

E16 Features

- Push-on hub - spring loaded collet design
- Fits shaft diameters of 1.5mm (0.059 in.) and 2mm (0.079 in.)
- 250/256 to 4,000/4096 cycles per revolution (CPR)
- 1,000/1024 to 16000/16384 pulses per revolution (PPR)
- Single +5V supply



E16 Product Description

The E16 16mm micro optical encoder 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 which accepts shaft diameters of 1.5mm and 2mm.



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

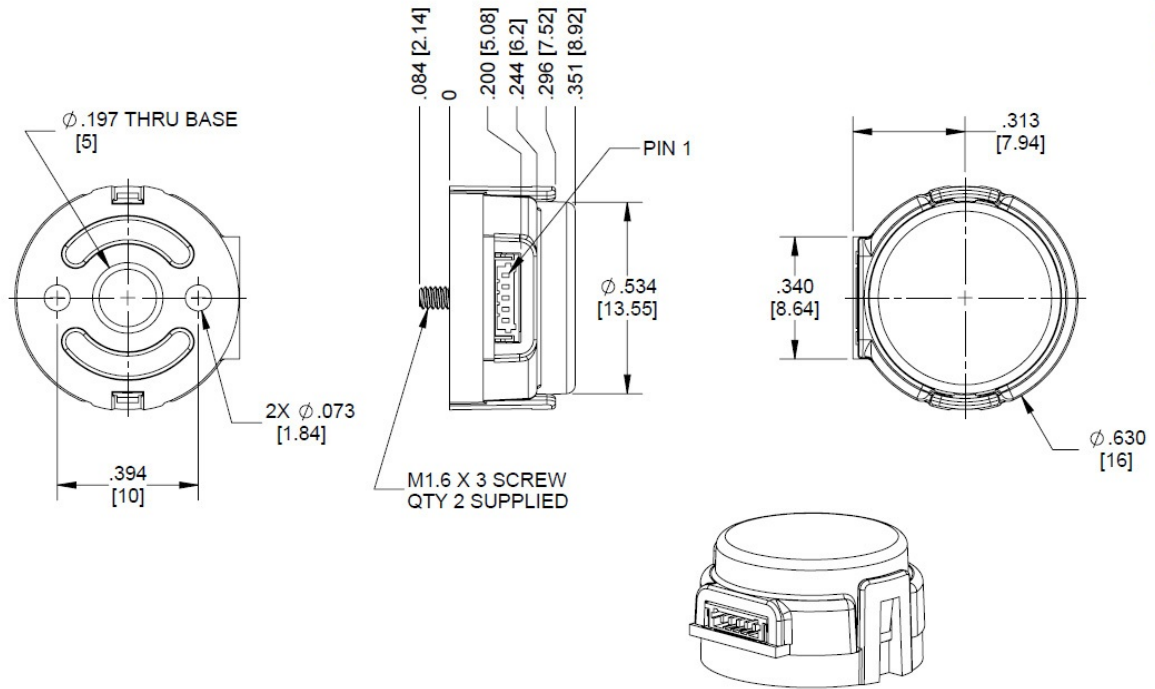
The E16 series encoder is connected using a 5-conductor, polarized, 0.8mm pitch connector (Hirose part number DF52-5P-0.8C). Mating cable (see the Cables web page) is not included and is available separately.

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
Shock, 6 millisecond, half-sine	75	G
Vibration (20Hz to 2kHz, sinusoidal)	20	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

