

**CRLOWAMB030A01,  
CRLOWAMB031A01,  
CRLOWAMB032A01**

**48/50TC\*D14, 50TCQD12, 50HCQD09, 48/50HC\*D12  
558/580J\*14D, 548J\*12, 549J\*09, 551J/581J\*12  
RGS150, RAS150, RGH120, RAH120, RHS120, RHH102  
LOW AMBIENT OPERATION  
MOTORMASTER® V CONTROL ACCESSORY  
50/60HZ**

## Installation Instructions

**IMPORTANT:** This book contains instructions for the installation, start-up and service of the Motormaster V (MMV) control on 48/50TC\*D14, 558/580J\*14D, RGS150, RAS150, 48/50HC\*D12, 551/581J\*12, RGH120, RAH120, 50TCQD12, 50HCQD09, 548J\*12, 549J\*09, RHS120, RHH102.

### PACKAGE CONTENTS

#### Motormaster V/Fuse Sub-Assembly

ITEM	CRLOWAMB030A01	CRLOWAMB031A01	CRLOWAMB032A01	QTY
Controller, 230V	HR46TN001			1
Controller, 460V		HR46TN002		1
Controller, 575V			HR46TN003	1
Fuse 20A, KTK-R, Class CC	HY10KB200			3
Fuse 15A, KTK-R, Class CC		HY10KB151		3
Fuse 15A, KTK-R, Class CC			HY10KB152	3
Fuse Block		HY11UT035		1
Relay Base		HN79KK035		1
Relay		HN61KK055		1
Fuse Cover		HY12BM002		3
Wire Tie		HY76TB110		4
Screws 8 x 3/4		AL56AU169		8
Screws 6 x 1/2		AL56AU126		2
Harness		48TM402167		1
Bracket		48TM502101		1
MMV Cover		48TM502193		1

#### Additional Parts

ITEM	CRLOWAMB030A01	CRLOWAMB031A01	CRLOWAMB032A01	QTY
Transducer		HK05ZZ001		1
Transducer Cable		30GT415783		1
Check Valve Tee		EC36SZ061		1
Wire Tie		HY76TB036		5
Screws #10 x 1/2		AL78AG216		5
Diagram Label		48TM502162		1
Caution Label		48TM501658		1
Heat Pump Adapter Kit		48TM404523		1
Label Diagram		48TM504591		1

# MOTORMASTER® V CONTROL PACKAGE USAGE

UNIT	VOLTAGE-Ph-Hz	ITEM DESCRIPTION
48/50TC*D14 558/580J*14D 50TCQD12 548J*12	208/230-3-60	CRLOWAMB030A01
	460-3-60	CRLOWAMB031A01
	400-3-50	CRLOWAMB032A01
50HCQD09 549J*09 48/50HC*D12 551J/581J*12	208/230-3-60	CRLOWAMB030A01
	460-3-60	CRLOWAMB031A01
	575-3-60	CRLOWAMB032A01
RGS150 RAS150 RHS120	208/230-3-60	CRLOWAMB030A01
	460-3-60	CRLOWAMB031A01
	400-3-50	CRLOWAMB032A01
RHH102 RGH120 RAH120	208/230-3-60	CRLOWAMB030A01
	460-3-60	CRLOWAMB031A01
	575-3-60	CRLOWAMB032A01


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## SAFETY CONSIDERATIONS

Installation, start-up and servicing of this equipment can be hazardous due to system pressures, electrical components and equipment location (roofs, elevated structures, etc.)

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

Follow all safety codes. Wear safety glasses and work gloves.

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

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

## WARNING

### ELECTRICAL SHOCK HAZARD

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

Open all remote disconnects before servicing this equipment.

## CAUTION

### CUT HAZARD

Failure to follow this caution may result in personal injury.

When removing access panels or performing maintenance functions inside your unit, be aware of sharp sheet metal parts and screws. Although special care is taken to reduce sharp edges to a minimum, be extremely careful when handling parts or reaching into the unit.

## GENERAL

The Motormaster® V control is a motor speed control device which adjusts condenser fan motor speed in response to varying discharge refrigerant pressure. A properly applied Motormaster V control extends the operating range of air-conditioning systems and permits operation at lower outdoor ambient temperatures.

To operate these units at very low ambient temperatures, Motormaster V controls must be added. (See Fig. 1.) Field-fabricated and installed wind baffles are also required for units in areas with prevailing winds of more than 5 mph and where temperatures drop below 32°F (0°C). The Motormaster V control permits operation of the unit to an ambient temperature of -20°F (-29°C). The control regulates the speed of one 3-phase fan motor that is compatible with the control. Replacement of fan motor on most units is not necessary since the control is compatible with the factory-installed fan motors. To verify that unit fan motors are compatible with control see Table 1.

Field wiring of control is required.

This accessory kit will allow the Motormaster V Control to be used on heat pump units (using the single 3-phase outdoor fan motor). A second relay assembly is provided to override the Motormaster V when in heat pump mode. The second relay must be installed by the technician. For cooling units, the second relay assembly is not used.

