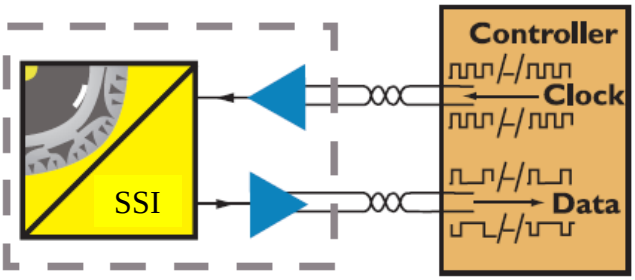
Using an External SSI Linear Encoder for Dual Loop Mode

Objective

Explain how to set up a “Dual Loop” system using an external SSI linear encoder.

SSI (Synchronous Serial Interface) Interface Primer

SSI output provides effective synchronization in a closed-loop control system. A clock pulse train from the drive is used to shift out encoder data: one bit of position data is transmitted to the drive per clock pulse received by the sensor.



Key SSI Parameters are:

- Baud Rate
- Communication Bit Resolution – Number of data bits used to represent the whole encoder position in the communication message.
- Data Format: Gray Code or Binary Format
- Power Supply Fail Bit Monitoring

Understanding the positional data of a SSI linear encoder:

- The maximum position is based on the Communication Bit Resolution (Number of data Bits) and the units of resolution for each bit.
- Example: A SSI encoder which has 24 bits of position data and resolution of 1 micron has a maximum position of 2^24 (16,777,216) microns

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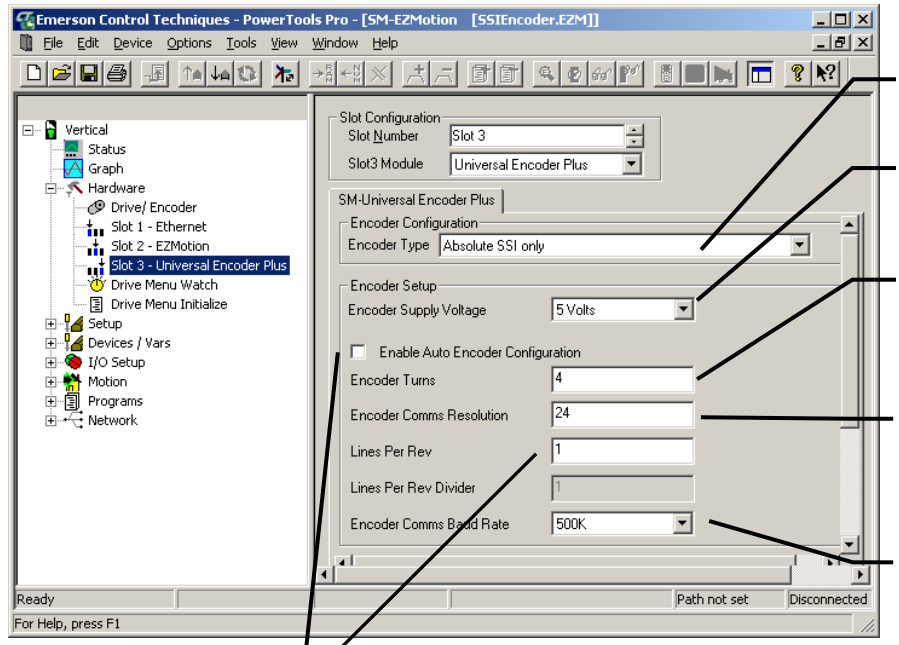
Step 1 – External SSI Encoder Setup



Select Absolute SSI only

Select Encoder Voltage Based on Encoder Specifications

Enter Number of Encoder Turn Bits Based on Required Resolution & User Units

Enter Encoder Communication Bit Resolution Based on Encoder Specifications

Select Encoder Comms Baud Rate Based on Encoder Specifications

Not Applicable

Note: Increase Encoder Turns to improved feedback resolution. Feedback resolution is displayed on User Units Setup in Step 2

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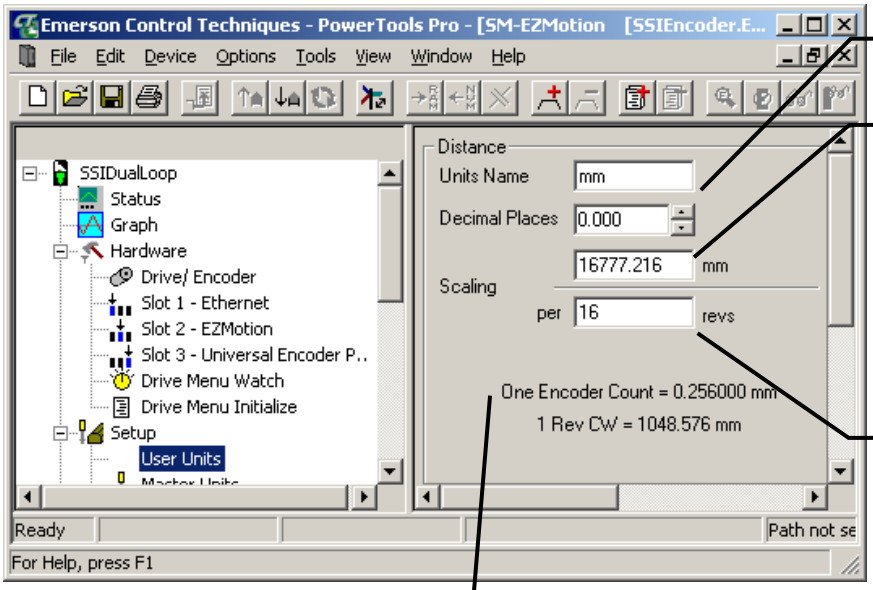
Step 2 – User Units Setup



