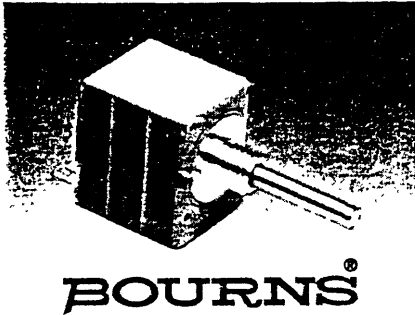




## OPTICAL INCREMENTAL ENCODERS

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

## Rotary Optical Encoders

Bourns<sup>®</sup> Optical Encoders

### Electrical Characteristics

|                                                                     |                                                                                        |
|---------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Output                                                              | 2-bit gray code, Channel A leads Channel B by 90° (electrical) with clockwise rotation |
| Supply Voltage                                                      | 5.0 VDC $\pm 0.25$ VDC*                                                                |
| Supply Current                                                      | 26 mA maximum                                                                          |
| Output Voltage                                                      |                                                                                        |
| Low Output                                                          | 0.8V maximum                                                                           |
| High Output                                                         | 4V minimum                                                                             |
| Output Current                                                      |                                                                                        |
| Low Output                                                          | 25mA minimum                                                                           |
| Insulation Resistance (500 VDC)                                     | 1,000 megohms                                                                          |
| Rise/Fall Time                                                      | 200ns (typical)                                                                        |
| Shaft RPM (Ball Bearing)                                            | 3,000 rpm maximum                                                                      |
| Power Consumption                                                   | 136 mW maximum                                                                         |
| Pulse Width (Electrical Degrees, Each Channel)                      | 180° $\pm 45^\circ$ TYP.                                                               |
| Pulse Width (Index Channel)                                         | 360° $\pm 90^\circ$                                                                    |
| Phase (Electrical Degrees, Channel A to Channel B)                  | 90° $\pm 45^\circ$ TYP.                                                                |
| Index Channel Centered on 1-1 State Combination of A and B Channels | 0° $\pm 45^\circ$                                                                      |

\*Consult factory for other voltages up to 15 VDC.

### Environmental Characteristics

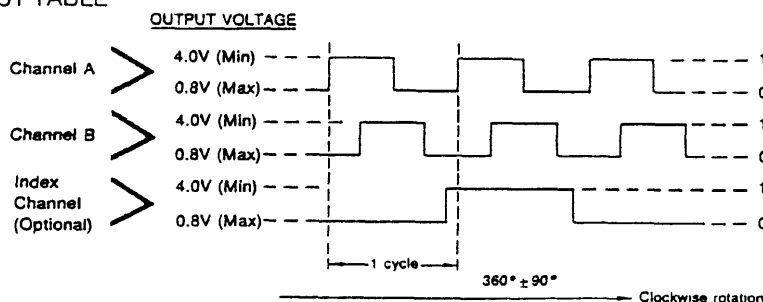
|                                        |                                       |
|----------------------------------------|---------------------------------------|
| Operating Temperature Range (Standard) | -40°C to +85°C                        |
| Vibration                              | 5G                                    |
| Shock                                  | 50G                                   |
| Humidity                               | MIL-STD-202, Method 103B, Condition B |

### Mechanical Characteristics

|                                                 |                         |
|-------------------------------------------------|-------------------------|
| Torque (Starting and Running)                   |                         |
| A & C Bushings (Spring Loaded for Optimum Feel) | 1.5 oz-in. maximum      |
| W, S & T Bushings (Ball Bearing Shaft Support)  | 0.1 oz-in. maximum      |
| Mechanical Rotation                             | Continuous              |
| Shaft End Play                                  | 0.012" T.I.R. maximum   |
| Shaft Radial Play                               | 0.005" T.I.R. maximum   |
| Rotational Life                                 |                         |
| A & C Bushings (300 rpm maximum)**              | 10,000,000 revolutions  |
| W, S & T Bushings (3,000 rpm maximum)**         | 200,000,000 revolutions |
| Weight                                          | 0.4 oz.                 |

\*\*For resolutions  $\leq 128$  quadrature cycles per shaft revolution.

### OUTPUT TABLE



### STANDARD RESOLUTIONS AVAILABLE

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

For Non-Standard Resolutions--  
Consult Factory

\* Channel B leads Channel A

Specifications are subject to change without notice.

107-100 to 107-102

## DIGITAL CONTACTING

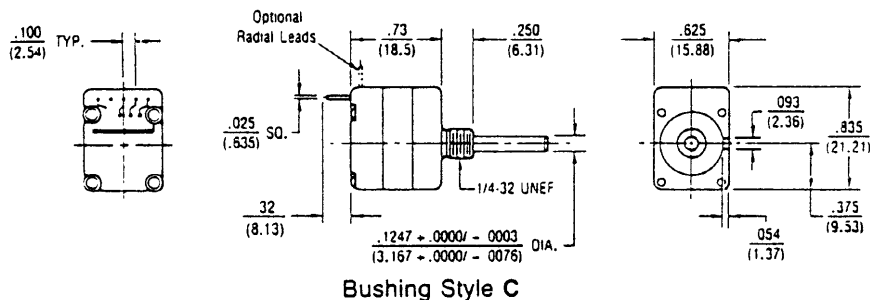
The Digital Contacting Encoder is commonly referred to by such names as Digital Panel Control, Bit Switch, Gray Switch and Digital Switch. All such names are synonymous with a device whose output is a digital gray code signal, rather than a conventional potentiometric voltage ratio output.

