MAGNETEK
ELEVATOR

HPV1000 AC

HPV1000 AC Elevator Drive

Technical Manual

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure that the end user receives this manual.

TM7369 rev 01

◆ WARRANTY

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This warranty does not apply to experimental products for which no warranty is made or given and Buyer waives any claim thereto.

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◆ LIMITATIONS OF LIABILITY

IN NO EVENT SHALL MAGNETEK BE LIABLE FOR LOSS OF PROFIT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES WHETHER ARISING OUT OF WARRANTY, BREACH OF CONTRACT OR TORT.

Table of Contents

1 Model Numbers and Ratings

Drive Model Number	Rated Power (kW)	Continuous Output Current Rating	Peak (max. accelerating current for 5's)	Drive Input Current
HPV1000-4009-BA-N02	4	9A	16A	10.4
HPV1000-4015-BA-N02	5.5	15A	26A	15
HPV1000-4018-BA-N02	7.5	18A	34A	20
HPV1000-4024-BA-N02	11	24A	48A	29
HPV1000-4031-BA-N02	15	31A	62A	39
HPV1000-4039-BA-N02	18	39A	78A	47
HPV1000-4045-BA-N02	22	45A	90A	43
HPV1000-4060-BA-N02	30	60A	120A	58
HPV1000-4075-BA-N02	37	75A	150A	71
HPV1000-4091-BA-N02	45	91A	182A	86
HPV1000-4112-CA-N02	55	112A	202A	105
HPV1000-4150-CA-N02	75	150A	270A	142

Note: All continuous current ratings based on an 8kHz carrier frequency except HPV1000-4112/4150 models, which are based on 5kHz.

For further details on drive derating at high switching frequencies, please refer to ***Drive Derating Data on page 71***.

2 Mechanical Installation

◆ Dimensions

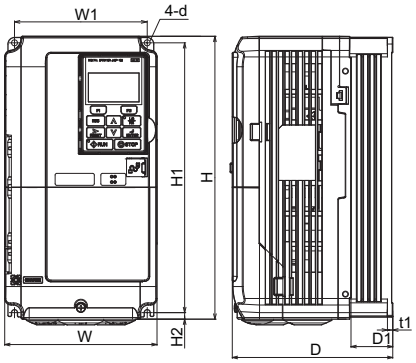


Figure 1

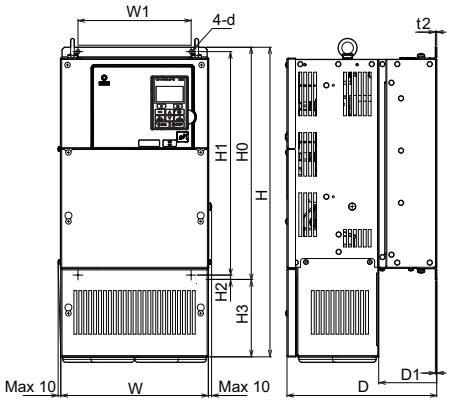


Figure 2

Model HPV1000	Fig.	Dimensions (mm)												Weight (kg)
		W	H	D	W1	H0	H1	H2	H3	D1	t1	t2	d	
4009-BA-N02	1	140	260	164	122	–	248	6	–	55	5	–	M5	3.5
4015-BA-N02		140	260	167	122	–	248	6	–	55	5	–	M5	3.9
4018-BA-N02		140	260	167	122	–	248	6	–	55	5	–	M5	3.9
4024-BA-N02		180	300	167	160	–	284	8	–	55	5	–	M5	5.4
4031-BA-N02		180	300	187	160	–	284	8	–	75	5	–	M5	5.7
4039-BA-N02		220	350	197	192	–	335	8	–	78	5	–	M6	8.3
4045-BA-N02	2	254	465	258	195	400	385	7.5	65	100	2.3	2.3	M6	23
4060-BA-N02		279	515	258	220	450	435	7.5	65	100	2.3	2.3	M6	27
4075-BA-N02		329	630	258	260	510	495	7.5	120	105	2.3	3.2	M6	39
4091-BA-N02		329	630	258	260	510	495	7.5	120	105	2.3	3.2	M6	39
4112-CA-N02		329	630	283	260	550	535	7.5	80	110	2.3	2.3	M6	43
4150-CA-N02		329	630	283	260	550	535	7.5	80	110	2.3	2.3	M6	45
4180-CA-N02		456	868	330	325	705	680	12.5	163	130	3.2	3.2	M10	85
4216-CA-N02		504	1038	350	370	800	773	13	238	130	4.5	4.5	M12	103

3 Electrical Installation

◆ Electrical Interconnections

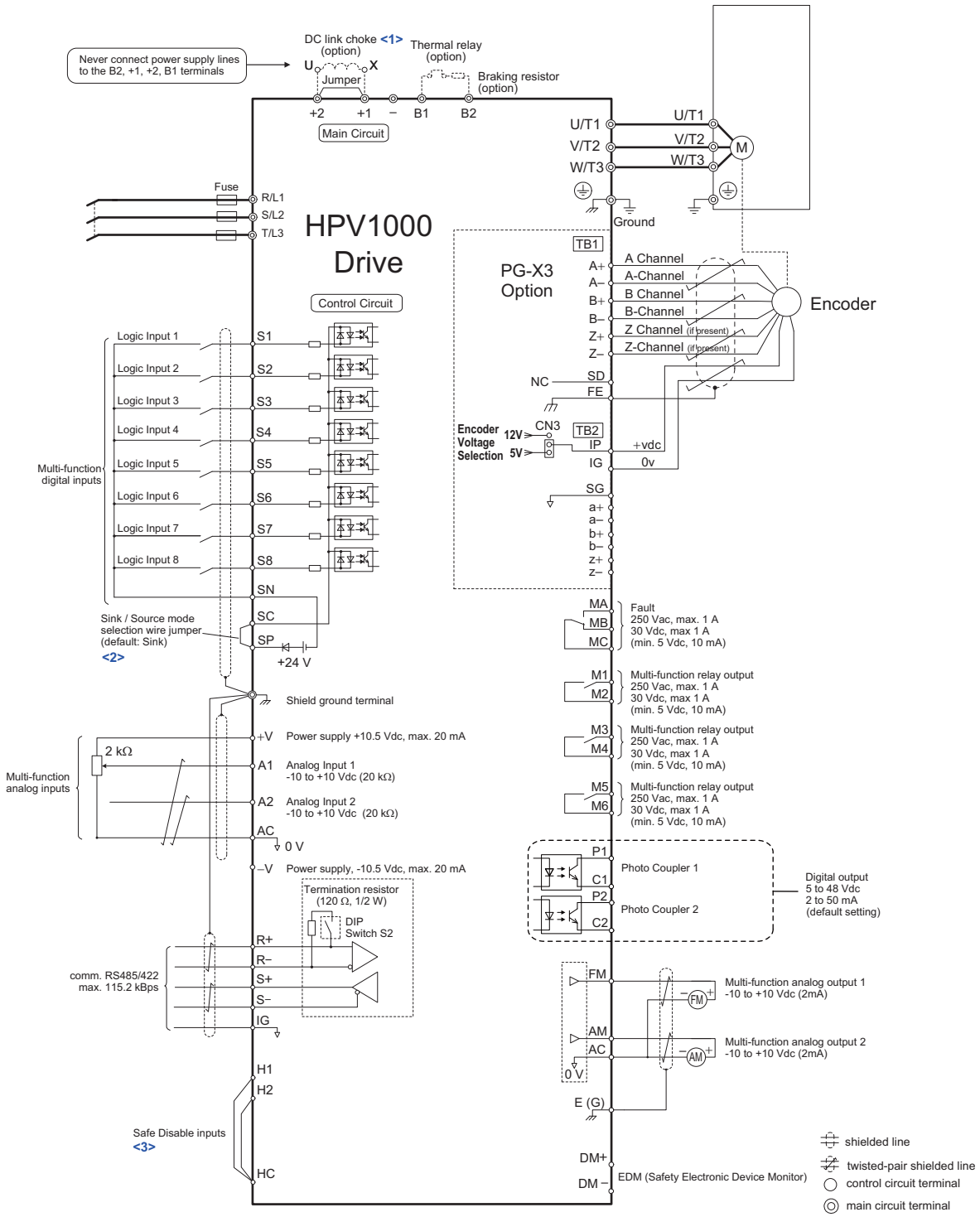


Figure 3

<1> Remove the jumper when installing a DC reactor. Models 4045 up to 4216 come with a built-in DC reactor.

<2> Never short terminals SP and SN, as doing so will damage the drive.

<3> Disconnect the wire jumper between H1-HC and H2-HC when utilizing the Safe Disable inputs.

Note: 1. The drive should be implemented in the system in a way so that a drive fault causes the safety chain to open. Always use terminal MA-MB-MC for this purpose.

◆ Main and Control Circuit Wiring

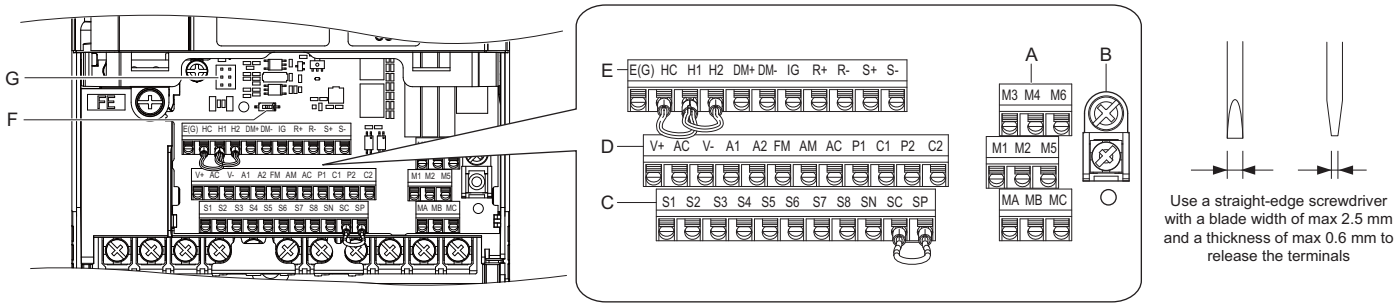
■ Main Circuit Terminals

Terminal		Type			Function
400 V Class	Model HPV1000	4009 to 4039	4045, 4060	4075 to 4216	
R/L1, S/L2, T/L3		Main circuit power supply input			Connects line power to the drive
U/T1, V/T2, W/T3		Drive output			Connects to the motor
B1, B2		Braking resistor		Not available	Available for connecting a braking resistor or a braking resistor unit option
+2		• DC reactor connection (+1, +2) (remove the shorting bar between +1 and +2) • DC power supply input (+1, –)	Not available		For connection • of the drive to a DC power supply (terminals +1 and – are not UL approved) • of dynamic braking options
+1, –			DC power supply input (+1, –)	• DC power supply input (+1, –) • Braking unit connection (+3, –)	
+3					
⏚		–			Grounding terminal

Note: Use terminal B1 and – terminals when installing the braking unit (CDBR type) to the drives with built-in braking transistor (4009-4060).

■ Control Circuit Terminals

The figure below shows the control circuit terminal arrangement. The drive is equipped with screwless terminals.



A – Terminal Block (TB 2)
B – Terminal Block (TB 5)
C – Terminal Block (TB 1)
D – Terminal Block (TB 3)
E – Terminal Block (TB 4)
F – DIP switch S2
G – Jumper S3

DIP switch S2 and jumper S3 are located on the terminal board. Set them as described below.

S2	RS422/485 Termination Resistor	Off On
S3	Safe Disable Input Sink/Source/External Supply Selection	Sink / Source / External 24 Vdc Power Supply

■ Control Circuit Input Terminal Functions

Type	No.	Terminal Name (Function)	Function (Signal Level) Default Setting
Digital Inputs	S1	Multi-function input 1	Photocoupler 24 Vdc, 8 mA Use the wire link between terminals SC and SN or between SC and SP to select sinking or sourcing, and to select the power supply.
	S2	Multi-function input 2	
	S3	Multi-function input 3	
	S4	Multi-function input 4	
	S5	Multi-function input 5	
	S6	Multi-function input 6	
	S7	Multi-function input 7	
	S8	Multi-function input 8	
Digital Input Power Supply	SC	Multi-function input common	Photocoupler, 24 Vdc, 8 mA Use the wire link between terminals SC and SN or between SC and SP to select sinking or sourcing, and to select the power supply.
	SN	0 V	
	SP	+24 Vdc	
Safe Disable Inputs	H1	Safe Disable input 1	24 Vdc, 8 mA One or both open: Drive output disabled Both closed: Normal operation Internal impedance: 3.3 kΩ Off time of at least 1 ms Set the S3 jumper to select sinking or sourcing, and to select the power supply.
	H2	Safe Disable input 2	
	HC	Safe Disable function common	Common for the Safe Disable function
Analog Inputs	+V	Power supply for analog inputs	10.5 Vdc (max. allowable current 20 mA)
	–V	Power supply for analog inputs	-10.5 Vdc (max. allowable current 20 mA)
	A1	Multi-function analog input 1	-10 to 10 Vdc, 0 to 10 Vdc (input impedance: 20 kΩ)
	A2	Multi-function analog input 2	-10 to 10 Vdc, 0 to 10 Vdc (input impedance: 20 kΩ)
	AC	Analog Input common	0 V
	E (G)	Ground for shielded lines and option cards	–

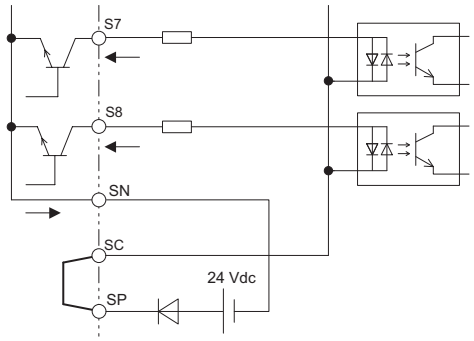
NOTICE: *The wiring length to terminals HC, H1 and H2 should not exceed 30 m.*

■ Sinking/Sourcing Mode (NPN/PNP Selection)

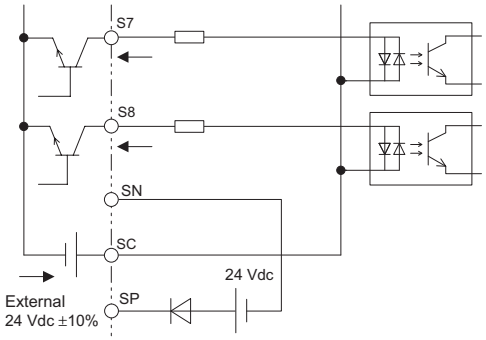
Use a wire link between terminals SC and SP or SC and SN to select between Sink mode, Source mode or external power supply for the digital inputs S1 to S8 as shown below (Default: Sink mode, internal power supply).

Note: Never short terminals SP and SN as doing so will damage the drive.

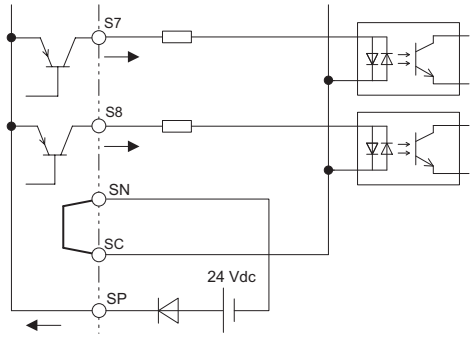
Internal Power Supply – Sinking Mode (NPN) (default)



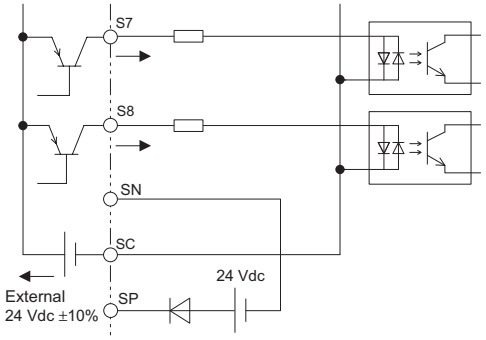
External Power Supply – Sinking Mode (NPN)



Internal Power Supply – Sourcing Mode (PNP)



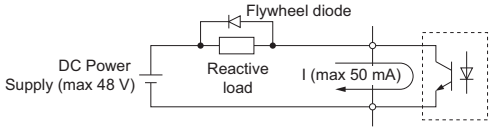
External Power Supply – Sourcing Mode (PNP)



■ Control Circuit Output Terminal Functions

Type	No.	Terminal Name	Function (Signal Level) Default Setting
Fault Relay	MA	N.O. output	30 Vdc, 10 mA to 1 A; 250 Vac, 10 mA to 1 A Minimum load: 5 Vdc, 10 mA
	MB	N.C. output	
	MC	Fault output common	
Multi-Function Relay Output	M1	Multi-function Relay output 1	
	M2		
	M3	Multi-function Relay output 2	
	M4		
	M5	Relay output 3	
	M6		
Multi-Function Photocoupler Output	P1	Photocoupler output 1	Photocoupler output 48 Vdc, 2 to 50 mA
	C1		
	P2	Photocoupler output 2	
	C2		
Monitor Output	FM	Analog monitor output 1	-10 to +10 Vdc, 0 to +10 Vdc
	AM	Analog monitor output 2	
	AC	Monitor common	0 V
Safety Monitor Output	DM+	Safety monitor output	Outputs status of Safe Disable function. Closed when both Safe Disable channels are closed. Up to +48 Vdc 50 mA.
	DM–	Safety monitor output common	

NOTICE: *When connecting a reactive load such as a relay coil to a photo coupler output, attach a flywheel diode to the load (relay coil) like shown below. Ensure the diode rating is greater than the circuit voltage.*



■ Encoder Terminations

When the HPV1000 is used with an encoder the following points should be noted:

- Use twisted pair cable with shield terminated at drive end only.
- Encoder wiring should be routed at least 30cm from motor cable or power.
- Continuity of wires and shields should be maintained from the encoder through to the controller, avoiding the use of terminals in a junction box.
- The shield and shield drain wires must be insulated from other objects. This helps to minimize radiated and induced noise problems and magnetically induced ground loops.
- Use direct motor mounting without couplings where possible.
- Should the encoder to be connected to the motor via a coupling, the encoder should not oscillate when the motor is turning, as this **will** result in a compromised ride quality and possibly drive faults occurring.
- When attempting to configure a drive for closed loop/PM operation an option card is required, when a standard Incremental encoder is used the PG-X3 option card is required, for EnDat encoders the PG-F3 card is required.

For the correct termination information please refer to ***Closed-Loop Startup on page 34*** and ***PM Startup on page 37***.

4 Keypad Operation

◆ Operator Power Up

When the operator is powered up, the Operator will display the drive software and the Operator software for a second after a Magnetek Logo splash screen.

The software versions shown in this screen can be viewed in the drive U6 sub-menu.

◆ Operator LEDs

The Operator has two operational status LEDs: one ALARM LED and one RUN LED.

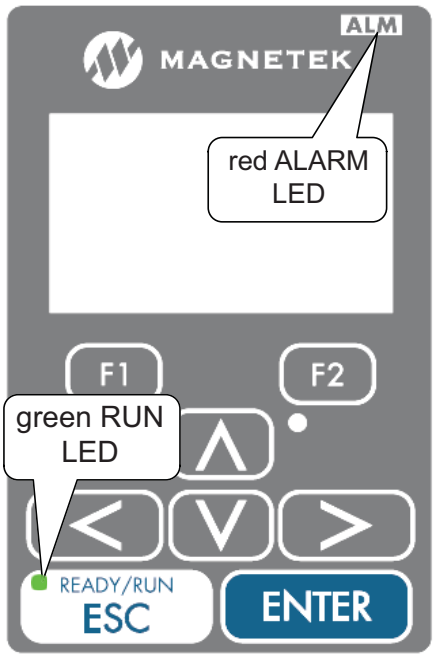


Figure 4 Operator Status LED

■ Alarm (ALM) LED Operation

When the drive detects an alarm that does not warrant a drive operation shut down, the ALM LED will begin to flash red. If the drive detects a fault (drive operation shut down), the ALM LED will be a solid red light. *Refer to Troubleshooting on page 41* for more details.

■ RUN LED Operation

The RUN LED will turn green when the drive is commanded to run.

■ Alarm / Fault Display

When the drive detects an alarm or a fault, it will display the name and the code on a splash screen (as shown below). *Refer to Troubleshooting on page 41* for more details.

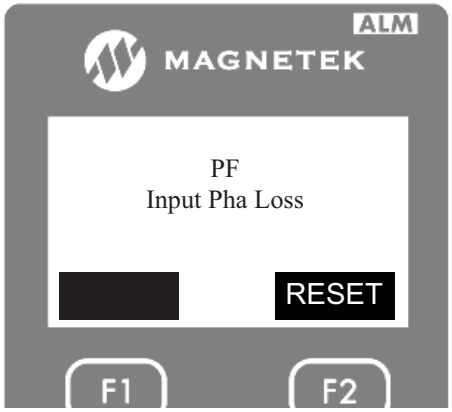


Figure 5 Alarm/Fault Splash Screen

To remove the splash screen, press the F2 key to select the reset.

◆ Operator Keys

The Operator has eight functional keys as shown below:

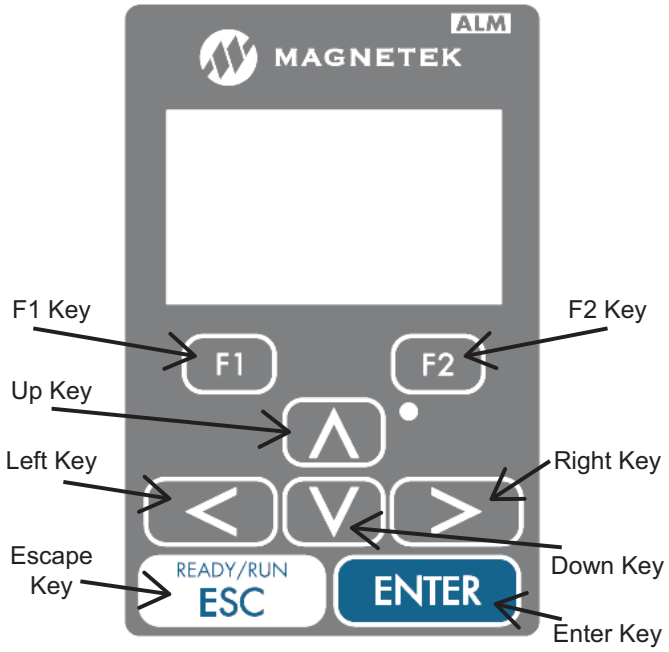
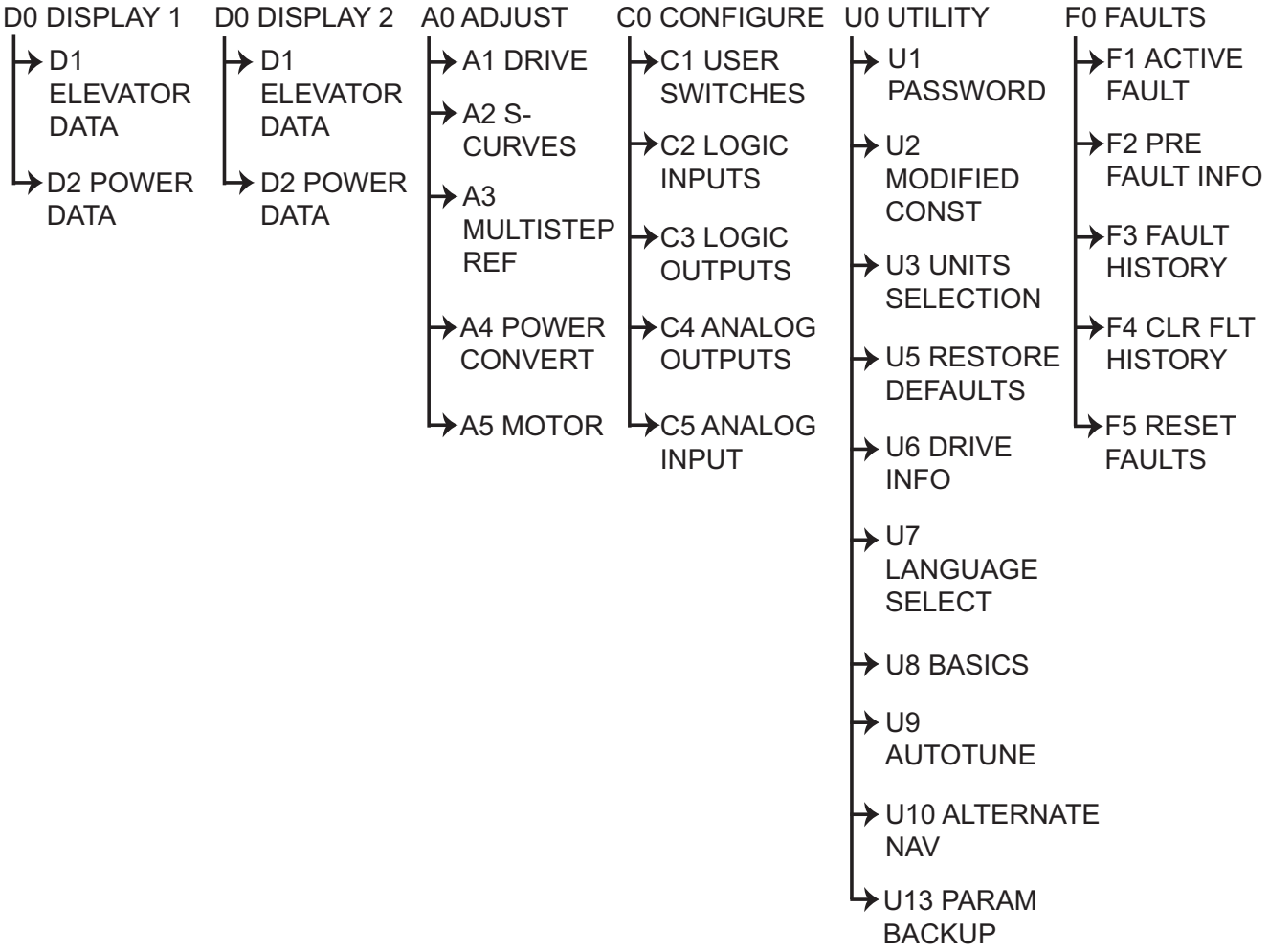


Figure 6 Operator Keys

◆ Menu Navigation

The menu operates on three levels: the menu level, the sub-menu level and the entry level. At the menu level, it allows the user to navigate between menus or sub-menus. At the sub-menu level, it allows users to navigate between sub-menus or menu items. At the entry level, it allows the user to change values or select different options.



■ Menu Navigation at the Menu Level

The menu level (such as the D0, A0, C0, U0, and F0) is the top level display that allows the user to navigate between sub-menus within a menu level. For example, the user will be able to navigate the A1 - A5 sub-menus if the A0 menu level is being viewed.

At the menu level, the up and down arrow keys cause the display to show the sub-menus of the menu level the user is in. Using the left or right key will cause the display to move to a different menu level. At the end of either the menu level list or the sub-menu level list (either left, right, up, or down), pressing the same key will cause a wrap-around.

Each menu will remember the last accessed sub-menu. The left and right arrow keys will navigate between these last active sub-menus shown in ***Figure 7***.

Note: This remembrance of the last active sub-menu is volatile and will be lost at power down.

