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# PACKAGED UNITS KITS AND ACCESSORIES

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# VFD FIELD RETROFIT USER'S GUIDE

## Warranty Replacement

The VFD model number and serial number are required for warranty replacement. See table 1.

TABLE 1

VFD Model Number	
VFD Serial Number	
Install Date MM/DD/YYYY	

## Application

This User's Guide is used with field-installed supply air inverter (variable frequency drive - VFD) installations. See table 2 for rooftop packaged unit applications.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD.**

Failure to follow instructions exactly could result in serious injury or death.

**VFD HOLDS A POTENTIALLY LETHAL CHARGE UP TO 10 MINUTES AFTER POWER HAS BEEN DISCONNECTED. Do not open VFD cover until 10 minutes AFTER power source has been disconnected and power lamp has turned off.**

Read manual provided by VFD manufacturer. Carefully review and follow all safety warnings in that manual also.

**⚠ WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier

**⚠ WARNING**

Power wiring must be connected properly. Improperly connected power wiring may result in damage to the VFD.

**⚠ CAUTION**

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD.**

**STOP! Before you continue, make sure that power to the VFD has been off for at least 10 minutes. The capacitor in the VFD holds high voltage power for up to 10 minutes after power has been disconnected.**

## Inverter Operation

This unit is equipped with a VFD controlled supply air blower. The blower will operate at lower speeds when demand is low and increase to higher speeds when demand is high.

See figure 1 to identify units equipped with a Unit Controller (LG/LC/LH models). A 5-ton unit is shown. When the VFD is controlled by the rooftop integrated modular Unit Controller, up to seven blower speeds can be utilized. See table 3.

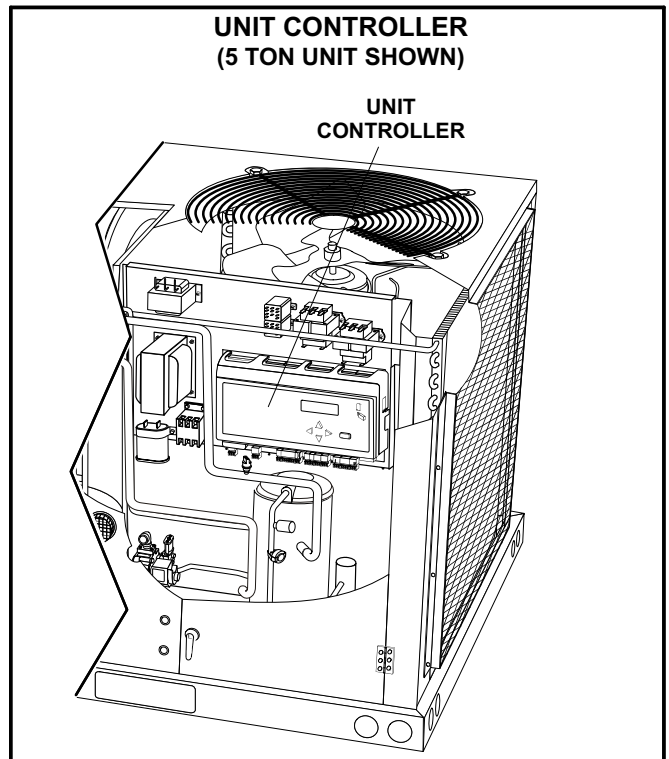


FIGURE 1

**TABLE 2**

Model	HP Rating	Voltage	Part Number	Order / Catalog Number
LG/LC/LH	2	230	613155-01	12B06
LG/LC/LH	2	460	613155-02	12B07
LG/LC/LH	2	575	613155-03	12B10
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	2	230	613155-04	12B11
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	2	460	613155-05	12B12
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	2	575	613155-06	12B18
LG/LC/LH	3	230	613155-07	12B19
LG/LC/LH	3	460	613155-08	12B20
LG/LC/LH	3	575	613155-09	12B21
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	3	230	613155-10	12B22
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	3	460	613155-11	12B23
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	3	575	613155-12	12B24
LG/LC/LH	5	230	613155-13	12B25
LG/LC/LH	5	460	613155-14	12B26
LG/LC/LH	5	575	613155-15	12B27
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	5	230	613155-16	12B28
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	5	460	613155-17	12B29
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	5	575	613155-18	12B30
LG/LC/LH	7.5	230	613155-19	12B31
LG/LC/LH	7.5	460	613155-20	12B32
LG/LC/LH	7.5	575	613155-21	12B33
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	7.5	230	613155-22	12B34
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	7.5	460	613155-23	12B35
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	7.5	575	613155-24	12B36
LG/LC/LH	10	230	613155-25	12B37
LG/LC/LH	10	460	613155-26	12B38
LG/LC/LH	10	575	613155-27	12B39
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	10	230	613155-28	12B40
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	10	460	613155-29	12B42
TG/TC/TC, KG/KC/KH, ZG/ZC/ZH	10	575	613155-30	12B43

**TABLE 3**  
**ECTO PARAMETER SETTINGS FOR UNITS EQUIPPED WITH A UNIT CONTROLLER**

ECTO	Supply Air Flow Setting (0-100)	Description	T'Stat Signal
0.01	3*	VFD Supply Air Control Mode	MSAV
0.02		Supply Fan Speed for Smoke Alarm	(Optional)
0.03		Supply Fan Speed for Ventilation or Occupied	G
0.04		Supply Fan Speed for Heating	W
0.05		Supply Fan Speed for Cool Stage 1	Y1
0.14		Supply Fan Speed for Cool Stage 2	Y2
0.15		Supply Fan Speed for Cool Stage 3	Y3
0.16		Supply Fan Speed for Cool Stage 4	Y4

\*ECTO setting 0.01 is not a fan speed; setting 3 enables VFD supply air control.

