



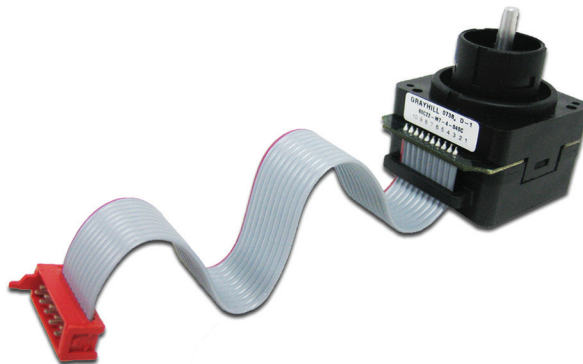
## SERIES 60C Multi-Function Joystick

### FEATURES

- Three-in-One Joystick, Optical Encoder and Pushbutton
- Compact Packaging
- Choices of Cable Length and Termination
- Customized Solutions Available

### APPLICATIONS

- Avionics
- Medical Equipment
- Automotive Navigation, Information & Entertainment Equipment



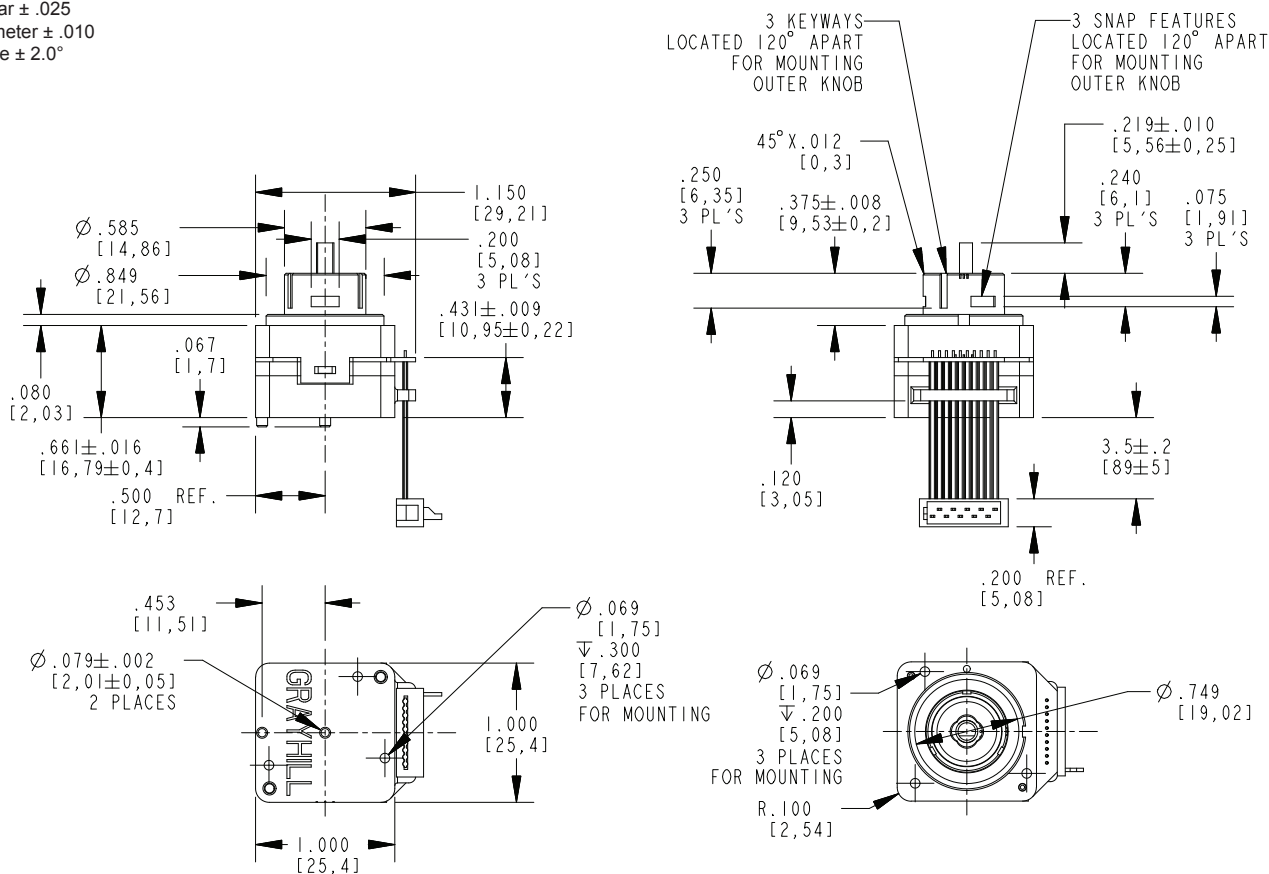
The 60C is a cost-effective replacement of a stationary mouse or trackball with improved control over cursor movement. An integral Schmitt Trigger is used to stabilize against noise and vibration.

