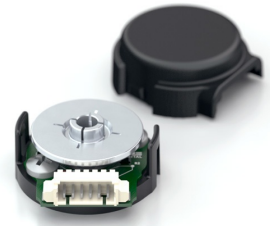## E4P Features

- 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The E4P is no longer available for purchase, and has been replaced by our recently released E4T *(/products/encoders/incremental/kit/e4t/)*. 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).
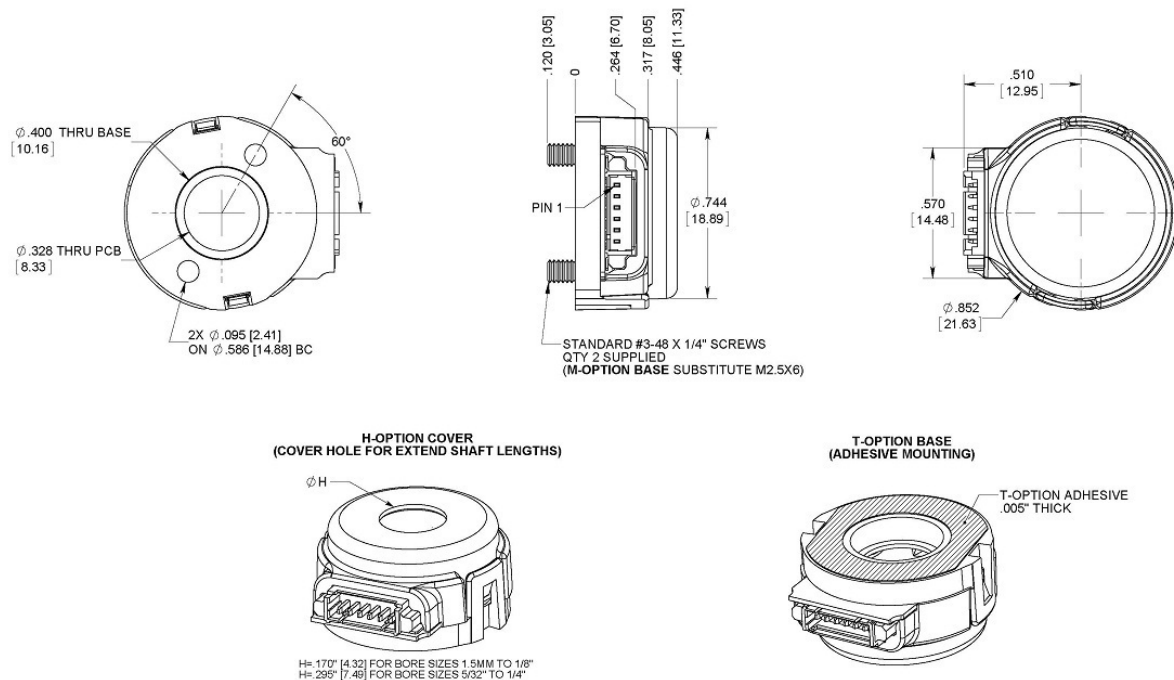
The E4P miniature encoder base provides mounting holes for two #3-48, length 1/4 in. or two M2.5x.45mm, length 6mm screws on a .586 in. bolt circle. When mounting holes are not available, a pre-applied transfer adhesive (with peel-off backing) is available for "stick-on" mounting.

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.

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E4P

Mechanical Drawings

E4P Differential OEM Miniature Optical Kit Encoder

RELEASE DATE 9/21/2011

∅ .400 THRU BASE [10.16]

∅ .328 THRU PCB [8.33]

2X ∅ .095 [2.41] ON ∅ .586 [14.88] BC

60°

.120 [3.05]
.264 [6.70]
.317 [8.05]
.446 [11.33]

PIN 1

∅ .744 [18.89]

STANDARD #3-48 X 1/4" SCREWS QTY 2 SUPPLIED (M-OPTION BASE SUBSTITUTE M2.5X6)

.510 [12.95]

.570 [14.48]

∅ .852 [21.63]

H-OPTION COVER
(COVER HOLE FOR EXTEND SHAFT LENGTHS)

∅ H

H=.170" [4.32] FOR BORE SIZES 1.5MM TO 1/8"
H=.295" [7.49] FOR BORE SIZES 5/32" TO 1/4"

T-OPTION BASE
(ADHESIVE MOUNTING)

T-OPTION ADHESIVE .005" THICK

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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) Differential (D-option)	± 8 ± 15	kV

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MECHANICAL

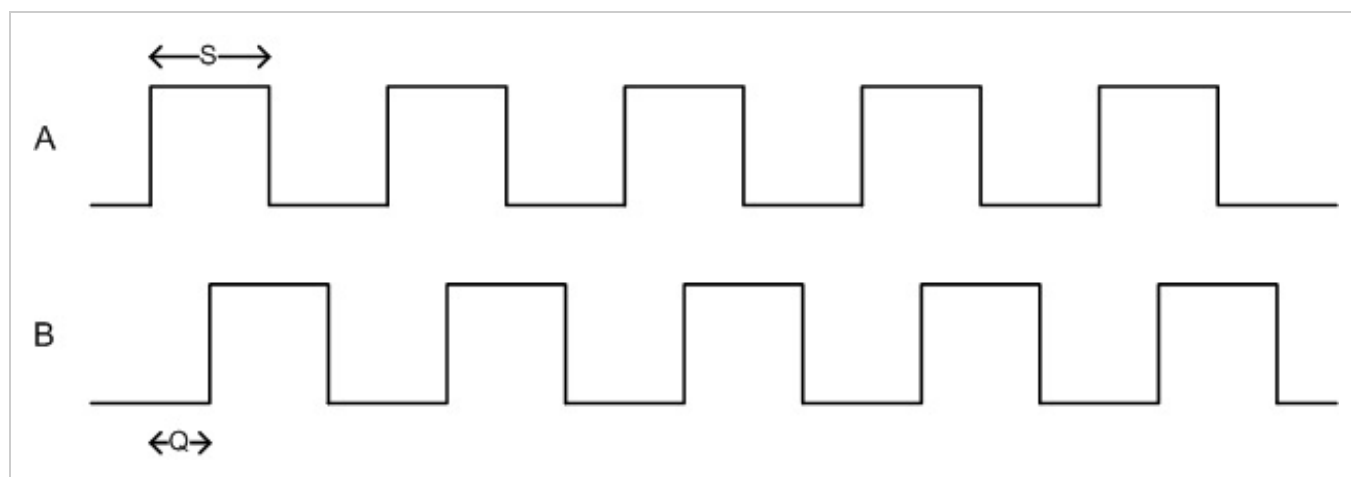| PARAMETER	VALUE	UNITS
Max. Shaft Axial Play	± .020	in.
Max. Off-axis Mounting Tolerance	± .010	in.
Max. Acceleration	250000	rad/sec²
Mounting Screw Size Default (D-option base) Metric (M-option base)	#3-48 x 1/4" M2.5x.45mm, length 6mm	
Screw Bolt Circle Diameter	.586 ±.002	in.
Axial Length of Codewheel	.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 *(https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/)*	

(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_{OL} = 6 mA
High-level Output	2.4			V	I_{OH} = -1 mA
Rise Time		500		ns	CL = 25 pF, RL = 2.7 kΩ
Fall Time		100		ns	

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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/woalacqe/e4p-assembly-instructions.pdf)*

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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

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.

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