Rev. 2.0 - 07-17-2024

MICRO CONTROL SYSTEMS

Variable Frequency Drives (VFD)

Startup Manual
with Alarm Codes

Lower your operating costs with Rhymebus VFD Drives

Wiring and Startup

This startup manual includes general specs for the Rhymebus VFD's.

The VFD'S are setup at MCS prior shipping to the contractor.

Dimensions for Cases and Basic Models are shown, along with General Specifications.

Wiring Diagrams and setup parameters are shown for both Hardwired and Modbus on the following pages in this setup manual.

The back section of this manual include Alarm Displays and Error Codes.

Provided that terms of payment are observed, a two-year (24 month) Manufacturer's Warranty against factory defects is offered from the date of installation or 27 months from date of shipment; whichever occurs earlier.

MCS may, at its option, repair or replace defective items that are under warranty. Repair or replacement of a warrantied VFD does NOT reset the warranty date; however, the Factory Warranty will remain in effect for the remaining period of time.

Please call MCS SUPPORT at 239-694-0089 or email at: support@mcscontrols.com for any questions.

⚠ DANGER

a. Do not install the drive with system power on to avoid electric shock.

b. R/L1, S/L2 and T/L3 are input power terminals. U/T1, V/T2 and W/T3 are the drive's output terminals to the motor. Do not connect either to P+, N- or PR as these are the access terminals for the DC bus voltage.

c. Once installation is completed, make sure that the drive cover is replaced prior to applying power so that the terminals are not exposed while the power is on. This is to avoid any accidental contact while the drive is in operation.

d. The drive family has 100, 200 and 400 VAC input capability. Check to insure that the input voltage being used does not exceed the capability of that drive.

e. The grounding terminal must be connected to earth ground in compliance with both local electrical codes and the NEC.

f. All wiring used for both input and output connections shall be in accordance with both local electrical codes and the NEC.

g. Input circuit protection is to be used to protect the drive. Whether it is in the form of an input circuit breaker or fusing. It is recommended that the circuit breaker have an SCCR rating of 65kA and the fuses 100kA SCCR rating as a set.

h. If using the drive to control multiple motors, each motor circuit should have thermal device or motor circuit protector sized for each load.

i. Do not connect any non-motor related loads to the output terminals of the drive.

j. The use of an input AC line reactor is required when the power capacity exceeds 500kVA or 10 times the drive's rated capacity.

k. Do not touch the drive terminals until the drive's power indicators have turned off. Residual power remains in the drive even when input power has been removed. Residual power can be checked at terminals P+ and N-.

l. The motor leads should be removed from the drive for any insulation testing of the motor that may be required prior to use.

Applications

Rhymebus VFDs controlling HVAC applications are available in a wide variety of configurations:

- VFD-R2 - 200 ~ 240 V - 3 Phase - Rated Output Current - 8 amps to 700 amps - 17 models
- VFD-R4 - 380 ~ 480 V - 3 Phase - Rated Output Current - 9 amps to 866 amps - 22 models Heavy duty mode with parameters.

Communication Interfaces

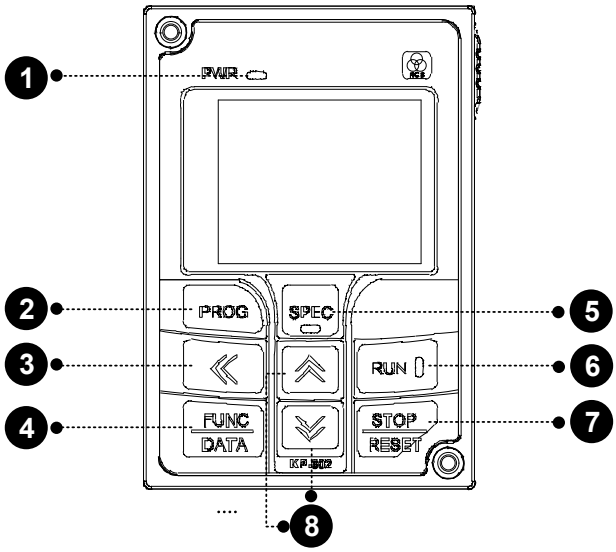
- Built-in RS-485 Modbus RTU, supports reading of vital operating values and alarms. Supports writing: start/ stop, speed and reset commands.

Keypad Display (with full color LCD installed by MCS)

LCD KP-602 - Supports full color LCD display and multiple languages. The keypad displays text on the screen with full parameter names, which allows for easy data viewing and changing.

The Keypad is removable and remote mountable up to 30 feet using Cat5 straight Ethernet cable, (remote mounting bracket included). The display will scroll a Marquee on the LCD keypad, Alarms will display in Red. A complete manual is available on the MCS website.

KP-602 Keypad



KP-602 Keypad with bracket

No.	Symbol	Name	Discriptions
1	PWR	Power source signal	On：Power system is operation Off：No power source input
2	PROG	Program	Switch to different mode
3	«	Number of digits selection	• Switch to monitor mode • Switch to number of digits
4	FUNC DATA	Function/data	• Enter /return to parameter setting mode • Switch to monitor mode
5	SPEC	Reserve	
6	RUN	Drive start key and operation signal	• Blinking: Acceleration and deceleration • On:Constant speed • Off: Stop operating
7	STOP RESET	Stop/Reset	• Drive stop output • Error occurs recover
8	^ v	Up Down	Change the Setting Value and Parameter.

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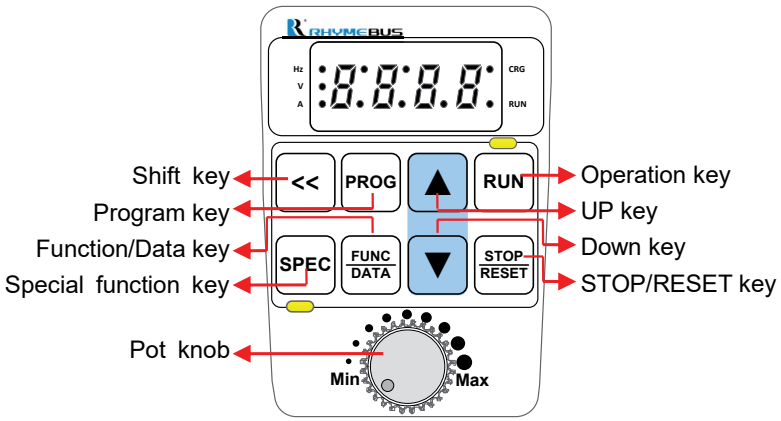
*LED Keypad Display

*KP-601 LED keypad is shipped installed from the factory.

MCS removes the LED KP-601 keypad and installs and programs the KP-602 LCD full color keypad prior to shipping from our plant.

If using the KP-601 keypad it can monitor the frequency of drive, voltage, current, drive temperature, motor temperature, terminal status, in a digital screen. A complete manual is available on the MCS website.

KP-601A Keypad



3-1-2 Keys of Operation Panel

Symbol	Name	Description
PROG	Program key	1.Enter the function setting mode. 2.Back to the monitor mode.
FUNC DATA	Function/Data key	1.Enter the parameter setting mode. 2.Back to the function setting mode. 3.Switch monitor mode.
▲	Up key	Changing the functions or parameters.
▼	Down key	
RUN	Operation key	Drive start key.
STOP RESET	Stop/Reset key	1.Drive stops (all outputs cut off). 2.Fault reset. 3.Stop key can be set as the emergency stop function when the operation command is set by external multi-function input terminals(see the description of F1.05).
SPEC	Special function key	This key function is programmable(see the description of F1.17 and F1.18).
<<	Shift key	1.Switch of function group and function numbers. 2.The shifting key for digits of parameter value setting. 3.When the setting of frequency command is over 100Hz above, pressing this key to set the value of second decimal.

