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Product	Optidrive Elevator

Title	Control Mode - Parameter P4-01

Summary	This document gives information about the Optidrive Elevator Control Mode, parameter P4-01.

Note: Please read in conjunction with the Optidrive Elevator User Guide.

Note: This document assumes the drive is running a standard AC induction motor in open loop with no encoder fitted.

P4-01 = 0 – Advanced Vector IM Speed Control

In this mode, the following parameters must be set:

P1-07 – Motor rated voltage – set to motor name plate
P1-08 – Motor rated current – set to motor name plate
P1-09 – Motor rated frequency – set to motor name plate
P1-10 – Motor rated speed – This parameter only needs to be set if RPM is required on the display
P4-05 – Motor power factor Cos ø

After these parameters have been set, an autotune must be carried out in order for the drive to measure the motor characteristics for excellent low speed performance.

NOTE: If possible, an autotune should be carried out on a cold motor.

For details on 'Autotune' please see ***MCW-Elevator-002*** for details.

P4-01 = 1 – Vector IM Speed Control

This mode should be used if the power factor of the motor is not known.

In this mode, the following parameters must be set:

P1-07 – Motor rated voltage – set to motor name plate
P1-08 – Motor rated current – set to motor name plate
P1-09 – Motor rated frequency – set to motor name plate
P1-10 – Motor rated speed – This parameter only needs to be set if RPM is required on the display

With this mode, the drive uses an internal set of motor characteristics parameters to control the motor in order to give good low speed performance.

NOTE: To get good low speed torque performance in this mode, an autotune should be carried out in order to measure the motors stator resistance.

With modes P4-01 = 1 and P4-01 = 0, the boost settings in parameter **P7-14 & P7-15** can be adjusted to increase the torque at low speed.

P4-01 = 2 – Enhanced V/f IM Speed Control

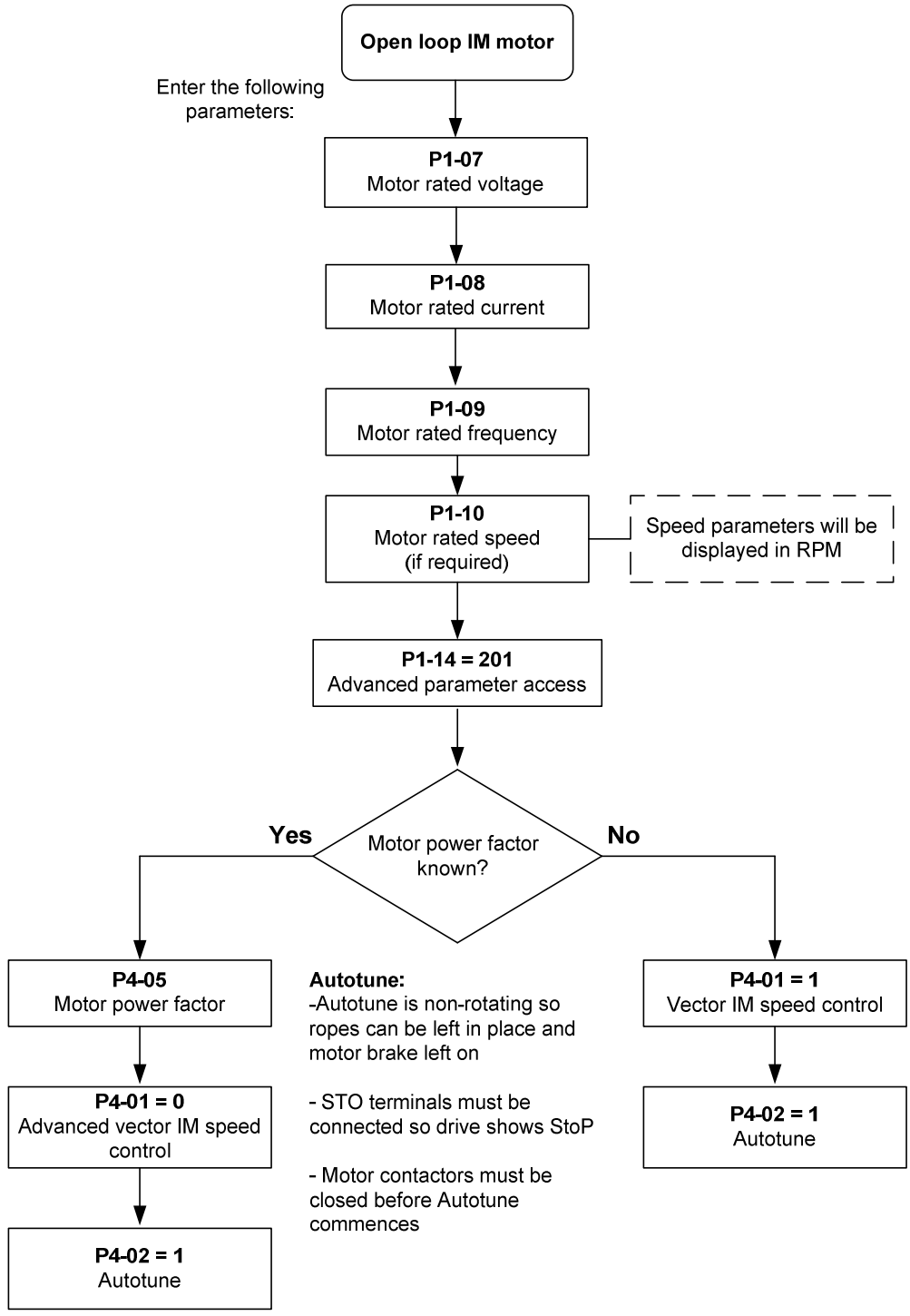
In this mode, the following parameters must be set:

