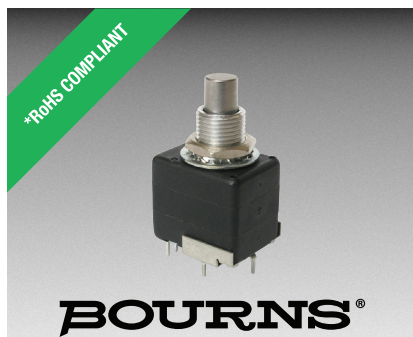




Features

- Two channel quadrature output
- Bushing or servo mount
- Square wave signal
- Small size
- Resolution to 256 PPR
- CMOS and TTL compatible
- Long life

- Ball bearing option for high operating speed up to 3000 rpm
- RoHS compliant*

EN - Rotary Optical Encoder

General Information

The Bourns® EN model is a self-contained rotary optical encoder. It produces a 2-bit quadrature signal which is suitable for digital systems where both magnitude and direction of adjustment must be provided. The EN encoder is ideal for use as a digital panel control or as a position sensing device in applications where long life, reliability, high resolution and precise linearity are critical.

The EN series encoder converts rotary input into electrical signals which can be used by microprocessors without A/D conversion.

Bourns encoder output signals are square wave digital pulses which do not require debounce circuitry. Both features make it possible to significantly reduce the memory overhead, wiring and wiring interconnects required by other types of control devices.

EN optical encoders offer a useful rotational life of from 10 million to 200 million shaft revolutions, making them ideal for extended service applications. The Bourns encoder is also compact and well suited for situations where the available space is limited.

Additional Information

Click these links for more information:



[PRODUCT](#)



[TECHNICAL
LIBRARY](#)



[INVENTORY](#)



[SAMPLES](#)



[CONTACT](#)

Electrical Characteristics

Output.....	2-bit quadrature code, Channel A leads Channel B by 90 ° (electrical) with clockwise rotation
Resolution.....	25 to 256 cycles per revolution
Insulation Resistance (500 VDC)	1,000 megohms
Electrical Travel	Continuous
Supply Voltage.....	5.0 VDC ± 0.25 VDC
Supply Current.....	26 mA maximum
Output Voltage	
Low Output	0.8 V maximum
High Output.....	4 V minimum
Output Current	
Low Output	25 mA minimum
Rise/Fall Time.....	200 ns (typical)
Shaft RPM (Ball Bearing)	3,000 rpm maximum
Power Consumption	136 mW maximum
Pulse Width (Electrical Degrees, Each Channel)	180 ° ± 45 ° typ.
Pulse Width (Index Channel).....	360 ° ± 90 °
Phase (Electrical Degrees, Channel A to Channel B).....	90 ° ± 45 ° typ.

Environmental Characteristics

Operating Temperature Range.....	-40 °C to +75 °C (-40 °F to +167 °F)
Storage Temperature Range	-40 °C to +85 °C (-40 °F to +185 °F)
Humidity.....	MIL-STD-202, Method 103B, Condition B
Vibration	5 G
Shock.....	50 G
Rotational Life	
A & C Bushings (300 rpm maximum)**	10,000,000 revolutions
W, S & T Bushings (3,000 rpm maximum)**	200,000,000 revolutions
IP Rating.....	IP 40

**For resolutions ≤ 128 quadrature cycles per shaft revolution.

BOURNS®

Asia-Pacific: Tel: +886-2 2562-4117 • Email: asiacus@bourns.com

Europe: Tel: +36 88 885 877 • Email: eurocus@bourns.com

The Americas: Tel: +1-951 781-5500 • Email: americus@bourns.com

www.bourns.com



WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.



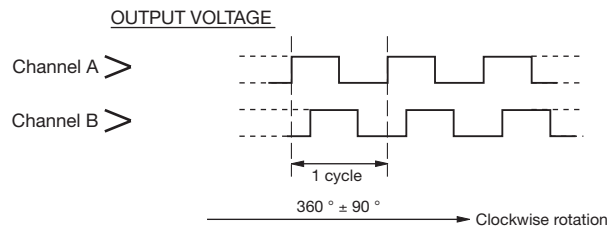
EN – Rotary Optical Encoder

BOURNS®

Mechanical Characteristics

Mechanical Angle	360 ° Continuous
Torque (Starting and Running)	
A & C Bushings (Spring Loaded for Optimum Feel)	1 N-cm (1.5 oz-in.) maximum
W, S & T Bushings (Ball Bearing Shaft Support)	0.07 N-cm (0.1 oz-in.) maximum
Mounting Torque	1.7 to 2.0 N-m (15 to 18 lb.-in.) maximum
Shaft End Play	0.30 mm (0.012 ") T.I.R. maximum
Shaft Radial Play	0.12 mm (0.005 ") T.I.R. maximum
Weight	11 gms. (0.4 oz.)
Terminals	Axial or radial pc pins or ribbon cable
Soldering Condition	
Manual Soldering	96.5Sn/3.0Ag/0.5Cu solid wire or no-clean rosin cored wire 370 °C (700 °F) max. for 3 seconds
Wave Soldering	96.5Sn/3.0Ag/0.5Cu solder with no-clean flux 260 °C (500 °F) max. for 5 seconds
Wash processes	Not recommended
Marking	Manufacturer's trademark, name, part number, and date code.
Hardware	One lockwasher and one mounting nut supplied with each encoder, except on servo mount versions.

