Miniature Motor Encoder

Product ID | E4T »



Features of the E4T Miniature Motor Encoder

- Kit version for mounting on a motor or other shaft
- Supports 11 shaft sizes (2 to 6 mm and 1/8 to 1/4 in.)
- For NEMA 8 to 17 and larger motors
- 19 Resolutions from 100 to 1,000 CPR (400 to 4,000 PPR)
- Single-ended or Optional Differential output
- Choice of 2 base styles and cover options
- Push-on hub for quick assembly
- High retention connector/cable (sold separately)

Description

The US Digital E4T miniature motor encoder mounts directly to a motor or other rotating shaft. This incremental encoder uses a specially patterned optical disk on a precision-machined aluminum hub.

RoHS COMPLIANT

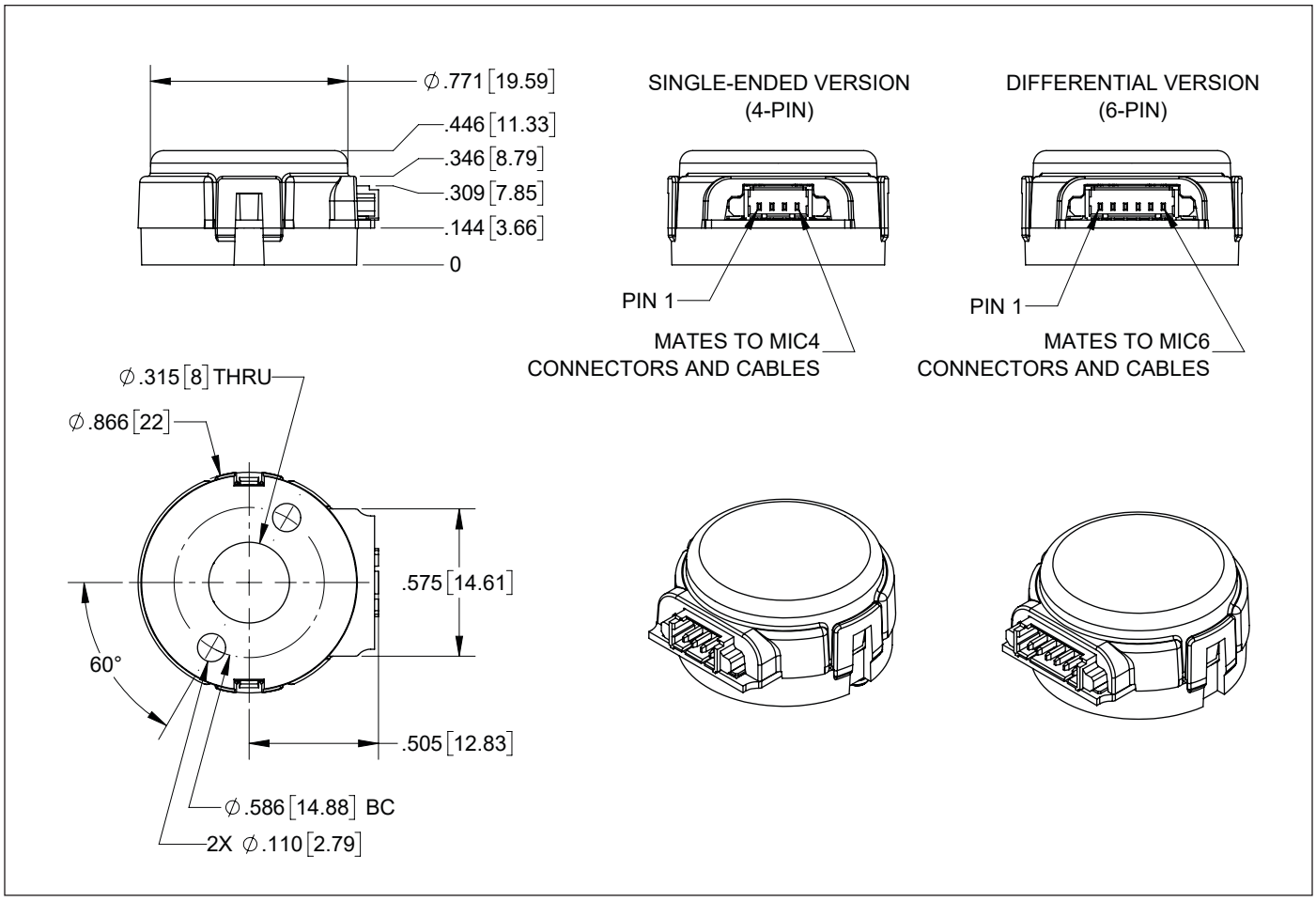
This disk, in combination with a custom detector, creates a system highly tolerant to mechanical misalignment. A push-on hub design and a robust, glass-filled polymer housing provide easy installation in space-limited applications.

