

Serial Example for Velocity Mode Using Command Profiler

Velocity Mode Examples Using Command Profiler

This document is intended for use with AN-006, which provides examples on how to send a velocity command to an Advanced Motion Controls serial servo drive.

Make sure the drive is configured for velocity mode with the Command Source set to Interface Input 1 and the Command Limiter activated to allow for the acceleration and deceleration to be adjusted.

Command Profiler Objects for Acceleration/Deceleration Limits in Velocity Mode

The following objects are used to set acceleration and deceleration limits when operating in velocity mode. These parameters are often set to the same value so that the acceleration and deceleration are limited equally for both directions of motor rotation.

3C.00h

Linear Ramp Positive Target Positive Change
This parameter limits the acceleration for a velocity commanded in the positive direction.

3C.03h

Linear Ramp Positive Target Negative Change
This parameter limits the deceleration for a velocity commanded in the positive direction.

3C.06h

Linear Ramp Negative Target Negative Change
This parameter limits the acceleration for a velocity commanded in the negative direction.

3C.09h

Linear Ramp Negative Target Positive Change
This parameter limits the deceleration for a velocity commanded in the negative direction.

Drive Units

To convert from acceleration units to drive units, start with an acceleration in counts/sec², based upon feedback resolution, then multiply by the scaling factor below. To convert from drive units to counts/sec², divide by the scaling factor.

Drive Unit Type	Physical Units	Scaling Factor
Acceleration	counts/s ²	DA2 = 2 ³⁴ /K _I K _S ²

Constant	Value
K _I	Feedback interpolation value. Only applies to drives that support 1 V _{pp} Sin/Cos feedback. For all other drives, K _I = 1.
K _S	Switching frequency of the drive in Hz. This is found on the drive datasheet.

Example 1 – Write an acceleration limit of 100 RPM/s to 3C.00h 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.

$$100 \frac{\text{rev}}{\text{min} \cdot \text{s}} \times 8000 \frac{\text{counts}}{\text{rev}} \times \frac{1 \text{ min}}{60 \text{ sec}} = 13,333.33 \frac{\text{cnts}}{\text{sec}^2}$$

$$13,333.33 \frac{\text{cnts}}{\text{sec}^2} \times \frac{2^{34}}{20,000^2} = 572,662$$

Round to the nearest whole number and convert to hex.

$$572,662 = 8BCF6h$$

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



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Set the linear ramp, positive target, positive change limit to 100 RPM/S by writing 8BCF6h to object 3C.00h.

Send

SF	DA	CB	Ind.Off	L	CRC	Data							
A5	3F	02	3C	00	03	A6	F1	F6	BC	08	00	00	00

CRC	
3C	8B

Reply

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

Typically, all four objects are set to the same value to enable equal acceleration and deceleration for both positive and negative velocity.

After all linear ramp parameters have been set to desired values, a velocity may be commanded and the effects of these limits can be observed.

Drive Status – At Command

To verify that the velocity has been reached, read bit 1 of object 02.04h, which is the Drive System Status 2. This object has a length of 1 word (2 bytes). When bit 1 is high, this indicates that the measured velocity is within the “At Velocity Window” of the Velocity Target. The At Velocity Window is the desired tolerance on the measured velocity and can be set within DriveWare (Limits & Options panel) or over a serial network using object 37.04h.

Example 2 – Verify velocity has been reached by reading bit 1 of object 02.04h

Start by commanding velocity as shown in Application Note #6. Then, read object 02.04h as shown below.

Send

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

Reply

SF	DA	CB	Ind.Off	L	CRC	Data	CRC
A5	FF	02	01	00	01	32 FF	02 00 66 62

Convert the data read from object 2.04h to binary.

0002h = 0000000000000010

Bit 1 is high, therefore the At Command event is active, indicating that the measured velocity is within the At Velocity Window of the target velocity that was commanded.