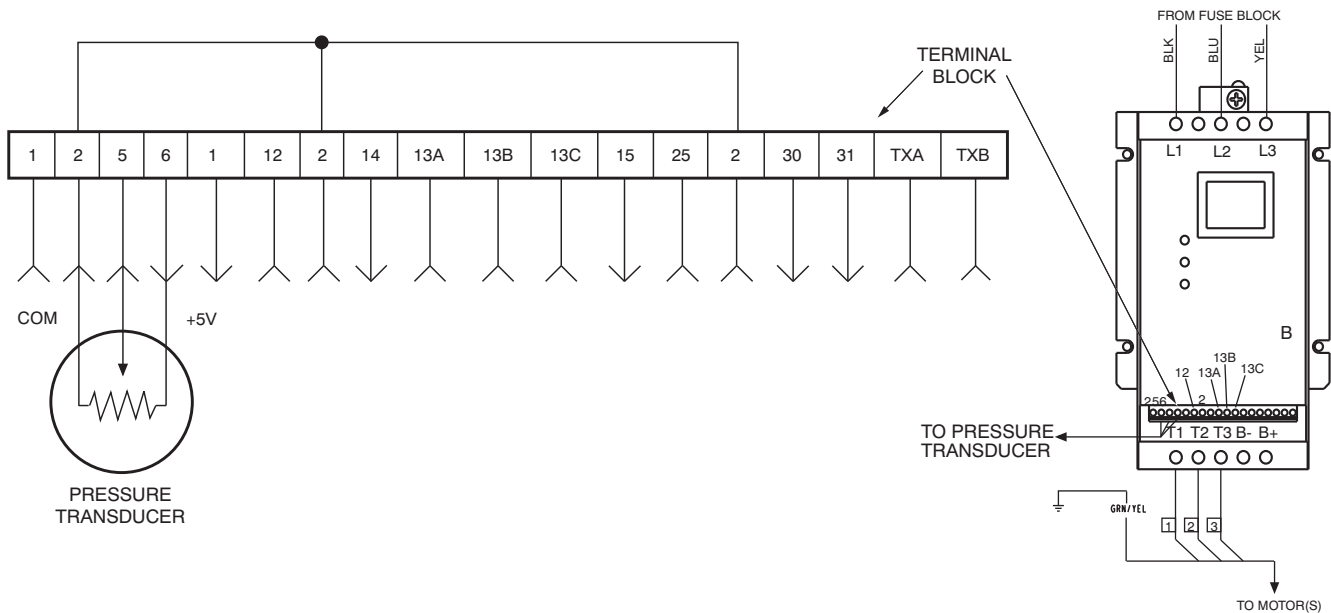


Fig. 1 - Motormaster® V Control Cooling Units

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**Pre-Installation**

Inspect the contents of this accessory package before installing. File a claim with the shipper if there is shipping damage or if a part is missing.

Table 1 – Applicable Voltages and Motors

VOLTAGE	COMPATIBLE VOLTAGE MOTOR
208/230-3-60	HD52AK002
460-3-60	
400-3-50	
575-3-60	HD52GE577

**INSTALLATION**

**Step 1 — Install Field-Fabricated Wind Baffles**

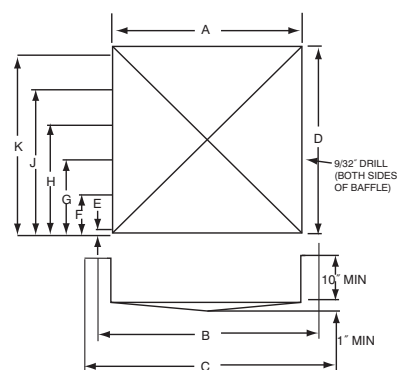
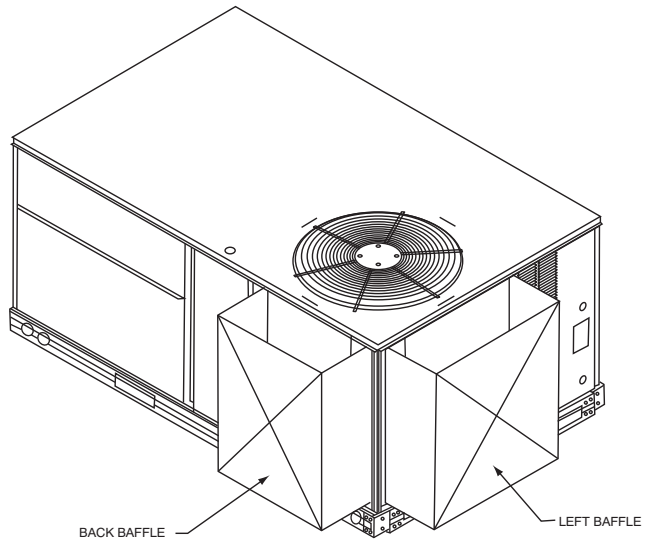
**⚠ WARNING**

**ELECTRICAL SHOCK HAZARD**  
 Failure to follow this warning could result in personal injury and/or death.  
 Open all disconnects before installing or servicing this accessory.

In areas with prevailing winds of more than 5 mph (8 kmh) and where temperatures drop below 32°F (0°C), wind baffles must be field fabricated to ensure proper cooling cycle operation at low-ambient temperatures with Motormaster® V controls. See Fig. 2 for baffle details. Use 20-gauge (1 mm) galvanized sheet metal, or similar corrosion-resistant material for the baffles. Use field-supplied screws to attach baffles to unit. Screws should be 1/4-in. (6.3 mm) diameter or larger. Screws should not be more than 1/2-in. (12.7 mm) in length. Drill required screw holes for mounting baffles.

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**  
 Failure to follow this caution may result in damage to unit.  
 To avoid damage to refrigerant coils, electrical components and wiring, use extreme care when drilling screw holes and screwing in fasteners.



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Fig. 2 - Wind Baffle Details

**Dimensions for Copper-Tubes Aluminum Fin Coil**

**Back Baffle - inches (mm)**

Unit	Size	A	B	C	D	E	F	G	H	J	K
50HCQD 549J	09	41-7/8 (1063.6)	42-1/2 (1079.5)	43-1/8 (1095.4)	43-1/2 (1104.9)	1-1/4 (31.8)	9-1/4 (235.8)	17-1/4 (438.2)	25-1/4 (641.4)	33-1/4 (844.6)	41-1/4 (1047.6)
48/50HCD 50TCQD 551J/581J 548J	12										
48/50TCD 558/580J	14										
RHH102	102	41-7/8 (1063.6)	42-1/2 (1079.5)	43-1/8 (1095.4)	43-1/2 (1104.9)	1-1/4 (31.8)	9-1/4 (235.8)	17-1/4 (438.2)	25-1/4 (641.4)	33-1/4 (844.6)	41-1/4 (1047.6)
RGH RAH RHS	120										
RGS RAS	150										

**Left Baffle - inches (mm)**

Unit	Size	A	B	C	D	E	F	G	H	J	K
50HCQD 549J	09	42-3/4 (1085.85)	43-3/8 (1101.7)	44 (1117.6)	43-1/2 (1104.9)	1-1/4 (31.8)	9-1/4 (235)	17-1/4 (438.2)	25-1/4 (641.4)	33-1/4 (844.6)	41-1/4 (1047.8)
48/50HCD 50TCQD 551J/581J 548J	12										
48/50TCD 558/580J	14										
RHH	102	42-3/4 (1085.85)	43-3/8 (1101.7)	44 (1117.6)	43-1/2 (1104.9)	1-1/4 (31.8)	9-1/4 (235)	17-1/4 (438.2)	25-1/4 (641.4)	33-1/4 (844.6)	41-1/4 (1047.8)
RGH RAH RHS	120										
RGS RAS	150										

## Dimensions for Novation Coils

Back Baffle - inches (mm)