Quadrature Output Table



STANDARD RESOLUTIONS AVAILABLE

(Full quadrature output cycles per shaft revolution)

25*	125
50*	128
64	200
100	256

For Non-Standard Resolutions—Consult Factory

* Channel B leads Channel A

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

BOURNS®

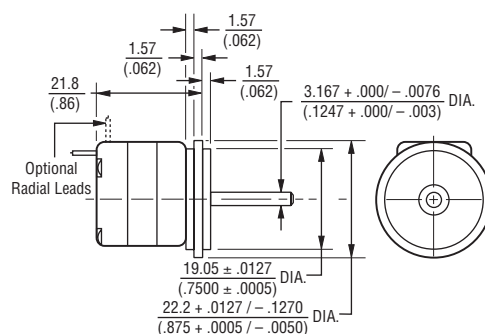
Technical drawing of a 1/4-32 UNEF threaded component. The drawing includes three views: a top view, a side view, and a front view. Dimensions are provided in inches and millimeters.

- Top View:**
 - Overall width: 2.54 (100)
 - Overall height: 2.54 (100)
 - Four mounting holes, each with a diameter of 0.125 (3.175).
- Side View:**
 - Overall length: 18.5 (73)
 - Threaded section length: 6.35 (250)
 - Thread specification: 1/4-32 UNEF
 - Threaded section diameter: 0.3167 (+0.000/-0.0076) (1247 + 0.00/-0.0003)
 - Overall diameter: 0.3167 (+0.000/-0.0076) (1247 + 0.00/-0.0003)
 - Optional Radial Leads: 0.635 (0.025)
 - Overall height: 9.525 (375)
 - Overall width: 8.636 (34)
- Front View:**
 - Overall width: 15.88 (625)
 - Overall height: 2.36 (0.093)
 - Overall diameter: 0.3167 (+0.000/-0.0076) (1247 + 0.00/-0.0003)
 - Overall length: 21.21 (835)
 - Overall width: 1.37 (054)
 - Overall height: 9.53 (375)

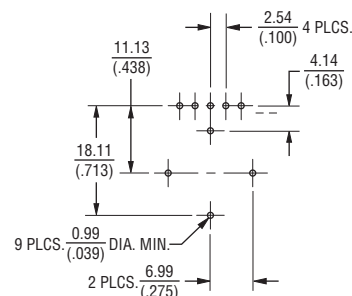
- Wire lead or cable options
- Connectors
- Non-standard resolutions
- Special shaft/bushing sizes and features
- Special performance characteristics
- PCB mounting bracket

Shaft End Style C

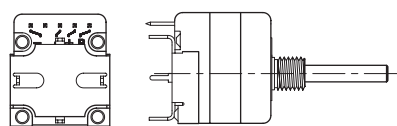
SHAFT LENGTH	SHAFT FLAT LENGTH (DIM. F)
<u>12.7</u> (.050)	<u>2.54</u> (.100)
<u>15.9</u> (.625)	<u>5.08</u> (.200)
<u>19.1</u> (.750)	<u>8.25</u> (.325)
<u>22.2</u> (.875)	<u>9.65</u> (.380)



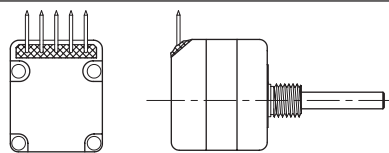
Servo Mount Style W (Ball Bearing)



