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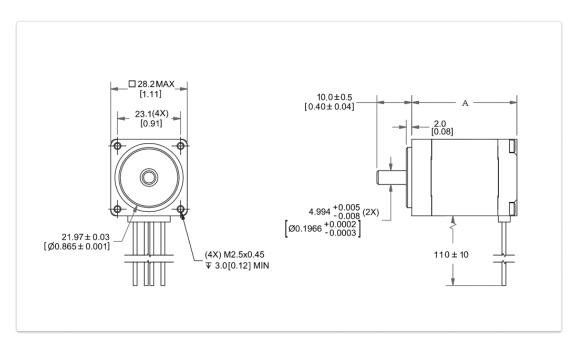
36488-MS

MOTOR SPECIFICATIONS

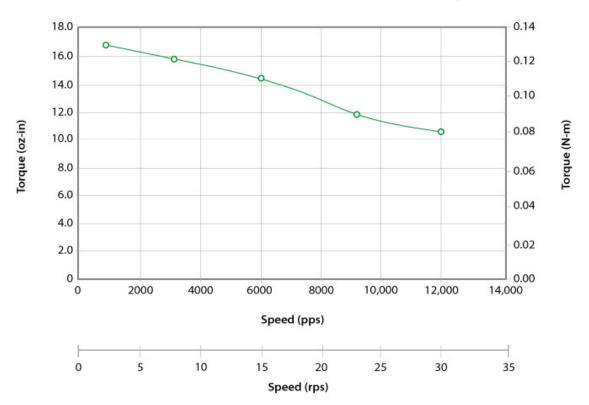
Part Number	211-20-02			
NEMA Size	NEMA 11			
Frame Size	28.2mm (1.1 in)			
Step Angle	1.8 deg/step			
Body Length (Dim. A)	51.1mm (2 in)			
Current	1.3 Amps/Phase			
Holding Torque	0.12 Nm (17 oz-in)			
Resistance	1.9 Ohm/Phase			
Rotor Inertia	18.3 g-cm2 (0.1 oz-in)			
Number of Leads	4			
Connection	Bipolar			
Weight	0.2 kg (0.44 lb)			



DIMENSIONS



PERFORMANCE CURVE



211-20-02 24VDC, 1.3 Amps/Phase, Bipolar, 1/2 Stepping

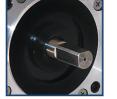
OPERATING CONDITIONS

Radial Play	0.03 mm max @ 0.45 kg load (0.001 in max @ 1 lb load)
End Play	0.08 mm max @ 1.36 kg load (0.003 in max @ 3 lb load)
Shaft Run Out	0.05 mm TIR (0.002 in TIR)
Concentricity of Mounting Pilot to Shaft	0.08 mm TIR (0.003 in TIR)
Perpendicularity of Shaft to Mounting Face	0.08 mm TIR (0.003 in TIR)
Max Axial Load	1.02 kg (2.2 lb)
Maximum Case Temperature	60 deg C
Ambient Temperature	-20 to 50 deg C
Storage Temperature	-20 to 100 deg C
Humidity Range	85% or less, non-condensing
Magnet Wire Insulation	Class B 180° C*
Insulation Resistance	100 Ohm at 500 VCD
Dielectric Strength	500 VCD for 1 min

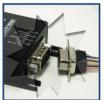
OPERATION & USAGE TIPS



Do not disassemble motors; a significant reduction in motor performance will occur.



Do not machine shafts; this will have a negative effect on shaft run out and perpendicularity.



Do not disconnect motor from drive while in operation.



Do not hold motor by lead wires.



Do not exceed the rated current; this wil burn the motor.

FAILURE TO COMPLY WITH THESE RECOMMENDATIONS WILL VOID ALL WARRANTY TERMS

brake.

WIRING TABLE

COLOR	FUNCTION	
Red	A+ Phase	
Blue	A- Phase	
Green	B + Phase	
Black	B- Phase	

RECOMMENDED DRIVERS/CONTROLLERS



Single Axis Controller + Driver **R256-RO**



Microstepping Driver

Motion Control, Solved. MOTOR ENGINEERING & MANUFACTURING







Quick Prototype Turnaround



Small Batch to OEM Volume Production



US Based Support & Manufacturing



US E4T Miniature Optical Kit Encoder Page 1 of5



Description

The E4T miniature transmissive optical encoder is designed to provide digital quadrature encoder feedback for high volume, limited space applications. The E4T is designed to be a drop in replacement for the E4P that offers higher maximum speed and increased output drive. The E4T utilizes an innovative, push-on encoder disk which accepts shaft diameters of 2.0mm to .250".

The E4T miniature encoder base provides mounting holes for two #3-48, length 3/16" or two M2.5, length 4mm screws on a .586" bolt circle. The encoder cover is easily snapped onto the base and is marked with the connector pin-out.

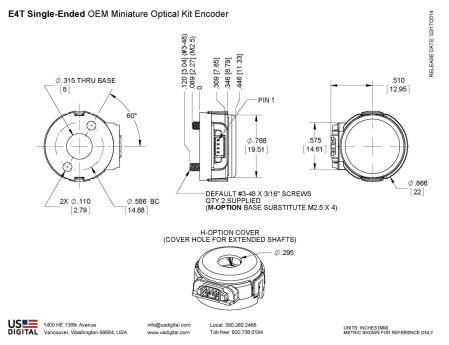
The E4T series encoder is connected using a 4-conductor, high retention, polarized, 1.25mm pitch connector. Mating cables and connectors (see the Cables / Connectors web page) are not included, and are available separately.