Unit	Size	A	B	C	D	E	F	G	H	J	K
48/50TCD 558/580J	14	40-1/4 (1022.3)	40-7/8 (1038.2)	41-1/2 (1054.1)	43-1/2 (1104.9)	4-1/4 (108)	11-1/4 (285.8)	18-1/4 (463.6)	25-1/4 (641.4)	32-1/4 (819.2)	39-3/16 (995.4)

Left Baffle - inches (mm)

Unit	Size	A	B	C	D	E	F	G	H	J	K
48/50TCD 558/580J	14	47-3/4 (1212.8)	48-1/4 (1225.5)	48-7/8 (1241.43)	43-1/2 (1104.9)	1-1/4 (31.8)	9-1/4 (235)	17-1/4 (438.2)	25-1/4 (641.4)	33-1/4 (844.6)	41-1/4 (1047.8)

### Step 2 — Mounting and Electrical Connections for Motormaster® V Control

#### ⚠ WARNING

##### ELECTRICAL SHOCK HAZARD

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

Open and tag all electrical disconnects before installing or servicing unit.

#### ⚠ WARNING

##### ELECTRICAL OPERATION HAZARD

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

Wait three minutes after disconnecting incoming power before servicing drive. Capacitors retain charge after power is removed.

#### ⚠ CAUTION

##### EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in personal injury and damage to equipment.

To avoid damage to the small terminals on the Motormaster V control, use care when tightening the compression terminals and use the proper size screwdriver.

#### ⚠ CAUTION

##### EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in personal injury and damage to equipment.

DO NOT connect incoming AC power to Motormaster V output terminals T1, T2 and T3. Severe damage to the control will result.

### Cooling Only

For 48/50TC\*D14, 558/580J\*14D, and RGS/RAS150, use the following procedure to mount and connect the MMV control to the unit.

1. Disconnect power to the unit. Lockout and tag power disconnect.
2. Remove compressor access panel, control box cover and indoor blower panel. Lifting the top cover on

the control box side of unit will aid routing of wiring from the blower section to the control box.

3. Mount the MMV assembly on the bulkhead of the indoor section using the #10 screws 4-in. (101.6 mm) down from the top of partition. The left edge of mounting bracket to be flush with partition edge. (See Fig. 3.) Verify that that fuses match those specified on the packaging list.

**IMPORTANT:** Do not drive screws into control box area.

4. Disconnect the OFM wires from the OFC-21 and -23 and IFC-13 or TB10 and save. Remove the two jumper wires between OFC and C2 and discard. Remove the 24V control wires from OFC and save. Remove and discard OFC.
5. Route all wires connected to MMV sub-assembly through bulkhead. Route the transducer harness cable separately from the rest to avoid electrical interference.

The following wiring refers to Fig. 4 (wiring diagram) and Fig. 5 (wire harness).

6. Connect violet and brown control wires that were connected to OFC to the violet and brown wires from FR13 and 14. Match the colors.
  - a. Connect BLK 1, YEL 2 and BLU 3 coming from MMV control T1, T2 and T3 to the BLK, YEL and BLU OFM wires previously disconnected. Match the colors.
  - b. Connect BLK 6, YEL 7, and BLU 8 coming from fuse block to C2-11, C2-13 and IFC-13 or TB10 for 208/230 units with electric heaters installed.
  - c. Connect the GRN/YEL ground wire to the ground screw in the control box used to ground the outdoor fan motor.
  - d. For 400-3-50 units, move the orange control wire from TB-1 to TB-13C on the MMV as indicated in Fig. 4.
7. Remove the cap from the discharge line service port of Circuit 1 and connect the check valve tee (EC36SZ061) to the port.

#### ⚠ WARNING

##### PERSONAL INJURY HAZARD

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

Orient the valve so that the ports are directed away from the access panel.

8. Attach service port cap to check valve tee.
9. Connect transducer HK05ZZ001 to check valve tee.
10. Connect transducer harness cable to transducer.
11. Bundle any excess wire and dress harnesses with wire ties.
12. Place the appropriate wiring label on the control box cover.
13. Reattach control box cover, compressor access panel and indoor blower panel.
14. Place the caution label on the top cover above the control box near the outdoor fan grill.

### **Heat Pump Only**

For 50TCQD12/50HCQD09, 548J\*12/548J\*09 and RHS/RHH120, use the following procedure to mount and connect the MMV control to the unit. See Fig. 7.

1. Disconnect power to the unit. Lockout and tag power disconnect.
2. Remove compressor access panel, control box cover and indoor blower panel. Lifting the top cover on the control box side of unit will aid routing of wiring from the blower section to the control box.
3. Locate the heat pump adapter kit and mount the relay (FR-H) to the MMV bracket using the (2) \*8 screws provided.
4. Connect the blue, white and yellow wires to the MMV as shown - terminals 5, 6 and 2 respectively. The orange and brown wires will go into the control box along with the wires from the other fan relay (FR).

**NOTE:** If the transducer harness is connected to the MMV at the 2, 5, 6 terminals, disconnect and reconnect per item 6 below.

**NOTE:** On the MMV there are three #2 positions in the terminal block, these are connected internally.

5. Use the wire ties to secure the FR-H wiring to existing wires.
6. Connect the transducer harness to the FR-H as shown - green to #9, red to #10 and black to #11. This may need to be done prior to installing the MMV into the unit since there may be limited access to the relay terminals.
7. Mount the MMV assembly on the bulkhead of the indoor section using the #10 screws 4-in. (101.6 mm) down from the top of partition. The left edge of mounting bracket to be flush with the partition edge (See Fig. 3.) Verify that that fuses match those specified on the packaging list.

**IMPORTANT:** Do not drive screws into control box area.

8. Disconnect the OFM wires from the OFC-21 and -23 and IFC-13 or TB10 and save. Remove the two jumper wires between OFC and C2 and discard.

Remove the 24V control wires from OFC and save. Remove and discard OFC.

9. Route all wires connected to MMV sub-assembly through bulkhead. Route the transducer harness cable separately from the rest to avoid electrical interference.

The following wiring refers to Fig. 6 (wiring diagram) and Fig. 7 (second relay).

