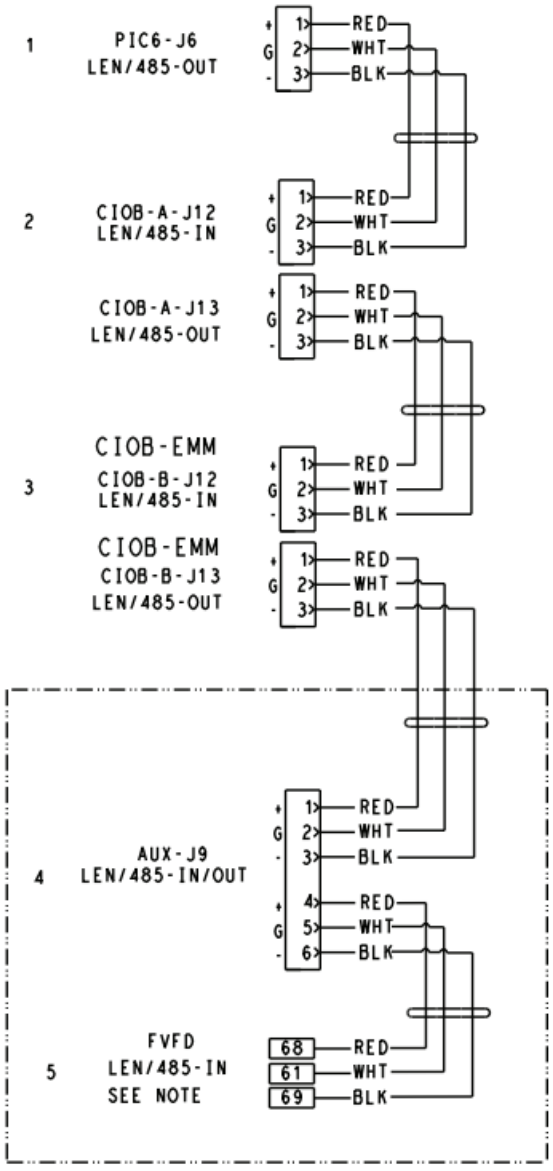


Fig. 8 — Fan Motor Power Wiring

LEN BUS WIRING

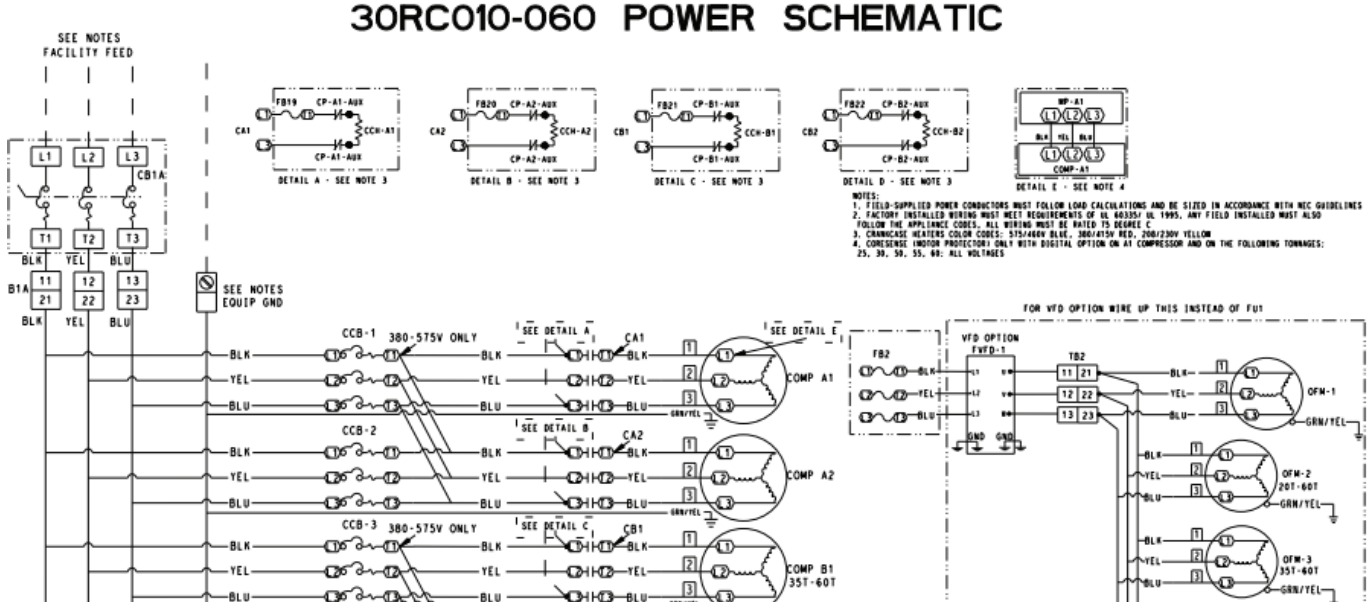
IF THE COMPONENT ISN'T PRESENT GO TO THE NEXT

