

MAGNETEK

E L E V A T O R

HPV1000-App_Note_27

Closed Loop Start Guide (Using the JVOP180 Keypad)

Guide to set up HPV1000 drive in Closed Loop Vf Control





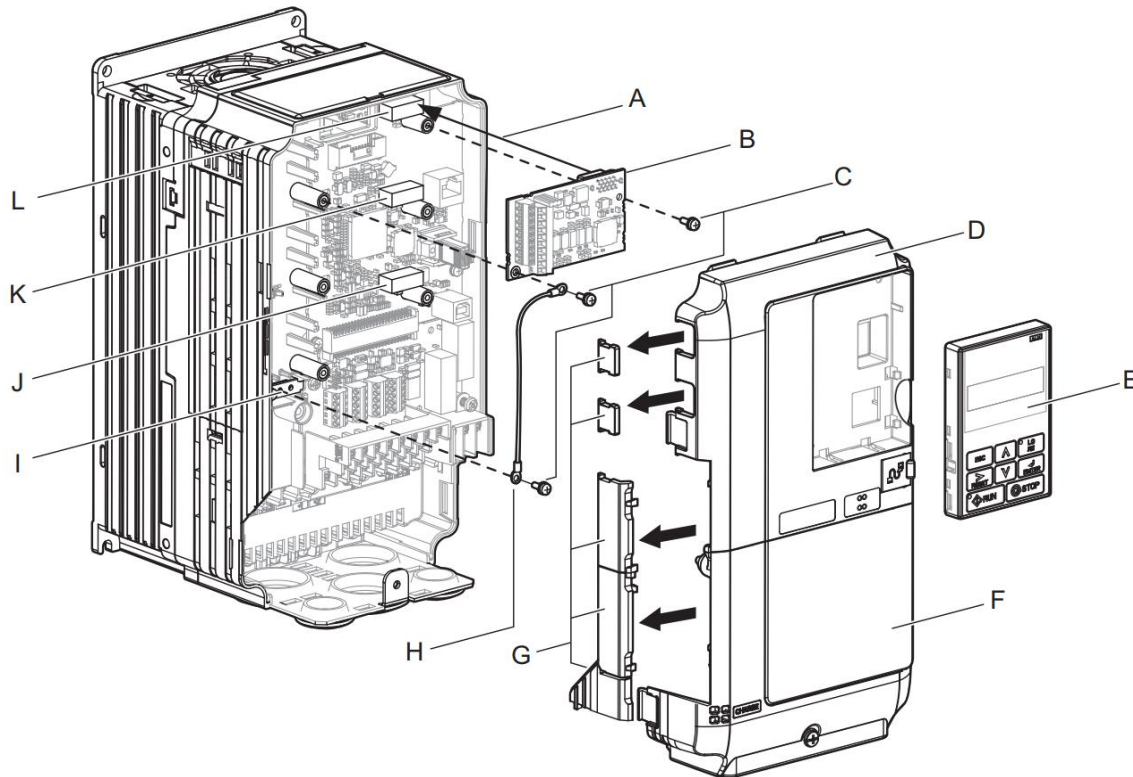
NOTE: This quick start-up guide just outlines the general parameters that should be changed / verified when a drive is installed with information that are readily available. The drive will **not** run if **only** these parameters are set. Because different controller manufacturers have different interfaces, 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 Closed Loop Vector in the Drive Mode menu (Selection 0 in the A1-02 menu).

Option Card

- 2) 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. The card should be installed as follows:

