



## 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

### 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                                 |

### 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-cm (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<br>370 °C (700 °F) max. for 3 seconds |
| Wave Soldering .....                                  | 96.5Sn/3.0Ag/0.5Cu solder with no-clean flux<br>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.  |

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

### Quadrature Output Table



#### STANDARD RESOLUTIONS AVAILABLE

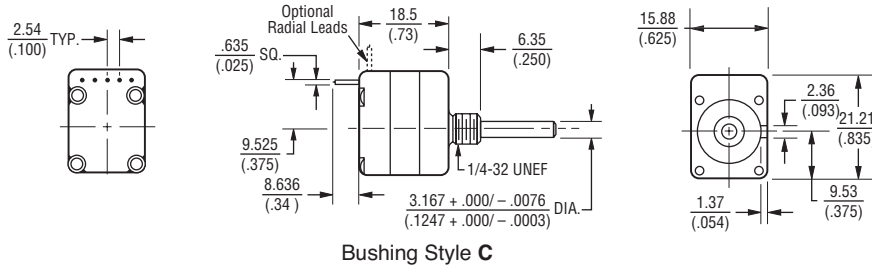
|  |     |
|--|-----|
| (Full quadrature output cycles per shaft revolution) |     |
| 25*  | 125 |
| 50*  | 128 |
| 64   | 200 |
| 100  | 256 |

For Non-Standard Resolutions—Consult Factory

\* Channel B leads Channel A

# EN - Rotary Optical Encoder

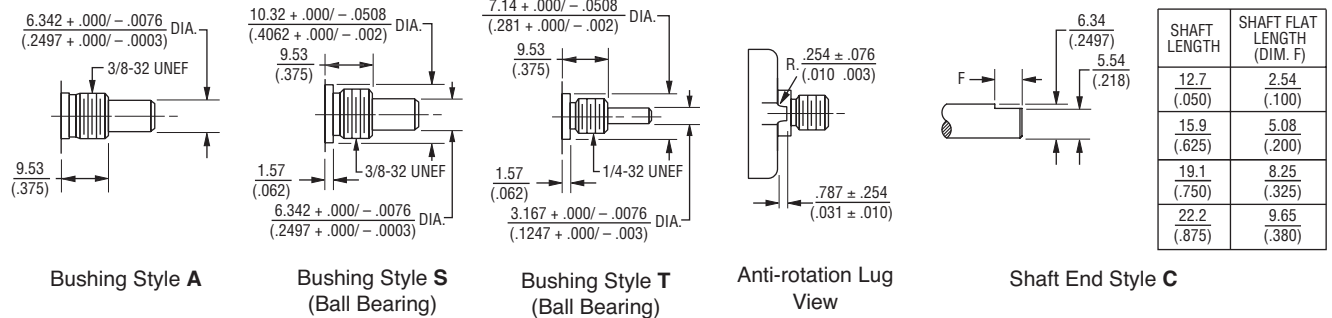
## Dimensional Drawings



Consult factory for options not shown, including:

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

Bushing Style C



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

Bushing Style A

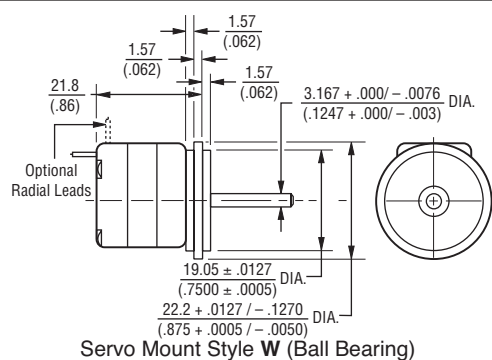
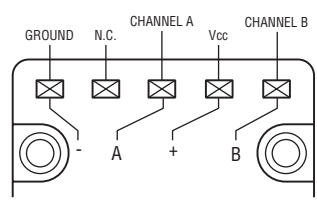
Bushing Style S (Ball Bearing)

Bushing Style T (Ball Bearing)

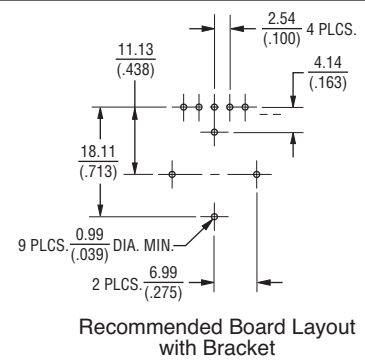
Anti-rotation Lug View

Shaft End Style C

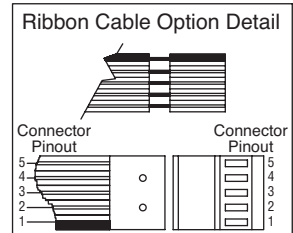
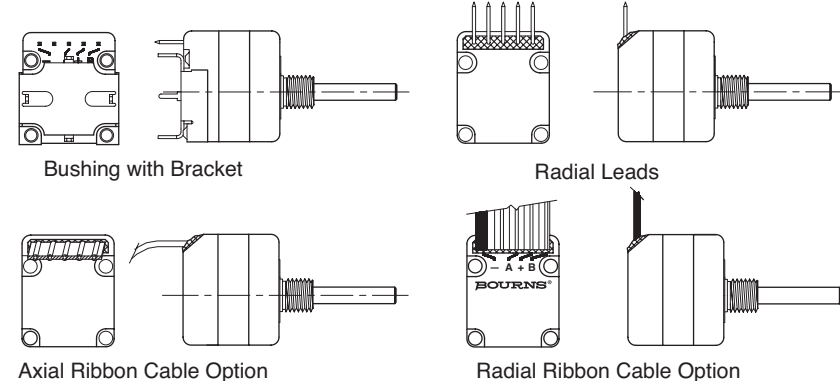
## TERMINATION DIAGRAM



Servo Mount Style W (Ball Bearing)



Recommended Board Layout with Bracket



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

Specifications are subject to change without notice. Customers should verify actual device performance in their specific applications.