

SERIES 61L Full Quadrature Cycle Per Detent

FEATURES

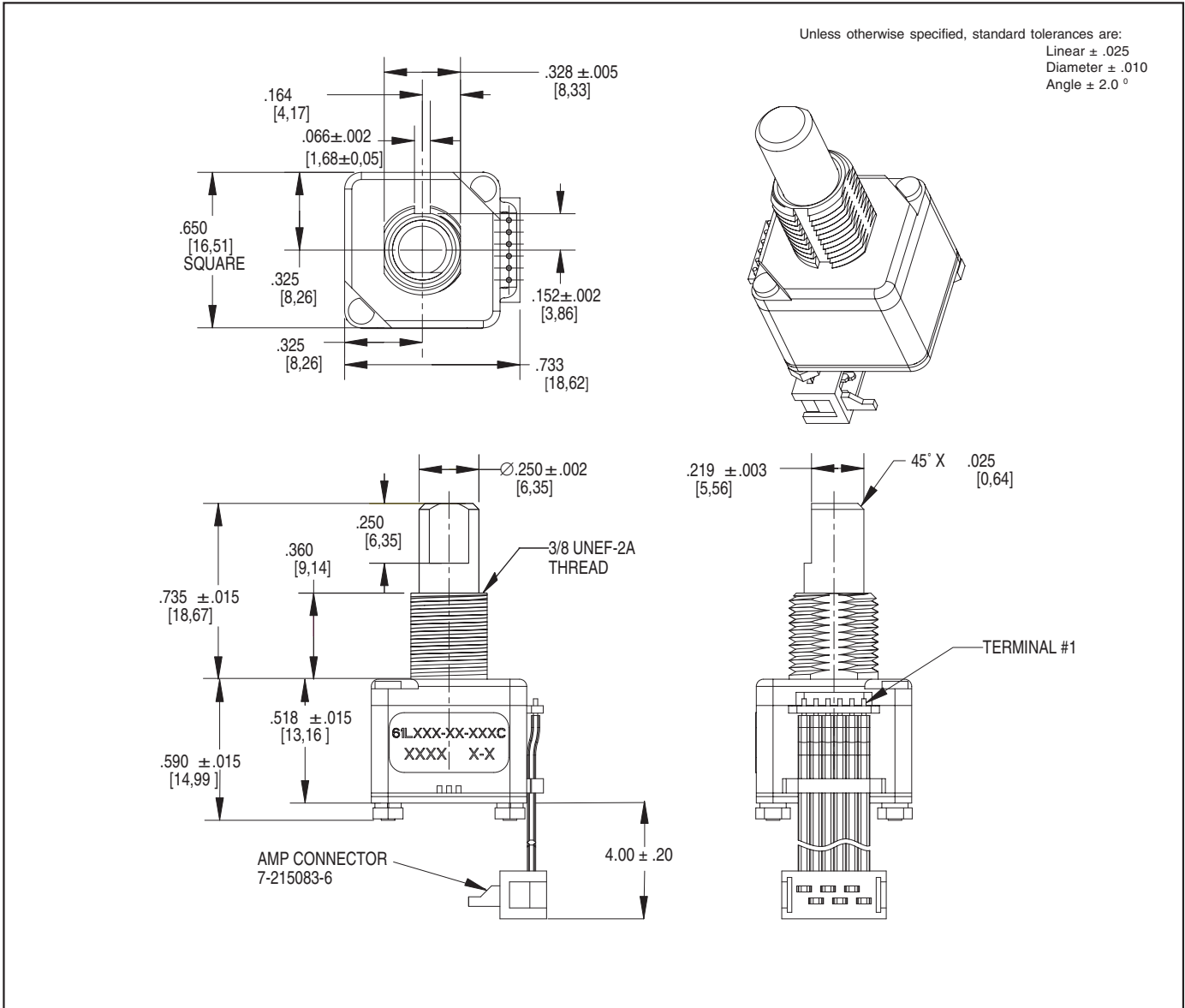
- .650 sq. inch package size
- Optically coupled for 1 million rotational cycles
- Optional integrated pushbutton
- Detented and non-detented versions available
- Available in 24 positions

APPLICATIONS

- Medical Devices
- Test and Measurement Equipment
- Other Scroll and Select Applications

