

Installation Instructions

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SAFETY CONSIDERATIONS

DANGER

Failure to follow these instructions will result in severe personal injury or death.

ELECTRIC SHOCK HAZARD. Do not operate compressor or provide electric power to it unless the compressor terminal box is installed and the terminal box cover is in place and secured.

DO NOT provide power to unit or turn on compressor unless suction and discharge service valves are open.

DO NOT remove the compressor terminal box cover until all electrical sources have been disconnected.

NEVER EXCEED specified test pressures. System strength/tightness test pressure may not exceed the compressor maximum test pressure on the nameplate.

Close shutoff valves to isolate the compressor if necessary.

DO NOT USE oxygen or other industrial gases for tightness/pressure testing. Use nitrogen or inert gas.

WARNING

Failure to follow these instructions may result in serious injury or death.

CONTENTS UNDER PRESSURE. Compressor contains oil and refrigerant under pressure. Pressure must be relieved before installation, servicing or opening any connections.

HOT and COLD surface temperatures can occur during operation and can result in severe burns or frostbite.

USE ONLY approved refrigerants and refrigeration oils.




CHECK THE REFRIGERANT TYPE. Charge only with refrigerant that conforms to AHRI Standard 700.

Only qualified, authorized, and appropriately trained HVAC or refrigeration personnel should install, commission, and maintain this equipment.

Use appropriate personal safety equipment where required. Safety goggles, gloves, protective clothing, safety boots, and hardhats should be worn where necessary.

CAUTION

This document contains information specific to the application and installation of 06D, 06E, and 06CC compressors on variable speed applications. Except as noted herein, all safety instructions, operating limits and installation procedures of these documents apply. Follow all safety practices as defined in the drive manufacturer's literature.

MODEL	APPLICATION GUIDE	INSTALLATION AND START GUIDES
06D, 06E, 06CC	 http://bit.ly/484Tz5o	 http://bit.ly/47z3SP7
VFD Operations Manual	Follow all safety practices as defined in the drive manufacturer's literature. For drives purchased from Carrier, refer to Carrier VFD Operations Manual M00356 and M00372.  https://bit.ly/41aBxMu	

GENERAL

New Carlyle 06D, 06E, and 06CC compressors are approved for variable speed applications. Conversion of older compressor models from fixed speed to variable speed may require upgrades to the internal compressor hardware, these instructions do not fully outline the requirements for this type of conversion. Carlyle Application Engineering should be consulted for any conversion of older compressors to variable speed operation.

Variable Speed Operating Limits

ALLOWABLE REFRIGERANTS AND OPERATING ENVELOPES

Operating envelopes of the compressor models will differ with each model and refrigerant. Refer to the CARWIN rating program for these operating limits.

MINIMUM ALLOWABLE SPEED

Table 1 shows the minimum allowable speeds that the 06D, 06E, and 06CC compressors may be operated. Figure 1 shows additional speed restrictions for R-448A and R-449A applications.

Table 1 — Allowable Refrigerants and Minimum Allowable Speed

VFD PROGRAMMING PARAMETER →	MINIMUM ALLOWABLE SPEED (Hz)
	3-02 4-12
R-22, R-404A, R-507A, R-407A, R-407C, R-407F	30
R-134a, R-513A	20
R-448A, R-449A	20 See Fig. 1 (conditioned-based limits)

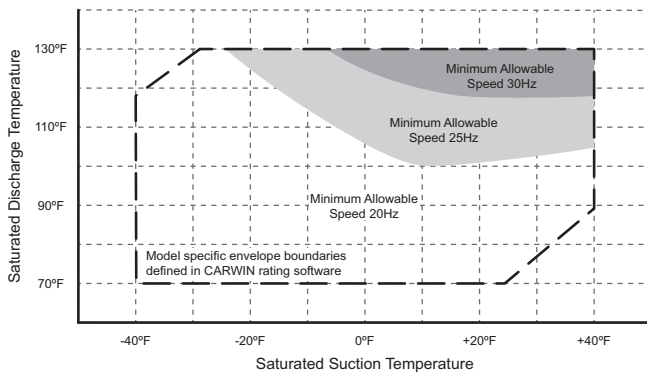


Fig. 1 — Minimum Speed Limitations (R-448A and R-449A)

MAXIMUM ALLOWABLE SPEED

Operation above 60 Hz is allowed only for 460-3-60/400-3-50 line power. These applications require a 380-3-60 motor, as denoted by “37” digits 11-12 of the 06D models and by “9” in digit 8 of the 06E models. All other motor voltages are limited to 60 Hz maximum speed.

ELECTRICAL DATA

06D and 06CC 17-37 cfm models

Consult the wiring diagram located inside the compressor terminal box cover and Fig. 2-3 associated with corresponding model and the correct terminal plate for proper wiring connections. See Table 2 for corresponding electrical data.

⚠ CAUTION

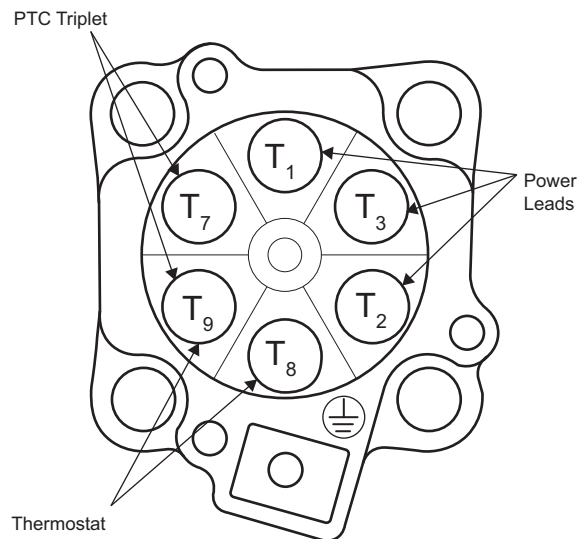
Compressors operating with variable frequency drives use the drive for overcurrent protection of the compressor. Systems that may have a VFD bypass option must have appropriate overcurrent protection for the compressor when operating in bypass mode.

