



## E4P Features

- Miniature size
- Push-on hub - spring loaded collet design
- Minimum shaft length of .375 in.
- Fits shaft diameters of .079 in. to .250 in.
- Accepts +/- .020 in. Axial shaft play
- Off-axis mounting tolerance of .010 in.
- 100 to 360 cycles per revolution (CPR)
- 400 to 1,440 pulses per revolution (PPR)
- Single +5V supply



### The E4P is no longer available for purchase.

The E4P is no longer available for purchase, and has been replaced by our recently released E4T ([/products/encoders/incremental/kit/e4t/](https://www.usdigital.com/products/encoders/incremental/kit/e4t/)). The E4T is a redesigned, enhanced version of the E4P, and is already available for purchase.

## E4P Product Description

The E4P miniature reflective encoder is designed to provide digital quadrature encoder feedback for high-volume applications with limited space constraints. The E4P version utilizes an innovative, patented push-on encoder disk that accepts shaft diameters of 2mm to .250 in.



The E4P reflective encoder is the leader for high-quality OEM applications, but the E4 is the ideal choice when a set-screw encoder disk encoder is required (see the E4 (<https://www.usdigital.com/products/discontinued-products/discontinued-encoders/e4/>) page).

The E4P miniature encoder base provides mounting holes for two #3-48, length 1/4 in. or two M2.5x.45mm, length 6mm screws on a .586 in. bolt circle. When mounting holes are not available, a pre-applied transfer adhesive (with peel-off backing) is available for "stick-on" mounting.

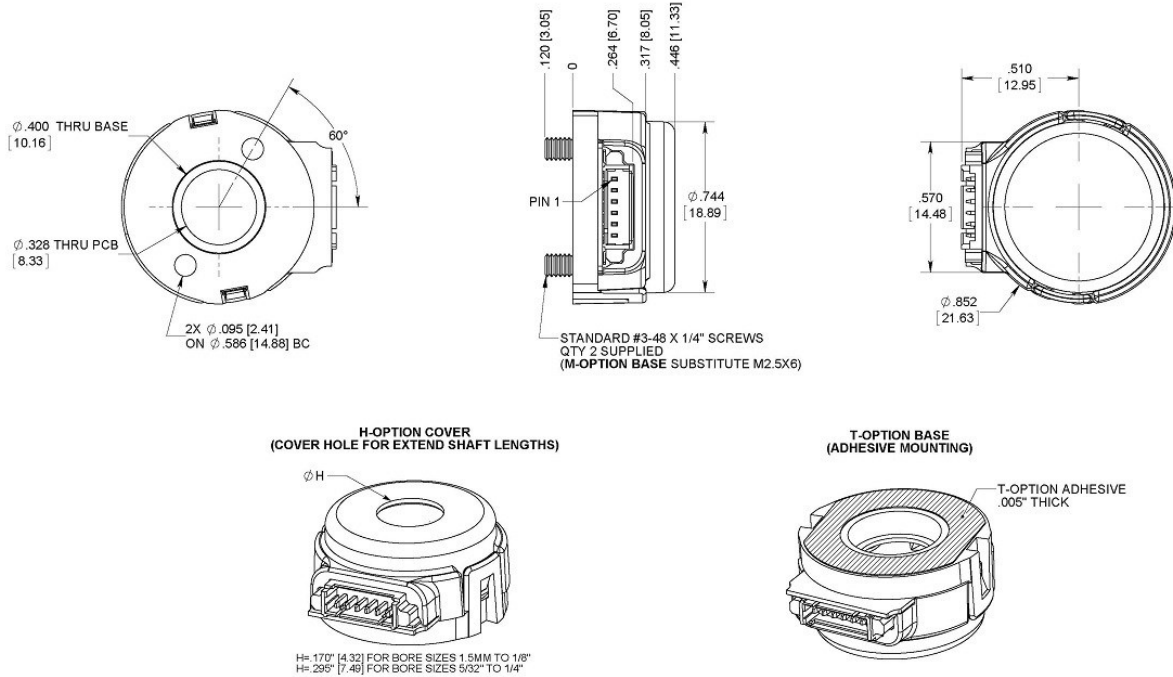
The encoder cover is easily snapped onto the base and is embossed with the connector pin-out.

The E4P reflective series encoder can be connected using a (high retention 4-conductor snap-in polarized 1.25mm pitch) connector. Mating cables and connectors (see the Cables (<https://www.usdigital.com/products/accessories/cables/>)/Connectors (<https://www.usdigital.com/products/accessories/connectors/>) web page) are not included and are available separately.

## Mechanical Drawings

E4P Differential OEM Miniature Optical Kit Encoder

RELEASE DATE: 9/2/2021



US DIGITAL 1400 NE 139th Avenue  
Vancouver, Washington 98684, USA

info@usdigital.com  
www.usdigital.com

Local: 360.260.2468  
Toll-Free: 800.736.0194

UNITS: INCHES (MM)  
METRIC DIMENSIONS FOR REFERENCE ONLY

## Specifications

### ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Vibration (5Hz to 2kHz)	20	G
Max. Relative Humidity	90	%
Storage Temperature	-40 to 100	C
Operating Temperature	-20 to 100	C
Electrostatic Discharge, IEC 61000-4-2		
Single-ended (S-option)	± 8	KV
Differential (D-option)	± 15	



## MECHANICAL

PARAMETER	VALUE	UNITS
Max. Shaft Axial Play	± .020	in.
Max. Off-axis Mounting Tolerance	± .010	in.
Max. Acceleration	250000	rad/sec <sup>2</sup>
Mounting Screw Size Default (D-option base) Metric (M-option base)	#3-48 x 1/4" M2.5x.45mm, length 6mm	
Screw Bolt Circle Diameter	.586 ±.002	in.
Axial Length of Codewheel	.270	in.
Required Shaft Length (1)	.375 to .395	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) Includes axial play.