3-1-3 Knob of Operation Panel

Symbol	Name	Description
	Pot knob	The knob can be set as the frequency command (see the description of F5.00).

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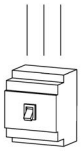
Peripheral Equipment of Drive

Power Source

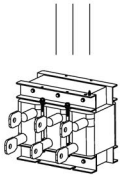
Provide power within the range for the drive.

Molded Case Circuit Breaker (MCCB) (not included)



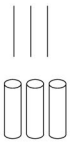
The MCCB provides branch circuit protection against short circuits and isolation of the complete drive circuit through the disconnecting function.

AC Reactor (ACL) (optional on some models)

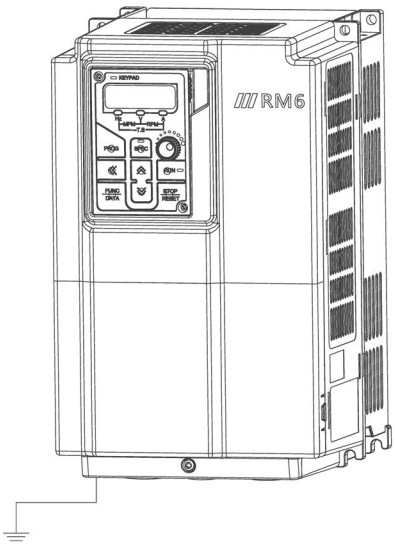


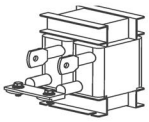
AC line reactors are used to protect the drive and other devices from electrical disturbances such as voltage spikes, surges, and transients. Line reactors can limit your current flow and harmful harmonics from the rest of the system. In regions/countries with unstable power and/or high harmonic currents power supply capacity exceeding 500kVA requires their use.

FUSE (not included)



Without the protection of fuses with your drive, you run the risk of dealing with nuisance tripping or even outages.

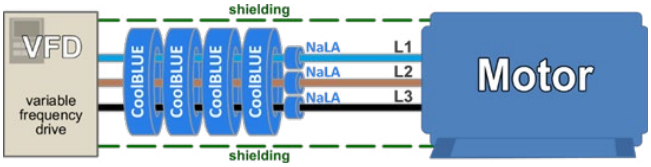




DC line reactors are used to help mitigate the impact of harmonics created by the drive as well as helping to reduce ripple currents.

*Optional Cool Blue *(consult MCS sales how to install in the field)*

CoolBLUE® toroids are being used increasingly to reduce damaging motor bearing currents in modern high power inverter systems operating at high switching frequencies. As a result of these unwanted currents, the bearings corrugate, leading to electrical breakdown in the lubrication and finally a standstill of the entire motor.



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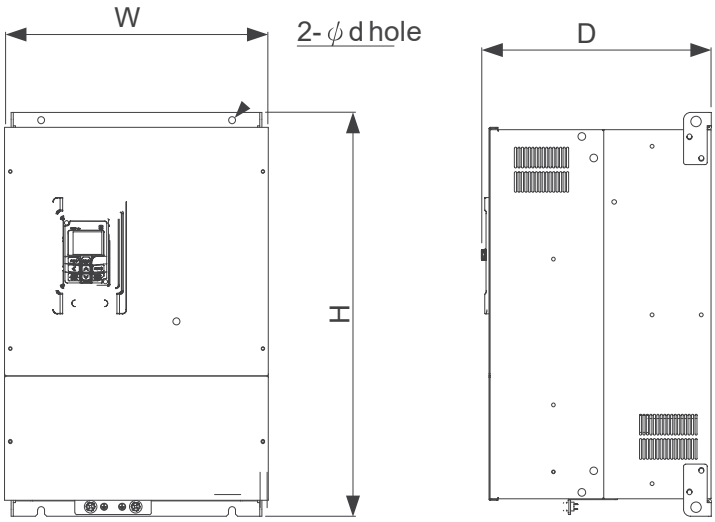
CASE DIMENSIONS

Internal cooling type



RM6G1-R2 Dimensions

Enclosure Case Size	Dimension (in)			Screw Size
	W	H	D	(mm)
CASE 2	5.51	10.24	7.48	M5
CASE 3	5.51	10.24	7.48	M5
CASE 4	9.84	15.75	10.16	M8
CASE 5	15.20	22.99	13.03	M8
CASE 6	17.56	29.97	13.15	M10
CASE 7	20.00	32.20	14.72	M12
CASE 8	27.40	39.37	16.26	M12

RM6G1-R4 Dimensions

Enclosure Case Size	Dimension (in)			Screw Size
	W	H	D	(mm)
CASE 2	5.51	10.24	7.48	M5
CASE 3	7.09	11.42	8.15	M5
CASE 4	9.84	15.75	10.16	M8
CASE 5	15.20	22.99	13.03	M8
CASE 6	17.56	29.97	13.15	M10
CASE 7	17.56	32.20	13.15	M10
CASE 8	27.40	39.37	16.26	M12
CASE 9	39.06	40.55	16.81	M13

MCS Rhymebus Basic Models with Dimensions

IMPORTANT

*VFD-R2-8 ~ R2-90 AC Line Reactor and DC Line Reactor are ***optional*** equipment.
*VFD R2-115 ~ R2-700 AC Line Reactor and DC Line Reactor is ***standard*** equipment .

*VFD-R4-9 ~ R4-39 AC Line Reactor and DC Line Reactor are ***optional*** equipment.
*VFD-R4-115 ~ R4-866 AC Line Reactor and DC Line Reactor is ***standard*** equipment .

MCS SPEC SHEET	MOTOR HP	CASE	Case Weight	ACL AMPS	ACL DIMENSIONS W, L, H (in)	WEIGHT (LBS)	DCL AMPS	DCL DIMENSIONS W, L, H (in)	WEIGHT (LBS)
VFD-R2-8	2	2	6.61	15	4.37 x 3.74 x 5.31	4.41	NA	NA	NA
VFD-R2-11	3	2	6.61	15	4.37 x 3.74 x 5.31	4.41	20	3.78 X 4.72 x 3.45	6.61
VFD-R2-17	5	2	6.61	30	4.37 x 3.74 x 5.31	4.85	30	4.49 x 5.90 x 3.94	9.70
VFD-R2-25	7.5	2	6.83	30	4.37 x 3.74 x 5.31	4.85	30	4.49 x 5.90 x 3.94	9.70
VFD-R2-33	10	3	11.90	50	5.98 x 4.96 x 5.12	10.14	50	5.27 x 6.30 x 4.53	14.33
VFD-R2-46	15	3	12.57	75	5.94 x 4.96 x 5.16	10.58	75	5.27 x 6.30 x 4.53	14.99
VFD-R2-63	20	4	27.34	75	5.94 x 4.96 x 5.16	10.58	75	5.27 x 6.30 x 4.53	14.99
VFD-R2-75	25	4	28.88	100	6.10 x 5.20 x 5.20	9.04	100	6.38 x 7.09 x 5.11	27.56
VFD-R2-90	30	4	32.41	150	6.10 x 5.20 x 5.20	9.04	100	6.38 x 7.09 x 5.11	27.56
*VFD-R2-115	40	4	32.41	*150	6.10 x 5.20 x 5.20	9.04	*150	6.38 x 7.40 x 5.12	30.42
*VFD-R2-150	50	5	94.14	*200	7.16 x 6.30 x 5.90	21.60	*200	6.38 x 7.87 x 5.47	34.17
*VFD-R2-185	60	5	97.66	*200	7.16 x 6.30 x 5.90	21.60	*200	6.38 x 7.87 x 5.47	34.17
*VFD-R2-220	75	5	102.07	*300	9.05 x 8.66 x 8.37	41.89	*300	7.48 x 8.86 x 9.05	41.89
*VFD-R2-295	100	6	140.21	*400	9.05 x 8.66 x 8.37	44.53	*400	7.87 x 11.02 x 10.63	76.50
*VFD-R2-346	125	7	196.21	*400	9.05 x 8.66 x 8.37	44.53	*400	7.87 x 11.02 x 10.63	76.50
*VFD-R2-432	150	7	198.42	*600	11.02 x 10.63 x 9.25	64.59	*600	9.45 x 12.60 x 12.40	133.38
*VFD-R2-585	200	8	361.56	*800	11.81 x 11.81 x 12.10	143.30	*800	9.84 x 11.42 x 15.16	158.73
*VFD-R2-700	250	8	368.17	*800	13.78 x 11.42 x 12.60	143.30	*800	9.84 x 11.42 x 15.16	158.73