■ Navigation at the Sub-Menu Level

To access the sub-menu from the menu level, press the “ENTER” key when the display is showing you the sub-menu you would like to go into. While in the sub-menu level, the text “SUB” will be shown in between the arrows on the screen as shown in ***Figure 7***. At the sub-menu level, the positioning keys work slightly different than they did at the menu level. The up and down arrow keys now select separate parameters in the sub-menu.

At any time while in the sub-menu, pressing the “ESC” key will return the display to the menu level. Upon exiting a sub-menu via the “ESC” key, the last viewed parameter is “remembered”. The next time that same sub-menu is entered, it is entered at the “remembered” parameter.

This feature can be used to obtain quick access to two monitor values. Two menus, one labeled Display 1 D0 and one labeled Display 2 D0, have the same display items. One item can be selected under the Display 1 menu and another under the Display 2 menu. The left and right arrow keys can then be used to move back and forth between these two display parameters.

Note: This remembrance of sub-menus and sub-menu items is volatile and is lost at power down.

■ Navigation at the Entry Level

To access the entry level from the sub-menu level, press the “ENTER” key on the parameter while it is being displayed. While in the entry level, the text “Ent” will be displayed in between the arrows on the screen as shown in ***Figure 7***. At the entry level, the functions of the keys are redefined. The “ESCAPE” key remains as the key used to move back to the higher level (in this case to the sub-menu level). The left and right arrow keys are used as cursor positioning keys and the up and down arrow keys are used as increment and decrement keys.

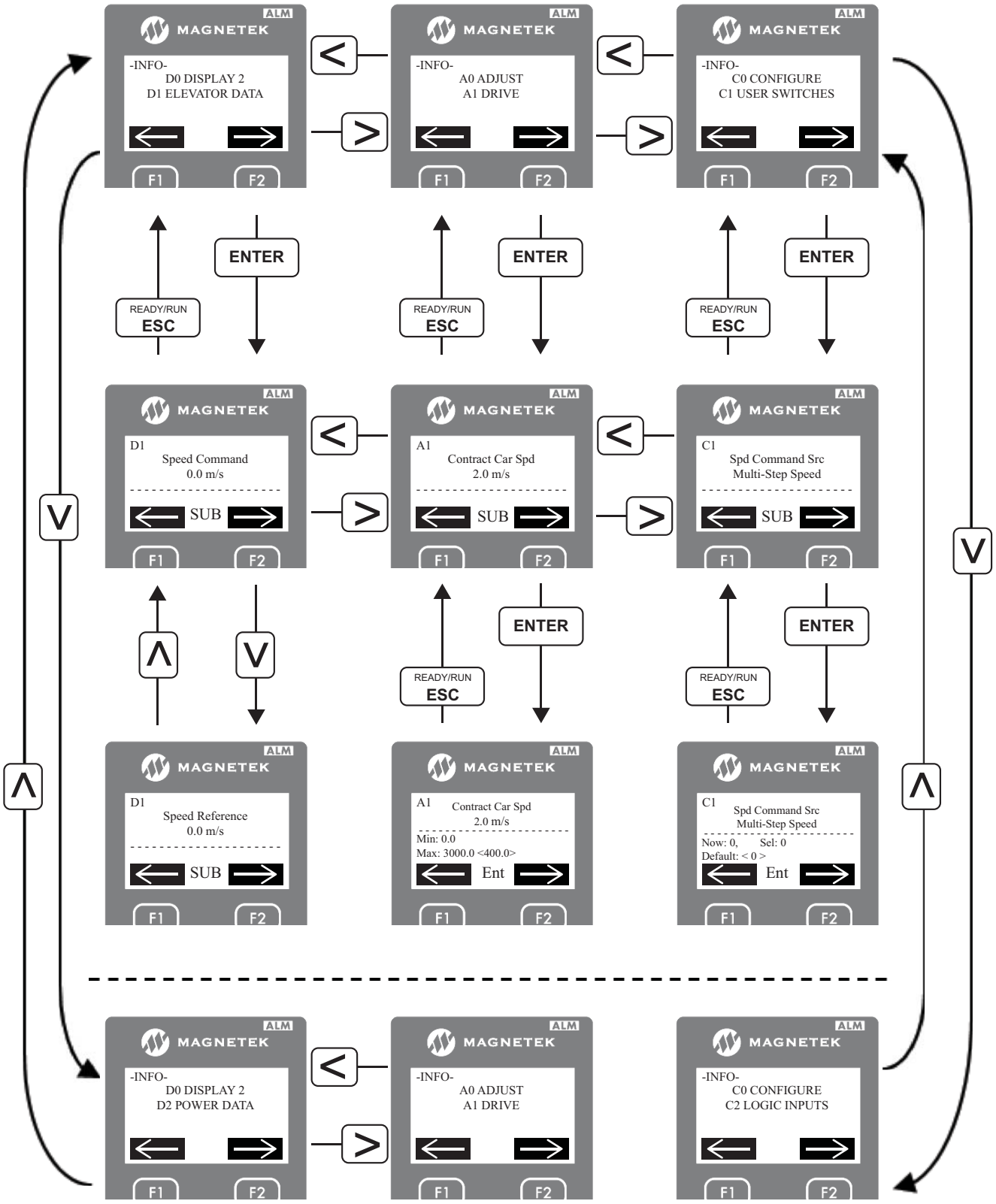


Figure 7 Operator Navigation

◆ Feedback Mode Selection

When the drive is first powered up, the appropriate control modes must be selected using BASICS (U8) menu to match the application. Note that Closed Loop Vector modes require encoder feedback cards. The table below indicates possible control modes depending on the motor type and shows the required encoder feedback card.

Machine Type	Control Mode	U8 Setting	Encoder Option Card
Induction motor without encoder	V/f Control	Open Loop	No card required
	Open Loop Vector Control	Open Loop	No card required
Induction motor with incremental encoder	Closed Loop Vector Control	Closed Loop	PG-B3 / PG-X3
Permanent magnet motor with EnDat 2.1/01, EnDat 2.2/01, EnDat 2.2/22 encoder or Hiperface encoder	Closed Loop Vector Control for PM motors	PM	PG-F3
Permanent magnet motor with ERN1387 encoder	Closed Loop Vector Control for PM motors	PM	PG-E3

5 Programming

◆ Adjust Menu Parameters

Table 1 Drive A1 Submenu

A1 Parameter Name	Description	Units	Default
Contract Car Spd	Sets the elevator contract car speed. The value entered here will be the number that is displayed on the drive when commanded to run at high speed.	m/s	2.0
Contract Mtr Speed	Motor speed (in rpm) that will allow the elevator to travel at Elevator Contract Car Speed.	RPM	1130.0
Response <3>, <4>	Sets the sensitivity of the drive's speed regulator in terms of the speed regulator bandwidth in radians. The responsiveness of the drive as it follows the speed reference will increase as this number increases. If the number is too large, the motor current and speed will become jittery. If this number is too small, the motor will become sluggish.	Rad/sec <3>, <4>	10.0 <3>, <4>
Inertia <3>, <4>	Sets the equivalent of the system inertia in terms of the time it takes the elevator to accelerate to motor base speed at rated torque.	Sec <3>, <4>	2.00 <3>, <4>
Encoder Pulses	This parameter sets the pulses per revolution the drive receives from the encoder.	PPR	1024 <1>, <2>, <3> 2048 <4>
Mtr Torque Limit <2>, <3>, <4>	Sets the maximum torque allowed during the motoring mode.	% <2>, <3>, <4>	200.0 <2>, <3>, <4>
Regen Torq Limit <2>, <3>, <4>	Sets the maximum regenerative torque allowed during the regeneration mode.	% <2>, <3>, <4>	200.0 <2>, <3>, <4>
Trq Lim Msg Dly <1>, <2>, <4>	This parameter determines the amount of time the drive is in torque limit before the Torque Limit alarm is declared.	Sec <1>, <2>, <4>	01.0 <1>, <2>, <4>
Gain Change Level <3>, <4>	Sets the speed level at which the Response (A1) gain will begin to be reduced for low gain mode.	% <3>, <4>	100.0 <3>, <4>
Gain Reduce Mult <3>, <4>	This parameter is the percentage that the Response (A1) value will change to when in low gain mode.	% <3>, <4>	100 <3>, <4>
Contact Flt Time	When external logic outputs are used to control the closing of the motor contactor, this parameter sets the amount of time delay at start until the drive output is enabled and current flows. And when external logic inputs are used to confirm the closing of the motor contactor, this parameter sets time the drive should expect the motor contactor confirmation signal to be made before a Contactor Fault is declared.	Sec	00.10
Notch Frequency <3>, <4>	Sets the center frequency of the notch filter.	Hz <3>, <4>	20 <3>, <4>
Notch Depth <3>, <4>	Sets the attenuation level of the notch filter.	% <3>, <4>	0 <3>, <4>
Tach Rate Gain <3>, <4>	Setting of this parameter helps with reducing the effects of rope resonance.	-	0.0 <3>, <4>
Inner Loop Xover <3>, <4>	This parameter sets the frequency of the inner loop speed regulator	-	10.0 <3>, <4>
Auto Restarts	Sets the number of times the drive may attempt to reset after the following faults occur: Ground Fault, Phase Loss, Overcurrent, Overvoltage, Braking Transistor Fault, Heatsink Error, Motor Overload, Drive Overload, Overtorque Detection 1, Overtorque Detection 2, Undertorque Detection 1, Undertorque Detection 2.	-	0
Brake Pick Delay <1>, <2>	In Open Loop modes when external logic outputs are used to control the mechanical brake, this is the time delay from a drive run command until the brake is picked. This time delay needs to be set for the following: have DC injection current before the mechanical brake is picked and have DC injection current after the mechanical brake is picked to allow the brake to fully open.	Sec <1>, <2>	0.20 <1>, <2>
Brake Drop Delay <1>, <2>	In Open Loop modes when external logic outputs are used to control the mechanical brake and ramp to stop is selected, this parameter sets the time delay to set the brake after decelerating to the DC Stop Freq. This time delay needs to be set for the following: have DC injection current before the mechanical brake is closed and after the mechanical brake is picked to allow the brake to fully open.	Sec <1>, <2>	0.10 <1>, <2>
Brake Pick Time	Determines the amount of time the drive allows for the brake to lift and close.	Sec	0.10

A1 Parameter Name	Description	Units	Default
AB Zero Spd Lev <3>, <4>	This parameter sets the speed point that will be considered as zero speed for the auto brake function.	% <3>, <4>	0.00 <3>, <4>
AB Off Delay <3>, <4>	This parameter determines the time after zero speed is reached (level determined by the AB ZERO SPD LEV (A1) parameter) that the Autobrake logic output goes false.	Sec <3>, <4>	0.00 <3>, <4>
Brake Open Delay	This sets how long the drive should wait after a RUN before the brake is picked with Brake Control (C3).	Sec	0.20
Brake Fault Time	This parameter sets the time allowed for the brake pick feedback not to match the brake pick command before a Brake Pick Fault occurs.	ms	500
Brake Close Dly	This sets how long the drive should wait before the brakes are dropped with Brake Control (C3).	Sec	0.10
DC Start Level <1>, <2>	Determines the amount of current to use for DC Injection at start. Set as a percentage of the drive rated current.	% <1>, <2>	50 <1>, <2>
DC Stop Level <1>, <2>	Determines the amount of current to use for DC Injection at stop. Set as a percentage of the drive rated current.	% <1>, <2>	50 <1>, <2>
DC Stop Freq	Determines the speed to begin applying DC Injection (or Position Lock) when the drive is ramping to stop (C1 Stopping Mode = Ramp to Stop). Set as a percentage of the maximum output frequency (A5 Rated Motor Frequency).	%	2.400 <1> 1.000 <2> 0.200 <3> 0.350 <4>
DC Brk TimeStart	Determines how long the drive should perform DC Start Level (A1). OR In Closed Loop Vect (U8) or PM ClosedLoopVct (U8) mode, this parameter determines how long Position Lock should be performed at the start. A setting of 0.00 disables this function.	Sec	0.40
DC Brk Time Stop	Determines how long the drive should perform DC Injection at stop. OR In Closed Loop Vect (U8) or PM ClosedLoopVct (U8) mode, this parameter determines how long Position Lock should be performed at the stop. A setting of 0.00 disables this function.	Sec	0.60
Pos Lock P Gain <3>, <4>	Sets the proportional gain for the speed regulator during Position Lock. If this is set too high, vibration can be introduced.	-	40.00 <3> 10.00 <4>
Pos Lock I Time <3>, <4>	Sets the integral time for the speed regulator during Position Lock. If this is set too low, vibration can be introduced.	-	0.100 <3>, <4>
Pos Lock Gain 1 <3>, <4>	Sets gain levels for the Position Lock function at the start of a run. Setting too low of a gain will cause the drive to be less responsive. Setting too high of a gain will cause vibration.		005 <3>, <4>
Pos Lock Gain 2 <3>, <4>	Sets gain levels for the Position Lock function at the start of a run. Setting too low of a gain will cause the drive to be less responsive. Setting too high of a gain will cause vibration.		000.00 <3>, <4>
Pos Loc Stp Gain <3>, <4>	Sets the Position Lock gain at the stop. Setting too low of a gain will cause the drive to be less responsive. Setting too high of a gain will cause vibration.		005 <3>, <4>
Pos Loc Stp Time <3>, <4>	Determines the reduction rate used to bring the internal torque reference value down to zero after Position Lock at Stop has finished. Rate = (Torque 300%/ Pos Loc Stp Time)	ms <3>, <4>	100 <3>, <4>
Pos Loc B-width <3>, <4>	Determines the bandwidth around the lock position in which a digital output programmed for Zero Servo End (C3) is active.		00010 <3>, <4>
Overspd Det Lvl <3>, <4>	Sets the speed at which an Overspeed fault is declared as a percentage of Contract Car Speed (A1).	% <3>, <4>	115 <3>, <4>
Overspd Det Time <3>, <4>	Sets the time in seconds for an overspeed situation to trigger an Overspeed Fault.	Sec <3>, <4>	1.0 <3>, <4>
PM Accel Limit <4>	Determines the how fast a PM motor can accelerate before an overacceleration fault is triggered.	- <4>	1.5 <4>

A1 Parameter Name	Description	Units	Default
Spd Dev Low Lvl <3>, <4>	When the difference between the speed reference and the speed feedback value exceeds this setting for the time set in Dev Low Time (A1), the Speed Deviation Low digital output is open. Setting of 0.0 disables this feature (aka. output will always be closed).	% <3>, <4>	10.0 <3>, <4>
Spd Dev Low Time <3>, <4>	When the difference between the speed reference and the speed feedback value exceeds the level in Dev Low Level (A1) for this time setting, the Speed Deviation Low digital output will open.	Sec <3>, <4>	0.50 <3>, <4>
Speed Dev Alm Lvl <3>, <4>	When the difference between the speed reference and the speed feedback value exceeds this setting for the time set in Alarm Time (A1), a Speed Dev alarm is generated. A setting of 0.0 disables this feature.	% <3>, <4>	15.0 <3>, <4>
Spd Dev Alm Time <3>, <4>	Defines the time the Speed Feedback (D1) signals needs to be in the range of Speed Reference (D1) before a Speed Dev alarm is declared. The range is defined by Spd Dev Alm Lvl (A1).	Sec <3>, <4>	00.10 <3>, <4>
Spd Dev Flt Lvl <3>, <4>	When the difference between the speed reference and the speed feedback value exceeds this setting for the time set in Fault Time (A1), a Speed Dev fault is generated. A setting of 0.0 disables this feature.	% <3>, <4>	25.0 <3>, <4>
Spd Dev Flt Time <3>, <4>	Defines the time the Speed Feedback (D1) signals needs to be in the range of Speed Reference (D1) before a Speed Dev Fault is declared. The range is defined by Spd Dev Flt Lvl (A1).	Sec <3>, <4>	00.50 <3>, <4>
PreTrq Time <3>, <4>	Sets a time constant for the torque reference to reach 300%. Enabled by setting an analog terminal for torque compensation. Effective only when Trq Comp Type (C1) is set to Pre-torque.	ms <3>, <4>	500 <3>, <4>
PreTrq Dec Freq <3>, <4>	Sets the speed level for torque compensation to diminish. A setting of 0.0 disables this function. Effective only when Trq Comp Type (C1) is set to Pre-torque.	Hz <3>, <4>	0.0 <3>, <4>
PreTrq Dec Time <3>, <4>	Sets the time for torque compensation to diminish once motor speed reaches the level set in TrqCmpFadeoutSpd (A1). Effective only when Trq Comp Type (C1) is set to Pre-torque.	ms <3>, <4>	1000 <3>, <4>
Slip Comp Gain M <1>, <2>	Slip compensation for leveling speed in the motoring region.	-	0.7 <1>, <2>
Slip Comp Gain R <1>, <2>	Slip compensation for leveling speed in the regenerative region.	-	1.0 <1>, <2>
Trq Det Dly Time <1>, <2>	Sets a delay time before detecting torque for slip compensation.	ms <1>, <2>	1000 <1>, <2>
Trq Det FltrTime <1>, <2>	Sets the filter time constant applied to the torque signal used for the slip compensation value calculation.	ms <1>, <2>	500 <1>, <2>
Slip Comp Gain <2>, <3>	Sets the gain for the motor slip compensation function.	-	1.0 <2>, <3>
Slip Comp Time <2>	Adjusts the slip compensation function delay time.	ms <2>	2000 <2>
Slip Comp Limit <2>	Sets an upper limit for the slip compensation function as a percentage of motor rated slip.	% <2>	200 <2>
Torq Comp Gain <1>, <2>	Sets the gain for the automatic torque (voltage) compensation function and helps to produce better starting torque.	-	1.00 <1>, <2>
Torq Comp Time <1>, <2>	Sets the torque compensation filter time.	ms <1>, <2>	200 <1> 50 <2>
Zero Speed Level	Sets the detection level for Zero Speed output.	%	80.0
Zero Speed Width	Sets the width for Zero Speed output.	%	4.0
SpdAgreeLvl +/-	Sets the speed detection level for digital output functions SpdRef /Out Agr (C3), SpdRef /Set Agr (C3), Spd Detection 3 (C3), and Spd Detection 4 (C3).	%	0.0
SpdAgreeWdth +/-	Sets the range of the speed detection for digital outputs SpdRef /Out Agr (C3), SpdRef /Set Agr (C3), Spd Detection 3 (C3), and Spd Detection 4 (C3).	%	4.0
Run Delay Time	Sets the time that must pass after the Up/Down command is entered until the drive internal Run command is set and the ride is started.	Sec	0.00

A1 Parameter Name	Description	Units	Default
Contactor DO Dly	Determines the delay time between shutting off the output of the drive and resetting the contactor control output (C3 'Close Contact') in order to release the motor contactor after a run has finished.	Sec	0.10
Load Sense Time	Sets the time to perform Light Load Direction Search.	Sec	1.0
Load Sense Speed	Sets the speed reference (percent of contract car speed) to use during Light Load Direction Search.	%	5.00 <1>, <2>, <3> 10.00 <4>
Rescue Trq Limit	Sets the maximum motor torque when the drive is in Rescue Operation Mode.	%	100
UPS Power Rating	Sets the capacity of the UPS used when the drive is in Rescue Operation Mode.	kVA	0
DCVoltLvl@Rescue	Sets the DC bus voltage the drive should expect when the drive is in Rescue Operation Mode.	V	0
PS ReuctnDetLvl	Determines at which level of backup power supply deterioration a PF5 fault is triggered in Rescue Operation.	%	80
FieldForce Limit <2>, <3>	Sets the maximum limit of the excitation current command during magnetic field forcing. A setting of 100% is equal to motor no-load current. Disabled only during DC injection Braking.	% <2>, <3>	400 <2>, <3>
Mtr Mag Flt Time	Sets a delay time to let the drive produce no-load current in the induction motors before the Starting Current Fault is declared.	ms	0200
Ser1 Spd Filter	Applies a filter when Spd Command SRC (C1) is set to Serial and Serial Mode (C1) is Mode 1. A setting of 0.00 s disables this feature.	Sec	0.00
Spd Input Filter <3>, <4>	Filter applied to the speed feedback and commanded speed before the E-Reg Process	ms <3>, <4>	002 <3>, <4>
Mains Dip Speed	This parameter sets the percentage of contract speed for the speed to be reduced when the drive goes into 'low voltage' mode. The Mains Dip function is enabled by the Mains Dip Enable (MAINS DIP ENA(C1)) parameter. When the drive goes into 'low voltage' mode, it reduces the speed by the percentage defined by this parameter. 'Low voltage' mode is defined as when the drive declares a UV alarm, which is defined by the Input line-to-line voltage (INPUT L-L VOLTS(A4)) parameter and the Undervoltage.	%	25.00
Ser2 Res CrpTime	When in Serial Mode 2 and SER2 FLT MODE (C1)=rescue, this parameter defines the maximum time the drive will continue to run at rescue creep speed (defined by SER2 RS CRP SPD (A1) parameter) when reacting to a serial fault. The time is defined as the time running at creep speed. It does not include the time it takes to decelerate to creep speed.	Sec	180
Ser2 Res Crp Spd	When in Serial Mode 2 and SER2 FLT MODE (C1)=rescue, this parameter defines the creep speed that will be used in the "rescue mode".	m/s	0.00
Ser2 Fault Tol	When in Serial Mode 2, this parameter defines the maximum time that may elapse between valid run time messages while in serial run mode before a serial fault is declared.	Sec	0.50
Ser2 Insp Spd	When in Serial Mode 2, this parameter defines the inspection speed to be used. To run in inspection speed via serial mode 2 requires that the run command for inspection speed come from two sources, a command sent in a serial message and via hardware as a logic input defined as "SER2 INSP ENA".	m/s	0.00

<1> Parameter accessible in V/f control mode

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

Table 2 S-Curves A2 Submenu

A2 Parameter Name	Description	Units	Default
Accel Rate 0	Acceleration Rate Limit	m/s^2	0.80
Decel Rate 0	Deceleration Rate Limit	m/s^2	0.80
Accel Jerk In 0	Rate of increase of acceleration, up to ACCEL RATE, when increasing elevator speed	m/s^3	0.60
Accel Jerk Out 0	Rate of decrease of acceleration to zero when approaching contract elevator speed	m/s^3	0.60
Decel Jerk In 0	Rate of increase of deceleration, up to DECEL RATE, when decreasing elevator speed	m/s^3	0.60
Decel Jerk Out 0	Rate of decrease of deceleration to zero when slowing the elevator to zero or level speed	m/s^3	0.60
Accel Rate 1	Acceleration Rate Limit	m/s^2	0.80
Decel Rate 1	Deceleration Rate Limit	m/s^2	0.80
Accel Jerk In 1	Rate of increase of acceleration, up to ACCEL RATE, when increasing elevator speed	m/s^3	0.60
Accel Jerk Out 1	Rate of decrease of acceleration to zero when approaching contract elevator speed	m/s^3	0.60
Decel Jerk In 1	Rate of increase of deceleration, up to DECEL RATE, when decreasing elevator speed	m/s^3	0.60
Decel Jerk Out 1	Rate of decrease of deceleration to zero when slowing the elevator to zero or level speed	m/s^3	0.60
Accel Rate 2	Acceleration Rate Limit	m/s^2	0.80
Decel Rate 2	Deceleration Rate Limit	m/s^2	0.80
Accel Jerk In 2	Rate of increase of acceleration, up to ACCEL RATE, when increasing elevator speed	m/s^3	0.60
Accel Jerk Out 2	Rate of decrease of acceleration to zero when approaching contract elevator speed	m/s^3	0.60
Decel Jerk In 2	Rate of increase of deceleration, up to DECEL RATE, when decreasing elevator speed	m/s^3	0.60
Decel Jerk Out 2	Rate of decrease of deceleration to zero when slowing the elevator to zero or level speed	m/s^3	0.60
Accel Rate 3	Acceleration Rate Limit	m/s^2	0.80
Decel Rate 3	Deceleration Rate Limit	m/s^2	0.80
Accel Jerk In 3	Rate of increase of acceleration, up to ACCEL RATE, when increasing elevator speed	m/s^3	0.60
Accel Jerk Out 3	Rate of decrease of acceleration to zero when approaching contract elevator speed	m/s^3	0.60
Decel Jerk In 3	Rate of increase of deceleration, up to DECEL RATE, when decreasing elevator speed	m/s^3	0.60
Decel Jerk Out 3	Rate of decrease of deceleration to zero when slowing the elevator to zero or level speed	m/s^3	0.60
Fast Stop Time	Used when a Fast Stop is invoked.	m/s^2	2.0

Table 3 Multistep Reference A3 Submenu

A3 Parameter Name	Description	Units	Default
Speed Command 1	Sets the Speed command for the drive. Speed command selected depends on the following table:	m/s	000.00
Speed Command 2		m/s	000.00
Speed Command 3		m/s	000.00
Speed Command 4		m/s	000.00
Speed Command 5		m/s	000.00
Speed Command 6		m/s	000.00
Speed Command 7		m/s	000.00
Speed Command 8		m/s	000.00
Speed Command 9		m/s	000.00
Speed Command 10		m/s	000.00
Speed Command 11		m/s	000.00
Speed Command 12		m/s	000.00
Speed Command 13		m/s	000.00
Speed Command 14		m/s	000.00
Speed Command 15		m/s	000.00
Inspect Oper Spd	Sets speed reference when inspection operation is enabled.	m/s	0.00
Rescue Speed	Rescue Operation Speed: Sets the speed that the elevator will run at when it is in Rescue Operation Mode. Note: This setting can be disabled with the setting of Rescue Speed (C1).	m/s	0.00

Table 4 Power Convert A4 Submenu

A4 Parameter Name	Description	Units	Default
Input Voltage	This parameter must be set to the power supply voltage.	VAC	400 <5>
UV Detect Level	Sets the DC bus undervoltage trip level.	VDC	380 <5>
Mains Dip Level	This parameter sets the level (as a percentage of the Input Voltage - A4) at which an under voltage alarm will be declared. Units in percent of nominal bus.	%	80
PWM Frequency <2>, <3>, <4>	This parameter sets the PWM or 'carrier' frequency of the drive.	kHz <2>,, <4>	08.0 <5>
OH Pre-Alarm Lvl	Set an OVRLD shutdown alarm that will occur if the drive heatsink temperature exceeds this setting.	C	110 <5>
Fan Delay Time	Sets a delay time to shut off the cooling fan after the run command is removed. Note: This operating mode can be disabled.	Sec	20