Features

- E4T Optical Kit Encoder
- Push-on hub spring loaded collet design
- Minimum shaft length of .275"
- ▶ Fits shaft diameters of .079" to .250"
- 100 to 500 cycles per revolution (CPR)
- + 400 to 2,000 pulses per revolution (PPR)
- Single +5V supply







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Environmental

Parameter	Value	Units
Operating Temperature	-20 to 100	С
Electrostatic Discharge, IEC 61000-4-2 Single-ended (-S version) Differential (-D version)	± 12 ± 7	kV
Shock, 6 millisecond, half-sine	75	G
Vibration (20Hz to 2kHz, sinusoidal)	20	G

Mechanical

Parameter	Value	Units
Max. Shaft Axial Play	± .010	in.
Max. Shaft Runout (TIR)	.002	in.
Max. Acceleration	250,000	rad/sec ²
Maximum RPM (1) e.x. CPR = 300, max. rpm = 20,000 e.x. CPR = 200, max. rpm = 30,000	minimum value of (6,000,000/CPR) and (60,000)	rpm
Max. Codewheel Moment of Inertia	5.1 x 10^-7	oz-in-s²
Mounting Screw Size Default (D-option base) Metric (M-option base)	#3-48 x 3/16" M2.5, length 4mm	
Screw Bolt Circle Diameter	.586 ±.005	in.
Minimum Shaft Length (2)	.275	in.
Maximum Shaft Length (2)	.395 (D option) / no limit (H option)	in.
Mounting Screw Torque	2-3	in-lbs
Technical Bulletin TB1001 - Shaft and Bore Tolera	inces	Download

(1) 60,000 rpm is the maximum rpm due to mechanical considerations. The maximum rpm due to the module's 100kHz maximum output frequency is (6,000,000/CPR).

(2) Including axial play.



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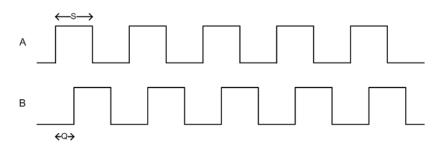




Single-ended Electrical

Specifications	Min.	Тур.	Max.	Units	Notes
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		25	30	mA	no load
Low-level Output			0.4	V	IOL = 8 mA
		0.035		V	no load
High-level Output	2.4			V	IOH = -8 mA
		4.0		V	no load
Output Rise Time		100		ns	no load
Output Fall Time		50		ns	no load

Phase Relationship



Parameter	Min.	Тур.	Max.	Units
Symmetry, S	105	180	255	electrical degrees
Quadrature Delay, Q	30	90	150	electrical degrees

(1) A leads B for clockwise shaft rotation, B leads A for counter clockwise shaft rotation viewed from the cover side of the encoder.

(2) Typical values represent the encoder performance at typical mounting alignment, whereas the maximum values represent the encoder performance across the range of recommended mounting tolerance.

Pin-out

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4-pin Single-ended

Pin	Description	
1	+5VDC power	
2	A channel	
3	Ground	
4	B channel	

(1) 4-pin single-ended mating connector isCON-MIC4

(2) 6-pin differential mating connector isCON-MIC6



H-option (Hole In Cover)

The H-option adds a 0.295" diameter hole in the cover for the shaft to pass through.

M-option (Metric Mounting Screws)

Provides alternate metric M2.5, length 4mm screws. When M-option is NOT specified the default is #3-48 x 3/16" screws.

Accessories

1. Centering Tool*

Part #: MCTOOL - (Shaft Diameter)

Description: This reusable tool is used to accurately center the E4T base on the shaft.

2. Spacer Tool*

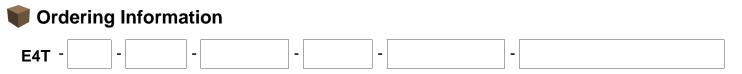
Part #: SPACER-E4T

Description:This reusable tool is used to properly space the codewheel from the encoder.

*Both the MCTOOL and SPACER-E4T tools are included with all packaging options.

Assembly Instructions

E4T Assembly Instructions - http://usdigital.com/assets/assembly/E4T%20Assembly%20Instructions.pdf





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USEE E4T Miniature Optical Kit Encoder Page 5 of 5



CPR	Bore	Output	Cover	Base	Packaging
100	079 <i>=2mm</i>	S =Single	D =Default	D =Default	B = Encoder components packaged in bulk.
108	098 =	Ended	H =Hole in	M =Alternate metric	One spacer and one centering tool per 100
120 =	2.5mm	D =Differential	Cover	M2.5, length 4mm	encoders.
125 =	118 <i>=3mm</i>			screws	1 = Each encoder packaged individually.
128 =	125 =1/8"				One spacer tool and one centering tool per
200 =	157 <i>=4mm</i>				100 encoders.
250 =	188 =3/16"				2 =Each encoder packaged individually. One spacer and one centering tool per
256 =	<u> 197 <i>=5mm</i></u>				encoder.
300 =	236 = <i>6mm</i>				
360 =	250 = 1/4"				
400 =	_				
500 =	-				

Notes

· Cables and connectors are not included and must be ordered separately.

• US Digital® warrants its products against defects in materials and workmanship for two years. See completewarranty for details.



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