MCS SPEC SHEET	MOTOR HP	CASE	Case Weight	ACL AMPS	ACL DIMENSIONS W, L, H (in)	WEIGHT (LBS)	DCL AMPS	DCL DIMENSIONS W, L, H (in)	WEIGHT (LBS)
VFD-R4-9	5	2	6.61	15	4.37 x 3.74 x 5.31	4.41	NA	NA	NA
VFD-R4-14	7.5	2	6.61	30	4.37 x 3.74 x 5.31	4.85	20	3.78 x 4.72 x 3.45	6.61
VFD-R4-18	10	2	6.61	30	4.37 x 3.74 x 5.31	4.85	30	4.49 x 5.90 x 3.94	9.70
VFD-R4-24	15	2	6.83	30	4.37 x 3.74 x 5.31	4.85	30	4.49 x 5.90 x 3.94	9.70
VFD-R4-30	20	3	12.57	50	5.98 x 4.96 x 5.12	10.14	50	5.27 x 6.30 x 4.53	14.33
VFD-R4-39	25	3	12.79	50	5.98 x 4.96 x 5.12	10.14	50	5.27 x 6.30 x 4.53	14.33
VFD-R4-45	30	4	28.22	50	5.98 x 4.96 x 5.12	10.14	50	5.27 x 6.30 x 4.53	14.33
*VFD-R4-61	40	4	28.44	*75	5.94 x 4.96 x 5.16	10.58	*75	5.27 x 6.30 x 4.53	14.99
*VFD-R4-75	50	4	33.07	*100	6.10 x 5.20 x 5.20	19.04	*100	6.38 x 7.09 x 5.11	27.56
*VFD-R4-91	60	4	33.73	*100	6.10 x 5.20 x 5.20	19.04	*100	6.38 x 7.09 x 5.11	27.56
*VFD-R4-115	75	5	97.00	*150	6.10 x 5.20 x 5.20	19.04	*150	6.38 x 7.40 x 5.12	30.42
*VFD-R4-150	100	5	100.31	*200	7.16 x 6.30 x 5.90	21.60	*200	6.38 x 7.87 x 5.47	34.17
*VFD-R4-180	125	5	102.29	*200	7.16 x 6.30 x 5.90	21.60	*200	6.38 x 7.87 x 5.47	34.17
*VFD-R4-216	150	6	141.10	*300	9.05 x 8.66 x 8.37	41.89	*300	7.48 x 8.86 x 9.05	41.89
*VFD-R4-253	175	6	142.20	*300	9.05 x 8.66 x 8.37	41.89	*300	7.48 x 8.86 x 9.05	41.89
*VFD-R4-310	200	7	209.44	*400	9.05 x 8.66 x 8.37	44.53	*400	7.87 x 11.02 x 10.63	76.50
*VFD-R4-377	250	7	213.85	*400	9.05 x 8.66 x 8.37	44.53	*400	7.87 x 11.02 x 10.63	76.50
*VFD-R4-432	300	8	350.53	*600	11.02 x 10.63 x 9.25	64.59	*600	9.45 x 12.60 x 12.40	133.38
*VFD-R4-480	350	8	359.35	*600	11.02 x 10.63 x 9.25	64.59	*600	9.45 x 12.60 x 12.40	133.38
*VFD-R4-585	420	8	361.56	*800	11.81 x 11.81 x 12.10	143.30	*800	9.84 x 11.42 x 15.16	158.73
*VFD-R4-700	500	9	478.40	*800	11.81 x 11.81 x 12.10	143.30	*800	9.84 x 11.42 x 15.16	158.73
*VFD-R4-866	600	9	599.66	*1000	13.78 x 11.42 x 12.60	186.51	*1000	10.63 x 12.20 x 15.75	189.60