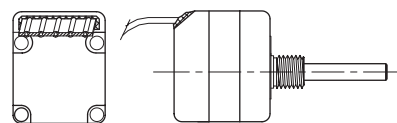
Recommended Board Layout with Bracket



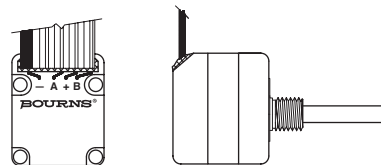
Bushing with Bracket



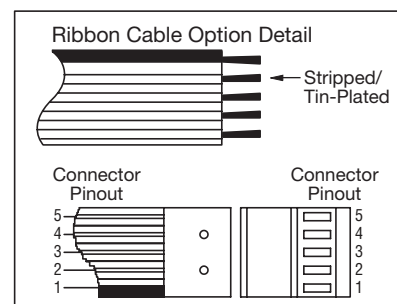
Radial Leads



Axial Ribbon Cable Option



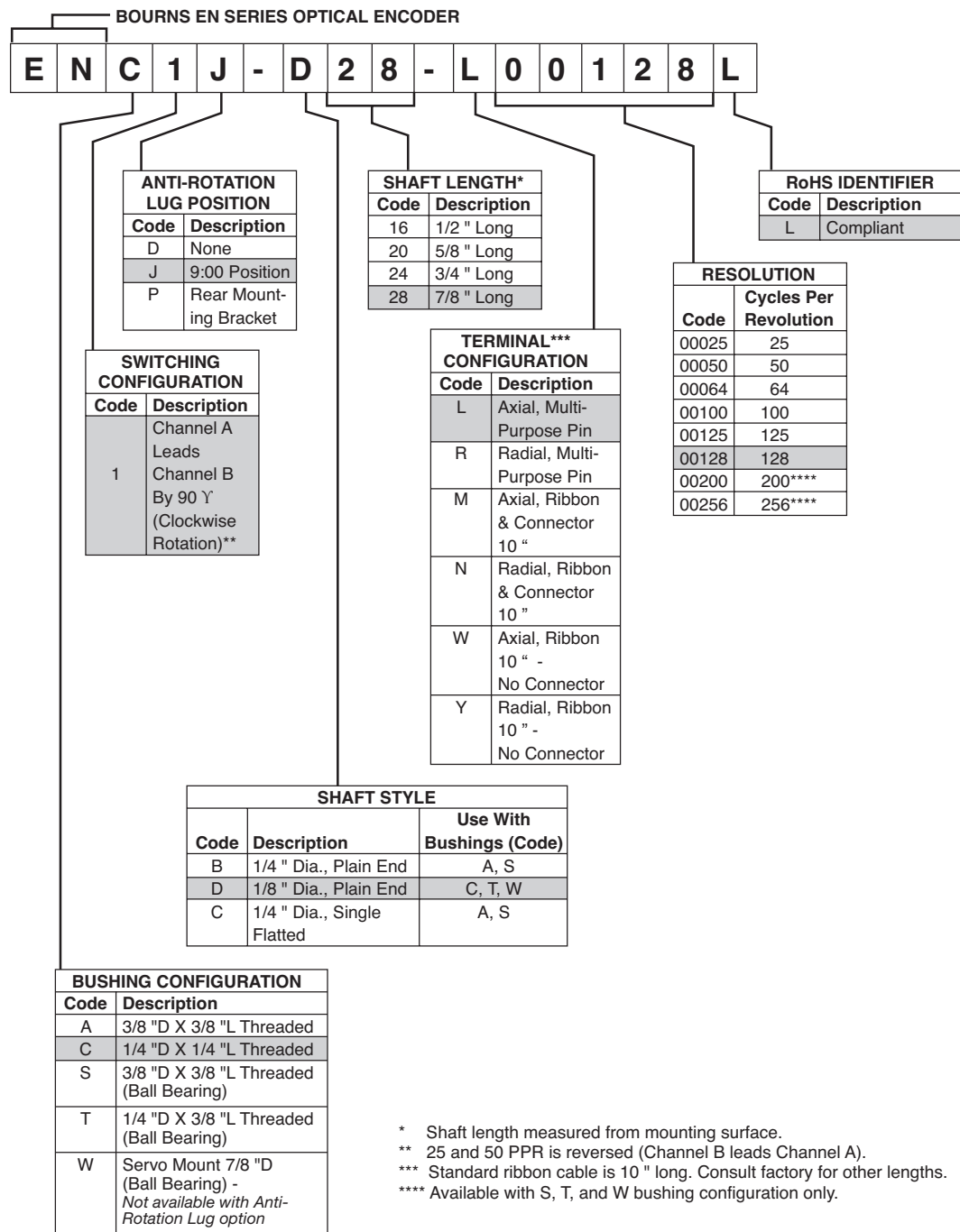
Radial Ribbon Cable Option



DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

How To Order



- * Shaft length measured from mounting surface.
 ** 25 and 50 PPR is reversed (Channel B leads Channel A).
 *** Standard ribbon cable is 10 " long. Consult factory for other lengths.
 **** Available with S, T, and W bushing configuration only.

This legal disclaimer applies to purchasers and users of Bourns® products manufactured by or on behalf of Bourns, Inc. and its affiliates (collectively, "Bourns").

Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain types of applications are based on Bourns' knowledge of typical requirements in generic applications. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Users should always verify the actual performance of the Bourns® product in their specific devices and applications, and make their own independent judgments regarding the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification. Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user's sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Users shall not sell, transfer, export or re-export any Bourns® products or technology for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology in any facility which engages in activities relating to such devices. The foregoing restrictions apply to all uses and applications that violate national or international prohibitions, including embargos or international regulations. Further, Bourns® products and Bourns technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products may not, without prior authorization from Bourns and/or the U.S. Government, be resold, transferred, or re-exported to any party not eligible to receive U.S. commodities, software, and technical data.

To the maximum extent permitted by applicable law, Bourns disclaims (i) any and all liability for special, punitive, consequential, incidental or indirect damages or lost revenues or lost profits, and (ii) any and all implied warranties, including implied warranties of fitness for particular purpose, non-infringement and merchantability.

For your convenience, copies of this Legal Disclaimer Notice with German, Spanish, Japanese, Traditional Chinese and Simplified Chinese bilingual versions are available at:

Web Page: <http://www.bourns.com/legal/disclaimers-terms-and-policies>

PDF: <http://www.bourns.com/docs/Legal/disclaimer.pdf>