



# MAGNETEK

E L E V A T O R

HPV1000-App\_Note\_01

## Open Loop Vector Start Guide

Guide to set up HPV1000 drive in Open Loop





# OPEN-LOOP VECTOR QUICK START-UP GUIDE

**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.

## Open-Loop Operation Set-up

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

## Hoistway Parameter Set-up

- 2) Enter / verify the following parameters:
  - CONTRACT CAR SPD (A1) 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 (A1) 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

- 3) Enter the Line Voltage in the A4 menu:
  - INPUT VOLTAGE (A4) parameter should be set to the measured incoming phase to phase voltage.

## Autotune

- 4) The autotune can now be performed by navigating to the U9 menu. 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.

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 VOLTAGE(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\* (RATED SPEED (U9) - *This is after slip, so NOT synchronous speed.*)
- No Load Current (NO-LOAD CURRENT(U9) - *Enter 35% of the RATED MOTOR CURRENT entered above for 4 pole motors or 45% for a 6 pole motor*)

**\*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 OL: Synchronous/Asynchronous Motor Speeds & Motor Poles Reference for 50Hz



Once the above information has been entered and the bottom of the menu is reached the screen will display: 'Auto-tuning. Waiting for command – Tune Ready? Give Run/Hit Enter'.

At this point **DO NOT** press any keypad buttons.

Using your inspection controls, **PRESS AND HOLD** the buttons to run the lift in the **UP DIRECTION** (the lift will not move, however the tune will begin) 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 test run UP button can now be released.

The drive will then automatically populate the following parameters in the A5 menu:

- 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*
- Motor Min Volts (A5) – *calculated from autotune*
- Motor Min Freq (A5) – *calculated from autotune*
- Motor Mid Volts (A5) – *calculated from autotune*
- Motor Mid Freq (A5) – *calculated from autotune*

### Low speed inspection mode

- Run the lift using inspection controls and verify direction is correct. If the direction is incorrect, this can be reversed with the MOTOR ROTATION (C1) parameter if required.

### Key Drive Parameters

**NOTE:** Key parameters that are **not** listed below are parameters that are set for drive/controller interface in the C0 menu and A2 and A3 sub menus

#### **Drive Menu A1**

Parameter	Description	Default	Units	Suggested Adjustment
CONTRACT CAR SPD	Elevator contract speed	0.0	m/s	Adjust to speed the installation is rated to run at.
CONTRACT MTR SPD	Motor speed at elevator contract speed	1130.0	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.
MTR TORQUE LIMIT	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	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.



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Parameter	Description	Default	Units	Suggested Adjustment
DC START LEVEL	Determines the amount of DC Injection at start, as a percentage of drive rated current	50	%	Increase if rollback occurs at start
DC STOP LEVEL	Determines the amount of DC Injection at stop, as a percentage of drive rated current	50	%	Increase if rollback occurs at stop
DC STOP FREQ	Determines the speed to begin applying DC injection at stop, as a percentage of contract speed	1	%	Increase to begin DC injection sooner at the end of travel
DC BRK TIMESTART	Determines how long the drive should apply DC BRK I @ START current	0.4	Sec	Increase to lengthen DC Injection time at start
DC BRK TIMESTOP	Determines how long the drive should apply DC BRK I @ STOP current	0.6	Sec	Increase to lengthen DC Injection time at stop
SLIPCOMP GAIN M	Slip compensation for levelling in the motoring direction	0.7	None	
SLIPCOMP GAIN R	Slip compensation for levelling in the regenerative direction	1	None	
SLIP COMP GAIN	Gain for the slip compensation function	1	None	
SLIP COMP TIME	Slip compensation delay time	2000	mSec	
SLIP COMP LIMIT	Upper limit for the slip compensation function as a result of motor rated slip	200	%	
TORQ COMP GAIN	Sets the gain for the automatic torque compensation parameter	1	None	Use this function to improve holding torque
TORQ COMP TIME	Time filter for the Torque Compensation function	50	mSec	Adjust in conjunction with TORQ COMP GAIN to improve torque at start

Table 3 OL: Important parameters in A1 menu to set/check when setting up a drive in open-loop



### Power Convert A4

Parameter	Description	Default	Units	Suggested Adjustment
INPUT VOLTAGE	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	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	Carrier frequency	8.0	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 OL: Important parameters in A4 menu to set/check when setting up a drive in open-loop

### Motor A5

Parameter	Description	Default	Units	Suggested Adjustment
RATED MTR POWER	Rated motor output power	0	kW	Set to motor kW rating as per the motor nameplate (Should be set in U9 during autotune)
RATED MTR VOLTS	Rated Motor Voltage	0	VAC	Set to motor VAC rating as per the motor nameplate (Should be set in U9 during autotune)
RATED MOTOR FREQ	Rated excitation frequency	0	Hz	Set to motor frequency rating as per the motor nameplate (Should be set in U9 during autotune)
RATED MOTOR CURR	Rated motor current	0	Amps	Set to motor nameplate rated current (Should be set in U9 during autotune)
NUMBER OF POLES	Motor poles	0	none	Adjust to set number of motor poles as per nameplate (Should be set in U9 during autotune)
MOTOR RATED SLIP	The slip frequency of the motor	0	Hz	Set to the slip frequency of the motor. May not be available from the motor nameplate. (Should be set in U9 during autotune)
NO-LOAD CURRENT	No Load Current	0	A	If it is not known, use the default value in the U9 menu (Should be set in U9 during autotune)
LEAK INDUCTANCE	Leakage Inductance	0	%	These parameters should be set during the autotune (U9)
TERM RESISTANCE	Phase to phase resistance of motor	0	%	
MOTOR MIN VOLTS	Sets the lowest voltage point on the V/Hz curve	0	V	
MOTOR MIN FREQ	Sets the lowest frequency point on the V/Hz curve	0	Hz	
MOTOR MID VOLTS	Sets the middle point on the V/Hz curve	0	V	
MOTOR MID FREQ	Sets the middle point on the V/Hz curve	0	Hz	

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

### Basics U8

Parameter	Description	Default	Choices	Suggested Adjustment
DRIVE MODE	Drive operation	Open Loop Vector	V/f Control Open Loop Vector Closed Loop Vector PM ClosedLoop Vct	Set to Open Loop Vector for optimum open loop control

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



**Autotune U9**

Parameter	Description	Default	Choices	Suggested Adjustment
Autotune	Autotune menu	Standard Tune	Standard Tune Tune-No Rotate1 Tune-No Rotate2 Term Resistance	<p>'Tune-No Rotate1' is the method to use if the motor is already roped. If the motor is not roped then the 'Standard Tune' method can be used to learn the No Load Current value.</p> <p>Note that when performing the autotune, the drive will also ask for the following parameters:</p> <ul style="list-style-type: none"> <li>• Rated Motor Power in HP</li> <li>• Rated Motor Voltage in V</li> <li>• Rated Motor Current in A</li> <li>• Rated Motor Frequency in Hz</li> <li>• Number of Motor Poles</li> <li>• Rated Motor Speed</li> <li>• No Load Current</li> </ul>

Table 7 OL: Important parameters in U9 menu to set/check when setting up a drive in open-loop