10. Connect violet and brown control wires that were connected to OFC to the violet and brown wires from FR13 and 14. Match the colors.
  - a. Connect BLK 1, YEL 2 and BLU 3 coming from MMV control T1, T2 and T3 to the BLK, YEL and BLU OFM wires previously disconnected. Match the colors.
  - b. Connect BLK 6, YEL 7, and BLU 8 coming from fuse block to C2-11, C2-13 and IFC-13 or TB10 for 208/230 units with electric heaters installed.
  - c. Connect the GRN/YEL ground wire to the ground screw in the control box used to ground the outdoor fan motor.
  - d. For 400-3-50 units, move the orange control wire from TB-1 to TB-13C on the MMV as indicated in Fig. 6.
11. Orange wire (FR-H) to LCTB "W1".
12. Brown wire (FR-H) to LCTB "C" 24V common.
13. Remove the cap from the discharge line service port of Circuit 1 and connect the check valve tee (EC36SZ061) to the port.

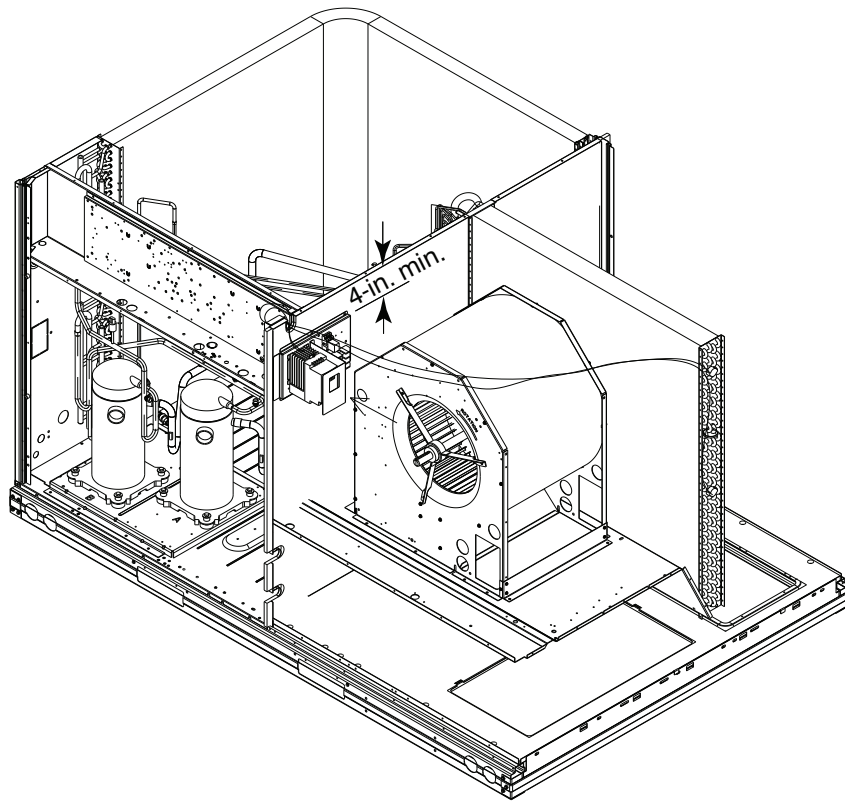
## **WARNING**

### **PERSONAL INJURY HAZARD**

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

Orient the valve so that the ports are directed away from the access panel.

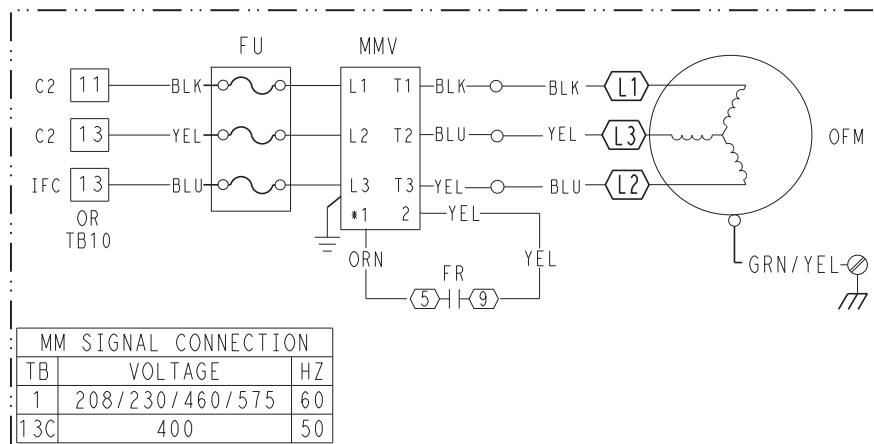
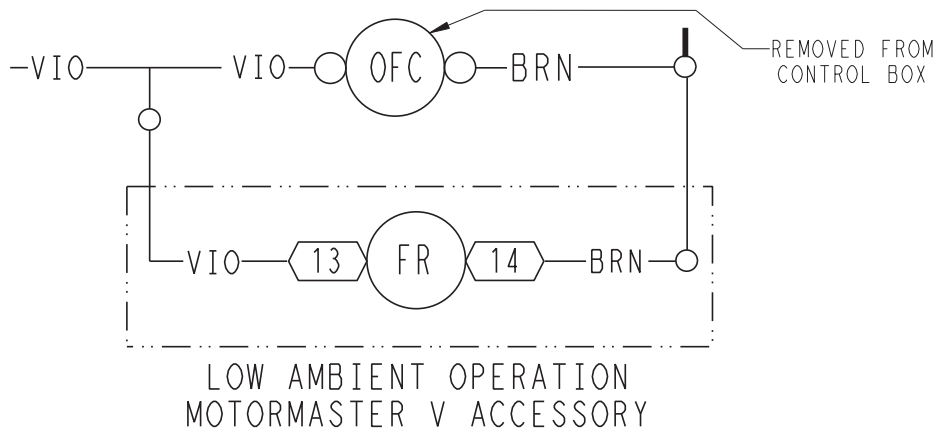
14. Attach service port cap to check valve tee.
15. Connect transducer HK05ZZ001 to check valve tee.
16. Connect transducer harness cable to transducer.
17. Bundle any excess wire and dress harnesses with wire ties.
18. Place the appropriate wiring label on the control box cover.
19. Reattach control box cover, compressor access panel and indoor blower panel.
20. Place the caution label on the top cover above the control box near the outdoor fan grill.



