

## 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

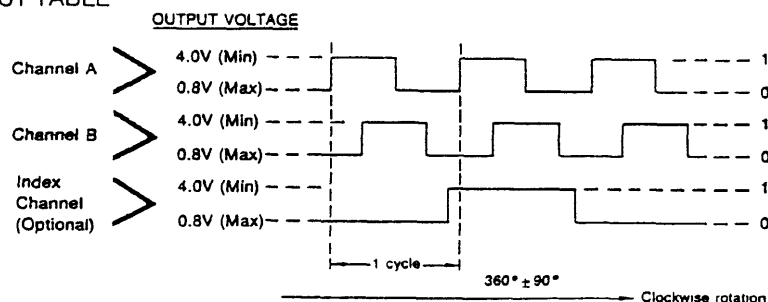
Operating Temperature Range (Standard) .....	-40°C to +85°C
Vibration .....	5G
Shock .....	50G
Humidity .....	MIL-STD-202, Method 103B, Condition B

### 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

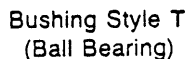
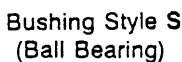
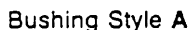
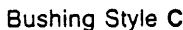
\* Channel B leads Channel A

Specifications are subject to change without notice.

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.

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.

## Bourns® Optical Encoders



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

The diagram illustrates the Bourns EN Series Optical Encoder with its pin configuration and various options. The top row of pins is labeled: E, N, C, 1, J, D, 2, 8, L, 0, 0, 1, 2, 8. Below this, several tables define the options available for the encoder, with lines indicating which pins are used for each option.

**ANTI-ROTATION LUG POSITION**

Code	Description
0	None
J	9:00 Position

**SWITCHING CONFIGURATION**

Code	Description
1	Channel A Leads Channel B By 90 (Clockwise Rotation)**
2	Code 1 Switching With Index Channel

**SHAFT LENGTH\***

Code	Description
16	1/2" Long
20	5/8" Long
28	7/8" Long

**TERMINAL CONFIGURATION**

Code	Description
L	Axial, Multi-Purpose Pin
R	Radial, Multi-Purpose Pin

**RESOLUTION**

Code	Cycles Per Revolution
00025	25
00050	50
00064	64
00100	100
00128	128
00200	200
00256	256***

**SHAFT STYLE**

Code	Description	Use With Bushings (Code)
B	1/4" Dia., Plain End	A, S
D	1/8" Dia., Plain End	C, T, W

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