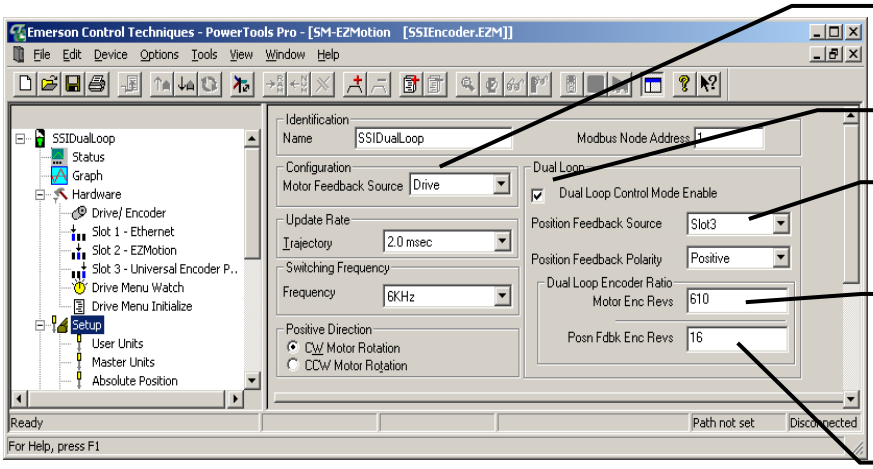
Enter User Units

Enter Number Based on Encoder Comms Resolution Entered in Step 1, the User Units and the Resolution of Each Bit in the Position Data (Encoder Units).
Entry = 2^(Comms Resolution) / Number of Encoder Units per User Units

Enter Number Based on the Number of Encoder Turn Bits Entered in Step 1.
Entry = 2^(Number of Turn Bits)

Feedback Resolution. Increase encoder turns in step 1 for improved resolution

Step 3 – Dual Loop Setup



Select the Appropriate Motor Encoder Port

Check the Dual Loop Mode

Select the Appropriate SSI Encoder Port

Enter number based on the number of motor revs to move the SSI encoder to the full range entered as the numerator in step 2.

Enter Number Based on the Number of Encoder Turn Bits Entered in Step 1.
Entry = 2^(Number of Turn Bits)

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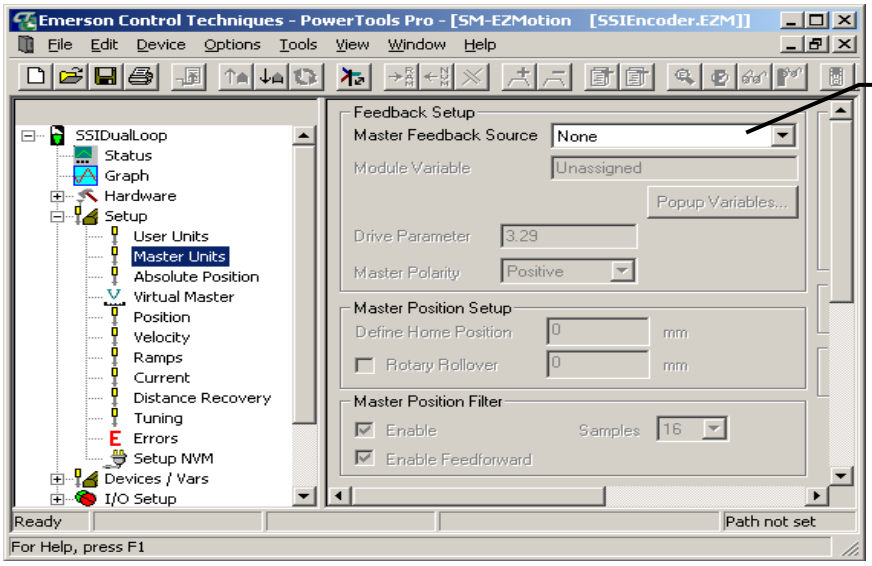
Step 4 – Master Unit Setup



For Dual Loop Mode Make Sure Master Feedback Source is Set to None.

Examples:

Encoder Data		Gearing	PowerTools Configuration						
			PowerTools User Units			SSI Encoder Setup		Dual Loop Setup	
Comm Bits	Data Resolution	Gear Ratio (distance per motor rev)	User Units	Scaling Numerator	Scaling Denominator	Encoder Turns	Comms Resolution	Motor Enc Revs	Posn Fdbk Enc Revs
24	1 Micron	27.5mm/rev	mm	16777.216	16	4	24	610	16
24	1 Micron	27.5mm/rev	mm	16777.216	1024	10	24	610	1024
24	1 Micron	1mm/rev	mm	16777.216	16	4	24	16777	16
25	1 Micron	1mm/rev	mm	33554.432	16	4	25	33554	16

For information on setting up a Dual Loop system with incremental feedback refer to Application Note EZAT-13.

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