IMPORTANT: At a constant suction and discharge pressure condition, the current draw of the motor will not change as the shaft speed changes. Motor current draw changes only as the shaft torque changes based on the operating condition.

TERMINAL PLATE ARRANGEMENTS

New 06D and 06CC 17-37 cfm compressors for variable speed applications (06D defined by 0, 1, 2, or 3 in digit 10, or 06CC 17-37 cfm defined by letters A-M in digit 5) will have 6-pin terminal plate assemblies. See Fig. 2.

Older compressors with either 5-pin or 6-pin terminal plates (06D defined by A, B, C, D, or G in digit 10, or 06CC 17-37 cfm defined by 0, 1, 2 or 3 in digit 5) for all refrigerants, may only be applied in a speed range of 30-60 Hz.



Thermostat

LEGEND

PTC — Positive Temperature Coefficient Thermistor

Fig. 2 — 06D, 06CC 17-37 cfm 6-Pin Universal Terminal Plate Arrangement

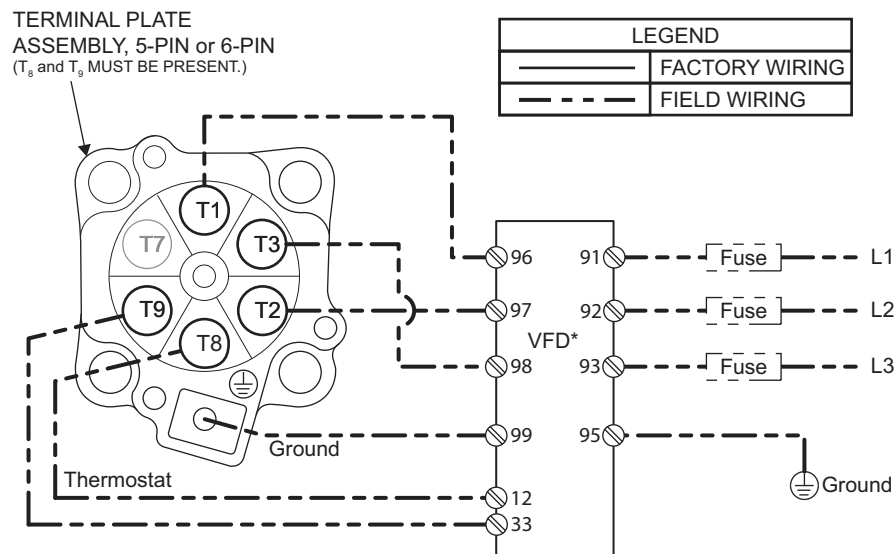
VARIABLE SPEED WIRING

Follow steps 1-6 for wiring of variable speed units.

1. For compressors that are factory-supplied with electronic overloads (06D with 1, 2, or 3 in Digit 10, or 06CC 17-37 cfm with any letter A-M in digit 5), disconnect and discard the factory-supplied overloads. 06D compressors with a 0 in Digit 10 and 06CC 17-37 cfm compressors with 5, 6, 7, or 8 in digit 5 are supplied from the factory without overloads.
2. Connect motor power T₁, T₂, and T₃ to the VFD (Variable Frequency Drive), make terminal plate connections as shown in Fig. 3.
3. Connect the terminal plate ground to the ground terminal of the VFD.

4. Connect the internal motor thermostat, terminal pins T₈ and T₉ to VFD inputs 12 and 33. There is no connection to compressor terminal pin T₇.
5. Verify that the VFD has the appropriate input line fuses installed.
6. Verify VFD parameters are properly programmed. Parameters for the Carrier VFDs are in the Carrier VFD Operation Manual M00356, which is supplied with the VFD and is available on the Carlyle website. Refer to QR Code for VFD Operations Manual on page 1.

NOTE: 06E compressor models with 208/230V, 35 Hp or 40 Hp motors must refer to VFD Operations Manual M00372, see Table 4, Note k.



*The VFD terminal numbers shown are for the variable frequency drives sold by Carrier. Consult VFD literature for other VFD suppliers.

Fig. 3 — 06D, 06CC 17-37 cfm Variable Speed Wiring (All Voltages)

