



## E4T Features

- Push-on hub - spring loaded collet design
- Minimum shaft length of .275 in.
- Fits shaft diameters of .079 in. to .250 in.
- 100 to 1,000 cycles per revolution (CPR)
- 400 to 4,000 pulses per revolution (PPR)
- Single +5V supply



## E4T Product 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 that accepts shaft diameters of 2.0mm to .250 in.



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

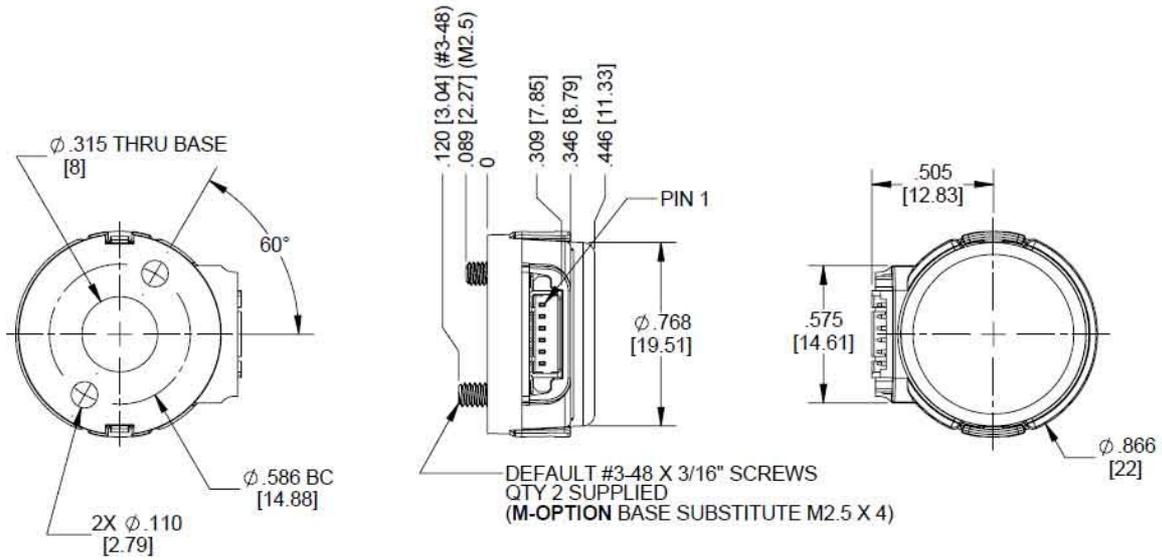
The E4T series encoder is connected using a 4-conductor, high retention, polarized, 1.25mm pitch connector. Mating cables and connectors (see the [Cables \(https://www.usdigital.com/products/accessories/cables/\)](https://www.usdigital.com/products/accessories/cables/) / [Connectors \(https://www.usdigital.com/products/accessories/connectors/\)](https://www.usdigital.com/products/accessories/connectors/) web page) are not included and are available separately.

**Please Note:** Due to the E4T's push-on hub design, it is recommended for use as a one-time installation.

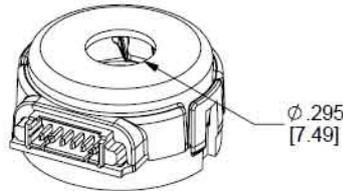
## Mechanical Drawings

## E4T Differential Optical Kit Encoder

RELEASE DATE: 07/30/2020



H-OPTION COVER  
(COVER HOLE FOR EXTENDED SHAFTS)



