



# Optical Encoders

## SERIES 62AG Price Competitive Solution

### FEATURES

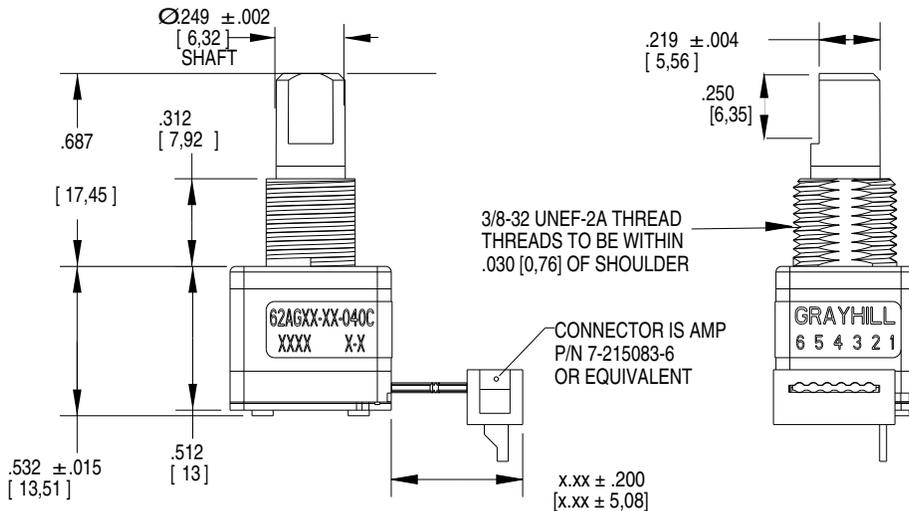
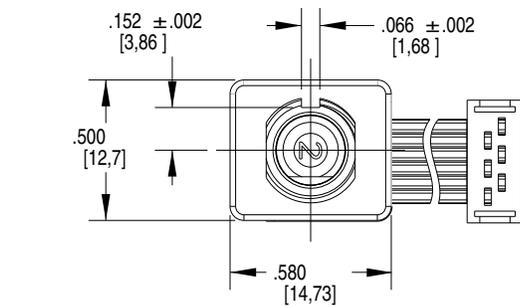
- Over 1 million rotational cycles
- 2-bit gray code output
- Quadrature coding
- Available in 16, 20, 24 and 32 detent positions
- Choices of cable length and terminations
- Available for 5Vdc and 3.3Vdc
- Optional integrated pushbutton
- Patented light pipe technology
- Cost competitive with mechanical encoders at higher volumes

### APPLICATIONS

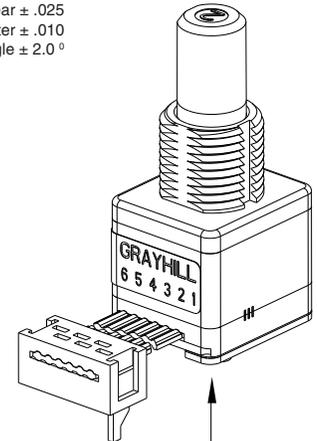
- Automotive
  - audio systems
  - navigation systems
- Medical
  - patient monitoring systems
- Test & Measurement
  - analyzers
  - oscilloscopes
- Audio & Video
  - consumer electronics
  - professional editing equipment



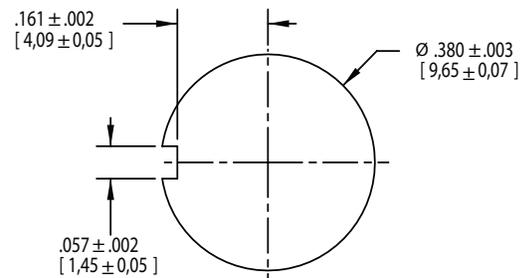
### DIMENSIONS in inches (and millimeters)