P1-07 – Motor rated voltage – set to motor name plate
P1-08 – Motor rated current – set to motor name plate
P1-09 – Motor rated frequency – set to motor name plate
P1-10 – Motor rated speed – This parameter only needs to be set if RPM is required on the display

With this mode, the boost setting in parameter **P1-11** can be adjusted to increase the torque at low speed. No autotune required.

P4-01 = 0 will give best low speed torque performance
P4-01 = 1 will give good low speed torque performance but not as good as P4-01 = 0
P4-01 = 2 will give good low speed torque performance but not as good as P4-01 = 1

Optidrive Elevator Control Mode Set up Flowchart For Open Loop Induction Motors



Advanced Vector IM Speed Control will give the best performance and best torque control.

If an autotune is carried out with P4-01 = 0 (Advanced Vector IM Speed Control) with the default or an incorrect motor power factor, the magnetising current for the motor will be incorrect and this will mean that the motor will be either under or over magnetised on enable. This can give poor starting performance (lack of torque) or cause the drive to go into current limit because the motor is saturated (too much magnetising current).

If the motor power factor is not known, setting P4-01 = 1 (Vector IM speed control) and carrying out an autotune to measure the motors stator resistance is best practice.

P4-01 = 0 – Advanced Vector IM Speed Control without knowing motor power factor

NOTE: This set up should only be attempted by experience Optidrive Elevator users.

With the majority of motors where the power factor isn't available, the above information on setting P4-01 = 1 will produce adequate motor torque for good low speed torque performance.

With some very old AC motors where the power factor is not available, after an autotune has been carried out with P4-01 = 1 (Vector IM Speed Control) there may not be enough torque generated in the motor for good low speed torque performance.
To get better low speed torque performance, P4-01 = 0 can be set. An estimated power factor will need to be set in P4-05. The power factor of an old AC motor will be less than that of a new motor. A suggested initial power factor setting of 0.75 should be set in P4-05 and then an autotune should be carried out (P4-02 = 2). The measured magnetising current for the motor should be observed in P7-04.

The table below gives the default magnetising current value for the various ratings of Optidrive Elevator. With the initial suggested power factor (0.75) after an autotune has been carried out, the measured magnetising current should be similar to the value in the table.

If the measured magnetising current is less than the value in the table, decrease the power factor in P4-05 and carry out another autotune.

If the measured magnetising current is greater than the value in the table, increase the power factor in P4-05 and carry out another autotune.

Optidrive Elevator default magnetising current setting in P7-04

Model Number	Frame size	Input voltage	Number of input phases	Output voltage	kW	Maximum motor rated current in P1-08 (A)	Default Mag current value P7-04
ODP-2-22075-1KF42	2	200 to 240VAC ±10%	1	0 to 230V (250V max)	0.75	4.3	2.0
ODP-2-22150-1KF42	2				1.5	7.0	3.2
ODP-2-22220-1KF42	2				2.2	10.5	4.7
ODP-2-24400-3KF42	2	380 to 480VAC ±10%	3	0 to 400V (500V max)	4.0	9.5	4.4
ODP-2-34055-3KF42	3				5.5	14.0	6.5
ODP-2-34075-3KF42	3				7.5	18.0	8.1
ODP-2-34110-3KF42	3				11	24.0	10.5
ODP-2-44110-3KF4N	4	380 to 480VAC ±10%	3	0 to 400V (500V max)	11	24.0	10.5
ODP-2-44150-3KF4N	4				15	30.0	14.0
ODP-2-44185-3KF4N	4				18.5	39.0	18.2
ODP-2-44220-3KF4N	4				22	46.0	21.5
ODP-2-54300-3KF4N	5				30	61.0	27.6
ODP-2-54037-3KF4N	5				37	72.0	31.5

Usually an old motor will require slightly more magnetising current compared to a new motor to get good starting torque performance.

Further measures

Usually with the magnetising current set correctly as above, the motor should have good starting torque performance.

With some very old, very poor efficiency motors, it may be necessary to increase the low speed torque boost to increase starting torque.

Parameters P7-14 and P7-15 can be adjusted to increase motor torque at low speed.

A starting point would be to set P-15 to 10Hz and then increase P7-14 in small increments to increase motor torque at low speed.

P7-14 – Low frequency torque boost
Boost current applied to the motor at start up as a % of the motor rated current (P1-08).

P7-15 – Torque boost frequency limit
Frequency range for applied boost current (P7-14) as a % of motor rated frequency (P1-09). This sets the frequency cut-off point above which boost current is no longer applied to the motor.

NOTE: Increasing the low frequency torque boost in parameter P7-14 by too much can cause the motor to stall when trying to start. P7-14 should only be used when necessary and should only be increased in small increments.