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OPTIDRIVE™ eleVAtor

Slide out help card
Quick reference to travel curve setup

Back-lit elevator logo
Logo flashes if the drive trips

Pluggable control terminals

RJ45 port
Modbus/CanOpen connection

Expansion slot
Encoder Interface

Quick Start-up Guide

for geared/induction motor applications

Please refer to the 'Optidrive P2 Elevator User Guide' for complete safety and operating instructions, this can be found at **www.invertekdrives.com** or by scanning this QR code

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Step 1 Electrical connections

Action		Additional Information
Connect Motor	☐ Check phases = U>U, V>V, W>W	
Connect Braking Resistor	☐ Connect resistor to '+' and 'BR' terminals	

kW	HP	Min resistance 200-240VAC 1 Phase Input	Min resistance 200-240VAC 3 Phase Input	Min resistance 380-480VAC 3 Phase Input	Suggested resistor power rating (W)
0.75	1	50			1000
1.5	2	32			1000
2.2	3	25			1000
4	5		20	50	1000
5.5	7.5		20	40	1500
7.5	10		22	40	2000
11	15		22	40	3000
15	20		12	22	4000
18.5	25		12	22	4500
22	30		6	22	5000
30	40		6	12	7000
37	50		6	12	8000

If an encoder is used connect the encoder to the drive using the Encoder interface Module	☐ Check that the correct Encoder interface module type is installed. ☐ Check encoder wiring is correct. 	Encoder interface module types : **OPT-2-ENCOD-IN** = 5V TTL Encoder. **OPT-2-ENCHT-IN** = 24V HTL Encoder. • Encoder connections:

Terminal	ENCOD-IN	ENCHT-IN
1	A	A
2	A/	A/
3	B	B
4	B/	B/
5	+5V	*No Connection
6	0V	*No Connection

*Provide 24V to the Encoder from an external power source, or use T1 (24V) and T7 (0V) of drive control terminals.

⚠	☐ Apply rated voltage to the drive. L1>L1, L2>L2, L3>L3 ☐ Check that the drive displays StoP or Inhibit.	See 'Fault Messages' section if a fault message is shown.

Step 2 Motor nameplate data entry

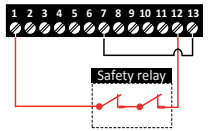
Action		Additional Information
☐ **Open advanced parameter access**	Set **P**1-14 to 201	
☐ **Enable Geared (IM) motor control**	Set **P**4-01 to 0	Advanced Vector Control
☐ **Enter motor rated voltage**	Enter value into **P**1-07	Enter Voltage value as shown on the motor nameplate (Volts).
☐ **Enter Motor Rated Current**	Enter value into **P**1-08	Enter Current value as shown on the motor nameplate (Amps).
☐ **Enter Motor Rated Frequency**	Enter value into **P**1-09	Enter Frequency value as shown on the motor nameplate (Hz).
☐ **Enter Motor Rated Speed**	Enter value into **P**1-10	Obtained from Motor nameplate. The drive will now operate in Rpm.
☐ **Enter Motor power factor Cos Ø**	Enter value into **P**4-05*	Obtained from Motor nameplate *If Motor power factor is unknown use Vector IM speed control instead (**P**4-01 to a 1).

Step 3 Encoder nameplate data entry (if an encoder is used)