Note - A supply fan speed value of 100 indicates the inverter is providing an output at 60Hz; a supply fan speed value of 50 indicates the inverter is providing an output at 30Hz or approximately half of full speed.

When the VFD is not controlled by an integrated micro controller (KG/KC/KH/TG/TC/TH/ZG/ZC/ZH units and other manufacturer's units), four speeds can be utilized. See table 4. Supply air blower speeds are entered using the VFD keypad. Refer to the inverter instruction manual (FR-E500 and FR-D700) located in the document packet shipped with the VFD.

The field-adjusted blower speed settings can be found:

- 1- In the unit configuration ECTO menu of the Unit Controller.

AND/OR

- 2- Written on the VFD Field Retrofit Commissioning label located near the wiring diagrams on the rooftop unit inside of the control access door.

Units equipped with 3 and 4 compressors and a 2-stage thermostat will energize cooling circuits 1 & 2 with a Y1 thermostat demand. Cooling circuits 3 & 4 are energized with a Y2 thermostat demand.

## Inverter Troubleshooting

The VFD will display current mode of operation. The SET button will cycle the display monitored values as follows

- Output Frequency
- Blower-VFD Load Amps
- VFD Output Watts

*Note - The drive will actively try to reduce power consumption by lowering output frequency while monitoring amps. This results in small continuous changes to the output frequency. If the set-point is 60Hz, the drive will fluctuate +/- 2 Hz.*

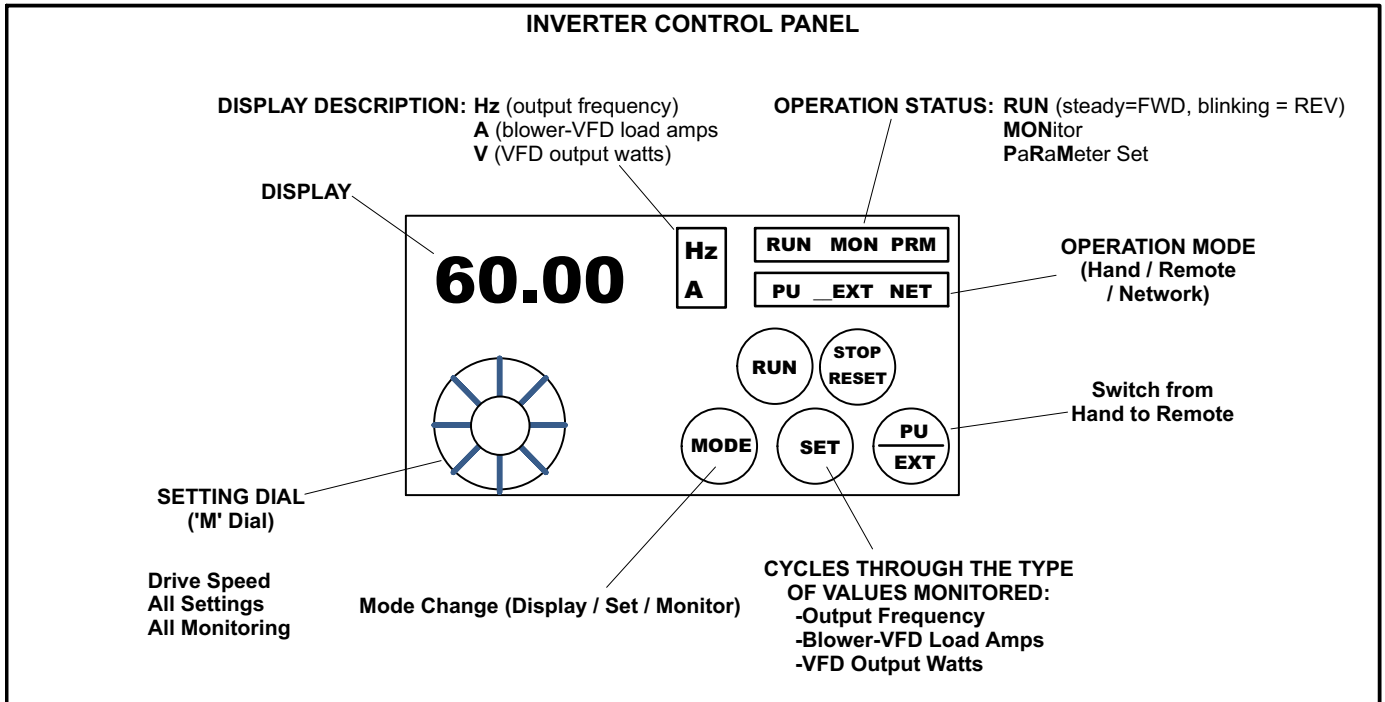
How to reset the Variable Frequency Drive:

- 1- Press (STOP/RESET) button on the VFD keypad.
- 2- Turn power OFF at rooftop unit disconnect. When the keypad display turns OFF, turn power ON at rooftop unit disconnect.

**TABLE 4**  
**VFD Parameter Settings For Units Not Equipped With A Unit Controller**

VFD Parameters	Supply Air Frequency Setting (0-60)	Description	T'Stat Signal
Pr. 4	60 (same as Pr. 25)	Heat	W1
Pr. 5	40	Cool Stage 1	Y1
Pr. 6	30	Ventilation or Occupied	G
Pr. 24	60	Cool Stage 2	Y2
Pr. 25	60 (same as Pr. 4)	Heat	W1

Note - A supply air frequency value of 60 indicates the inverter is providing an output at 60Hz; a supply air frequency value of 15 indicates the inverter is providing an output at 15Hz.



