



## E8T Features

- Push-on hub - spring loaded collet design
- Minimum shaft length of .295 in.
- Fits shaft diameters of .118 in. to .375 in.
- 180 to 720 cycles per revolution (CPR)
- 720 to 2,880 pulses per revolution (PPR)
- Single +5V supply



## E8T Product Description

The E8T transmissive optical encoder is designed to provide digital quadrature encoder feedback for high volume, compact space applications. The E8T is designed to be a drop-in replacement for the E7P (<https://www.usdigital.com/products/discontinued-products/discontinued-encoders/e7p/>)/E8P

(<https://www.usdigital.com/products/discontinued-products/discontinued-encoders/e8p/>) and offers higher maximum

speed and increased output drive. The E8T utilizes an innovative, push-on code wheel that accepts shaft diameters of .118 in. to .375 in.



The E8T default encoder base provides mounting holes for two #4-40, length 0.188 in. or two M2.5, length 5mm screws on a 0.75 in. bolt circle diameter. A 1.28 in. diameter bolt circle mount is also available, only with #4-40, length 0.188 in. screws. The encoder cover is easily snapped onto the base and is marked with the connector pin-out.

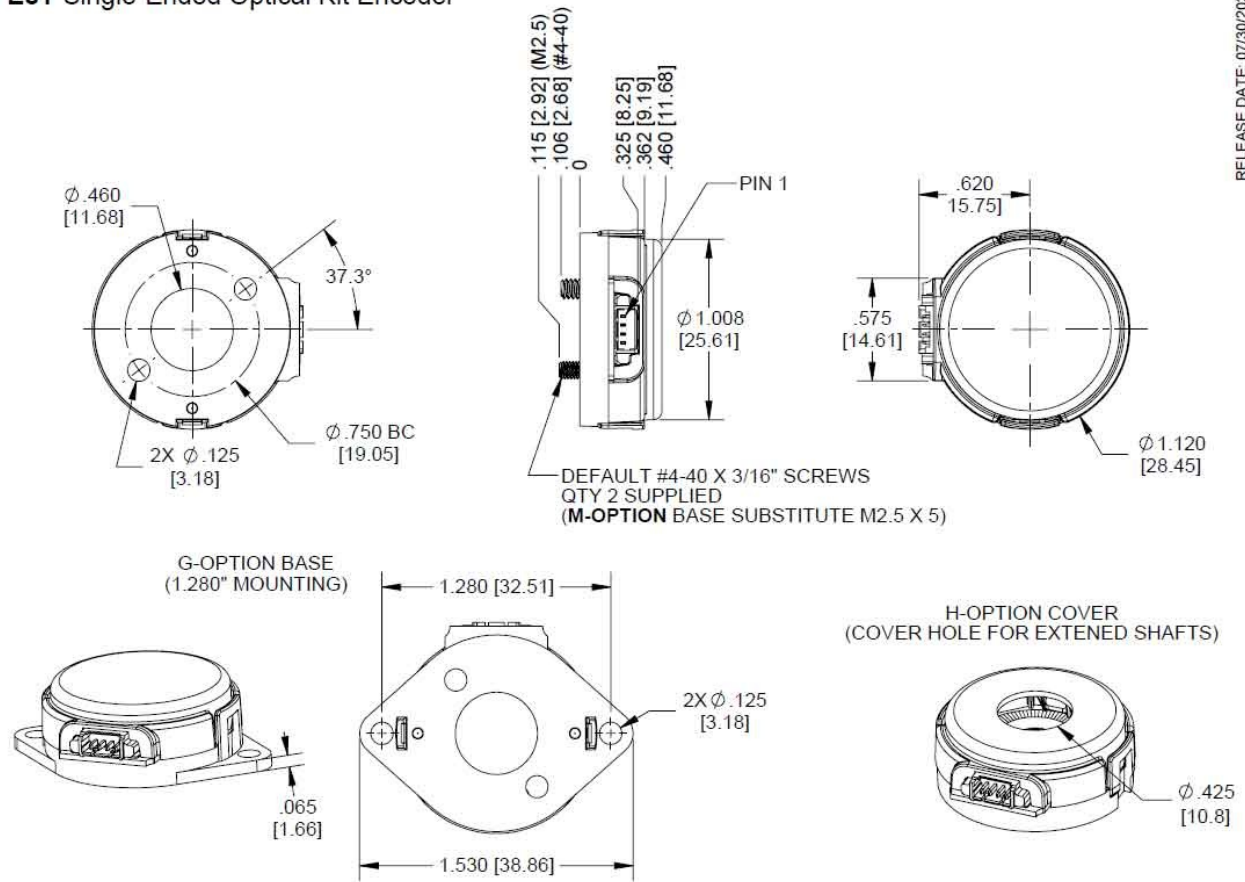
The single-ended output version is connected using a 4-conductor, high retention, polarized, 1.25mm pitch connector. The differential output version uses a similar 6-pin connector. Mating cables and connectors (see the Cables/Connectors web page) are not included and are available separately.