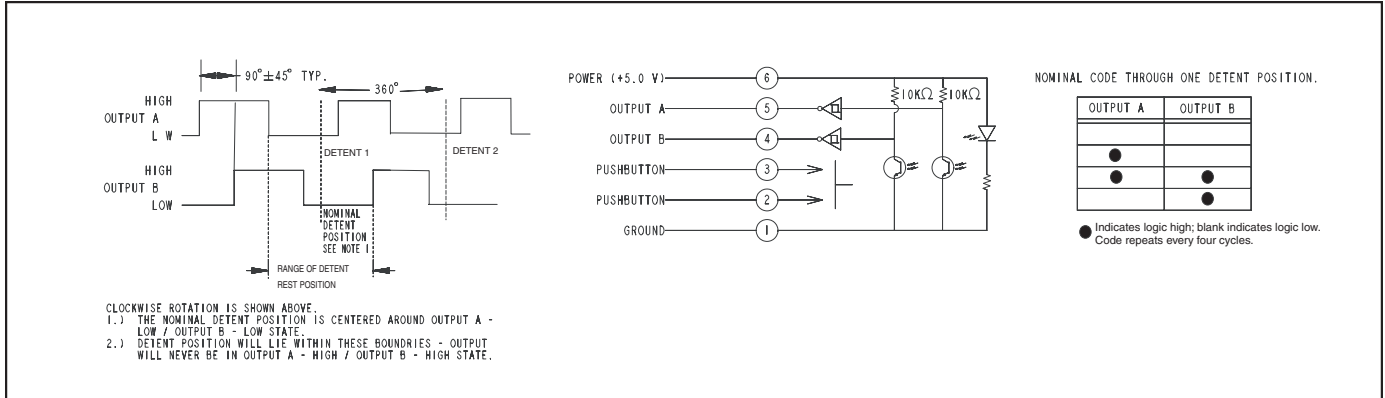


DIMENSIONS In inches (and millimeters)



Optical and Mechanical Encoders

CIRCUITRY, WAVEFORM AND TRUTH TABLE



SPECIFICATIONS

Environmental Specifications

Operating Temperature Range: -40° C to 85° C
Storage Temperature Range: -55° C to 100° C
Humidity: 96 hours at 90-95% humidity at 40° C

Mechanical Vibration: Harmonic motion with amplitude of 15g, 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/sec
 Test 2: 100g for 6 ms sawtooth wave with a velocity change of 9.7 ft/sec

Rotary Electrical and Mechanical Specifications

Operating Voltage: 5.00±.25Vdc
Supply Current: 30 mA maximum at 5Vdc

Output Code: Two-bit quadrature, channel A leads channel B by 90° electrically during clockwise rotation of the shaft.

Logic Output Characteristics:

Logic high signal shall be no less than 3.8 Vdc
 Logic low signal shall be no greater than 0.8 Vdc

Minimum Sink Current: 2.0 mA
Power Consumption: 150 mW maximum
Mechanical Life: 1 million cycles of operation for Medium, Low and Non-Detent. 1/2 million cycles of operation for High. One cycle is a rotation through all positions and a full return.

Average Rotational Torque: H= 6.0 ± 2.6 in-oz, M= 2.7 ± 1.8 in-oz, L= 1.4 ± 0.8 in-oz, N= <0.50 in-oz. Torque shall be within 50% of initial value throughout life.

Mounting Torque: 15 in-oz 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 pinholes and voids

