

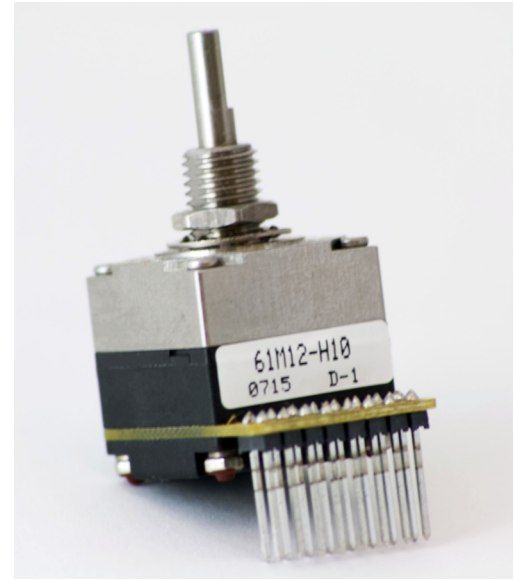
**SERIES 61M**  
**Optically Coupled for Simulated**  
**Mechanical Rotary Switch Output**

**FEATURES**

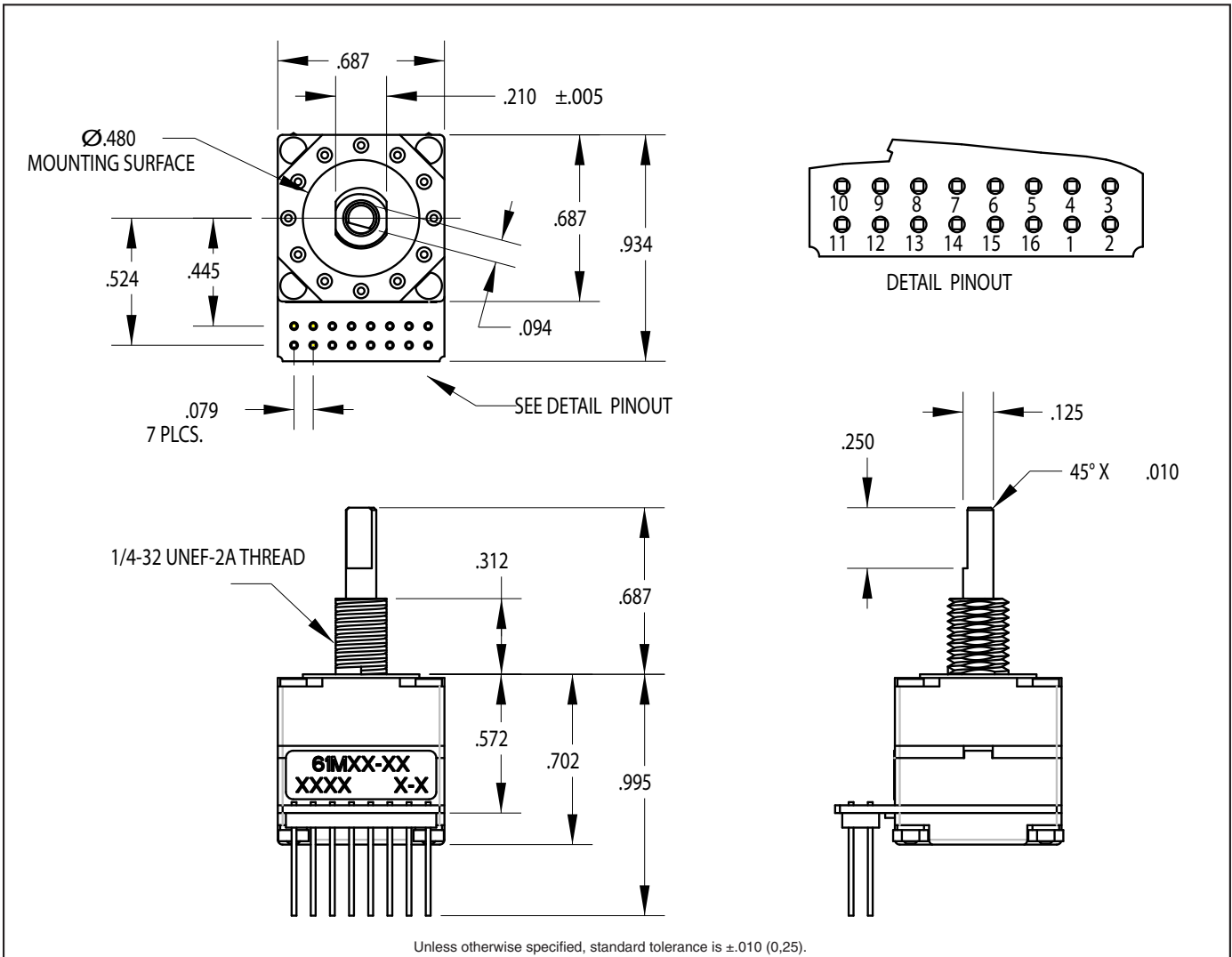
- Optical Alternative to Rotary Contacts
- One Pulse Per Detent Position Per Rotation
- Long Life of a Million Cycles
- With or Without Pushbutton
- Continuous Rotation and Fixed Stops Available
- Rugged Construction

**Applications**

- Avionics
- Any application requiring rotary switch output and the increased reliability of an optical device.

