

FEATURES

- ❑ “System on a Chip” sensor technology
- ❑ Quadrature Outputs
- ❑ Index Output (once per revolution)
- ❑ 0.35 degree resolution 1/1024 per revolution
- ❑ High shock & vibration resistance
- ❑ 10,000 RPM Capability
- ❑ -40° C to +90° C operation
- ❑ 5V nominal supply voltage
- ❑ Environmentally protected to IP-67
- ❑ Anodized or Nickel Plated housing options for corrosion resistance.
- ❑ Small form factor solution.
- ❑ Zero-Halogen continuous flex cable
- ❑ Slew rate limited differential outputs for high noise rejection, and low EMI radiation.



A MAGNETIC NON-CONTACT ROTARY ENCODER for position feedback in a wide range of industrial applications.

Eclipse Scientific Products is pleased to offer MPE-2, a versatile rotary encoder that senses position by measuring the orientation of the North-South poles of a specially magnetized magnet.

In a typical application, a suitable magnet is mounted on a shaft, wheel, or other mechanical component that rotates, and MPE-2's integrated sensor produces the incremental A & B quadrature output signals of common industrial encoders.

MPE-2 has no moving parts to wear out, and it's robust design offers very high resistance to shock and vibration. MPE-2 operates over a -40 to + 90 C temperature range and features a durable polyurethane CSA/UL approved continuous flex cable.

Eclipse Scientific will quote customer specific connectors and others options upon request.

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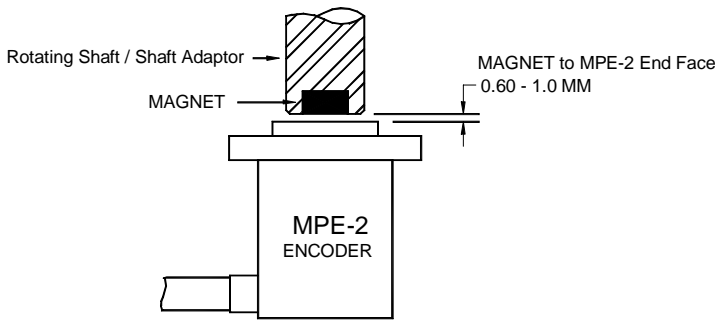
Magnet Alignment

The MPE-2 sensor element is positioned directly at the center of the encoder's end face, and the rotating magnet should be positioned as close as possible to that centerline, and normal to the mounting flange for proper operation. MPE-2 is designed to locate into a 14 mm hole.

Sensing Distance

The optimum distance between a rotating magnet and the MPE-2 end face is 0.6 mm to 1.0 mm as shown in figure 1. Increasing the distance between magnet and sensor will cause the encoder outputs to jitter, however, the encoder does not lose counts until the magnetic field drops below its sensitivity. It may be possible to increase the sensing distance and minimize output jitter using more powerful magnets if greater sensing distance is required.

Figure 1

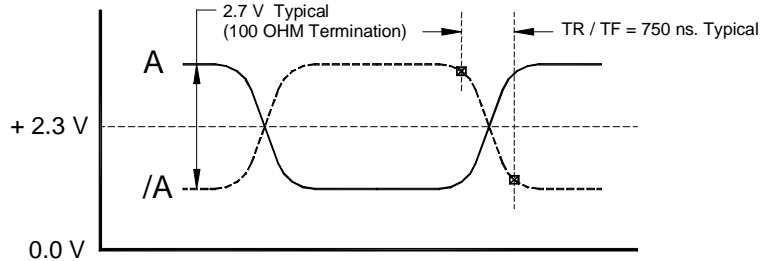


Digital Outputs

MPE-2 generates quadrature (A/B) digital outputs and a once per revolution Index (Z) output. Unlike many small form factor encoder products, MPE-2 has rugged slew-rate limited (low EMI) differential outputs to drive terminated differential lines. A simple example waveform diagram for the A & /A output is shown in figure 2. MPE-2 differential outputs have a common mode voltage of approximately 2.3 Volts. The typical differential voltage swing for a 100-Ohm termination is 2.7 volts.

Differential interconnect rejects common mode interference in the form of EMI and ground loops to enable error free counting over hundreds of meters of cable when properly terminated. The outputs can be used to drive a variety of industry standard Encoder Interface cards and Motion Controllers.

Figure 2



Single Ended Outputs

MPE-2 outputs swing 0 - 4.50 volts unterminated or lightly loaded, and can be used to drive motion controllers and CMOS/TTL logic in a single ended fashion with respect to the Supply V- (Signal Ground) when differential interconnect isn't required. In single ended mode, /A, /B & /Z outputs can be left unconnected. MPE-2 outputs have a 750 ns. rise time (for low EMI), which may be too slow for direct interface to TTL & CMOS digital logic. Eclipse recommends a high gain receiver suitable for slow rise time encoder signals.