Pushbutton Electrical and Mechanical Specifications

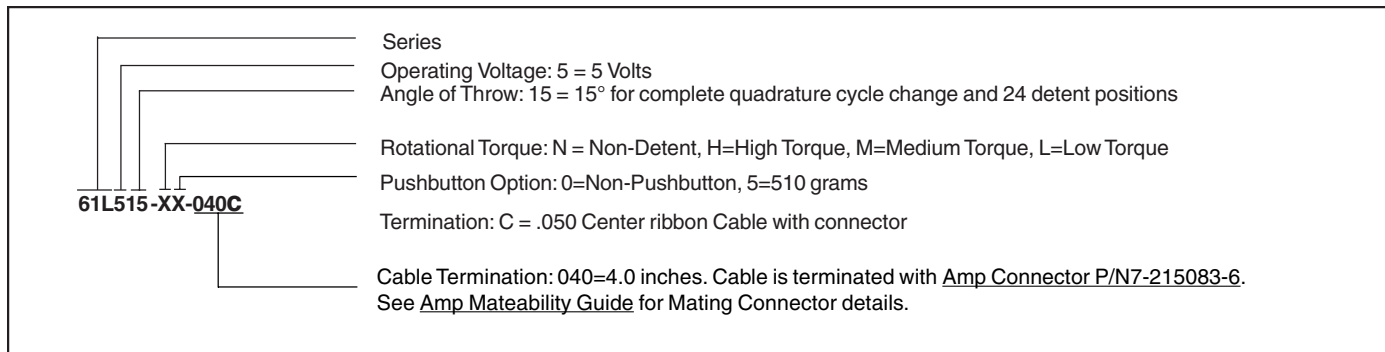
Rating: 50 mA at 12 Vdc
Contact Resistance: <10Ω
Life: 1/2 million actuations minimum
Contact Bounce: <4 ms make, <10 ms break
Actuation Force: 510 ± 150 grams
Shaft Travel: .025 ± .015 inch

Materials and Finishes

Bushing: Zinc
Shaft: Aluminum
Retaining Ring: Stainless Steel
Detent Spring: Music Wire
Detent Ball: High Carbon Chrome, Nickel finish
Code Housing: Polyamide Polymer, Hiloy 610
Aperture: Stainless Steel

Detent: Polyamide Polymer, Hiloy 610
Rotor Hub: Polyamide Polymer, Hiloy 610
Code Rotor: Stainless Steel
Printed Circuit Boards: Nema Grade FR4, Double Clad with Copper, Plated with Gold over Nickel
Infrared Light 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
Tact Switch: Cover - Stainless Steel, contact Disc - Phosphor Bronze with silver cladding, terminal - brass with silver cladding, base - UL94V-0 Nylon 19: High Temp
Back Plate: Stainless Steel
Spacer: Nomex Type 410
Cable: Copper Standard with Topcoat in PVC Insulation
Connector: Glass filled Polyester, Tin/Nickel Phosphor Bronze
Label: TT406 Thermal Transfer Cast Film
Solder: 96.5% tin / 3% silver / 0.5% copper, no clean
Lubricating Grease: NYE Nyogel 774L
Studs: Stainless Steel
Lockwasher: Stainless Steel
Hex Nuts: Stainless Steel

Optical and Mechanical Encoders



Available from your local Grayhill Component Distributor. For pricing an discounts, contact a local Sales Office, an authorized local Distributor, or Grayhill.

SERIES 61K
High Resolution, 4-Pin

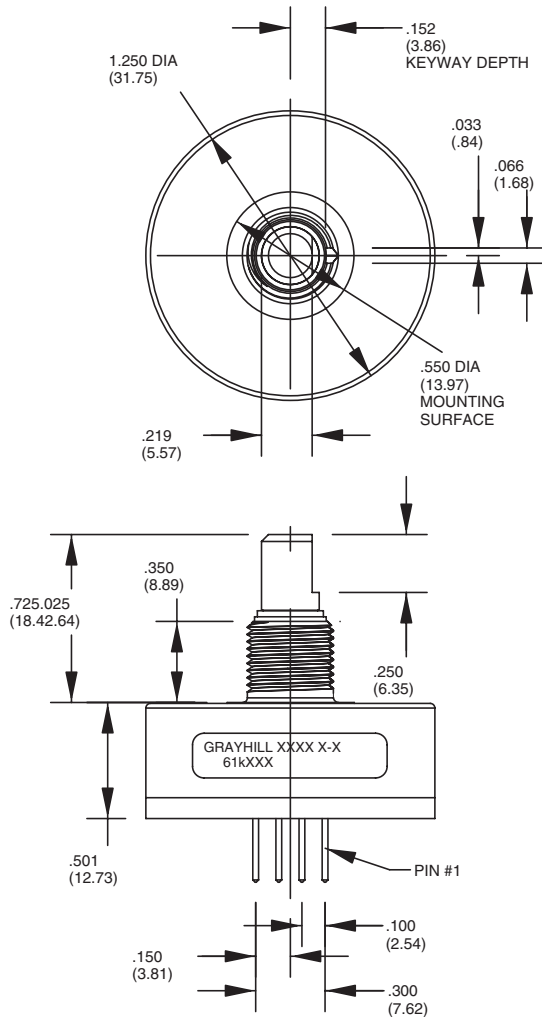
FEATURES

- 25, 32, 50, 64, 100, 128 and 256 Cycles per Revolution Available
- Sealed Version Available
- Rugged Construction
- Cable or Pin Versions
- 10 Million Rotational Life Cycles
- 300 RPM Shaft Rotation