Table 2 — Electrical Data for Variable Speed 06D and 06CC 17-37 cfm Models

Compressor Model	Model Voltage Code 06D: Digits 11-12 06CC: Digit 8	Nom. Motor (Hp)	Compressor Motor Electrical Information						VFD Input Line Voltage	Variable Frequency Drive Electrical Information							
			Max. Allowable (Hz)	Nominal Motor Voltage	Nominal Motor Freq.	LRA ^a	Comp. Max. Cont. Current (MCC) ^b	Rated Load Amps (RLA)		Single Compressor Applications				Multiple Compressor Applications			
										Nom. Power Rating (kW)	Carrier VFD Part No.	VFD Max. Cont. Output Current (Amps)	Input Line Fuse Size (Amps)	Nom. Power Rating	Carrier VFD Part No.	VFD Max. Cont. Output Current (Amps)	Input Line Fuse Size (Amps)
VFD Programming Parameter ^c →		1-21	3-03 4-14	1-22	1-23	—	1-24	—	—	—	—	—	—	—	—	—	—
06DR109	12	2	20-60	208/230	60	53.3	12.1	7.8	208-230	7	HR46ZY204	30.8	50	7	HR46ZY204	30.8	50
	06		20-60	460	60	26.3	5.5	3.5	460		HR46ZY205	14.5	30		HR46ZY205	14.5	30
	01		20-60	575	60	21	4.4	2.8	575		HR46ZY206	11	30		HR46ZY206	11	30
06DR013	32	3	60	208	60	71	17.4	11.2	208/230		HR46ZY204	30.8	50	18	HR46ZY204	30.8	50
	37		80	380	60	43	10.5	6.7	460		HR46ZY205	14.5	30		HR46ZY214	34	50
	36		60	460	60	35.5	8.7	5.6	460		HR46ZY205	14.5	30		HR46ZY214	34	50
06CC*16, 06CC*17, 06CC*18	31	5	60	575	60	28.4	7.0	4.5	575		HR46ZY206	11	30		HR46ZY215	27	45
	D		60	208	60	100	27.0	17.3	208/230		HR46ZY204	30.8	50		HR46ZY213	74.8	125
	G		60	460	60	50	13.5	8.7	460		HR46ZY205	14.5	30		HR46ZY214	34	50
06DM313, 06DM316, 06DR316, 06DR718	J	6 1/2	60	575	60	40	10.8	6.9	575		HR46ZY206	11	30		HR46ZY215	27	45
	32		60	208	60	100	27.0	17.3	208/230	HR46ZY213	74.8	125	HR46ZY213		74.8	125	
	37		80	380	60	61	16.3	10.4	460	HR46ZY214	34	50	HR46ZY214		34	50	
	36		60	460	60	50	13.5	8.7	460	HR46ZY214	34	50	HR46ZY214		34	50	
06DR820, 06DR725, 06DA818	31	7 1/2	60	575	60	40	10.8	6.9	575	HR46ZY215	27	45	HR46ZY215		27	45	
	32		60	208	60	160	44.0	28.2	208/230	HR46ZY213	74.8	125	HR46ZY213	74.8	125		
	37 ^d		80 ^e	380	60	97	26.6	17.1	460	HR46ZY214	34	50	HR46ZY218	52	80		
	36		60	460	60	80	22.0	14.1	460	HR46ZY214	34	50	HR46ZY218	52	80		
06CC*25	31	10	60	575	60	64	17.6	11.3	575	HR46ZY215	27	45	18	HR46ZY215	27	45	
	D		60	208	60	160	33.0	21.2	208/230	HR46ZY213	74.8	125		HR46ZY213	74.8	125	
	G		60	460	60	80	16.5	10.6	460	HR46ZY214	34	50		HR46ZY214	34	50	
06DR228, 06DA825	J	7 1/2	60	575	60	64	13.2	8.5	575	HR46ZY215	27	45		HR46ZY215	27	45	
	32		60	208	60	198	55.5	35.6	208/230	HR46ZY213	74.8	125	30	HR46ZY217	115	150	
	37 ^f		80 ^g	380	60	120	33.6	21.5	460	HR46ZY214	34	50		HR46ZY218	52	80	
	36		60	460	60	99	27.8	17.8	460	HR46ZY214	34	50		HR46ZY218	52	80	
06CC*28	31	10	60	575	60	79	22.2	14.2	575	HR46ZY215	27	45	22	HR46ZY216	34	50	
	D		60	208	60	198	41.6	26.7	208/230	HR46ZY213	74.8	125	18	HR46ZY213	74.8	125	
	G		60	460	60	99	20.9	13.4	460	HR46ZY214	34	50		HR46ZY214	34	50	
06DR337, 06DM337, 06DA328	J	10	60	575	60	79	16.7	10.7	575	HR46ZY215	27	45		HR46ZY215	27	45	
	32		60	208	60	228	62.0	39.7	208/230	HR46ZY213	74.8	125	30	HR46ZY217	115	150	
	37 ^h		80 ⁱ	380	60	138	33.6	21.5	460	HR46ZY214	34	50		HR46ZY218	52	80	
	36		60	460	60	114	31.0	19.9	460	HR46ZY214	34	50		HR46ZY218	52	80	
06CC*37	31	15	60	575	60	91	25.0	16.0	575	HR46ZY215	27	45	37	HR46ZY221	52	80	
	D		60	208	60	228	46.5	29.8	208/230	HR46ZY213	74.8	125	18	HR46ZY222	74.8	125	
	G		60	460	60	114	23.3	14.9	460	HR46ZY214	34	50	30	HR46ZY223	52	80	
	J		60	575	60	91	18.8	12.1	575	HR46ZY215	27	45	22	HR46ZY224	34	50	
06DA537, 06DR541	12	15	60	208	60	266	89.0	57.1	208/230	30	HR46ZY217	115	150	37	HR46ZY225	143	200
	06		60	460	60	120	40.0	25.6	460		HR46ZY218	52	80		HR46ZY226	65	100
	01		60	575	60	96	32.0	20.5	575		HR46ZY216	34	50		HR46ZY227	52	80

NOTE: See notes and legend on page 5.

NOTES AND LEGEND FOR TABLE 2.

NOTES:

- a. All LRA values are for 60 Hz across the line starting. LRA is only a valid motor parameter for across-the-line starting applications.
- b. During VFD startup, the maximum current that the motor will see is the current limit value (MCC) that is programmed in the VFD.
- c. Refer to Table 7 for VFD programming parameters.
- d. Compressor models 06DR820 and 06DR725 only.
- e. Maximum speed of 06DA818 is 60 Hz.
- f. Compressor models 06DR228 only.
- g. Maximum speed of 06DA825 is 60 Hz.
- h. Compressor models 06DR337 and 06DM337 only.
- i. Maximum speed of 06DA328 is 60 Hz.

LEGEND

- LRA** — Locked Rotor Amps
- MCC** — Maximum Continuous Current
- RLA** — Rated Load Amps
- VFD** — Variable Frequency Drive

06E and 06CC 50-99 cfm Models

See Fig. 4 for terminal plate wiring. Consult the wiring diagram located inside the compressor terminal box cover and Fig. 5-8 associated with corresponding model and terminal plate for proper wiring connections. See Table 4 for corresponding electrical data.

TERMINAL PLATE ARRANGEMENTS

Wiring accessories (jumper bars and insulators) are supplied in the parts bag with the compressor. Insulated ring terminals (field supplied) must be suitable for the 3/8 in. diameter terminal studs. Figure 4 shows the wiring components of the terminal plate. Jam Nut No. 1 is factory-installed and should not be disturbed. Jam Nut No. 2 should be in contact with the underside of the jumper bar or ring terminal if no jumper bars are used. Jam Nut No. 3 should be in contact with the upper side of the jumper bars or ring terminal and should be wrench torqued to a maximum of 18lb-ft (24Nm).