The advantage of the Digital Contacting Encoder is that it permits the direct entry of digitized analog data into a digital circuit without A/D

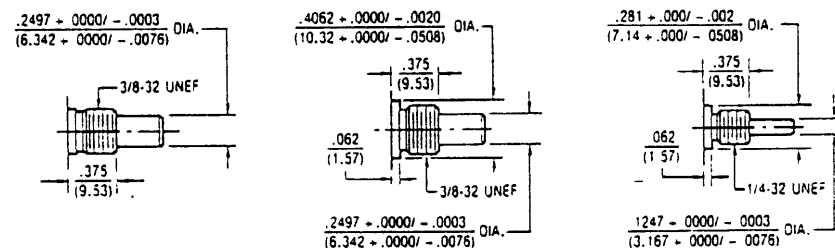
conversion. The two (2) channel gray coded signal of this incremental encoder allows the user's decoder circuit to sense analog direction of rotation, as well as up-down counter capabilities... all without the time and cost required for A/D conversion. This approach can reduce memory overhead, wiring and wiring interconnects, and can provide greater MPU program speed.

# Rotary Optical Encoders

Bourns® Optical Encoders



Bushing Style C

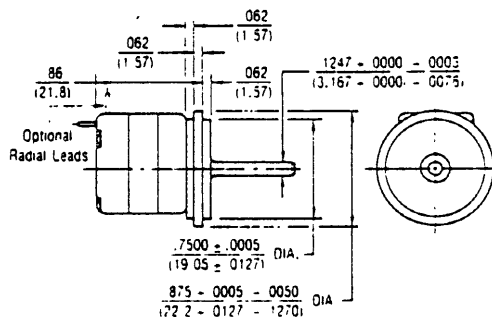
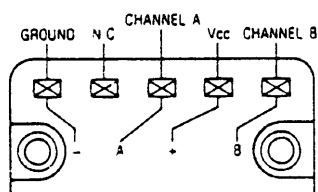


Bushing Style A

Bushing Style S (Ball Bearing)

Bushing Style T (Ball Bearing)

## TERMINATION DIAGRAM

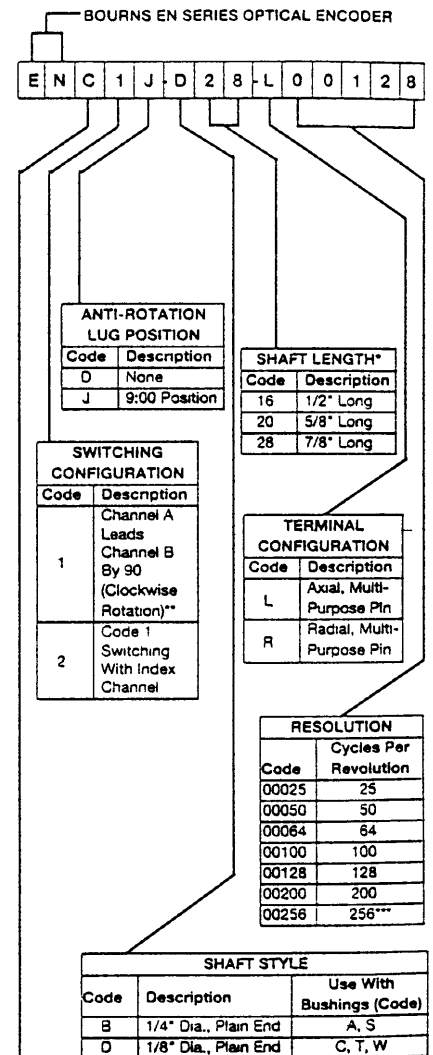


Servo Mount Style W (Ball Bearing)

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

Specifications are subject to change without notice.



| BUSHING CONFIGURATION |                                         |
|-----------------------|-----------------------------------------|
| Code                  | Description                             |
| A                     | 3/8" D X 3/8" L Threaded                |
| C                     | 1/4" D X 1/4" L Threaded                |
| S                     | 3/8" D X 3/8" L Threaded (Ball Bearing) |
| T                     | 1/4" D X 3/8" L Threaded (Ball Bearing) |
| W                     | Servo Mount 7/8" D (Ball Bearing)       |

\* Shaft length measured from mounting surface.  
 \*\* 25 and 50 ppr is reversed (channel B leads channel A)  
 \*\*\* S/T/W bushing only