**FIGURE 2**

**TABLE 5**  
**INVERTER FAULT AND ALARM INDICATIONS**  
**(Refer to VFD Installation Guide for Complete Fault Codes)**

Type of Alarm	Display	Description
Err. Msg	E---	Faults history
	HOLD	Operational panel lock
	Er1 to 4	Parameter write error
	LOCd	Password locked
	Err.	Inverter reset
Warnings	OL	Stall prevention (overcurrent)
	oL	Stall prevention (over-voltage)
	RB	Regenerative brake pre-alarm
	TH	Electronic thermal relay function pre-alarm
	PS	PU stop
	MT	Maintenance signal output
	UV	Under-voltage
	SA	Safety Stop
Alarm	FN	Fan Alarm
Fault	E.OC1	Overcurrent trip during acceleration
	E.OC2	Overcurrent trip during constant speed
	E.OC3	Overcurrent trip during deceleration or stop
	E.THT	Inverter overload trip (electronic thermal relay function)
	E.THM	Motor overload trip (electronic thermal relay function)
	E.FIN	Fin overheat
	E.ILF	Input phase loss
	E.OLT	Stall prevention
	E.GF	Output side earth (ground) fault overcurrent at start
	E.LF	Output phase loss

## VFD Replacement

### Shipping and Packing List

#### Package 1 of 1 contains:

- 1- Pre-programmed VFD (A96)

**Note - Return replaced VFD in the packaging used to ship the replacement VFD.**

### Application

Kits are used to replace the variable frequency drive as shown in table 6.

**TABLE 6  
VFD REPLACEMENT KIT**

HP Rating	Voltage	Kit Number	Catalog Number
2HP	230V	607820-01	84W30
	460V	607820-02	84W31
	575V	607820-03	84W32
3HP	230V	607820-04	84W33
	460V	607820-05	84W34
	575V	607820-06	84W35
5HP	230V	607820-07	84W36
	460V	607820-08	84W37
	575V	607820-09	84W38
7.5HP	230V	607820-10	84W39
	460V	607820-11	84W40
	575V	607820-12	84W41
10HP	230V	607820-13	84W42
	460V	607820-14	84W43
	575V	607820-15	84W44

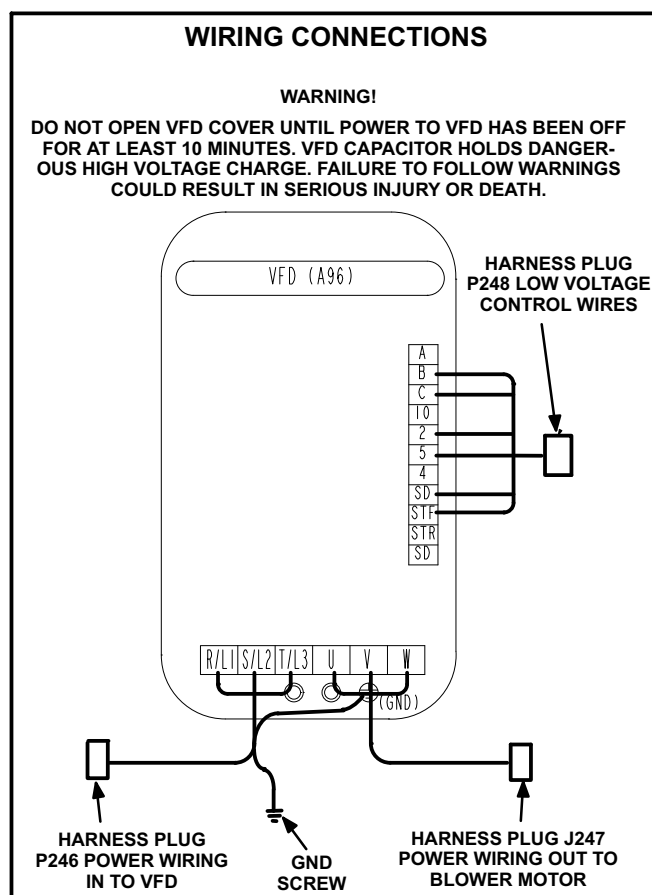
### Installation

- 1- Disconnect all power to unit and **WAIT AT LEAST 10 MINUTES** before opening the VFD cover.
- 2- Open the lower cover on the VFD to access wire connections. Disconnect the wires from the terminals, making special note of the wire color and stamping that was connected to each terminal.
- 3- Remove the top two screws which secure the existing VFD to the mounting bracket. Loosen the lower two securing screws and remove the existing VFD from the controls compartment.

**NOTE - It is not necessary to completely remove the two lower screws to remove the VFD.**

- 4- Slide keyholes on replacement VFD over lower securing screws. Reinsert and tighten two upper screws, then tighten lower screws.

- 5- Carefully connect existing wires to the replacement VFD as illustrated in figure 3. On units without harnesses, take care to properly connect the power wiring going into and out of the VFD.
- 6- Close access panel and restore power to the unit.



**FIGURE 3**

### Verify Proper Operation

#### If the blower is not rotating in the proper direction:

- 1- Disconnect all power to the unit and open the compressor / controls compartment access panel.
- 2- Check all control wiring to the VFD. No wires should be connected to STR.
- 3- Check all power wiring to and from the VFD. Verify the high voltage wire connections are not crossed.
- 4- Check to ensure that wiring connections are secure.
- 5- Close access panel and restore power to unit.

#### Verify proper operation of VFD:

If unit has a Unit Controller, verify unit operates correctly. If unit does not have a Unit Controller, VFD parameters must be set as shown in table 4.

