

## 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



### 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

**POWER +5V**  
**OUTPUT A**  
**OUTPUT B**  
**GROUND**

**PIN #**  
 6  
 5  
 4  
 3  
 2  
 1

**Waveform:** Shows two square waves, Output A and Output B, which are 90 degrees out of phase. The x-axis is labeled POSITION NUMBER (1-6).

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

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

\* External pull-up resistors required for operation (2.2 kΩ).

**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

| AVERAGE ROTATIONAL TORQUE SPECIFICATIONS |             |             |             |
|--|-------------|-------------|-------------|
|  | 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:** Stainless steel

**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. Control knobs are also available.

**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
- 9 = 950 Grams
- 5 = 510 Grams
- 4 = 400 Grams
- 3 = 300 Grams
- 2 = 200 Grams

**62SXX-XX-040X**

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Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)