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

<5> Default is dependent on drive model number

Table 5 Motor A5 Submenu

A5 Parameter Name	Description	Units	Default
Rated Mtr Power	Sets the motor rated power in kW. Automatically set during Auto-Tuning.	kW	<5>
Rated Mtr Volts	Sets the motor rated voltage. Automatically set during Auto-Tuning.	VAC	<5>
Rated Motor Freq <1>, <2>, <3>	Sets the motor rated frequency for induction motors. Automatically set during Auto- Tuning.	Hz <1>, <2>, <3>	<5>
Rated Motor Speed <4>	Sets the motor rated speed when the drive is set to PM Vector.	RPM <4>	0 <4>
Rated Motor Curr	Sets the motor nameplate current in amps. Automatically set during some Auto-Tuning.	A	<5>
Number of Poles	Sets the number of motor poles. Automatically set during Auto-Tuning.	-	4 <1>, <2>, <3> 20 <4>
Motor Rated Slip <1>, <2>, <3>	Sets the motor rated slip. Automatically set during Auto-Tuning.	Hz <1>, <2>, <3>	<5>
No-Load Current <1>, <2>, <3>	Sets the no-load current for the induction motor. Automatically set during Auto-Tuning.	A <1>, <2>, <3>	<5>
Leak Inductance <1>, <2>, <3>	Sets the voltage drop due to motor leakage inductance as a percentage of motor rated voltage. Automatically set during Auto-Tuning.	%	<5>
Term Resistance	Sets the phase-to-phase motor resistance. Automatically set during Auto-Tuning.	Ω	<5>
Saturation Comp1 <2>	Sets the motor iron saturation coefficient at 50% of magnetic flux. Automatically set during Auto-Tuning.	-	0.50 <2>
Saturation Comp2 <2>	Sets the motor iron saturation coefficient at 75% of magnetic flux. Automatically set during Auto-Tuning.	-	0.75 <2>
Motor Min Volts <1>, <2>	This parameter sets voltage at the V/Hz pattern minimum frequency. Used in Open Loop modes.	VAC <1>, <2>	<5>
Motor Min Freq <1>, <2>	This parameter sets minimum frequency used to define the V/Hz pattern in Open Loop modes.	Hz <1>, <2>	0.5 <1>, <2>
Mid Mid Volts <1>, <2>	This parameter sets rated voltage at the V/Hz pattern middle frequency in Open Loop modes.	VAC <1>, <2>	<5>
Motor Mid Freq <1>, <2>	This parameter sets middle frequency used to define the V/Hz pattern in Open Loop modes.	Hz <1>, <2>	3.0 <1>, <2>
Base Voltage <1>, <2>, <3>	Sets the voltage going out to the motor when the drive is running at the Base Frequency (A5). This setting would normally match the Mtr Rated Voltage (A5). Automatically set during auto-tune.	VAC <1>, <2>, <3>	000 <1>, <2>, <3>
Base Frequency <1>, <2>, <3>	Sets the motor base frequency.	Hz <1>, <2>, <3>	50.0 <1>, <2>, <3>
Mechanical Loss <2>, <3>	Sets the induction motor mechanical loss as a percentage of motor rated power (kW).	% <2>, <3>	0.0 <2>, <3>
D Axis Induct <4>	Sets the d-axis inductance of a PM motor.	mH <4>	<5>
Q Axis Induct <4>	Sets the q-axis inductance of a PM motor.	mH <4>	<5>
PM Mtr Ind V 1 <4>	Sets the induced phase peak voltage in units of 0.1 mV [electrical angle]. Note: If this parameter is set to a non-zero, PM Mtr Ind V 2 (A5) should be set to 0.0.	mH <4>	<5>
PM Mtr Ind V 2 <4>	Sets the induced phase peak voltage in units of 0.1 mV [electrical angle]. Note: If this parameter is set to a non-zero, PM Mtr Ind V 1 (A5) should be set to 0.0.	mH <4>	<5>
Mtr OL Method	Sets the type of motor overload to be used to protect the motor from overheating: -VT Motor -CT Motor -Vector Motor	-	VT Motor <1>, <2>, <3> Constant Torque <4>
Mtr OL Timeout	Sets the motor thermal overload protection (oL1) time.	Min	1.0
Encoder Offset <4>	Sets the offset between the rotor magnetic axis and the encoder zero position. Set during Encoder Offset Tuning.	Deg	0.0 <4>

<1> Parameter accessible in V/f control mode

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

<5> Default is dependent on drive model number

◆ Configure Menu Parameters

Table 6 User Switches C1 Submenu

C1 Parameter Name	Description	Choices	Default
Spd Command Src	This parameter selects the source of the drives speed command Multi-Step - Uses discrete logic inputs to choose which multi-step speed command the drive should command Ser Multi-Step - operates similar to Multi-Step however uses serial signaling as opposed to logic inputs Serial - The drive will follow a serially dictated speed profile Analog - The drive will follow an externally generated bipolar analogue speed reference	– Multi-Step – Ser Multi-Step – Serial HPV Ref Analog Input	Multi-Step
Run Command Src	This parameter selects the source of the drives run command. External TB - uses discrete logic inputs to command the drive to run Serial - uses a serial signal to command the drive to run	– External TB – Serial	External TB
Serial Run Src	If a serial run command is used, this parameter allows either the serial run signal to operate independently or in conjunction with an External TB input	– Serial Only – Serial+External	Serial Only
Motor Rotation	Allows the output phasing of the drive to be reversed without needing to swap motor wiring	– Forward – Reverse	Forward
Speed Reg Type	Selects between the Magnetek Elevator Speed Regulator and the Yaskawa Speed Regulator	– E-Reg – Yaskawa ASR	E-REG
Brake Pick Src	Allows Brake Pick operation to be controlled internally or by an external serial source.	– Internal – Serial	Internal
Brake Pick Cnfm	This parameter defines how the mechanical brake signal is monitored by the drive. A setting of None, will result in the drive not waiting for any brake pick confirmation signaling. A setting of External TB will look to a logic input for confirmation the mechanical brake is lifted by means of brake pick switches. A setting of Internal Time will result in the drive waiting Brake Pick Time (A1) before beginning travel.	– None – External TB – Internal Time	None
Auto Stop	Enabling Auto Stop will allow the drive to complete a travel on removal of the speed command only (with the run command still present). The run command is required to be cycled prior to a new travel. When enabled, the run command is not accepted until a speed command is also provided.	– Disabled – Enabled	Disabled
Encoder Select <4>	Selects the encoder type connected the PG-F3 option card	– EnDat Sin/Cos – EnDat SerialOnly – Hiperface	EnDat Sin/Cos <4>
Encoder Com Spd <4>	Selects the communication speed between the PG-F3 option card and the encoder	– 1M/9600bps – 500k/19200bps – 1M/38400bps – 1M/38400bps	1M/9600bps <4>
Encoder Connect	This parameter swaps the phasing of the encoder signals to negate the need to re-terminate wires	– Forward – Reverse	Forward
PG Card Detect	When enabled the drive will report if an option card is removed whilst required for the current operation mode	– Enabled – Disabled	Enabled
Stopping Mode	A setting of Coast To Stop requires the run command to be active until the lift is stationary as if the run is removed, travel will complete immediately (crash stop). If set to Ramp to Stop and the Run command is removed whilst in travel, the lift will slow and perform a controlled stop.	– Coast to Stop – Ramp to Stop	Ramp to Stop
Serial Mode	Selects the serial protocol used to communicate with the control system.	– HPV Mode 1 – HPV Mode 2 – Memobus	HPV Mode 1
Ser Comm Err Sel	Defines how the drive reacts when 3 consecutive checksum errors are noted	– Fault – None – Alarm	Fault
Ser1 Time-out Sel	Defines how the drive reacts when a runtime message is not received within 40ms (when using serial mode 1 only)	– Fault – None – Alarm	Fault

C1 Parameter Name	Description	Choices	Default
Ser2 Fault Mode	Defines how the drive will react if serial communication is lost (when using serial mode 2 only). Immediate - the lift will crash stop immediately. Rescue - the lift will continue at SER2 Res Crp Spd until either the enable signal is removed or Ser2 ResCrpTime elapses. Run Remove - the drive will behave in the same way as if a run command is removed as defined by other sequencing parameters (stopping mode, etc.).	– Immediate – Rescue – Run Remove	Rescue
Trq Comp Cmd Src <3>, <4>	Selects the source for the Torque Compensation Command if used.	– Analog – Serial HPV – Option Card	Analo <3>, <4>
Trq Comp Latch <3>, <4>	If Torque Compensation is used, this parameter selects whether the values is latched on run command.	– Disabled – Enabled	Disabled <3>, <4>
Trq Comp Type <3>, <4>	Selects which Torque Compensation method is used	– Pre-torque – Feed Forward	Pre-torque <3>, <4>
Mtr Overload Act	Determines which action the drive takes when a Motor Overload has been detected.	– Alarm Only – Fault	Alarm Only
Field Force Sel <2>, <3>	Determines if Field Forcing is in operation	– Disabled – Enabled	Disabled <2>, <3>
Restart Sel	Determines if the fault output is active when a reset is attempted	– Flt Outp Disabld – Flt Outp Enabled	Flt Outp Disabld
Out Ph Loss Det	Defines the output (motor) phase loss detection method	– Disabled – 1PH Loss Det – 2/3PH Loss – DC-PH	DC-PH
DB Tr Protection	Defines if the internal DBR protection is active (can be disabled when using a regen unit or external brake module)	– Enabled – Disabled	Enabled
Autotune Cont On	Determines the state of the motor contactor output during Auto-Tuning.	– Disabled – Enabled – Enable at HBB	Disabled
Power Supply Sel	Selects the backup power supply method.	– Battery – Single Phase UPS – Three Phase UPS	Single Phase UPS
Auto Fc Reduce	If enabled, Torque Boost increases the output current limit while decreasing the carrier frequency when required	Disabled Enabled	Disabled
OH Pre-Alarm Sel	Defines the operation in the event of an overheat alarm.	Alarm Only Ramp to Stop Coast to Stop	Alarm Only
Inp Ph Loss Det	Defines when the drive should declare a PF Fault.	En During Run Disabled En at Const Spd	Disabled
PPT Select	When enabled the drive will sense cabin load prior to lifting brake outputs, then pretorque motor to prevent rollback.	Disabled Enabled	Disabled
Mains Dip Enable	When enabled, this allows the maximum operating speed to be limited under low mains voltage or when commanded via a logic input	Disabled External TB Low Mains	Disabled
Output V Lim Sel <2>, <3>, <4>	Function that will automatically decrease motor flux when the output voltage reaches the saturation range.	-Enabled, -Disabled <2>, <3>, <4>	Enabled <2>, <3>
Fan Selection	Used to determine how the drive cooling fans will operate.	– Run With Timer – Run Always – Temp Controlled	Run With Timer
Inspection PWM	Sets if the drive will run at reduced PWM frequency when on inspection control.	– 2kHz – Default Carrier	2kHz
Rescue PWM	Sets if the drive will run at reduced PWM frequency when in rescue operation.	– 2kHz – Default Carrier	2kHz

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

<5> Default is dependent on drive model number

Table 7 Logic Inputs C2 Submenu

C2 Parameter Name	Description	Default
Logic Input S1	Logic Input 1 on terminal S1	Not Used
Logic Input S2	Logic Input 2 on terminal S2	Not Used
Logic Input S3	Logic Input 3 on terminal S3	Not Used
Logic Input S4	Logic Input 4 on terminal S4	Not Used
Logic Input S5	Logic Input 5 on terminal S5	Not Used
Logic Input S6	Logic Input 6 on terminal S6	Not Used
Logic Input S7	Logic Input 7 on terminal S7	Not Used
Logic Input S8	Logic Input 8 on terminal S8	Not Used

Table 8 Logic Input Choices

C2 Parameter Choice	Description
Brake Feedback NC	Brake Feedback Normally Closed
Brake Feedback NO	Brake Feedback Normally Open
Comm Test Mode	Serial Comm Test Mode
Contact Cnfm NC	Contactor Confirmation Normally Closed
Contact Cnfm NO	Contactor Confirmation Normally Open
DL Dist Correctn	Stop Distance Correction Input
Drive Enable	Drive Enable
BaseBlock NC	Base Block Normally Closed
BaseBlock NO	Base Block Normally Closed
Fast-Stop NO	Fast Stop Normally Open
Fast-Stop NC	Fast Stop Normally Closed
Fault Reset	Fault Reset
Insp Operation	Inspection Operation
Intermed Speed	Intermediate Speed
Jog Freq Ref	Jog Frequency Reference
Leveling Speed	Leveling Speed
Mains Dip Enable	Mains Dip Enable
Multi-Step Ref 1	Multi-Step input 1
Multi-Step Ref 2	Multi-Step input 2
Multi-Step Ref 3	Multi-Step input 3
Multi-Step Ref 4	Multi-Step input 4
NC Ext Fault 1	Normally Closed External Fault (always detect, ramp to stop)
NC Ext Fault 2	Normally Closed External Fault (always detect, cost to stop)
NC Ext Fault 3	Normally Closed External Fault (always detect, fast stop)
NC Ext Fault 4	Normally Closed External Fault (always detect, alarm only)
NC Ext Fault 5	Normally Closed External Fault (during run, ramp to stop)
NC Ext Fault 6	Normally Closed External Fault (during run, cost to stop)
NC Ext Fault 7	Normally Closed External Fault (during run, fast stop)
NC Ext Fault 8	Normally Closed External Fault (during run, alarm only)
NO Ext Fault 1	Normally Open External Fault (always detect, ramp to stop)
NO Ext Fault 2	Normally Open External Fault (always detect, cost to stop)
NO Ext Fault 3	Normally Open External Fault (always detect, fast stop)
NO Ext Fault 4	Normally Open External Fault (always detect, alarm only)
NO Ext Fault 5	Normally Open External Fault (during run, ramp to stop)
NO Ext Fault 6	Normally Open External Fault (during run, cost to stop)
NO Ext Fault 7	Normally Open External Fault (during run, fast stop)
NO Ext Fault 8	Normally Open External Fault (during run, alarm only)
Nominal Speed	Nominal Speed Input
Not Used	Input Not Used
Pre-Torque Latch	Pre-Torque Latch Input
Re-Lvling Speed	Re-Leveling Speed Input
Rescue Operation	Rescue Operation Input
Run Down	Run Down Input
Run Up	Run Up Input
Run	Run Input
S-curve Select 0	S-curve Select 0 Input
S-curve Select 1	S-curve Select 1 Input
Ser2 Insp Ena	Ser2 Insp Enable Input
Speed Limit Down	Speed Limit Down
Speed Limit Up	Speed Limit Up
Timer function	Timer function
Up/Down	Up/Down Input

Table 9 C3 Logic Outputs

C3 Parameter Name	Description	Default
Logic output P1	Terminal P1 - C1 Function Selection (photocoupler)	Not Used
Logic output P2	Terminal P2 - C2 Function Selection (photocoupler)	Not Used
Relay M1-M2	Terminal M1 - M2 Function Selection (relay)	Not Used
Relay M3-M4	Terminal M3 - M4 Function Selection (relay)	Not Used
Relay M5-M6	Terminal M5 - M6 Function Selection (relay)	Not Used

Table 10 Logic Output Choices

C3 Choice	Description
Auto Brake	Auto Brake Output (uses encoder feedback to ensure motor is stationary before setting)
BaseBlock NO	Base Block output Normally Open
BaseBlock NC	Base Block output Normally Closed
Brake Pick	Brake Pick Output (uses run signaling/timers to set the brake)
Close Contact	Motor Contactor output
DBR Trans Flt	Dynamic Braking Transistor Fault
DC Bus Undervolt	DC Bus Undervolt Fault
Door Zone	Door Zone Output
Drive Ready	Drive Ready to Run
Dur Flt Restart	Drive fault being reset
During Run 1	Output closes when the drive is outputting a voltage
During Run 2	Output closes when the drive is outputting a frequency
Fan Alarm	Internal cooling fan alarm
Fault	Drive in a faulted state
Input Ph Loss	Input Phase Loss detected
LightLoadDetStat	Light Load Direction Detection Status
LightLoadDirect	Light Load Direction
Maintenance	Drive requires maintenance
Minor Fault	A Minor fault is active
Motor Overload	Motor Overload fault active
Not Used	Output not used
Overheat Alarm	Motor or drive over temperature alarm active
Ovld Shdwn Alm	Overload shutdown alarm active
Regenerating <3>, <4>	Drive is running and regenerating (not motoring)
Reset Cmd Active	Fault Reset input active
Reverse Dir	Lift traveling in reverse direction (down)
SafeDisable Stat	Safe Disable Status
Spd Detection 3	Speed Detection 3
Spd Detection 4	Speed Detection 4
Spd Ref Release	Speed Reference Release active
Spd Reg Release	Speed Regulator Release active
SRef/Out Agr 1	Speed Reference Agree 1
SRef/Out Agr 2	Speed Reference Agree 2
SRef/Set Agr 1	Speed User Set Agree 1
SRef/Set Agr 2	Speed User Set Agree 2
Speed Dev Low <3>, <4>	Speed Deviation low active
Torque Detect 1	Torque Detect 1
Torque Detect 2	Torque Detect 2
Torque Limit <2>, <3>, <4>	Drive in Torque Limit
Zero Speed	Zero speed output
! BaseBlock NC	Base Block output Normally Open (Inverse)

C3 Choice	Description
! BaseBlock NO	Base Block output Normally Closed (Inverse)
! Brake Pick	Brake Pick Output (uses run signaling/timers to set the brake) (Inverse)
! Close Contact	Motor Contactor output (Inverse)
! Drive Ready	Drive Ready to Run (Inverse)
! DBR Trans Flt	Dynamic Braking Transistor Fault (Inverse)
! DCBus Undervlt	DC Bus Undervolt Fault (Inverse)
! Door Zone	Door Zone Output (Inverse)
! During Run 1	Output closes when the drive is outputting a voltage (Inverse)
! During Run 2	Output closes when the drive is outputting a frequency (Inverse)
! Fan Alarm	Internal cooling fan alarm (Inverse)
! Fault	Drive in a faulted state (Inverse)
! Input PH Loss	Input Phase Loss detected (Inverse)
! LiteLoadDetSta	Light Load Direction Detection Status (Inverse)
! LiteLoadDirect	Light Load Direction (Inverse)
! Maintenance	Drive requires maintenance (Inverse)
! Minor Fault	A Minor fault is active (Inverse)
! Motor Overload	Motor Overload fault active (Inverse)
! Overheat Alarm	Motor or drive over temperature alarm active (Inverse)
! Ovld Shdwn Alm	Overload shutdown alarm active (Inverse)
! Regenerating <3>, <4>	Drive is running and regenerating (Inverse)
! ResetCmd Activ	Fault Reset input active (Inverse)
! Restart Enable	Output active unless drive fault auto reset occurring
! Reverse Dir	Lift traveling in reverse direction (down) (Inverse)
! SafeDisablStat	Safe Disable Status
! Spd Ref Rls	Speed Reference Release active (Inverse)
! Spd Reg Rls	Speed Regulator Release active (Inverse)
! Speed Dev Low <3>, <4>	Speed Deviation low active (Inverse)
! SRef/Out Agr 1	Speed Reference Agree 1 (Inverse)
! SRef/Out Agr 2	Speed Reference Agree 2 (Inverse)
! SRef/Set Agr 1	Speed User Set Agree 1 (Inverse)
! SRef/Set Agr 2	Speed User Set Agree 2 (Inverse)
! Torque Limit <2>, <3>, <4>	Drive in Torque Limit (Inverse)
! Trq Det 1 N.O.	Torque Detect 1 (Inverse)
! Trq Det 2 N.O.	Torque Detect 2 (Inverse)
! Zero Speed	Zero speed output (Inverse)

<2> Parameter accessible in Open Loop Vector control mode
<3> Parameter accessible in Closed Loop Vector control mode
<4> Parameter accessible in PM Closed Loop Vector control mode
<5> Default is dependent on drive model number

Table 11 C4 Analog Outputs

C4 Parameter Name	Description	Default
Analog FM Select	Terminal FM Monitor Selection	Output Speed
Analog FM Level	Sets the required working range of analog output FM	-10 ~ +10VDC
Analog FM Gain	Sets the signal level at terminal FM that is equal to 100% of the selected monitor value.	100.0
Analog FM Bias	Sets the bias value added to the terminal FM output signal.	0.0
Analog AM Select	Terminal AM Monitor Selection	Output Current
Analog AM Level	Sets the required working range of analog output AM	-10 ~ +10VDC
Analog AM Gain	Sets the signal level at terminal AM that is equal to 100% of the selected monitor value.	50.0
Analog AM Bias	Sets the bias value added to the terminal AM output signal.	0.0

Table 12 Analog Output Choices

C4 Choice	Description
AI Opt Ch1 Level	AI Opt Ch1 Level
AI Opt Ch2 Level	AI Opt Ch2 Level
AI Opt Ch3 Level	AI Opt Ch3 Level
ASR Out w/o Fil	Yaskawa Speed Regulator output (without filter)
Car Accel Rate <4>	Car Acceleration Rate
dAxis CtrlOutp <2>, <3>, <4>	d-Axis Current Controller Output
DC Bus Voltage	DC Bus Voltage
Distance-to-go <4>	Remaining Distance
Encoder Counts	Encoder Counts
Encoder Speed	Encoder Speed
Heatsink Temp	Heatsink Temperature
InertiaComp Outp <3>, <4>	Inertia Compensation Output
MaxCurrent@Acc	Max. Current during Acceleration
MaxCurrent@Dec	Max. Current during Deceleration
MaxCurrent@Level	Max. Current during Leveling Speed
MaxCurrent@Run	Max. Current during Constant Speed
Mot EXC Current <2>, <3>, <4>	Motor Excitation Current (Id)
Mot SEC Current	Motor Secondary Current (Iq)
Mot Overload Lvl	Motor Overload Estimate (oL1)
Not Used	Used to disable the outputs
Offset Frequency	Output Frequency
Output Current	Output Current
Output kWatts	Output Power in kW
Output Speed	Output Speed
Output Voltage	Output Voltage
PID Diff Fdbk	PID Regulator Difference
PID Feedback 1	PID Regulator Feedback 1
PID Feedback 2	PID Regulator Feedback 2
PID Input	PID Input

C4 Choice	Description
PID Output	PID Output
PID Setpoint	PID Setpoint
PosLck Dev Count <3>, <4>	Position Lock Deviation Count
qAxis I CtrlOutp <2>, <3>, <4>	q-Axis Current Controller Output
Ref Speed 2	Reference Speed 2
Rescue SpdLimLvl	Speed Reference limit at Rescue Operation
Spd Ctrl Input <3>, <4>	Speed Control Loop Input
Spd Ctrl Output <3>, <4>	Speed Control Loop Output
SpdFbkCmp Output <4>	Speed Feedback Compensation Output
Speed Command	Speed Command
Speed Feedback	Speed Feedback
Speed Reference	Speed Reference
Term A1 Level	Terminal A1 Input Voltage
Term A2 Level	Terminal A2 Input Voltage
Term A3 Level	Terminal A3 Input Voltage
Term RP Inp Freq	Terminal RP Input Frequency
Torque Comp <2>, <3>, <4>	Torque Compensation
Torque Reference <2>, <3>, <4>	Torque Reference
Up/Dn 2 Bias Val	Up/Dn Bias Value
Voltage Ref (Vd) <2>, <3>, <4>	Output Voltage Reference (Vd)
Voltage Ref (Vq) <2>, <3>, <4>	Output Voltage Reference (Vq)

<2> Parameter accessible in Open Loop Vector control mode
<3> Parameter accessible in Closed Loop Vector control mode
<4> Parameter accessible in PM Closed Loop Vector control mode
<5> Default is dependent on drive model number

Table 13 C5 Analog Inputs

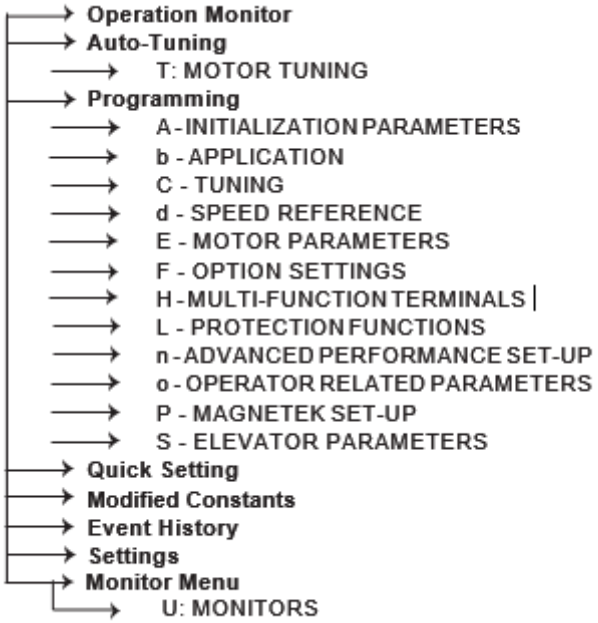
C5 Parameter Name	Description	Default
Analog A1 Select	Analouge Input A1 Function Select	Not Used
Analog A1 Gain	Sets the gain level of the input value when 10 V is applied at terminal A1.	100.0
Analog A1 Bias	Sets the level of the input value when 0 V is applied at terminal A1	0.0
Analog A1 Offset	Applies an offset to analog input A1. Can be used for zero adjustment of the analog input.	0000
Analog A1 Level	Sets the required working range of analog input A1	-10 ~ +10VDC
Analog A2 Select	Analouge Input A2 Function Select	Not Used
Analog A2 Gain	Sets the gain level of the input value when 10 V is applied at terminal A2.	100.0
Analog A2 Bias	Sets the level of the input value when 0 V is applied at terminal A2.	0.0
Analog A2 Offset	Applies an offset to analog input A2. Can be used for zero adjustment of the analog input.	0000
Analog A2 Level	Sets the required working range of analog input A2	-10 ~ +10VDC
Analog In Filter	Sets a primary delay filter time constant for terminals A1 and A2. Used for noise filtering.	0.03

Table 14 Analog Input Choices

C5 Choice	Description
Motor PTC	Motor Thermistor Input Declares a Motor OH Alarm at 1.18v Declares a Motor OH Fault at 2.293v
Not Used	Input disabled
Speed Command	Used as the primary external speed reference when the drives speed profile is dictated by an external speed profile generator within the control system.
Pre-Torque	Load cell input when Trq Comp Type (C1) is configured to Pre-Torque or Torque Feed Forward when Trq Comp Type (C1) is configured to Feed Forward.

