



E16 Features

- Our smallest motor encoder kit - only 16 mm diameter (0.630 in.)
- Supports 1.5 mm (0.059 in.) and 2 mm (0.079 in.) shaft sizes
- 10 Resolutions from 250 to 4,096 CPR (1,000 to 16,384 PPR)
- A/B/Index quadrature output
- Push-on hub for quick assembly
- Cable with polarized connector (sold separately)



E16 Micro Rotary Encoder Product Description

The E16 micro optical encoder is only 16 mm in diameter and is designed to provide A, B, and Index digital quadrature signals for high-volume, restricted space applications. The E16 utilizes an innovative, push-on encoder disk that accepts shaft diameters of 1.5 mm and 2 mm.



The E16 is designed to be a one-time installation miniature motor encoder, the base provides mounting holes for two M1.6--0.35 x 3 mm screws on a 10 mm bolt circle. The encoder cover is easily snapped onto the base and is laser marked with the connector pin-out.

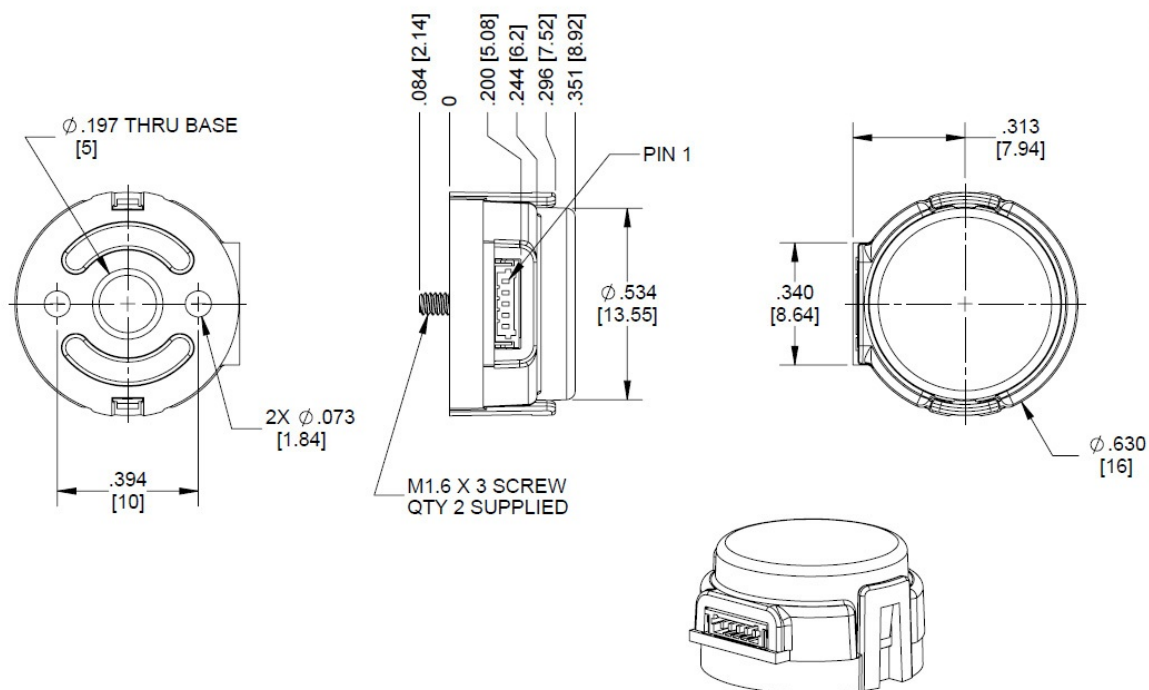
The E16 series miniature encoder is connected using a 5-conductor, polarized, 0.8 mm pitch connector (Hirose part number DF52-5P-0.8C). When using the Configurator, compatible cables will be displayed below after the encoder is configured. Cables must be ordered separately.

Please Note: Due to the E16's design, it is recommended for use as a one-time installation.