**Please Note:** Due to the E8T's design, it is recommended for use as a one-time installation.

## Mechanical Drawings

## E8T Single-Ended Optical Kit Encoder

RELEASE DATE: 07/30/2020



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

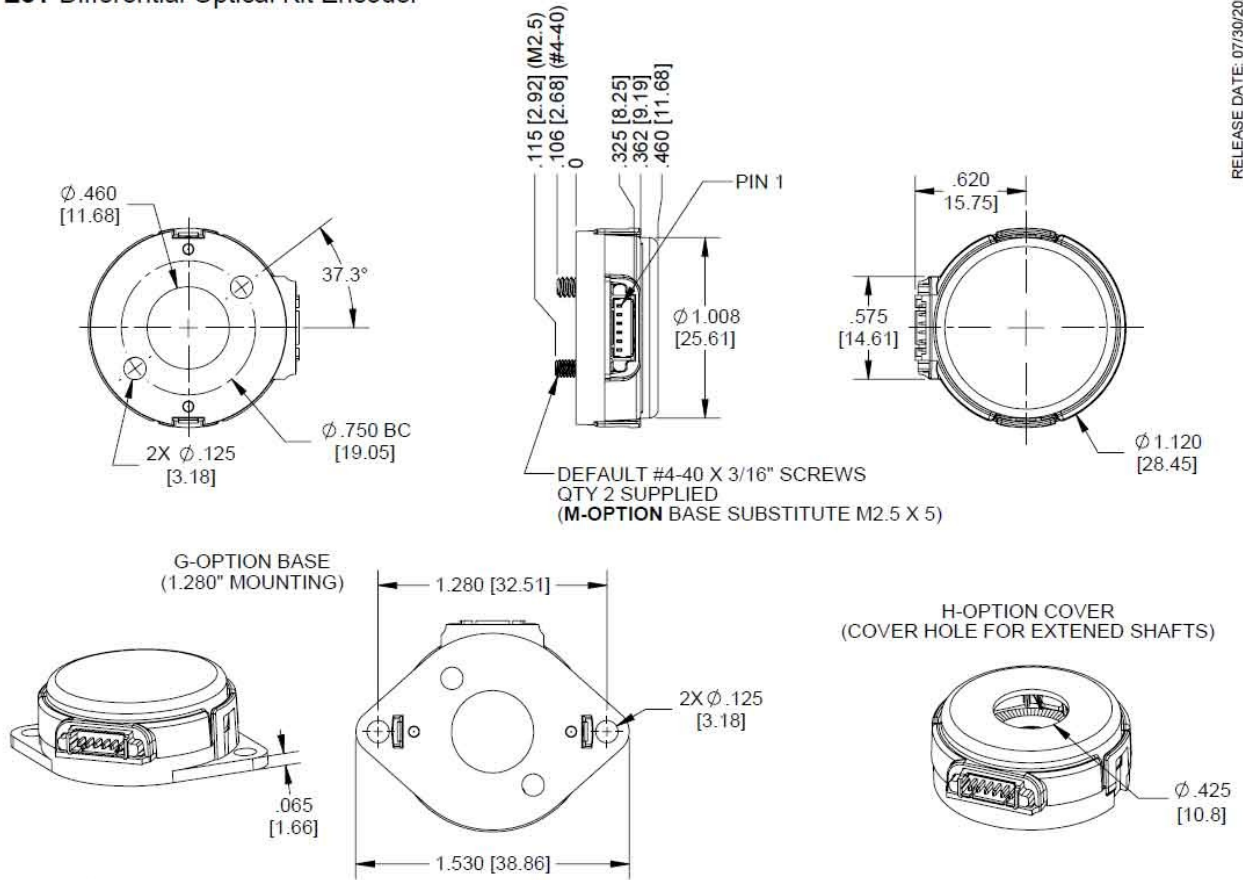
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UNITS: INCHES [MM]  
METRIC SHOWN FOR REFERENCE ONLY

## E8T Differential 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 option)	$\pm 12$	kV
Differential (-D option)	$\pm 7$	
Vibration (10Hz to 2kHz, sinusoidal)	20	G
Shock (6 milliseconds, half-sine)	75	G