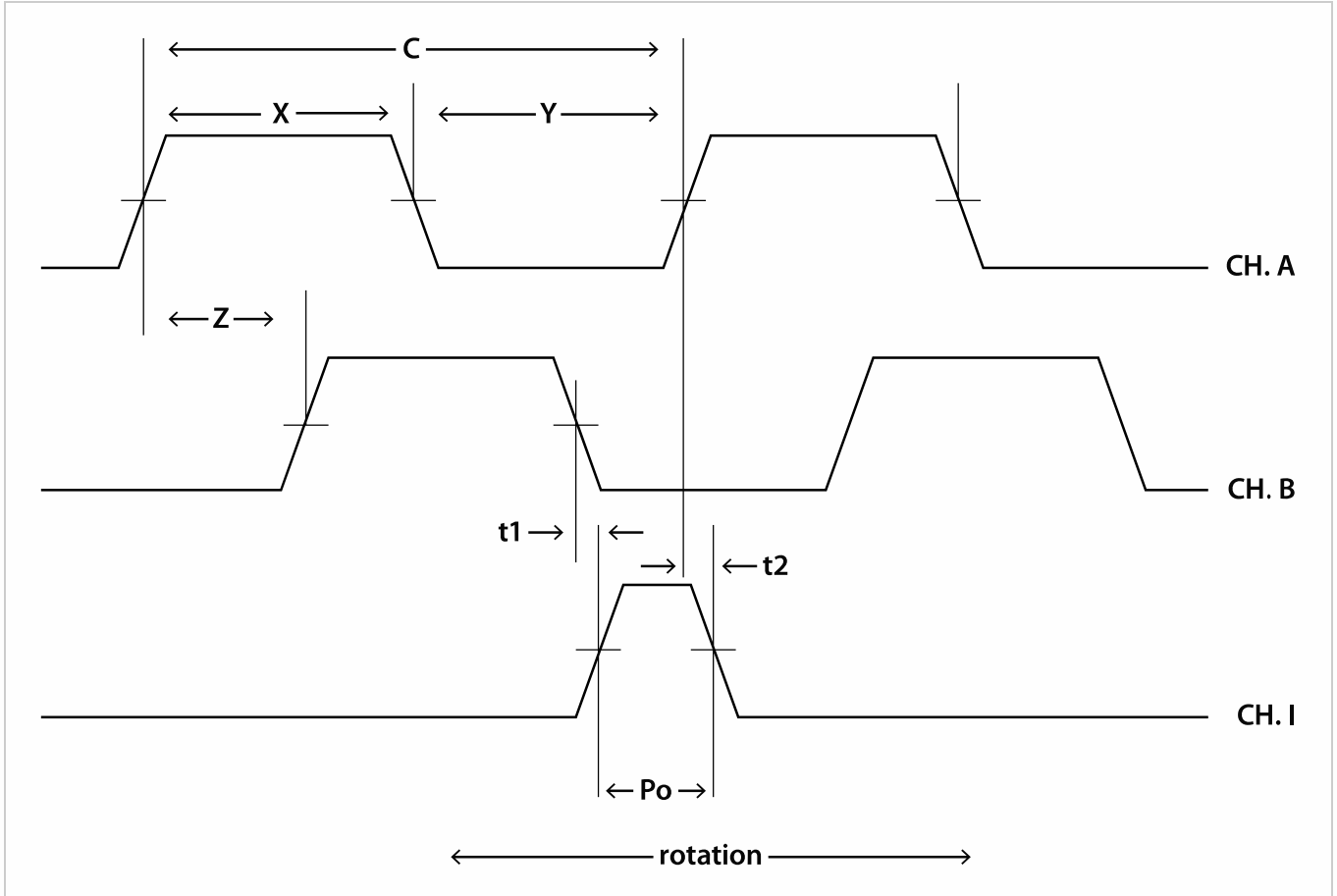
PARAMETER	MIN.	TYP.	MAX.	UNITS	NOTES
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		18	26	mA	no load
Low-level Output			0.4	V	$I_{OL} = 4 \text{ mA}$, $V_{CC} = 5V$
		0.1		V	no load
High-level Output	4.7			V	$I_{OH} = 4 \text{ mA}$, $V_{CC} = 5V$
		4.9		V	no load
Output Rise Time		80	135	ns	no load
Output 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	$^{\circ}e$ (https://www.usdigital.com/support/resources/glossary/#glossary_e)
Quadrature	Z	60	90	120	$^{\circ}e$ (https://www.usdigital.com/support/glossary/#glossary_e)
Index Pulse Width	Po	60	90	120	$^{\circ}e$ (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



CPR

The number of Cycles (C) of the A or B outputs Per Revolution.

Index (I)

The index output goes high once per revolution, coincident with the low states of channels A and B, nominally $1/4$ of one cycle ($90^\circ e$).

One Shaft Rotation

360 mechanical degrees.

One Electrical Degree ($^\circ e$)

$1/360$ th of one cycle.

One Cycle (C)

360 electrical degrees ($^\circ e$). Each cycle can be decoded into 1, 2, or 4 states, referred to as x1, x2, or x4 resolution multiplication.

PPR

The number of resolvable Positions Per Revolution of the encoder disk with x4 quadrature decoding.

Quadrature (Z)

The phase lag or lead between channels A and B in electrical degrees, nominally $90^\circ e$.

Symmetry

A measure of the relationship between (X) and (Y) in electrical degrees, nominally $180^\circ e$.



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.