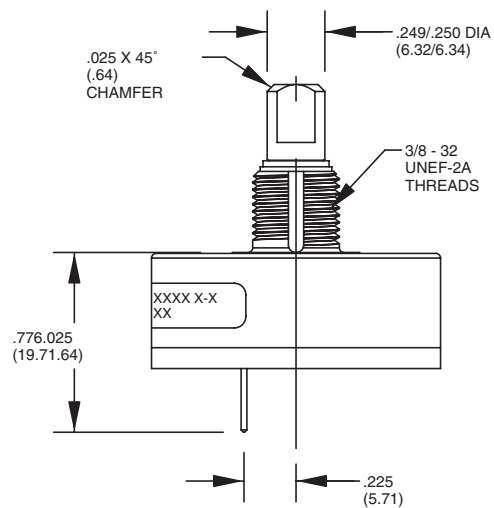


DIMENSIONS In inches (and millimeters)

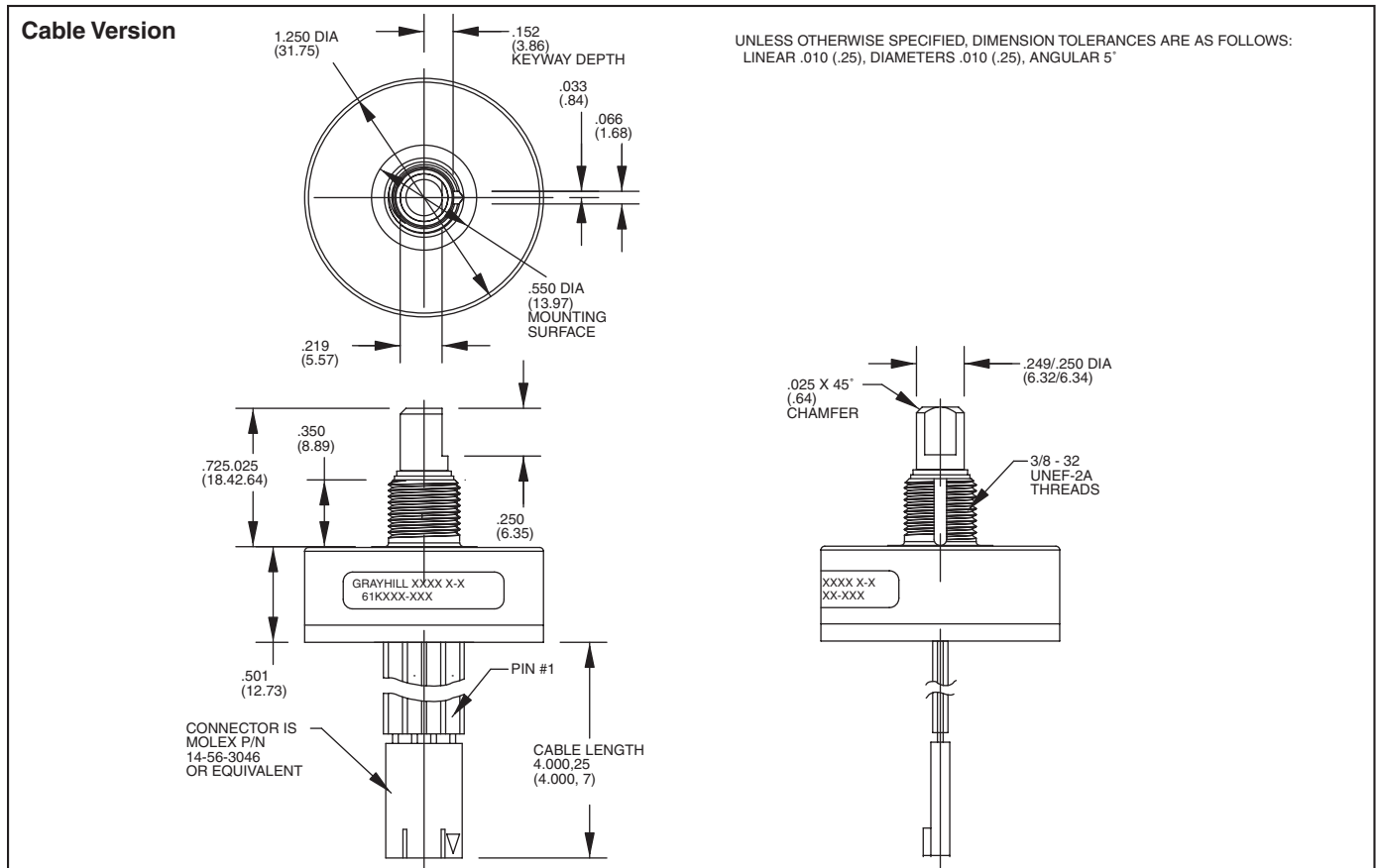
Pin Version



Unless otherwise specified, standard tolerance are:
 Linear $\pm .010$
 Diameter $\pm .025$
 Angle $\pm 2.0^\circ$

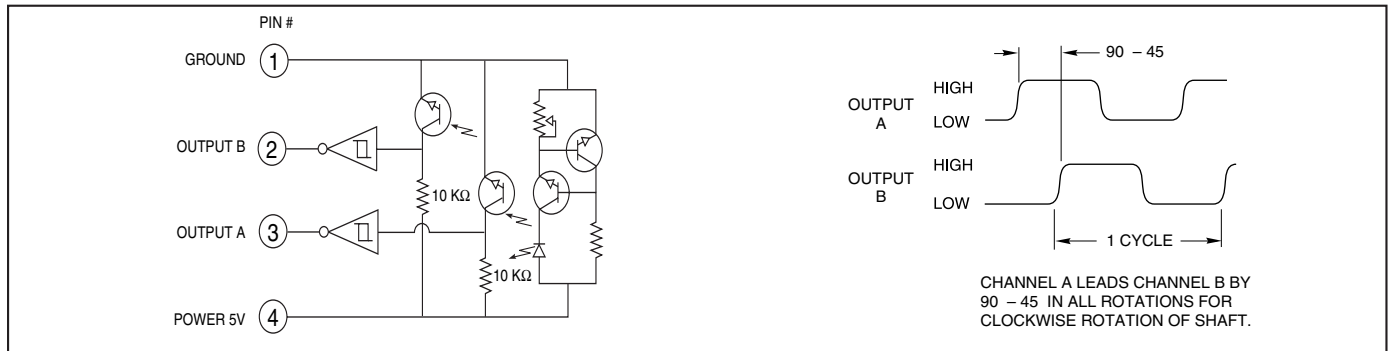


DIMENSIONS In inches (and millimeters)



Optical and Mechanical Encoders

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



SPECIFICATIONS

Electrical Ratings

- Operating Voltage:** 5.0 ± .25 Vdc
- Supply Current:** 30 mA maximum at 5 Vdc
- Logic Output Characteristics:**
 Output Type: Open collector with integrated Schmitt Trigger and 10K ohms pull-up resistor
 Maximum Sink Current: 16 mA at .40 volts
- Power Consumption:** 150 mW maximum
- Optical Rise Time:** 500 nS typical
- Optical Fall Time:** 16 nS typical

Mechanical Ratings

- Mechanical Life:** 10 million revolutions
- Time Life:** Guaranteed for 10 years of continuous operation (calculated from emitter degradation data)
- Mounting Torque:** 20 in-lbs maximum
- Shaft Push Out Force:** 100 lbs
- Terminal Strength:** 5 lbs terminal pull-out force minimum
- Solderability:** 95% free of pin holes and voids
- Operating Torque:** 1.5 in-oz maximum (no detents) for unsealed versions

Environmental Ratings

- Operating Temperature Range:** -40°C to 85°C
- Storage Temperature Range:** -55°C to 100°C
- Relative Humidity:** 90-95% at 40°C for 96 hours
- Vibration Resistance:** Harmonic motion with amplitude of 15g, within a varied 10 to 2000 Hz frequency for 12 hours per MIL-STD-202, Method 204
- Mechanical Shock:** Test 1: 100g for 6 mS, half-sine wave with velocity change of 12.3 ft/s. Test 2: 100g for 6 mS, sawtooth wave with velocity change of 9.7 ft/s.