Rhymebus VFD

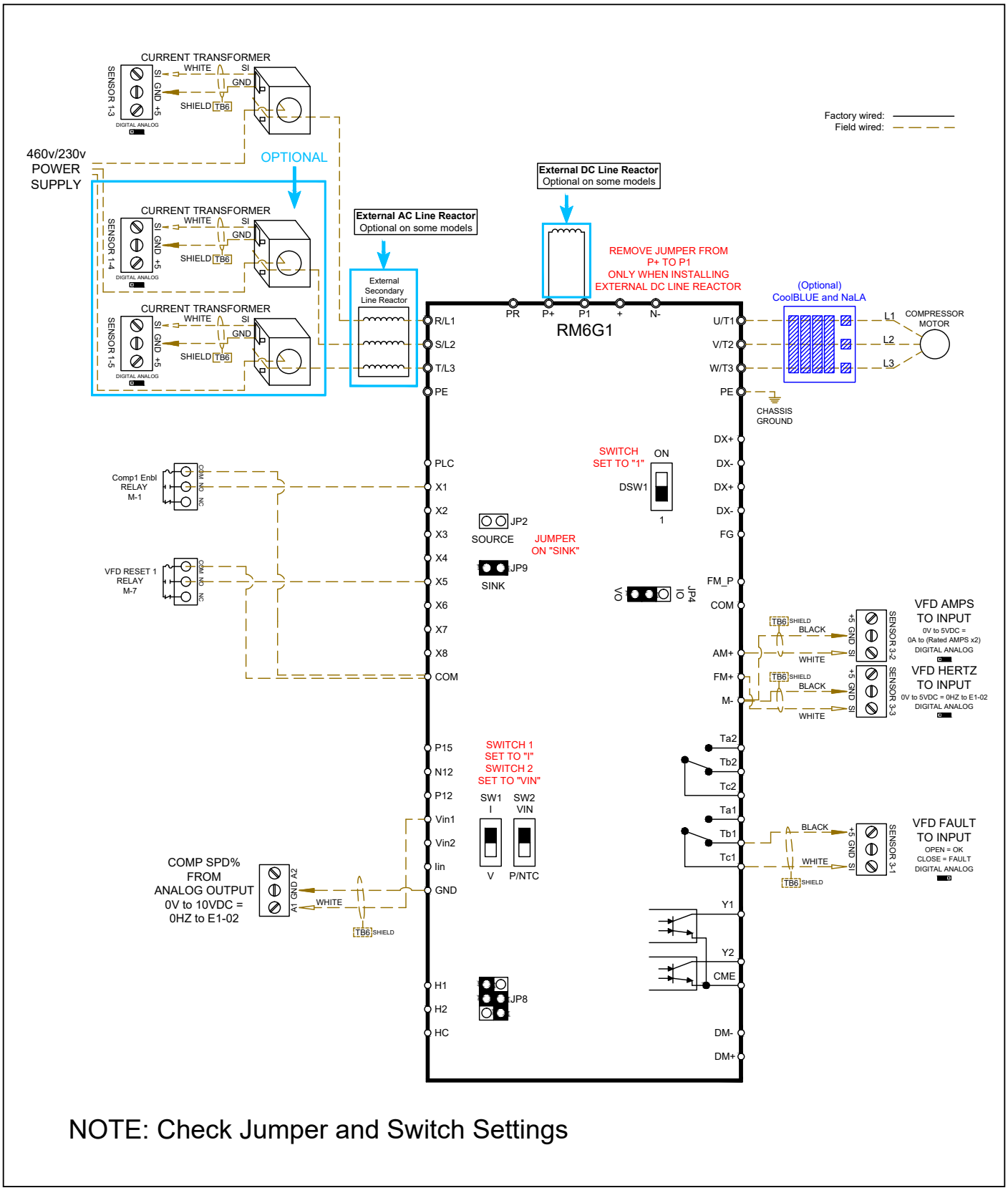
AC Line Reactor

DC Line Reactor

General Specifications

Control Characterostocs	Control Method		• VFD Control
	Range of Frequency setting		0.01~600Hz
	Resolution of Frequency setting		• Digital keypad (KP-601A / KP602): 0.01Hz
	Resolution of Output Frequency		0.01 Hz
	Overload Protection		Heavy duty - 150% of drive rated output current for 1 min. (Inverse time curve protection)
	Acceleration / Deceleration time		• 0.1-3200 range
	Stall Prevention		• Acceleration/constant speed stall prevention (Current level 30-200%) • Stall prevention when decelerate
	Other Functions		Slip compensation, auto-torque compensation, auto-adjustment for output voltage stability, auto-operation for energy-saving, auto-adjustment of switching frequency, restart after instantaneous power failure, speed tracing, overload detection, acceleration/deceleration switch , parameters copy, dynamic brake unit duty control, 16 sections of operating procedures control, kWh accumulation value, counter, timer, Modbus communication, jump frequency, holding frequency, upper and lower limits output frequency , 16 sections speed, S curve acceleration and deceleration, motor temperature display and protection, drive temperature display, cooling fan control, pulse input/output·, password lock, predictive maintenance information, error record, PIO control (two-stage PIO), upper and lower limits detection feedback, Traverse for textile, switching parameter sets for 2 independent motors, automatic adjustment, torque limit, KEB function, Over-voltage suppress function.
Operation Characteristics	Input	Multi-function Inputs	• 8 sets programmable Input terminals: X1~X8 • RM6G1: X8 also has function of pulse input
		Analog Inputs	• Vin1Nin2*-GND: DC 0~1ov or DC ~10-+10V • Iin-GND: DC 4-20mA/2~10V or DC 0-20mA/0-10V
		Simulate Analog Inputs	Vin3, Vin4 (the same function as Vin1, Vin2*): set by parameters/communication
		Multi-function Outputs	• 5 sets programmable output detection: Ta1-Tb1-Tc1, Ta2-Tb2**-Tc2, Y1-CME • 2 sets programmable output detection: Y3, Y4 (detection function= Y1, Y2)
		Analog outputs	• “FM+”: DC 0~1ov • “AM+”: DC 0~10V or DC 0-20mA/DC 4~20mA
Display	LED keypad (KP-601A)		Monitor the frequency of drive, voltage, current, drive temperature, motor temperature, terminal status···etc.
	LCD keypad (KP-602)		Full-color display, multiple languages and 8 descriptions of monitor modes are shown at the same time.
Protections	Fault protection	Error trip messages of drive	EEPROM error (EEr), AID converter error (Ad Er), fuse open (SC), under voltage during operation (LE1), drive over current (OC), grounding fault (GF), over voltage (OE), drive overheat (OH), motor overload OL), drive overload (OL 1), system overload (OLO), external fault (EF), keypad interruption during copy (PAdF), input/output under-phase protection (IPLF/OPLF)
		Warning message of drive	Power source under voltage (LE, drive output interruption (bb), coast to stop (Fr), dynamic brake transistor over voltage (db), keypad cable trip before connection (Err_00), keypad cable trip during operation (Err_01), direction command error (dFt), version copy error (Fault)
Environment	Atmosphere		Non-corrosive or non-conductive, or non-explosive gas or liquid, and non-dusty
	Surrounding Temperature		• Heavy duty: -10°C (14°F)- +50°C (122°F) (Non-freezing and non-condensing)
	Storage Temperature		-20°C (- 4°F)- +10°C (158°F)
	Relative Humidity		90% RH or less (non-condensing atmosphere)
	Vibration		Less than 5.9m/sec^2 (0.6G)
	Altitude		Less than 1000m (3280 ft.)

HARDWIRED WIRING DIAGRAM



NOTE: Check Jumper and Switch Settings

SCREW & CENTRIFUGAL (60Hz)
HARDWIRED SETTING

Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
RM6G1 Parameters & Values			**Parameter Description**	**Comments**
#	Value	Comments	Default values in parenthesis (xxxxxx)	Mfg / User
A1-05	DF60	DF60	60Hz	Set Hz first
A1-05	DF-HD	Heavy Duty Mode	HD: heavy duty mode	Set HD mode next
A1-04		Input Voltage Setting	100.0~300.0V(220V series) 240.0~500.0V (380V series)	Set to Motor Voltage
A3-16	0	Display	0: Disable - Alternately Display	
A3-23	104	Dual Display	104 - Left side shows output amps / Right side shows Main Display	
b1-00	2	Primary Frequency Selection	2: Analog Input (Vin 1)	
b1-02	1	Primary Start Command	1: Digital Input (X1)	
b1-04	1	Primary Direction Command	1: Digital Input (X1)	
b1-10	1	Stop Method	1: Coast to stop	
b1-11	1	Reverse Operation Selection	1: Disabled	
b1-12	1	Phase Order Selection	Counter clockwise rotation w/correct L1, L2, L3 phasing	
C1-01	10/15	Acceleration Time (sec)	10 sec - Acceleration Time from Min Frequency to Max Frequency	15 sec for Centrifugal
C1-02	10/90	Deceleration Time (sec)	10 sec -Deceleration Time from Max Frequency to Min Frequency	90 sec for Centrifugal
D2-02	0.50	Frequency Lower Limit (%)	0.50 = 50%	0.70=70% for Centrifugal
E1-01	Maximum Output Voltage Based on Motor Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Motor Voltage
E1-03	Base Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Base Voltage

E2-01																										
	RM6G1-2A	010	016	022	031	042	060	075	090	112	150	185	220	275	346	410	500	700	840							
	Rated Output (A)	8	11	17	25	33	46	63	75	90	115	150	185	220	295	346	432	585	700							
	RM6G1-4A	009	012	018	023	031	039	045	058	075	091	110	144	180	216	253	304	377	415	480	585	700	860	960		
	Rated Output (A)	6	9	14	18	24	30	39	45	61	75	91	115	150	180	216	253	310	377	432	480	585	700	866		