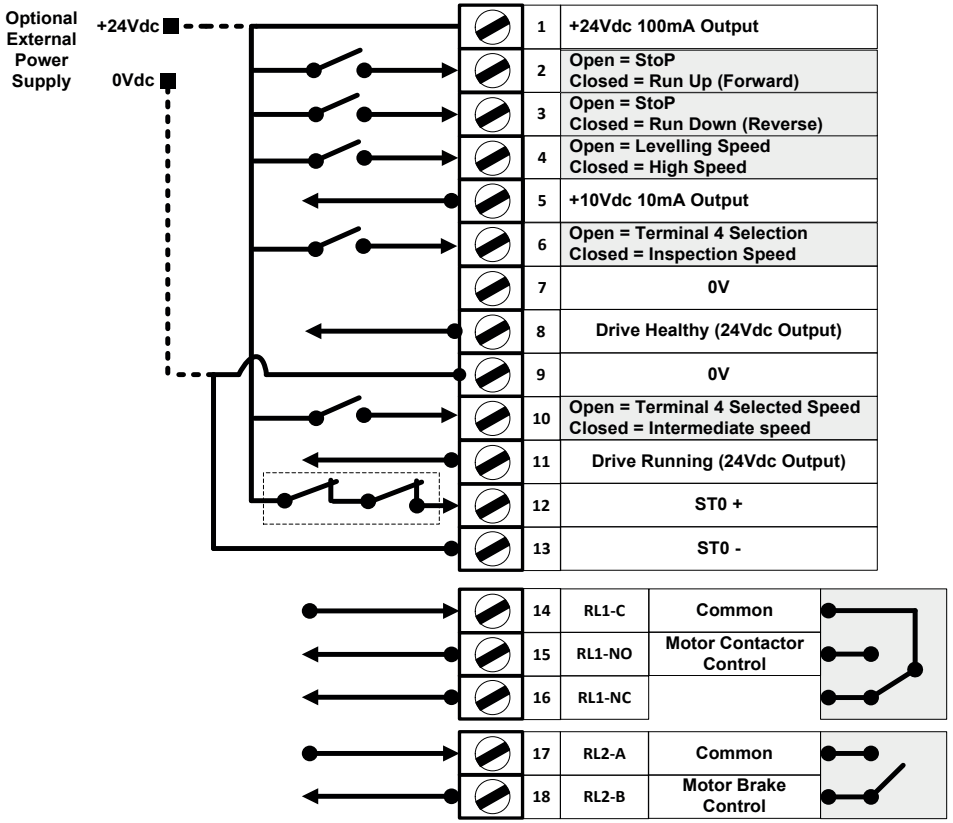
Action		Additional Information
☐ **Enable Encoder**	Set **P**6-05 to 1	Enables Encoder Feedback
☐ **Enter Encoder Type**	Enter Encoder Pulses per revolution value into **P**6-06	Enter value as shown on encoder nameplate/ datasheet e.g. 1024

Step 4 Motor auto-tune

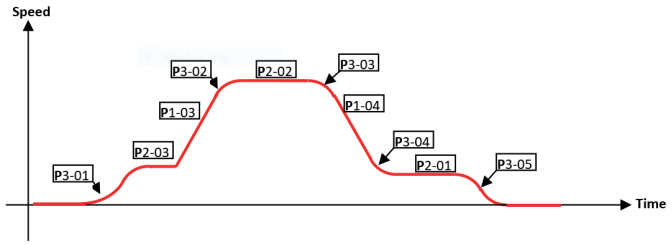
A Motor Auto-tune must be carried out in order to measure the motor electrical characteristics, brakes will be applied by the drive (unless controlled by other means) during this test.

Action		Additional Information
☐ **If motor contactor(s) are controlled by the elevator controller check that they are closed.**		
☐ **Close Safe Torque off input connections**		Drive should now show StoP if not see 'Fault messages' section of this guide.
☐ **Enable Motor Auto-tune**	Set **P**4-02 to a 1 and press the button.	The display will show AUto-t. Once the Auto-tune is completed **P**4-02 will return to 0 and the display will show StoP (**P**7-01 thru to **P**7-06 will be populated). **Note:** Motor Auto-tune will need to be repeated if the motor, motor cables, motor parameters or drive control mode is changed in **P**4-01.

Control terminal connections (default)



Speed profile setup

Related Parameters	Action
P1-03 (Accel ramp time) **P**1-04 (Decel ramp time) **P**2-01 (Levelling Speed) **P**2-02 (Run Speed) **P**2-03 (Intermediate Speed) **P**2-04 (Inspection Speed) **P**3-01 (Accel start Jerk) **P**3-02 (Accel end Jerk) **P**3-03 (decel start Jerk) **P**3-04 (decel end Jerk) **P**3-05 (Stopping Jerk)	

Digital input configuration parameter (P1-13)

The below table assumes the drive already has a direction command given i.e. Terminal 2 or 3 input is high