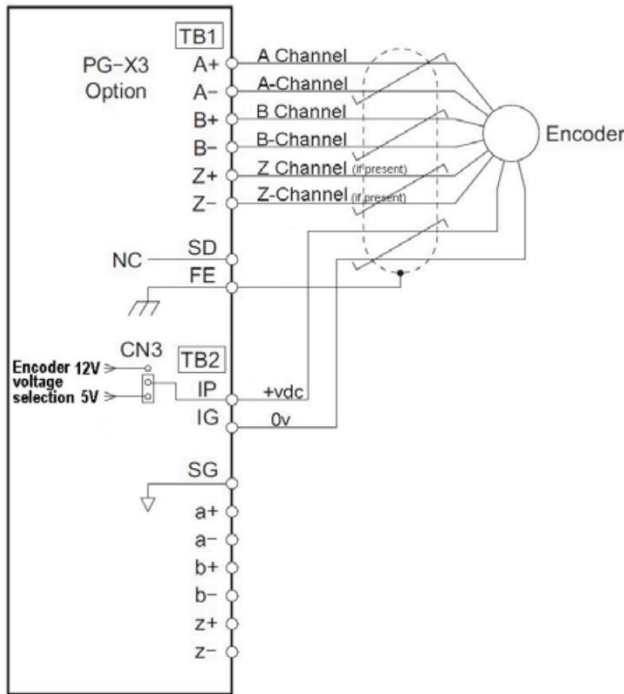


- | | |
|--|--|
| A – Insertion point for CN5 | H – Ground wire |
| B – Option card | I – Drive grounding terminal (FE) |
| C – Included screws | J – Connector CN5-A
(Not available for PG option installation.) |
| D – Front cover | K – Connector CN5-B |
| E – Keypad | L – Connector CN5-C |
| F – Terminal cover | |
| G – Removable tabs for wire routing | |



Encoder Wiring

3) The encoder should be wired to the drive as follows:
Quadrature Operation



Single Ended Operation

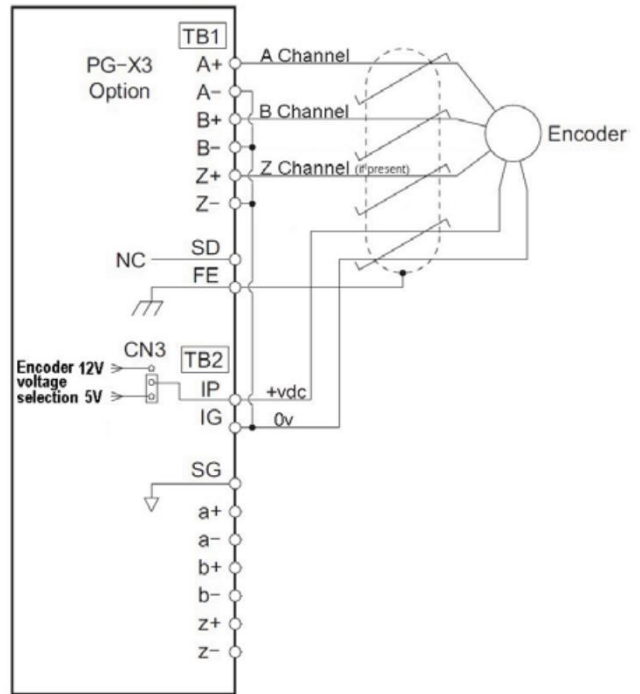


Table 1 CL: PG-X3 Encoder connections

- 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.
- If wired single ended, PG Card Detect (F1-20) must be Disabled

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:
- INPUT VOLTAGE (E1-01) parameter should be set to the measured incoming phase to phase voltage.



Encoder Set-up

- 6) 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.

IMPORTANT- 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. 12V_{DC} 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

- 7) The autotune can now be performed by navigating to the autotune 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.

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

Navigate to the Autotune menu and enter the following information:

- 'Tune-No Rotate1' (T1-01 TUNING MODE SEL)
- Motor Rated Power in kW (T1-02 MTR RATED POWER)
- Rated Voltage in V (T1-03 RATED VOLTAGE)
- Rated Current in A (T1-04 RATED CURRENT)
- Rated Frequency in Hz (T1-05 RATED FREQUENCY)
- Number of Poles (T1-06 NUMBER OF POLES)
- Rated Motor Speed* (T1-07 RATED SPEED) - *This is after slip, so NOT synchronous speed.*
- Encoder Pulses (T1-08 ENCODER PPR)
- No Load Current (T1-09 NO-LOAD CURRENT) - **[AG1]** Enter 35% of the RATED MOTOR CURRENT entered above for 4 pole motors or 45% for a 6 pole motor

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.

***Note** The rated motor rpm entered must equal what it can achieve at rated frequency, at full load and full speed. If synchronous speed is given on the dataplate, a lower RPM must be entered. Table 2 gives an indication of typical motor rated rpm for lift applications.