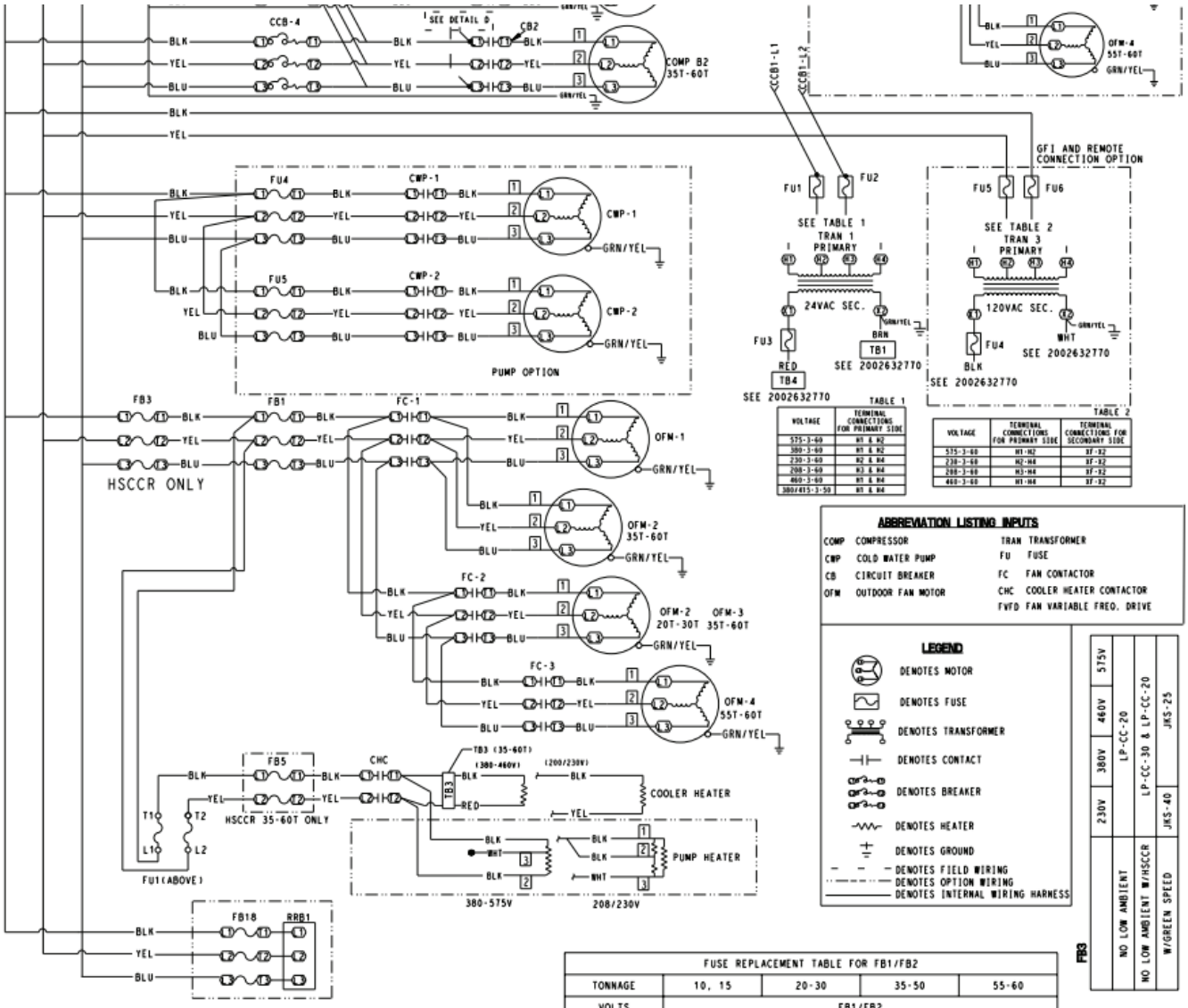


NOTE: Address for FVFD is 184 (Parameter 8-31)

Fig. 9 — LEN BUS Wiring

30RC010-060 POWER SCHEMATIC





FUSE REPLACEMENT TABLE FOR FB1/FB2				
TONNAGE	10, 15	20-30	35-50	55-60
VOLTS	FB1/FB2			
208/230V	KTK-R-20	LP-CC-20	LP-CC-20	FNQ-R-30
380V	KTK-R-10			FNQ-R-20
460V	KTK-R-10			FNQ-R-17-1/2
575V	KTK-R-10			FNQ-R-15

FUSE REPLACEMENT TABLE FOR FB15/FB16					
HP	1/1.5	3	5	7.5	10
VOLTS	FB15/FB16				
208/230V	FNQ-R-5	FNQ-R-9	FNQ-R-15	FNQ-R-25	FNQ-R-30
380V	FNQ-R-3	FNQ-R-5	FNQ-R-8	FNQ-R-15	FNQ-R-17-1/2
460V	FNQ-R-3	FNQ-R-5	FNQ-R-7	FNQ-R-10	FNQ-R-15
575V	FNQ-R-2	FNQ-R-3	FNQ-R-5	FNQ-R-10	FNQ-R-10

FUSE REPLACEMENT TABLE									
VOLTS	FB5	FB25/26	FB18	FU4	FU12	FU3	FU1/FU2	FU5/FU6	FB19-FB22
24V	-	-	-	-	-	KTK-R-20	-	-	-
120V	-	-	-	KTK-R-8	KTK-R-3/4	-	-	-	-
208/230V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-3.5	FNQ-R-4	FNQ-R-1/2
380V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-2.5	FNQ-R-2	FNQ-R-1/2
460V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-2	FNQ-Q-2	FNQ-R-1/2
575V	FNQ-R-5	FNQ-R-15	FNQ-R-5	-	-	-	FNQ-R-1.5	FNQ-Q-2	FNQ-R-1/2

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Fig. 10 — 30RC 010-060 Power Schematic

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

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Documents / Resources

	**Carrier 30RC 020-060 Variable Speed Fan Control** [pdf] Installation Guide 30RC70004901, 30RC70005001, 30RC70005101, 30RC70005301, 30RC70005401, 30RC70005501, 30RC70005701, 30RC70005801, 30RC70005901, 30RC 020-060 Variable Speed Fan Control, 30RC 020-060, Variable Speed Fan Control, Speed Fan Control, Fan Control, Control

References

- P65Warnings.ca.gov
- User Manual