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



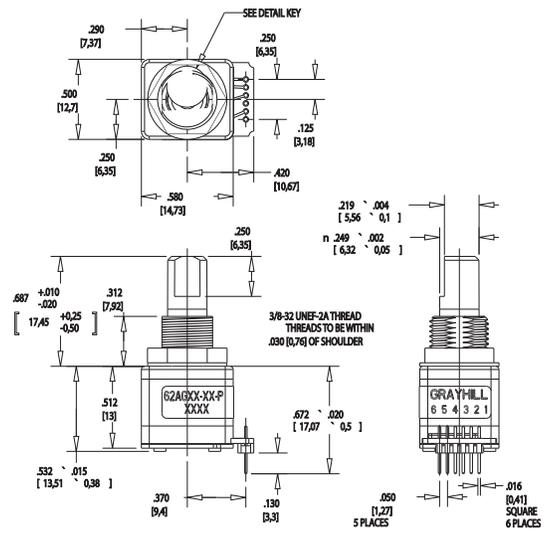
NOTE: GRAYHILL ALLOWS MULTIPLE ORIENTATIONS FOR THE GRAYHILL TEXT ON THE BACKPLATE.



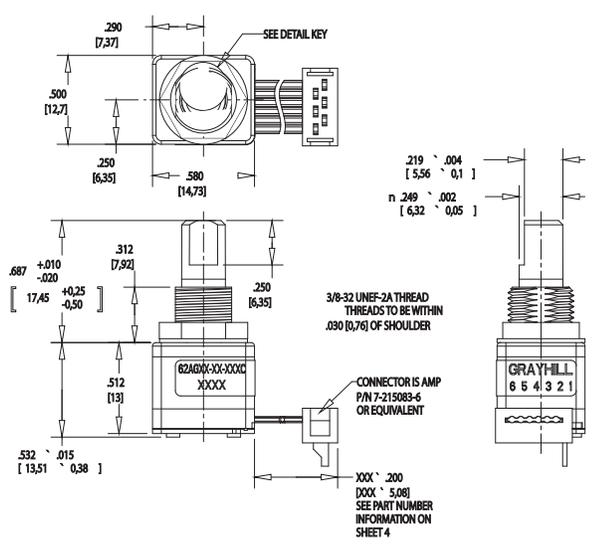
**Suggested Mounting Panel Cutout**

Optical and Mechanical Encoders

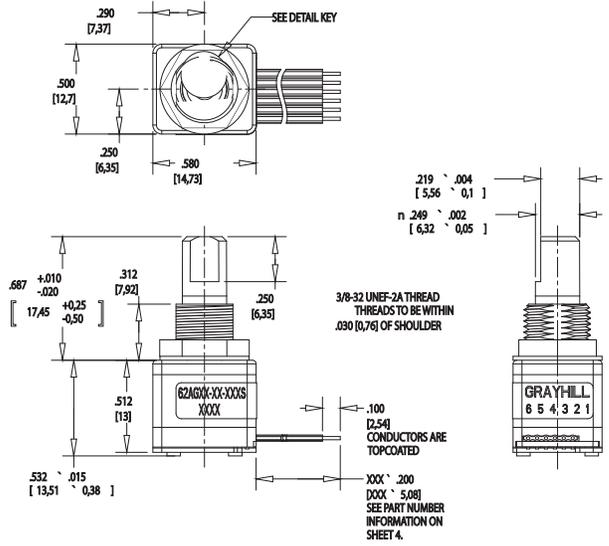
Termination Options



P - .050 Center Pins with 0.185 inch length



C - .050 Center Ribbon Cable with connector



S - .050 Center Ribbon Cable with .100 stripped end

Optical and Mechanical Encoders

WAVEFORM AND TRUTH TABLE

**Standard 5.0V (Style AG)**

**Standard 3.3V (Style VG)**

\*10K Ω PULL-UP RESISTOR REQUIRED FOR OPERATION  
\*\*NOISE FILTERING CAPACITOR, LESS THAN 1000pf

WAVEFORM (CW ROTATION)

CW ROTATION

TRUTH TABLE (CW ROTATION)		
POSITION	OUTPUT A	OUTPUT B
1		
2	●	
3	●	●
4		●

BLANK = LOGIC LOW  
● = LOGIC HIGH  
CODE REPEATS EVERY FOUR POSITIONS.