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**Fig. 3 - Motormaster® V Assembly on Bulkhead**



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**Fig. 4 - Wiring Diagram - Cooling Unit**

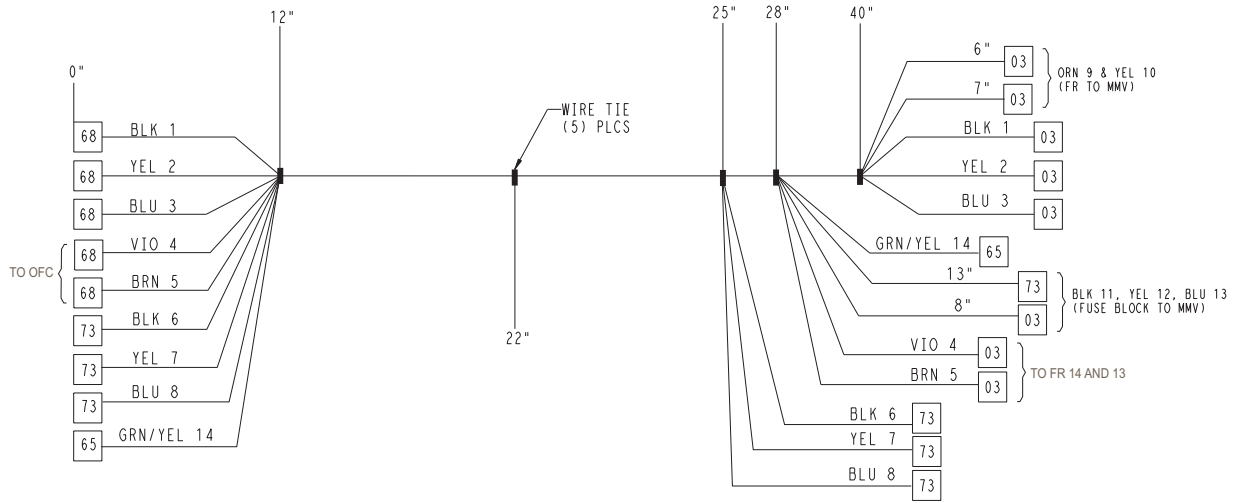


Fig. 5 - Wire Harness Diagram - Cooling Only

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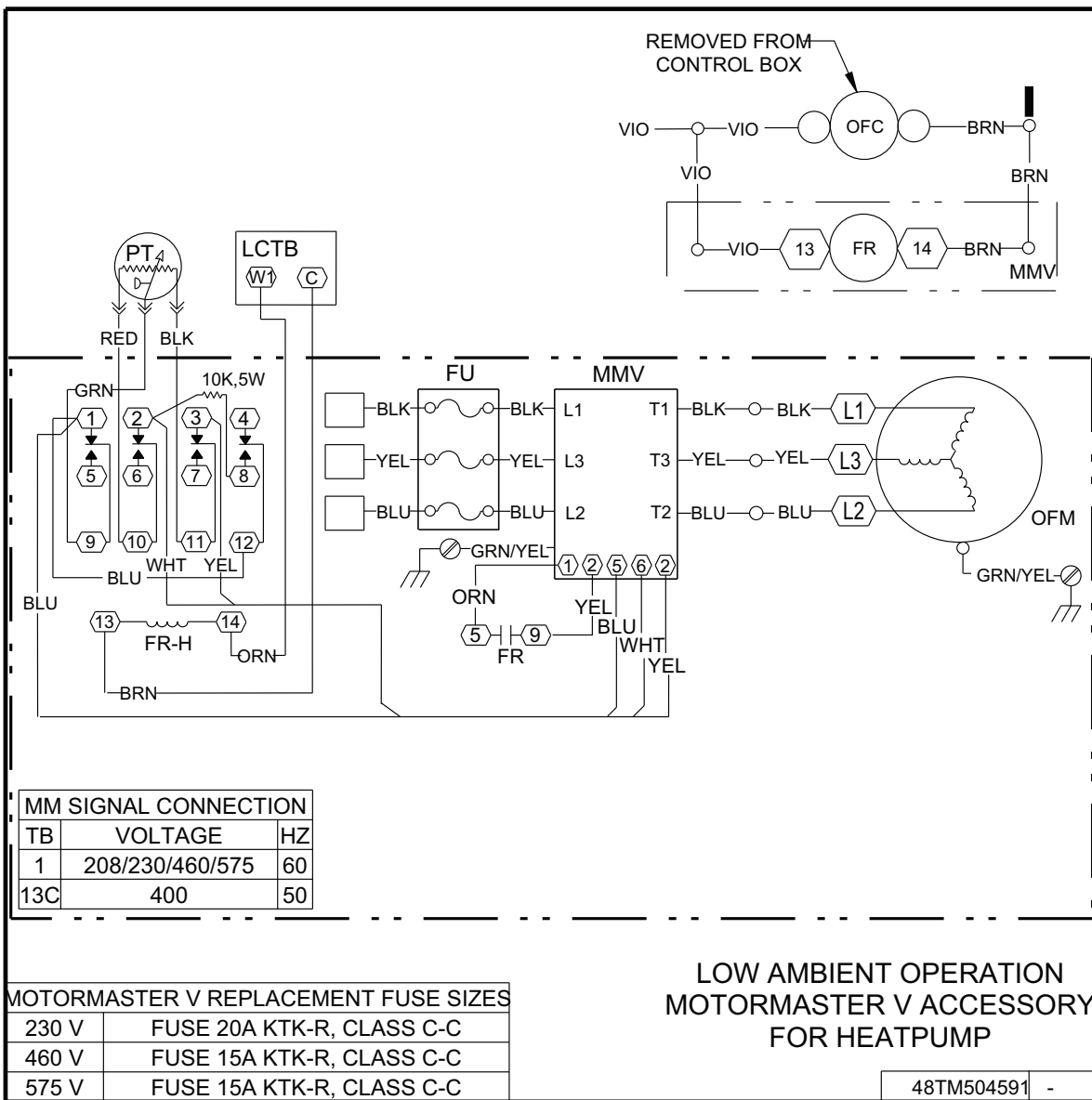
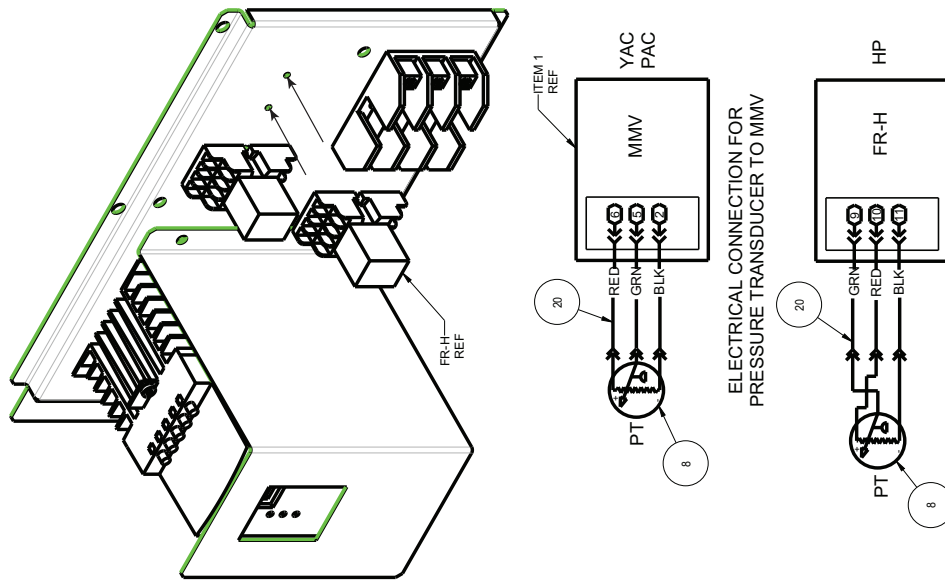