E2-04	2	Number of Motor poles	2 = 2 pole motor = 3600 rpm	This parameter only effect the RPM display, if number of poles not set correct, RPM value will be incorrect.
H1-00	+2	Multi-Function Input Terminal (X1)	+2 FWD Command (X1)	
H4-01	0.500	Gain (FM+)	Max Frequency = 5vdc	
H4-04	0.500	Gain (AM+)	Max AMPS = 5vdc	
H4-07	0	AM Output	0 = 0V to 10VDC, 1 = 0-20MA, 2 = 4-20MA	

SCREW & CENTRIFUGAL (100Hz) HARDWIRED SETTING

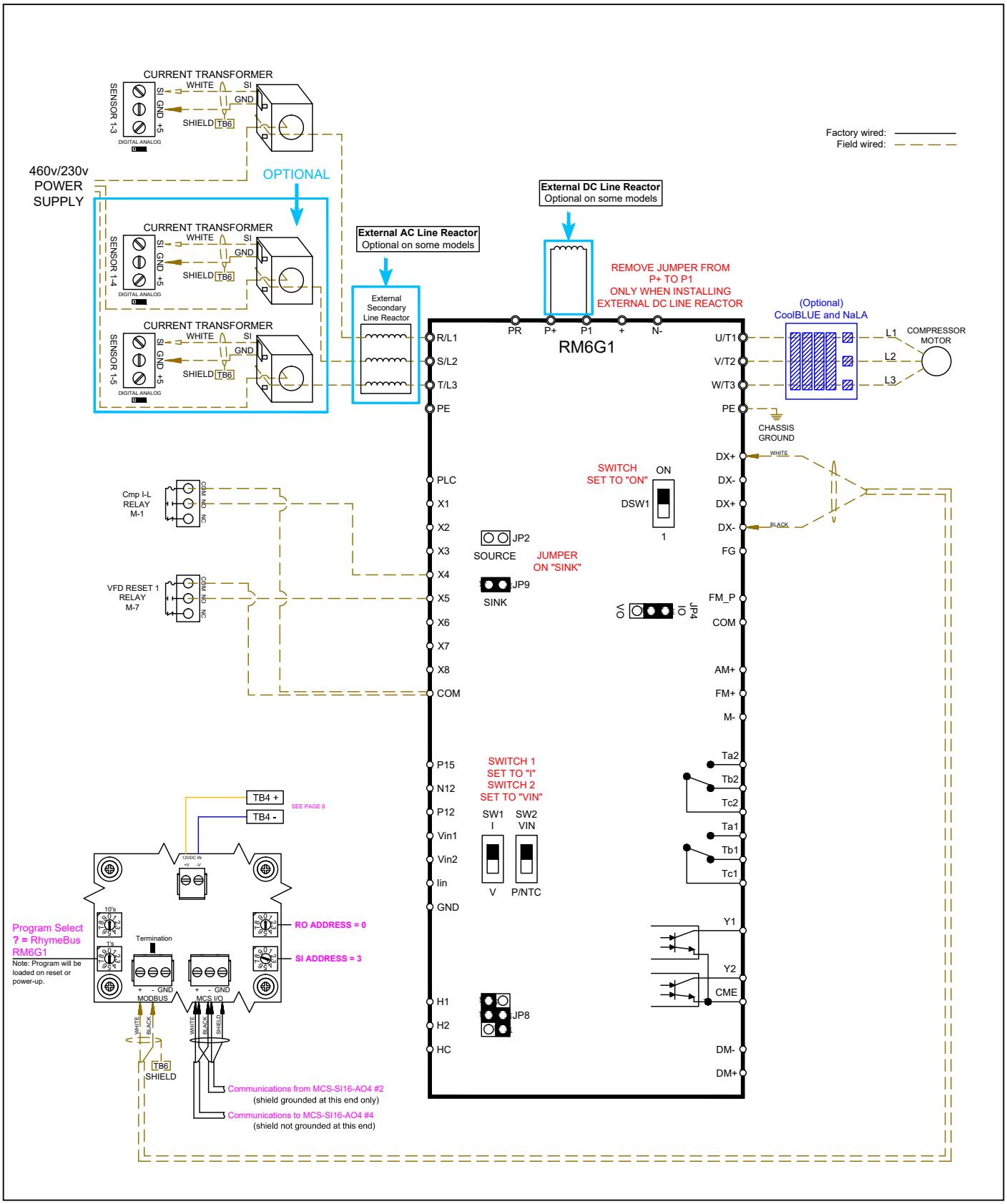
Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
RM6G1 Parameters & Values			**Parameter Description**	**Comments**
#	Value	Comments	Default values in parenthesis (xxxxxx)	Mfg / User
A1-05	DF60	DF100	100Hz	Set Hz first
A1-05	DF-HD	Heavy Duty Mode	HD:heavy duty mode	Set HD mode next
A1-04	480	Input Voltage Setting	100.0~300.0V(220V series) 240.0~500.0V (380V series)	Set to Motor Voltage
A3-16	0	Display	0: Disable - Alternately Display	
A3-23	104	Dual Display	104 - Left side shows output amps / Right side shows Main Display	
b1-00	2	Primary Frequency Selection	2: Analog Input (Vin 1)	
b1-02	1	Primary Start Command	1: Digital Input (X1)	
b1-04	1	Primary Direction Command	1: Digital Input (X1)	
b1-10	1	Stop Method	1: Coast to stop	
b1-11	1	Reverse Operation Selection	1: Disabled	
b1-12	1	Phase Order Selection	Counter clockwise rotation w/correct L1, L2, L3 phasing	
C1-01	10/15	Acceleration Time (sec)	10 sec - Acceleration Time from Min Frequency to Max Frequency	15 sec for Centrifugal
C1-02	10/90	Deceleration Time (sec)	10 sec -Deceleration Time from Max Frequency to Min Frequency	90 sec for Centrifugal
* D2-02	0.50	Frequency Lower Limit (%)	0.00 to 1.00 = 0Hz to Max Hz	
* E1-00	100	Maximum Output Frequency	0.1~600.0 Hz	
E1-01	Maximum Output Voltage - 480 Based on Motor Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Motor Voltage
* E1-02	100	Base Frequency	0.1~600.0 Hz	
E1-03	Base Voltage - 480		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Base Voltage

E2-01																								
	RM6G1-2A	010	016	022	031	042	060	075	090	112	150	185	220	275	346	410	500	700	840					
	Rated Output (A)	8	11	17	25	33	46	63	75	90	115	150	185	220	295	346	432	585	700					
	RM6G1-4A	009	012	018	023	031	039	045	058	075	091	110	144	180	216	253	304	377	415	480	585	700	860	960
	Rated Output (A)	6	9	14	18	24	30	39	45	61	75	91	115	150	180	216	253	310	377	432	480	585	700	866

E2-04	2	Number of Motor poles	2 = 2 pole motor = 3600 rpm	This parameter only effect the RPM display, if number of poles not set correct, RPM value will be incorrect.
H1-00	+2	Multi-Function Input Terminal (X1)	+2 FWD Command (X1)	
H4-01	0.500	Gain (FM+)	Max Frequency = 5vdc	
H4-04	0.500	Gain (AM+)	Max AMPS = 5vdc	
H4-07	0	AM Output	0 = 0V to 10VDC, 1 = 0-20MA, 2 = 4-20MA	