As a compact cursor control device, Grayhill's Series 60C is ideally suited for automotive and aviation dashboards, where use of separate joysticks, encoders and pushbuttons might be impractical. It provides all the functionality of a stationary mouse or trackball in a single unit with a 1"x1"x .661" deep housing. The joystick manipulates a cursor left, right, up and down; the rotary encoder facilitates sequential scrolling through menu options; and the pushbutton performs on-screen menu selects.

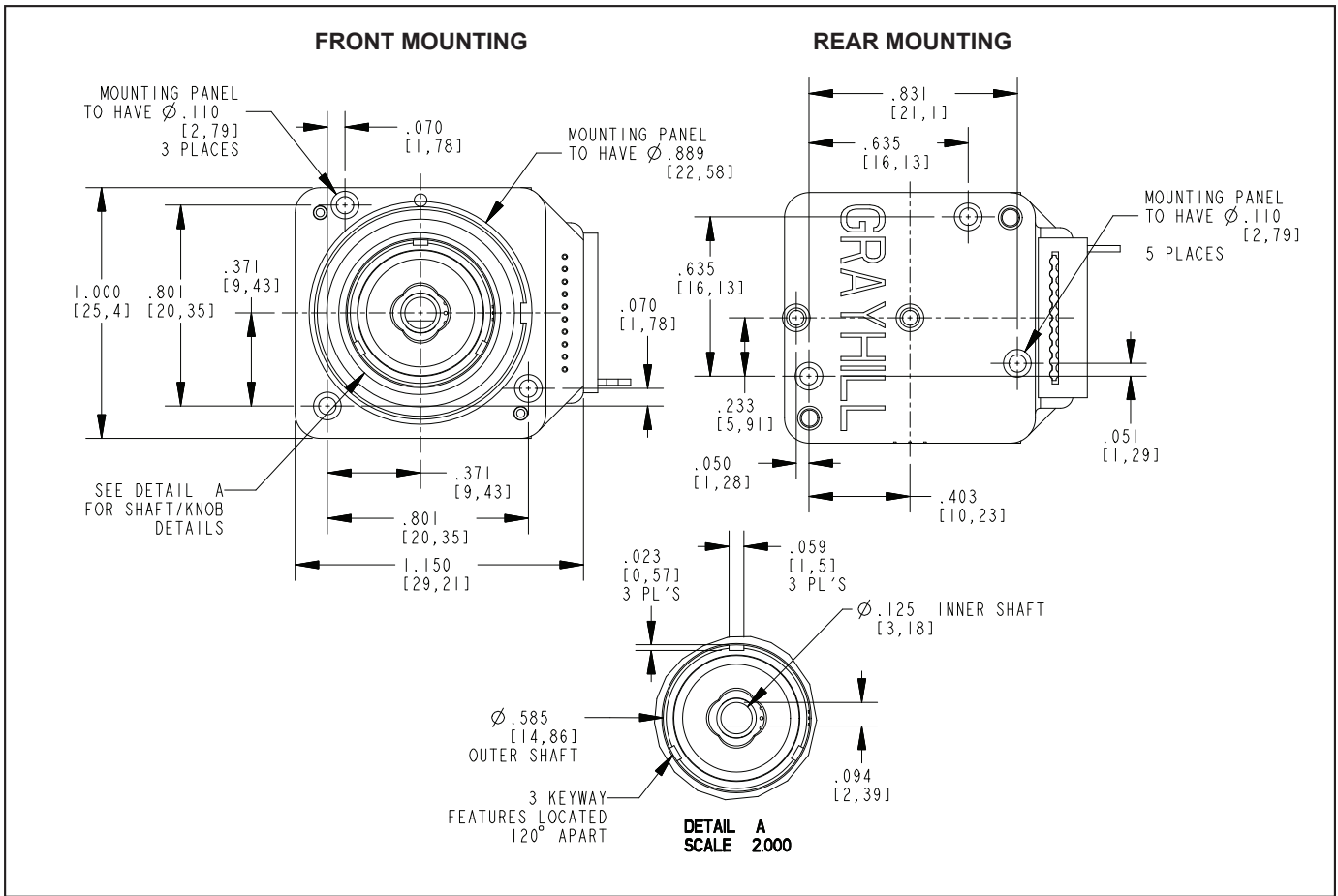
### DIMENSIONS in inches (and millimeters)

Unless otherwise specified, standard tolerance are:

