US DIGITAL **E4T** **Miniature Optical Kit Encoder**

RoHS COMPLIANT

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

- Push-on hub - spring loaded collet design
- Minimum shaft length of .275"
- Fits shaft diameters of .079" to .250"
- 100 to 1000 cycles per revolution (CPR)
- 400 to 4000 pulses per revolution (PPR)
- Single +5V supply

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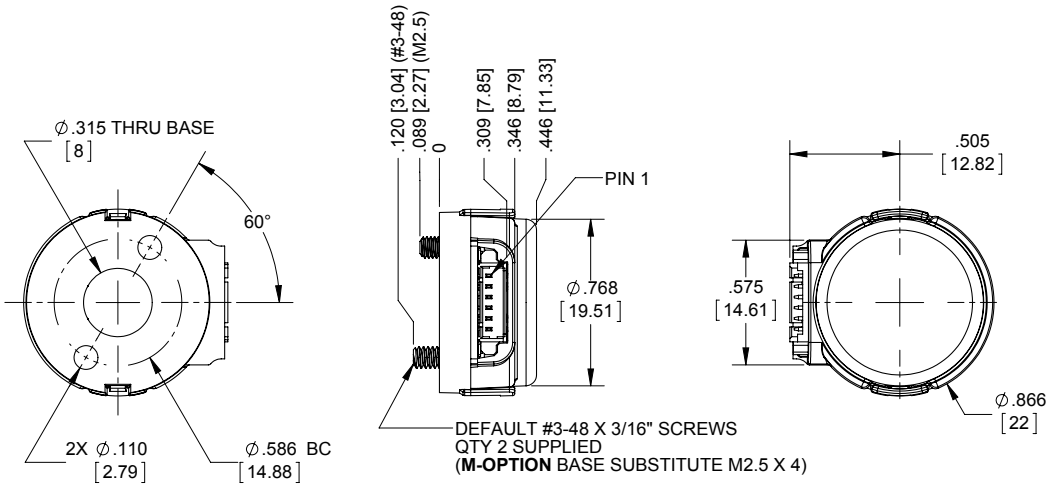
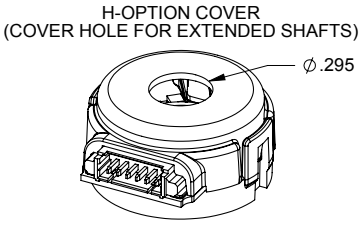
E4T Differential OEM Miniature Optical Kit Encoder

RELEASE DATE: 11/18/2014

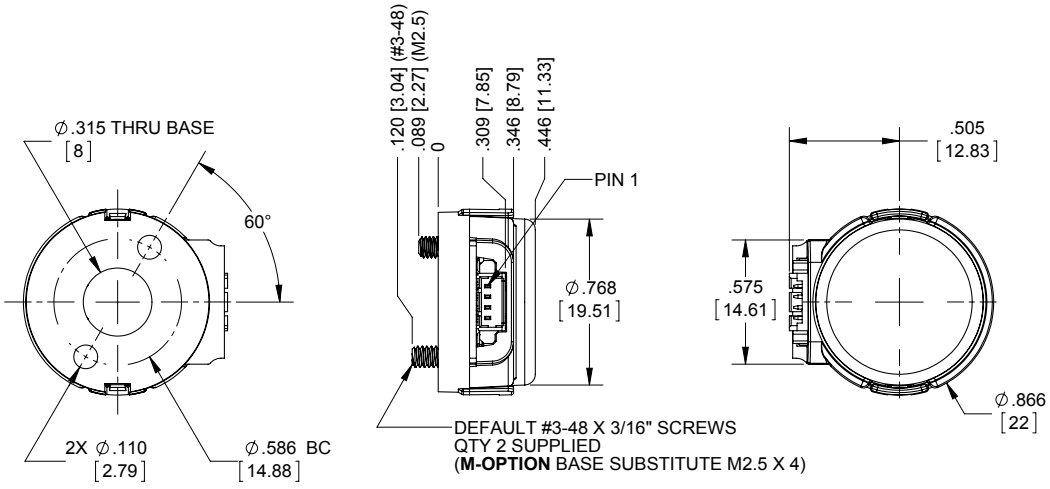


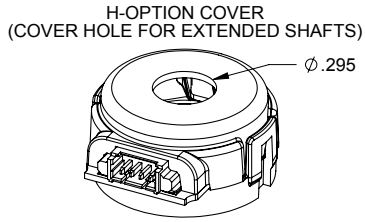


UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

E4T Single-Ended OEM Miniature Optical Kit Encoder

RELEASE DATE: 11/18/2014





UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

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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/sec²
Maximum RPM (1) e.x. CPR = 300, max. rpm = 20000 e.x. CPR = 200, max. rpm = 30000	minimum value of (6000000/CPR) and (60000)	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 Tolerances		Download

(1) 60000 RPM is the maximum rpm due to mechanical considerations. The maximum RPM due to the module's 100kHz maximum output frequency is (6000000/CPR).

(2) Including axial play.