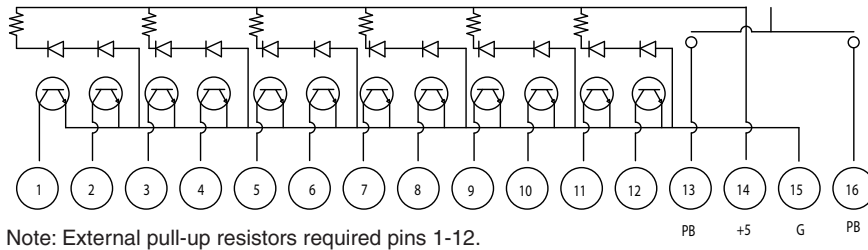


**DIMENSIONS** In inches (and millimeters)



Optical and Mechanical Encoders

**CIRCUITRY and TRUTH TABLE**



Note: External pull-up resistors required pins 1-12.

POSITION	PIN NUMBER											
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
1	•											
2		•										
3			•									
4				•								
5					•							
6						•						
7							•					
8								•				
9									•			
10										•		
11											•	
12												•

Note:  
Blank Indicates high state  
• Indicates low state  
Code repeats every 12 positions

**SPECIFICATIONS**

**Pushbutton Specifications**

**Rating:** 10mA at 5 Vdc  
**Contact Resistance:** Less than 10 Ohms  
**Contact Bounce:** Less than 4 mS at make and less than 10 mS at break  
**Actuation Life:** 3,000,000 actuations  
**Actuation Force:** 8- 850±200g, 5- 550±200g  
**Shaft Travel:** .020±.010 inch

**Rotary Specifications**

**Rating:** 5.0 ± .25 Vdc  
**Supply Current:** 60mA maximum at 5 Vdc  
**Output:** Open collector phototransistor, external pull-up resistors are required  
**Output Code:** One pulse per position per rotation (360 degrees CW/CCW)  
**Logic High:** 3.0V minimum  
**Logic Low:** 1.0V maximum  
**Power Consumption:** 300mW maximum

**Mechanical Life:** 1 million cycles of operation (1 cycle=360° rotation)  
**Rotational Torque:** H- 10.0±3.0 in\*oz, (initial) L- 4.0±1.5 in\*oz (torque shall be within 50% of initial value throughout life)  
**Shaft Pushout Force:** 50 lbs. minimum  
**Shaft Pullout Force:** 50 lbs. minimum

**Environmental**  
**Operating and Storage Temperature Range:** -40°C to +85°C  
**Humidity:** 90-95% Relative Humidity at 40°C for 96 hours  
**Vibration:** Harmonic motion with amplitude of 15g, within a varied frequency of 10-2000 hZ  
**Mechanical Shock:** 100g's, 6 ms, Half Sine, 12.3 ft/s and 100g's, 6 ms, Sawtooth, 9.7 ft/s

**Materials and Finishes**

**Shaft:** Stainless steel  
**Detent/Bushing Housing:** Stainless steel  
**Code Rotor:** Reinforced Thermoplastic  
**Stop Arm:** Stainless steel  
**Deck Spacer:** Reinforced thermoplastic  
**Detent Springs:** Piano wire  
**Detent Balls:** Nickel plated stainless steel  
**Pushbutton Actuator:** Zytel 70G33L  
**Domes:** Stainless steel  
**Backplate:** Reinforced Thermoplastic  
**Printed Circuit Boards:** NEMA Grade FR-4, double clad copper, gold plated over nickel  
**Phototransistor:** Planar silicone  
**Infrared Emitter:** Gallium aluminum arsenide  
**Solder Pins:** Tin plated brass  
**Header:** Hi-temp glass filled thermoplastic UL94V-0, phosphor bronze  
**Resistor:** Metal oxide on ceramic substrate

Optical and Mechanical Encoders

**ORDERING INFORMATION**

**Series**  
"M" Style  
**Angle of Throw: Detent**  
12 = 30° or 12 positions

**Pushbutton Force:** 0 = no PB, 5 = 550g, 10 = 1,000g  
**Rotational Torque:** L = low torque, H = high torque

		Pushbutton Force		
		0 none	5 550g	10 1,000g
Rotational Torque	L 5in-oz	L0	L5	L10
	H 10in-oz	H0	N/A	H10

Custom materials, styles, colors, and markings are available. Control knobs available.

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