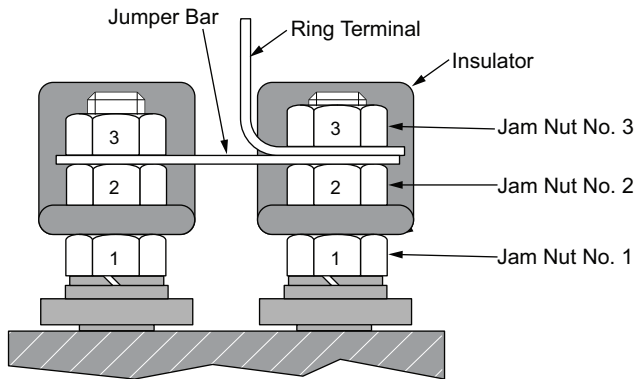


Fig. 4 — Terminal Plate Components

VARIABLE SPEED WIRING

Follow steps 1-5 for wiring of variable speed units.

1. Make jumper bar connections (see Table 3) for the appropriate motor and input line voltage.
2. Connect motor power T₁, T₂, and T₃ to the VFD. Refer to Terminal Plate Wiring section for connection details.
3. Connect the terminal plate ground to the ground terminal of the VFD.
4. Verify that the VFD has the appropriate input line fuses installed.
5. Verify VFD parameters are properly programmed. Parameters for the Carrier VFDs are in the Carrier VFD Operation Manual M00356, which is supplied with the VFD and is available on the Carlyle website. Refer to QR Code for VFD Operations Manual on page 1.

NOTE: 06E compressor models with 208/230V, 35 Hp or 40 Hp motors must refer to VFD Operations Manual M00372, see Table 4, Note k.

Table 3 — Terminal Plate Jumper Configurations — 06E, 06CC 50-99 cfm Models

06E MODELS (DIGIT 8)	06CC 50-99 cfm MODELS (DIGIT 8)	VFD INPUT VOLTAGE V-Ph-Hz	MAX. SPEED	MOTOR VOLTAGE V-Ph-Hz	TERMINAL PLATE WIRING SCHEMATIC
3	E	208/230-3-60 200-3-50	60	208/230/460-3-60 200/400-3-50 (Dual)	Fig. 6 Fig. 7
6	F	460-3-60 400-3-50		460-3-60 400-3-50 (Discrete)	Fig. 5
9	P		80	220/380-3-60 (Dual)	Fig. 8
1	J	575-3-60	60	575-3-60 (Discrete)	Fig. 5

Table 4 — Electrical Data for Variable Speed 06E and 06CC 50-99 cfm Models

Compressor Model	Model Voltage Code 06E: Digit 8 06CC: Digit 8	Nom. Motor (Hp)	Compressor Motor Electrical Information						Variable Frequency Drive Electrical Information								
			Max. Allowable (Hz)	Nominal Motor Voltage	Nominal Motor Freq.	LRA ^a	Comp. Max. Cont. Current (MCC) ^b	Rated Load Amps (RLA)	VFD Input Line Voltage	Single Compressor Applications				Multiple Compressor Applications			
										Nom. Power Rating (kW)	Carrier VFD Part No. ^c	VFD Max. Cont. Output Current (Amps)	Input Line Fuse Size (Amps)	Nom. Power Rating	Carrier VFD Part No.	VFD Max. Cont. Output Current (Amps)	Input Line Fuse Size (Amps)
VFD Programming Parameter ^d →		1-21	3-03 4-14	1-22	1-23	—	1-24	—	—	—	—	—	—	—	—	—	—
06CC550	E	15	60	208	60	283	68.0	49.0	208/230	30	HR46ZY217	115	150	37	HR46ZY219	143	200
	F		60	460	60	142	32.0	23.0	460	30	HR46ZY218	52	80	37	HR46ZY220	65	100
	J		60	575	60	98	27.0	19.0	575	22	HR46ZY216	34	50	37	HR46ZY221	52	80
06ER450, 06EM450	3	15	60	208	60	283	90.0	64.0	208/230	30	HR46ZY217	115	150	45	HR46ZY223	170	250
	9		80	380	60	157	52.0	37.0	460	30	HR46ZY218	52	80	55	HR46ZY226	105	150
	6		60	460	60	142	46.0	33.0	460	30	HR46ZY218	52	80	45	HR46ZY224	80	125
06CC665, 06CC675	1	20	60	575	60	98	38.0	27.0	575	22	HR46ZY216	34	50	45	HR46ZY225	62	100
	E		60	208	60	345	100.0	71.0	208/230	30	HR46ZY217	115	150	45	HR46ZY223	170	250
	F		60	460	60	173	50.0	36.0	460	30	HR46ZY218	52	80	45	HR46ZY224	80	125
06EA550, 06ER465, 06ER475	J	20	60	575	60	120	38.0	27.0	575	22	HR46ZY216	34	50	45	HR46ZY225	62	100
	3		60	208	60	345	108.0	77.0	208/230	45	HR46ZY223	170	250	75	HR46ZY230	277	350
	9 ^e		80 ^f	380	60	185	63.0	45.0	460	55	HR46ZY226	105	150	55	HR46ZY226	105	150
	6		60	460	60	173	54.0	39.0	460	55	HR46ZY226	105	150	55	HR46ZY226	105	150
06EA565, 06EM475	1	25	60	575	60	120	45.0	32.0	575	55	HR46ZY227	83	125	55	HR46ZY227	83	125
	3		60	208	60	446	140.0	100.0	208/230	45	HR46ZY223	170	250	75	HR46ZY230	277	350
	9 ^g		80 ^h	380	60	247	81.0	58.0	460	55	HR46ZY226	105	150	75	HR46ZY228	130	200
	6		60	460	60	223	70.0	50.0	460	55	HR46ZY226	105	150	55	HR46ZY226	105	150
06CC899	1	30	60	575	60	164	57.0	41.0	575	55	HR46ZY227	83	125	75	HR46ZY229	100	150
	E		60	208	60	506	141.0	101.0	208/230	45	HR46ZY223	170	250	75	HR46ZY230	277	350
	F		60	460	60	253	73.0	52.0	460	55	HR46ZY226	105	150	75	HR46ZY228	130	200
06EA575, 06ER399	J	30	60	575	60	176	58.0	41.0	575	55	HR46ZY227	83	125	75	HR46ZY229	100	150
	3		60	208	60	506	168.0	120.0	208/230	45	HR46ZY223	170	250	75	HR46ZY230	277	350
	9 ⁱ		80 ^j	380	60	280	98.0	70.0	460	55	HR46ZY226	105	150	110	HR46ZY005	190	315
	6		60	460	60	253	84.0	60.0	460	55	HR46ZY226	105	150	75	HR46ZY228	130	200
06EM499	1	35	60	575	60	176	65.0	46.0	575	55	HR46ZY227	83	125	75	HR46ZY229	100	150
	3		60	208	60	610	193.0	138.0	208	75	HR46ZY230 ^k	277	350	Consult Carrier Application Engineering			
	9		60	380	60	338	107.0	77.0	460	55	HR46ZY226	105	150	110	HR46ZY005	190	315
	6		60	460	60	305	96.0	69.0	460	55	HR46ZY226	105	150	110	HR46ZY005	190	315
06EA599	1	40	60	575	60	244	77.0	55.0	575	55	HR46ZY227	83	125	132	HR46ZY007	155	315
	3		60	208	60	690	236.0	169.0	208	75	HR46ZY230 ^k	277	350	Consult Carrier Application Engineering			
	3		60	230	60	690	213.4	152.0	230	75	HR46ZY230 ^k	277	350				
	9		60	380	60	382	130.0	93.0	460	75	HR46ZY228	130	130	132	HR46ZY006	240	350
	6		60	460	60	345	118.0	84.0	460	75	HR46ZY228	130	130	110	HR46ZY005	190	315
	1		60	575	60	276	94.0	67.0	575	75	HR46ZY229	100	100	132	HR46ZY007	155	315