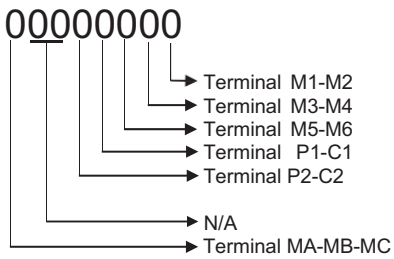
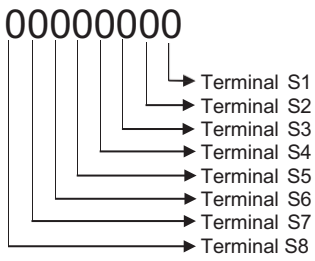
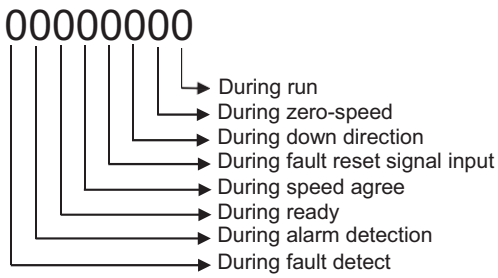
◆ Utility Menu Parameters

Submenus	Parameter Name	Description
U1	Password	The password allows the user to restrict a select few parameters from being viewed and accessed without the correct 4 digit password. The value shown in the "Enter Password" screen as shown below will display the last value that was entered as a possible password. If the displayed password does not match the drive's valid password, the drive will continue to hide and restrict parameters. The currently set password can be revealed if the following is done. While in the sub-menu U1 Password with "Enter Password" on the display, press and hold the "F2" key while hitting the up directional arrow. If done successfully, the following display below will appear with the password. While in the "Select Password" sub-menu, the user can either leave the password the same, change the password by pressing the "ENTER" key, or resetting the password back to default of 0 by pressing the "F2" key for reset. After any of the above is done, press the "ESC" key to go back into the main menu.
U2	Modified Const	Lists all parameters that have been edited or changed from default settings
U3	Units Selection	Sets the units that are used and displayed in the drive. The following options can be selected: • Contract: m/s • r/min • User Units • 0.0001 • 0.01Hz • Contract:fpm
U5	Factory Dflts	Initialize all the drive parameters back to default settings. NOTE: the default settings depends on the setting of Control Method (U8) and Inverter Model # (U6). The following options can be selected: • No Initialize - The drive will not initialize the parameters to default settings • Term -> Cntrl Int - The drive will transfer all the parameter settings from the terminal board to the control board. Should only need to be done if a new control board was installed • Factory Default - The drive will initialize all the parameters to factory default settings.
U6	Drive Info	Displays and adjusts the drive's hardware and software configuration and revisions. • SW No. (Flash) - Displays the drive software • SW No. (ROM) - Displays the drive gate firing software • Drive Firm Ver - Displays the drive software version • Drive Model - Selects the drive rating • Operator Firm - Displays the operator software revision
U7	Language Select	Selects different languages. The following options can be selected: • English
U8	Basics	The control method determines the type of AC motor that will be connected to the drive and the type of motor control that will be applied to the attached motor. The following options can be selected: • V/f Control - The drive will spin an induction motor with no vector control or no feedback • Closed Loop Vect - The drive will spin an induction motor with vector control using an encoder feedback. • Open Loop Vector - The drive will spin an induction motor with vector control using no encoder feedback. • PM - The drive will control a permanent magnet motor with closed loop control using encoder feedback.
U9	Autotune	Allows the drive to perform autotune on the motor connected to the drive. Refer to ***Open-Loop Startup on page 32***.

Submenus	Parameter Name	Description
U10	Alternate Nav	The alternate navigation operates on 5 levels: the main menu level, parameter group level, parameter sub-group level, parameter level, and the data entry level. At the menu level, it allows the user to navigate between menus. At the parameter group level, it allows the user to navigate between different parameter groups within that menu: such as A, b, C, d, and etc. At the sub-group level, the user can navigate through a group of parameters: such as C1, C2, C3, and etc. At the parameter level, the user can select a specific parameter in a sub-group: such as C1-01, C1-02, and etc. At the entry level, the user can change values or select different options. Below is the menu tree of the alternate navigation. 
U13	Param Backup	It is possible to allow the user to save the drive's current parameters as drive defaults. These settings can be restored should the user in the future wish to revert the settings. This is particularly useful for control system manufacturers saving their specific drive configuration prior to dispatch. • Parameter Backup - In this submenu, selecting "set user backup" will save the current settings as default and "wipe user backup" will remove the saved settings and allow the drive to be reset to Magnetek default settings. • Parameter Restore - Selecting "Restore Backup" will restore the previously saved drive settings.

◆ Display Menu Parameters

Table 15 ELEVATOR DATA D1 Submenu

D1 Parameter Name	Description	Units
Speed Command	**Speed Command:** Displays the commanded speed from the controller.	m/s
Speed Reference	**Speed Reference:** Displays the drive speed reference.	m/s
Speed Feedback <2>, <3>, <4>	**Speed Feedback:** Displays the speed feedback measured from the motor.	% <3>, <4>
Speed Error <3>, <4>	**Speed Reference-Speed Feedback:** Shows the amount of speed error seen by the encoder.	m/s <2>, <3>, <4>
Encoder Speed	**Encoder Speed:** Displays the measured speed from the encoder.	RPM
Logic Outputs	**Output Terminal Status:** Displays the output terminal status. 	1 = on, 0 = off
Logic Inputs	**Input Terminal Status:** Displays the input terminal status. 	1 = on, 0 = off
SrlBytesReceived	**Serial Bytes Received:** Number of valid HPV Mode 1 Runtime bytes the drive received after a power up. **Note:** The value rolls over after 65535.	number of byte
SerialBytesSent	**Serial Bytes Received:** Number of valid HPV Mode 1 response bytes the drive received after a power up. **Note:** The value rolls over after 65535.	number of byte
Drive Status	**Internal Control Status:** Displays the input terminal status. 	1 = on; 0 = off
Analog A1 Level	**Terminal A1 Level:** Displays the voltage input to terminal A1.	%
Analog A2 Level	**Terminal A2 Level:** Displays the voltage input to terminal A2.	%

D1 Parameter Name	Description	Units
Torque Comp <3>, <4>	**Torque Compensation:** Torque Compensation Input value. Used for either Pre-Torque or Feed Forward operation, depending on Trq Comp Type (C1).	% <3>, <4>
Measured PPR	**Measured Pulses Per Revolution:** Only for Incremental PM, this displays the measured encoder pulses for one revolution of the motor (determined by the Z index).	PPR
Z-Edge Count	**Z-Edge Count:** Only for Incremental PM, this displays the amount of motor revolution (determined by index pulses from the Z index channel).	-
Rx Com Status	**Rx Com Status** **Serial communication status display**	Hex

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

<5> Default is dependent on drive model number

Table 16 POWER DATA D2 Submenu

D2 Parameter Name	Description	Units
DC Bus Voltage	**DC Bus Voltage:** Displays the measured DC bus voltage.	VDC
Motor Current	**Output Current:** Displays the measured output current to the motor.	A
Motor Voltage	**Output Voltage:** Displays the output voltage to the motor.	VAC
Motor Freq	Displays the output frequency to the motor.	Hz
Torque Reference <2>, <3>, <4>	**Torque Reference:** Displays the internal torque reference.	% of rated torque <2>, <3>, <4>
Power Output	**Output Kilowatts:** Displays the output power (this value is calculated internally).	kW
Motor Overload	**Motor Overload Level:** Shows the value of the motor overload detection accumulator. 100% is equal to the Motor Overload detection level.	% of motor amp rating
Drive Overload	**Drive Overload Level:** Displays the level of the drive overload detection level. A value of 100% is equal to the Drive Overload detection level	% drive amp rating
Current PeakHold	**Current Peak Hold:** Displays the highest current value that occurred during a ride.	A
Heatsink Temp	**Heatsink Temperature:** Displays the heatsink temperature.	C
Drv Elapsed Time <6>	**Drive Elapsed Time:** Displays the cumulative operation time of the drive. The value for the cumulative operation time counter can be reset. Contact Magnetek for details. The maximum number displayed is 99999, after which the value is reset to 0.	Hours
Fan Elapsed Time <6>	**Fan Elapsed Time:** Displays the cumulative operation time of the cooling fan. This value can be reset. Contact Magnetek for details. This value will reset to 0 and start counting again after reaching 99999.	Hours
Fan Life Mon <6>	**Fan Life Monitor:** Displays main cooling fan usage time in as a percentage of its expected performance life. This value can be reset. Contact Magnetek for details. The fan should be replaced when this monitor reaches 90%.	% of expected operation time
Cap Life Mon <6>	**Capacitor Life Monitor:** Displays main circuit capacitor usage time in as a percentage of their expected performance life. The capacitors should be replaced when this monitor reaches 90%. This value can be reset. Contact Magnetek for details.	% of expected operation time
IGBT Life Mon <6>	**IGBT Life Monitor:** Displays IGBT usage time as a percentage of the expected performance life. The IGBTs should be replaced when this monitor reaches 90%. This value can be reset. Contact Magnetek for details.	% of expected operation time
Max Accel Amps	**Maximum Current at Acceleration:** Shows the maximum current that occurred during acceleration.	A
Max Decel Amps	**Maximum Current at Deceleration:** Shows the maximum current that occurred during deceleration.	A
Max Run Amps	**Maximum Current at Run:** Shows the maximum current that occurred during ride at top speed.	A
Slip Comp Value <1>, <2>	**Slip Compensation Value:** Shows the slip compensation value.	% <1>, <2>
Flux Position	**Flux Position:** Displays the angular position of the PM flux position. This number is dependent on the setting of Enc Z-Pulse Offs (A5).	Deg
PG Counter	**Pulse Generator Counter:** Displays the number of pulses for speed detection.	PPR

<1> Parameter accessible in V/f control mode

<2> Parameter accessible in Open Loop Vector control mode

<3> Parameter accessible in Closed Loop Vector control mode

<4> Parameter accessible in PM Closed Loop Vector control mode

<6> Only available in Alternate Navigation menu. Contact Magnetek for details.

6 Installation Startup and Autotune Guides

◆ Open-Loop Startup

■ Open-Loop Operation Set-up

Enter / verify that the drive is set to run in Open Loop Vector in the Drive Mode menu (U8).

■ Hoistway Parameter Set-up

Enter / verify the hoistway parameters:

- CONTRACT CAR SPD (A1) parameter should be the elevator contract speed in m/s.
- CONTRACT MTR SPD (A1) parameter should be set to an RPM that will make the elevator travel at desired car speed (measured with hand tachometer).

Note: The above two parameters are utilized by the drive for many purposes regarding speed control of the lift, therefore it is important these are set correctly.

■ Input Voltage

Enter the Line Voltage in the A4 menu:

- INPUT VOLTAGE (A4) parameter should be set to the measured incoming phase to phase voltage.

■ Autotune

The autotune can now be performed by navigating to the U9 menu. The drive has several options for autotuning the motor, however usually the motor will be roped, and so the 'Tune-No Rotate1' (Static) method will be used.

If the ropes are off, and the motor can turn freely, the 'Standard Tune' (Rotating) method can be used.

Navigate to the U9 menu and enter the following information:

- 'Tune-No Rotate1' (TUNING MODE SEL(U9))
- Rated Motor Power in kW (MTR RATED POWER(U9))
- Rated Motor Voltage in V (RATED VOLTS(U9))
- Rated Motor Current in A (RATED CURRENT(U9))
- Rated Motor Frequency in Hz (RATED FREQUENCY (U9))
- Number of Motor Poles (NUMBER OF POLES(U9))
- Rated Motor Speed*. This is after slip, so NOT synchronous speed. (RATED SPEED (U9))
- Encoder Pulses (PG PULSE/REV (U9))
- No Load Current. If this is not stamped on the motor, leave it as the default value (NO-LOAD CURRENT(U9))

***Note:** The rated motor rpm must be full load speed. If synchronous speed is given, the motor rated rpm can be estimated by:
– 97.5% of synchronous speed for Nema type B motor design
– 94% of synchronous speed for Nema type D motor design

Table 17 Synchronous/Asynchronous Motor Speeds and Motor Poles Reference for 50Hz

Synchronous Speed	Rated Motor Speed (rpm)	Number of Motor Poles
1500	1497 - 1195	4
1000	998 - 797	6
750	748 - 598	8
600	599 - 478	10

Once the above information has been input, the bottom of the menu will be reached, and the screen will display 'Begin Autotune?'. You can then give and maintain a test/inspection run in the up direction, and the drive will perform the autotune as long as the run command is issued. If the drive has control of the motor contactors they will now pull in and the tune will begin.

During this process the drive will display motor speed and motor current for reference.

Once complete the drive will display "END Tune Successful".

The drive will then automatically populate the following parameters in the A1 and A5 menus:

- Rated Mtr Power (A5)
- Rated Mtr Volts (A5)
- Rated Motor Freq (A5)
- Rated Motor Curr (A5)
- Number of Poles (A5)
- Motor Rated Slip (A5) - calculated from autotune
- No-Load Current (A5)
- Leak Inductance (A5) - calculated from autotune
- Term Resistance (A5) - calculated from autotune
- Min Voltage (A5) - calculated from autotune
- Min Frequency (A5) - calculated from autotune
- Mid Voltage (A5) - calculated from autotune
- Mid Frequency (A5) - calculated from autotune

■ Low-Speed Inspection Mode

Run the drive in low-speed inspection mode and verify proper hoistway direction can be reversed with the MOTOR ROTATION (C1) parameter.

◆ Closed-Loop Startup

■ Closed-Loop Operation Set-up

Enter / verify that the drive is set to run in Closed Loop Vector in the Drive Mode menu (U8).

■ Option Card

The drive will need an option card to run in closed loop mode. Confirm that the encoder board is installed in the drive. The most common variant for closed loop induction is the PG-X3 card.

■ Encoder Wiring

The encoder should be wired to the drive as follows:

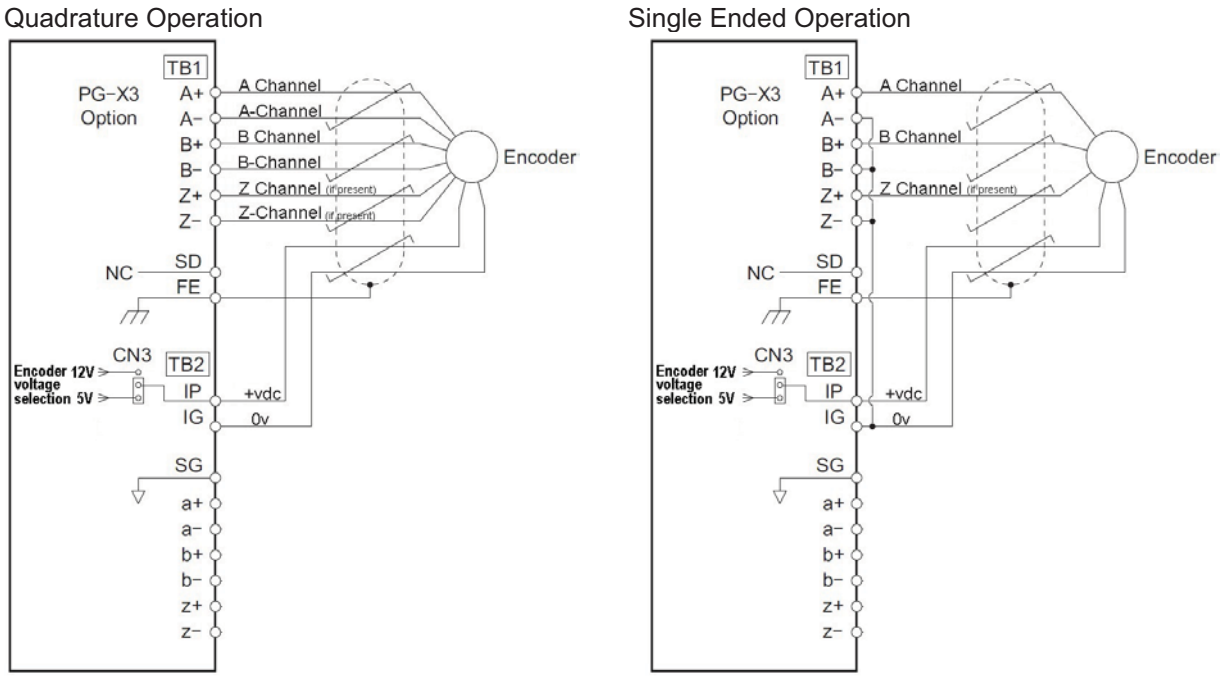


Figure 8 CL: PG-X3 Encoder Connections

- IP is the +VDC, and IG as the common.
- The encoder voltage is selected via the jumper CN3 as either 5.5V or 12V.
- Note that the encoder is wired in to the upper case terminals. The lower case terminals are an output from the drive and won't necessarily be used.

■ Hoistway Parameter Set-up

Enter / verify the hoistway parameters:

- CONTRACT CAR SPD (A1) parameter should be the elevator contract speed in m/s.
- CONTRACT MTR SPD (A1) parameter should be set to an RPM that will make the elevator travel at desired car speed (measured with hand tachometer).

Note: The above two parameters are utilized by the drive for many purposes regarding speed control of the lift, therefore it is important these are set correctly.

■ Input Voltage

Enter the Line Voltage in the A4 menu:

- INPUT VOLTAGE (A4) parameter should be set to the measured incoming phase to phase voltage.

■ Encoder Set-up

Verify the encoder has been selected and installed in accordance with the following:

Electrical interference and mechanical speed modulations are common problems that can result in improper speed feedback getting to the drive. To help avoid these common problems, the following electrical and mechanical considerations are suggested.

Note: Proper encoder speed feedback is essential for a drive to provide proper motor control.

Electrical Considerations

- If possible, insulate both the encoder case and shaft from the motor.
- Use twisted pair cable with shield tied to chassis ground at drive end.
- Use limited slew rate differential line drivers.
- Do not allow capacitors from internal encoder electronics to case.
- Do not exceed the operating specification of the encoder/drive.
- Use the proper encoder supply voltage and use the highest possible voltage available. (i.e. 12VDC is preferred because less susceptible to noise).

Mechanical Considerations

- Use direct motor mounting without couplings where possible.
- Use hub or hollow shaft encoder with concentric motor stub shaft.
- If possible, use a mechanical protective cover for exposed encoders.

■ Autotune

The autotune can now be performed by navigating to the U9 menu. The drive has several options for autotuning the motor, however usually the motor will be roped, and so the ‘Tune-No Rotate1’ (Static) method will be used.

If the ropes are off, and the motor can turn freely, the ‘Standard Tune’ (Rotating) method can be used.

Navigate to the U9 menu and enter the following information:

- ‘Tune-No Rotate1’ (TUNING MODE SEL(U9))
- Rated Motor Power in kW (MTR RATED POWER(U9))
- Rated Motor Voltage in V (RATED VOLTS(U9))
- Rated Motor Current in A (RATED CURRENT(U9))
- Rated Motor Frequency in Hz (RATED FREQUENCY (U9))
- Number of Motor Poles (NUMBER OF POLES(U9))
- Rated Motor Speed*. This is after slip, so NOT synchronous speed. (RATED SPEED (U9))
- Encoder Pulses (PG PULSE/REV (U9))
- No Load Current. If this is not stamped on the motor, leave it as the default value (NO-LOAD CURRENT(U9))

***Note:** The rated motor rpm must be full load speed. If synchronous speed is given, the motor rated rpm can be estimated by:
– 97.5% of synchronous speed for Nema type B motor design
– 94% of synchronous speed for Nema type D motor design

Table 18 Synchronous/Asynchronous Motor Speeds and Motor Poles Reference for 50Hz

Synchronous Speed	Rated Motor Speed (rpm)	Number of Motor Poles
1500	1497 - 1195	4
1000	998 - 797	6
750	748 - 598	8
600	599 - 478	10

Once the above information has been input, the bottom of the menu will be reached, and the screen will display ‘Begin Autotune?’. You can then give and maintain a test/inspection run in the up direction, and the drive will perform the autotune as long as the run command is issued. If the drive has control of the motor contactors they will now pull in and the tune will begin.

During this process the drive will display motor speed and motor current for reference.

Once complete the drive will display “END Tune Successful”.

The drive will then automatically populate the following parameters in the A1 and A5 menus:

- Encoder Pulses(A1)
- Rated Mtr Power (A5)
- Rated Mtr Volts
- Rated Motor Freq (A5)
- Rated Motor Curr (A5)
- Number of Poles (A5)
- Motor Rated Slip (A5) - calculated from autotune
- No-Load Current (A5)
- Leak Inductance (A5) - calculated from autotune
- Term Resistance (A5) - calculated from autotune

■ Low-Speed Inspection Mode

Run the drive in low-speed inspection mode and:

- Start with default values for INERTIA (A1)
- Verify encoder polarity. The motor phasing should match the encoder phasing. If you experience ENCODER FAULT/ HIT TRQ LIM alarm the phasing may be incorrect. This can be reversed changing ENCODER CONNECT (C1) between C.W (clockwise) and C.C.W (counterclockwise).
- Verify proper hoistway direction can be reversed with the MOTOR ROTATION and ENCODER CONNECT (C1) parameters.

◆ PM Startup

■ PM Operation Set-up

Enter / verify that the drive is set to run in 'PM Closed Loop Vector' in the Drive Mode menu (U8).

■ Option Card

The drive will need an option card to run in PM mode, and for EnDat encoders this will be the PG-F3 card. Confirm that the encoder board is installed in the drive.

■ Encoder Wiring

The encoder should be wired to the drive as follows:

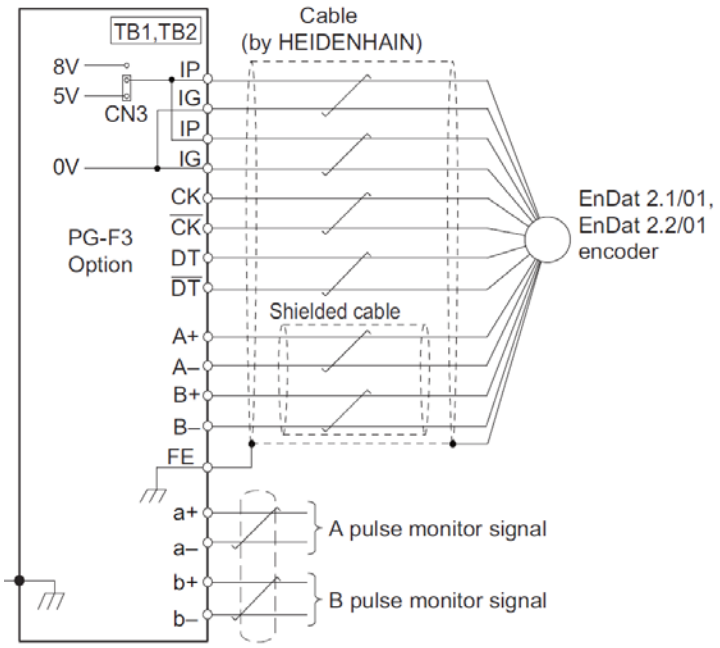


Figure 9 CL: PG-F3 Encoder Connections

- IP is the +VDC, and IG as the common.
- The encoder voltage is selected via the jumper CN3 as 5V.
- Note that the encoder is wired in to the upper case terminals. The lower case terminals are an output from the drive and won't necessarily be used.

Table 19

Encoder Signal	PG-F3 Terminal	Cable Colours							
		Heidenhain	Ziehl	CEG	IME Package Extension	Wittur	Wittur 2 (Extension)	Sassi ECN1313	Site Encoder
A/	A-	Yellow & Black	Red & Blue	Brown	Purple	Yellow	Pink	Purple	
A	A+	Green & Black	Grey & Pink	White	Green	Green	Grey	Red	
B/	B-	Red & Black	Red	Yellow	Pink	Pink	Yellow	White	
B	B+	Blue & Black	Blue	Green	Blue	Grey	Green	Brown	
Data/	/DT	Pink	Brown	Pink	Brown	White	Brown	Blue	
Data	DT	Grey	White	Grey	Grey	Brown	White	Yellow	
Clock/	/CK	Yellow	Black	Red	White	Black	Purple	Pink	
Clock	CK	Purple	Purple	Blue	Black	Purple	Black	Green	
0V Com	IG	Green & White	Pink	Purple	Yellow	Blue	Blue	Red & Blue	
+5V	IP	Green & Brown	Grey	Black	Red	Red	Red	Grey & Pink	
0V Sense	IG	White	Yellow	N/A	N/A	N/A	N/A	Black	
+5V Sense	IP	Blue	Green	N/A	N/A	N/A	N/A	Grey	
Shield	FE	Shield	Shield	Shield	Shield	Shield	Shield	Shield	

■ Power Up and Parameterization

Enter / verify the hoistway parameters:

- CONTRACT CAR SPD (A1) parameter should be the elevator contract speed in m/s.
- CONTRACT MTR SPD (A1) parameter should be set to an RPM that will make the elevator travel at desired car speed (measured with hand tachometer).

Note: The above two parameters are utilized by the drive for many purposes regarding speed control of the lift, therefore it is important these are set correctly.

Enter the Line Voltage in the A4 menu:

- INPUT VOLTAGE (A4) parameter should be set to the measured incoming phase to phase voltage.

When all connections and terminations are made, and the controller switched to 'Test/Inspection Controls' you can then power up the installation. You will next need to verify the parameters entered in the drive match that of the motor data plate, please do not assume that these are already entered correctly.

You may wish to note your motor data in the adjacent box for reference:

Note: Some motors do not quote the number of motor poles however this can be simply calculated using this formula:

$$\frac{120 \times \text{Rated Motor Frequency}}{\text{Rated Motor Speed}}$$

Note: Ensure that the motor connections are phased correctly, that is U, V, W (A, B, C) terminals on the control panel terminal rail are connected to the hoist motor terminals U, V, W.

The motor data obtained from the motor data plate should now be entered in the A5 menu of the drive. When this is complete and the control system is prepared to run with any required wiring/links, etc. the encoder alignment can take place.

In some instances the data on the motor data plate may not be 100% accurate (if the machine is not 'made to order' they may quote the motors maximum values as opposed to what is required for your installation) - if this is the case the 'calculated' motor data that matches your installation will have to be obtained from the motor manufacturer and entered in the drive. This 'Calculated' data may have been used to select the drive and the information on the data plate may be beyond the rating of the drive. It is also important to verify and adjust the CONTRACT MOTOR SPEED parameter in the A1 Menu of the drive at this stage.

■ Autotune

The autotune can now be performed by navigating to the U9 menu. The drive has several options for autotuning the motor, however usually the motor will be roped, and so the 'Tune-No Rotate1' (Static) method will be used.

Navigate to the U9 menu and enter the following information:

- 'Tune-No Rotate' (TUNING MODE SEL(U9))
- Rated Motor Power in kW (MTR RATED POWER(U9))
- Rated Motor Voltage in V (RATED VOLTS(U9))
- Rated Motor Current in A (RATED CURRENT(U9))
- Number of Motor Poles (NUMBER OF POLES(U9))
- Rated Motor Speed (RATED SPEED (U9))
- Encoder Pulses – should be 2048 (PG PULSE/REV (U9))

Once the above information has been input the bottom of the menu will be reached, and the screen will display 'Begin Autotune?'. You can then give and maintain a test/inspection run in the up direction, and the drive will perform the autotune as long as the run command is issued. If the drive has control of the motor contactors they will now pull in and the tune will begin.

During this process the drive will display motor speed and motor current for reference.

Once complete the drive will display "END Tune Successful".

The drive will then automatically populate the following parameters in the A1 and A5 menus:

- Encoder Pulses (A1)
- Rated Mtr Power (A5)
- Rated Mtr Curr (A5)
- Motor Poles (A5)
- Stator Resistance (A5) - calculated from autotune
- D Axis Induct (A5) - calculated from autotune
- Q Axis Induct (A5) - calculated from autotune

■ Alignment – Non-Rotating

This procedure is only recommended if the 'InitPoleEstPrms' procedure passed correctly.

Navigate to the U9 menu and set:

- 'PolePos-norotate' (TUNING MODE SEL U9)

Once the above information has been input the bottom of the menu will be reached, and the screen will display 'Begin Autotune?'. You can then give and maintain a test/inspection run in the up direction, and the drive will perform the pole estimation as long as the run command is issued. If the drive has control of the motor contactors they will now pull in and the tune will begin.

During this process the drive will display motor speed and motor current for reference.

Once complete the drive will display "END Tune Successful".

The drive will then automatically populate the following parameters in the A1 and A5 menus:

- Enc Z-Pulse Offs (A5)

■ Alignment – Rotating

This procedure is only required if the 'InitPoleEstPrms' **cannot** pass correctly.

This will require the sheave to be able to turn freely with no resistance, and so the ropes will have to be lifted off the sheave.