Fig. 6 - Wiring Diagram - Heat Pump Only

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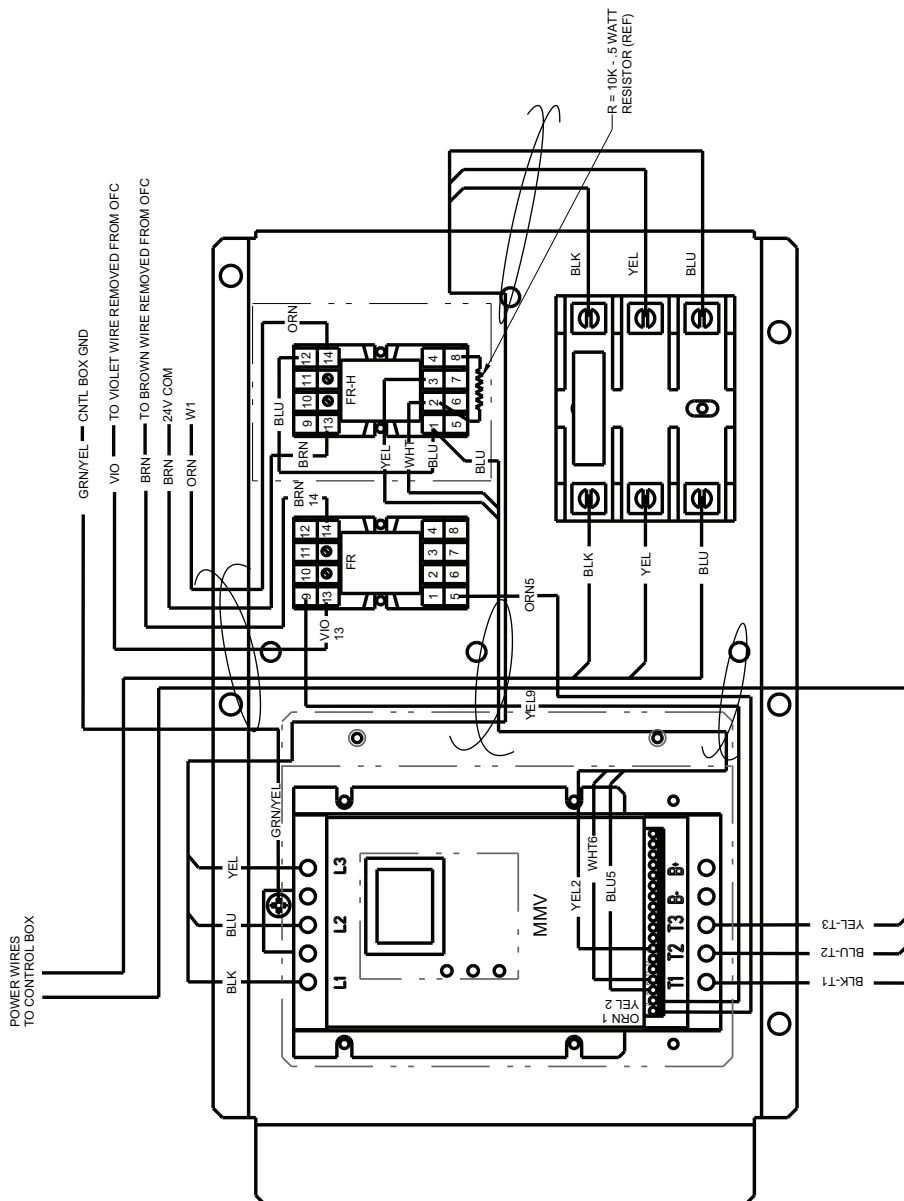


Fig. 7 - Assembly for Second Relay - Heat Pump Only

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### Step 3 — Configure Motormaster® V Control

The Motormaster V control is configured for an operation mode of internal PI (pressure independent) control and 0 to 5V feedback by installing the start contactor according to Table 2. No additional programming is required. Note that the pressure transducer must be attached for proper configuration.

**Table 2 – Configuration Table**

NOMINAL VOLTAGE (V–Ph–Hz)	MODE	CONTROL INPUT (Pin 5)	START CONTACT
230–3–60 460–3–60 575–3–60	1	Internal PI control, 0–5V feedback	TB1–TB2
400–3–50	4	Internal PI control, 0–5V feedback	TB13C–TB2

### Step 4 — Test Motormaster V Control

To test the control and motor in the test mode, run compressor no. 1. The Motormaster V electronic control adjusts the fan speed based on the discharge pressure input. Ensure that fans are rotating clockwise (as viewed from above). If rotation is backward, lock out all power then swap 2 leads AFTER the Motormaster V control.

### START-UP

The Motormaster V electronic control will be powered up as long as unit voltage is present. When the system calls for cooling, the fan relay will be energized to initiate the start-up sequence for the Motormaster V electronic control. The LED (light-emitting diode) will display the speed of the motor. The display range will be 8 to 60 Hz. The Motormaster V electronic control will start the condenser fan when the compressor engages. The control will adjust the fan speed to maintain approximately 200 psig discharge pressure. Above that pressure, the fan should operate at full speed.

The Motormaster V control uses a 0 to 5 vdc signal input from a pressure transducer attached to the liquid line service valve gauge port on circuit A. The pressure transducer is connected to terminals 2, 5 and 6 on the controller. The controller is configured by jumper wires and sensor input types. No field programming is required. If controller does not function properly, the information provided below can be used to program and troubleshoot the drive.

