

**SERIES 61K**  
High Resolution, 4-Pin

**FEATURES**

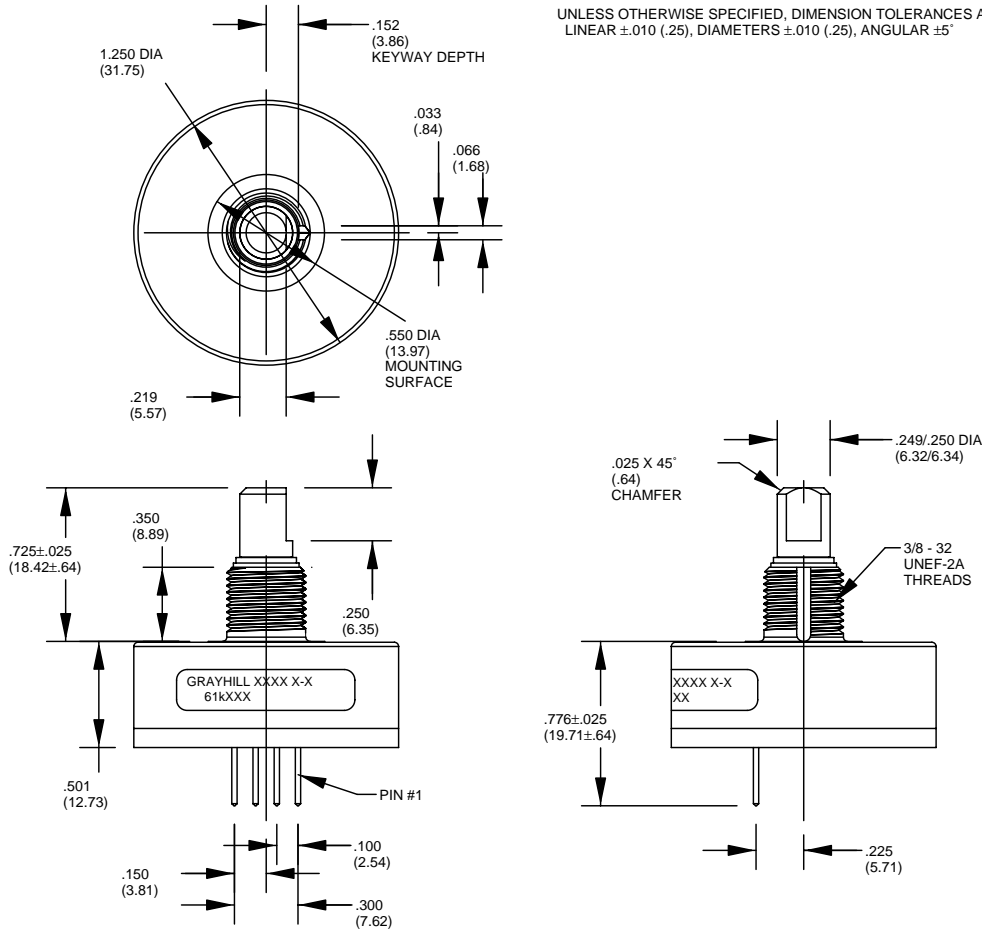
- 25, 32, 50, 64, 100, 128 and 256 Cycles per Revolution Available
- Sealed Version Available
- Rugged Construction
- Cable or Pin Versions
- 10 Million Life Cycles
- 300 RPM Shaft Rotation



