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

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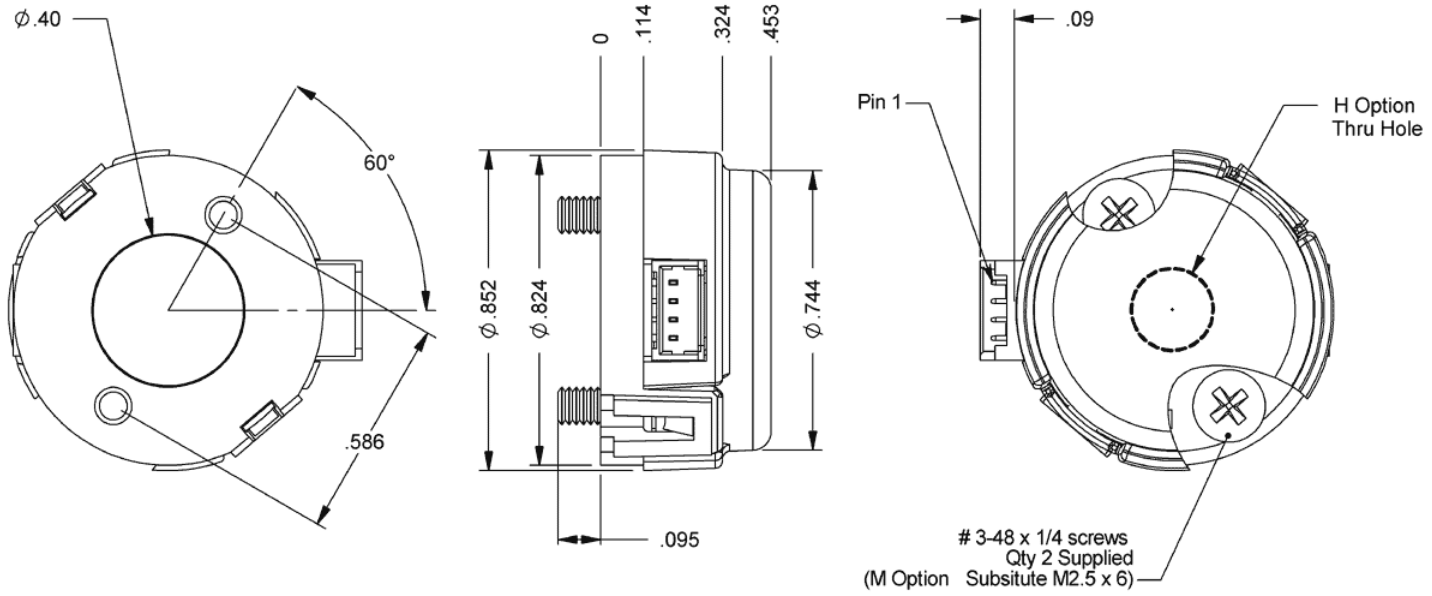
Mechanical Drawing



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.

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Parameter	Value	Units
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

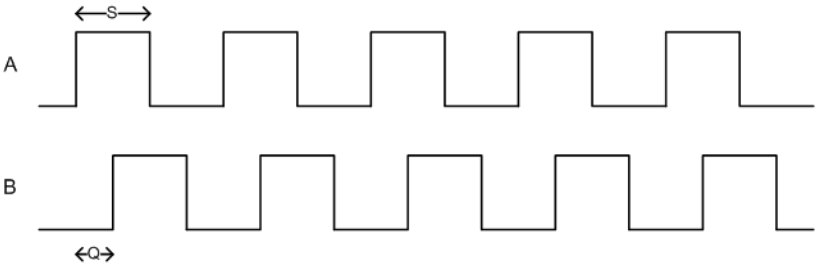
(1) Includes axial play.

(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).

Electrical

Parameter	Min.	Typ.	Max.	Units	Notes
Power Supply Voltage	4.5	5.0	5.5	V	
Power Supply Current	-	21	27	mA	no load on outputs
High Level Output Voltage	2.4	-	-	V	IOH = -1.2 mA
Low Level Output Voltage	-	-	0.4	V	IOL = 6.0 mA
Rise Time	-	500	-	ns	CL = 25pF, RL = 2.7kOhm
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

Pin	Description
1	+5VDC power
2	A channel
3	Ground
4	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.

L-option (Low Power Strobe)

To reduce the average power requirements, the **L**-option version of the **E4P** power can be strobed on just long enough to sample outputs A and B. This option is the same as our standard **E4P**, except the internal power bypass capacitor is not installed. The outputs settling time is typically 200 to 400 nano seconds after power up. The minimum sample frequency must be less than the maximum RPM X the CPR / 10.

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

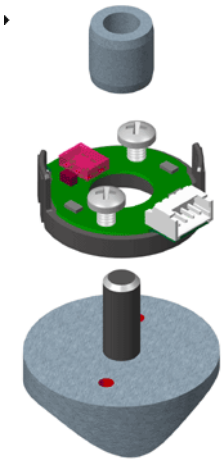
Description: This reusable tool is used to properly space the codewheel from the encoder base. Provides air gap of 0.07" to 0.03".

Material: Polycarbonate.

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

Assembly Instructions

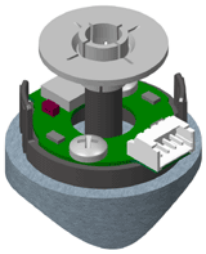
View the PDF version of this document.



1. Base Mounting

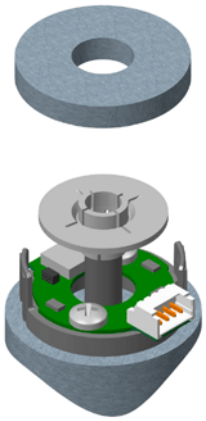
Place base onto shaft. Secure base to mounting surface using two screws.

Transfer Adhesive: Peel off paper backing, place centering tool into center hole of base, slip centering tool onto shaft and slide base and centering tool down onto mounting surface as one piece. Press to form a good bond, then slip centering tool off shaft and continue with standard mounting instructions.



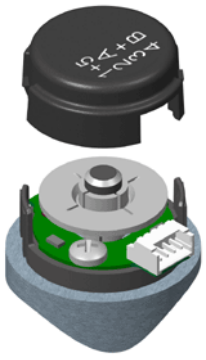
2. Codewheel Placement

Place codewheel onto shaft with pattern-side down towards base.



3. Codewheel Installation

Position spacer / installation tool onto codewheel. Spacer / installation tool provides an air gap of 0.07" ± 0.03". Press down firmly until t ool bottoms out on base latching ears.



4. Cover Installation

Place housing (cover) on. With thumb and finger, squeeze ears together to insure that cover fully latches.

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	Power	Cover	Base	Packaging
100	059 = *1.5mm*	D =*Default*	D =*Default*	D =*Default*	B =*Encoder components packaged in bulk. One spacer tool per 100 encoders.*
108	079 = *2mm*	L =*Low Power Strobe*	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 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.

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- 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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