*Set these Parameters based on Min/Max Hz allowable for your compressor

MODBUS Wiring Diagram



SCREW & CENTRIFUGAL (60 Hz)
MODBUS VFD SETTINGS

Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
RM6G1 Parameters & Values			**Parameter Description**	**Comments**
#	Value	Comments	Default values in parenthesis (xxxxxx)	Mfg / User
A1-05	DF60	DF60	60HZ	Set HZ first
A1-05	DF-HD	Heavy Duty Mode	HD:heavy duty mode	Set HD mode next
A1-04		Input Voltage Setting	100.0~300.0V(220V series) 240.0~500.0V (380V series)	Set to Motor Voltage
A3-16	0	Display	0: Disable - Alternately Display	
A3-23	104	Dual Display	104 - Left side shows output amps / Right side shows Main Display	
b1-00	3	Primary Frequency Selection	3: Modbus Communications	
b1-02	2	Primary Start Command	2: Modbus Communications	
b1-04	2	Primary Direction Command	2: Modbus Communications	
b1-10	1	Stop Method	1: Coast to stop	
b1-11	1	Reverse Operation Selection	1: Disabled	
b1-12	1	Phase Order Selection	Counter clockwise rotation w/correct L1, L2, L3 phasing	
C1-01	10/15	Acceleration Time (sec)	10 sec - Acceleration Time from Min Frequency to Max Frequency	15 sec for Centrifugal
C1-02	10/90	Deceleration Time (sec)	10 sec -Deceleration Time from Max Frequency to Min Frequency	90 sec for Centrifugal
D2-02	0.50	Frequency Lower Limit (%)	0.50= 50%	0.70=70% for Centrifugal
E1-01	Maximum Output Voltage Based on Motor Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Motor Voltage
E2-04	2	2 pole motor	Motor Poles range 2-24	
E1-03	Base Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Base Voltage

E2-01																										
	RM6G1-2A	010	016	022	031	042	060	075	090	112	150	185	220	275	346	410	500	700	840							
	Rated Output (A)	8	11	17	25	33	46	63	75	90	115	150	185	220	295	346	432	585	700							
	RM6G1-4A	009	012	018	023	031	039	045	058	075	091	110	144	180	216	253	304	377	415	480	585	700	860	960		
	Rated Output (A)	6	9	14	18	24	30	39	45	61	75	91	115	150	180	216	253	310	377	432	480	585	700	866		

E2-04	2	Number of Motor poles	2 = 2 pole motor = 3600 rpm	This parameter only effect the RPM display, if number of poles not set correct, RPM value will be incorrect.
H1-03	-22	Multi-Function Input Terminal (X4)	-22 External Fault - Interlock Relay	
H5-00	1	Comm. Address	1: Modbus Address	
H5-01	38400	Baud Rate	38400 Baud Rate on Modbus Communication	
H5-04	2	Comm. Overtime Disposal (COT)	2: Keep Running on Loss of Communication (Interlock will stop VFD)	
H5-05	5	Comm. Overtime (COT)	0.0 ~ 100.0 sec - Time Out	

SCREW & CENTRIFUGAL (100 Hz)
MODBUS VFD SETTING

Key features include: Start/Stop, 0-10V Speed Reference, Speed Reference Feedback				
RM6G1 Parameters & Values			**Parameter Description**	**Comments**
#	Value	Comments	Default values in parenthesis (xxxxxx)	Mfg / User
A1-05	DF60	DF100	100HZ	Set HZ first
A1-05	DF-HD	Heavy Duty Mode	HD:heavy duty mode	Set HC mode next
A1-04	480	Input Voltage Setting	100.0~300.0V(220V series) 240.0~500.0V (380V series)	Set to Motor Voltage
A3-16	0	Display	0: Disable - Alternately Display	
A3-23	104	Dual Display	104 - Left side shows output amps / Right side shows Main Display	
b1-00	2	Primary Frequency Selection	2: Analog Input (Vin 1)	
b1-02	1	Primary Start Command	1: Digital Input (X1)	
b1-04	1	Primary Direction Command	1: Digital Input (X1)	
b1-10	1	Stop Method	1: Coast to stop	
b1-11	1	Reverse Operation Selection	1: Disabled	
b1-12	1	Phase Order Selection	Counter clockwise rotation w/correct L1, L2, L3 phasing	
C1-00	100	Reference Freq. of Accel./Decel. Time	0.01~600.00 Hz	
C1-01	10/15	Acceleration Time (sec)	10 sec - Acceleration Time from Min Frequency to Max Frequency	15 sec for Centrifugal
C1-02	10/90	Deceleration Time (sec)	10 sec -Deceleration Time from Max Frequency to Min Frequency	60 sec for Centrifugal
* D2-02	0.50	Frequency Lower Limit (%)	0.00 to 1.00 = 0Hz to Max Hz	
* E1-00	100	Maximum Output Frequency	0.1~600.0 Hz	
E1-01	Maximum Output Voltage - 480 Based on Motor Voltage		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Motor Voltage
* E1-02	100	Base Freq.	0.1~600.0 Hz	
E1-03	Base Voltage - 480		0.0-300.0V (220V series) 0.0~550.0V (380V series)	Set to Base Voltage

E2-01																										
	Model 200V	010	016	022	031	042	060	075	090	112	150	185	220	275	346	410	500	700	840							
	Rated Output (A)	8	11	17	25	33	46	63	75	90	115	150	185	220	295	346	432	585	700							
	Model 400V	009	012	018	023	031	039	045	058	075	091	110	144	180	216	253	304	377	415	480	585	700	860	960		
	Rated Output (A)	6	9	14	18	24	30	39	45	61	75	91	115	150	180	216	253	310	377	432	480	585	700	866		

E2-04	2	Number of Motor poles	2 = 2 pole motor = 3600 rpm	This parameter only effect the RPM display, if number of poles not set correct, RPM value will be incorrect.
H1-03	-22	Multi-Function Input Terminal (X4)	-22 External Fault - Interlock Relay	

*Set these Parameters based on Min/Max Hz allowable for your compressor

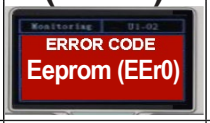
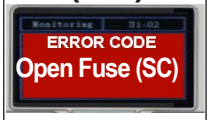
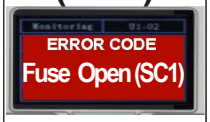
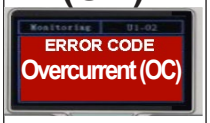
ALARM DISPLAYS AND ERROR CODES

Description:
The frequency converter has complete protection functions to protect the frequency converter and the motor when an abnormality occurs. When an abnormality occurs, the frequency converter will trip the protection and display an abnormality message on the keypad. After the abnormality is eliminated, you can press the " STOP / RESET " key on the keypad panel, or issue a reset command from the external through the multifunction input terminal.

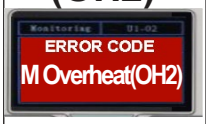
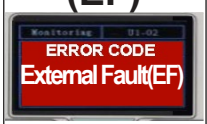
NOTE: The LCD display will show a scrolling Marquee describing the error and the code.