**DIMENSIONS** In inches (and millimeters)

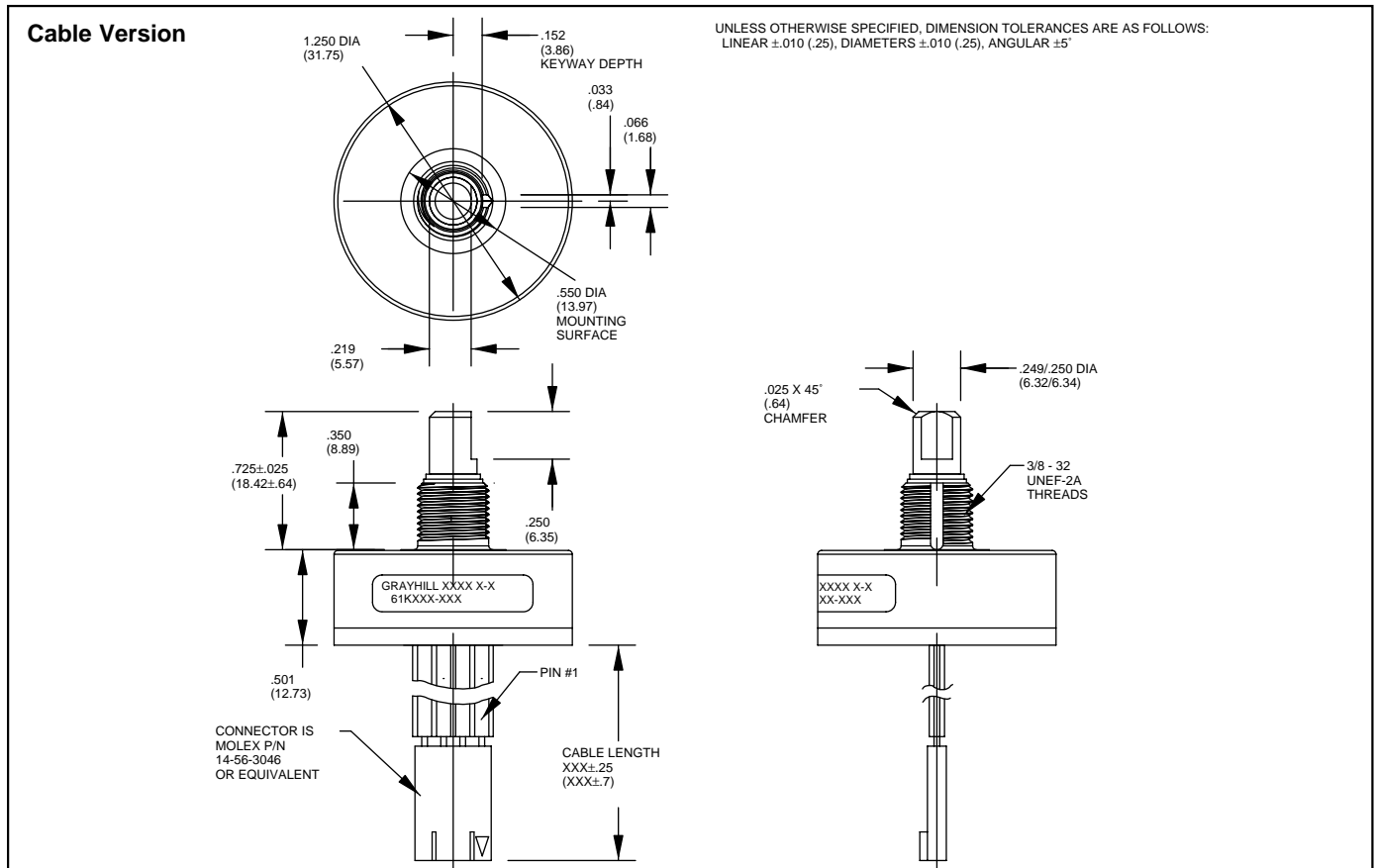
**Pin Version**

UNLESS OTHERWISE SPECIFIED, DIMENSION TOLERANCES ARE AS FOLLOWS:  
LINEAR  $\pm 0.10$  (.25), DIAMETERS  $\pm 0.10$  (.25), ANGULAR  $\pm 5^\circ$



