

Description:

The **E4** miniature encoder is designed to provide digital quadrature encoder feedback for applications with limited space constraints. The **E4** utilizes a traditional set-screw hub disk assembly which accommodates shaft sizes from 1.5mm to 4mm in diameter.

For high quantity OEM applications **US Digital offers a cost saving OEM packaging option** (see **ordering information**). When a set-screw is not required, the **E4P** is the ideal choice for high quantity OEM applications (see the **E4P data sheet**).

The **E4** base provides mounting holes for two 3-48 x 1/4" or two 2.5mm x 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 internal components consist of a precision machined aluminum hub and a encoder circuit board module.

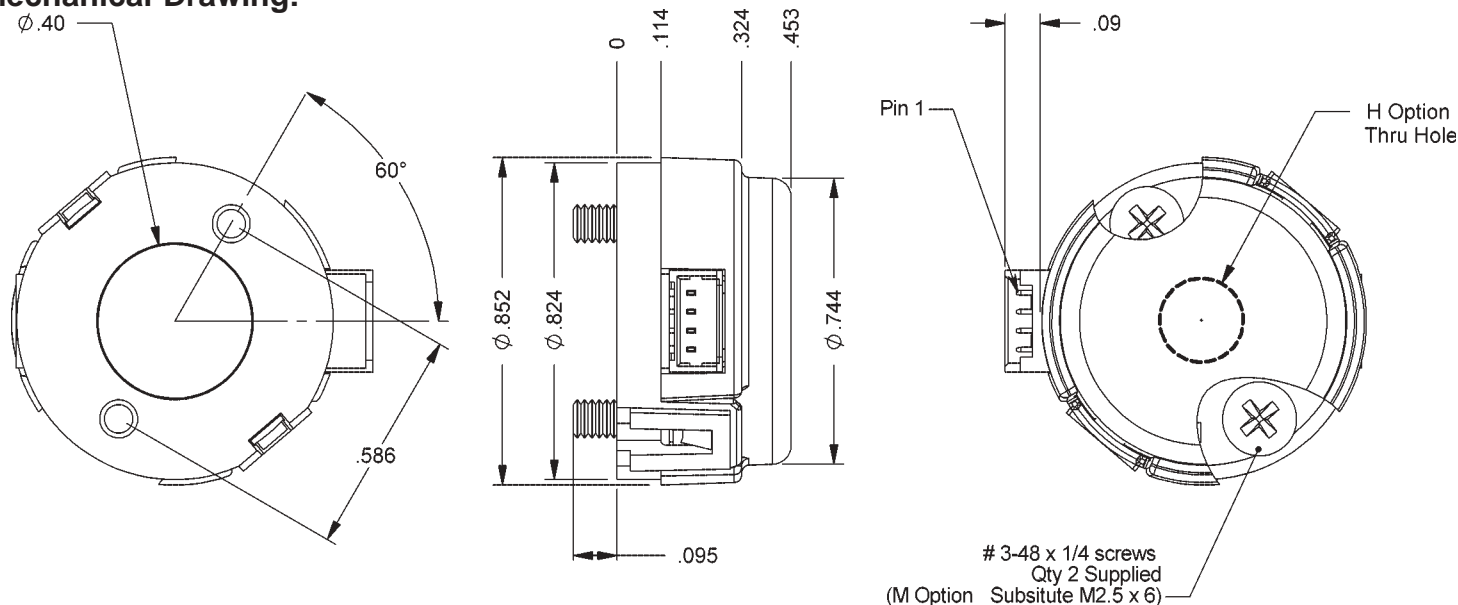
The encoder cover is easily snapped onto the base and is embossed with the connector pin-out.

The **E4** 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 data sheet**) are not included and are available separately.