**Note - Parameter Pr. 160 value must be changed to 0 before any changes can be made to the 4 pre-set speeds.**

## VFD Manual Bypass

In the event of a VFD failure or malfunction, a manual VFD bypass can be accomplished as follows. After the VFD is bypassed, the indoor blower motor will run when field power is restored.

1- Turn off power to unit at the field disconnect point.

2- Allow a minimum of 10 minutes to pass before servicing VFD.

3- Disconnect P247 from J247 and J246 from P246. See figure 4.

4- Connect P247 to J246.

5- Secure J247 & P246 away from moving parts.

6- Resume unit power at field disconnect point.

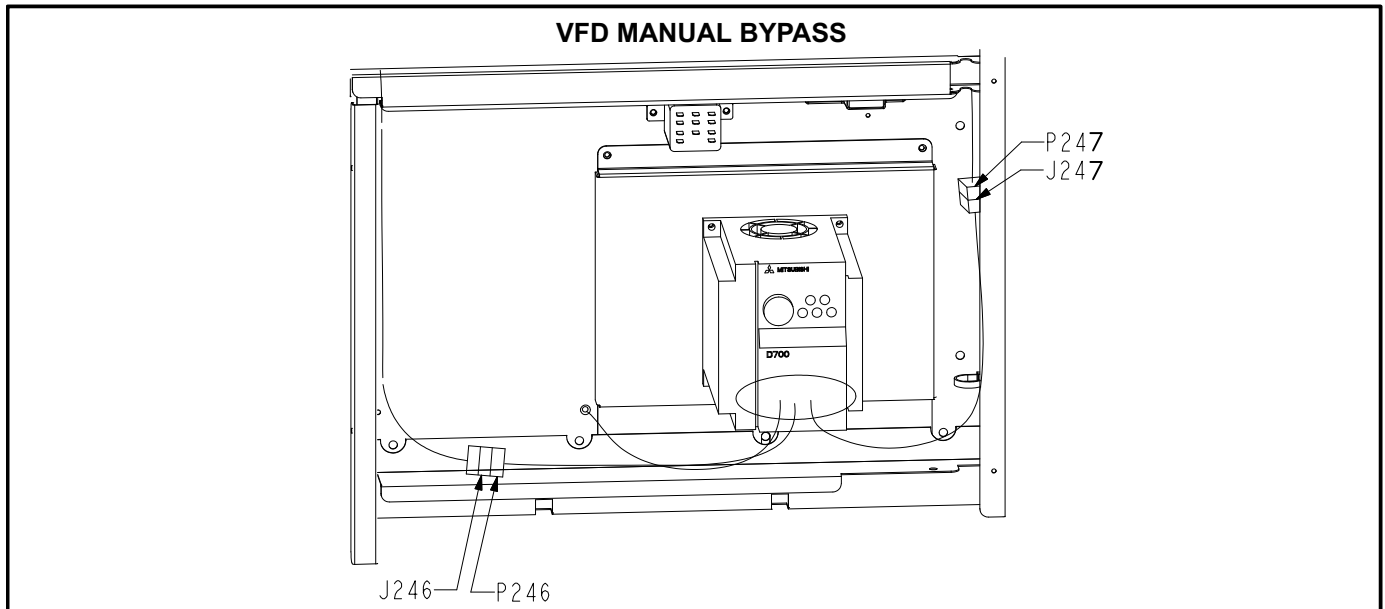
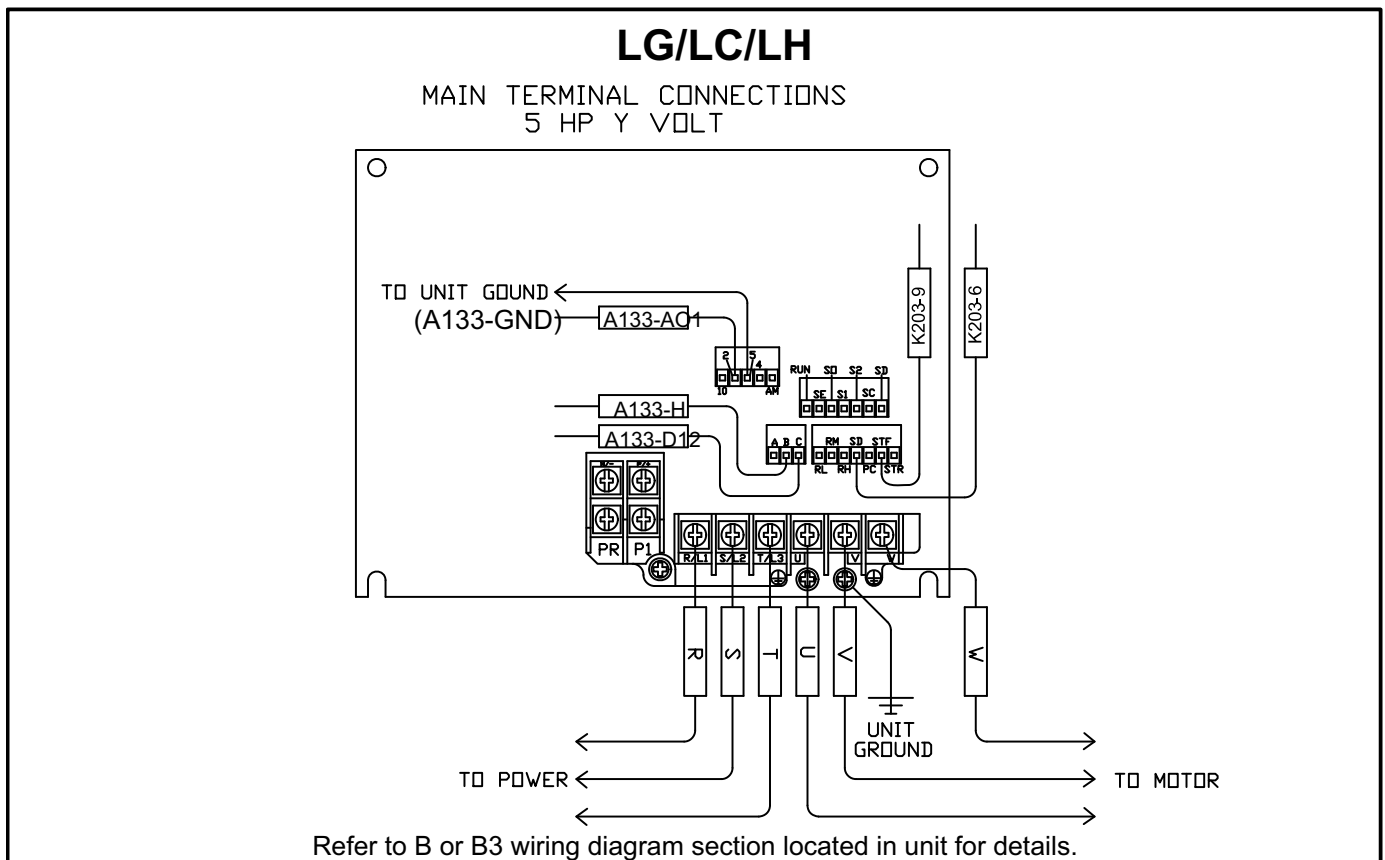