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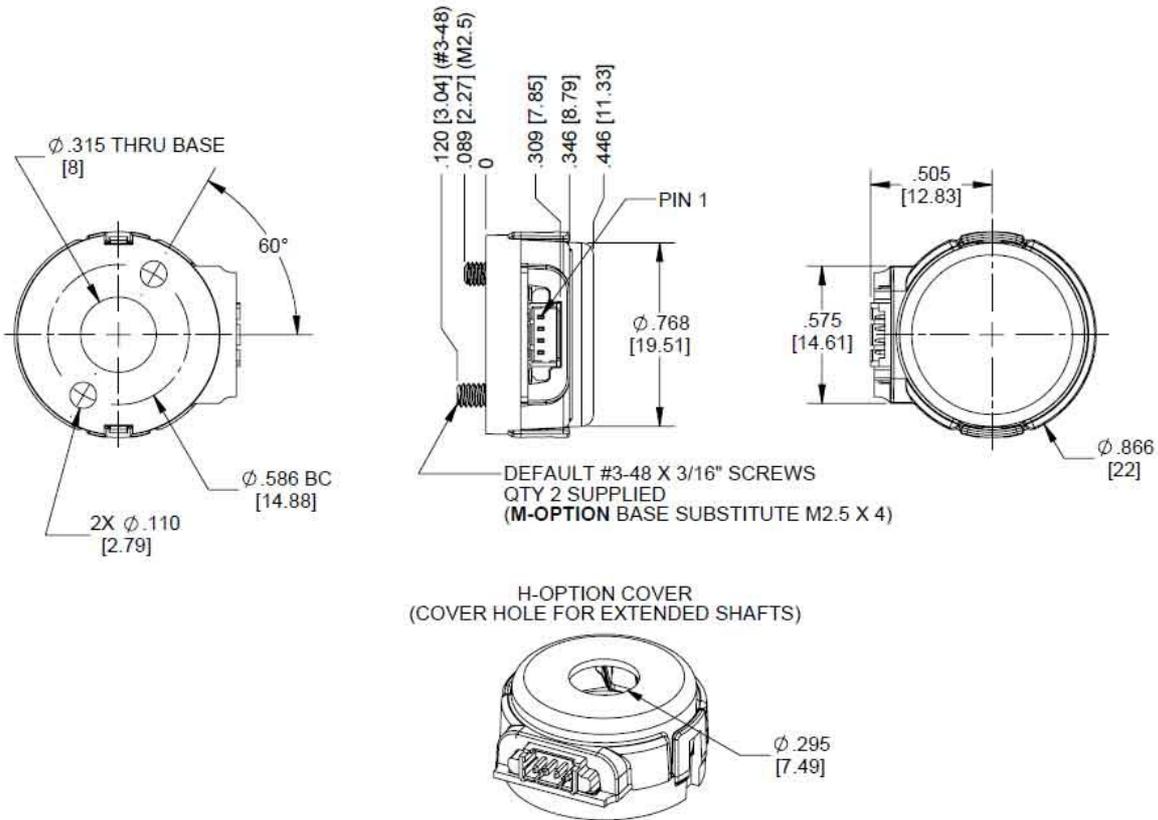
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UNITS: INCHES [MM]  
METRIC SHOWN FOR REFERENCE ONLY

## E4T Single-Ended Miniature Optical Kit Encoder

RELEASE DATE: 07/30/2020



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## Specifications

### ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature	-20 to 100	C
Electrostatic Discharge, IEC 61000-4-2		
Single-ended (-S version)	± 12	kV
Differential (-D version)	± 7	
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)	minimum value of ((6 x 10 <sup>6</sup> )/CPR) and (60000)	RPM
Maximum A/B Frequency e.x. CPR = 200, Max. RPM = 30000	100	kHz
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	Download ( <a href="https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/">https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/</a> )	

(1) 60000 RPM is the maximum rpm due to mechanical considerations. The maximum RPM due to the module's maximum frequency response is dependent upon the module's resolution (CPR).

(2) Including axial play.