Navigate to the U9 menu and set:

- 'PolePos-rotate' (TUNING MODE SEL U9)

Once the above information has been input, the bottom of the menu will be reached, and the screen will display ‘Begin Autotune?’. You can then give and maintain a test/inspection run in the up direction, and the drive will perform the pole estimation as long as the run command is issued. If the drive has control of the motor contactors they will now pull in and the tune will begin.

During this process the drive will display motor speed and motor current for reference.

Once complete the drive will display “END Tune Successful”.

The drive will then automatically populate the following parameters in the A1 and A5 menus:

• Enc Z-Pulse Offs (A5)

■ Inspection Run

Run the drive in low speed inspection mode and:

• Start with default values for INERTIA (A1).
• Ensure Motor Contactors are closing, Brake is lifting, and the car see that the car moves freely in the shaft.
• Verify encoder polarity. The motor phasing should match the encoder phasing. If you experience ENCODER FAULT/ HIT TRQ LIM alarm the phasing may be incorrect -the most likely cause is incorrect motor phasing. Swap two motor phases, perform alignment and run again.
• Verify proper hoistway direction. If this is running with correct speed and control, but in the incorrect direction, swap both Encoder Connect (C1) and Motor Rotation (C1), and repeat alignment procedure.

7 Troubleshooting

◆ Fault Codes, Causes and Possible Solutions

Faults are detected for drive protection, and cause the drive to stop while triggering the fault output terminal MA-MB-MC. Remove the cause of the fault and manually clear the fault before attempting to run the drive again.

◆ Alarm Codes, Causes and Possible Solutions (alarm)

Alarms are drive protection functions that do not necessarily cause the drive to stop. Once the cause of an alarm is removed, the drive will return to the same status as before the alarm occurred.

When an alarm has been triggered, the ALM light on the digital operator display blinks and the alarm code display flashes. If a multi-function output is set for an alarm, that output terminal will be triggered for certain alarms.

Note: If a multi-function output is set to close when an alarm occurs, it will also close when maintenance periods are reached, triggering drive hardware alarms.

◆ oPE Codes, Causes and Possible Solutions (programming error)

An Operator Programming Error (oPE) occurs when a contradictory parameter is set or an individual parameter is set to an inappropriate value.

The drive will not operate until the parameter or parameters causing the problem are set correctly. An oPE, however, does not trigger an alarm or fault output. If an oPE occurs, investigate the cause and refer to ***Table 20*** for the appropriate action. When an oPE appears on the operator display, go to oPE Flt Parameter (F2) to see which parameter is causing the oPE.

◆ Auto-Tuning Codes, Causes and Possible Solutions (auto-tune)

Auto-Tuning faults in this section are displayed on the digital operator and will cause the motor to coast to a stop. Auto-Tuning faults do not trigger a multi-function digital output set for fault or alarm output.

An End error on the digital operator display indicates Auto-Tuning has successfully completed with discrepancies in the calculations. Check the cause of the End error using the tables in this section and perform Auto-Tuning again after fixing the cause.

The drive may be used in the application if no cause can be identified despite the existence of an End error.

An Er error indicates that Auto-Tuning has not completed successfully. Check for the cause of the error using the tables in this section, and perform Auto-Tuning again after fixing the cause.

Table 20 lists the corrective action that can be taken when an error occurs.

Table 20 Detailed Fault Displays, Causes, and Possible Solutions

Fault Code/Name	Description	Causes and Solutions
bb **Baseblock Alarm**	Drive output interrupted as indicated by an external baseblock signal.	External baseblock signal was entered via one of the multi-function input terminals (S1 to S8). • Check external sequence and baseblock signal input timing. • Verify that one of the logic input terminals in the C2 sub-menu is not programmed incorrectly to “Ext BaseBlk N.O.” or “Ext BaseBlk N.C.”. • Verify that the logic input is being triggered correctly when the drive is running.
boL **DB Overload Flt** **DB Overload Alm**	The braking transistor has reached its overload level.	The wrong braking resistor is installed. • Make sure the rating of the braking resistor fits drive and application. Use an external braking transistor if necessary.

Fault Code/Name	Description	Causes and Solutions
bUS **Op Comm Flt** **Op Comm Alarm**	The connection was lost after establishing initial communication; Only detected when the Up/Down command speed reference is assigned to an option card.	No signal was received from the PLC, or faulty communications wiring or an existing short circuit. • Check for fault wiring. • Correct the wiring. • Check for disconnected cables and short circuits and repair as needed. A communications data error occurred due to noise. • Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Ensure that other equipment such as switches or relays do not cause noise. Use surge absorbers if necessary. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input. The option card is damaged. • Replace the option card if there are no problems with the wiring and the error continues to occur. The option card is not properly connected to the drive. • The connector pins on the option card do not line up properly with the connector pins on the drive. • Reinstall the option card.
CALL **No Comms Alarm**	Communication has not yet been established.	Communications wiring is faulty, there is a short circuit, or something is not connected properly. • Check for wiring errors. • Correct the wiring. • Check for disconnected cables and short circuits. Repair as needed. Programming error on the master side. • Check communications at start-up and correct programming errors. Communications circuitry is damaged. • Perform a self-diagnostics check. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek. Termination resistor setting is incorrect. • A termination resistor must be installed at both ends of a communication line. Slave drives must have the internal termination resistor switch set correctly. Place DIP switch S2 to the ON position.
CE **Mod Comm Flt** **Memobus Alarm**	Communication data was not received for the amount of time set in parameter Communication Fault Detection Time.	Faulty communications wiring or an existing short circuit. • Check for faulty wiring. • Correct the wiring. • Check for disconnected cables and short circuits and repair as needed. Communication data error occurred due to noise. • Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Ensure that other equipment such as switches or relays do not cause noise. Use surge absorbers if required. • Separated all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.
CF **Overtorque Flt**	The torque limit was reached continuously for three seconds or longer while ramping to stop in OLV Control.	Motor parameters are improperly set. • Check the motor parameter settings and repeat Auto-Tuning. Torque limit is too low. Set the torque limit to the most appropriate setting for Mtr Torque Limit (A1) and Regen Torque Limit (A1). Load inertia is too big. • Lower the deceleration ramp rates in A2. • Set the speed reference to the minimum value and interrupt the Up/Down command when the drive finishes decelerating.
CoF **CT Fault**	The current sensor is damaged or there was residual induction current in the motor (e.g., during sudden deceleration or when coasting) when the drive attempted to start the motor.	Due to residual induction current in the motor when the drive attempted to start the motor, the drive attempted to adjust the current offset value beyond the allowable range. • Create a motor restart sequence that allows enough time for the residual induction voltage to dissipate. Hardware is damaged. Replace the drive.

Fault Code/Name	Description	Causes and Solutions
CPF00 or CPF01 **CPF** **CPF01**	Control Circuit Error	There is a self-diagnostic error in control circuit. • Cycle power to the drive. • Set the frequency to the minimum value and interrupt the Run command when the drive finishes decelerating. Connector on the operator is damaged. • Replace the operator.
CPF02 **A/D Flt**	An A/D conversion error or control circuit error occurred.	Control circuit is damaged. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF03 **Ctl Con Flt 1**	Connection error between the control board and the drive.	There is a connection error. • Turn off the power and check the connection between the control board and the drive. • If the program continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board. Drive fails to operate properly due to noise interference. • Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Ensure that other equipment such as switches or relays do not cause noise and use surge absorbers if required. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.
CPF06 **CPF06**	An error in the data saved to EEPROM.	There is an error in EEPROM control circuit. • Turn off the power and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board. The power supply was switched off while parameters were being saved to the drive. • Restore defaults in the drive with Initialization (U5). Power to the control board was lost while writing parameter settings during Rescue Operation. • Restore defaults in the drive with Initialization (U5).
CPF07 **Term Con Flt 1**	Terminal Board Connection Error	There is a fault connection between the terminal board and control board. • Turn off the power and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF08 **Term Con Flt 2**		
CPF11 to CPF14, CPF16 to CPF21 **RAM Flt** **Rom Flt** **Watchdog Flt** **Ctrl Circuit Flt** **Clock Flt** **Interrupt Flt** **Ctrl Circuit Flt** **Ctrl Circuit Flt** **CPU Flt** **CPU Flt**	Control Circuit Error	Hardware is damaged. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF22 **A/D Flt**	Hybrid IC Failure	Hybrid IC failure on the power board. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.

Fault Code/Name	Description	Causes and Solutions
CPF23 **Ctl Con Flt 2**	Connection error between the control board and the drive.	Hardware is damaged. • Turn the power off and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF24 **Drive Model Flt**	The drive capacity cannot be detected correctly (drive capacity is checked when the drive is powered up)	Hardware is damaged. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF25 **No Tmnl Card**	Terminal Board not Connected	Terminal board is not connected correctly. • Reconnect the terminal board to the connector on the drive, then cycle power to the drive.
CPF26 to CPF34 **BB Circuit Flt** **PWM Set Reg Flt** **PWM Pattern Flt** **On-Delay Flt** **BB On Flt** **ASIC Code Flt** **ASIC Startup Flt** **Watch-dog Flt** **Power/Clock Flt**	CPU Error	Hardware is damaged. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CPF35 **A/D Conv Flt**	A/D Conversion Error: An A/D conversion error or control circuit error occurred.	A/D conversion is damaged; control circuit is damaged. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
CrST *(alarm)*	Cannot Reset	A fault reset command was entered while the Run command was still present. • Ensure that a Run command cannot be entered from the external terminals or option card during fault reset. • Turn off the Run command.
dEv **Speed Dev Flt** **Speed Dev Alm**	The deviation between the speed reference and speed feedback is greater than the setting in Spd Dev Flt Lvl (A1)and Spd Dev Flt Time (A1).	Load is too heavy. • Reduce the load. Accel/decel ramp is too short. • Lower the acceleration and deceleration rates in the A2 menu. The load is locked up. • Check the machine and hoistway. Parameters are not set appropriately. • Check the settings of parameters Spd Dev Flt Lvl (A1) and Spd Dev Flt Time (A1). The motor brake is not applied. • Ensure the motor brake picks when the drive is running.
dv1 **Z Marker Lost**	The motor turned one full rotation without the Z Pulse being detected.	Encoder is not connected, not wired properly, or is damaged. • Make sure the encoder is properly connected and all shielded lines are properly grounded. • If the problem continues after cycling power, then replace either the PG option card or the encoder itself.
dv2 **Encod Out Of Tol**	The Z pulse is out of phase by more than 5 degrees. Contact Magnetek for more details.	Noise interference along the encoder cable. • Separate the encoder cable lines from the source of the noise. Encoder cable is not wired properly. • Rewire the encoder and make sure all shielded lines are properly grounded. PG option card or the encoder is damaged. • If the problem continues after cycling power, replace the PG option card or the encoder.

Fault Code/Name	Description	Causes and Solutions
dv3 **Reverse Tach**	The torque reference and acceleration are in opposite directions and the speed reference and actual motor speed differ by over 30% for 10 times. Contact Magnetek for more details.	The encoder offset is not set properly. • Set the Enc Z-Pulse Offs (A5) as specified on the motor nameplate. Replacing the encoder or changing the motor/encoder rotation direction requires readjustment of the encoder offset. Perform an alignment in U9 sub-menu. An external force on the load side has caused the motor to move. • Make sure the motor is rotating in the right direction. • Look for any problems on the load side that might cause the motor to rotate in the opposite direction. Noise interference along the encoder cable is disturbing the encoder signals. • Properly rewire the encoder and connect all lines including shielded line. Encoder is disconnected, not wired properly, or the PG option card or the encoder itself is damaged. • Properly rewire the encoder and connect all lines including shielded line. Rotational direction for the encoder is the opposite of the order of the motor lines. • Properly connect the motor lines for each phase (U/T1, V/T2, W/T3). Swap the Motor Rotation (C1), and then perform an alignment in the U9 menu. • Swap the Encoder connect (C1), and then perform an alignment in the U9 sub-menu.
dv4 **Direction Flt**	Pulses indicate that the motor is rotating in the opposite direction of the speed reference for 128 pulses. **Note:** It is possible to disable inverses detection in applications where the motor may rotate in the opposite direction of the speed reference. Contact Magnetek for details.	The encoder offset is not set properly. • Set the Enc Z-Pulse Offs (A5) as specified on the motor nameplate. • Perform an encoder alignment in the U9 sub-menu. • If the problem continues after cycling power, then replace either the PG option card or the encoder itself. Replacing the encoder or changing the motor/encoder rotation direction requires readjustment of the encoder offset or an encoder alignment in the U9 sub-menu. Noise interference along the encoder cable is disturbing the encoder signals. • Make sure the motor is rotating in the correct direction. • Look for any problems on the load side that might be causing the motor to rotate in the opposite direction. Encoder is disconnected, not wired properly, or the PG option card or the encoder itself is damaged. • Rewire the encoder and make sure all lines including shielded line are properly connected. • If the problem continues after cycling power, replace the PG option card or the encoder.
dv6 **Over Accel Flt**	The acceleration/deceleration of the elevator car exceeds the overacceleration detection level	The encoder offset is incorrect. • Perform an encoder alignment in the U9 sub-menu for PM motors. Noise along the encoder cable. • Check the encoder wiring for any loose connections. Make sure that the shielded line is properly grounded. Cables for the motor encoder are not wired properly, or the PG option card (or the encoder itself) is damaged. • Check the encoder wiring for any loose connections. Make sure that the shielded line is properly grounded. Incorrect motor data has been set. • Check the parameters in the A5 sub-menu to make sure they match the information on the motor nameplate. The acceleration is too fast. • Check and adjust the acceleration rate and the jerk at acceleration start set in the A2 sub-menu. Incorrect setting for overacceleration • Check and adjust the setting of PM Accel Limit (A1) so the fault is not too sensitive.

Fault Code/Name	Description	Causes and Solutions
dv7 **Polarity Det Flt**	Unable to detect the magnetic poles within the designated time.	Battery voltage is too low. • Charge the battery. The output cable is disconnected. • Check for wiring errors and ensure the output cable is connected properly. • Correct the wiring. The motor winding is damaged. • Check the resistance between the motor lines. • Replace the motor if the winding is damaged. The output terminal is loose. • Apply the tightening torque specified in this manual to fasten the terminals. Incorrect motor data has been sent. • Check the parameters in the A5 sub-menu to make sure they match the information on the motor nameplate. Non-rotational alignment failure. • A non-rotational alignment cannot be performed; perform a rotational alignment instead.
dv8 **Pole Detect Flt**	An invalid value resulted from Initial Pole Search. **Note:** Reset the fault and try Initial Pole Search again.	Brake was released during Initial Pole Search or during power loss. • Check the brake sequence. • The brake must remain applied during Initial Pole Search and whenever the power supply is interrupted. Initial Pole Search cannot be performed on the monitor being used. • Use a PG option card that is compatible with both the drive and an absolute encoder. Initial Pole Search cannot be performed. • A non-rotational alignment cannot be performed; perform a rotational alignment instead.
EF **Up/Down Alarm**	Both forward run and reverse run closed simultaneously for over 0.5 s.	Sequence error. • Check the forward and reverse command sequence and correct the problem. **Note:** When minor fault EF detected, motor ramps to stop.
EF0 **Ext Opt Flt** **Opt Card Alarm**	An external fault condition is present.	An external fault was received from the PLC. • Remove the cause of the external fault. • Remove the external fault from the PLC. Problem with the PLC program. • Check the PLC program and correct problems.

Fault Code/Name	Description	Causes and Solutions
EF1 **Ext Flt S1 Alarm**	External fault at Logic Input 1 on terminal S1.	An external device has tripped an alarm function. • Remove the cause of the external fault and reset the fault. Wiring is incorrect. • Ensure the signal lines have been connected properly to the terminals assigned for external fault detection. • Reconnect the signal line. Incorrect Logic Input settings. • Check for incorrect setting of Logic Inputs in the C2 sub-menu for external faults.
EF2 **Ext Flt S2 Alarm**	External fault at Logic Input 2 on terminal S2.	
EF3 **Ext Flt 3** **Ext Flt S3 Alarm**	External fault at Logic Input 3 on terminal S3.	
EF4 **Ext Flt 4** **Ext Flt S4 Alarm**	External fault at Logic Input 4 on terminal S4.	
EF5 **Ext Flt 5** **Ext Flt S5 Alarm**	External fault at Logic Input 5 on terminal S5.	
EF6 **Ext Flt 6** **Ext Flt S6 Alarm**	External fault at Logic Input 6 on terminal S6.	
EF7 **Ext Flt 7** **Ext Flt S7 Alarm**	External fault at Logic Input 7 on terminal S7.	
EF8 **Ext Flt 8** **Ext Flt S8 Alarm**	External fault at Logic Input 8 on terminal S8.	
End1 *(auto-tune)*	Excessive V/f Setting (detected only during Rotational Auto-Tuning, and displayed after Auto-Tuning is complete).	The torque reference exceeded 20% during Auto-Tuning, or the results from Auto-Tuning the no-load current exceeded 80%. • Before Auto-Tuning the drive, verify the information written on the motor nameplate and enter the data in to the A5 menu and verify in the U9 menu. • Enter parameters and repeat Auto-Tuning.
End2 *(auto-tune)*	Motor Iron-Core Saturation Coefficient (detected only during Rotational Auto-Tuning and displayed after Auto-Tuning is complete).	Motor data entered during Auto-Tuning was incorrect. • Make sure the data entered match the information written on the motor nameplate. • Restart Auto-Tuning and enter the correct information. Results from Auto-Tuning are outside the parameter setting range, assigning the Saturation Comp 1 and Saturation Comp 2 parameters a temporary value. • Check and correct faulty motor wiring.
End3 *(auto-tune)*	Rated Current Setting Alarm (displayed after Auto-Tuning is complete)	The correct current rating printed on the nameplate was not entered into Rated Current in the U9 sub-menu during Auto-Tune. • Check the setting of parameter Rated Current in the U9 sub-menu. • Check the motor data and repeat Auto-Tuning.
End4 *(auto-tune)*	Adjusted Slip Calculation Error	The slip that was calculated is outside the allowable range. • Make sure the data entered for Auto-Tuning in the U9 sub-menu is correct. • Execute the “Standard Tuning” in the U9 sub-menu for a rotational auto-tune. If a rotational auto-tune cannot be done, try “Tune-No Rotate2.”
End5 *(auto-tune)*	Resistance Tuning Error	The resistance value that was calculated is outside the allowable range. • Double-check the data that was entered for the Auto-Tuning process. • Check the motor and motor cable connection for faults.
End6 *(auto-tune)*	Leakage Inductance Alarm	Control Method (U8) setting error. • Check the setting of Control Method (U8). • Check the control mode and repeat Auto-Tuning. The leakage inductance value that was calculated is outside the allowable range. • Double-check the data that was entered for the auto-tune process in Leak Inductance (A5).

Fault Code/Name	Description	Causes and Solutions
End7 *(auto-tune)*	No-Load Current Alarm	The entered no-load current value was outside the allowable range. • Check and correct the faulty motor wiring. Auto-Tuning results were less than 5% of the motor rated current. • Double-check the data that was entered for the auto-tuning process in No-Load Current (A5).
End8 *(auto-tune)*	Rescue Operation Speed Warning	High frequency injection calculations for the battery power supply were below 10 Hz. • For Rescue Operation, either switch to a larger battery (at least 280 VDC for a 200 V class drive, 560 VDC for a 400 V class drive, or 700 VDC for a 600 V class drive) or switch to an absolute encoder and the PG-F3 option card.
End9 *(auto-tune)*	Rescue Operation Rotor Pole Position Search Warning	While operating from the backup battery, pole diversion exceeded 40 degrees. • For Rescue Operation, either switch to a larger battery (at least 280 VDC for a 200 V class drive, 560 VDC for a 400 V class drive, or 700 VDC for a 600 V class drive) or switch to an absolute encoder and the PG-F3 option card.
End10 *(auto-tune)*	Rescue Operation Rotor Polarity Detection Warning	While operating from the backup battery, the Id value between poles was less than 5%. • For Rescue Operation, either switch to a larger battery (at least 280 VDC for a 200 V class drive, 560 VDC for a 400 class drive, or 700 VDC for a 600 class drive) or switch to an absolute encoder and the PG-F3 option card.
EPE *(copy)*	ID Mismatch	Attempted to acquire machine data from an encoder that does not have any machine data written to it yet. • Try again after writing machine data to the encoder.
Er-01 *(auto-tune)*	Motor Data Error	Motor data or data entered during Auto-Tuning was incorrect. • Check that the motor data entered to U9 matches motor nameplate input before Auto-Tuning. • Start Auto-Tuning over again and enter the correct information. Rated Motor Power and Rated Motor Current settings in U9 Menu do not match. • Check the drive and motor capacities. • Correct the settings of parameters Rated Motor Power (U9) and Rated Motor Current (U9). Motor rated current and detected no-load current are not consistent with each other. • Check the motor rated current and no-load current. • Correct the settings of parameters Rated Motor Current (U9) and No-Load Current (A5). Base Frequency (U9) and Rated Motor Speed (U9) do not match. • Set Base Frequency (U9) and Rated Motor Speed (U9) to the correct value. • Check if the correct pole number was entered to Number of Poles (U9).
Er-02 *(auto-tune)*	Alarm	An alarm was triggered during Auto-Tuning. • Exit the Auto-Tuning menu, check the alarm code, remove the alarm cause, and repeat Auto-Tuning.
Er-03 *(auto-tune)*	Escape Key Input	Auto-tuning canceled by pressing ESC key. • Auto-tuning did not complete properly and will have to be performed again.
Er-04 *(auto-tune)*	Line-to-Line Resistance Error	Motor data entered during auto-tuning was incorrect. • Make sure the data entered in the U9 sub-menu for auto-tune match the information written on the motor nameplate. • Reset auto-tuning and enter the correct information. Results from auto-tuning are outside the parameter setting range or the tuning process took too long, or the motor cable or cable connection is faulty. • Check and correct faulty motor wiring.

Fault Code/Name	Description	Causes and Solutions
Er-05 *(auto-tune)*	No-Load Current Error	Motor data entered during auto-tuning was incorrect. • Make sure the data entered in the U9 sub-menu for auto-tune match the information written on the motor nameplate. • Restart auto-tuning and enter the correct information. Results from auto-tuning are outside the parameter setting range or the tuning process took too long. • Check and correct faulty motor wiring. • Perform a “standard tuning” the U9 sub-menu for a rotational auto-tuning. Remember that the rope must be fully removed from the motor and the brake must be released to perform a rotational auto-tuning. The load during rotational auto-turning was too high. • Disconnect the motor from machine and restart auto-tuning. If motor and load cannot be uncoupled, make sure the load is lower than 30%. • If a mechanical brake is installed, make sure it is fully lifted during tuning.
Er-08 *(auto-tune)*	Rated Slip Error	Motor data entered during auto-tuning was incorrect. • Make sure the data entered in the U9 sub-menu for auto-tune match the information written on the motor nameplate. • Restart auto-turning and enter the correct information. Drive-calculated values outside parameter setting range or the tuning process took too long. • Check and correct faulty motor wiring. • Perform a “standard tuning” in the U9 sub-menu for a rotational auto-tuning. Remember that the rope must be fully removed from the motor and the brake must be released to perform a rotational auto-tuning. The load during rotational auto-tuning was too high. Disconnect the motor from machine and restart auto-tuning. If motor and load cannot be uncoupled make sure that the load is lower than 30%. • If a mechanical brake is installed, make sure it is fully lifted during tuning.
Er-09 *(auto-tune)*	Acceleration Error	The motor did not accelerate for the specified acceleration ramp. • Lower the acceleration rates in the A2 sub-menu. Torque limit when motoring is too low. • Check the settings of Mtr Torque Limit (A1) and Regen Torq Limit (A1). • Increase the setting of Mtr Torque Limit (A1) and Regen Torq Limit (A1). The load during rotational auto-tuning was too high. • Disconnect the motor from machine and restart auto-tuning. If motor and load cannot be uncoupled make sure the load is lower than 30%. • If a mechanical brake is installed, make sure it is fully lifted during tuning.
Er-10 *(auto-tune)*	Motor Direction Error	The encoder signal lines are not properly connected to the drive. • Check and correct wiring to the encoder. Motor and encoder direction are opposite. • Check the Speed Feedback (D1) while turning the motor manually in forward direction. If the sign displayed is negative, change the setting of Encoder Connect (C1). The load pulled the motor in the opposite direction of the speed reference and the torque exceeded 100%. • Uncouple the motor from the load and repeat auto-tuning.
Er-11 *(auto-tune)*	Motor Speed Fault	Torque reference is too high. • Lower the acceleration rate in the A2 sub-menu. • Disconnect the machine from the motor, if possible.
Er-12 *(auto-tune)*	Current Detection Error	One of the motor phases is missing: (U/T1, V/T2, W/T3). • Check motor wiring and correct any problems. Current exceeded the current rating of the drive, or the current is too low. • Check the motor wiring for a short between motor lines. • Make sure the motor contactor is closed during tuning. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek. Attempted auto-tuning without motor connected to the drive. • Manually push the motor contactor close while performing the auto-tune. • Connect the motor and perform auto-turning. Current detection signal error. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.

Fault Code/Name	Description	Causes and Solutions
Er-13 *(auto-tune)*	Leakage Inductance Error	Drive was unable to complete tuning for leakage inductance within 300 seconds. • Check all wiring and correct any mistakes. • Double-check the motor current value that was entered for Rated Current in the U9 sub-menu for auto-tuning. • Check the motor rated current value written on the motor nameplate and enter the correct value.
Er-18 *(auto-tune)*	Induction Voltage Error	The induced voltage constant attempted to set a value outside the allowable setting range. • Double-check the data entered in the PM auto-tune in the U9 sub-menu, and perform auto-tuning again.
Er-19 *(auto-tune)*	Inductance Error	The induced voltage constant attempted to set a value to PM Mtr Ind V1 (A5) that is outside the allowable range. • Double-check the data entered in the PM auto-tune in the U9 sub-menu, and perform auto-tuning again.
Er-20 *(auto-tune)*	Stator Resistance Error	Stator resistance tuning attempted to set a value to PM Mtr d Induct (A5) that is outside the allowable setting range. • Double-check the data entered to the U9 Menu and perform Auto-Tuning again.
Er-21 *(auto-tune)*	Z Pulse Correction Error	Motor is coasting when auto-tuning is initiated. • Make sure the motor has stopped completely. Repeat auto-tuning. Either the motor or the encoder on the motor is not properly wired. • Check the wiring for the motor and the encoder. Repeat auto-tuning. The direction for the encoder on the motor is not properly wired. • Check the direction of the motor with Motor Rotation (C1) or encoder with Encoder Connect (C1). Encoder is damaged. • Check the signal output from the encoder attached to the motor. Replace the encoder if damaged. PG-E3 option detected excess position error with the ERN1387 encoder. • If other possible solutions are not successful, perform auto-tuning of PG-E3 encoder characteristics.
Er-22 *(auto-tune)*	Initial Rotor Pole Search Error	Parameters set by Initial Rotor Pole Search Tuning were outside the acceptable range, or during normal operation, pole diversion exceeded 20 degrees. • Switch to an absolute encoder and to the PG-F3 option card.
Er-23 *(auto-tune)*	Non-rotating Encoder Offset Tuning Warning	Pole diversion exceeded 15 degrees three times, or parameters set by Encoder Offset Tuning were outside the acceptable range. • Remove the ropes and conduct a “PolePos-rotate” for PM Tuning Mode (U9) for a rotational auto-tuning for encoder offset.
Er-24 *(auto-tune)*	Auto-Tuning Error for PG-E3 Encoder Characteristics	The signal lines between the PG-E3 option card and encoder are disconnected at the R+ and R- terminals, or there is excessive electrical interference at the PG-E3 option card. • Refer to the installation manual for the PG-E3 option card for information on correct connection of signal lines. The software for the PG-E3 option card does not support the Auto-Tuning of PG-E3 encoder characteristics.
Err **EEPROM R/W Err**	Data cannot be written to the EEPROM.	Noise has corrupted data while writing to the EEPROM. • Press the ENTER button. • Correct the parameter setting. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board. Hardware problem. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
FrL **No Speed Ref Flt**	No speed was selected while an Up or Down command was entered.	• Make sure the selected speed selection method matches the elevator controller sequence. • Make sure the elevator controller is connected properly. • Make sure the elevator controller selects the speed properly.

