

## 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

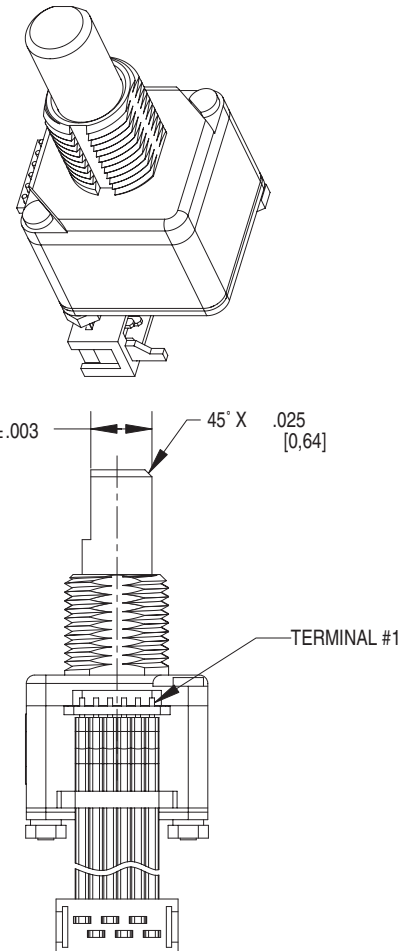
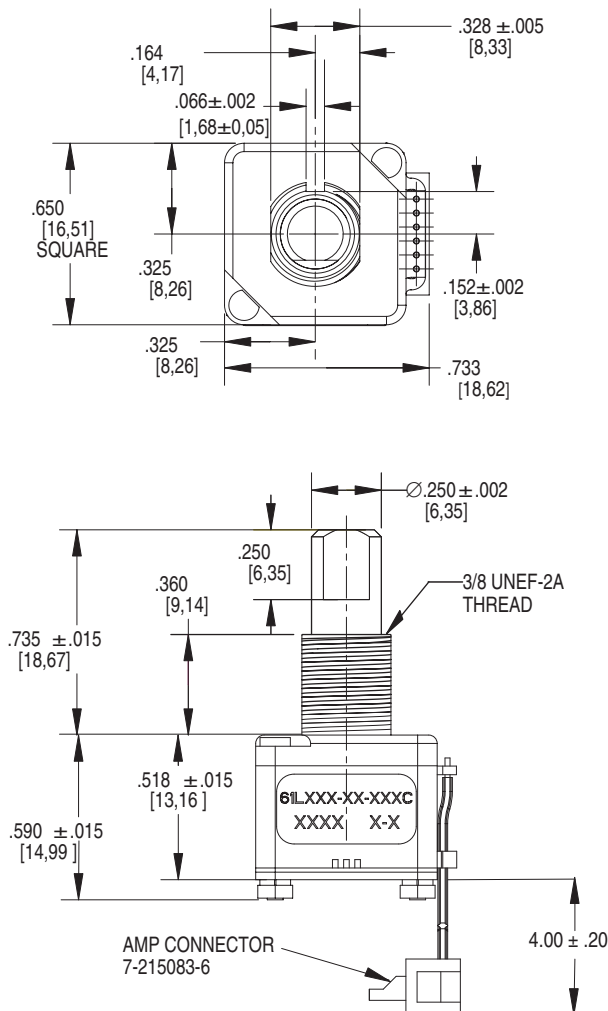
- Medical Devices
- Test and Measurement Equipment
- Other Scroll and Select Applications



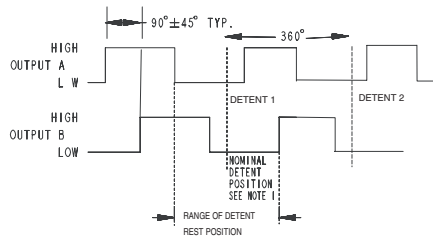
### DIMENSIONS In inches (and millimeters)

Unless otherwise specified, standard tolerances are:

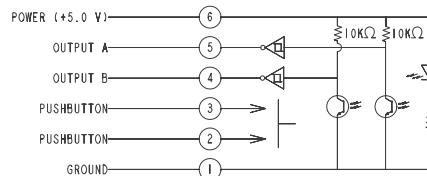
Linear  $\pm .025$   
Diameter  $\pm .010$   
Angle  $\pm 2.0^\circ$



## CIRCUITRY, WAVEFORM AND TRUTH TABLE



CLOCKWISE ROTATION IS SHOWN ABOVE.  
 1.) THE NOMINAL DETENT POSITION IS CENTERED AROUND OUTPUT A - LOW / OUTPUT B - LOW STATE.  
 2.) DETENT POSITION WILL LIE WITHIN THESE BOUNDARIES - OUTPUT WILL NEVER BE IN OUTPUT A - HIGH / OUTPUT B - HIGH STATE.



NOMINAL CODE THROUGH ONE DETENT POSITION.

OUTPUT A	OUTPUT B
●	●
●	●
●	●
●	●

● Indicates logic high; blank indicates logic low.  
 Code repeats every four cycles.

## 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

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**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

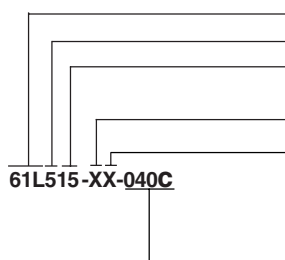
**Solder:** 96.5% tin / 3% silver / 0.5% copper, no clean

**Lubricating Grease:** NYE Nyogel 774L

**Studs:** Stainless Steel

**Lockwasher:** Stainless Steel

**Hex Nuts:** Stainless Steel



Series

Operating Voltage: 5 = 5 Volts

Angle of Throw: 15 = 15° for complete quadrature cycle change and 24 detent positions

Rotational Torque: N = Non-Detent, H=High Torque, M=Medium Torque, L=Low Torque

Pushbutton Option: 0=Non-Pushbutton, 5=510 grams

Termination: C = .050 Center ribbon Cable with connector

Cable Termination: 040=4.0 inches. Cable is terminated with Amp Connector P/N7-215083-6. See Amp Mateability Guide for Mating Connector details.

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