## SINGLE-ENDED ELECTRICAL

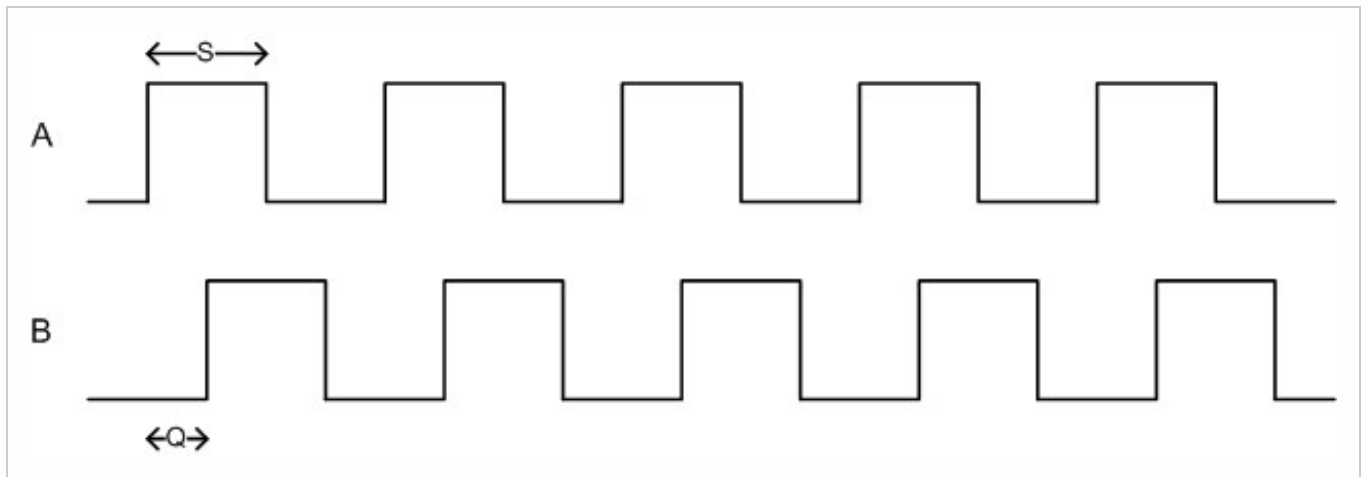
SPECIFICATIONS	MIN.	TYP.	MAX.	UNITS	NOTES
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		21	27	mA	no load
Low-level Output			0.4	V	I <sub>OL</sub> = 6 mA
High-level Output	2.4			V	I <sub>OH</sub> = -1 mA
Rise Time		500		ns	CL = 25 pF, RL = 2.7 kΩ
Fall Time		100		ns	



## DIFFERENTIAL ELECTRICAL

SPECIFICATIONS	MIN.	TYP.	MAX.	UNITS	NOTES
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		23	29	mA	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			1300	ns	

## PHASE RELATIONSHIP



PARAMETER	TYP.	MAX.	UNITS
Symmetry, S	180 ± 16	180 ± 75	electrical degrees
Quadrature Delay, Q	90 ± 10	90 ± 60	electrical degrees

- (1) A leads B for clockwise shaft rotation, B leads A for counterclockwise shaft rotation viewed from the cover/label 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/CON-MIC4>)

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

## OPTIONS

### H-OPTION (HOLE IN COVER)

The H-option adds a hole in the cover for the shaft to pass through:

- For shaft diameters of 1.5mm to 1/8", a 0.170" hole is supplied.
- For shaft diameters of 5/32" to 1/4", a 0.295" hole is supplied.

### M-OPTION (METRIC MOUNTING SCREWS)

Provides alternate metric M2.5x.45mm, length 6mm screws. When M-option is NOT specified the default is #3-48 x 1/4" screws.

### T-OPTION (TRANSFER ADHESIVE)

When mounting holes are not available, a pre-applied transfer adhesive (with peel-off backing) is available for "stick-on" mounting. Use the centering tool (above) to position the base. T-option specifies transfer adhesive.

Before installation, cleaning the mounting surface with alcohol is recommended to remove dust and oil.

## ASSEMBLY INSTRUCTIONS

Download the E4P Assembly Instructions. (<https://www.usdigital.com/media/w0alacqe/e4p-assembly-instructions.pdf>)



## ACCESSORIES

### 1. Centering Tool

The centering tool is only included with the **-3** packaging option. It has to be ordered separately for other package options.

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

**Description:** This reusable tool provides a simple method for accurately centering the **E4P** base onto the shaft. A centering tool is highly recommended when using the **T**-option transfer adhesive.

### 2. Spacer Tool

A spacer tool is included for all packaging options.

**Part #: SPACER-E4P**

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

## 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

E4P
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**PLEASE NOTE: This chart is for informational use only.** Certain product configuration combinations are not available. Visit the E4P product page (<https://www.usdigital.com/products/E4P>) for pricing and additional information.