Materials and Finishes

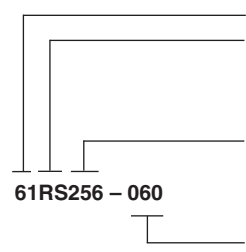
Bushing: Aluminum
Code Housing: Zytel FR-50
Shaft: Stainless steel
Retaining Ring: Stainless steel
Code Rotor and Aperture: Chemically etched stainless steel/electroformed nickel

Printed Circuit Board: NEMA Grade FR-4.
 Five microinches minimum gold over 100 microinches minimum nickel over copper

Optical Barrier: Polyphenylene sulfide, 94 V-0

Backplate: Polyester
Header: Phosphor bronze, 200 microinches tin over 50 microinches nickel (pin version only)
Infrared Emitter: Gallium aluminum arsenide
Photo IC: Planar silicon
Cable: 26 AWG, stranded/tinned wire, PVC coated on .100 (2,54) centers (cable version only)

ORDERING INFORMATION



Series
Style: K = Standard, 4-pin, high resolution
 KS = Sealed, 4-pin, high resolution
 R = Standard, 5-pin, high resolution
 RS = Sealed, 5-pin, high resolution
Cycles: per channel per revolution = 25, 32, 50, 64, 100, 128, 256

61RS256 - 060

Cable Termination: 060 = 6.0in. Cable is terminated with Molex Connector P/N 14-56-3056

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Optical and Mechanical Encoders

ACCESSORIES

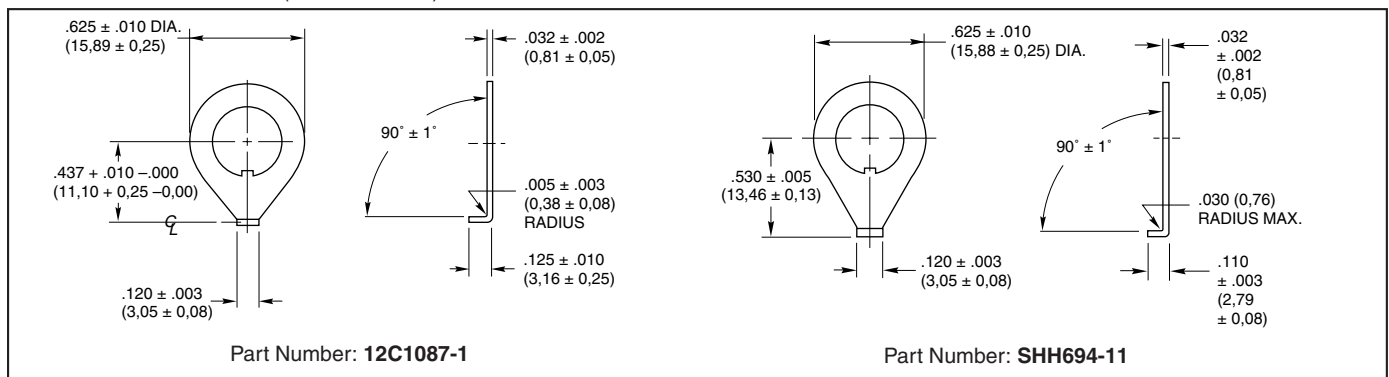
Non-Turn Washer

The Series 61 bushing is 3/8 inches in diameter and has a non-turn keyway to prevent rotation of the switch body when the panel is cut to fit. Another way to keep the switch from turning is to use a non-turn washer. The washer is cadmium-plated brass.
 Part number: **12C1087-1**
 Part number: **SHH694-11**, 302-2B stainless steel, no plating

Shaft and Panel Seal

For shaft and panel seal version, the shaft is sealed by an o-ring inside the bushing. The panel is sealed by a flat gasket .045" thick at the base of the bushing. The panel seals will increase the behind panel dimension by .020" to .040", when the switch is mounted. The panel seal is silicon rubber.

