US DIGITAL

RoHS COMPLIANT

🔍 Description

On January 16, 2012, the E4P part number will be modified.
Please see the E4P Part Number Change notification for more information.

The E4P miniature 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 codewheel which accepts shaft diameters of 1.5mm to .250".

The E4P encoder is the leader for high quantity OEM applications, but the E4 is the ideal choice when a set-screw codewheel encoder is required (see the E4 page).

The E4P miniature encoder base provides mounting holes for two #3-48, length 1/4" or two M2.5x.45mm, length 6mm screws on a .586" 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 series encoder can be connected by using a (high retention 4-conductor snap-in polarized 1.25mm pitch) connector. Mating cables and connectors (see the Cables / Connectors web page) are not included, and are available separately.

Features

- Miniature size
- Push-on hub - spring loaded collet design
- Minimum shaft length of .375"
- Fits shaft diameters of .059" to .250"
- Accepts +/-.020" Axial shaft play
- Off-axis mounting tolerance of .010"
- 100 to 360 cycles per revolution (CPR)
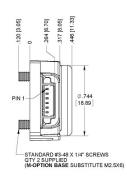- 400 to 1440 pulses per revolution (PPR)
- Single +5V supply

US DIGITAL

1400 NE 136th Avenue
Vancouver, Washington 98684, USA

info@usdigital.com
www.usdigital.com

Local: 360.260.2468
Toll-free: 800.736.0194

Rev. 120315163135

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E4P Differential
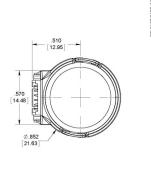
E4P Differential OEM Miniature Optical Kit Encoder

RELEASE DATE: 9/21/2011

∅ .400 THRU BASE [10.16]

∅ .328 THRU PCB [8.33]

60°

2X ∅ .095 [2.41] ON ∅ .586 [14.88] BC

.120 [3.05]

0

.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
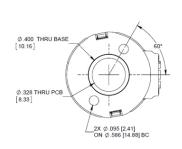
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1400 NE 136th Avenue
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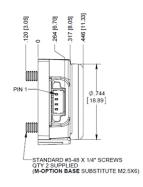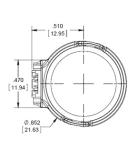info@usdigital.com
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UNITS: INCHES [MM]
METRIC DIMENSIONS FOR REFERENCE ONLY

E4P Single Ended
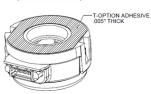
E4P Single-Ended OEM Miniature Optical Kit Encoder

RELEASE DATE: 9/21/2011

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∅ .328 THRU PCB [8.33]

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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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⚙ Environmental

Parameter	Min.	Max.	Units
Vibration (5Hz to 2kHz)	-	20	G
Relative Humidity	-	90	%
Storage Temperature	-40	100	C
Operating Temperature	-20	100	C
ESD (Human Body Model JESD22-A114-A Class 2)	-	3	kV
ESD (Machine Model JESD22-A115-A Class B)	-	300	V

⚙ Mechanical

Parameter	Value	Units
Moment of Inertia	3.36 x 10^-6	oz-in-s²
Mounting Screw Size	#3-48 x 1/4"	-
M-option Screw Size	M2.5x.45mm, length 6mm	-
Screw Bolt Circle Diameter	.586 ±.002	in.
Mounting Screw Torque	2-3	in.-lbs.
Axial Length of Codewheel	.270	in.
Required Shaft Length (1)	.375 to .395	in.
Shaft Axial Play	± .020	in.
Off-axis Mounting Tolerance	± .010	in.
Shaft to Mounting Surface Perpendicularity	90 ± 1	deg.
Acceleration	250000 max.	rad/sec²
Maximum RPM (2) e.x. CPR = 360, max. rpm = 10000 e.x. CPR = 100, max. rpm = 36000	minimum value of (3600000/CPR) and (60000)	rpm

(1) Includes axial play.

(2) 60000 rpm is the maximum rpm due to mechanical considerations. The maximum rpm due to the module's 60kHz maximum count frequency is (3600000/CPR).