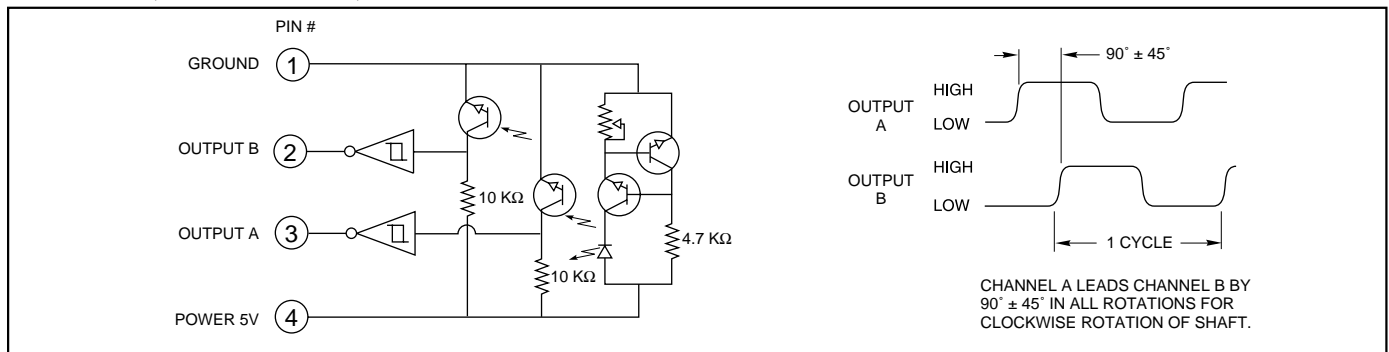
Optical and Mechanical Encoders

**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**

See page I-41.

**ACCESSORIES**

See page I-41. For control knobs see page I-57.

**ORDERING INFORMATION**

See page I-41.

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

**FEATURES**

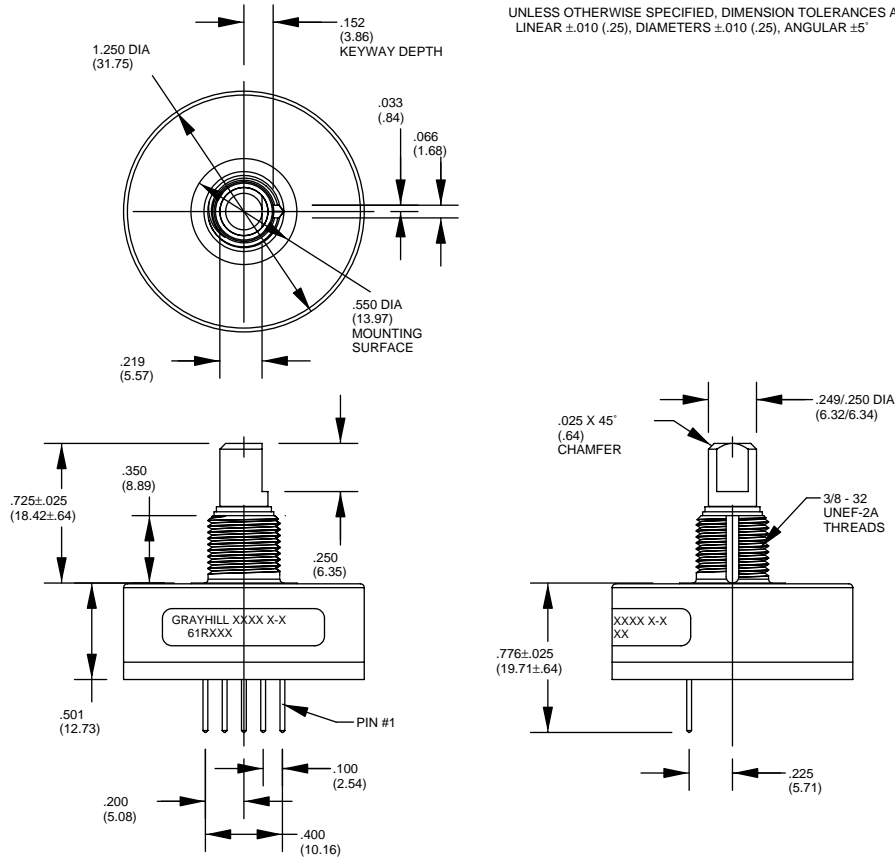
- 25, 32, 50, 64, 100, 128 and 256 Cycles per Revolution Available
- Sealed Version Available
- Rugged Construction
- Cable or Pin Version
- 10 Million Life Cycles
- 300 RPM Shaft Rotation
- Index Pulse Available



