

MAGNETEK
E L E V A T O R

HPV1000-App_Note_28

PM EnDat Start Guide (Using the JVOP180 Keypad)

Guide to set up HPV1000 drive with Permanent Magnet motor and EnDat Encoder





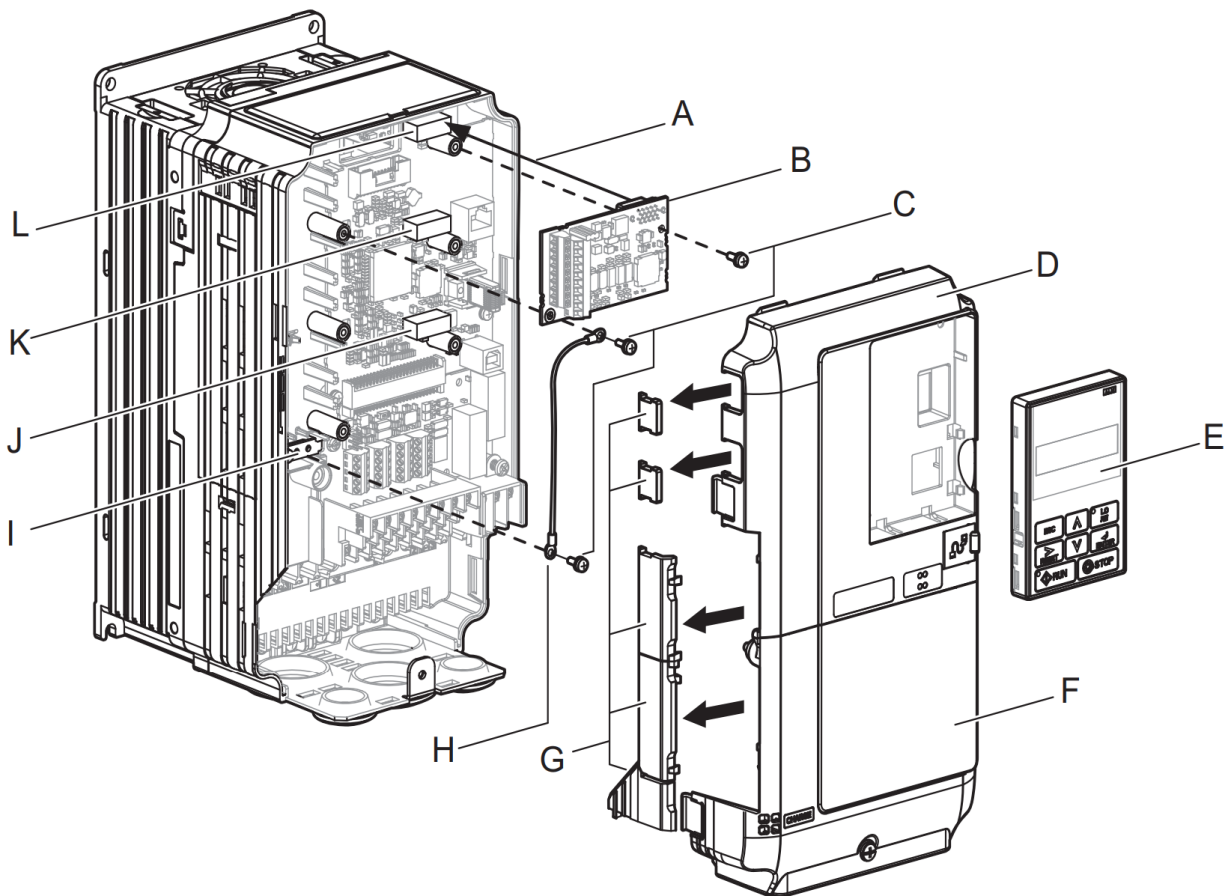
NOTE: This quick start-up guide just outlines the general parameters that should be changed / verified when a drive is installed with information that are readily available. The drive will **not** run if **only** these parameters are set. Because different controller manufacturers have different interfaces, it is recommended that the parameters in the drive be set to what is recommended by the elevator controller in their technical manual.

Closed-Loop Operation Set-up

- 1) Enter / verify that the drive is set to run in 'PM Closed Loop Vector' in the Drive Mode menu (A1-02)

Option Card

- 2) 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 as follows:



- A – Insertion point for CN5
- B – Option card
- C – Included screws
- D – Front cover
- E – Digital operator
- F – Terminal cover

- G – Removable tabs for wire routing
- H – Ground wire
- I – Drive grounding terminal (FE)
- J – Connector CN5-A
- K – Connector CN5-B
- L – Connector CN5-C



Power up and parameterisation

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Note * Some motors do not quote the number of motor poles however this can be simply calculated using this formula:

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

Rated Motor Power (KW)	KW
Rated Motor Volts	Volts
Rated Motor Current	Amps
Motor Poles*	Poles
Rated Motor Speed*	RPM
Rated Motor Frequency*	Hz

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.