The E4T mini motor encoder offers 19 available resolutions and compatibility with 11 shaft sizes, 2 base configurations, and 2 cover styles, enabling it to fit a wide range of applications. Users can choose between single-ended or differential outputs.

This optical encoder is designed for use with a high-retention connector. After making each selection in the Product Configurator, compatible cables and connectors will be displayed below and must be purchased separately.

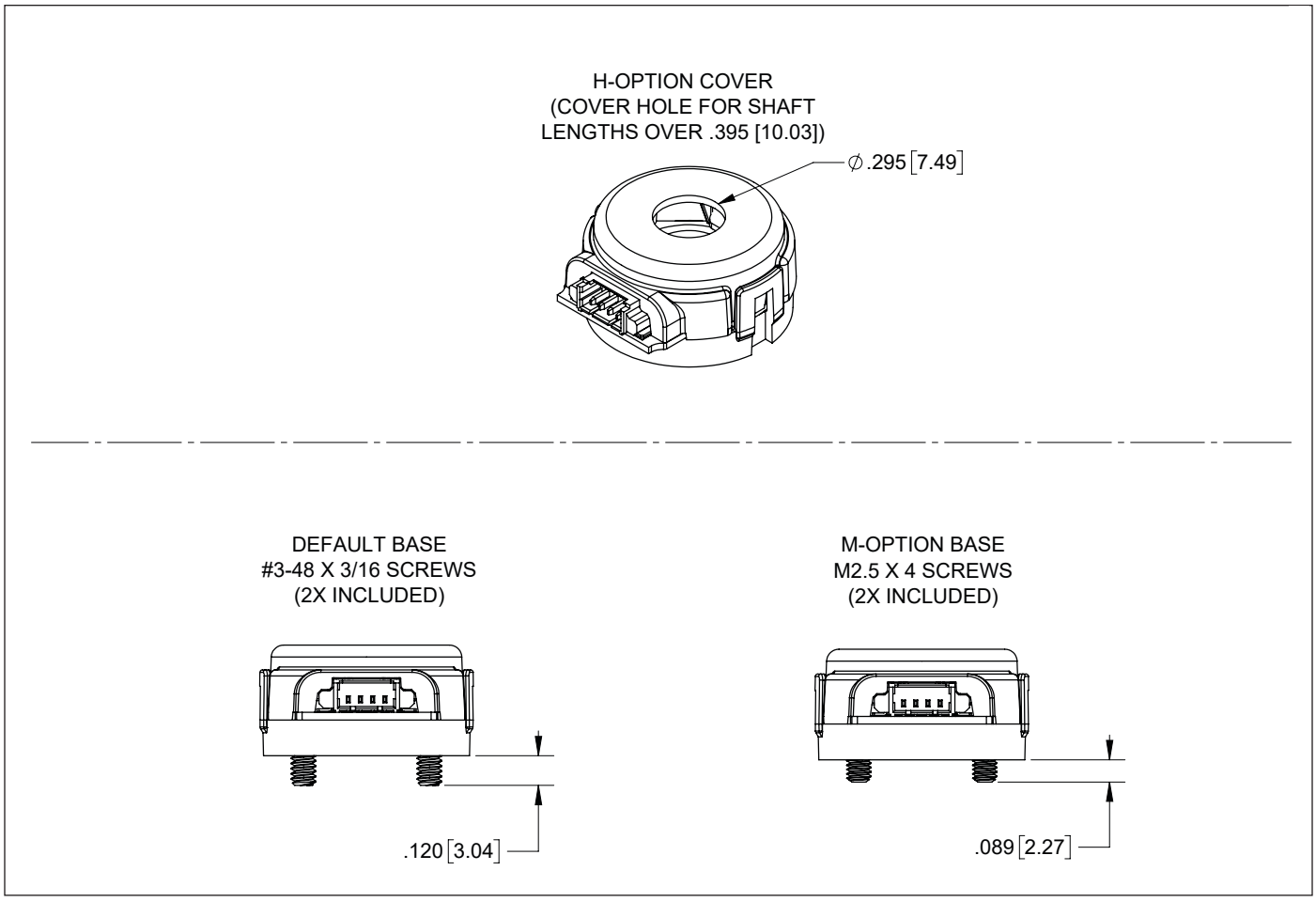
Please Note: Due to the E4T's design, it is recommended for use as a one-time installation.

Mechanical Drawings



E4T Miniature Motor Encoder (Default)

Mechanical Drawings



E4T Miniature Motor Encoder (Base and Cover Options, Single-Ended Version Shown)

Specifications

Environmental

Parameter	Value	Units
Operating Temperature	-20 to 100	C
Electrostatic Discharge, IEC 61000-4-2 Single-ended (-S option) Differential (-D option)	 ± 12 ± 7	kV
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 (TIR)	.002	in.
Max. Acceleration	250,000	rad/sec²
Maximum RPM (1) Maximum A/B Frequency e.x. CPR = 200, Max. RPM = 30000	minimum value of ((6 x 10^6)/CPR) and (60000) 100	RPM kHz
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 in. 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)

(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.

