Introduction

This app note describes how to set up a profiled position move with velocity, acceleration, and deceleration limits.

Note: This document is intended for use with AN-006, which provides examples on how to configure and send target commands in various drive modes.

The Command Limiter

The Command Limiter is the tool for configuring profiled position moves. Turn on the Command Limiter in DriveWare by clicking the Accel/Decel radio button in the Drive > Configuration 0 window in the System Browser, or through the RS232 interface using index D1h.

Drive Units

To convert from physical units to drive units, start with velocity in counts/sec, then acceleration and deceleration in counts/sec² based upon feedback resolution, and then multiply by the scaling factor in Table 1.

<table>
<thead>
<tr>
<th>Drive Unit Type</th>
<th>Physical Units</th>
<th>Scaling Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accel/Decel</td>
<td>counts/s²</td>
<td>DA3 = 2²⁰KₘₛKₛ</td>
</tr>
<tr>
<td>Max Speed</td>
<td>counts/s</td>
<td>DS3 = 2³¹Kₛ</td>
</tr>
</tbody>
</table>

Table 1 - Drive Unit Scaling Factors

In order to convert to drive units, the following information in the table below must also be known.

<table>
<thead>
<tr>
<th>Constant</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kₘₛ</td>
<td>Maximum profiler speed (in counts/s) for an Accel/Decel command profile.</td>
</tr>
<tr>
<td>Kₛ</td>
<td>Switching frequency of the drive in Hz. This is found on the drive datasheet.</td>
</tr>
</tbody>
</table>

Table 2 - Drive Quantities

Example Profiled Move

Write a maximum velocity of 800 RPM to 3C.18h given a motor with a 2000 line encoder using a drive with a 20KHz switching freq.

\[
\begin{align*}
800 \text{ rev/min} & \times 8000 \frac{\text{counts}}{\text{rev}} \times \frac{1 \text{ min}}{60 \text{ sec}} = 106,667 \frac{\text{cnts}}{\text{sec}} \\
106,667 \frac{\text{cnts}}{\text{sec}} & \times \frac{2³¹}{20,000} = 45,812,984,490.668
\end{align*}
\]
Round to the nearest whole number and convert to hex.

45,812,984,491 = AAAAAAAABh

**Write an acceleration and deceleration limit of 100 RPM/s to 3C.1Ch and 3C.1 Eh**
given a motor with a 2000 line encoder using a drive with a 20KHz switching freq.

Convert 100 RPM/s to counts/sec², then multiply by the scaling factor.

\[
100 \text{rev/min} \times \frac{8000 \text{counts/rev}}{\text{rev}} \times \frac{1 \text{min}}{60 \text{sec}} = 13,333.33
\]

The calculated maximum velocity is substituted for the \( K_{ms} \) value.

\[
13,333.33 \frac{\text{cnts}}{\text{sec}^2} \times \frac{2^{16}}{20,000 \times 10000/7} = 1.677.72
\]

Round to the nearest whole number and convert to hex.

1,678 = 68Eh

**Note:** Make sure you have write access to the drive. If not, write an Fh to object 07.00h.

**Sending RS232 Messages.**

To write the maximum velocity, send the following command:

```
SF DA CB Ind.Off L CRC
A5 3F 02 3C 18 04 5C CC
```

To set the acceleration and deceleration values send this data. Acceleration is at index 3C offset 1C. Deceleration is at index 3C offset 1E.

To set the acceleration:

```
SF DA CB S1 S2 L CRC
A5 FF 00 01 00 00 CF B6
```

**Acceleration:**

```
SF DA CB Ind.Off L CRC
A5 3F 02 3C 1C 02 F0 CE
Data CRC
8E 06 00 00 CD C2
```

```
Deceleration:
SF DA CB Ind.Off L CRC
A5 3F 02 3C 1E 02 96 AC
Data CRC
8E 06 00 00 CD C2
```

**Note:** Changing max speed will require recalculating accel/decel values.

**Drive Status – At Command**

To verify that the position has been reached, read the At Command in 02.04h. When high, this indicates that the measured position is within the “At Position Window” of the Position Target. The At Position Window is the desired tolerance on the measured position and can be set within DriveWare (Position Limits).

**Verify position has been reached by reading bit 1 of object 02.04h**

Command a position move of 2,133,333 counts. The move begins immediately and the total time is 28s. Then, read object 02.04h as shown below.

Send:

```
SF DA CB S1 S2 L CRC
A5 3F 01 02 04 01 0F 0F
```

Reply:

```
SF DA CB Ind.Off L CRC Data CRC
A5 FF 02 01 00 01 32 FF C7 00 8F C3
```

Convert the data read from object 2.04h to binary.

00C7h = 0000000011000111

At Command is active, indicating that the measured position has reached the target of 2,133,333 counts.