

## 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.

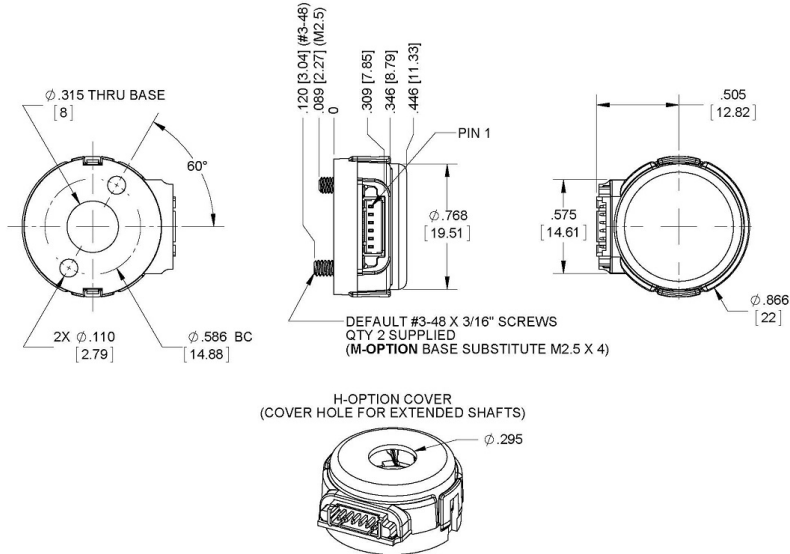


## Features

- ▶ 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

**E4T Differential**

E4T Differential OEM Miniature Optical Kit Encoder



RELEASE DATE: 02/17/2014

**US DIGITAL** 1400 NE 136th Avenue  
Vancouver, Washington 98684, USA

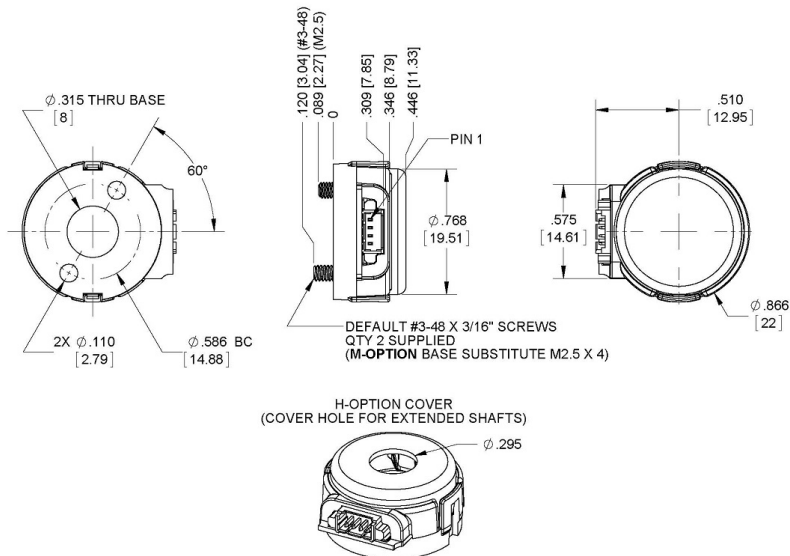
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UNITS: INCHES (MM)  
METRIC SHOWN FOR REFERENCE ONLY

**E4T Single Ended**

E4T Single-Ended OEM Miniature Optical Kit Encoder



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### Environmental

Parameter	Value	Units
Operating Temperature	-20 to 100	C
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 <sup>2</sup>
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 <sup>-7</sup>	oz-in-s <sup>2</sup>
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 Tolerances

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(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.

### Single-ended Electrical

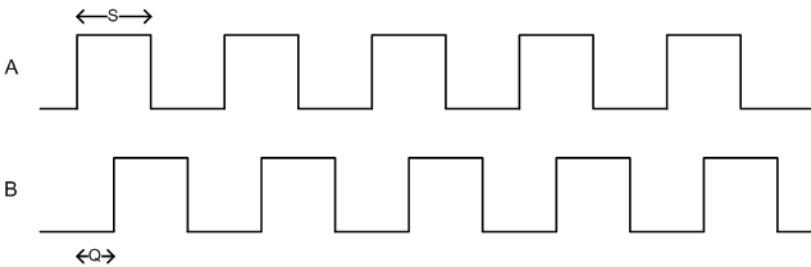
Specifications	Min.	Typ.	Max.	Units	Notes
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Supply Voltage	4.5	5.0	5.5	V	
Supply Current		25	30	mA	no load
Low-level Output			0.4	V	IOL = 8 mA
		0.035		V	no load
High-level Output	2.4			V	IOH = -8 mA
		4.0		V	no load
Output Rise Time		100		ns	no load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

### Differential Electrical

Specifications	Min.	Typ.	Max.	Units	Notes
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	32	mA	no load
Single-Ended Output Voltage High	4.75	5.0		V	Min. @ 25mA load, Typ. @ no load
Single-Ended Output Voltage Low		0.25	0.60	V	Typ. @ no load, Max. @ 4.5mA load
Differential Output Voltage	3.0	3.8		V	RL = 100 ohm
Differential Output Rise/Fall Time			20	ns	

### Phase Relationship



Parameter	Min.	Typ.	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

4-pin Single-ended

6-pin Differential

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

(1) 4-pin single-ended mating connector is CON-MIC4

(2) 6-pin differential mating connector is CON-MIC6

 Options

**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>

 Ordering Information

E4T -  -  -  -  -  -

CPR	Bore	Output	Cover	Base	Packaging
100	079 =2mm	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 encoders.
120 =	2.5mm	D =Differential	Cover	M2.5, length 4mm	
125 =	118 =3mm			screws	1 =Each encoder packaged individually.
128 =	125 =1/8"				One spacer tool and one centering tool per 100 encoders.
200 =	157 =4mm				
250 =	188 =3/16"				2 =Each encoder packaged individually.
256 =	197 =5mm				One spacer and one centering tool per encoder.
300 =	236 =6mm				
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 complete warranty for details.