Features:

- Low cost
- Cost saving OEM packaging option available
- Miniature size
- Minimum shaft length of .285"
- Fits shaft diameters of .059" to .157" (1.5mm to 4mm)
- High retention snap-in polarized connector
- Accepts $\pm .020$ " ($\pm .5$ mm) axial shaft play
- Off-axis mounting tolerance of .010"
- Tracks from 0 to 60,000 cycles/sec
- 100 to 360 cycles per revolution (CPR)
- 400 to 1440 pulses per revolution (PPR)
- 2 channel quadrature TTL squarewave outputs
- -10° to +85°C operating temperature
- Single +5V supply
- Low power strobe option available
- Adhesive option available
- US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.

Mechanical Drawing:



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 2.5mm, a 0.143" hole is supplied.
- For shaft diameters of 3mm and 1/8", a 0.170" hole is supplied.
- For shaft diameters of 5/32" and 4mm, a 0.242" hole is supplied.

M-option (Metric Mounting Screws):

Provides alternate metric 2.5mm x 6mm screws. When **M**-option is NOT specified the default is 3-48 x 1/4" screws.

L-option (Low Power Strobe):

To reduce the average power requirements, the **L**-option version of the **E4** power can be strobed on just long enough to sample outputs A and B. This option is the same as our standard **E4**, 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.

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 to position the base. **T**-option specifies transfer adhesive.

Mechanical Specifications:

Parameter	Dimension	Units
Moment of Inertia	7.4E ⁻⁶	oz-in-s ²
Hub Set Screw Size	3-48 or 4-48	in.
Hex Wrench Size	.050	in.
Mounting Screw Size	#3-48 x 1/4"	
M-option Screw Size	2.5mm x 6mm	
Screw Bolt Circle Diameter	.586 ±.002	in.
Required Shaft Length*	.285 to .395	in.

* Includes axial play.

Absolute Maximum Ratings:

Parameter	Min.	Max.	Units
Vibration (5 to 2kHz)	-	20	g
Shaft Axial Play	-	±.020	in.
Off-Axis Mounting Tolerance	-	.010	in.
Acceleration	-	250,000	rad/sec ²
Storage Temperature	-40°	85°	°C
Relative Humidity	-	90	%

Torque Specifications:

Parameter	Torque
Hub Set Screw to Shaft	1.5-2.0 in.-lbs.
Base to Mounting Surface	2-3 in.-lbs.

Electrical Specifications:

For complete details see the **AEDR** data sheet.

Phase Relationship:

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from the cover/label side of the encoder (see the **AEDR** data sheet).

Compatible Cables & Connectors:**4-pin Micro:**

CON-MIC4	Connector
CA-3285-1FT	Connector on one end with 4 12" wires
CA-3286-6FT	Connector on one end of a 6' round twisted pair cable

Attention:

- Specify cable length when ordering.
- Custom cable lengths are available. See the **Cables / Connectors** data sheet for more information.
- The connector built into the encoder is Molex# 53048-0410.
- The mating connector is made up of housing (Molex# 51021-0400) and 4 individual crimp-on pins (Molex# 50079-8100).
- Special crimp tool (Molex# 50079) is needed to install connector pins.

Pin-out:

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

Accessories:

Spacer Tool:

SPACER-4216 Price: \$0.53
Nylon. Round.
Provides air gap of 0.07" ±0.03".

Hex Tools:

HEXD-3404 Price: \$5.25
Hex driver, .050" flat-to-flat for 3-48
or 4-48 set screws.

HEXW-349 Price: \$0.53
Hex wrench, .050" flat-to-flat for
3-48 or 4-48 set screws.

Centering Tool:

This reusable tool provides a simple
method for accurately centering the **E4**
base onto the shaft. It is recommended
when using the **T**-option transfer adhe-
sive.



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Price	CPR:	Shaft Diameter:
\$5.25	100	Code Size
	108	059 1.5mm
	120	079 2mm
	125	091 2.3mm
	128	098 2.5mm
	200	118 3mm
	250	125 1/8"
	256	156 5/32"
	300	157 4mm
	360	

Ordering Information:

Price:

\$30.45 / 1
\$27.09 / 10
\$23.10 / 50
\$20.48 / 100
\$18.17 / 500
\$16.28 / 1K
\$14.60 / 5K
\$13.55 / 10K

Cost Modifiers:

- Add 10% for **T**-option.
- Add \$3 for **PKG1**-option.
- Add \$4 for **PKG2**-option.
- Add \$7 for **PKG3**-option.
- Subtract \$0.50 for **OEM**-option.