Fault Code/Name	Description	Causes and Solutions
GF **Ground Fault**	A current short to ground exceeded 50% of rated current on the output side of the drive.	Motor insulation is damaged. • Check the insulation resistance of the motor. • Replace the motor. A damaged motor cable is creating a short circuit. • Check the motor cable; remove the short circuit and turn the power back on. • Check the resistance between the cable and the ground terminal; replace the cable. The leakage current at the drive output is too high. • Reduce the Carrier Frequency (A4). • Reduce the amount of stray capacitance. • The drive started to run during a current offset fault or while coasting to a stop. • The value set exceeds the allowable setting range while the drive automatically adjusts the current offset (this happens only when attempting to restart a PM motor that is coasting to stop). Hardware problem. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
Hbb **Safe Off Open**	Both Safe Disable Input channels are open.	Both Safe Disable Inputs H1 and H2 are open. • Check signal status at the input terminals H1 and H2. • Check the Sink/Source Selection for the digital inputs. • If the Safe Disable function is not utilized, check if the terminals H1-HC, and H2-HC are linked. Internally, both Safe Disable channels are broken. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
HbbF **Safe Off Open 2**	One Safe Disable channel is open while the other one is closed.	The signals to the Safe Disable inputs are wrong or the wiring is incorrect. • Check signal status at the input terminals H1 and H2. if the Safe Disable function is not utilized, the terminals H1-HC, and H2-HC must be linked. One of the Safe Disable channels is faulty. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
HCA **Hi Current Alarm**	Drive current exceeded overcurrent warning level (150% of the rated current).	Load is too heavy. • Either reduce the load for applications with repetitive operation (repetitive stops and starts, etc.) or replace the drive. Acceleration/deceleration is too fast. • Calculate the amount of torque required for the desired acceleration and/or deceleration ramp relative to the inertia moment of the load. • If the torque level is not right for the load, take the following steps: • Lower the acceleration and deceleration times in the A2 sub-menu. • Increase the capacity of the drive. A special-purpose motor is being used, or the drive is attempting to run a motor greater than the maximum allowable capacity. • Check the motor capacity. • Use a motor appropriate for the drive. Ensure the motor is within allowable capacity range. The current level increased due to a momentary power loss or while attempting to perform a fault reset. • The alarm will appear only briefly. There is no need to take action to prevent the alarm from occurring in such instances.

Fault Code/Name	Description	Causes and Solutions
LF **MTR Phse Flt**	Phase Loss on the output side of the drive was detected.	The output cable is disconnected. • Check for wiring errors and properly connect the output cable on U, V, and W. • Correct the wiring. • Verify that the motor contactor is closing when running. • Verify that wen the motor contactor is picked, the drive and motor are electrically connected. The motor winding is damaged. • Check the resistance between motor lines. • Replace the motor if the winding is damaged. The output terminal is loose. • Check for loose wires on the motor contactor. • Check for loose wires on the drive's U, V, and W. • Apply the tightening torque specified in this manual to fasten the terminals. The rated current of the motor being used is less than 5% of the drive rated current. • Check the drive and motor capacities. An output transistor is damaged. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board. A single-phase motor is being used. • The drive cannot operate a single phase motor. • Check the setting of Out Ph Loss Det (C1). • Check that the correct output phase loss detection is being selected. If it is a nuisance fault, disable the function.
LF2 **Mtr Phse Balance**	One or more of the phases in the output current is lost.	Phase loss has occurred on the output side of the drive. • Check for faulty wiring or poor connections on the output side of the drive. • Correct the wiring. Wires on the output side of the drive are loose. • Check for loose wires on the drive's U, V, and W. • Check for loose wires on the motor contactor. • Apply the tightening torque specified in this manual to fasten the terminals. The output circuit is damaged. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board. Motor impedance or motor phases are uneven. • Measure the line-to-line resistance for each motor phase. Ensure all values are the same. • Replace the motor.
LT-1 **Fans Alarm**	The cooling fan has reached its expected maintenance period and may need to be replaced.	The cooling fan has reached 90% of its expected performance life. • Replace the cooling fan and contact Magnetek to reset timer.
LT-2 **Capacitor Alarm**	The main circuit and control circuit capacitors are nearing the end of their expected performance life.	The main circuit and control circuit capacitors have reached 90% of their expected performance life. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
LT-3 **PreCharge Alarm**	The DC bus soft charge relay is nearing the end of its expected performance life.	The DC bus soft charge relay has reached 90% of expected performance life. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
LT-4 **IGBT Alarm 1**	IGBTs have reached 90% of their expected performance life.	IGBTs have reached 90% of their expected performance life. • Check the load, carrier frequency, and output speed. **NOTICE:** *Optimize Performance Life. To maximize drive performance life, make sure the drive output current does not exceed 150% of the drive rated current. Expected performance life estimates the number of drive starts at three million times if output does not exceed 150%. This assumes the carrier frequency is at its default setting.*

Fault Code/Name	Description	Causes and Solutions
oC **Overcurrent Flt**	Drive sensors have detected an output current greater than the specified overcurrent level.	The motor has been damaged due to overheating or the motor insulation is damaged. • Check the insulation resistance. • Replace the motor. One of the motor cables has shorted out or there is a grounding problem. • Check the motor cables; remove the short circuit and reapply the power to the drive. • Check the resistance between the motor cables and the ground terminal; replace damaged cables. The drive is damaged. • Check the drive output side short circuit for broken output transistor: B1 or +3 and U/V/W; - (negative) and U/V/W • Contact Magnetek for assistance. The load is too heavy. • Measure the current flowing into the motor. • Replace the drive with a larger capacity if the current value exceeds the rated current. • Determine if there is sudden fluctuation in the current level. • Reduce the load to avoid sudden changes in the current level or switch to a larger drive. Acceleration/Deceleration is too fast. • Lower the acceleration and/or deceleration rate in the A2 sub-menu. • Use a larger capacity drive. The drive is attempting to operate a specialized motor or a motor larger than the maximum size allowed. • Check the motor capacity. • Ensure that the rated capacity of the drive is greater than or equal to the capacity rating found on the motor nameplate. Magnetic contactor (MC) on the output side of the drive has turned on or off. • Set up the operation sequence so that the MC is not tripped while the drive is outputting current. Incorrect parameter settings. • Lower the Carrier Frequency (A4) parameter. • Change PWM Method (A4) to “2 Phase Modulate”. • Check all the motor parameters in the A5 sub-menu for proper settings. V/f setting is not operating as expected. • Check the V/Hz ratio between the middle voltage/frequency and add the minimum voltage/frequency. • Lower the voltage if it is too high relative to the frequency. Excessive torque compensation. • Reduce the Torq Comp Gain (A1) until there is no speed loss and less current. Drive fails to operate properly due to noise interference. • Review the possible solutions provided for handling noise interference. • Review the section on handling noise interference and check the control circuit lines, main circuit lines, and ground wiring. The motor control method and motor do not match. • Check that the drive is set to the correct motor control in Control Method (U8).
oFA00 **CNA Card Comp**	Option compatibility error.	The option card installed into port CN5-A is incompatible with the drive. • Check if the drive supports the option card to be installed. Contact Magnetek for assistance. A PG option card is connected to option port CN5-A. • PG option cards are supported by option port CN5-C. Place the PG option card into the correct option port.
oFA01 **CNA Connect Flt**	Option not properly connected.	The option board connection to port CN5-A is faulty. • Turn off the power and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • If the option is not a communication option card, try to use the card in another option port. If the option card works properly in a different option port, replace the drive because port CN5-A is damaged. If the error persists (oFb01 or oFC01 occur), replace the option card.

Fault Code/Name	Description	Causes and Solutions
oFA05, oFA06 **CNA Card A/D Flt** **CNA Card Com Flt** oFA10, oFA11 **CNA Card Ram Flt** **CNA Card Ope Flt** oFA12 to oFA17 **Drv CRC Flt** **Drv Frame Flt** **Drv Abort Flt** **CNA CRC Flt** **CNA Frame Flt** **CNA Abort Flt** oFA30 to oFA43 **Com ID Flt** **Type Code Flt** **Sum Chk Flt** **Opt TimeOver Flt** **Memobus Time Flt** **Inv Time Flt 1** **Cl Chk Flt** **Inv Time Flt 2** **Ctrl Ref Flt** **Inv Time Flt 3** **CtrlResSel Flt 1** **Inv Time Flt 4** **CtrlResSel Flt 2** **Inv Time Flt 5**	Option card error occurred at option port CN5-A.	Option card or hardware is damaged. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
oFb00	Option Card Fault at Option Port CN5-B: Option compatibility error.	The option card installed into port CN5-B is incompatible with the drive. • Make sure the drive supports the option card to be installed. Contact Magnetek for assistance. A communication option card has been installed in option port CN5-B. • Communication option cards are only supported by option port CN5-A. It is not possible to install more than one comm. option. PG-F3 is connected to option port CN5-B. • PG-F3 is only supported by option port CN5-C. Place PG-F3 on the top option port.
oFb01 **CNB Connect Flt**	Option not properly connected.	The option board connection to port CN5-B is faulty. • Turn off the power and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • Try to use the card in another option port (in case of a PG option use CN5-C). If the option cards work in the other port, replace the drive because port CN5-B is damaged. If the error persists (oFA01 or oFC01 occur), replace the option board.
oFb02 **CNBDuplicate Flt**	Same type of option card already connected.	An option card of the same type is already installed in option port CN5-A. • Except for PG options, each option card type can only be installed once. Make sure only one type of option card is connected. An input option card is already installed in option port CN5-A. • Install a comm. option, a digital input option, or an analog input option. The same type of card cannot be installed twice.

Fault Code/Name	Description	Causes and Solutions
oFb03 to oFb11 **CNB Diag Flt** **DNB A/D Flt** **CNB Comm Flt** **CNB Ram Flt** **CNB Mode Flt** oFb12 to oFb17 **Drv CRC Flt** **Drv Frame Flt** **Drv Abort Flt** **CNB CRC Flt** **CNB Frame Flt** **CNB Abort Flt**	Option card error occurred at Option Port CN5-B.	Option card or hardware is damaged. • Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
oFC00 **CNC Card Comp**	Option compatibility error.	The option card is installed into port CN5-C is incompatible with the drive. • Confirm that the drive supports the option card to be installed. Contact Magnetek for assistance. A communication option card has been installed in option port CN5-C. • Communication option cards are only supported by option port CN5-A. It is not possible to install more than one comm. option.
oFC01 **CNC Connect Flt**	Option not properly connected.	The option board connection to port CN5-C is faulty. • Turn the power off and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • Try to use the card in another option port (in case of a PG option card use CN5-B). If the option card works in a different port, replace the drive because port CN5-C is damaged. If the error persists (oFA01 or oFb01 occur), replace the option board.
oFC02 **CNCDuplicate**	A maximum of two PG option boards can be used simultaneously. Remove the PG option board installed into option port CN5-A.	An option card of the same type is already installed in option port CN5-A or CN5-B. • Except for PG options, each option card type can only be installed once. Make sure only one type of option card is connected. An input option card is already installed in option port CN5-A or CN5-B. • Make sure that a comm. option, a digital input option, or an analog output option is installed. The same type of card cannot be installed twice. Three PG option boards are installed. • A maximum of two PG option boards can be used simultaneously. Remove the PG option board installed into option port CN5-A.
oFC03 to oFC11 **CNC Diag Flt** **CNC Card A/D Flt** **CNC Card Com Flt** **CNC Card Ram Flt** oFC12 to oFC17 **Drv CRC Flt** **Drv Frame Flt** **Drv Abort Flt** **CNC CRC Flt** **CNC Frame Flt** **CNC Abort Flt**	Option card error occurred at option port CN5-C.	Option card or hardware is damaged. • Cycle power to the drive. • Re-seat the option card with the power off. • If the problem continues, replace the control board or the entire drive. Contact Magnetek for instructions on replacing the control board.
oFC50 **Enc A/D Flt**	Error with the A/D conversion level (VCC level), or A/D conversion timed out.	The PG option card is damaged. • Replace the PG option card.
oFC51 **CNC Enc Ang Flt**	Incorrect signal level (+2.5 V signal)	The PG option card is damaged. • Replace the PG option card.

Fault Code/Name	Description	Causes and Solutions
oFC52 **CNC Enc Time Flt**	Signal encoder timed out waiting to receive data.	Encoder cable wiring is wrong. • Correct the wiring. Encoder cable does not seem to be connected. • Verify that the encoder card is securely connected. • Verify that there is no break in the encoder cable. • Verify that the encoder cable isn't too long. Parameters for Encoder Select (C1) are set to the wrong values. • Set Encoder Select (C1) to the proper setting.
oFC53 **CNC Enc Dat Flt**	Serial encoder CRC checksum error.	Encoder cable wiring is wrong. • Correct the wiring. Encoder cable does not seem to be connected. • Verify that the encoder card is securely connected. • Verify that there is no break in the encoder cable. • Verify that the encoder cable isn't too long.
oFC54 **CNC Encoder Flt**	Alarm reading EnDat absolute position data from encoder (OR flag from EnDat error for overvoltage, undervoltage, etc.)	Power supply to encoder is wired incorrectly. • Correct the wiring. The power supply circuit of the PG option card is damaged. • Replace the PG option card.
oH **User Overtemp Overtemp Alarm**	The temperature of the heatsink exceeded the OH Pre-Alarm Lvl (A4).	Parameters are set incorrectly. • Verify that OH Pre-Alarm Lvl (A4) is not set too low. Surrounding temperature is too high. • Check the temperature surrounding the drive. Verify temperature is within drive specifications. • Improve the air circulation within the enclosed panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat. Load is too heavy. • Measure the output current. • Decrease the load. • Lower the Carrier Frequency (A4). Internal cooling fan is stopped. • Replace the cooling fan, and contact Magnetek to reset maintenance timer.
oH1 **Overtemp Flt**	The temperature of the heatsink exceeded the drive overheat level.	Surrounding temperature is too high. • Check the temperature surrounding the drive. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat. Load is too heavy. • Measure the output current. • Lower the Carrier Frequency (A4). • Reduce the load.
oH3	Motor Overheat Alarm (PTC thermistor input): • The motor overheat signal to analog input terminal A1 or A2 has exceeded the alarm detection level.	Parameter settings are incorrect. • Verify that the C5 sub-menu analog input of "Motor PTC" is set correctly. • Verify that the analog input gain setting and bias offset in the A5 sub-menu are set correctly: Analog A1 Gain, Analog A1 Bias, Analog A1 Offset, Analog A2 Gain, Analog A2 Bias and Analog A2 Offset, all of which can be found in the A5 menu. Motor thermostat wiring is fault (PTC thermistor input). • Repair the PTC thermistor input wiring. Motor has overheated. • Check the size of the load, the accel/decel times, and the cycle times. • Decrease the load. • Lower the acceleration and deceleration in the A2 sub-menu. • Adjust the preset V/f pattern in the A5 sub-menu. • Be careful not to lower Motor Mid Volts (A5) and Motor Min Volts (A5) too much, as this reduces load tolerance at low speeds. • Check the motor rated current. • Enter the motor rated current as indicated on the motor nameplate in Rated Motor Curr (A5). Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.

Fault Code/Name	Description	Causes and Solutions
oH4	Motor Overheat Fault (PTC thermistor input): • The motor overheat signal to analog input terminal A1 or A2 exceeded the fault detection level.	Parameter settings are incorrect. • Verify that the C5 sub-menu analog input of "Motor PTC" is set correctly. • Verify that the analog input gain setting and bias offset in the A1 sub-menu are set correctly: Term A1 Gain (A1), Terminal A1 Bias (A1), Ana In A1 Offset (A1), Term A2 Gain (A2), Terminal A2 Bias (A1), and Ana In A2 Offset (A1). Motor thermostat wiring is fault (PTC thermistor input). • Repair the PTC thermistor input wiring. Motor has overheated. • Check the size of the load, the accel/decel times, and the cycle times. • Decrease the load. • Lower the acceleration and deceleration in the A2 sub-menu. • Adjust the preset V/f pattern in the A5 sub-menu. • Be careful not to lower Motor Mid Volts (A5) and Motor Min Volts (A5) too much, as this reduces load tolerance at low speeds. • Check the motor rated current. • Enter the motor rated current as indicated on the motor nameplate in Rated Motor Curr (A5). Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
oL1 **Motor Overload** **Motor OVLD Alarm**	The electronic motor overload protection tripped.	Load is too heavy. • Reduce the load. **Note:** After the value of Motor Overload (D2) has decreased to one less than 100, reset oL1. The value of Motor Overload (D2) must be less than 100 before oL1 can be reset. Cycle times are too short during acceleration and deceleration. • Lower the acceleration and deceleration times in the A2 sub-menu. A general purpose motor is driven below the rated speed with too high load. • Reduce the load. • Increase the speed. • If the motor is supposed to operate at low speeds, either increase the motor capacity or use a motor specifically designed to operate in the desired speed range. The output voltage is too high. • Adjust the user-set V/f pattern by reducing Motor Mid Frequency A (A5) and Motor Min Frequency (A5). **Note:** Do not reduce either parameter too low because this reduces load tolerance at low speeds. The wrong motor rated current has been set. • Check the Rated Motor Curr (A5). • Perform auto-tune in U9 sub-menu. The Base Frequency is set incorrectly. • Enter the rated frequency on nameplate to Base Frequency (A5). Multiple motors are running off the same drive. • Disable the motor protection function in Mtr OL Method (A5) and install a thermal relay to each motor. The electrical thermal protection characteristics and motor overload characteristics do not match. • Check the motor characteristics. • Correct the type of motor protection that has been selected in Mtr OL Method (A5). • Install an external thermal relay. The electrical thermal relay is operating at the wrong level. • Check the current rating listed on the motor nameplate. • Check the value set for the current in Rated Motor Curr (A5). Output current fluctuation due to power supply loss. • Check the power supply for phase loss.

Fault Code/Name	Description	Causes and Solutions
oL2 **Drive Overload** **Drive OVLD Alarm**	The thermal sensor of the drive triggered overload protection.	Load is too heavy. • Reduce the load. Accel/decel ramp is too short. • Lower the settings for the acceleration and deceleration in the A2 sub-menu. The output voltage is too high. • Adjust the preset V/f pattern by reducing Motor Mid Frequency A (A5) and Motor Min Frequency (A5). **Note:** Do not lower this parameter excessively, as this will reduce load tolerances at low speeds. Drive capacity is too small. • Replace the drive with a larger model. Overload occurred when operating at low speeds. • Reduce the load when operating at low speeds. • Replace the drive with a model that is one frame size larger. • Lower the Carrier Frequency. Excessive torque compensation. • Reduce the Torq Comp Gain (A1) until there is no speed loss but less current. Output current fluctuation due to input phase loss. • Check the power supply for phase loss.
oL3 **Overtorque 1** **Overtorque 1 Alm**	The current has exceeded the value set for torque detection for longer than the allowable time. Contact Magnetek should you need to adjust these factory determined settings.	Parameter settings are not appropriate for the load. • Check the settings of parameters. Fault on the machine side (e.g., machine is locked up). • Check the status of the load. Remove the cause of the fault.
oL4 **Overtorque 2** **Overtorque 2 Alm**	The current has exceeded the value set for Overtorque Detection 2 for longer than the allowable time. Contact Magnetek should you need to adjust these factory determined settings.	Parameter settings are not appropriate for the load. • Check the settings of parameters.
oPE01 **Capacity Alarm**	Drive capacity and the value set in U6 do not match.	The drive model selection (U6) and the actual capacity of the drive are not the same. • Correct the value set as Drive Model Selection (U6).
oPE02 **Pram Range Alm**	There are parameters set outside the drive range.	Parameters were set outside of the possible setting range. • Power cycle the drive. • Set parameters to the proper values. **Note:** Use oPE Flt Parameter (F2) to find which parameter is causing the oPE02 to be declared. When multiple errors occur at the same time, other errors are given precedence over oPE02.
oPE03 **Input Setup Alm**	A contradictory setting is assigned to multi-function contact inputs.	The same function is assigned to two multi-function inputs (excludes “Brake Feedback NO” and “Brake Feedback NC.”); the Brake Feedback is assigned to three or more multi-function inputs. • Ensure all multi-function inputs are assigned to different functions. • Re-enter the multi-function settings to ensure this does not occur. Contact CNFM NO and Contact CNFM NC are selected simultaneously. • Check for contradictory settings assigned to the multi-function input terminals simultaneously. Correct setting errors.
oPE04 **Board Change Alm**	Terminal Board Mismatch Error	The drive, control board, or terminal board has been replaced and the parameter settings between the control board and the terminal board no longer match. • To load the parameter settings to the drive that are stored in the terminal board, go to the U6 menu and select Term -> Ctrl Int. Initialize parameters after drive replacement by setting U5 to Factory Defaults.
oPE05 **SpeedRef SRC Alm**	Reference Source Selection Error	Speed reference is assigned to an option card but an input option card is not connected to the drive; the Up/Down command is assigned to an option card but an input option card is not connected to the drive. • Reconnect the input option card to the drive.
oPE06 **No Enc Card Alm**	Correct the setting for the control method.	A control method has been selected that requires a PG option card to be installed, but no option card is installed. • Connect a PG option card.

Fault Code/Name	Description	Causes and Solutions
oPE07 **Analog Setup Alm**	A contradictory setting is assigned to multi-function analog inputs.	At least two analog input terminals are set to the same function.
oPE08 **Mode Setting Alm**	A function has been set that cannot be used in the motor control method selected.	Attempted to use a function that is not valid for the selected control mode. **Note:** Use oPE Flt Parameter (F2) to find which parameter is causing the oPE08 to be declared. Other errors are given precedence over oPE08 when multiple errors occur simultaneously. Incorrect selection for Control Method (U8) • Check the selected control mode in the U8 sub-menu.
oPE10 **V/F Setup Alm**	The following setting errors have occurred where:	Correct the settings for VF pattern in the A5 menu.
oPE16 **EnrgSavSetup Alm**	Energy Savings Constants Error	Energy saving coefficients are out of the allowable range.
oPE18 **ParamSetting Alm**	Parameter Setting Error: A configuration relating to load cell inputs is incorrect. This is a non-standard feature, contact Magnetek for further assistance.	Multiple parameters relating to load cell inputs have the same setting. This is a non-standard feature, contact Magnetek for assistance.
oPE20 **PPR setting Alm**	The encoder signal frequency is too high.	With the entered Encoder Pulses (A1), Rated Motor Freq (A5) and Number Of Poles (A5), the calculation encoder signal frequency exceeds 50 kHz (with PG-F3 option) or 20 kHz (with PG-E3 option). • Set Encoder Pulses (A1) to the correct encoder resolution. • Reduce the maximum output frequency of the drive in parameter Rated Motor Freq (A5) so the encoder signal frequency at maximum speed is lower than 50 kHz.
oPE21 **Start Setup Alm**	Elevator parameters are not set correctly.	The DC Brk Time Stop (A1) is set to a value lower than the Brake Close Delay A1. • Correct parameter settings.
oPr **Oper Disconnect** **Operator Con Alm**	The external operator has been disconnected from the drive. **Note:** An oPr fault will occur when all of the following conditions are true: • Output is interrupted when the operator is disconnected.	External operator is not properly connected to the drive. • Check the connection between the operator and the drive. • Replace the cable if damaged. • Turn off the drive input power and disconnect the operator. Then reconnect the operator and turn the drive input power back on.
oS **Overspeed Flt** **Overspeed Alm**	The motor speed feedback exceeded the Overspd Det Lvl (A1).	Overshoot is occurring. • If using a closed loop vector mode, increase Inertia (A1). Inappropriate parameter settings. • Check the setting for the Oversp Det Lvl (A1) and Overspd Det Time (A1).

Fault Code/Name	Description	Causes and Solutions
ov **Overvolt Flt** **Bus OverVolt Alm**	Voltage in the DC bus has exceeded the overvoltage detection level. For 400V Class: approx. 820 V **Note:** For drive models with internal DBR transistor, the turn-on voltage is 788V for 400V class drives.	Deceleration ramp is too short and regenerative energy is flowing from the motor into the drive. • Lower the deceleration in the A2 sub-menu. Fast acceleration ramp causes the motor to overshoot the speed reference. • Check if sudden drive acceleration triggers an overvoltage alarm. • Lower the acceleration ramp in the A2 sub-menu. • Lower the jerk setting in the A2 sub-menu. Surge voltage entering from the drive input power. • Install a DC link choke. **Note:** Voltage surge can result from a thyristor converter and phase advancing capacitor using the same input power supply. Ground fault in the output circuit causes the DC bus capacitor to overcharge. • Check the motor wiring for ground faults. • Correct grounding shorts and turn the power back on. Drive input power voltage is too high. • Check the voltage. • Lower drive input power voltage within the limits listed in the specifications. The external braking transistor or regen drive does not seem to be wired correctly. • Check the braking transistor wiring for errors. • Check that the external CDBR or regen drive is operating. Dynamic Braking Resistors Verify that the resistors are connected correctly to the drive. • Verify that the correct resistance is read on a meter. • Verify that the resistance is low enough to dissipate the regenerative energy quickly enough for the application. Encoder cable is disconnected. • Reconnect the cable. Encoder cable wiring is wrong. • Correct the wiring. Noise interference along the encoder wiring. • Separate the wiring from the source of the noise (often the output lines from the drive). Drive fails to operate properly due to noise interference. • Review the list of possible solutions provided for controlling noise. • Review the section on handling noise interference and check the control circuit lines, main circuit lines, and ground wiring. Drive hardware is damaged. • Verify that the measured DC bus voltage (with meter) and the DC Bus Voltage (D2) are reading the same voltage.
PASS *(alarm)*	MEMOBUS/Modbus Communication Test Mode Complete	MEMOBUS/Modbus test has finished normally. • This verifies that the test was successful.
PF **LS Phase Flt** **Input Phase Alm**	Drive input power has an open phase or has a large imbalance of voltage between phases. Detected when Inp Ph Loss Prot (C1) is enabled.	There is phase loss in the drive input power. • Check for wiring errors in the main circuit drive input power. • Correct the wiring. There is loose wiring in the drive input power terminals. • Ensure the terminals are tightened properly. • Apply the tightening torque as specified in this manual. There is excessive fluctuation in the drive input power voltage. • Check the voltage from the drive input power. • Review the possible solutions for stabilizing the drive input power. There is poor balance between voltage phases. • Stabilize drive input power or disable phase loss detection. Parameter Setting • If the drive is being fed single phase power, disable Inp Ph Loss Prot (C1). The main circuit capacitors are worn. • Check the maintenance time for the capacitors (D2). • Replace the capacitor if Cap Life Mon (D2) is greater than 90%. For instructions on replacing the capacitor, contact Magnetek. • Check for problems with the drive input power. If drive input power appears normal but the alarm continues to occur, replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.