**DIMENSIONS** In inches (and millimeters)

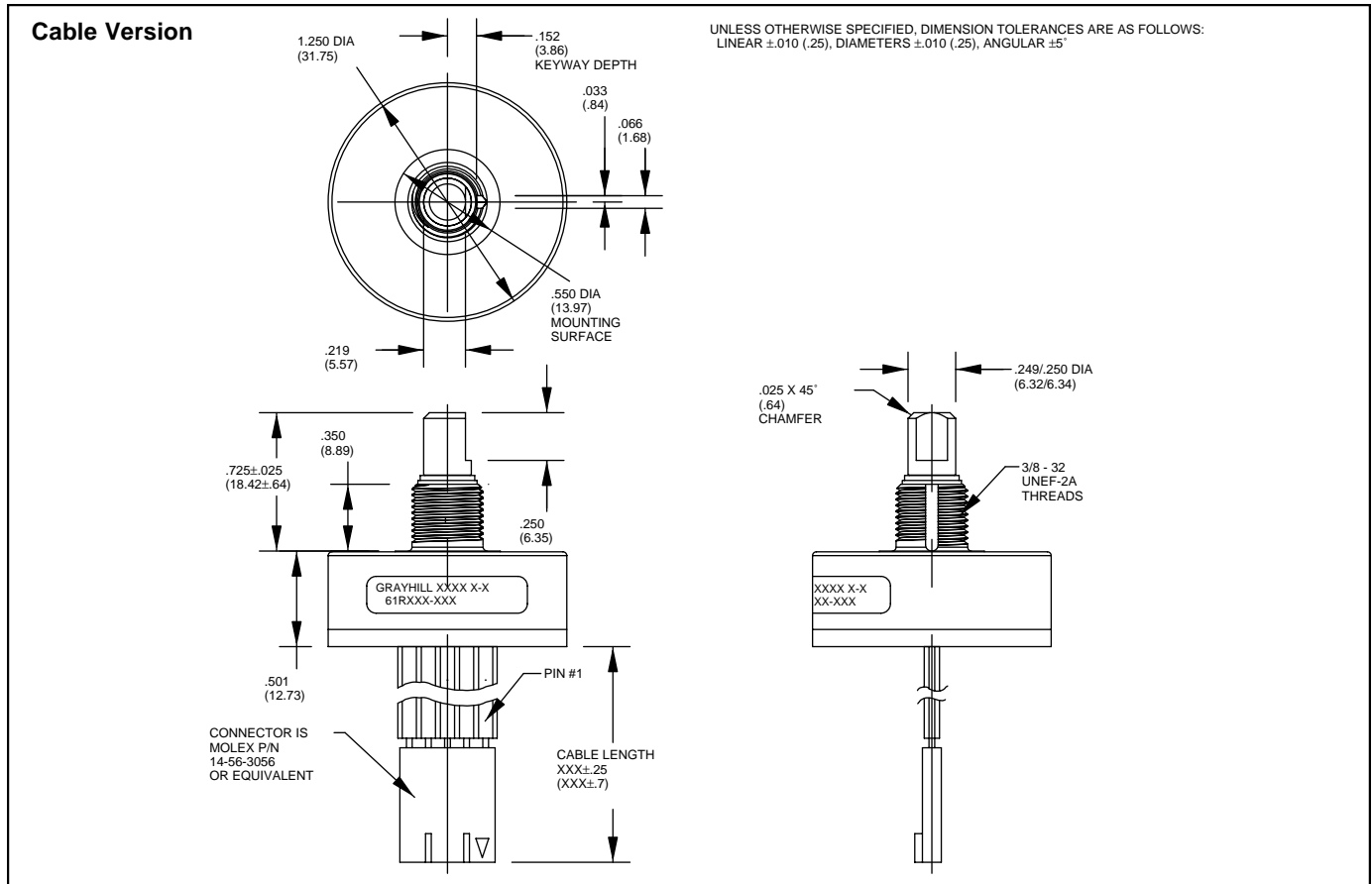
**Pin Version**

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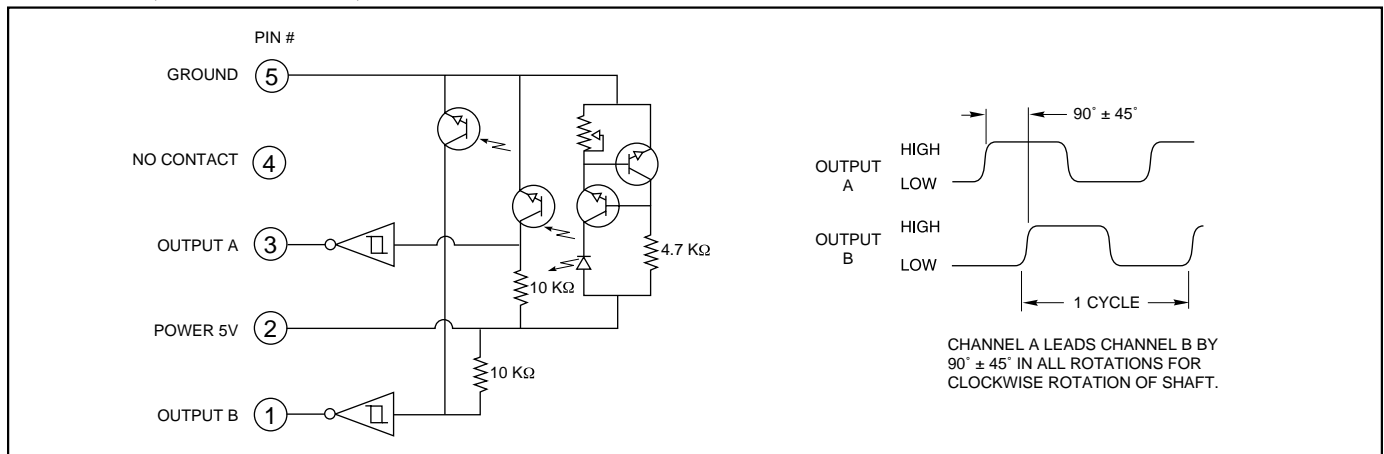
Optical and Mechanical Encoders

**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  $\pm$  .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  
**Shock Resistance:** 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:** Cast zinc, nickel-plated  
**Code Housing:** Hiloy 610B  
**Shaft:** Stainless steel  
**Rotor:** Nylon  
**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

### Termination:

Blank (no dash or numbers): pins as described in drawing.  
 Cable Termination: 020 = 2.0 inches minimum to 250 = 25 inches maximum  
 Provided in increments of 1/2 inch. Example 035 = 3.5", 060 = 6". Cable is terminated with standard Molex part no. 14-56-3046 for 61K, 14-56-3056 for 61R. Use any standard .100 center 4-pin header for 61K, 5-pin header for 61R to interface with cable. Recommended to be mounted with Molex header part no. 70543-0003 or 70553-0003 for 61K, 70543-0004 or 70553-0004 for 61R.

Control knobs available, see page I-57.

**Available from your local Grayhill Distributor.** For prices and discounts, contact a local Sales Office, an authorized local Distributor or Grayhill.

## 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)