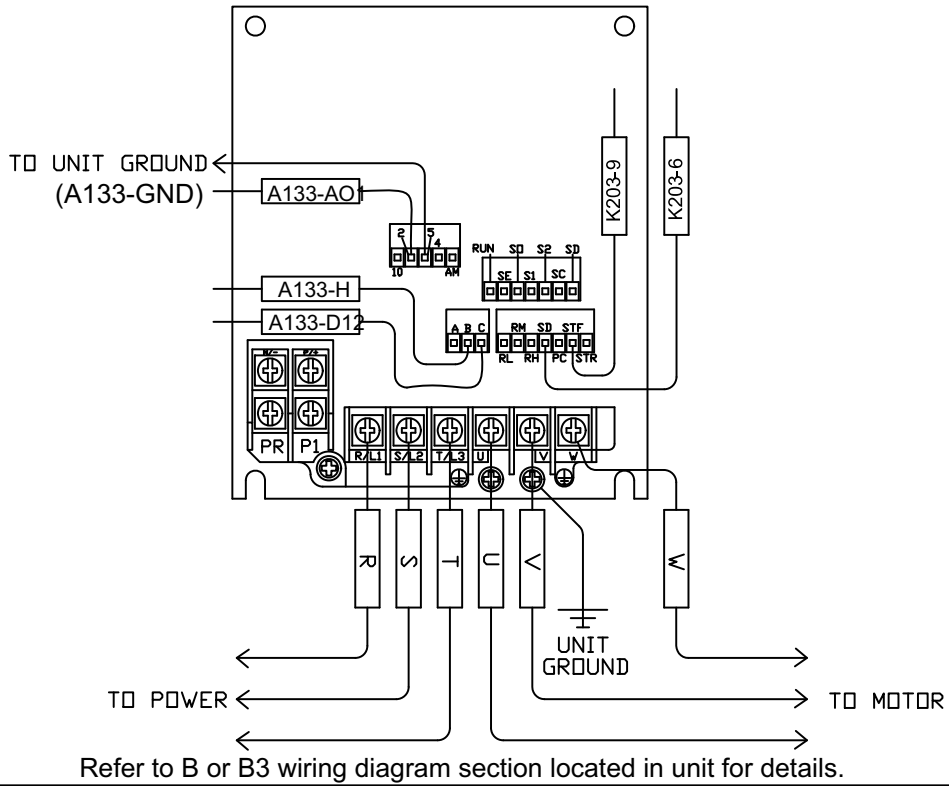
FIGURE 4



Refer to B or B3 wiring diagram section located in unit for details.