⚙ Single-ended Electrical
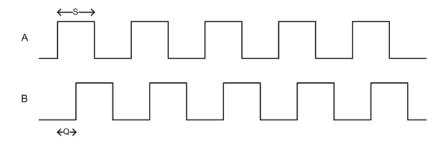
Specifications	Min.	Typ.	Max.	Units	Notes

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Supply Current	-	21	27	mA	
Supply Voltage	4.5	-	5.5	V	
High Level Output	2.4	-	-	V	$I_{oh} = -1$ mA
Low Level Output	-	-	0.4	V	$I_{ol} = 6$ 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 Current	-	22	30	mA	
Supply Voltage	4.5	-	5.5	V	
High Level Output	2.4	3.4	-	V	$I_{oh} = -20$ mA
Low Level Output	-	0.2	0.4	V	$I_{ol} = 20$ mA
Rise Time	-	500	-	ns	
Fall Time	-	100	-	ns	

⚙ Phase Relationship

Parameter	Typ.	Units
Symmetry, S	180 ± 16	electrical degrees
Quadrature Delay, Q	90 ± 12	electrical degrees

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

⚙ Pin-out

4-pin Single-ended		6-pin Differential	
Pin	Description	Pin	Description

4-pin Single-ended		6-pin Differential	
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

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.

Accessories

Centering Tool

Part #: MCTOOL - (Shaft Diameter*)

Description: This reusable tool provides a simple method for accurately centering the **E4P**base onto the shaft.

Material: Aluminum.

Please note:A centering tool is highly recommended when using the **T**-option transfer adhesive.

* See Ordering Information below for available Shaft Diameters.

Spacer Tool

Part #: SPACER-E4P

Rev. 120315163135

Description: This reusable tool is used to properly space the codewheel from the encoder base. Provides air gap of 0.07" to 0.03".

Material: Polycarbonate.

Please note: Each order includes at least one spacer tool per 100 encoders.

Assembly Instructions

Download the E4P Assembly Instructions.

http://usdigital.com/assets/assembly/E4P Assembly Instructions.pdf

Product Change Notifications

Title	Date	Description	Download
E4 - E4P - S4 Update - PCN 1014	11/29/2011	We have modifed the E4, E4P and S4 product lines in order to improve the performance and durability of the encoder. Changes include new molds for the plastic base and cover parts with an over-molded bushing in the S4 base, a new SMT connector (compatible with current mating connector)and a modified PCB profile to accommodate the new connector and plastic part modifications.	Download

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📦 Ordering Information

E4P - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

CPR	Bore	Index	Output	Cover	Base	Packaging
100	059 = 1.5mm	N = No Index	S = Single Ended	D = Default	D = Default	B = Encoder components packaged in bulk. One spacer tool per 100 encoders.
108	079 = 2mm		D = Differential	H = Hole in Cover	M = Alternate metric M2.5x.45mm, length 6mm screws	1 = Each encoder packaged individually with one spacer tool per 100 encoders.
120	091 = 2.3mm				T = Transfer Adhesive	2 = Each encoder packaged individually with one spacer tool per encoder.
125	098 = 2.5mm					3 = Each encoder packaged individually with one spacer tool and one centering tool per encoder.
128	118 = 3mm					
200	125 = 1/8"					
250	156 = 5/32"					
256	157 = 4mm					
300	188 = 3/16"					
360	197 = 5mm					
	236 = 6mm					
	250 = 1/4"					

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 for details.

Base Pricing

Quantity	Price
1	$25.25
10	$19.84
50	$17.26
100	$15.21

‣ Add 39% per unit for **Output** of Differential
‣ Add 15% per unit for **Base** of Transfer Adhesive
‣ Add $3.00 per unit for **Packaging** of Each encoder packaged individually with one spacer tool per 100 encoders.
‣ Add $4.00 per unit for **Packaging** of Each encoder packaged individually with one spacer tool per encoder.
‣ Add $7.00 per unit for **Packaging** of Each encoder packaged individually with one spacer tool and one centering tool per encoder.

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