The LED display will only show the code

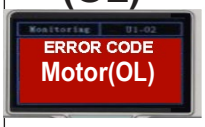
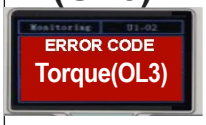
Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(EEr) 	(EEr) 	0999H	EEPROM Abnormality Protection	• The writing of EEPROM data is abnormal. • EEPROM parts failure.	• Restore all parameter settings to factory defaults and restart the machine. • If the abnormality cannot be eliminated, please send the inverter for repair.
(EEr0) 	(EErO) 	006FH	Default EEPROM Abnormality Protection	• Writing of default EEPROM data is abnormal.	• Please contact customer service for repair.
(SC) 	(SC) 	0032H	Open Fuse Protection 1	• The internal fuse of the inverter is open. • The IGBT power module is failure.	• Please contact customer service for repair.
(SC1) 	(SC1) 	0033H	Inverter Fuse Open Protection 2		• Please contact customer service for repair.
(LE1) 	(LE1) 	0004H	Low Power Supply Voltage Protection During Operation Internal DC Bus Voltage level is lower than 70%.	• The input power supply is out of phase. • Momentary power failure. The power supply voltage changes too much. • The heavy load of the equipment causes the voltage drop of the power supply to be too large.	• Increase power supply capacity
(OC) 	(OC) 	0001H	Inverter Overcurrent Protection The output current of the inverter exceeds 220% of the rated current of the inverter during operation.	• The inverter output terminal is short-circuited. • The inverter is overloaded. • The acceleration time is too short. • When the motor is not stopped, the inverter starts from zero speed. • The wiring of the motor is wrong or the insulation is bad. • The starting voltage is too high. • The motor end-assembly is equipped with a phase- advancing capacitor or a filter capacitor.	• Check U/T1, V/T2, W/T3 terminals to make sure there is no short circuit among them. • Check whether the motor and frequency converter match. • Check whether the motor is operating in excess state. • Check whether the acceleration time is too short.

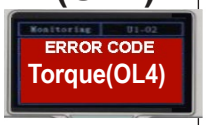
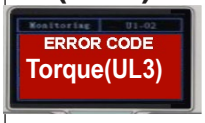
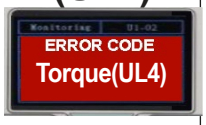
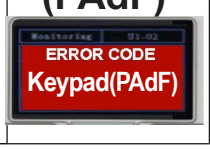
Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(GF) 	(GF) 	0005H	Grounding Fault Protection · The output terminal of the inverter is grounded and the grounding current exceeds 70% of the rated current of the inverter. · Setting: L1-01.	• Defective motor or motor wire insulation.	• Check motor and motor wire insulation.
(OE) 	(OE) 	0002H	Overvoltage Protection • The DC bus voltage inside the inverter exceeds the protection level. • 100V / 200V series: about DC410V. • 400V series: approximately DC820V.	• The deceleration time of the motor is too short, and the inertia recovery voltage causes the DC bus voltage to be too high. • The power supply voltage is too high. • Surge voltage appears on the power supply side.	• Increase the “Deceleration Time” setting. • Install a dynamic braking device. • Check whether the input power is within the rated input range of the inverter. • Add an AC reactor on the output side of the power supply.
(OH) 	OH) 	002FH	Inverter Overheat Protection • The temperature of the inverter reaches the trip point. • Trip level: L1-05	• Ambient temperature is too high. • The heat sink has impurities. • The cooling fan of the inverter is failure.	• Improve the ventilation system. • Remove impurities on the heat sink. • Please send the inverter for repair to replace the cooling fan.
(OH2) 	(OH2) 	0022H	Motor Overheat • The internal temperature of the motor is too high, exceeding the tripping level • Trip level: L6-11, L6-14	• The motor is overheating.	• Check whether the motor load is too large. • Check whether the acceleration/deceleration time is too short. • Check whether the V/F setting is appropriate.
(HF1) 	(HF1) 	0030H	Safe Signal Protection 1 Inverter HF1	• H1 safety switch open circuit.	• Confirm that the external safety circuit is abnormal. • When the safety input is not used, check whether the H1 and HC terminals are short-circuited by the connecting wire.
(HF2) 	(HF2) 	0031H	Safe Signal Protection 2	• H2 safety switch open circuit.	• Confirm that the external safety circuit is abnormal • When the safety input is not used, check whether the H1 and HC terminals are short-circuited by the connecting wire.
(EF) 	(EF) 	0040H	External Fault	• Multifunction input terminal receives external abnormal signal	• Press RESET after clearing the external source of exception.

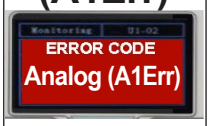
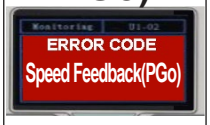
Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(EF1) 	(EF1) 	0041H	External Fault 1	• Multifunction input terminal receives external abnormal signal	• Press RESET after clearing the external source of exception.
(OL) 	(OL) 	0001FH	Motor overload protection The operating current exceeds 150% of the rated motor current and reaches the motor overload protection time.	• The motor is overloaded. • The V/F curve is not set according to the motor characteristics. • Rated motor current is not set properly.	• Check the motor load. • Check whether the acceleration/deceleration time is too short. • Check whether the V/F setting is appropriate. • Check whether the motor rated current setting is appropriate.
(OL1) 	(OL1) 	0011H	Inverter overload protection • Heavy load: The operating current exceeds 150% of the rated current of the inverter and lasts for 1 minute. • General load: The operating current exceeds 120% of the rated current of the inverter and lasts for 1 minute.	• The motor is overloaded. • The V/F curve is not set according to the motor characteristics. • The inverter capacity is too low.	• Check whether the motor load is too large. • Check whether the acceleration time is too short. • Check whether the V/F setting is appropriate. • Select a frequency converter with higher capacity.
(OL2) 	(OL2) 	0012H	Inverter current limit • The operating current exceeds 200% of the rated current of the inverter to trip the condition.	• The load is too heavy. • The acceleration time is too short. • Restart after natural stopping.	• Check the load size. • Check whether the acceleration time is too short. • Check whether the motor has over- rotation.
(OL3) 	(OL3) 	0013H	Motor Over Torque Protection 1 • The motor torque exceeds the detection level and lasts longer than the detection time. • Detection level: L4-11. • Detection time: L4-12.	• The parameter setting is incorrect. • Mechanical equipment failure.	• Confirm the setting values of L4-11 and L4-12 parameters. • Check the use of mechanical equipment.

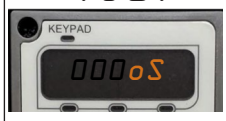
Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(OL4) 	(OL4) 	0014H	Motor Over Torque Protection 2 • The motor torque exceeds the set level and lasts longer than the detection time. • Detection level: L4-14. • Detection time: L4-15.	• The parameter setting is incorrect. • Mechanical equipment failure.	• Confirm the setting values of L4-14 and L4-15 parameters. • Check the use of mechanical equipment.
(UL3) 	(UL3) 	001BH	Motor torque is less than 1 • The motor torque is lower than the detection level and lasts longer than the detection time. • Detection level: L4-11. • Detection time: L4-12.	• The parameter setting is incorrect. • Mechanical equipment failure.	• Confirm the setting values of L4-11 and L4-12 parameters. • Check the use of mechanical equipment.
(UL4) 	(UL4) 	001CH	Motor torque is less than 2 • The motor torque is lower than the detection value and lasts longer than the detection time. • Detection level: L4-14. • Detection time: L4-15.	• The parameter setting is incorrect. • Mechanical equipment failure.	• Confirm the setting values of L4-14 and L4-15 parameters. • Check the use of mechanical equipment.
(OLO) 	(OLO) 	0020H	System Overload Protection • The system is overloaded and the operating current reaches the operating level. • Detection level: L1-15. • Detection time: L1-16.		• Check the use of mechanical equipment.
(PAdF) 	(PAdF) 		KP-601A Keypad Disconnected (after startup)	• The connecting wire of the manipulator is loose. • The operator socket of the inverter is oxidized.	• Check the keypad cable.