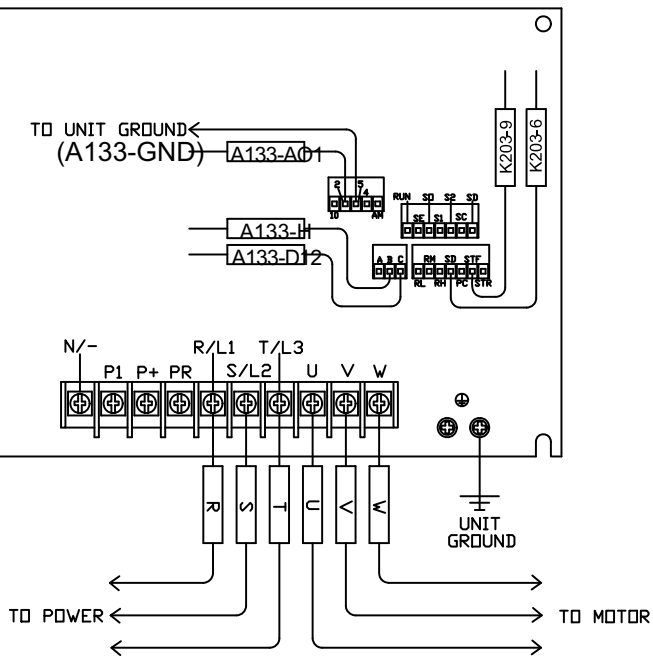
FIGURE 5

**LG/LC/LH**  
 MAIN TERMINAL CONNECTIONS  
 2 & 3 HP Y VOLT, 2, 3 & 5 HP G VOLT



**FIGURE 6**

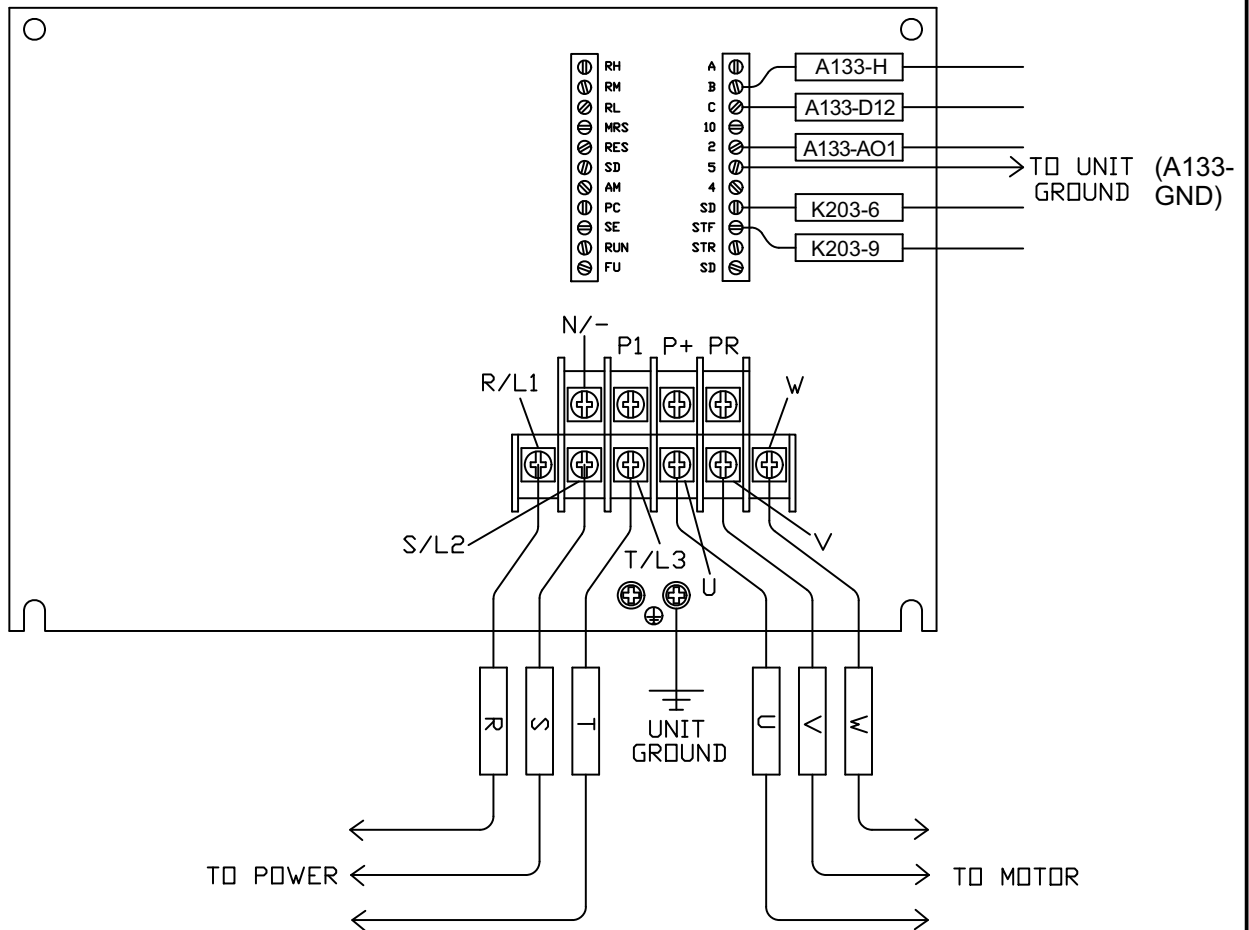
**LG/LC/LH**  
 MAIN TERMINAL CONNECTIONS  
 7.5 & 10 HP Y & G VOLT