Specifications

Single-Ended Electrical

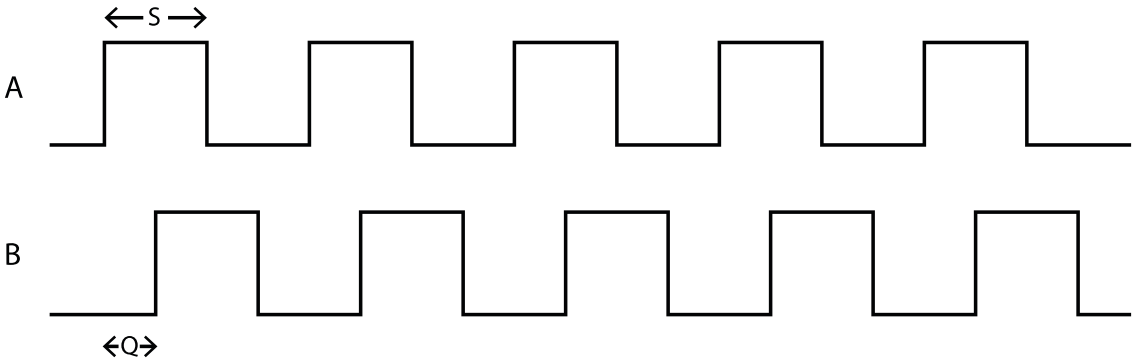
Specifications	Min.	Typ.	Max.	Units	Notes
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		25 34	30 42	mA mA	CPR ≤ 500, no load CPR > 500, no load
Low-level Output		 0.035	0.4	V V	CPR ≤ 500, I_{OL}= 8 mA CPR > 500, I_{OL}= 5 mA no load
High-level Output	2.4	 4.0		V V	CPR ≤ 500, I_{OH}= -8 mA CPR > 500, I_{OH}= -5 mA 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 36	32 44	mA mA	CPR ≤ 500, no load 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	

Specifications

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-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*[(2)]
(2) 6-pin differential mating connector is *CON-MIC6*[(3)]

Specifications

Options

H-Option (Hole In Cover)

The **H**-option adds a 0.295 in. 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 in. 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 code-wheel from the encoder.

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

3. Screws

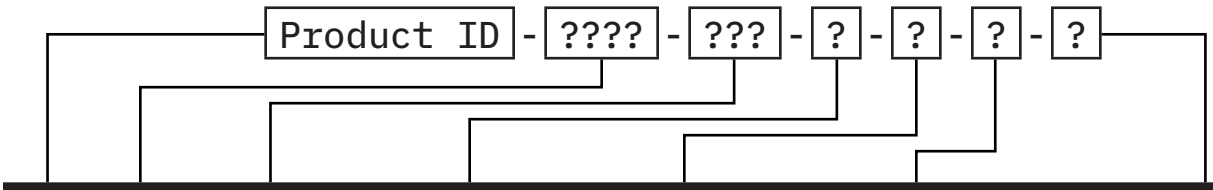
Part #: SCREW-348-188-PH
Description: Pan Head, Philips #3-48 UNC x 3/16 in.
Use: Base Mounting
Quantity Required: 2
Screws are included with default base option

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

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*[(4)] for details.

Part Number Guide and Configuration Options



E4T	CPR	Bore Size	Output	Cover	Base	Packaging
	100 108 120 125 128 200 250 256 300 360 400 500 512 720 800 1000	079 (2.0mm) 091 (2.3mm) 098 (2.5mm) 118 (3.0mm) 125 (1/8 in.) 156 (5/32 in.) 157 (4.0mm) 188 (3/16 in.) 197 (5.0mm) 236 (6.0mm) 250 (1/4 in.)	**S** (Single-Ended) **D** (Differential)	**D** (Default) **H** (Through-Hole)	**D** (Default) **M** (Metric Screws)	Bulk (**B**) - Includes one centering and spacer tool per order, plus an extra set per 100 encoders. Individual (**1**) - Includes one centering and spacer tool per order, plus an extra set per 100 encoders. Individual (**2**) - Includes one centering and spacer tool per encoder.

PLEASE NOTE: This chart is for informational use only. Certain product configuration combinations are not available. Visit the *E4T product page*[5] for pricing and additional information.

Reference Links

(1) Technical Bulletin TB1001 - Shaft and Bore Tolerances

(2) CON-MIC4 4-Position High Retention Connector

(3) CON-MIC6 6-Position High-Retention Connector

(4) Legal Terms and Conditions, Warranty

(5) E4T Miniature Motor Encoder