P1-13	Digital Input 3 (T4)	Analog Input 1 (T6)	Analog Input 2 (T10)	Active Speed
1 (Option 1) Default	1	0	0	**P**2-02 (HighSpeed)
	0 or 1	0	1	**P**2-03 (Intermediate Speed)
	0 or 1	1	0 or 1	**P**2-04 (Inspection Speed)
	0	0	0	**P**2-01 (Levelling Speed)
2 (Option 2)	1	0	*1	**P**2-02 (High Speed)
	0 or 1	1	*1	**P**2-04 (Inspection Speed)
	0	0	*1	**P**2-01 (Levelling Speed)
3 (Option 3)	1	0	0	**P**2-02 (High Speed)
	0 or 1	1	0	**P**2-04 (Inspection Speed)
	0	0	0	**P**2-01 (Levelling Speed)
4 (Option 4)	1	0	**1	**P**2-02 (High Speed)
	0 or 1	1	**1	**P**2-04 (Inspection Speed)
	0	0	**1	**P**2-01 (Levelling Speed)
5 (Option 5)	Brake release monitoring function see 'Optidrive P2 Elevator User Guide'			
6 (Option 6) (Multispeed Selection)	0	0	0	**P**2-01
	1	0	0	**P**2-02
	0	1	0	**P**2-03
	1	1	0	**P**2-04
	0	0	1	**P**2-05 (Max 5.0Hz)
	1	0	1	**P**2-06
	0	1	1	**P**2-07
	1	1	1	**P**2-08

1 = Input High 0 = Input Low

* If 0 the drive will trip on External trip or F-Ptc if a motor thermistor fitted and Ptc-th has been selected in **P**2-33.

** If 0 drive will fast stop using deceleration ramp in time set in **P**2-25., if **P**2-25 is zero the drive will coast to stop.

Optimising & improving travel comfort

Symptom	Possible Cause	Control Modes	Possible Corrective Actions	Notes
1 – Rollback During starting	Brake release time maybe too short.	**P**4-01 = 0-3	Increase **P**3-07 (Brake Release time)	**P**2-02 (HighSpeed)
		P4-01 = 0,1,2	Increase **P**4-03 (Speed Controller P-Gain)/ decrease **P**4-04 (Speed Controller I-Gain)	Higher value=faster response/ Eliminates steady state speed error.
		P4-01 = 0,1,2	If Modifying **P**P4-03/**P**4-04 is not successful use Closed loop (With Encoder)	
		P4-01 = 2	If Modifying **P**4-03/**P**4-04 is not successful Increase value in parameter **P**1-11 (V/F Mode Voltage Boost).	Take care when modifying Increasing too high could overheat the motor
1 – Jerk Felt During starting	Brake not releasing quick enough	**P**4-01 = 0,1,2	Reduce **P**3-07 (Brake Release time)	
	Acceleration time too short	**P**4-01 = 0,1,2	Increase **P**3-01 (Acceleration S-Ramp 1 duration)	
2 – Vibration during speed transition	Speed Loop gains need adjusting	**P**4-01 = 0,1	Reduce **P**4-03 (Speed Controller Proportional gain) & Adjust **P**4-04 (Speed Controller Integral gain) to reduce steady state speed error.	If proportional gain is set to low the system response will be slow, if too high the system could become unstable and show as Vibration.
3 – Jerk Felt During stopping	Brake coming on too early	**P**4-01 = 0,1,2	Decrease **P**3-09 (brake apply speed). or Use motor Brake control option 2, see 10.6.2	
	Deceleration time too short	**P**4-01 = 0,1,2	Increase **P**3-01 (Acceleration S-Ramp 1 duration)	
3 – Floor Levelling-Short	Drive is reaching current limit and extending ramp time	**P**4-01 = 0,1,2	Check drive current rating matches system requirements. Increase **P**4-07(Motoring Torque Limit)/ **P**4-09 (Regen current limit)	Check that increasing **P**4-07/ **P**4-09 is in line with the capability for the connected motor.
	Speed Loop gains need adjusting	**P**4-01 = 0,1	Increase **P**4-03 (Speed Controller Proportional gain) to achieve faster response & Adjust **P**4-04 (Speed Controller Integral gain) to reduce steady state speed error.	If proportional gain is set to low the system response will be slow, if too high the system could become unstable and show as Vibration.
	Motor data incorrect causing error between commanded and actual speed	**P**4-01 = 0,1 Open Loop	• Check that the motor nameplate data (**P**1-09, **P**1-10) are correct and that an autotune has been successful. • Adjust Motor rated speed (**P**1-10) to increase/decrease slip amount.	
	Levelling time too short	**P**4-01 = 0,1,2	Increase **P**3-05 (Levelling S-ramp duration)	