**FIGURE 7**

# LG/LC/LH

## MAIN TERMINAL CONNECTIONS 2, 3, 5, 7.5, & 10 HP J VOLT



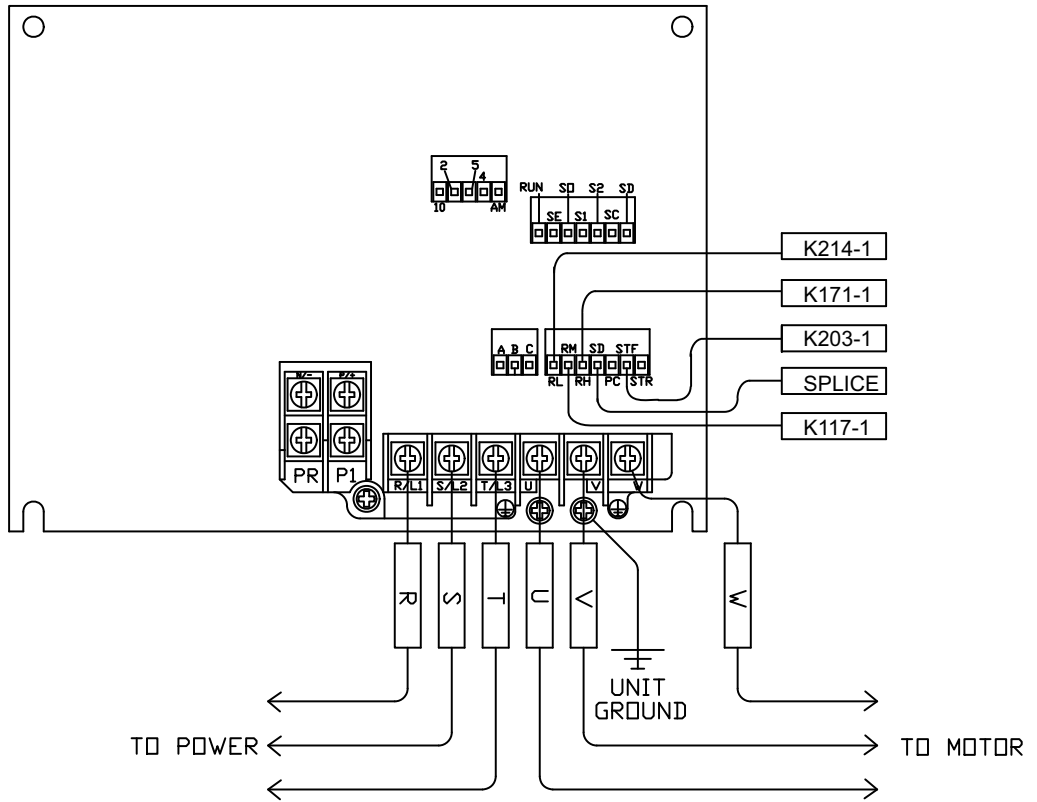
Refer to B or B3 wiring diagram section located in unit for details.

**FIGURE 8**



# KG/KC/KH/TG/TC/TH/ZG/ZC/ZH

MAIN TERMINAL CONNECTIONS  
5 HP Y VOLT

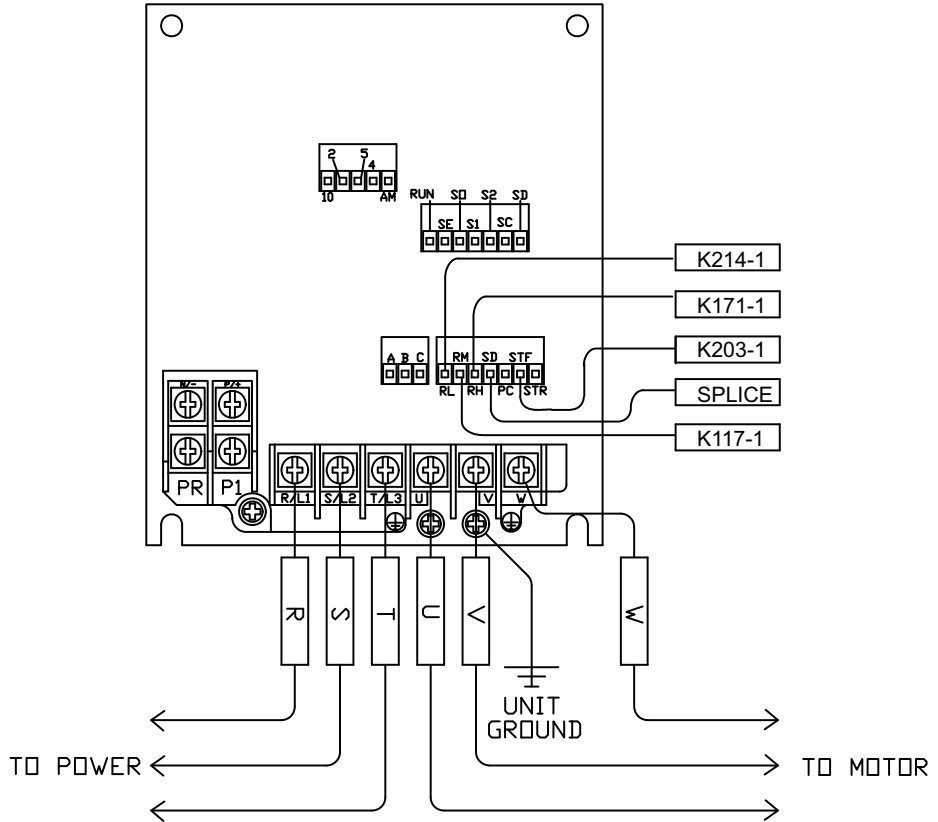


Refer to B wiring diagram section located in unit for details.

