Encoder Resolutions Greater Than 32767 Counts per Rev.

Abstract

MotionBASIC® allows encoders with a resolutions of 1 to 32767 counts per revolution. Occasionally, applications require resolutions higher than this. This tech note shows you how to set the axis parameters and user units to use higher resolutions.

There are two different procedures depending on whether the high resolution encoder is used to provide position feedback for a servo motor or position data for a pacer/follower. The procedures are grouped under headings representing the MotionPRO™ configuration forms to which they refer.

Case 1 - Axis Feedback Encoder

If the encoder is not mounted directly on the motor shaft*, you should first adjust the actual resolution to convert it to counts per motor revolution. Sometimes this step alone will reduce the effective counts per rev to less than 32767 making the remainder of this process unnecessary. This adjusted value of counts per rev is the value you should use wherever this procedure refers to “actual resolution”.

*See also Tech Note TN018, “Split Velocity/Position Feedback”.

Motor/Load Parameters Form

Position Transducer Resolution - Set this to the largest number less than 32767, that is a convenient multiple of the actual resolution. For example, if your encoder has 50000 counts per rev, set this value to 25000. Calculate the ratio of the actual resolution and the resolution you enter and call it R. We will use this value throughout this procedure. In the above example R will be 50000/25000 = 2.

Motor Maximum Speed - set this to the actual maximum speed multiplied by R.

Motor Inertia - Enter the actual value divided by R.

Load Inertia at Motor Shaft - Enter the actual value divided by R.

User Units Form

Axis Position - calculate the User Units and Motor Units in the normal way, based on the actual motor encoder resolution.

Machine/Axis Speed Limit - Calculate the User Units and the Motor Units in the normal way then multiply the Motor Units by R.

Machine/Motor Accel Limit - Calculate the User Units and Motor Units in the normal way then multiply the Motor Units by R.

Gear Speed Multipliers - Calculate these values based on the actual resolutions of the Motor and Pacer encoders.
Case 2 - Pacer Encoder

Motor/Load Parameters Form

Position Transducer Resolution - Set this to the largest number less than 32767, that is a convenient multiple of the actual resolution. For example, if your encoder has 50000 counts per rev. set this value to 25000. Calculate the ratio of the actual resolution and the resolution you enter and call it P. We will use this value throughout this procedure. In the above example P will be 50000/25000 = 2.

Motor Maximum Speed - set this to the actual maximum speed multiplied by P.

User Units Form (For Pacer Encoder Axis)

Axis Position - calculate the User Units and Motor Units in the normal way, based on the actual pacer encoder resolution.

Machine/Axis Speed Limit - Calculate the User Units and the Motor Units in the normal way then multiply the Motor Units by P.

Machine/Motor Accel Limit - Calculate the User Units and Motor Units in the normal way then multiply the Motor Units by R.

User Units Form (For Follower Axis)

Position Transducer Resolution (Pacer): Set to the actual pacer encoder resolution divided by P.

Pacer Position - calculate the User Units and Motor Units in the normal way using the actual pacer encoder resolution.

Pacer Transducer Speed Limit - Set to the actual speed limit you want multiplied by P.

Gear Speed Multipliers - Calculate these values based on the actual resolutions of the Motor and Pacer encoders.

General Notes

Once you have configured the system in the above manner, you can program your application in the normal way. You will need to make sure that the maximum speed of the encoder (in revs per sec) multiplied by the resolution 1.0 MHz or less.