E4 - <input type="text"/> — <input type="text"/> — <input type="text"/> — <input type="text"/>	<table border="1"> <tr> <th>CPR:</th> <th>Code</th> <th>Size</th> </tr> <tr><td>100</td><td></td><td></td></tr> <tr><td>108</td><td>059</td><td>1.5mm</td></tr> <tr><td>120</td><td>079</td><td>2mm</td></tr> <tr><td>125</td><td>091</td><td>2.3mm</td></tr> <tr><td>128</td><td>098</td><td>2.5mm</td></tr> <tr><td>200</td><td>118</td><td>3mm</td></tr> <tr><td>250</td><td>125</td><td>1/8"</td></tr> <tr><td>256</td><td>156</td><td>5/32"</td></tr> <tr><td>300</td><td>157</td><td>4mm</td></tr> <tr><td>360</td><td></td><td></td></tr> </table>	CPR:	Code	Size	100			108	059	1.5mm	120	079	2mm	125	091	2.3mm	128	098	2.5mm	200	118	3mm	250	125	1/8"	256	156	5/32"	300	157	4mm	360			<table border="1"> <tr> <th>Options: (specify in order shown)</th> </tr> <tr> <td>L = Low power strobe.</td> </tr> <tr> <td>H = Adds hole in cover to allow the shaft to pass through.</td> </tr> <tr> <td>T = Adds transfer adhesive.*</td> </tr> <tr> <td>M = Provides alternate metric 2.5mm x 6mm screws.**</td> </tr> </table>	Options: (specify in order shown)	L = Low power strobe.	H = Adds hole in cover to allow the shaft to pass through.	T = Adds transfer adhesive.*	M = Provides alternate metric 2.5mm x 6mm screws.**	<table border="1"> <tr> <th>Packaging Options:</th> </tr> <tr> <td>Blank (default) = Encoder components packaged in bulk, PCB's are pre-assembled to encoder base.</td> </tr> <tr> <td>OEM*** = Encoder cover, base, pcb, and screws are all packaged separately in bulk. PCB's come in scored panels that need to be broken out by the customer. Additional assembly is required.</td> </tr> <tr> <td>PKG1 = Each encoder packaged individually. One spacer tool and one hex driver per 100 encoders packaged in bulk.</td> </tr> <tr> <td>PKG2 = One spacer tool and one hex wrench individually packaged together with each encoder.</td> </tr> <tr> <td>PKG3 = One spacer tool, one hex wrench, and one centering tool individually packaged together with each encoder.</td> </tr> </table>	Packaging Options:	Blank (default) = Encoder components packaged in bulk, PCB's are pre-assembled to encoder base.	OEM*** = Encoder cover, base, pcb, and screws are all packaged separately in bulk. PCB's come in scored panels that need to be broken out by the customer. Additional assembly is required.	PKG1 = Each encoder packaged individually. One spacer tool and one hex driver per 100 encoders packaged in bulk.	PKG2 = One spacer tool and one hex wrench individually packaged together with each encoder.	PKG3 = One spacer tool, one hex wrench, and one centering tool individually packaged together with each encoder.
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Important:
Shaft diameters 187 and 197 are no longer available. Please see the **E4P** data sheet.

Notes:
 * A centering tool is highly recommended when using this option.
 ** When **M**-option is NOT specified the default is 3-48 x 1/4" screws.
 *** Minimum order quantity: 80.

Important:
 When a centering tool is needed it may be most cost effective to use the default packaging option and to order a centering tool separately. This is especially true when ordering a single encoder.

Technical Data, Rev. 10.16.07, October 2007
All information subject to change without notice.