FIGURE 9

# KG/KC/KH/TG/TC/TH/ZG/ZC/ZH

MAIN TERMINAL CONNECTIONS  
 2 & 3 HP Y VOLT, 2, 3 & 5 HP G VOLT

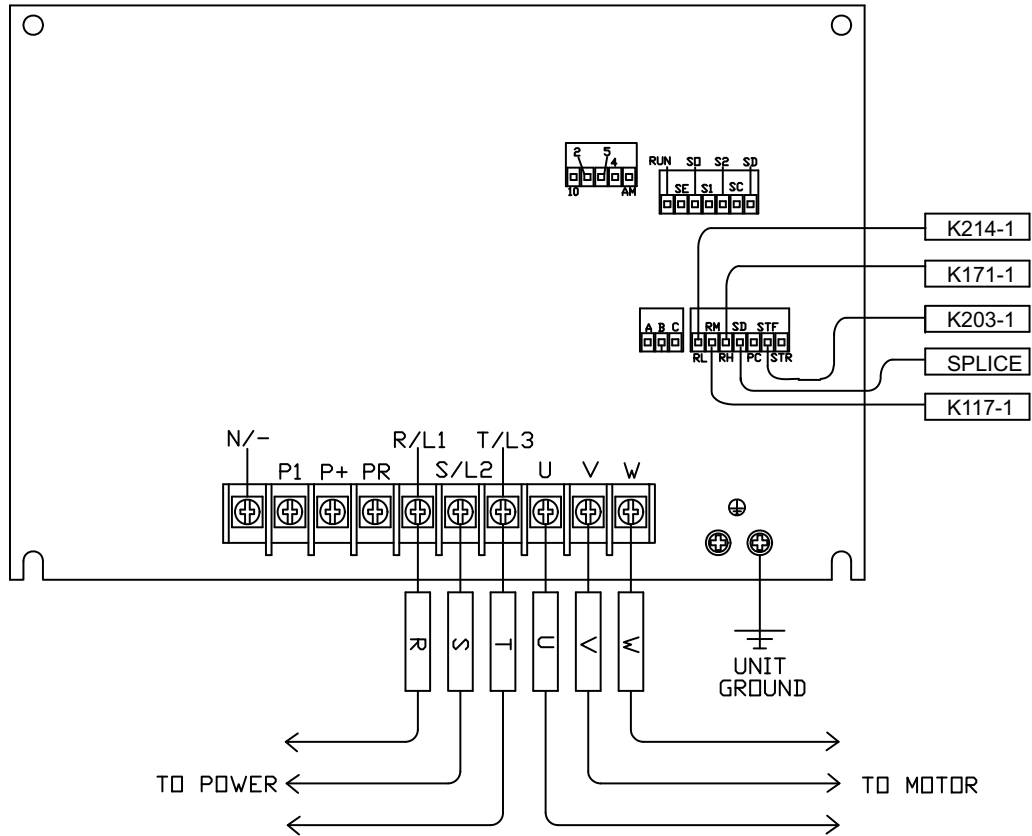


Refer to B wiring diagram section located in unit for details.

FIGURE 10

# KG/KC/KH/TG/TC/TH/ZG/ZC/ZH

## MAIN TERMINAL CONNECTIONS 7.5 & 10 HP Y & G VOLT

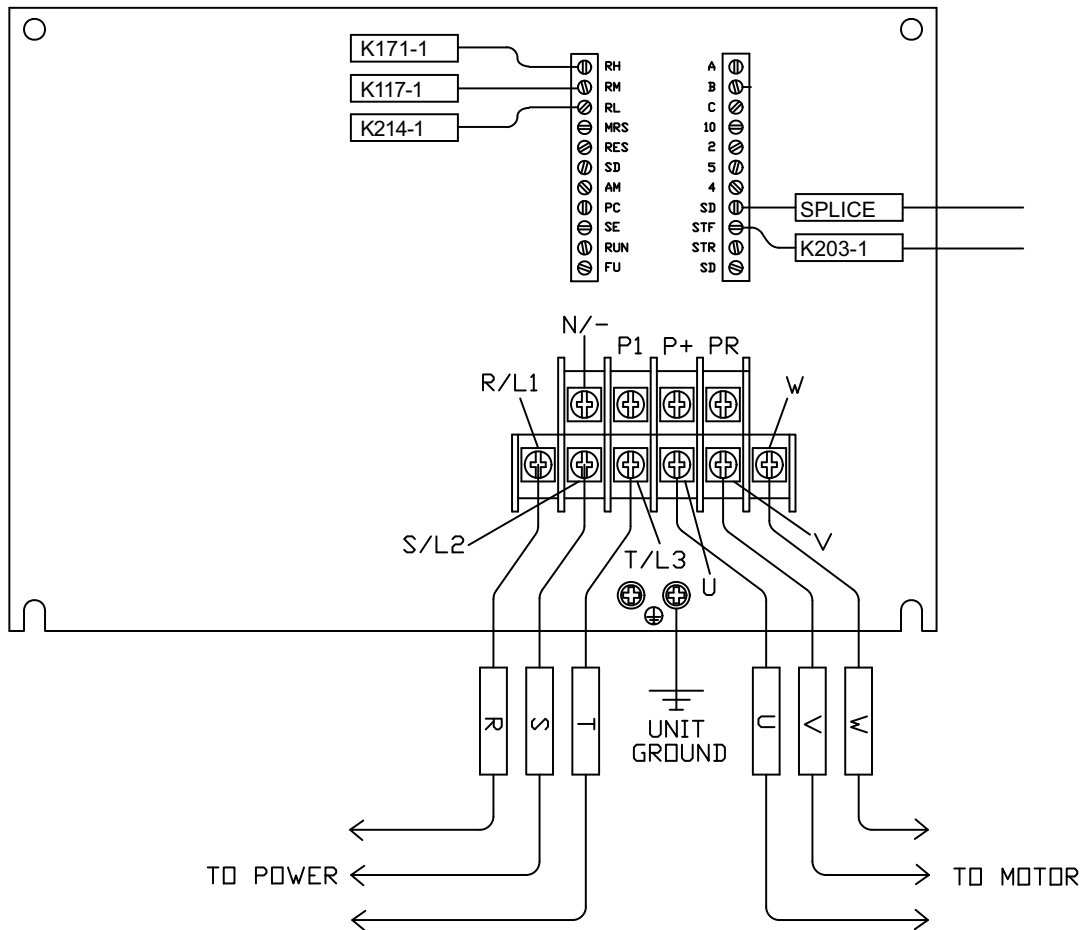


Refer to B wiring diagram section located in unit for details.

FIGURE 11

# KG/KC/KH/TG/TC/TH/ZG/ZC/ZH

MAIN TERMINAL CONNECTIONS  
2, 3, 5, 7.5, & 10 HP J VOLT



Refer to B wiring diagram section located in unit for details.

FIGURE 12