Fault Code/Name	Description	Causes and Solutions
PF5 **Resc Power Flt**	Rescue Operation Power Supply Deterioration Error	During Rescue Operation, either the DC bus voltage dropped below DCVoltLvl@Rescue (A1) x (PS ReductnDetLvl (A1) - 10%), or 100 ms after triggering Rescue Operation, the DC bus voltage did not reach DCVoltLvl@Rescue (A1) x PS ReductnDetLvl (A1) before the motor started. • Check the DC bus voltage setting for Rescue Operation. • Lower the speed reference set for Rescue Operation. • Check the backup power supply. It may need to be replaced with another UPS if it has become worn and can no longer provide enough power.
PGo **Encoder Fault** **Encoder Open Alm**	No encoder pulses are received for longer than the time set to F1-14.	Encoder cable is disconnected. • Reconnect the cable. Encoder cable wiring is wrong. • Correct the wiring. Encoder has no power. • Check the power line to the encoder. • Replace the encoder cable. Motor brake is not released. • Ensure the motor brake released properly. Encoder hardware issue • Verify encoder is operating, or replace the encoder. During Rescue Operation, either the DC bus voltage dropped below DCVoltLvl@Rescue (A1) x (PS ReuctnDetLvl (A1) - 10%), or 100 ms after triggering Rescue Operation, the DC bus voltage did not reach DCVoltLvl@Rescue (A1) x PS ReuctnDetLvl (A1) before the motor started. • Check the DC bus voltage setting for DCVoltLvl@Rescue (A1). • Lower the speed reference set for Rescue Operation. • Check the backup power supply. It may need to be replaced with another UPS if it has become worn and can no longer provide enough power.
PGoH **Enc Disconnected**	Encoder cable is not connected properly.	Encoder cable is disconnected. • Reconnect the cable. Encoder hardware issues. • Verify the encoder is operating, or replace the encoder. PG option card is having issues. • Verify that the correct PG encoder card is connected, and it is in the CN5-C slot.
rF **DBR Short Flt**	The resistance of the braking resistor being used is too low.	The proper braking resistor option has not been installed. • Select the braking resistor option so that fits to the drives braking transistor specification. A regenerative converter, regenerative unit or braking unit is being used and the +1 or +3 terminal is connected to - terminal. • Disable the DB Tr Protection (C1).
rr **DBTransistor Flt**	The built-in dynamic braking transistor failed.	The braking transistor is damaged, or the control circuit is damaged. • Cycle power to the drive and check if the fault reoccurs. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
SC **Short Circuit**	Short Circuit or Ground Fault is detected.	IGBT Fault, or IGBT short circuit detection circuit fault. • Check the wiring to the motor. • Turn the power supply off and then on again to check operation. • If the problem continues, contact Magnetek. The drive is damaged. • Check the drive output side short circuit for broken output transistor from: B1 and U/V/W and - (negative) and U/V/W.
SE **Memobus Seq Alm**	MEMOBUS/Modbus Self Test Failed	A digital input set to (MEMOBUS/Modbus test) was closed while the drive was running. • Stop the drive and run the test again.
SE1 **Contactor Fault**	Motor contactor does not respond within the time set in Contact Flt Time (A1).	There is a problem with the motor contactor or auxiliary switch. • Check the motor contactor, auxiliary switches and the wiring of the contactor feedback signal.
SE2 **Start Curr Fault**	The output current was lower than 25% of the motor no-load current at start.	The motor contactor is open. • Check the contactor for any problems. • Check for any sequencing problems between contact picking and the drive being told to run.

Fault Code/Name	Description	Causes and Solutions
SE3 **Current Fault**	The output current was lower than 25% of the motor no-load current during operation.	The motor contactor is open. • Check the contactor for any problems. • Check for any sequencing problems between contact picking and the drive being told to run.
SE4 **Brake Fdbk Flt**	The C2 sub-menu input terminal set for "Brake Monitor NO" or "Brake Monitor NC" did not respond within the Brake Flt Time (A1) after an output terminal set for "Brake Control" closed.	The feedback contact on the brake is defective or the wiring is incorrect. • Check the brake feedback contact and the wiring. The brake control circuit does not work properly. • Ensure the motor brake operates properly with a brake control command from the drive.
SvE **Pos Lock Fault**	Position deviation during Position Lock.	Torque Limit is set too low. • Set the torque limit to an appropriate value using Mtr Torque Limit (A1) and Regen Torq Limit (A1). Excessive load torque. • Reduce the amount of load torque. Noise interference along encoder wiring. • Check the encoder signal for noise reference.
STo **PM Stall Flt**	Motor pull out or step out has occurred. Motor has exceeded its pull out torque.	The wrong motor code has been set (only used for motor by drive manufacturer). • Enter the correct motor code for the PM being used into the A5 sub-menu. • For special-purpose motors, enter the correct data to all parameters in the A5 sub-menu according to the Test Report provided for the motor. Load is too heavy. • Reduce the load. • Increase the motor or drive capacity. Accel/decel ramp is too short. • Lower the acceleration and deceleration in the A2 sub-menu. • Lower the jerk setting in the A2 sub-menu.
TrPC **IGBT Alarm 2**	IGBTs have reached 90% of their expected performance life.	IGBTs have reached 90% of their expected performance life. • Replace the drive.
UL3 **Undertorque 1** **Undertorq 1 Alm**	The current has fallen below the minimum value set for torque detection. Should you need to adjust these factory determined values, contact Magnetek for more details.	Parameter settings are not appropriate for the load. • Check the settings of parameters. There is a fault on the machine side. • Check the load for any problems.
UL4 **Undertorque 2** **Undertorq 2 Alm**	The current has fallen below the minimum value set for torque detection. Should you need to adjust these factory determined values, contact Magnetek for more details.	Parameter settings are not appropriate for the load. • Check the settings of parameters. There is a fault on the machine side. • Check the load for any problems.

Fault Code/Name	Description	Causes and Solutions
Uv **Undervolt Alm**	One of the following conditions was true when the drive was stopped and an Up/Down command was entered: • DC bus voltage dropped below the level specified in UV Detect Level (A4). • Contactor to suppress inrush current in the drive was opened.	Phase loss in the drive input power terminals. • Check for wiring errors in the main circuit drive input power. Correct the wiring. Loose wiring in the drive input power terminals. • Ensure the terminals have been properly tightened. • Apply the tightening torque to the terminals as specified. There is a problem with the drive input power voltage. • Check the voltage. • Lower the voltage of the drive input power so that it is within the limits listed in the specifications. Drive internal circuitry is worn. • Check the maintenance time for the capacitors in the D2 menu. • Replace either the control board or the entire drive if Cap Life Mon (D2) exceeds 90%. For instructions on replacing the control board, contact Magnetek. The drive input power transformer is too small and the voltage drops when the power is switched on. • Check for an alarm when the magnetic contactor, line breaker, and leakage breaker are closed. • Check the capacity of the drive input power transformer. Air inside the drive is too hot. • Check the temperature inside the drive. The CHARGE light is broken or disconnected. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
Uv1 **DC Bus Undervolt**	One of the following conditions occurred while the drive was running: • Voltage in the DC bus fell below the UV Detect Level (A4) • For 400V Class: approx. 380V (350V when Input Voltage (A4) is less than 400)	Input power phase loss. • The main circuit drive input power is wired incorrectly. • Correct the wiring. One of the drive input power wiring terminals is loose. • Ensure there are no loose terminals. • Apply the tightening torque specified in this manual to fasten the terminals. There is a problem with the voltage from the drive input power. • Check the voltage. • Correct the voltage to be within the range listed in drive input power specifications. • If there is no problem with the power supply to the main circuit, check for problems with the main circuit magnetic contactor. The power has been interrupted. • Correct the drive input power. The main circuit capacitors are worn. • Check the maintenance time for the capacitors in the D2 menu. • Replace either the control board or the entire drive if Cap Life exceeds 90%. For instructions on replacing the control board, contact Magnetek. The relay or contactor on the soft-charge bypass circuit is damaged. • Check power to the drive and see if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the entire drive, contact Magnetek.
Uv2 **Control Volt Flt**	Voltage is too low for the control drive input power.	Control power supply wiring is damaged. • Cycle power to the drive. Check if the fault reoccurs. • If the problem continues, replace the control board, the entire drive, or the control power supply. For instructions on replacing the control board, contact Magnetek. Internal circuitry is damaged. • Cycle power to the drive. Check if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
Uv3 **PreCharge Fault**	The soft-charge bypass circuit failed.	The relay or contactor on the soft-charge bypass circuit is damaged. • Cycle power to the drive and see if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.
voF **Output Volt Flt** **Output Volt Alm**	Problem detected with the voltage on the output side of the drive.	Hardware is damaged. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Magnetek.

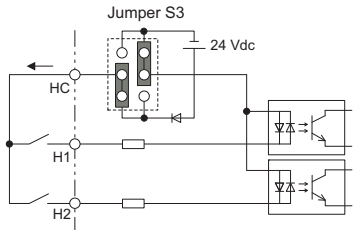
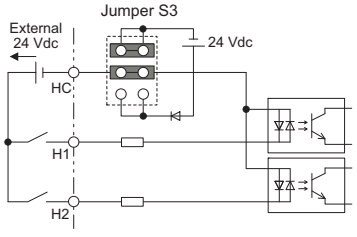
8 Appendix

◆ Single Contactor Operation – EN81-20

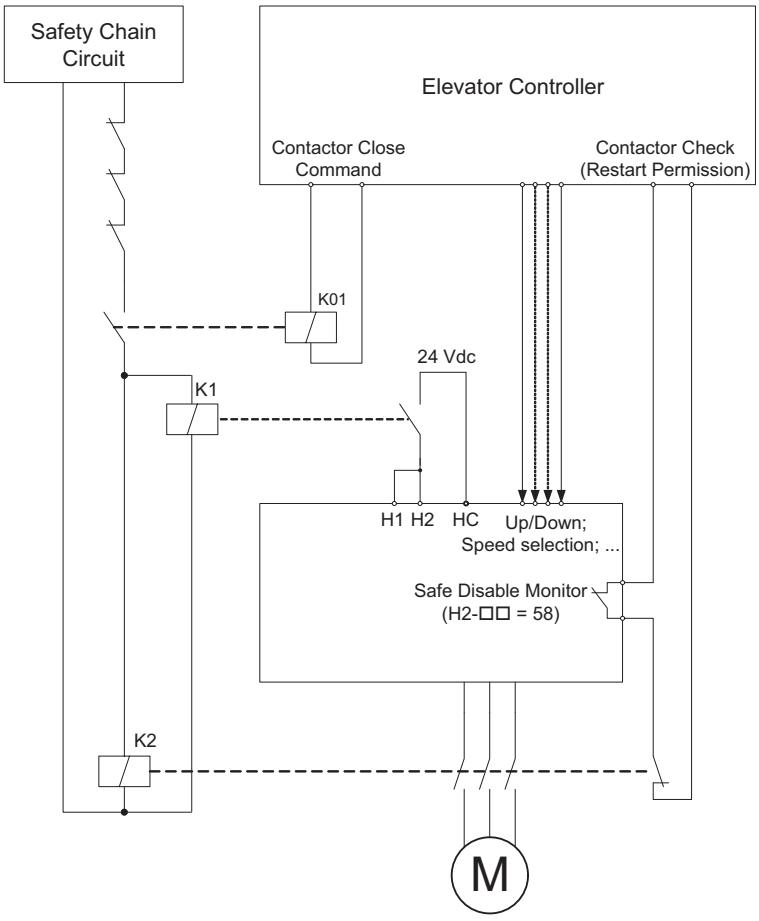
■ Installation

The safe disable circuit can be utilized to install the HPV1000 drive in an elevator system using only one motor contactor instead of two. In such a system the following guidelines must be followed to comply with EN81-20:

- The circuit must be designed so that the inputs H1 and H2 are opened and the drive output shuts off when the safety chain is interrupted.
- A drive logic output (C3) must be programmed as Safe Disable Status. This feedback signal must be implemented in the contactor supervision circuit of the controller that prevents a restart in case of a fault in the Safe Disable circuit or the motor contactor.
- All contactors and wiring must be selected and installed in compliance with EN81-20.
- The safe disable inputs H1 and H2 must be used to enable/disable the drive. The input logic must be set to Source Mode, i.e. jumper S3 must be set like shown below.

Drive Internal Power Supply	External 24 Vdc Power Supply
	

The figure below shows a wiring example.



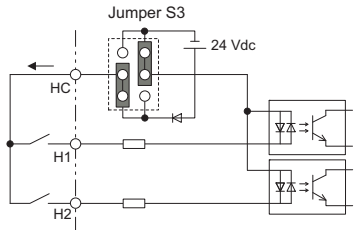
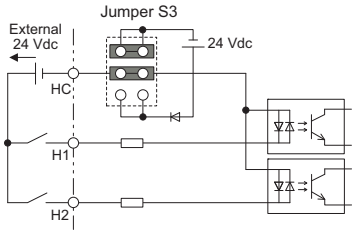
Note: **1.** The drive output will immediately shut off when either of the inputs H1 or H2 is opened. In this case the brake should apply immediately in order to prevent uncontrolled movement of the elevator.
2. Terminals H1 and H2 must be closed prior to setting the Up/Down command.

◆ Zero Contactor Operation – EN81-20

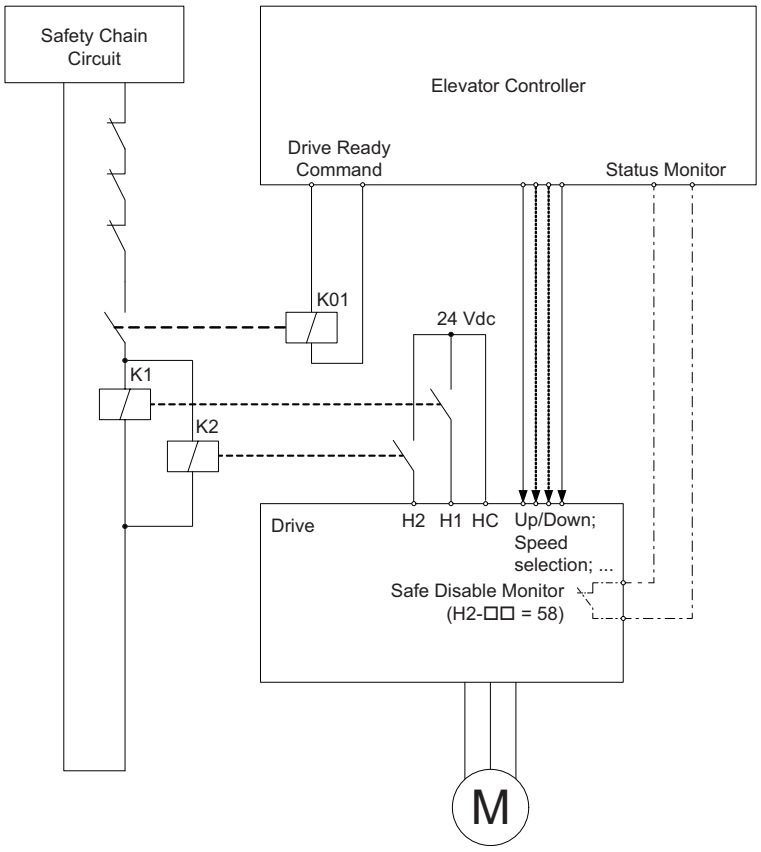
■ Installation

The safe disable circuit can be utilized to install the HPV1000 drive in an elevator system with no motor contactor. In such a system, the following guidelines must be followed to comply with EN81-20:

- The circuit must be designed so that the inputs H1 or H2 are opened and the drive output shuts off when the safety chain is interrupted.
- The safe disable inputs H1 and H2 must be used to enable/disable the drive. The input logic must be set to Source Mode, i.e. jumper S3 must be set like shown below.

Drive Internal Power Supply	External 24 Vdc Power Supply
	

The figure below shows a wiring example.



Note: **1.** The drive output will immediately shut off when either of the inputs H1 or H2 is opened. In this case the brake should apply immediately in order to prevent uncontrolled movement of the elevator.
2. Terminals H1 or H2 must be closed prior to setting the Up/Down command.
3. A drive logic output (C3) must be programmed as Safe Disable status. This feedback signal can be implemented in the contactor supervision circuit of the controller that monitors a fault in the Safe Disable circuit.

◆ CE Guidelines

■ European Standards

Figure 10 CE Mark

The CE mark indicates compliance with European safety and environmental regulations. It is required for engaging in business and commerce in Europe.

European standards include the Machinery Directive for machine manufacturers, the Low Voltage Directive for electronics manufacturers, and the EMC guidelines for controlling noise.

This drive displays the CE mark based on the EMC guidelines and the Low Voltage Directive.

- **Low Voltage Directive:** 2006/95/EC
- **EMC Guidelines:** 2004/108/EC, EN12015, EN12016

Devices used in combination with this drive must also be CE certified and display the CE mark. When using drives displaying the CE mark in combination with other devices, it is ultimately the responsibility of the user to ensure compliance with CE standards. After setting up the device, verify that conditions meet European standards.

■ CE Low Voltage Directive Compliance

This drive has been tested according to European standard IEC/EN 61800-5-1, and it fully complies with the Low Voltage Directive.

To comply with the Low Voltage Directive, be sure to meet the following conditions when combining this drive with other devices:

Area of Use

Do not use drives in areas with pollution higher than severity 2 and overvoltage category 3 in accordance with IEC/EN 664.

◆ UL/cUL Standards Compliance

The UL/cUL mark applies to products in the United States and Canada. It indicates that UL has performed product testing and evaluation, and determined that their stringent standards for product safety have been met. For a product to receive UL certification, all components inside that product must also receive UL certification.

This drive is tested in accordance with UL standard UL508C and complies with UL requirements. To ensure continued compliance when using this drive in combination with other equipment, meet the following conditions:

Installation Area – Do not install the drive to an area greater than pollution degree 2 (UL standard).

Ambient Temperature – IP20 enclosure: -10 to +50°C

■ Main Circuit Terminal Wiring

Magnetek recommends using closed-loop crimp terminals on all drive models. UL/cUL approval requires the use of UL Listed closed-loop crimp terminals when wiring the drive main circuit terminals on models HPV100-4045 to 4150. Use only the tools recommended by the terminal manufacturer for crimping.

The wire gauges listed in the following tables are Magnetek recommendations. Refer to local codes for proper wire gauge selections.

■ Wire Gauge and Tightening Torque Specifications

Three-Phase 400 V Class

Model HPV1000 -	Terminal	For Europe and China <1>		For Asia <2>		For U.S.A <3>		Screw Size	Tightening Torque N·m (lb.in.)
		Recommended Gauge mm^2	Applicable Gauge mm^2	Recommended Gauge mm^2	Applicable Gauge mm^2	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil		
4009	R/L1, S/L2, T/L3	2.5	2.5 to 6	2	2 to 5.5	12	14 to 10	M4	1.2 to 1.5 (10.6 to 13.3)
	U/T1, V/T2, W/T3	2.5	2.5 to 6	2	2 to 5.5	14	14 to 10		
	–, +1, +2	–	2.5 to 6	2	2 to 5.5	–	14 to 10		
	B1, B2	–	2.5 to 6	2	2 to 5.5	–	14 to 10		
	⏚	2.5	2.5 to 6	3.5	2 to 5.5	10	14 to 10		
4015	R/L1, S/L2, T/L3	2.5	2.5 to 16	3.5	2 to 14	10	12 to 6	M4	2.1 to 2.3 (18.6 to 20.4)
	U/T1, V/T2, W/T3	2.5	2.5 to 16	3.5	2 to 14	10	12 to 6		
	–, +1, +2	–	4 to 16	3.5	2 to 14	–	12 to 6		
	B1, B2	–	4 to 6	2	2 to 5.5	–	12 to 10		
	⏚	2.5	2.5 to 6	3.5	2 to 5.5	10	14 to 10	M5	2.0 to 2.5 (17.7 to 22.1)
4018	R/L1, S/L2, T/L3	4	2.5 to 16	5.5	3.5 to 14	10	10 to 6	M4	2.1 to 2.3 (18.6 to 20.4)
	U/T1, V/T2, W/T3	4	2.5 to 16	5.5	3.5 to 14	10	10 to 6		
	–, +1, +2	–	4 to 16	5.5	3.5 to 14	–	12 to 6		
	B1, B2	–	4 to 6	2	2 to 5.5	–	12 to 10		
	⏚	4	4 to 6	3.5	3.5 to 5.5	10	12 to 10	M5	2.0 to 2.5 (17.7 to 22.1)
4024	R/L1, S/L2, T/L3	6	6 to 16	14	5.5 to 14	8	8 to 6	M5	3.6 to 4.0 (31.8 to 35.4)
	U/T1, V/T2, W/T3	6	6 to 16	8	5.5 to 8	8	10 to 6		
	–, +1, +2	–	6 to 16	14	5.5 to 14	–	10 to 6		
	B1, B2	–	6 to 10	3.5	2 to 8	–	10 to 8	M5	2.7 to 3.0 (23.9 to 26.6)
	⏚	6	6 to 10	5.5	5.5 to 8	8	10 to 8	M6	5.4 to 6.0 (47.8 to 53.1)
4031	R/L1, S/L2, T/L3	10	10 to 16	14	14	6	8 to 6	M5	3.6 to 4.0 (31.8 to 35.4)
	U/T1, V/T2, W/T3	6	6 to 16	14	8 to 14	8	8 to 6		
	–, +1, +2	–	6 to 16	14	14	–	6		
	B1, B2	–	6 to 10	5.5	3.5 to 8	–	10 to 8	M5	2.7 to 3.0 (23.9 to 26.6)
	⏚	10	6 to 16	8	5.5 to 14	6	10 to 6	M6	5.4 to 6.0 (47.8 to 53.1)
4039	R/L1, S/L2, T/L3	16	16 to 25	14	14 to 22	6	6 to 4	M6	5.4 to 6.0 (47.8 to 53.1)
	U/T1, V/T2, W/T3	16	16 to 25	14	14 to 22	6	6 to 4		
	–, +1, +2	–	16 to 25	14	14 to 22	–	6 to 4		
	B1, B2	–	6 to 10	8	5.5 to 8	–	10 to 8	M5	2.7 to 3.0 (23.9 to 26.6)
	⏚	16	10 to 16	8	8 to 14	6	8 to 6	M6	5.4 to 6.0 (47.8 to 53.1)

Model HPV1000 -	Terminal	For Europe and China <1>		For Asia <2>		For U.S.A <3>		Screw Size	Tightening Torque N·m (lb.in.)
		Recommended Gauge mm²	Applicable Gauge mm²	Recommended Gauge mm²	Applicable Gauge mm²	Recommended Gauge AWG, kcmil	Applicable Gauge AWG, kcmil		
4045 <4>	R/L1, S/L2, T/L3	16	10 to 16	14	14	4	6 to 4	M8	9 to 11 (79.7 to 97.4)
	U/T1, V/T2, W/T3	16	10 to 16	14	14	4	6 to 4		
	–, +1	–	16 to 35	22	14 to 38	–	6 to 1		
	B1, B2	–	10 to 16	14	8 to 14	–	8 to 4		
	⏚	16	10 to 16	8	8 to 14	6	8 to 6		
4060 <4>	R/L1, S/L2, T/L3	16	16 to 25	22	14 to 22	3	4 to 3	M8	9 to 11 (79.7 to 97.4)
	U/T1, V/T2, W/T3	25	16 to 25	22	14 to 22	3	4 to 3		
	–, +1	–	25 to 35	30	22 to 38	–	4 to 1		
	B1, B2	–	16 to 25	14	14 to 22	–	6 to 3		
	⏚	16	16 to 25	14	14 to 22	6	6		
4075 <4>	R/L1, S/L2, T/L3	25	16 to 50	30	22 to 60	2	3 to 1/0	M8	9 to 11 (79.7 to 97.4)
	U/T1, V/T2, W/T3	25	25 to 50	30	22 to 60	2	3 to 1/0		
	–, +1	–	25 to 50	38	30 to 60	–	3 to 1/0		
	+3	–	16 to 50	22	14 to 60	–	6 to 1/0		
	⏚	16	16 to 25	22	14 to 22	4	6 to 4		
4091 <4>	R/L1, S/L2, T/L3	35	25 to 50	38	30 to 60	1/0	2 to 1/0	M8	9 to 11 (79.7 to 97.4)
	U/T1, V/T2, W/T3	35	25 to 50	38	30 to 60	1	2 to 1/0		
	–, +1	–	25 to 50	60	30 to 60	–	3 to 1/0		
	+3	–	25 to 50	30	22 to 60	–	4 to 1/0		
	⏚	16	16 to 25	22	14 to 22	4	6 to 4		
4112 <4>	R/L1, S/L2, T/L3	50	35 to 95	60	38 to 100	3/0	1/0 to 4/0	M10	18 to 23 (159 to 204)
	U/T1, V/T2, W/T3	50	35 to 95	60	60 to 100	2/0	1/0 to 4/0		
	–, +1	–	50 to 95	100	60 to 100	–	1/0 to 4/0		
	+3	–	25 to 95	50	30 to 100	–	3 to 4/0		
	⏚	25	25	22	22	4	4		
4150 <4>	R/L1, S/L2, T/L3	70	50 to 95	80	60 to 100	4/0	3/0 to 4/0	M10	18 to 23 (159 to 204)
	U/T1, V/T2, W/T3	70	70 to 95	80	80 to 100	4/0	3/0 to 4/0		
	–, +1	–	35 to 95	50 × 2P	50 to 100	–	1 to 4/0		
	+3	–	50 to 95	60	50 to 100	–	1/0 to 4/0		
	⏚	35	25 to 35	22	22 to 30	4	4 to 2		

<1> Gauges listed here are for use in Europe and China.

<2> Gauges listed here are for use in Asia except for China.

<3> Gauges listed here are for use in the United States.

<4> Drive models HPV100-4045 to 4150 require the use of closed-loop crimp terminals for UL/cUL compliance. Use only the tools recommended by the terminal manufacturer for crimping.

Note: Use crimp insulated terminals or insulated tubing for wiring these connections. Wires should have a continuous maximum allowable temperature of 75°C 600 V UL approved vinyl sheathed insulation. Ambient temperature should not exceed 40°C.

◆ Low Voltage Wiring for Control Circuit Terminals

Wire low voltage wires with NEC Class 1 circuit conductors. Refer to national state or local codes for wiring. If external power supply used, it shall be UL Listed Class 2 power source only or equivalent. Refer to NEC Article 725 Class 1, Class 2, and Class 3 Remote-Control, Signaling, and Power Limited Circuits for requirements concerning class 1 circuit conductors and class 2 power supplies.

Input / Output	Terminal Signal	Power Supply Specifications
Open Collector Outputs	P1, C1, P2, C2, DM+, DM-	Requires class 2 power supply.
Digital inputs	S1-S8, SN, SC, SP, HC, H1, H2	Use the internal LVLC power supply of the drive. Use class 2 for external power supply.
Analog inputs / outputs	+V, -V, A1, A2, AC, AM, FM	Use the internal LVLC power supply of the drive. Use class 2 for external power supply.