### Drive Programming

Table 3 shows all program parameters for each of the operating modes. Refer to Troubleshooting section before attempting to change programming in the Motormaster V control.

**⚠ CAUTION**

**EQUIPMENT DAMAGE HAZARD**

Failure to follow this caution may result in personal injury and damage to equipment.

It is strongly recommended that the user NOT change any programming without consulting service personnel. Unit damage may occur from improper programming.

### To Enter Password and Change Program Values:

1. Press MODE.
2. The display will read “00” and the upper right-hand decimal point will be blinking. This will activate the PASSWORD prompt (if the password has not been disabled).

**Table 3 – Program Parameters for the Operating Mode**

PARAMETERS	DESCRIPTION	MODE 1	MODE 2	MODE 4
P01	Line Voltage: 01 = low line, 02 = high line	01	02	02
P02	Carrier Freq: 01 = 4 kHz, 02 = 6 kHz, 03 = 8 kHz	01	01	01
P03	Startup mode: flying restart	06	06	06
P04	Stop mode: coast to stop	01	01	01
P05	Standard Speed source: 01 = keypad, 04 = 4–20mA (NO PI), 05 = R22, 06 = R134a	05	05	05
P06	TB–14 output: 01 = none	01	01	01
P08	TB–30 output: 01 = none	01	01	01
P09	TB–31 Output: 01 = none	01	01	01
P10	TB–13A function sel: 01 = none	01	01	01
P11	TB–13B function sel: 01 = none	01	01	01
P12	TB–13C function sel: 01 = none	01	01	01
P13	TB–15 output: 01 = none	01	01	01
P14	Control: 01 = Terminal strip	01	01	01
P15	Serial link: 02 = enabled 9600,8,N,2 with timer	02	02	02
P16	Units editing: 02 = whole units	02	02	02
P17	Rotation: 01 = forward only, 03 = reverse only	01	01	01
P19	Acceleration time: 20 sec	20	20	20
P20	Deceleration time: 10 sec	10	10	10
P21	DC brake time: 0	0	0	0
P22	DC BRAKE VOLTAGE 0%	0	0	0
P23	Min freq = 8 Hz ~ 100 – 160 rpm	8	8	8
P24	Max freq	60	60	50
P25	Current limit: (%)	125	110	110
P26	Motor overload: 100	100	100	100
P27	Base freq: 60 or 50 Hz	60	60	50
P28	Fixed boost: 0.5% at low frequencies	0.5	0.5	0.5
P29	Accel boost: 0%	0	0	0
P30	Slip compensation: 0%	0	0	0
P31	Preset spd #1: speed if loss of control signal	57	57	47
P32	Preset spd #2: 0	0	0	0
P33	Preset spd #3: 0	0	0	0
P34	Preset spd 4 default — R22 setpoint. TB12–2 open	24.0	24.0	24.0
P35	Preset spd 5 default — R134a setpoint. TB12–2 closed	12.6	12.6	12.6
P36	Preset spd 6 default	0	0	0
P37	Preset spd 7 default	0	0	0
P38	Skip bandwidth	0	0	0
P39	Speed scaling	0	0	0
P40	Frequency scaling 50 or 60 Hz	60	60	50
P41	Load scaling: default (not used so NA)	200	200	200
P42	Accel/decel #2: default (not used so NA)	60	60	60
P43	Serial address	1	1	1
P44	Password:111	111	111	111
P45	Speed at min signal: 8 Hz; used when PID mode is disabled and 4–20 mA input is at 4 mA	8	8	8
P46	Speed at max feedback: 60 or 50 Hz. Used when PID disabled and 4–20 mA input is at 20 mA	60	60	50
P47	Clear history? 01 = maintain. (set to 02 to clear)	01	01	01
P48	Program selection: Program 1 – 12	01	02	04
P61	PI Mode: 05 = reverse, 0–5V, 01 = no PID	05	05	05
P62	Min feedback = 0 (0V *10)	0	0	0
P63	Max feedback = 50 (5V * 10)	50	50	50
P64	Proportional gain = 3.5%	3.5	3.5	3.5
P65	Integral gain = .2	.2	.2	.2
P66	PI accel/decel (setpoint change filter) = 10	10	10	10
P67	Min alarm	0	0	0
P68	Max alarm	0	0	0

LEGEND

- NA – Not Applicable
- PI – Proportional Integral
- PID – Proportional Integral Derivative

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- Use the UP and DOWN buttons to scroll to the password value (the factory default password is “111”) and press the MODE button. Once the correct password value is entered, the display will read “P01”, which indicates that the PROGRAM mode has been accessed at the beginning of the parameter menu (P01 is the first parameter).

**NOTE:** If the display flashes “Er”, the password was incorrect and the process to enter the password must be repeated.

- Press MODE to display present parameter setting. The upper right decimal point blinks. Use UP and DOWN buttons to scroll to the desired parameter number.
- Once the desired parameter number is found, press the MODE button to display the present parameter setting. The upper right-hand decimal point will begin blinking, indicating that the present parameter setting is being displayed. Use the UP and DOWN buttons to change setting. Press MODE to store new setting.
- Press MODE to store the new setting and also exit the PROGRAM mode. To change another parameter, press the MODE button again to re-enter the PROGRAM mode (the parameter menu will be accessed at the parameter that was last viewed or changed before exiting). If the MODE button is pressed within two minutes of exiting the PROGRAM mode, the password is not required to access the parameters.
- After two minutes, the password must be entered in order to access the parameters again.

### **To Change Password**

Enter the current password, then change P44 to the desired password.

### **To Reset Factory Defaults**

To recognize a factory reset, the MMV controller must see a change in P48.

- Cycle power from Motormaster® V control.
- Enter PROGRAM mode by entering password.
- Scroll to P48 by using UP and DOWN buttons and then press MODE. One of the 12 mode numbers will appear. (Modes 1, 2 and 4 are used for these units.)
- Restore factory defaults by changing the value in P48 using UP and DOWN buttons and then storing the value by pressing MODE.
- Press MODE again to re-display the value of P48.
- Change the value of P48 to the desired factory default mode using UP and DOWN buttons then press MODE. (See Table 3.) The Motormaster V control is now restored to factory settings.

## **TROUBLESHOOTING**

Troubleshooting the Motormaster V control requires a combination of observing system operation and VFD display information. If the discharge line pressure is above the set point and the VFD is running at full speed, this is a normal condition. The fan CANNOT go any faster to maintain set point.