Single-ended Electrical

Specifications	Min.	Typ.	Max.	Units	Notes

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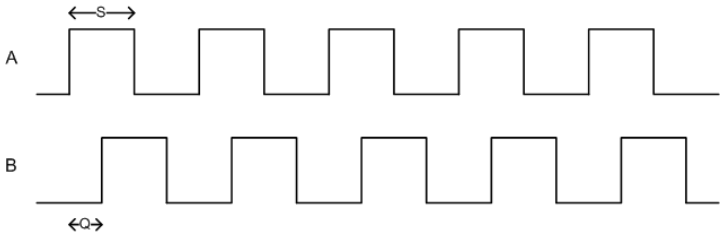
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		25	30	mA	CPR ≤ 500, no load
		34	42	mA	CPR > 500, no load
Low-level Output			0.4	V	I_{OL} = 8 mA
		0.035		V	no load
High-level Output	2.4			V	I_{OH} = -8 mA
		4.0		V	no load
Output Rise Time		100		ns	no load
Output Fall Time		50		ns	no load

Differential Electrical

Specifications	Min.	Typ.	Max.	Units	Notes
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	32	mA	CPR ≤ 500, no load
		36	44	mA	CPR > 500, 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

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encoder performance across the range of recommended mounting tolerance.

Pin-out

4-pin Single-ended (1)		6-pin Differential (2)	
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 isCON-MIC4
(2) 6-pin differential mating connector isCON-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.*

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E4T Miniature Optical Kit Encoder

Ordering Information

E4T - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

CPR	Bore	Output	Cover	Base	Packaging
100	079 = *2mm*	S =*Single Ended*	D =*Default*	D =*Default*	B =*Encoder components packaged in bulk. One spacer and one centering tool per 100 encoders.*
108	098 = *2.5mm*	D =*Differential*	H =*Hole in Cover*	M =*Alternate metric M2.5, length 4mm screws*	1 =*Each encoder packaged individually. One spacer tool and one centering tool per 100 encoders.*
120 =	118 = *3mm*				2 =*Each encoder packaged individually. One spacer and one centering tool per encoder.*
125 =	125 =*1/8"*				
128 =	157 = *4mm*				
200 =	188 = *3/16"*				
250 =	197 = *5mm*				
256 =	236 = *6mm*				
300 =	250 =*1/4"*				
360 =					
400 =					
500 =					
512 =					
1000 =					

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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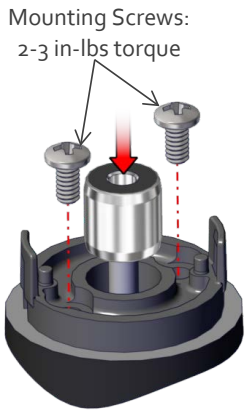
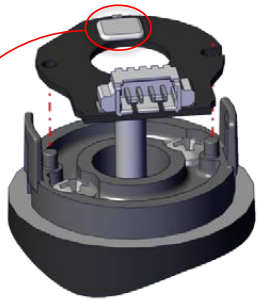
E4T Assembly Instructions



Step 1:

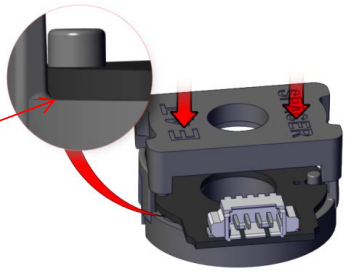
Place the base over the shaft and onto the mounting surface. Slide the centering tool onto the shaft so that it contacts and aligns the base. While applying light pressure to the centering tool, secure the base to the mounting surface using two screws.



Step 2:

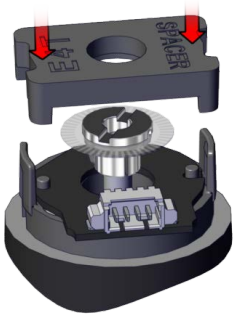
Remove the centering tool. Place the PCB onto the base surface, aligning the board with the two mounting posts. Note that the base is symmetrical allowing the connector to exit out either side.

Caution: To prevent damage, avoid directly touching the optical sensor area when handling the PCB.



Step 3:

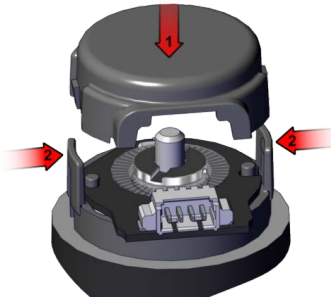
Using the spacer tool, very firmly press down on the PCB in order to push it over the alignment pins and completely onto the base surface. Check to make sure that the PCB is fully seated against the base. If it is not, use the spacer tool to press it again, recheck that it is fully seated.



Step 4:

Place the hubdisk onto the shaft with the longer end of hub toward the base. Position the spacer tool onto the hub such that the notches are aligned with the latches of the base. Press down firmly until the tool bottoms out on the PCB. Verify that this action has pressed the PCB flush against the base.

Caution: While installing the hubdisk ensure that the hub bore is parallel to the shaft. Forcing the hub onto the shaft at an angle may cause permanent damage to the hub.



Step 5:

Remove the spacer tool and snap the cover down onto the base, (1). With your thumb and finger, squeeze the base latches together to ensure they are fully engaged with the cover, (2).

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