NOTE: See notes and legend on page 8.

NOTES AND LEGEND FOR TABLE 4.

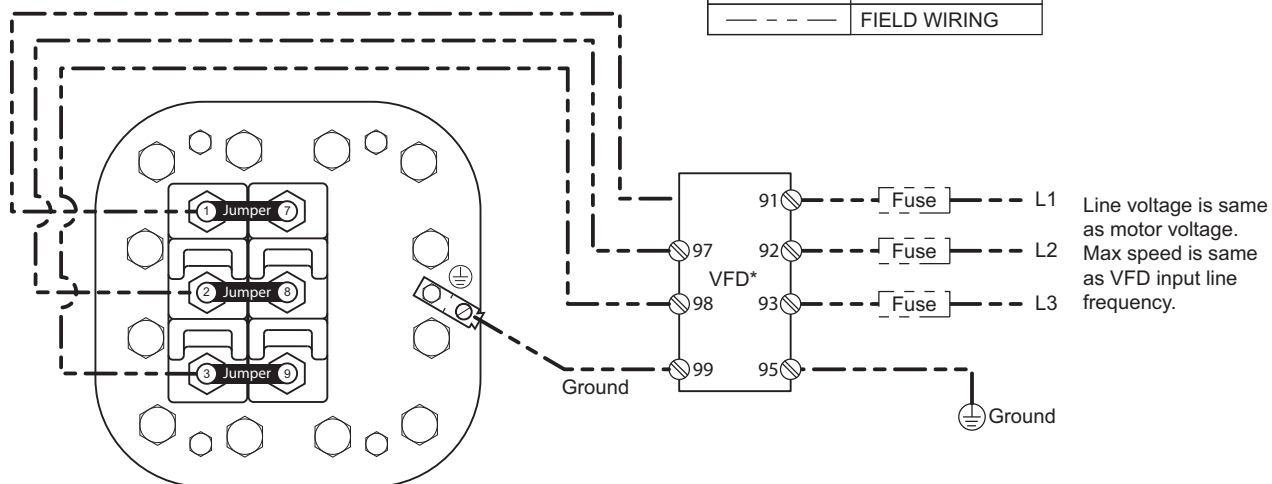
NOTES:

- a. All LRA values are for 60 Hz across the line starting. LRA is only a valid motor parameter for across-the-line starting applications.
- b. During VFD startup, the maximum current that the motor will see is the current limit value (MCC) that is programmed in the VFD.
- c. Refer to Carrier VFD Operation Manual M00352.
- d. Refer to Table 7 for VFD programming parameters.
- e. Compressor models 06ER465 and 06ER725 only.
- f. Maximum speed of 06EA550 is 60 Hz.
- g. Compressor models 06EM475 only.
- h. Maximum speed of 06EA565 is 60 Hz.
- i. Compressor models 06ER399 only.
- j. Maximum speed of 06EA575 is 60 Hz.
- k. Refer to Carrier Operation Manual M00372 in place of M00356 for these compressor models.

LEGEND

- LRA** — Locked Rotor Amps
- MCC** — Maximum Continuous Current
- RLA** — Rated Load Amps
- VFD** — Variable Frequency Drive