Mechanical Drawings

E16 Micro Optical Kit Encoder

RELEASE DATE: 07/22/2020



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UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

Specifications

ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature	-40 to 100	C
Electrostatic Discharge, IEC 61000-4-2	±12	kV
Vibration (10Hz to 2kHz, sinusoidal)	20	G
Shock (6 milliseconds, half-sine)	75	G

MECHANICAL

PARAMETER	VALUE	UNITS
Max. Shaft Axial Play	±0.010	in.
Max. Shaft Runout	0.002 T.I.R.	in.
Max. Acceleration	250000	rad/sec ²
Maximum RPM, CPR = 250/500/1000/2000	48000	RPM
Maximum RPM, CPR = 256/512/1024/2048	46875	RPM
Maximum RPM, CPR = 4000	27750	RPM
Maximum RPM, CPR = 4096	27099	RPM
Codewheel Moment of Inertia	2.8 x 10 ⁻⁷	oz-in-s ²
Mounting Screw Size Default (D-option base)	M1.6 x 3	mm
Screw Bolt Circle Diameter	10 ±0.13	mm
Minimum Shaft Length (1)	6	mm
Maximum Shaft Length (1)	7.75	mm
Mounting Screw Torque	1-2	in-lbs
Technical Bulletin TB1001 - Shaft and Bore Tolerances	Download (https://www.usdigital.com/media/yyvb4qsy/tb_1001.pdf)	

(1) Including axial play.



ELECTRICAL

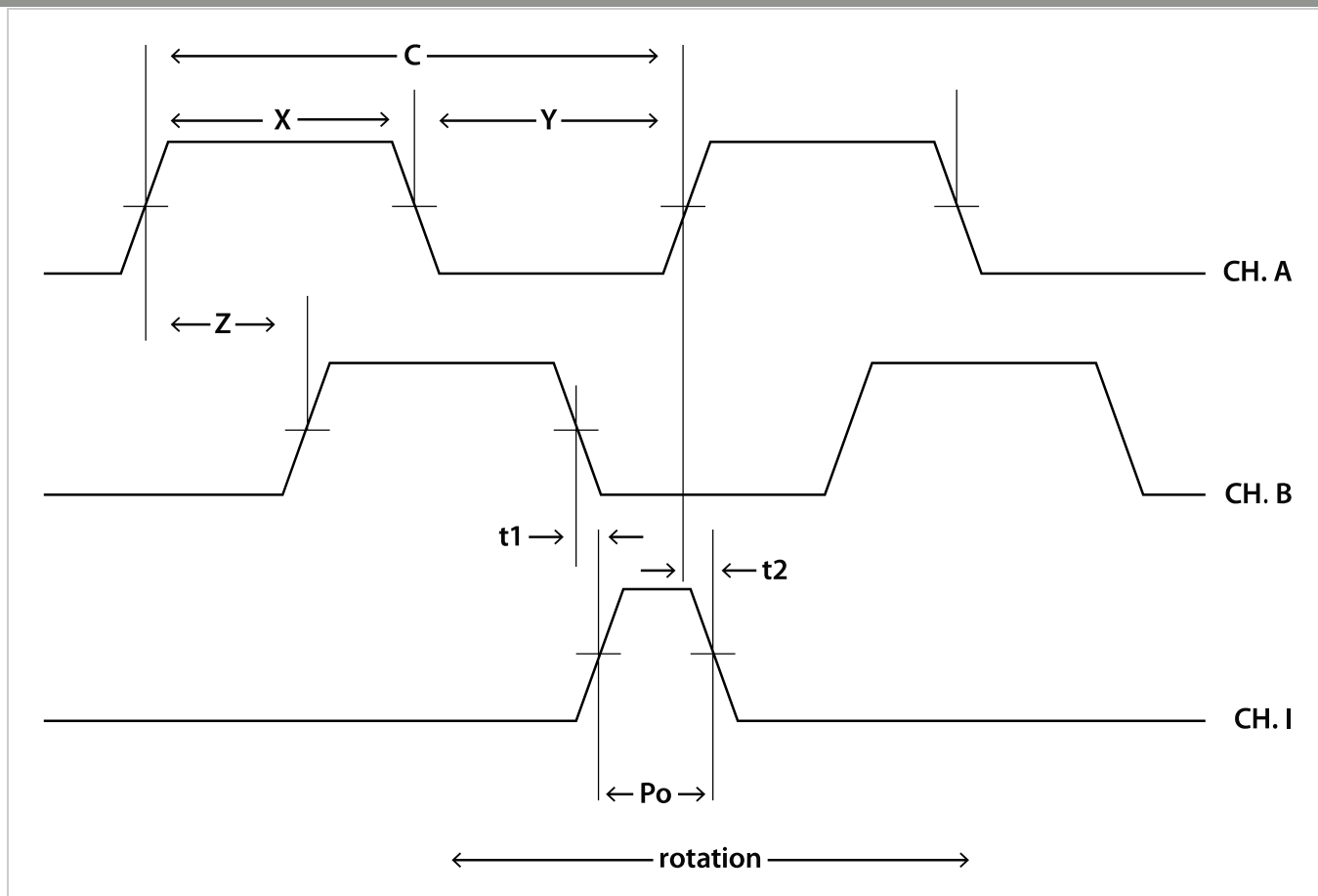
PARAMETER	MIN.	TYP.	MAX.	UNITS	NOTES
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		18	26	mA	no load
Low-level Output			0.4	V	$I_{OL} = 4 \text{ mA}$, $V_{CC} = 5V$
		0.1		V	no load
High-level Output	4.7			V	$I_{OH} = 4 \text{ mA}$, $V_{CC} = 5V$
		4.9		V	no load
Output Rise Time		80	135	ns	no load
Output Fall Time		80	135	ns	no load
Maximum Output Frequency					
250/256 CPR	0.2			MHz	
500/512 CPR	0.4			MHz	
1,000/1,024 CPR	0.8			MHz	
2,000/2,048 CPR	1.6			MHz	
4,000/4,096 CPR	1.85			MHz	