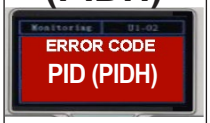
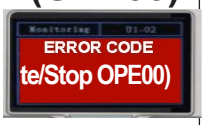
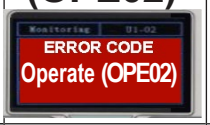
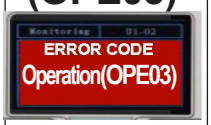
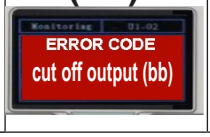
Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(IPLF) 	(IPLF) 	0008H	Input phase loss protection • If the peak-to-trough voltage difference ratio of the PN DC side ripple exceeds 0.075 and lasts for more than 10 seconds, the inverter will trip.	• Input power phase loss • The wiring terminal on the input side of the inverter is loose.	• Check whether the wiring on the input side is normal • Check whether the input terminal is locked
(OPLF) 	(OPLF) 	0009H	Output phase loss protection • When any phase of U, V, • W is lower than 0.4 times of the average current of the three setting and lasts for more than 1 sec, the inverter will trip.	• Output power phase loss • The wiring terminal on the output side of the inverter is loose	• Check whether the wiring on the output side is normal • Check whether the output terminal is locked
(A1Err) 	(A1Err) 	0051H	Analog Input Protection 1	• Analog input signal exceeds the set level	• Confirm the setting value of L6-00 parameter. • Check if the analog input signal is normal.
(A2Err) 	(A2Err) 	0052H	Analog Input Protection 2	• Analog input signal exceeds the set level	• Confirm the parameter setting value of L6-04. • Check if the analog input signal is normal.
PGo) 	PGo) 		Speed feedback card disconnection protection • The speed detection value of the pulse input is 0 and the duration of the state reaches the speed feedback card disconnection detection time • Detection time: F1-03.	• Pulse input disconnection • Pulse input wiring error	• Check whether the wiring of the speed feedback card is normal.

Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(oS) 	(oS) 	0071H	Speed feedback card disconnection protection • The speed detection value of the pulse input is 0 and the duration of the state reaches the speed feedback card disconnection detection time • Detection time: F1-03.	• Pulse input disconnection • Pulse input wiring error	• Check whether the wiring of the speed feedback card is normal.
(oS) 	(oS) 		Over speed protection • The speed of pulse wave input exceeds the detection level and lasts longer than the detection time. • Detection level: F1-05. • Detection time: F1-06.	• The parameter setting is incorrect. • Overcompensation occurs	• Check the parameter setting values of F1-05 and F1-06. • Properly adjust the setting values of C5-00 (Speed Control Proportional Gain 1) and C5-01 (Speed Control Integral Time 1).
(dEV) 	(dEV) 	0072H	Speed deviation is too large • The deviation of the pulse input speed and frequency commands exceeds the detection level and lasts longer than the detection time. • Detection level: F1-08. • Detection time: F1-09.	• The parameter setting is incorrect. • The load is too heavy. • The acceleration and deceleration time is too short.	• Check the parameter settings of F1-08 and F1-09. • Check the load size. • Check whether the acceleration time is too short.

Inverter Trip Messages and Countermeasures

LED DISPLAY	LCD DISPLAY (Scrolling Type)	MODBUS HEX CODE	Description	Reason	Countermeasure
(PIDH) 	(PIDH) 		PID feedback too high protection • The PID feedback value exceeds the set protection point and continues to exceed the detection time. • Detection level: b5-26 • Detection time: b5-27	• The feedback sensor is failure. • PID feedback wiring is wrong. • The parameter setting is incorrect.	• Check the feedback sensor. • Check whether the wiring is correct. • Check the setting values of parameters b5-26 and b5-27.
(PIDL) 	(PIDL) 		PID feedback low protection • The PID feedback value is lower than the set protection point and continues to exceed the detection time. • Detection level: b5-24 • Detection time: b5-25	• The feedback sensor is failure. • PID feedback wiring is wrong. • The parameter setting is incorrect.	• Check the feedback sensor. • Check whether the wiring is correct. • Check the setting values of parameters b5-24, b5-25, b5-26, b5-27.
(OPE00) 	(OPE00) 	0100H	Operate/Stop Command act at the same time	• Operate/stop command act at the same time.	• Check the operate/stop command action.
(OPE02) 	(OPE02) 	0102H	Operate Command Lock (Power ON/ OFF)	• During power transmission, the operation command is in the ON state.	• Please disconnect the operate command first and then restart the operate command.
(OPE03) 	(OPE03) 	0103H	Operation Command Lock (Local/Remote)	• When switching the Local/ Remote state, the operation command is not disconnected.	• Please disconnect the operate command first and then restart the operate command.
(LE) 	(LE) 	0003H	Power supply voltage is too low • DC bus voltage inside the inverter is lower than 70%.	• The power supply voltage is too low.	• Check that the power supply voltage is appropriate.
(bb) 	(bb) 	0A01H	Inverter cut off output	• When the interrupt output command acts, the inverter stops outputting.	• Clear the frequency converter to cut off the output command.

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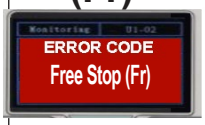
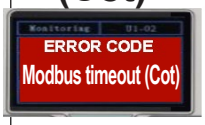
(Fr) 	(Fr) 	00A2H	Free Operation Stop	• When the free operating command acts, the inverter stops outputting.	• Clear the Free Operation Stop command.
(db) 	(db) 	00A0H	Stop Overvoltage The DC bus voltage inside the inverter exceeds the protection level.	• The supply voltage is too high.	• Check whether the input power is within the rated input range of the inverter.
(dFt) 	(dFt) 		Operation Direction Command Error	• The forward and reverse rotation commands are input to the inverter at the same time.	• Check the direction command.
(Cot) 	(Cot) 	0090H	Modbus Communication Timeout	• The communication line is loose or wrongly connected. • Main/Secondary device communication settings are different.	• Check whether the connection of the communication line is correct. • Check if the communication settings are appropriate.
(A1wARN) 	(A1wARN 	0053H	Analog Input Warning 1	• Analog input signal exceeds the set level	• Confirm the setting value of L6-00 parameter. • Check if the analog input signal is normal.
(A2wARN) 	(A2wARN 	0054H	Analog Input Warning 2	• Analog input signal exceeds the set level	• Confirm the parameter setting value of L6-04. • Check if the analog input signal is normal.
(OH1) 	(OH1) 	0021H	Motor Overheat Warning · The internal temperature of the motor is too high, exceeding the warning level · Warning level: L6-12, L6-15.	• The motor is overheating.	• Check if the motor load is too large. • Check whether the accelera-tion/deceleration time is too short. • Check whether the V/F curve setting is appropriate.
(OH3) 	(OH3) 	0023H	External Overheat Warning	• Multi-function input terminal receives external over-tem-perature warning signal	• Check for external overheating causes

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(OHt) 	(OHt) 	002EH	Inverter Overheat Protection • The heat sink temperature of the inverter reaches the overheating warning level. • Warning level: L1-07	• The ambient temperature is too high. • The heat sink has impurities. • The cooling fan of the inverter is abnormal.	• Improve the ventilation system. • Remove the dust accumulated on the heat sink. • Replace the cooling fan.

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- Bear right with Enterprise Parkway
- Follow Enterprise as it parallels Interstate 75

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