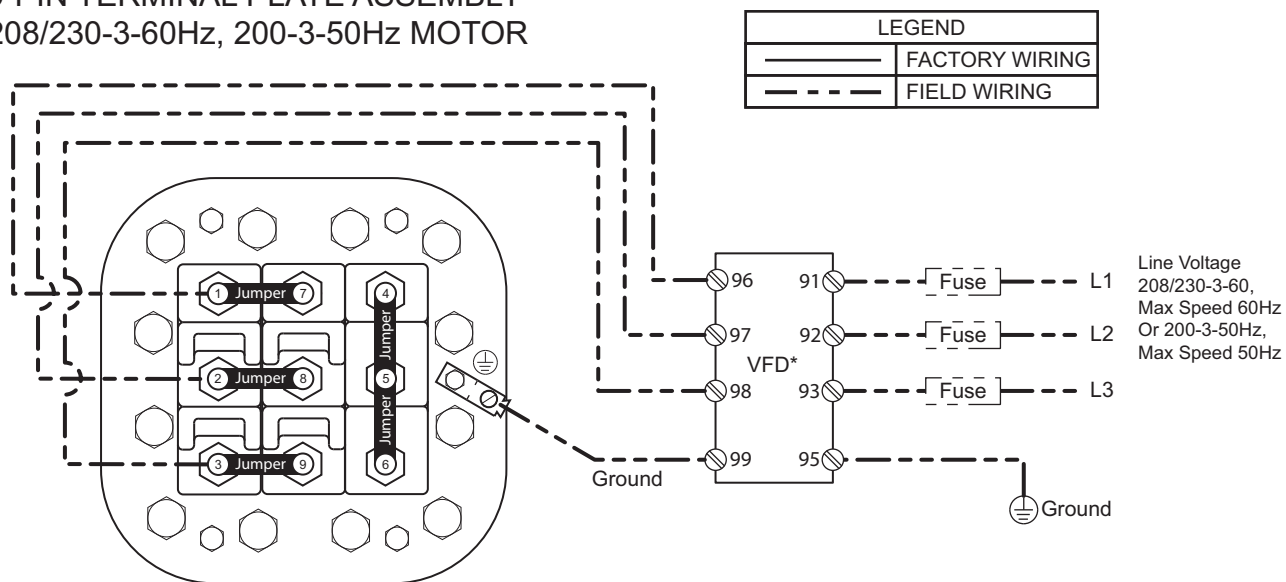
6-PIN TERMINAL PLATE ASSEMBLY ALL MOTOR VOLTAGES



*The VFD terminal numbers shown are for the variable frequency drives sold by Carrier. Consult VFD literature for other VFD suppliers.

Fig. 5 — 06E, 06CC 50-99 cfm Variable Speed Wiring Discrete Voltage Motor 460-v or 575-v

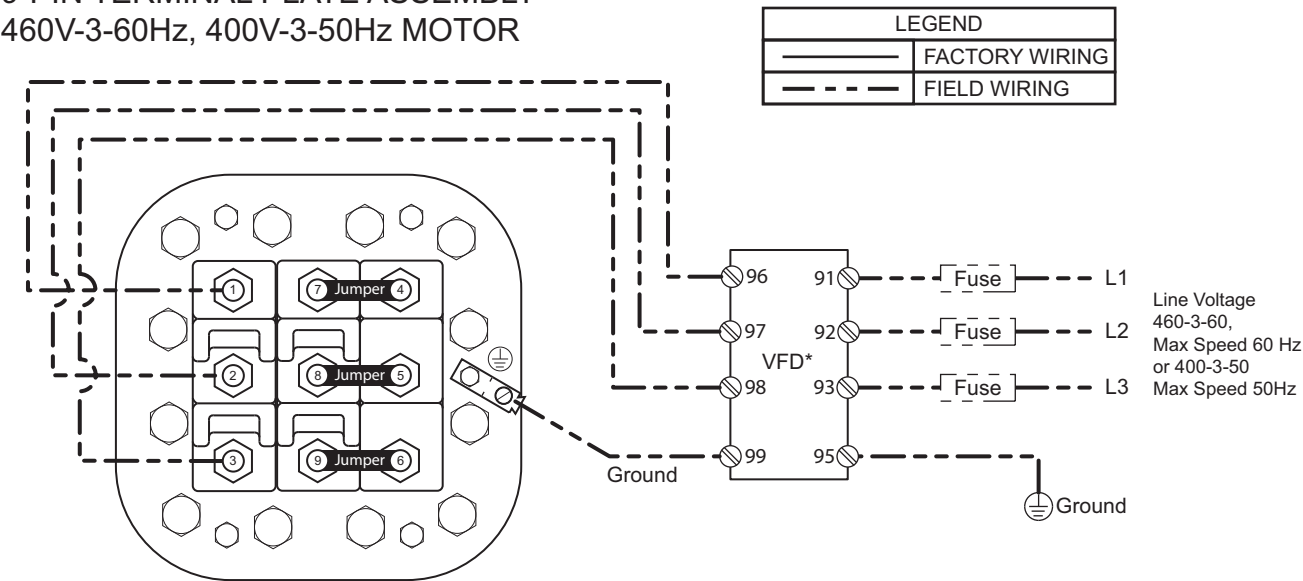
9-PIN TERMINAL PLATE ASSEMBLY 208/230-3-60Hz, 200-3-50Hz MOTOR



*The VFD terminal numbers shown are for the variable frequency drives sold by Carrier. Consult VFD literature for other VFD suppliers.

Fig. 6 — 06E, 06CC 50-99 cfm Variable Speed Wiring Dual Voltage Motor 208/230-v

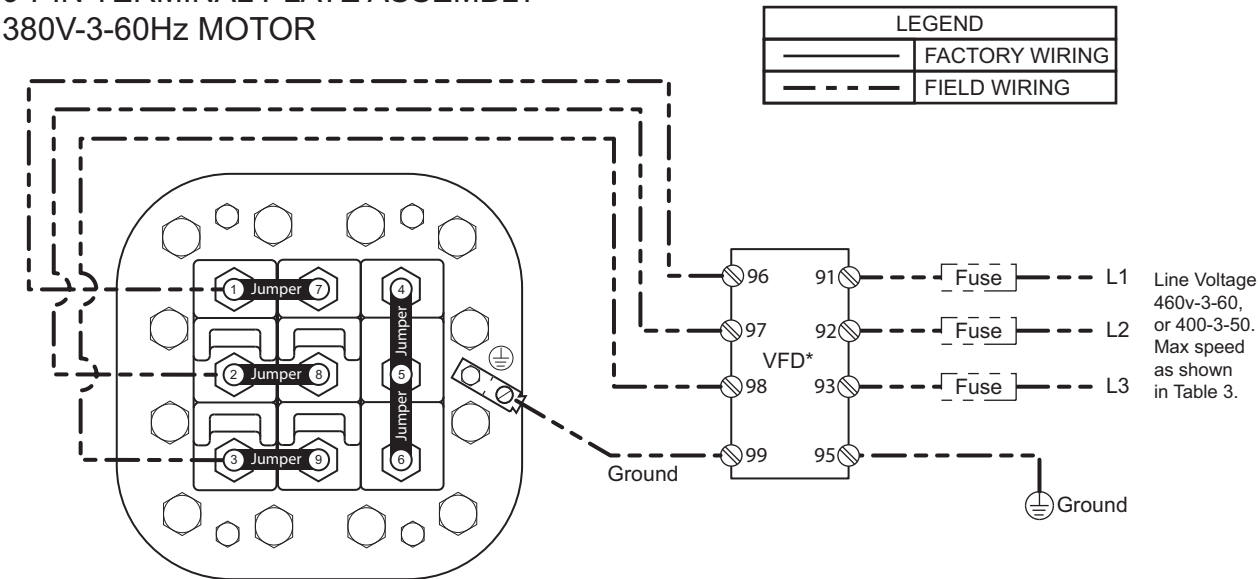
9-PIN TERMINAL PLATE ASSEMBLY
 460V-3-60Hz, 400V-3-50Hz MOTOR



*The VFD terminal numbers shown are for the variable frequency drives sold by Carrier.
Consult VFD literature for other VFD suppliers.