DIMENSIONS In inches (and millimeters)



SERIES 61R
High Resolution, 5-Pin
(Polarized Connection)

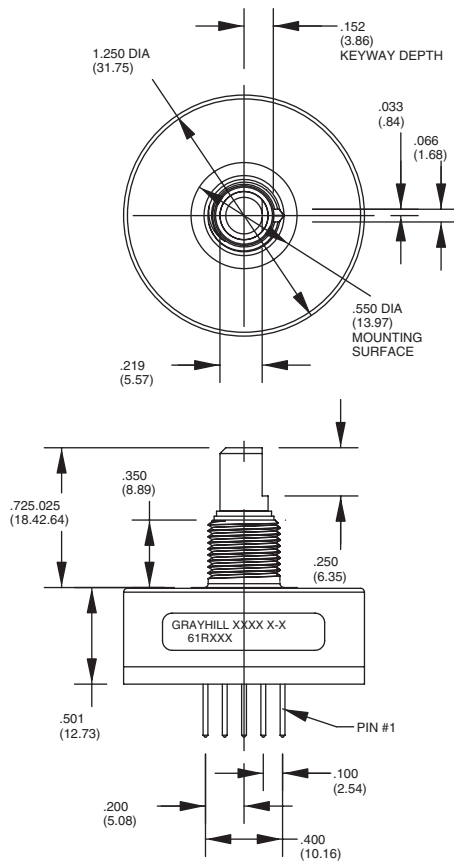
FEATURES

- 25, 32, 50, 64, 100, 128 and 256 Cycles per Revolution Available
- Sealed Version Available
- Rugged Construction
- Cable or Pin Version
- 10 Million Rotational Cycles
- 300 RPM Shaft Rotation
- Index Pulse Available

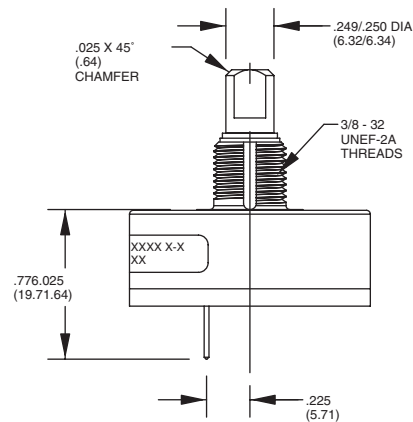


DIMENSIONS In inches (and millimeters)