PHASE RELATIONSHIP

- Specifications apply over the entire operating temperature range.
- Values are for the worst error over full rotation.
- Refer to the timing diagram below.

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS
Symmetry	X, Y	150	180	210	°e (https://www.usdigital.com/support/resources/glossary/#glossary_e)
Quadrature	Z	60	90	120	°e (https://www.usdigital.com/support/glossary/#glossary_e)
Index Pulse Width	Po	60	90	120	°e (https://www.usdigital.com/support/glossary/#glossary_e)
Ch. I Rise After Ch. B or Ch. A Fall	t1		10		ns
Ch. I Fall After Ch. B or Ch. A Rise	t2		10		ns

TIMING DIAGRAM



A leads B for clockwise shaft rotation, B leads A for counter clockwise shaft rotation viewed from the cover side of the encoder.

PIN-OUT

PIN	DESCRIPTION
1	Ground
2	Index
3	A channel
4	+5VDC power
5	B channel



ACCESSORIES

1. CENTERING TOOL*

Part #: CTOOL-E16-(Shaft Diameter)

Description: This reusable tool is used to accurately center the **E16** base on the shaft.

2. SPACER TOOL*

Part #: SPACER-E16

Description: This reusable tool is used to properly space the codewheel from the encoder.

*Both the CTOOL and SPACER-E16 tools are included with all packaging options.

3. SCREWS

Part #: SCREW-M16-3MM-PH

Description: Pan Head, Philips M1.6-0.35, length 3mm.

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

E16	CPR (Cycles Per Revolution)	Bore Size	Output	Cover	Base	Packaging
	250	059 (1.5mm)	S (Single-Ended)	D (Default)	D (Default)	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.)
	256	079 (2.0mm)				
	500					
	512					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.)
	1000					
	1024					
	2000					
	2048					
	4000					2 (Encoders packaged individually. Every order includes one centering tool and spacer tool per encoder.)
	4096					

PLEASE NOTE: This chart is for informational use only. Certain product configuration combinations are not available. Visit the E16 product page (<https://www.usdigital.com/products/E16>) for pricing and additional information.