SPECIFICATIONS

Environmental Specifications

**Operating Temperature:** -40°C to 85°C  
**Storage Temperature:** -40°C to 85°C  
**Humidity:** 96 hours @ 90-95% humidity @ 40°C  
**Mechanical Vibration:** Harmonic motion with amplitude of 15g within a varied frequency of 10 to 2000 Hz for 12 hours  
**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:**  
 AG Style 5.00±0.25 Vdc  
 VG Style 3.30±0.125 Vdc  
**Supply Current:**  
 AG Style 30 mA maximum  
 VG Style 30 mA maximum  
**Logic Output Characteristics:**  
 AG Style - Logic high no less than 3.0 Vdc. Logic low shall be no greater than 1.0 Vdc.  
 VG Style - Logic high no less than 2.0 Vdc. Logic low shall be no greater than 1.0 Vdc.  
**Output:** Open Collector Phototransistor  
**Optical Rise Time:** 30ms maximum.  
**Optical Fall Time:** 30ms maximum.

Average Rotational Torque:

Low = 2.0±1.4 in-oz initially.  
 High = 3.5±1.4 in-oz initially.  
 50% of initial value after 1 million cycles.  
**Mechanical Life:** 1,000,000 cycles of operation. 1 cycle is a rotation through all positions and a full return.  
**Mounting Torque:** 15in-lbs. maximum  
**Shaft Pushout Force:** 45 lbs. minimum  
**Terminal Strength:** 15 lbs. Cable pull out force minimum  
**Solderability:** 95% free of pin holes & voids  
**Maximum rotational speed:** 100 rpm.

Pushbutton Electrical and Mechanical Specifications

**Rating:** 10 mA @ 5 Vdc  
**Contact Resistance:** <10 Ω (Compatible with CMOS or TTL)  
**Life:** 1 million actuations minimum  
**Contact Bounce:** <4 ms make, <10ms break  
**Actuation Force:** 5 = 510±150 grams, 9 = 950±200 grams  
**Shaft Travel:** .017 ± .008 INCH

Materials and Finishes

**Bushing:** Zamak 2  
**Shaft:** Zamak 2

**Detent Rotor:** Reinforced Nylon Zytel 70G33L UL 94

**Detent Spring:** 303 Stainless Steel

**Housing, Upper:** Nylon 6/6 25% glass reinforced. Zytel FR-50

**Light Pipe:** Lexan, GE

**Code Rotor:** Delrin 100

**Housing, Lower:** Nylon 6/6 25% glass reinforced. Zytel FR-50

**Pushbutton Actuator:** Reinforced nylon. Zytel 70G33L. UL 94

**Pushbutton Dome:** Stainless Steel

**Printed Circuit Board:** NEMA Grade FR4, Double clad with copper, Plated with gold over nickel

**Infrared Emitting Diode:** Gallium Arsenide

**Phototransistor Diode:** NPN Silicon

**Resistor:** Metal oxide on ceramic substrate

**Spacer:** Pet plastic

**Backplate:** Stainless Steel

**Label:** TT406 thermal transfer cast film.

**Solder:** 96.5% tin / 3% silver / 0.5% copper. No clean.

**Hex Nut:** Brass, Plated with nickel

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

**Cable:** Copper Stranded with topcoat in PVC insulation

**Connector** (.050 center): PA4.6 with tin/nickel plated phosphor bronze.

Optical and Mechanical Encoders

Series

Style: AG = 5.0V; VG = 3.3V

Angle of Throw: 11 = 11.25° code change and 32 detent positions; 15 = 15° code change and 24 detent positions  
 18 = 18° code change and 20 detent positions; 22 = 22.5° code change and 16 detent positions

Rotational Torque Option: L = Low Torque, H = High Torque, N = No Detent

Pushbutton Option: 0 = No pushbutton, 5 = 510 grams, 9 = 950 grams

**62AGXX-XX-XXXX**

Termination:  
 C = .050 Center Ribbon Cable with connector, S = .050 Center Ribbon Cable with .100 stripped end,  
 P = .050 Center Pins with 0.185 inch length

Cable Length:  
 020 = 2.0 inch cable, 040 = 4.0 inch cable, 060 = 6.0 inch cable

Available from your local Grayhill Distributor. For prices and discounts, contact a local sales office, an authorized distributor, or Grayhill.