Notes

Fault messages

Fault Code	Description	Corrective Action
OL-br	Brake resistor overload	The drive software has determined that the brake resistor is overloaded (based on the values entered in **P**3-13 and **P**3-14), and trips to protect the resistor. Always ensure the brake resistor is being operated within its designed parameter before making any parameter or system changes. To reduce the load on the resistor, increase deceleration the time, reduce the load inertia or add further brake resistors in parallel, observing the minimum resistance value for the drive in use.
O-I h O-I	Instantaneous over current on drive output. Excess load on the motor.	**Fault Occurs on Drive Enable** Check the motor and motor connection cable for phase – phase and phase – earth short circuits. Check the load mechanically for a jam, blockage or stalled condition Ensure the motor nameplate parameters are correctly entered, **P**1-07, **P**1-08, **P**1-09. If operating in Vector mode (**P**4-01 – 0 or 1), also check the motor power factor in **P**4-05 and ensure an autotune has been successfully completed for the connected motor. Reduced the Boost voltage setting in **P**1-11 Increase the ramp up time in **P**1-03 If the connected motor has a holding brake, ensure the brake is correctly connected and controlled, and is releasing correctly **Fault Occurs When Running** If operating in Vector mode (**P**4-01 – 0 or 1), reduce the speed loop gain in **P**4-03
I_t-trP	Drive has tripped on overload after delivering >100% of value in **P**1-08 for a period of time.	Check to see when the decimal points are flashing (drive in overload) and either increase acceleration rate or reduce the load. Ensure the motor nameplate parameters are correctly entered in **P**1-07, **P**1-08, and **P**1-09 If operating in Vector mode (**P**4-01 – 0 or 1), also check the motor power factor in **P**4-05 and ensure an autotune has been successfully completed for the connected motor. Check the load mechanically to ensure it is free, and that no jams, blockages or other mechanical faults exist
O-uoLt	Over voltage on DC bus	The value of the DC Bus Voltage can be displayed in **P**0-20 This fault is generally caused by excessive regenerative energy being transferred from the load back to the drive during braking. Increase the deceleration ramp time **P**1-04. Check a suitable brake resistor is connected to the drive. If operating in Vector Mode, reduce the speed loop gain **P**4-03
U-uoLt	Under voltage on DC bus	This occurs routinely when power is switched off. If it occurs during running, check the incoming supply voltage, and all connections into the drive, fuses, contactors etc.
E-trIP	External trip	E-trip requested on control input terminals. Some settings of **P**1-13 require a normally closed contactor to provide an external means of tripping the drive in the event that an external device develops a fault. If a motor thermistor is connected check if the motor is too hot.
P-LoSS	Input phase loss trip	Drive intended for use with a 3 phase supply, one input phase has been disconnected or lost.
OUt-F	Drive output fault	Drive output fault. Check correct control terminal connections. Check for output contactor faults.
Sto-F	Internal STO circuit Error	Check supply to terminal T12 is >18V, otherwise Refer to your Invertek Sales Partner
Enc-01	Encoder Feedback Faults (Only visible when an encoder module is fitted and enabled)	Encoder communication /data loss
SP-Err		Encoder Speed Error. The % error between the measured encoder feedback speed and the drive estimated rotor speed is greater than the value set in **P**6-07.
Enc-03		Incorrect Encoder PPR count set in parameters
Enc-04		Encoder Channel A Fault
Enc-05		Encoder Channel B Fault
Enc-06		Encoder Channels A & B Fault
OUt-Ph	Output (Motor) Phase Loss	One of the motor output phases is not connected to the drive, check motor is connected.

Useful parameters

Parameter	Function
P1-01	Maximum Frequency
P2-24	Output PWM switching frequency
P3-06	Output contactor closing time
P3-07	Brake release time
P3-08	Brake Apply delay
P3-09	Brake Apply speed
P3-10	Zero speed holding time on disable
P4-01	Motor control mode (0=Advanced vector, 1=Basic vector, 2=V/F mode)
P4-03	Speed loop P-gain
P4-04	Speed loop I-gain