If the VFD is not slowing down even though discharge pressure is below set point, the VFD could be set for manual control or the control may be receiving faulty pressure transducer output. Corrective action would include:

- Check that VDC signal between TB5 and TB2 is between 0.5 v and 4.5 v.
- Restore VFD to automatic control.
- Change parameter P05 back to correct value shown in Table 3.

The MMV control also provides real time monitoring of key inputs and outputs. The collective group is displayed through parameters P50 to P56 and all values are read only. These values can be accessed without entering a password.

Press MODE twice and P50 will appear.

Press MODE again to display value.

To scroll to P51-P56 from P50, use UP and DOWN buttons, then press MODE to display the value.

- **P50: FAULT HISTORY** — Last 8 faults
- **P51: SOFTWARE version**
- **P52: DC BUS VOLTAGE** — in percent of nominal. Usually rated input voltage x 1.4
- **P53: MOTOR VOLTAGE** — in percent of rated output voltage
- **P54: LOAD** — in percent of drives rated output current
- **P55: VDC INPUT** — in percent of maximum input: 100% will indicate full scale which is 5 v
- **P56: 4-20 mA INPUT** — in percent of maximum input. 20% = 4 mA, 100% = 20 mA

**NOTE:** The Motormaster V transducer is attached to circuit A. If circuit A compressor power is interrupted (overload, high pressure cutout, etc.) the outdoor fans will operate at a reduced speed resulting from erroneous low pressure readings. This process may cause a high pressure safety cut-out on circuit B compressor. If only circuit B is capable of operating for a temporary period of time because of a circuit A problem, the transducer will have to be moved to the circuit B service port until circuit A can be repaired. Once the problem is repaired, move the transducer back to circuit A for proper unit operation.

## **Fault Lockout**

If a fault lockout (LC) has occurred, view the fault history in P50 to find the last fault. Once P50 is displayed, use the arrow buttons to scroll through the last 8 faults. Any current faults or fault codes from the fault history can be analyzed using Table 4.

TO DISABLE AUTOMATIC CONTROL MODE AND ENTER MANUAL SPEED CONTROL:

1. Change P05 to '01- keypad'.
2. Push UP and DOWN arrow button to set manual speed.
3. Set P05 to proper value to restore automatic control according to Table 3.

## **To Provide Manual Start/Stop Control**

With power removed from VFD, remove start command jumper and install a switch between the appropriate start terminals as required in Table 2.

## **EPM Chip**

The drive uses a electronic programming module (EPM) chip to store the program parameters. This is an EEPROM memory chip and is accessible from the front of the VFD. It should not be removed with power applied to the VFD.

## **Loss of CCN Communications**

Carrier Comfort Network® (CCN) communications with external control systems can be affected by high frequency electrical noise generated by the Motormaster® V control. Ensure unit is well grounded to eliminate ground currents along communication lines.

If communications are lost only while Motormaster V control is in operation, order a signal isolator (CEAS420876-2) and power supplies (CEAS221045-01, 2 required) for the CCN communication line.

**Table 4 – Fault Codes**

The drive is programmed to automatically restart after a fault and will attempt to restart three times after a fault (the drive will not restart after CF, cF, GF, F1, F2–F9, or Fo faults). If all three restart attempts are unsuccessful, the drive will trip into FAULT LOCKOUT (LC), which requires a manual reset.

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CODE	DESCRIPTION	RESET METHOD	PROBABLE CAUSE	CORRECTIVE ACTION
<b>AF</b>	High Temperature Fault	Automatic	Ambient temperature is too high; cooling fan has failed (if equipped)	Check cooling fan operation.
<b>CF</b>	Control Fault	Manual	A blank EPM or an EPM with corrupted data has been installed	Perform a factory reset using Parameter 48 – PROGRAM SELECTION. See Drive Programming section.
<b>cF</b>	Incompatibility Fault	Manual	An EPM with an incompatible parameter version has been installed	Either remove the EPM or perform a factory reset (Parameter 48) to change the parameter version of the EPM to match the parameter version of the drive.
<b>F1</b>	EPM Fault	Manual	The EPM is missing or damaged	Install EPM or replace with new EPM.
<b>F2–F9 Fo</b>	Internal Faults	Manual	The control board has sensed a problem	Consult factory.
<b>GF</b>	Data Fault	Manual	User data and Carrier defaults in the EPM are corrupted.	Restore factory defaults by toggling P48 to another mode. Then set P48 to desired mode to restore all defaults for that mode. See Drive Programming section. If that does not work, replace EPM.
<b>HF</b>	High DC Bus Voltage Fault	Automatic	Line voltage is too high; deceleration rate is too fast;overhauling load.	Check line voltage — set P01 appropriately.
<b>JF</b>	Serial Fault	Automatic	The watchdog timer has timed out, indicating that the serial link has been lost.	Check serial connection (computer). Check settings for P15. Check settings in communication software to match P15.
<b>LF</b>	Low DC Bus Voltage Fault	Automatic	Line voltage is too low	Check line voltage — set P01 appropriately.
<b>OF</b>	Output Transistor Fault	Automatic	Phase to phase or phase to ground short circuit on the output; failed output transistor; boost settings are too high;acceleration rate is too fast.	Reduce boost or increase acceleration values. If unsuccessful, replace drive.
<b>PF</b>	Current Overload Fault	Automatic	VFD is undersized for the application; mechanical problem with the driven equipment.	Check line voltage – set P01 appropriately. Check for dirty coils. Check for motor bearing failure.
<b>SF</b>	Single–Phase Fault	Automatic	Single–phase input power has been applied to a three–phase drive.	Check input power phasing.
<b>Drive displays ‘--’ even though drive should be running</b>	Start Contact is Not Closed	Automatic	Start contact is missing or not functioning.	Check fan relay.
<b>VFD flashes “--” and LCS</b>	Start Contact is Not Closed	Automatic	Start contact not closed.	Check FR for closed contact.
<b>VFD flashes 57 (or 47) and LCS</b>	Speed Signal Lost	Automatic	Speed signal lost. Drive will operate at 57 (or 47) Hz until reset or loss of start command. Resetting requires cycling start command (or power).	Transducer signal lost. Check VDC signal between TB5 and TB2. Should be in range of 0.5V to 4.5V. 5VDC output should be present between TB6 and TB2.

**LEGEND**

- EPM** – Electronic Programming Module
- FR** – Fan Relay
- LCS** – Loss of Control Signal
- TB** – Terminal Block
- VFD** – Variable Frequency Drive