Fig. 7 — 06E, 06CC 50-99 cfm Variable Speed Wiring Dual Voltage Motor 460-v

9-PIN TERMINAL PLATE ASSEMBLY
 380V-3-60Hz MOTOR



*The VFD terminal numbers shown are for the variable frequency drives sold by Carrier.
Consult VFD literature for other VFD suppliers.

Fig. 8 — 06E, 06CC 50-99 cfm Variable Speed Wiring Dual Voltage Motor 380-v

INSTALLATION REQUIREMENTS FOR VARIABLE SPEED

Cylinder Head Unloaders

Cylinder head unloading may not be used in combination with a VFD (variable frequency drive). Carlyle recommends that any cylinder heads either be replaced with non-unloading heads or that the unloading mechanism be blocked in the loaded state. If this is not possible, then the electric solenoid coils to the mechanical unloaders should be removed from the compressor and electrically disconnected from any power source.

Pressure actuated unloaders must be removed from the compressor in variable speed applications, either by changing the cylinder head or blocking the unloader mechanism.

Oil Pressure Switch

Oil pressure protection is required for all 06D, 06E, and 06CC variable speed applications.

Mounting

Variable speed 06D, 06E, and 06CC compressors may use either rigid mounts or spring mounts.

Vibration

Vibration in system components need to be carefully evaluated in variable speed systems. During commissioning of a variable

speed system, the entire system must be checked for excessive vibrations with a particular focus across the entire frequency range from minimum shaft speed up to at least the third harmonic of the discharge gas pulsation frequency. Any 4-cylinder compressors should be validated from 20-750 Hz, for 60 Hz maximum shaft speeds or 20-1000 Hz for 80 Hz maximum shaft speeds. Any 6-cylinder compressors should be validated from 20-1100 Hz for 60 Hz maximum shaft speeds or 20-1500 Hz for 80 Hz maximum shaft speeds.

All system resonance issues that cannot be resolved by clamping of the line must be avoided within the programming of the variable frequency drive. If speed ranges must be bypassed, the Carrier VFDs allow for a maximum of four frequency ranges. Table 5 shows the programming parameters for doing so in the Carrier VFD.

Variable Frequency Drive Programming Parameters

It is necessary to provide the VFD with an input signal to control the operating speed of the compressor. Table 6 shows the three control input signal configurations recommended for the Carlyle 06D, 06E, and 06CC compressors.

It is also necessary to configure the VFD for proper compressor/VFD operation. See Table 7.

Table 5 — VFD Programming Parameters for Avoiding Frequency Ranges

VFD PARAMETER DESIGNATION	PARAMETER NUMBER	RECOMMENDED VALUE	DESCRIPTION OF RECOMMENDED VALUE
Bypass Speed From (Hz)	4-61	User defined speed ranges to be skipped.	Enter the lower limits of the frequencies to be avoided. Up to 4 values can be input in this array.
Bypass Speed To (Hz)	4-63		Enter the upper limits of the frequencies to be avoided. Up to 4 values can be input in this array.

Table 6 — VFD Control Signal Input Configurations^a

FIGURE FROM CARRIER VFD OPERATION MANUAL M00356 and M00372 ^b	APPLICATION SET-UP EXAMPLES (from Carrier VFD Operation Manual M00356 and M00372) ^b
Fig. 27 and Table 20 ^c	0-10 vdc Analog Input Signal
Fig. 28 and Table 21 ^c	4-20 ma Analog Input Signal
Fig. 29 and Table 26 ^c	Speed Reference using a Manual Potentiometer

NOTES:

a. Consult Carlyle Application Engineering for other control input configurations.

b. Refer to QR Code for VFD Operations Manual on page 1.

c. Manual M00356 refers to the data in a figure (image) format whereas, manual M00372 refers to the data in a table format.