■ Drive Short-Circuit Rating

This drive is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes, 600 Vac maximum (up to 480 V for 400 V class drives) when protected by Bussmann Type FWH.

■ EMC Guidelines Compliance

This drive is tested according to European standards IEC/EN 61800-3: 2004, and complies with the European standards IEC/EN 12015 (requires an optional AC reactor) and IEC/EN 12016.

Note: Make sure the protective earthing conductor complies with technical standards and local safety regulations. Because the leakage current exceeds 3.5 mA when an EMC filter is installed, IEC/EN 61800-5-1 states that either the power supply must be automatically disconnected in case of discontinuity of the protective earthing conductor or a protective earthing conductor with a cross-section of at least 10 mm² (Cu) or 16 mm² (Al) must be used.

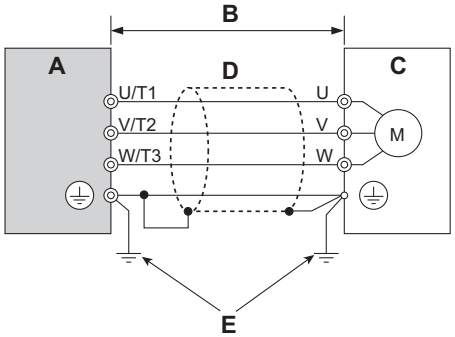
EMC Filter Installation

The following conditions must be met to ensure continued compliance with European standards IEC/EN 12015 and IEC/EN 12016. *Refer to EMC Filters, Fuses and Dynamic Braking Resistors on page 71* for EMC filter selection.

Installation Method

Verify the following installation conditions to ensure that other devices and machinery used in combination with this drive also comply with EMC guidelines.

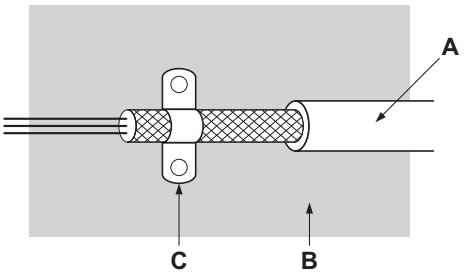
1. Install an EMC noise filter to the input side specified by Magnetek for compliance with European standards.
2. Place the drive and EMC noise filter in the same enclosure.
3. Use braided shield cable for the drive and motor wiring, or run the wiring through a metal conduit.
4. Keep wiring as short as possible. Ground the shield on both the drive side and the motor side.



A – Drive
B – 10 m max cable length between drive and motor
C – Motor
D – Metal conduit
E – Ground wire should be as short as possible.

Figure 11 Installation Method

5. Make sure the ground conductor complies with technical standards and local safety rules. When an EMC filter is installed, the leakage current exceeds 3.5 mA. Therefore according to IEC/EN 61800-5-1, at least one of the conditions below must be satisfied:
   a. The cross-section of the protective earthing conductor must be at least 10 mm² (Cu) or 16 mm² (Al).
   b. The power supply must be disconnected automatically in case of discontinuity of the protective earthing conductor.



A – Braided shield cable
B – Metal panel
C – Cable clamp (conductive)

Figure 12 Ground Area

6. Connect an AC reactor or a DC link choke to minimize harmonic distortion.

Three-Phase 400 V Class

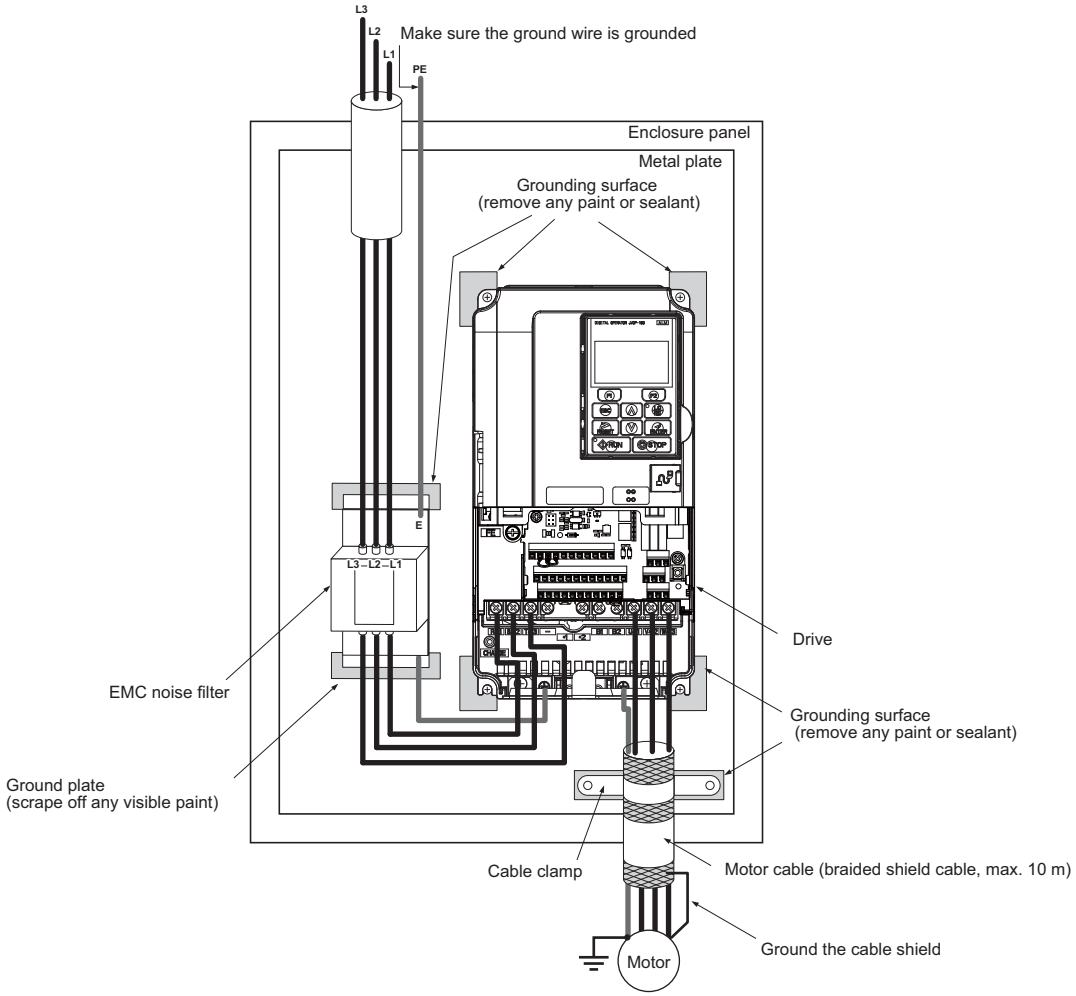


Figure 13 EMC and Drive Installation for CE Compliance (Three-Phase 400 V Class)

■ EMC Filters, Fuses and Dynamic Braking Resistors

Use the EMC filters, fuses and dynamic braking resistors listed in the table below.

Model HPV1000-	EMC Filter [Block]	Main Fuse [Bussmann]	Dynamic Braking Resistor [Cressall]
4009-BA-N02	FB-40014A	FWH-90B	DBR-600-32-E (Geared) DBR - 1500-32-E (Gearless)
4015-BA-N02	FB-40025A	FWH-80B	DBR-600-32-E (Geared) DBR - 1500-32-E (Gearless)
4018-BA-N02		FWH-100B	DBR-1500-32-E (Geared) DBR - 3000-32-E (Gearless)
4024-BA-N02	FB-40044A	FWH-125B	DBR-1500-32-E (Geared) DBR - 3000-32-E (Gearless)
4031-BA-N024		FWH-200B	DBR-3000-20-E (Geared) DBR - 4500-20-E (Gearless)
4039-BA-N02	FB-40060A	FWH-250A	DBR-3000-20-E (Geared) DBR - 4500-20-E (Gearless)
4045-BA-N02			DBR-3000-20-E (Geared) DBR - 6000-20-E (Gearless)
4060-BA-N02	FB-40072A		DBR-4500-20-E (Geared) DBR - 6000-20-E (Gearless)
4075-BA-N02	FB-40105A		DBR-4500-13-E (Geared) DBR - 8000-13-E (Gearless)
4091-BA-N02			DBR-4500-13-E (Geared) DBR - 8000-13-E (Gearless)
4112-CA-N02	FB-40170A	FWH-350A	DBR-6000-8-E (Geared) DBR - 12000-8-E (Gearless)
4150-CA-N02		FWH-400A	DBR-8000-8-E (Geared) DBR - 12000-8-E (Gearless)

◆ Drive Derating Data

Increasing the carrier frequency above 8kHz (or 5kHz on models 4012 and 4050) will reduce the rated output current as shown in the table below and ***Figure 14***.

Drive Model Number	Continuous Output Current Rating (A)				
	2kHz	5kHz	8kHz	10kHz	15kHz
HPV1000-4009-BA-N02	9.2	-	9.2	-	5.5
HPV1000-4015-BA-N02	14.8	-	14.8	-	8.9
HPV1000-4018-BA-N02	18	-	18	-	10.8
HPV1000-4024-BA-N02	24	-	24	-	14.4
HPV1000-4031-BA-N02	31	-	31	-	18.6
HPV1000-4039-BA-N02	39	-	39	-	23.4
HPV1000-4045-BA-N02	45	-	45	-	27
HPV1000-4060-BA-N02	60	-	60	-	36
HPV1000-4075-BA-N02	75	-	75	-	45
HPV1000-4091-BA-N02	91	-	91	-	55
HPV1000-4112-CA-N02	112	112	-	78	-
HPV1000-4150-CA-N02	150	150	-	105	-

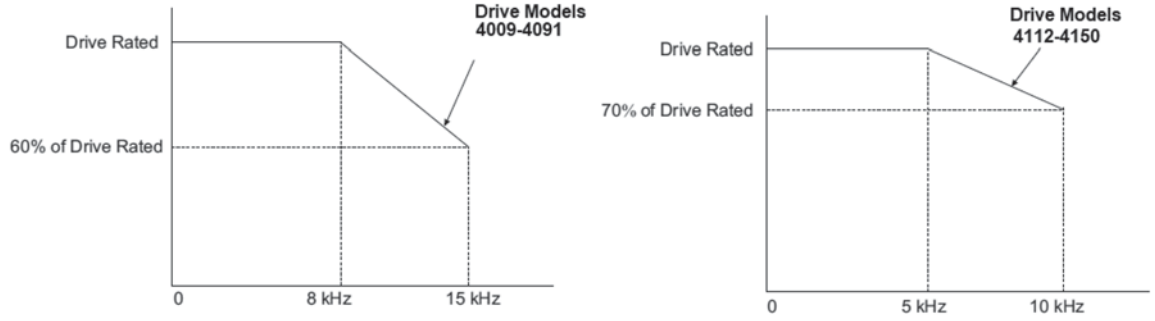


Figure 14 Rated Output Current

◆ Installation Environment

For optimum performance life of the drive, install the drive in an environment that meets the conditions listed below.

Environment	Conditions
Installation Area	Indoors
Ambient Temperature	IP20 enclosure: -10 to +50°C Drive reliability improves in environments without wide temperature fluctuations. When using the drive in an enclosure panel, install a cooling fan or air conditioner in the area to ensure that the air temperature inside the enclosure does not exceed the specified levels. Do not allow ice to develop on the drive.
Humidity	95% RH or less and free of condensation
Storage Temperature	-20 to +60°C
Surrounding Area	Install the drive in an area free from: • oil mist and dust • metal shavings, oil, water or other foreign materials • radioactive materials • combustible materials (e.g., wood) • harmful gases and liquids • excessive vibration • chlorides • direct sunlight
Altitude	1000 m or lower, up to 3000 m with derating (for details refer to the Technical Manual)
Vibration	10 to 20 Hz at 9.8 m/s^2 20 to 55 Hz at 5.9 m/s^2 (HPV1000-4009 to 4150)
Orientation	Install the drive vertically to maintain maximum cooling effects.

◆ Installation Orientation and Spacing

Always install the drive in an upright position. Leave space around the unit for proper cooling as shown in the following figure.

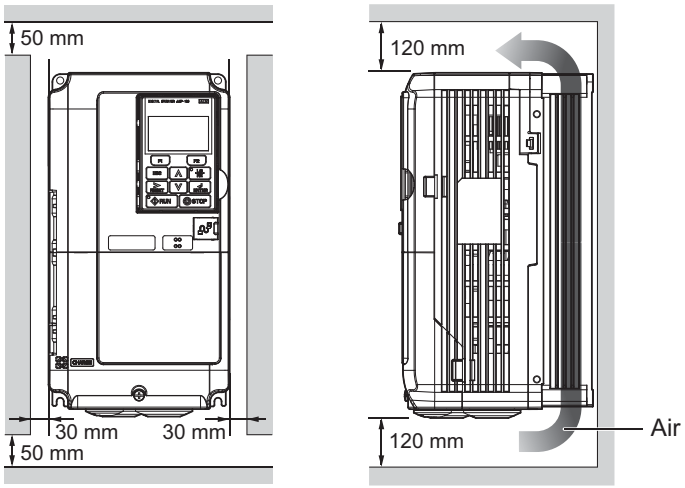


Figure 15

◆ Safety Instructions and General Warnings

■ General Safety

Supplemental Safety Information

General Precautions
• The diagrams in this manual may be indicated without covers or safety shields to show details. Replace the covers or shields before operating the drive and run the drive according to the instructions described in this manual. • Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable. • The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual. • When ordering a new copy of the manual due to damage or loss, contact your Magnetek representative or the nearest Magnetek sales office and provide the manual number shown on the front cover. • If nameplate becomes worn or damaged, order a replacement from your Magnetek representative or the nearest Magnetek sales office.

⚠ WARNING

Read and understand this manual before installing, operating or servicing this drive. The drive must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or fatal injury or damage to the products or to related equipment and systems.

⚠ DANGER

Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

WARNING! *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

⚠ CAUTION

Indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.

CAUTION! *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

NOTICE

Indicates a property damage message.

NOTICE: *may also be indicated by a bold key word embedded in the text followed by an italicized safety message.*

Safety Messages

⚠ DANGER

Heed the safety messages in this manual.

Failure to comply will result in death or serious injury.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

Electrical Shock Hazard

Do not connect or disconnect wiring or service the drive while the power is on.

Failure to comply will result in death or serious injury.

Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

⚠ WARNING

Sudden Movement Hazard

The drive system or elevator may start unexpectedly upon application of power, resulting in death or serious injury.

- Clear all personnel from the drive, motor, and machine area before applying power.
- Secure covers, couplings, shaft keys, and machine loads before applying power to the drive.

Ensure there are no short circuits between the main circuit terminals (R/L1, S/L2, and T/L3) or between the ground and main circuit terminals before restarting the drive.

Failure to comply may result in serious injury or death and will cause damage to equipment.

System may start unexpectedly upon application of power when the Auto-restart function is enabled resulting in death or serious injury.

Use care when enabling Auto-restart as this function may cause unintended start of the elevator.

Use parameter Atun Cont ON to enable/disable automatic switching of the Motor Contactor Control output signal during Auto-Tuning.

When using setting, ensure that the multi-function output terminals are properly wired and in the correct state before setting this parameter.

Failure to comply could result in damage to the drive, serious injury or death.

Electrical Shock Hazard

Do not attempt to modify or alter the drive in any way not explained in this manual.

Magnetek is not responsible for damage caused by modification of the product made by the user. Failure to comply could result in death or serious injury from operation of damaged equipment.

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may show drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the drives and run the drives according to the instructions described in this manual.

⚠ WARNING

When a drive is running a PM motor, voltage continues to be generated at the motor terminals after the drive is shut off while the motor coasts to stop. Take the precautions described below to prevent shock and injury:

- In applications where the machine can still rotate even though the drive has fully stopped a load, install a switch to the drive output side to disconnect the motor and the drive.
- Do not allow an external force to rotate the motor beyond the maximum allowable speed or to rotate the motor when the drive has been shut off.
- Wait for at least the time specified on the warning label after opening the load switch on the output side before inspecting the drive or performing any maintenance.
- Do not open and close the load switch while the motor is running, as this can damage the drive.

If the motor is coasting, make sure the power to the drive is turned on and the drive output has completely stopped before closing the load switch.

Do not connect or disconnect wiring to the drive or motor while the power is on.

Failure to comply will result in death or serious injury. Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. To prevent electric shock, wait at least five minutes after all indicators are OFF and measure the DC bus voltage level to confirm safe level.

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may show drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the drives and run the drives according to the instructions described in this manual.

Do not perform work on the drive while wearing loose clothing, jewelry or without eye protection.

Failure to comply could result in death or serious injury.
Remove all metal objects such as watches and rings, secure loose clothing, and wear eye protection before beginning work on the drive.

Do not change wiring, remove covers, connectors or options cards, or attempt to service the drive with power applied to the drive.

Failure to comply could result in death or serious injury. Disconnect all power to the drive and check for unsafe voltages before servicing.

Do not allow unqualified personnel to use the equipment.

Failure to comply could result in death or serious injury.
Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment and maintenance of AC drives.

Fire Hazard

Drive Short-Circuit Current Rating

Install adequate branch circuit protection according to applicable local codes and this Installation Manual.

Failure to comply could result in fire and damage to the drive or injury to personnel.

The device is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes and 480 Vac maximum (400 V class) when protected by branch circuit protection devices specified in this manual.

Applications using a braking option should wire a thermal relay so that the output contactor opens when the thermal relay trips.

Inadequate braking circuit protection could result in death or serious injury by fire from overheating resistors.

Do not use improper combustible materials.

Failure to comply could result in death or serious injury by fire.
Attach the drive to metal or other noncombustible material.

NOTICE

Equipment Hazard

Do not modify the drive circuitry.

Failure to comply could result in damage to the drive and will void warranty.

Magnetek is not responsible for any modification of the product made by the user. This product must not be modified.

Failure to comply could result in damage to the drive or braking circuit.

Observe proper electrostatic discharge procedures (ESD) when handling the drive, circuit boards, and option cards.

Failure to comply may result in ESD damage to the drive circuitry.

Do not operate damaged equipment.

Failure to comply could result in further damage to the equipment.
Do not connect or operate any equipment with visible damage or missing parts.

Do not lift the drive up while the cover is removed.

This can damage the terminal board and other components.

Do not expose the drive to halogen group disinfectants.

Failure to comply may cause damage to the electrical components in the drive.
Do not pack the drive in wooden materials that have been fumigated or sterilized.
Do not sterilize the entire package after the product is packed.

■ General Application Precautions

Motor Selection

Drive Capacity

The output current should not exceed 150% of the drive rated current. Select a drive that can output enough current when accelerating a load at 100%.

For specialized motors, make sure that the motor rated current is less than the rated output current for the drive.

Starting Torque

The startup and acceleration characteristics of the motor are restricted to the drive's overload current rating (150% rated current for 60 s).

The overload rating for the drive determines the starting and accelerating characteristics of the motor. Expect lower torque than when running from line power. To get more starting torque, use a larger drive or increase both the motor and drive capacity.

Stopping

Fast Stop

When the drive faults out, a protective circuit is activated and drive output is shut off. This, however, does not stop the motor immediately. A mechanical brake may be required to stop the motor if Fast Stop deceleration is insufficient.

Mechanical Brake

A mechanical brake is required to prevent the elevator from free falling during a drive fault condition.

Repetitive Starting/Stopping

Elevators and other applications with frequent starts and stops often approach 150% of their rated current values. Heat stress generated from repetitive high current will shorten the life span of the IGBTs. The expected lifetime for the IGBTs is about 3 million start and stop cycles with a default carrier frequency of 2 kHz, 5 kHz (HPV1000-4112 to HPV1000-4150), or 8 kHz (HPV1000-4009 to HPV1000-4091) and a 150% peak current.

Installation

Enclosure Panels

Keep the drive in a clean environment by installing the drive in an enclosure panel or selecting an installation area free of airborne dust, lint, and oil mist. Be sure to leave the required space between drives to provide for cooling, and take proper measures so the ambient temperature remains within allowable limits and keep flammable materials away from the drive. Magnetek offers protective designs for drives that must be used in areas subjected to oil mist and excessive vibration. Contact Magnetek or your Magnetek agent for details.

Installation Direction

Install the drive upright as specified in the manual. *Refer to Installation on page 64* for more information on installation. Failure to comply may damage the drive due to improper cooling.

Settings

DC Injection Braking

Excessive current during DC Injection Braking and excessive duration of DC Injection Braking can cause motor overheating. Adjust DC Injection parameters to prevent motor overheating.

Acceleration/Deceleration Ramp

Acceleration and deceleration times are affected by the amount of torque generated by the motor, the load torque, and the inertia moment. Set a longer accel/decel time when Stall Prevention is enabled. The accel/decel times are lengthened for as long as the Stall Prevention function is in operation. Install one of the available braking options or increase the capacity of the drive for faster acceleration and deceleration.

General Handling

Selecting a Molded Case Circuit Breaker or Ground Fault Circuit Interrupter (GFCI)

Select an appropriate GFCI. This drive can cause a residual current with a DC component in the protective earthing conductor. Where a residual current operated protective or monitoring device is used for protection in case of direct or indirect contact, always use an GFCI of type B according to IEC/EN 60755.

Select a MCCB (Molded Case Circuit Breaker) with a rated current that is 1.5 to 2 times higher than the rated current of the drive in order to avoid nuisance trips caused by harmonics in the drive input current.

WARNING! *Sudden Movement Hazard. Install a properly controlled contactor on the input-side of the drive for applications where power should be removed from the drive during a fault condition. Improper equipment sequencing could result in death or serious injury.*

Fire Hazard. Shut off the drive with a magnetic contactor (MC) when a fault occurs in any external equipment such as braking resistors. Failure to comply may cause resistor overheating, fire, and injury to personnel.

To get the full performance life out of the electrolytic capacitors and circuit relays, refrain from switching the drive power supply off and on more than once every 30 minutes. Frequent use can damage the drive. Use the drive to stop and start the motor.

Inspection and Maintenance

WARNING! *Electrical Shock Hazard. Capacitors in the drive do not immediately discharge after shutting off the power. Wait for at least the amount of time specified on the drive before touching any components after shutting off the power. Failure to comply may cause injury to personnel from electrical shock.*

CAUTION! *Burn Hazard. Because the heatsink can get very hot during operation, take proper precautions to prevent burns. When replacing the cooling fan, shut off the power and wait at least 15 minutes to be sure that the heatsink has cooled down. Failure to comply may cause burn injury to personnel.*

WARNING! *Electrical Shock Hazard. When a drive is running a PM motor, voltage continues to be generated at the motor terminals after the drive is shut off while the motor coasts to stop. Take the precautions described below to prevent shock and injury:*

- In applications where the machine can still rotate after the drive has fully stopped a load, install a load disconnect switch on the drive output side to disconnect the motor and the drive.
- Do not allow an external force to rotate the motor beyond the maximum allowable speed or to rotate the motor when the drive is powered off.
- Wait for at least the time specified on the warning label after opening the load switch on the output side before inspecting the drive or performing any maintenance.

- Do not open and close the load switch while the motor is running.
- If the motor is coasting, make sure the power to the drive is turned on and the drive output has completely stopped before closing the load switch to reconnect the drive to the motor.

Wiring

Magnetek recommends using ring terminals on all drive models for UL/cUL compliance. Use only the tools recommended by the terminal manufacturer for crimping.

Transporting the Drive

NOTICE: *Never steam clean the drive. During transport, keep the drive from coming into contact with salts, fluorine, bromine, phthalate ester, and other such harmful chemicals. Failure to comply may damage the drive.*

■ Motor Application Precautions

Standard Induction Motors

Insulation Tolerance

NOTICE: *Consider motor voltage tolerance levels and motor insulation in applications with an input voltage of over 440 V or particularly long wiring distances.*

NOTICE: *Ensure that the motor is suitable for inverter duty and/or the motor service factor is adequate to accommodate the additional heating with the intended operating conditions. A motor connected to a PWM drive may operate at a higher temperature than a utility-fed motor and the operating speed range may reduce motor cooling capacity.*

High-Speed Operation

Mechanical damage may occur with the motor bearings and dynamic balance of the machine when operating a motor beyond its rated speed. Operate the motor within specifications to prevent motor damage.

Low-Speed Range

The cooling fan of a standard motor should sufficiently cool the motor at the rated speed. As the self-cooling capability of such a motor reduces with the speed, applying full torque at low speed will possibly damage the motor. Reduce the load torque as the motor slows to prevent motor damage from overheat. Use a motor designed specifically for operation with a drive when 100% continuous torque is needed at low speeds.

Torque Characteristics

Torque characteristics differ compared to operating the motor directly from line power. The user should have a full understanding of the load torque characteristics for the application.

Vibration and Shock

The drive allows selection of high carrier PWM control and low carrier PWM control. Selecting high carrier PWM can help reduce motor oscillation.

If resonance occurs, install shock-absorbing rubber mounts around the base of the motor and utilize the Jump frequency selection to prevent continuous operation in the resonant frequency ranges.

Audible Noise

Noise created during run varies by the carrier frequency setting. When using a high carrier frequency, audible noise from the motor is comparable to the motor noise generated when running from line power. Operating above the rated r/min, however, can create unpleasant motor noise.

Precautions for PM Motors

NOTICE: *Damage to Equipment. Improper sequencing of output motor circuits could result in damage to the drive. Do not connect electromagnetic switches or magnetic contactors to the output motor circuits without proper sequencing. Do not open the main circuit between the drive and the motor while the PM motor is rotating.*

- *Contact Magnetek or your Magnetek agent if you plan to use any PM motor not endorsed by Magnetek.*
- *When using a holding brake, release the brake prior to starting the motor. Failure to set the proper timing can result in speed loss.*

WARNING! *Sudden Movement Hazard. Use a logic output to interlock the brake to ensure the brake is not released before the Initial Magnetic Pole Search is completed. Failure to comply may cause inadvertent elevator movement resulting in serious injury. This safety message is applicable under these conditions:*

- *When applying a PM motor, with an external brake sequence, and the PG-F3 option is not being used.*

WARNING! *Electrical Shock Hazard. The motor must be at a complete stop before performing any maintenance, inspection, or wiring.*

- *With a PM motor, drive output must be fully interrupted when the power is shut off and the motor is still rotating.*
  Failure to comply can result in personal injury from electrical shock.

■ Drive Label Warnings

Always heed the warning information listed in ***Figure 16*** in the position shown in ***Figure 17***.

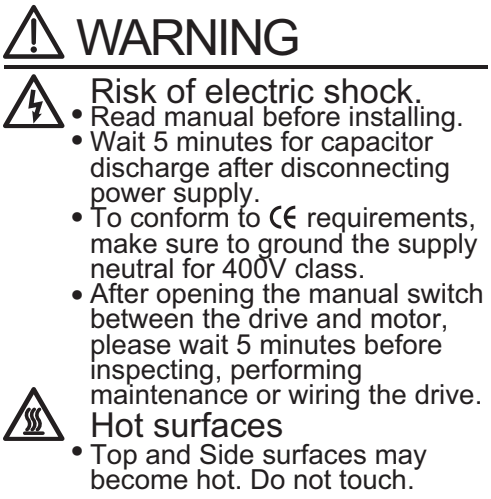


Figure 16 Warning Information

Figure 17 Warning Information Position

HPV1000 AC Elevator Drive

Data subject to change without notice.

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