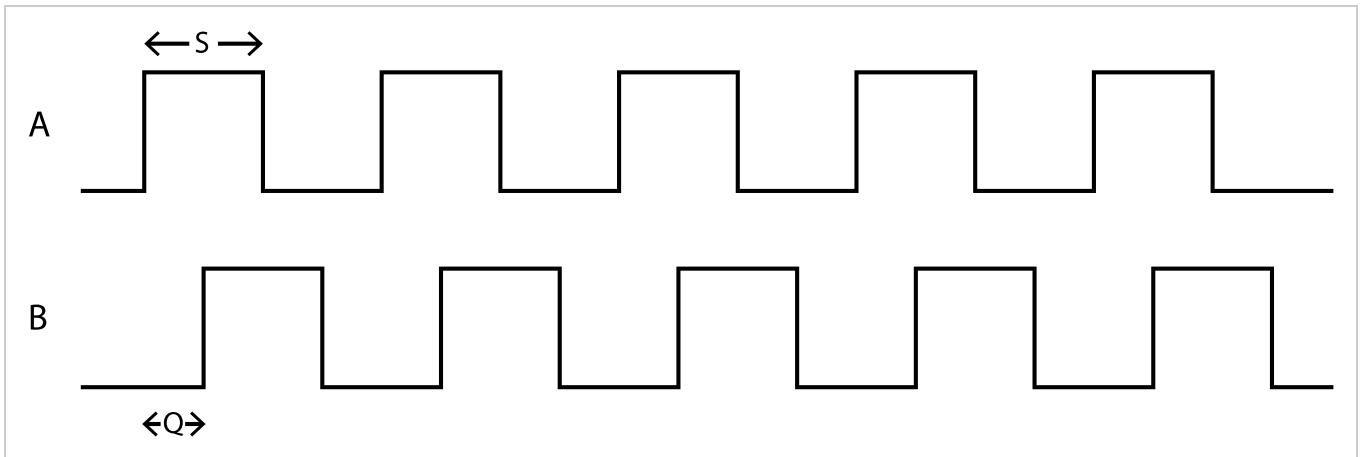
## MECHANICAL

PARAMETER	VALUE	UNITS
Max. Shaft Axial Play	± .010	in.
Max. Shaft Runout	0.002 T.I.R.	in.
Max. Acceleration	250000	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
Codewheel Moment of Inertia	1.789 x 10 <sup>-6</sup>	oz-in-s <sup>2</sup>
Mounting Screw Size Default (D-option), 1.28" base (G-option) Metric (M-option)	#4-40 x 3/16 M2.5 x 5	in. mm
Screw Bolt Circle Diameter Default (D-option), Metric (M-option) 1.28" base (G-option)	0.75 ±0.005 1.28 ±0.005	in.
Minimum Shaft Length (2)	0.295	in.
Maximum Shaft Length (2)	0.400 (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/media/yyvb4qsy/tb_1001.pdf">https://www.usdigital.com/media/yyvb4qsy/tb_1001.pdf</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.

## 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.

## SINGLE-ENDED ELECTRICAL

SPECIFICATIONS	MIN.	TYP.	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	$I_{OL} = 8 \text{ mA}$
		0.035		V	no load
High-level Output	2.4			V	$I_{OH} = -8 \text{ mA}$
		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
Differential Output Voltage High	4.75	5.0		V	Min. @ 25mA load, Typ. @ no load
Differential 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	

## PIN-OUTS

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 0.425" diameter hole in the cover for the shaft to pass through.

### M-OPTION (METRIC MOUNTING SCREWS WITH DEFAULT BASE)

Provides metric M2.5, length 5mm screws. When M-option is NOT specified the default is #4-40, length 0.188" screws. The mounting bolt circle diameter is 0.75"

### G-OPTION (1.28" DIAMETER BOLT CIRCLE MOUNT)

Provides 1.28" diameter bolt circle mount in addition to 0.75" diameter bolt circle mount. Screws are #4-40, length 0.188"



## ACCESSORIES

### 1. Centering Tool\*

**Part #: CTOOL - (Shaft Diameter)**

**Description:** This reusable tool is used to accurately center the **E8T** base on the shaft.

### 2. Spacer Tool\*

**Part #: SPACER-E8T**

**Description:** This reusable tool is used to properly gap the codewheel from the encoder sensor.

*\*Both the CTOOL and SPACER-E8T tools are included with all packaging options.*

### 3. Screws

**Part #: SCREW-440-188-PH**

Description: Pan Head, Phillips #4-40 UNC x 3/16"

Use: Base Mounting

Quantity Required: 2

Screws are included

**Part #: SCREW-M25-5MM-PH**

Description: Pan Head, Phillips M2.5 x 0.45 x 5mm

Use: Base Mounting

Quantity Required: 2

Screws are included

## 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.



## Configuration Options

E8T	CPR (Cycles Per Revolution)	Bore Size	Output	Cover	Base	Packaging
	180	118 (3.0mm)	S (Single-Ended)	D (Default)	D (Default, #4-40 x 3/16" Screws)	B (Encoders packaged in bulk. Every order includes one centering tool and spacer tool. An additional set of tools is included for each 100 encoders ordered.)
	200	125 (1/8")	D (Differential)	H (Through-Hole)	M (Metric, M2.5 X 5MM Screws)	1 (Encoders packaged individually. Every order includes one centering tool and spacer tool. An additional set of tools is included for each 100 encoders ordered.)
	250	156 (5/32")			G (1.28" Diameter Bolt Circle, #4-40 x 3/16" Screws)	2 (Encoders packaged individually. Every order includes one centering tool and spacer tool per encoder.)
	256	157 (4.0mm)				
	360	197 (5.0mm)				
	400	236 (6.0mm)				
	500	250 (1/4")				
	512	276 (7.0mm)				
	720	315 (8.0mm)				
		375 (3/8")				

**PLEASE NOTE: This chart is for informational use only.** Certain product configuration combinations are not available. Visit the E8T product page (<https://www.usdigital.com/products/E8T>) for pricing and additional information.