Hoistway Parameter Set-up

- 4) Enter / verify the following parameters:
- CONTRACT CAR SPD (O1-25) *parameter should be the lift contract speed in m/s. This can be verified with a hand tachometer if required and adjusted if required.*
 - CONTRACT MTR SPD (O1-26) *parameter should be set to the RPM that is required to make the lift travel at contract car speed*

NOTE: The above two parameters are utilised by the drive for many purposes regarding speed control of the lift, therefore its important these are set correctly prior to continuing any further.

Input Voltage

- 5) Enter the Line Voltage:
- (E1-01) parameter should be set to the measured incoming phase to phase voltage.

Autotune

- 6) The autotune can now be performed. The drive has several options for autotuning the motor, however as usually the motor is roped we recommend the 'Tune-No Rotate1' (Static) method is used. If the ropes are off, and the motor can turn freely, the 'Standard Tune' (Rotating) method can be used.

First, ensure parameter S1-12 is set to 2.

Navigate to the "Autotune" menu and enter the following information:

- 'Tune-No Rotate' (T2-01 TUNING MODE SEL)
- Rated Motor Power in kW (T2-04 MTR RATED POWER)
- Rated Voltage in V (T2-05 RATED VOLTAGE)
- Rated Current in A (T2-06 RATED CURRENT)
- Number of Poles (T2-08 NUMBER OF POLES)
- Rated Speed (T2-09 RATED SPEED)
- Encoder Pulses – should be 2048 (T2-16 PG PULSE/REV)

Stop at this point in the menu and begin running your lift UP on test control. The drive will ignore the run input until you press the up arrow on the keypad once more, at which point it will begin the autotune. During this process the drive will display motor current on the right hand side of the screen for reference.



Maintain the test run until the drive displays “END Tune Successful”. The test run UP button can then be released.

The drive will then automatically populate the following parameters:

- Encoder Pulses (F1-01)
- Rated Mtr Power (E5-02)
- Rated Mtr Volts (E1-05)
- Max Motor Speed (E1-04)
- Rated Speed (E1-06)
- Rated Mtr Curr (E5-03)
- Number of Poles (E5-04)
- Stator Resistance (E5-05) - *calculated from autotune*
- D Axis Induct (E5-06) - *calculated from autotune*
- Q Axis Induct (E5-07) - *calculated from autotune*
- PM Mtr Ind V 1 (E5-09) - *calculated from autotune*
- PM Mtr Ind V 2 (E5-24) - *calculated from autotune*

The drive is now ready for an alignment to be carried out using the steps below. If the ropes are off, use option A – Rotating. If the ropes are already on skip to option B – Non Rotating.

A - Alignment – Rotating

This procedure is used if the ropes are free of the sheave. This will require the sheave to be able to turn freely with no resistance, and so the ropes will have to be fully lifted off the sheave.

Navigate to the Autotune menu and set:

- ‘PolePos-rotate’ (T2-01 TUNING MODE SEL)

Stop at this point in the menu and begin running your lift UP on test control. The drive will ignore the run input until you press the up arrow on the keypad once more, at which point it will begin the autotune. During this process the drive will display motor current on the right hand side of the screen for reference. Maintain the test run until the drive displays “END Tune Successful”. The test run UP button can then be released.

The drive will then automatically populate the following parameters:

- Enc Z-Pulse Offs (E5-11)

B - Alignment – Non Rotating

If the motor is already roped we recommend the ‘PolePos-norotate’ (Static) alignment method. As above Navigate to the Autotune menu and set:

- ‘PolePos-norotate’ (T2-01 TUNING MODE SEL)

Stop at this point in the menu and begin running your lift UP on test control. The drive will ignore the run input until you press the up arrow on the keypad once more, at which point it will begin the autotune. During this process the drive will display motor current on the right hand side of the screen for reference. Maintain the test run until the drive displays “END Tune Successful”. The test run UP button can then be released.

The drive will then automatically populate the following parameters:

- Enc Z-Pulse Offs (E5-11)

Inspection Run

7) Run the drive in low speed inspection mode and...



- Start with a value of 0.5s for INERTIA (P5-03)
- Ensure Motor Contactors are closing, Brake is lifting, and the car can move freely in the shaft
- Verify encoder polarity. The motor phasing should match the encoder phasing. If you experience Speed Dev Flt/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 (F1-05) and Motor Rotation (B1-14) and repeat alignment procedure.

