



# Optical Encoders

## SERIES 62S Compact 1/2" Package

### FEATURES

- Compact Size
- Requires Minimal Behind Panel Space
- 1 Million Rotational Cycles for Low and Medium Torque, 1/2 Million for High
- 3 Million Rotations for Non-Detent Styles
- Optional Integral Pushbutton
- Choices of Cable Length and Terminations

### APPLICATIONS

- Global Positioning/Driver Information Systems
- Medical Equipment

### RECOMMENDED PANEL CUTOUT



### DIMENSIONS in inches (and millimeters)

Unless otherwise specified, standard tolerance is  $\pm 0.010$  (0,25)



**CIRCUITRY, TRUTH TABLE, AND WAVEFORM** Standard Quadrature 2-Bit Code

| Position | Output A | Output B |
|----------|----------|----------|
| 1        |          |          |
| 2        | •        |          |
| 3        | •        | •        |
| 4        |          | •        |

• Indicates logic high; blank indicates logic low.  
Code repeats every 4 positions.

**SPECIFICATIONS**

**Environmental Specifications**  
**Operating Temp. Range:** -40°C to 85°C  
**Storage Temp. Range:** -55°C to 100°C  
**Humidity:** 96 Hours at 90–95% humidity at 40°C  
**Mechanical Vibration:** Harmonic motion with amplitude of 15G's, within a varied frequency of 10 to 2000 Hz  
**Mechanical Shock:** Test 1: 100G for 6 mS, half sine wave with a velocity change of 12.3 ft/s; Test 2: 100G for 6 mS, sawtooth wave with a velocity change of 9.7 ft/s

**Rotary Electrical and Mechanical Specifications**

**Operating Voltage:** 5.00 ±0.25 Vdc  
**Supply Current:** 25mA max at 5.25Vdc  
**Output:** Open collector phototransistor, external pull up resistors are required  
**Output Code:** 2-Bit quadrature, channel A leads channel B by 90° electrically during clockwise rotation of the shaft  
**Logic Output Characteristics:**  
 Logic High shall be no less than 3.8 Vdc  
 Logic Low shall be no greater than 0.8Vdc  
**Minimum Sink Current:** 2.0 mA  
**Power Consumption:** 132mW maximum (includes power in 2 pull-up resistors)  
**Mechanical Life:**  
 Non-Detent 3 Million Cycles  
 Low & Medium 1 Million Cycles  
 High 1/2 Million Cycles  
 1 cycle is a rotation through all positions and a full return

|             | LOW         | MEDIUM      | HIGH        |
|-------------|-------------|-------------|-------------|
|             | ±0.50 IN-OZ | ±1.40 IN-OZ | ±1.60 IN-OZ |
| 8 POSITION  | 1.10        | 1.85        | 2.75        |
| 12 POSITION | 1.00        | 1.70        | 2.95        |
| 16 POSITION | 1.40        | 2.35        | 3.40        |
| 20 POSITION | 1.35        | 2.05        | 2.80        |
| 24 POSITION | 1.25        | 1.95        | 2.95        |
| 32 POSITION | 0.95        | 1.40        | 2.15        |

Torque shall be within 50% of initial value throughout life  
**Mounting Torque:** 15 in-lbs maximum  
**Shaft Push-Out Force:** 45 lbs minimum  
**Shaft Pull-Out Force:** 45 lbs minimum  
**Terminal Strength:** 15 lbs minimum terminal pull-out force for cable or header termination  
**Solderability:** 95% free of pin holes and voids

**Pushbutton Electrical & Mechanical Specifications**

**Rating:** 10 mA at 5 Vdc  
**Contact Resistance:** <10Ω  
**Life:** 3 million actuations minimum  
**Contact Bounce:** <4 ms Make, <10 ms Break  
**Actuation Force:** 9-950±150grams, 5-510±150 grams, 4-400±100 grams, 3-300±90 grams, 2-200±75 grams  
**Shaft Travel:** .025±.010 inch

**Materials and Finishes**

**Bushing:** Zamak 2  
**Shaft:** Aluminum or Zamak 2  
**Retaining Ring:** Stainless steel  
**Pushbutton Actuator:** Zytel 70G33L  
**Detent Spring:** Music wire  
**Detent Ball:** Stainless steel

**Code Housing:** Polyamide polymer, nylon 6/10 alloy UL94HB

**Code Rotor:** Delrin 100

**Printed Circuit Boards:** NEMA grade FR-4, double clad with copper, plated with gold over nickel

**Infrared Emitting Diode Chips:** Gallium aluminum arsenide

**Silicon Phototransistor Chips:** Gold and Aluminum Alloys

**Resistor:** Metal oxide on ceramic substrate

**Solder Pins:** Brass, plated with tin

**Pushbutton Dome:** Stainless steel

**Backplate:** Stainless steel

**Cable:** Copper stranded with topcoat in PVC insulation (Cable version only)

**Connector (.050 Center):** PA4.6 with tin over nickel plated phosphor bronze

**Connector (.100 Center):** Nylon UL94V-2, tin plated copper alloy

**Label:** TT406 Thermal transfer cast film

**Solder:** Sn/Ag/Cu, Lead-Free, No Clean

**Lubricating Grease:** NYE nyogel 774L

**Hex Nut:** Nickel, plated with brass

**Lockwasher:** Zinc Plated Spring Steel with Clear Trivalent Chromate Finish

**Header:** Hi-Temp glass filled thermoplastic UL94V-0, phosphor bronze (pin versions only)

**Strain Relief:** Glass filled thermoplastic (.100 center cable versions only)

**OPTIONS**

Contact Grayhill for custom terminations, shaft and bushing configurations, rotational torque pushbutton force, and code output.

**ORDERING INFORMATION**

**Angle of Throw**  
 45=45° for Code Change and 8 Detent Positions  
 30=30° for Code Change and 12 Detent Positions  
 22=22.5° for Code Change and 16 Detent Positions  
 18=18° for Code Change and 20 Detent Positions  
 15=15° for Code Change and 24 Detent Positions  
 11=11.25° for Code Change and 32 Detent Positions

**Rotational Torque Option**  
 N = Non-detent  
 L = Low Torque (available with 0, 4, 5, 9 pushbutton only)  
 M = Medium Torque (available with 0, 5, 9 pushbutton only)  
 H = High Torque (available with 0, 9 pushbutton only)

**Termination**  
 C = .050 Center Ribbon Cable with Connector  
 S = .050 Center Ribbon Cable with .100 Stripped End  
 P = .050 Center Pins with .130 Length  
 CH = .100 Center Ribbon Cable with Connector  
 SH = .100 Center Ribbon Cable with .100 Stripped End  
 PH = .100 Center Pins with .230 Length

**Cable Length**  
 Cable Termination: 040=4.0in or 040in. Cable is terminated with Amp Connector P/N 3-640442-6  
 See Amp Mateability Guide for mating connector details.

**Pushbutton Option**  
 0 = NO PUSHBUTTON      4 = 400 Grams  
 9 = 950 Grams          3 = 300 Grams  
 5 = 510 Grams          2 = 200 Grams

62SXX-XX-040X

Optical and Mechanical Encoders