Table 7 — VFD Programming Parameters

VFD PARAMETER DESIGNATION	PARAMETER NUMBER	RECOMMENDED VALUE	DESCRIPTION OF RECOMMENDED VALUE
Regional Settings	0-03	1	North America: Sets parameter 1-21 Motor Power (HP) units to [hp] and the default value of parameter 1-23 (Motor Frequency) to 60 Hz.
Torque Characteristics	1-03	0	For speed control of compressors. Torque provides a voltage which is optimized for a constant torque load characteristic of the motor in the entire range down to 10 Hz.
Motor Constructions	1-10	0	Asynchronous induction motor.
Nominal Motor Horsepower (Hp)	1-21	For 06D or 06CC17-37cfm models see Table 2.	Enter the nominal motor power in hp according to the motor nameplate data.
Nominal Motor Voltage (v)	1-22	For 06E or 06CC50-99cfm models see Table 4.	Enter the nominal motor voltage according to the motor nameplate data.
Nominal Motor Frequency (Hz)	1-23	60	Enter the nominal frequency of the motor. This should be 60 Hz for all 06D, 06E, and 06CC compressor models.
Motor Current (Amps)	1-24	For 06D or 06CC17-37cfm models see Table 2. For 06E or 06CC50-99cfm models see Table 4.	Enter the Maximum Continuous Current (MCC) value from the motor nameplate data.
Motor Nominal Speed (rpm)	1-25	1750	This is the nominal shaft speed (rpm) for the nominal motor frequency in parameter 1-23.
Compressor Start Max Speed (Hz)	1-78	50	The parameter enables high starting torque. This is a function, where the current limit and torque limit are ignored during start of the motor. The time, from the start signal is given until the speed exceeds the speed set in this parameter, and becomes a start-zone where the current limit and motor torque limit is set to what is maximum possible for the frequency converter/motor combination.
Compressor Start Max Time to Trip (seconds)	1-79	5	The time from the start signal is given until the speed exceeds the speed set in parameter 1-78 <i>Compressor Start Max Speed (Hz)</i> must not exceed the time set in the parameter. If the time set is exceeded, the frequency converter trips with <i>alarm 18, Start failed</i> .
Trip Speed Low (Hz)	1-87	Value should be 5 Hz lower than parameter 4-12.	Enter the low limit for the motor speed at which the frequency converter trips. If the speed at any time after the start (or during a stop) drops below the value in the parameter, the frequency converter trips with <i>alarm 49 (Speed Limit)</i> .
Motor Thermal Protection	1-90	06D and 06CC17-37cfm models only = 1.	At a predetermined temperature, the heat caused by the current through the internal thermostat causes a trip. With a setting of (1) the VFD will be allowed to restart when the thermostat has reset itself. Parameter 1-93 <i>Thermistor Source</i> must be set to (6), digital input.
		06D and 06CC17-37cfm models only = 2.	At a predetermined temperature, the heat caused by the current through the internal thermostat causes a trip. With a setting of (2) the VFD will NOT be allowed to restart when the thermostat has reset itself. <i>Parameter 1-93 Thermistor Source</i> must be set to (6), digital input.
		06E and 06CC50-99cfm models must be set at 0.	The 06E and 06CC 50-99 cfm models do not have internal thermal protection.
Thermistor Source (06D and 06CC 17-37 cfm only)	1-93	6	Select the input to which the thermal sensor is connected. Digital input terminal 33 = (6). When the compressor motor thermostat opens in response to a high temperature, <i>Alarm 11 Motor thermistor over temperature</i> will be shown on the VFD. For 06D or 06CC 17-37cfm models this alarm can be either manual or automatic reset depending on how parameter 1-90 is configured.
Minimum Reference (Hz)	3-02	See Table 1.	Enter the minimum operating speed for the compressor. This should not be any lower than the value listed in Table 1.
Maximum Reference (Hz)	3-03	For 06D or 06CC 217-37cfm models see Table 2. For 06E or 06CC 50-99cfm models see Table 4.	Enter the maximum operating speed for the compressor. This should not be any higher than the value listed in either Table 2 or Table 4.

Table 7 — VFD Programming Parameters (cont)

VFD PARAMETER DESIGNATION	PARAMETER NUMBER	RECOMMENDED VALUE	DESCRIPTION OF RECOMMENDED VALUE
Ramp 1 Ramp Up Time (seconds)	3-41	10	Enter the ramp-up time (the acceleration time from 0 rpm-parameter 1-25 <i>Motor Nominal Speed</i>). Select a ramp-up time such that the output current does not exceed the current limit in parameter 4-18 (<i>current Limit during ramping</i>).
Ramp 1 Ramp Down Time (seconds)	3-42	10	Enter the ramp-down time (the deceleration time from parameter 1-25 <i>Motor Nominal Speed</i> -0 rpm). Select a ramp-down time preventing overvoltage from arising in the inverter due to regenerative operation of the motor. The ramp-down time should also be long enough to prevent the generated current exceeds the current limit set in parameter 4-18 <i>Current Limit</i> .
Starting Ramp Up Time (seconds)	3-82	7.5	The ramp-up time is the acceleration time from 0 to the nominal motor speed (Hz) set in parameter 1-23 <i>Nominal Motor Speed</i> .
Motor Speed Low Limit (Hz)	4-12	See Table 1.	Enter the minimum limit for motor speed in Hz. The motor speed low limit can be set to correspond to the minimum output frequency of the motor shaft. The speed low limit must not exceed the setting in parameter 4-14 <i>Motor Speed High Limit (Hz)</i> .
Motor Speed High Limit (Hz)	4-14	For 06D or 06CC 17-37cfm models see Table 2. For 06E or 06CC50-99cfm models see Table 4.	Enter the maximum limit for motor speed in Hz. Parameter 4-14 <i>Motor Speed High Limit (Hz)</i> can be set to correspond to the manufacturer's recommended maximum motor speed. The motor speed high limit must exceed the value in parameter 4-12 <i>Motor Speed Low Limit (Hz)</i> . The output frequency must not exceed 10% of the switching frequency (parameter 14-01 <i>Switching Frequency</i>).
Torque Limit (%)	4-16	150	Enter the maximum torque limit for motor operation. The torque limit is active in the speed range up to and including the nominal motor speed set in parameter 1-25 <i>Motor Nominal Speed</i> . To protect the motor from reaching the stalling torque, the default setting is 1.1 x the rated motor torque (calculated value). See parameter 14-25 <i>Trip Delay at Torque Limit</i> for further details. If a setting in parameter 1-00 <i>Configuration Mode</i> to parameter 1-28 <i>Motor Rotation Check</i> is changed, parameter 4-16 <i>Torque Limit Motor Mode</i> is not automatically reset to the default setting.
Current Limit (%)	4-18	100	Enter the current limit for motor. To protect the motor from reaching the stalling torque, the default setting is 1.1 x the rated motor current (set in parameter 1-24 <i>motor current</i>). If a setting in parameter 1-00 <i>Configuration Mode</i> to parameter 1-28 <i>Motor Rotation Check</i> is changed, parameter 4-16 <i>torque limit motor mode</i> to parameter 4-18 <i>current limit</i> are not automatically reset to the default settings.
Max Output Frequency (Hz)	4-19	Carlyle recommends this value be set 5 Hz above parameter 3-03.	Enter the maximum output frequency value. Parameter 4-19 (<i>Max Output Frequency</i>) specifies the absolute limit on the frequency converter output frequency for improved safety in applications where accidental over-speeding must be avoided.