Pin Version

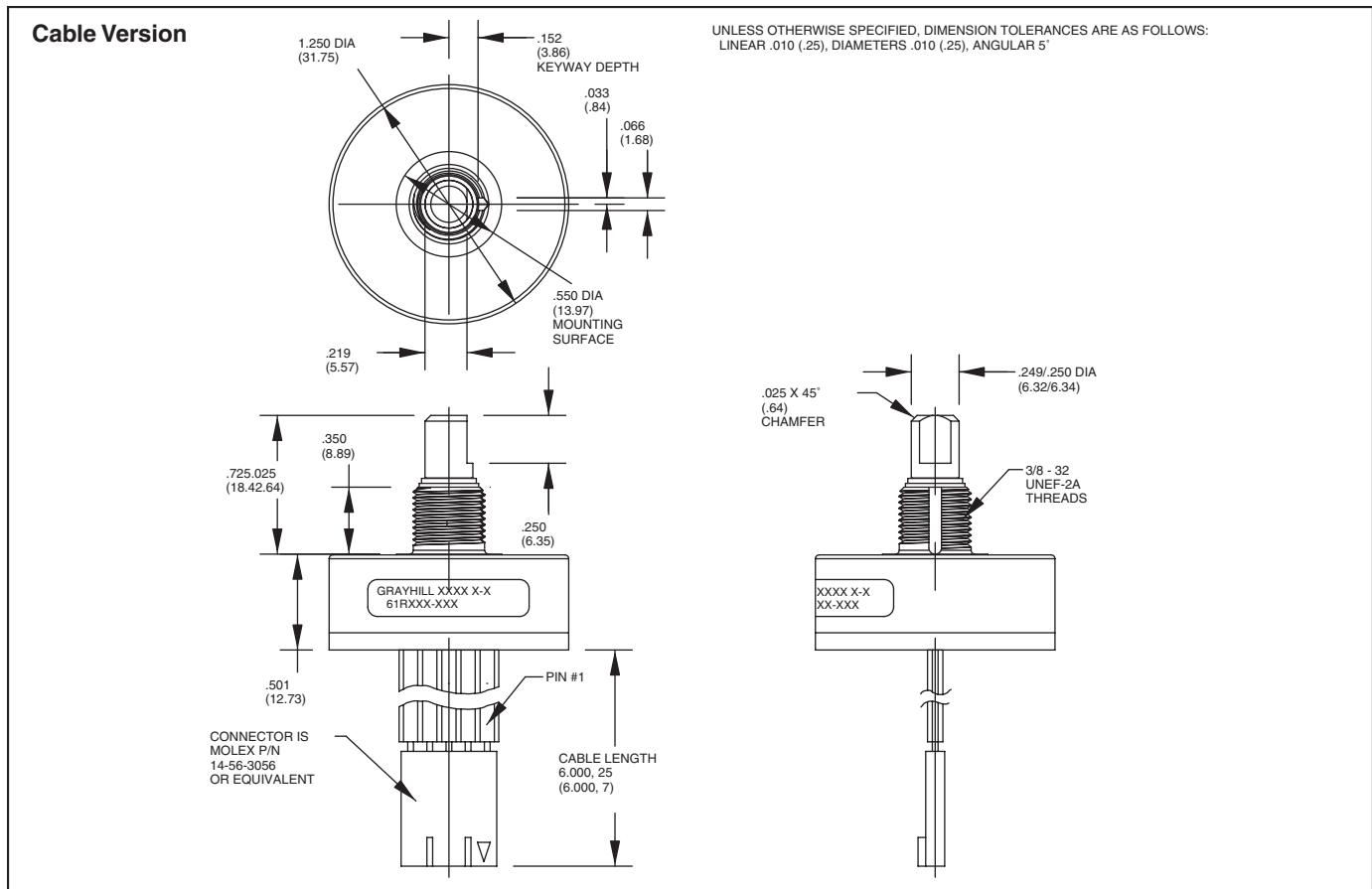


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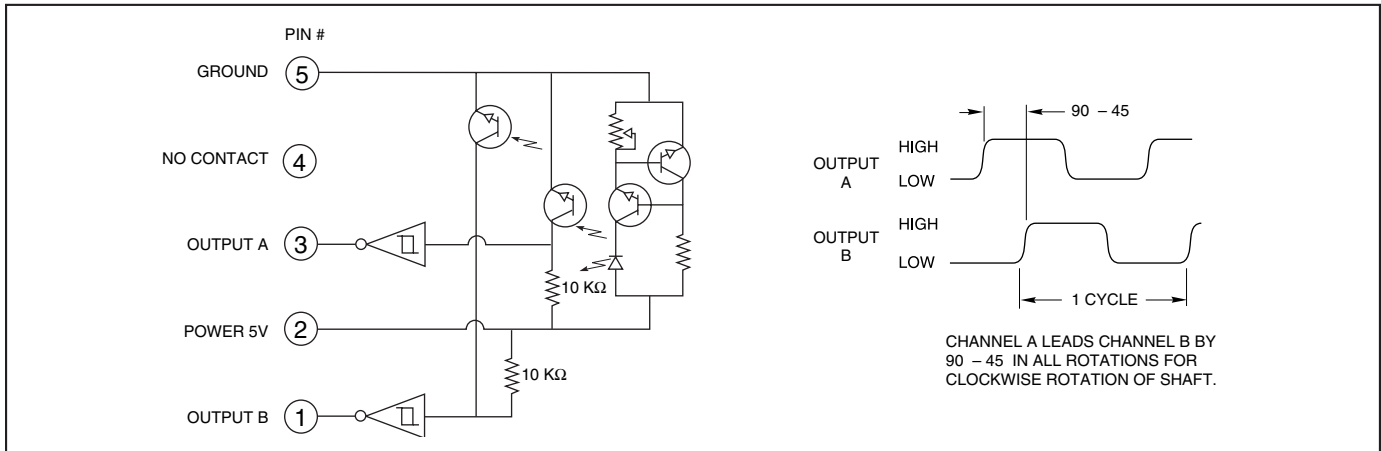
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Materials and Finishes

Bushing: Aluminum
Code Housing: Hiloy 610B
Shaft: Stainless steel
Retaining Ring: Stainless steel
Code Rotor and Aperture: Chemically etched stainless steel/electroformed nickel

Printed Circuit Board: NEMA Grade FR-4. Five microinches minimum gold over 100 microinches minimum nickel over copper
Optical Barrier: Polyphenylene sulfide, 94 V-0
Backplate: Polyester
Header: Phosphor bronze, 200 microinches tin over 50 microinches nickel (pin version only)
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