Synchronous speed (50hz)	Rated motor Speed (rpm)	Number of motor poles	Typical No Load Current
1500	1480 - 1340	4	35%
1000	980 - 840	6	45%

Table 2: Synchronous/Asynchronous Motor Speeds & Motor Poles Reference for 50Hz



The drive will then automatically populate the following parameters:

- Encoder Pulses (F1-01)
- Rated Mtr Power (E2-11)
- Rated Mtr Volts (E1-05)
- Rated Motor Freq (E1-04)
- Rated Motor Curr (E2-01)
- Number of Poles (E5-04)
- Motor Rated Slip (E2-02) – calculated from autotune
- No-Load Current (E2-03)
- Leak Inductance (E2-06) – calculated from autotune
- Term Resistance (E2-05) – calculated from autotune

Low speed inspection mode

- 8) Run the drive in low speed inspection mode and...
- Start with default value of 2 for INERTIA (P5-03)
 - Verify encoder polarity. The motor phasing should match the encoder phasing. If you experience Speed Dev Flt/ PGO Fault the phasing may be incorrect -this can be reversed changing ENCODER CONNECT (F1-05) between Forwards and Reverse
 - Verify proper hoistway direction. This can be reversed by changing both the MOTOR ROTATION (B1-14) and ENCODER CONNECT(F1-20) parameters.

Key Drive Parameters

NOTE: Key parameters that are **not** listed below are parameters that are set for drive/controller interface:

Drive Menu

Parameter	Description	Default	Units	Suggested Adjustment
CONTRACT CAR SPD O1-25	Elevator contract speed	2.0	m/s	Adjust to speed the installation is rated to run at.
CONTRACT MTR SPD O1-26	Motor speed at elevator contract speed	1450.0	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	1024	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.



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Parameter	Description	Default	Units	Suggested Adjustment
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 CL: Important parameters in A1 menu to set/check when setting up a drive in closed-loop

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.

Table 4 CL: Important parameters in A4 menu to set/check when setting up a drive in closed-loop

Motor

Parameter	Description	Default	Units	Suggested Adjustment
MTR RATED POWER E2-11	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	VAC	Set to motor Voltage rating as per the motor nameplate (Should be set during autotune)
RATED MOTOR FREQ E1-04	Rated excitation frequency	0	Hz	Set to motor frequency rating as per the motor nameplate (Should be set during autotune)
RATED MOTOR CURR E2-01	Rated motor current	0	Amps	Set to motor nameplate rated current (Should be set during autotune)
NUMBER OF POLES E2-04	Motor poles	4	none	Adjust to set number of motor poles (Should be set during autotune)
MOTOR RATED SLIP E2-02	The slip frequency of the motor	0	Hz	Set to the slip frequency of the motor (Should be set during autotune)
NO-LOAD CURRENT E2-03	No Load Current	0	A	If it is not known, use the default value (Should be set during autotune)
LEAK INDUCTANCE E2-06	Leakage Inductance	0	%	These parameters should be set during the autotune
TERM RESISTANCE E2-05	Phase to phase resistance of motor	0	%	

Table 5 CL: Important parameters in A5 menu to set/check when setting up a drive in closed-loop

Basics

Parameter	Description	Default	Choices	Suggested Adjustment
DRIVE MODE A1-02	Drive operation	Closed Loop Vect	V/f Control Open Loop Vector Closed Loop Vector PM ClosedLoop Vct	Set to Closed Loop Vect (Note: not "PM ClosedLoop Vct"!) to run in Closed Loop mode. Can be set to Open Loop Vect to run without encoder feedback for diagnosis purposes



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Parameter	Description	Default	Choices	Suggested Adjustment
DRIVE MODE A1-02	Drive operation	Closed Loop Vect	V/f Control Open Loop Vector Closed Loop Vector PM ClosedLoop Vct	Set to Closed Loop Vect (Note: not "PM ClosedLoop Vct!") to run in Closed Loop mode. Can be set to Open Loop Vect to run without encoder feedback for diagnosis purposes

Table 6 CL: Important parameter in U8 menu to set/check when setting up a drive in closed-loop