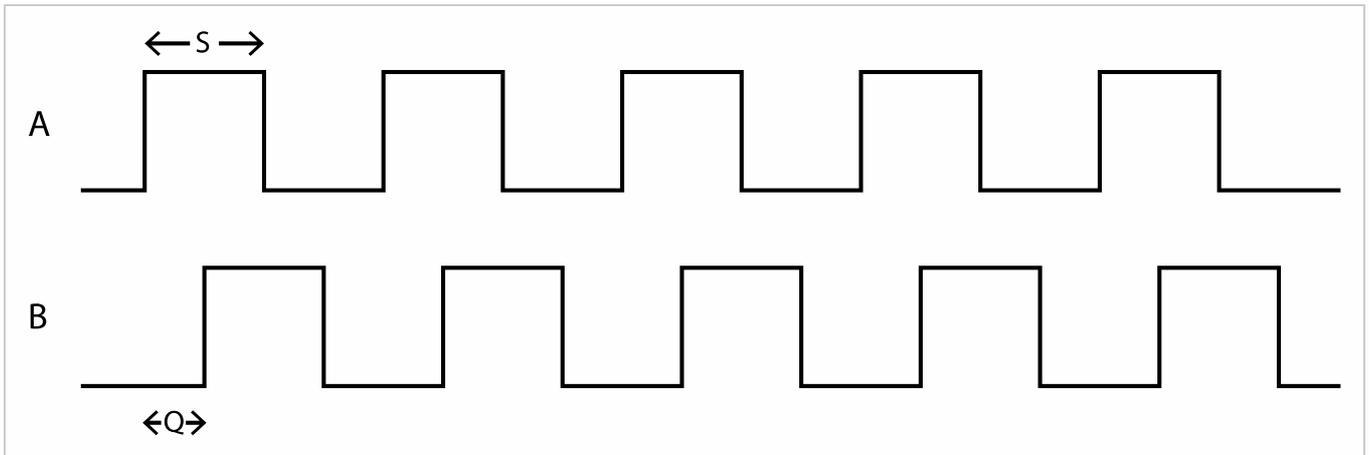
## SINGLE-ENDED ELECTRICAL

SPECIFICATIONS	MIN.	TYP.	MAX.	UNITS	NOTES
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	CPR ≤ 500, I <sub>OL</sub> = 8 mA
					CPR > 500, I <sub>OL</sub> = 5 mA
		0.035		V	no load
High-level Output	2.4			V	CPR ≤ 500, I <sub>OH</sub> = -8 mA
					CPR > 500, I <sub>OH</sub> = -5 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 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 is CON-MIC4 (<https://www.usdigital.com/products/accessories/connectors/con-mic4/>)

(2) 6-pin differential mating connector is CON-MIC6 (<https://www.usdigital.com/products/accessories/connectors/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.*

### 3. Screws

**Part #: SCREW-348-188-PH**

Description: Pan Head, Philips #3-48 UNC x 3/16"

Use: Base Mounting

Quantity Required: 2

Screws are included with default base option

**Part #: SCREW-M25-4MM-BH**

Description: Button Head Cap, M2.5 x 0.45 x 4mm

Use: Base Mounting

Quantity Required: 2

Screws are included with metric base option

## PRODUCT CHANGE NOTIFICATIONS

Title	Date	Description	Download
E4T, E8T Packaging - PCN 7195	2/16/2022	As part of our ongoing continuous improvement efforts, US Digital is implementing a change to our packaging options for our E4T and E8T kit encoders.	Download ( <a href="https://www.usdigital.com/support/resources/product-change-notifications/pcn-7195-e4t-e8t-packaging/">https://www.usdigital.com/support/resources/product-change-notifications/pcn-7195-e4t-e8t-packaging/</a> )



E4T Cover and Base Update - PCN 7192	2/15/2022	As part of our ongoing continuous improvement efforts, and to avoid any potential disruption to our supply chain, US Digital has decided to standardize our plastic material. Based on this, the E4T encoder cover and base will change from PBT (Polybutylene Terephthalate) to PC (polycarbonate).	Download ( <a href="https://cdn.usdigital.com/assets/pcns/E4T%20Update_PCN-7192.pdf">https://cdn.usdigital.com/assets/pcns/E4T%20Update_PCN-7192.pdf</a> )
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Updated PCB for E4T and S4T - PCN 6466	1/29/2018	<p>This notice is to inform our customers of a PCB design change that is being implemented for all of the E4T and S4T product lines. The new PCBs will improve overall product performance and enhance robustness of these product lines. The new PCBs can be identified by their blue color (instead of black) and have two mounting holes that mate with the base plate instead of one hole and one slot. This change has no impact on form, fit or function for either the E4T or S4T.</p>	<p>Download (<a href="https://cdn.usdigital.com/assets/pcns/E4T%20S4T%20%20hole%20PCB%20update%20PCN-6466.pdf">https://cdn.usdigital.com/assets/pcns/E4T%20S4T%20%20hole%20PCB%20update%20PCN-6466.pdf</a>)</p>
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E4T, S4T and E8T Laser Markings - PCN 6227	8/8/2017	<p>This notification is to inform our customers of a change to product markings for the E4T, E8T, and S4T series of encoders. The new marking will be utilized across all three product lines. We are making this change to improve readability for our customers and to provide consistency across the product lines.</p>	<p>Download (<a href="https://www.usdigital.com/support/resources/product-change-notifications/pcn-6227-e4t-s4t-and-e8t-laser-markings/">https://www.usdigital.com/support/resources/product-change-notifications/pcn-6227-e4t-s4t-and-e8t-laser-markings/</a>)</p>
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## 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 (<https://www.usdigital.com/company/warranty>) for details.