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# Linear Encoder

## Linear Encoders with TTL Interpolation Module

Application Note  
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Issue 2

### Consideration of output signal frequency and shaft velocity for Linear Encoders with TTL Interpolation Module (LE TTL) and LEIM

When using LE TTL variants it is important that the interface electronics (counter card, EIM etc.) used to read the output has a suitable frequency specification. If the maximum input frequency range is too low the encoder will appear to lose count.

The output frequency from the Linear Encoder is dependent on:

- ▶ Shaft velocity (gauging speed)
- ▶ Interpolation Rate

The maximum LE TTL output frequency from the interpolation module is calculated as follows:

- ▶ Output Frequency (kHz) = Shaft Velocity (ms<sup>-1</sup>) x 25 x Configurator Interpolation Rate\*

The table below shows typical values of Output Frequency versus Velocity and Interpolation Rate\*:

Shaft Velocity (m/s)	Configurator Interpolation Rate			
	Square Wave Output Frequency (kHz)			
	A (x100)*	B (x200)*	C (x400)*	D (x800)*
0.1	250	500	1000	2000
0.2	500	1000	2000	4000
0.3	750	1500	3000	-
0.4	1000	2000	4000	-
0.5	1250	2500	-	-

\*The Interpolation Rates shown assume that the counter used to read the LE TTL output is set to quadrature count mode (quad edge detection).

Note: With pneumatic Linear Encoders the inherently higher shaft velocity results in a higher output frequency, therefore the interpolation rate must be limited to type A (X100) and type B (X200).

### Dynamic Linear Encoder (LEIM)

To allow the Linear Encoder to be used as part of a Dynamic Orbit network, a special version of the Linear Encoder has been developed. The LEIM combines a LE TTL and an Encoder Input Module (EIM) to provide a 'Dynamic' Linear Encoder, a feature not possible with the standard Orbit Linear Encoder.

The EIM has a maximum input frequency of 1.2 MHz. This limits the shaft velocity of the Linear Encoder to 0.24 ms<sup>-1</sup>. If the probe is moved faster than this, the system will lose count. There is currently no method of signalling this condition and care should be taken when designing measurement systems with the LEIM.

Note: There are restrictions on cable lengths for LE TTL and LEIM dependent upon configuration. Technical advice is available.