Key Drive Parameters

Drive Menu

Parameter	Description	Default	Units	Suggested Adjustment
CONTRACT CAR SPD O1-25	Elevator contract speed	0.0	m/s	Adjust to speed the installation is rated to run at.
CONTRACT MTR SPD O1-26	Motor speed at elevator contract speed	0	rpm	Adjust this value to ensure the actual running speed of the car matches the parameter above. If the car is traveling too fast then reduce this value, if too slow then increase it.
RESPONSE P5-02	Sensitivity of the speed regulator	10.0	rad/sec	Set to 20 to improve the drive response to changes in speed reference. If the motor current and speed becomes unstable, reduce however if the value is too small, the response will be sluggish.
INERTIA P5-03	System inertia	2.00	sec	Determines the system inertia in terms of the time it takes the elevator to accelerate to contract speed. If the car is light, the value will be smaller than the default and vice versa if the car is heavy.
ENCODER PULSES F1-01	Encoder counts per revolution	2048	PPR	Obtain the Encoder PPR from the encoder nameplate and enter in this parameter.
MTR TORQUE LIMIT P5-08	This parameter sets the maximum motoring torque the drive will produce in the motor	200.0	%	Determines the maximum torque allowed when in the motoring direction. This is generally left at the default setting. If the drive intermittently gives 'Hit Torque Limit' messages, this can be increased. 250% would be a recommended value.
REGEN TORQUE LIMIT P5-09	This parameter sets the maximum regenerating torque the drive will produce in the motor	200	%	Determines the maximum torque allowed when in the regenerating direction. This is generally left at the default setting. If the drive intermittently gives 'Hit Torque Limit' messages, this can be increased. 250% would be a recommended value.

Table 3 PM: Important parameters set/check when setting up a drive in PM

Power Convert

Parameter	Description	Default	Units	Suggested Adjustment
INPUT VOLTAGE E1-01	Nominal line-line AC input Voltage, RMS	0	Volts AC	Adjust to match the voltage across R, S, and T of the drive. The drive uses this value for its undervoltage alarm and fault detection circuit
UV DETECT LEVEL L2-05	DC Bus Voltage level for undervoltage fault	500	Volts DC	Usually set to around 70% of the DC Bus voltage while idle (Can be monitored in the D2 menu)
PWM FREQUENCY C6-03	Carrier frequency	8	kHz	Setting this parameter to 8kHz is a good starting value to ensure low motor noise. Increasing this value will derate the drive.



Parameter	Description	Default	Units	Suggested Adjustment
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Table 4 PM: Important parameters set/check when setting up a drive in PM

Motor

Parameter	Description	Default	Units	Suggested Adjustment
RATED MTR POWER E5-02	Rated motor output power	0	kW	Set to motor kW rating as per the motor nameplate (Should be set during autotune)
RATED MTR VOLTS E1-05	Rated Motor Voltage	0	V	Set to motor Voltage as per the motor nameplate (Should be set during autotune)
MAX MOTOR SPEED E1-04	Upper Limit for motor speed	0	RPM	This is the upper limit for the motor speed. The Rated Motor Speed and Contract Motor Speed CANNOT be set higher than this value
RATED MTR SPEED E1-06	Rated Motor Speed	0	RPM	Set to motor RPM rating as per the motor nameplate (Should be set during autotune)
RATED MOTOR CURR E5-03	Rated Motor Current	0	A	Set to motor Current rating as per the motor nameplate (Should be set during autotune)
NUMBER OF POLES E5-04	Motor Poles	0	N/A	Set to motor nameplate Motor Poles or use the formula above (Should be set during autotune)
STATOR RESISTANCE E5-05	Stator Resistance	0	Ohms	Should be learnt from 'Tune No Rotate' (T2-01)
D AXIS INDUCT E5-06	D Axis Induct	0	mH	Should be learnt from 'Tune No Rotate' (T2-01)
Q AXIS INDUCT E5-07	Q Axis Induct	0	mH	Should be learnt from 'Tune No Rotate' (T2-01)
PM MTR IND V 1 E5-09	Induced Phase Peak Voltage	0	mH	Should be learnt from 'Tune No Rotate'. !!IMPORTANT! ONLY Ind 1 OR Ind 2 should be used, the other should be set to '0'
PM MTR IND V 1	Induced Phase Peak Voltage	0	mH	Should be learnt from 'Tune No Rotate'. !!IMPORTANT! ONLY Ind 1 OR Ind 2 should be used, the other should be set to '0'
ENC Z-PULSE OFFS E5-11	Encoder Offset Value	0	Deg	This parameters should be learnt during the PolPos procedure

Table 5 PM: Important parameters set/check when setting up a drive in PM

Basics

Parameter	Description	Default	Choices	Suggested Adjustment
DRIVE MODE A1-02	Drive operation	PM CLOSED LOOP VCT	V/f Control Open Loop Vect Closed Loop Vect PM ClosedLoop Vct	Set to PM ClosedLoopVct (Note: not "Closed Loop Vect"!) to run in PM mode.

Table 6 PM: Important parameter set/check when setting up a drive in closed-loop