Accuracy

MPE-2's incorporates an advanced magnetic sensor containing Analog & Digital signal processing to measure magnetic field strength and orientation in order to determine angular position. This process takes place at approximately 100 us. intervals (a 10 KHz rate). Because of this processing burden, MPE-2's quadrature outputs can lag behind actual position by up to 1.0 degrees at high speeds, which is much higher than typical optical encoders. However, in many applications, the distance traveled per motor revolution is small because a gear reduction is typically employed, and the resulting positional error in motion due to the encoder lag may not be a significant factor. MPE-2 does not lose counts, the quadrature outputs simply lag behind actual position at high speed. As the rotational speed decreases, the error decreases to within +/- .35 degrees. The worst case output lag at high speed is < 1.0 degree.

IMPORTANT NOTE

MPE-2 auto-calibrates upon power up, so it's important that a magnet be in place when power is applied.

GENERAL SPECIFICATIONS

Parameter	Conditions/Comments	Min	Typ	Max.	Units
Resolution	A & B Outputs		256		PPR
Effective resolution	4X Quadrature mode		1024		Count/Rev
Max. RPM	Recommended Magnetic Source		10,000		RPM
Accuracy			+/- 0.35		Degree
Magnet sensing distance	Recommended Magnetic source		1.0		mm
Operating Voltage		4.5		6	Volts
Operating Current	Outputs unterminated		20		ma.
	A + B + Index, 100 OHM diff load		110		ma.

DIGITAL OUTPUTS

Parameter	Conditions/Comments	Min	Typ	Max.	Units
Output Voltage					
LOW State	Unterminated		0		Volts
HIGH State	Unterminated		4.5		Volts
Rise/Fall Time	Measured @ 20% - 80%		750		ns
Differential output voltage	100 OHM Termination (i.e. A+ to A-)		2.7		Volts
Minimum load impedance			100		Ω

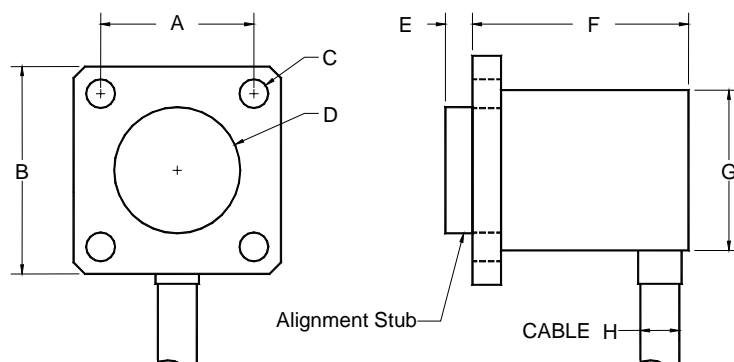
ENVIRONMENTAL

Parameter	Conditions/Comments/SPEC	Min	Typ	Max.	Units
Operating Temp Range		-40		+90	$^{\circ}$ C
Storage Temp Range			TBD		
Protection Class	IP-67 minimum				
Specified Depth	TBD		TBD		
Specified Time Duration	TBD		TBD		

MPE-2 DIMENSIONS

Note: MPE-2 is designed to locate in a 14.00 mm hole, and fastened with M3 or #4 screws.

DIM (Nominal)	INCHES	MM	TOL
A	0.700	17.80	+/- .2 MM
B (Square)	0.90	23.0	+/- .2 MM
C x 4	0.126	3.20	+/- .2 MM
D	0.543	13.82	+/- .2 MM
E	0.118	3.0	+/- .2 MM
F	0.906	24.0	+/- .2 MM
G	0.70	17.8	+/- .2 MM
H	0.18	4.8	



STANDARD WIRING CONNECTIONS

Table 6 refers to MPE-2 with the -01 cable Option (Yellow Polyurethane jacket).

MPE-2 can be ordered with different types of cable to suit requirements, and wire colours may vary. The -01 Cable option is standard. A minimum QTY applies to other cable types.

Table 6

Colour	Signal	Description
Red	VCC	5.0 VDC (V+ Supply)
Black	GND	GND (0V) Isolated from Housing
Orange	A+	A (Quadrature Output)
White	A-	A Inverted (complementary signal)
Blue	B+	B (Quadrature Output)
Green	B-	B Inverted (complementary signal)
Brown	Z+	INDEX
Yellow	Z-	INDEX Inverted (complementary signal)

Note: Shield is connected to MPE-2 housing, and isolated from power and signal conductors.

Alternate Conductor Colours

Table 7 refers to MPE-2 with -02 Cable option (Grey PVC Jacket).

Table 7

Colour	Signal	Description
Red	VCC	5.0 VDC (V+ Supply)
Black	GND	GND (0V)
Orange	A+	A (Quadrature Output)
White	A-	A Inverted (complementary signal)
Blue	B+	B (Quadrature Output)
Green	B-	B Inverted (complementary signal)
Red/Black	Z+	INDEX
White/Black	Z-	INDEX Inverted (complementary signal)

MPE Series MAGNETS

Eclipse Scientific markets specialized magnets that are ideal for use with MPE series magnetic encoders. These magnets are very high quality and nickel plated for high corrosion resistance.

PN:	Dimensions
ESPM-6025	6 mm. Dia. X 2.5 mm. L Tolerance (+/- 0.1) mm.

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