

Application Note

AN-ODP-35

## ***High speed spindle applications***

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- **General:**

Optidrive Plus supports high speed spindle applications and can operate with an output motor frequency up to 2000Hz.

It is important for this type of applications that the torque is smooth to give good surface finishes for example in machine tool applications. This requires a smooth current waveform. In order to keep the motor current waveform good enough at high speeds, there are some limitations between the maximum available output frequency and the power module effective switching frequency.

This document describes how to set up the parameters to get the required motor output frequency.

- **Parameters**

***It is recommended that V/F control mode (P4-01=2) is used in this type of high speed application.***

### **P1- 01 Maximum speed limit**

This parameter sets the upper limiting boundary for the output motor frequency (speed) that can be applied to the motor in any mode of operation.

Usually this parameter can be set up to five times of the motor base frequency (P1-09), but it is also limited by the Effective power stage switching frequency (P2-24).

### **P2- 24 Effective switching frequency**

This parameter specifies the effective switching frequency. The value in this parameter will also limit the maximum available drive output frequency.

The relationship between the effective switching frequency and drive maximum speed / drive base speed is showed in the table below:

Effective switching freq	Maximum speed/ Base freq
4kHz	250Hz
8kHz	500Hz
16kHz	1000Hz
24KHz	1500Hz
32KHz	2000Hz

*Note: For the different drive sizes, the maximum value for the effective switching frequency may be different. See the user guide for more information.*

For example, if P2-24 = 4kHz and P1-09 = 100Hz, then the upper limit for P1-01 is 250Hz. If the user wishes to set P1-01 to a value larger than 250Hz, then the value in P2-24 must be increased.

Parameter P1-01, P1-09 and P2-24 are inter-related. For example, if P2-24 = 8kHz and P1-01 = 300Hz, the user cannot reduce P2-24 to 4kHz until the value in P1-01 is less than 250Hz.

Parameter P2-24 has an "Automatic" mode, which when selected, configures the drive to operate at the minimum possible switching frequency that supports the value of maximum output speed set in P1-01.

- ***Further information***

The skip frequency function can be used to avoid zero speed wobble when using the analog input as the speed reference in this kind of application. Standby mode can also be used to prevent the motor from over-heating at zero speed. For more information about skip frequency and standby mode, please see AN-ODP-07 and AN-ODP-12.

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