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



**MOUNTING DETAILS** in inches (and millimeters)



Optical and Mechanical Encoders

**JOYSTICK OPERATION + ENCODER WAVEFORM AND TRUTH TABLE** Standard Quadrature 2-Bit Code

**JOYSTICK**

POSITION	BIT 1	BIT 2	BIT 3	BIT 4
1	○	○	○	○
2	○	○	○	○
3	○	○	○	○
4	○	○	○	○
5	○	○	○	○

○ INDICATES LOGIC HIGH  
○ INDICATES LOGIC LOW

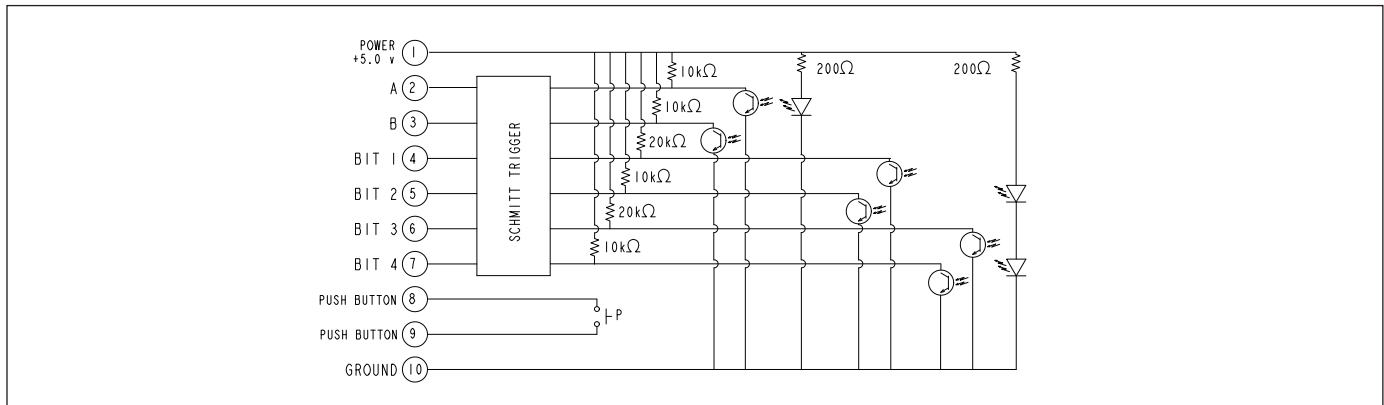
**ENCODER**

POSITION	OUTPUT A	OUTPUT B
#1	○	○
#2	○	○
#3	○	○
#4	○	○



## Optical Encoders

### SWITCH SCHEMATIC



### SPECIFICATIONS

#### Rotary

##### Electrical and Mechanical Ratings

**Operating Voltage:** 5.00 ± 0.25 Vdc  
**Supply Current:** 35mA TYP at 5 Vdc  
**Power Consumption:** 175mW TYP at 5Vdc  
**Output:** Direct output from inverting Schmitt trigger

**Output Code:** 2-Bit quadrature, channel A leads channel B by 90° in cw rotation

##### Logic Output Characteristics:

High: No less than 3.5 Vdc  
 Low: No greater than 1.0 Vdc

**Mechanical Life:** 500K rotational cycles

(through all positions and a full return)  
**Rotational Torque:** medium torque option 3.00±2.00 in-oz, torque shall be within 50% of initial value throughout life

**Mounting Torque:** 15 in-oz. maximum

**Shaft Push/Pull Out Force:** 25 lbs minimum

**Terminal Strength:** 15 lbs terminal minimum

#### Joystick

##### Electrical and Mechanical Ratings

**Operating Voltage:** 5.00 ± 0.25 Vdc  
**Supply Current:** 35mA at TYP at 5 Vdc  
**Power Consumption:** 175mW TYP at 5Vdc  
**Output:** Direct output from inverting Schmitt trigger

##### Logic Output Characteristics:

High: No less than 3.5 Vdc  
 Low: No greater than 1.0 Vdc

**Mechanical Life:** 500K cycles  
 (through all positions and a full return)

**Angle of Throw:** 8° max. in all directions

#### Pushbutton

##### Electrical and Mechanical Ratings

**Rating:** 10 mA at 5 Vdc resistive  
**Contact Resistance:** less than 10 ohms  
**Contact Bounce:** < 4ms make, 10 ms break  
**Mechanical Life:** 500K actuations minimum  
**Actuation Force:** option 7 = 485 ± 115grams  
**Pushbutton Travel:** 0.033 ± 0.015 inches to contact; 0.075 inches maximum

##### Environmental Ratings

**Operating Temperature Range:** -40°C to 85°C

**Storage Temperature Range:** -55°C to 100°C

**Relative Humidity:** 96 hours at 90-95% humidity at 40°C

**Vibration:** Harmonic motion with amplitude of 15g, within a varied 10 to 2000 Hz

##### Mechanical Shock:

Test 1: 100g for 6ms half-sine wave with a velocity change of 12.3 ft/s

Test 2: 100g for 6ms sawtooth wave with a velocity change of 9.7 ft/s

**Thermocycle:** 4 hours cycling between -40°C to 85°C

#### Materials and Finishes

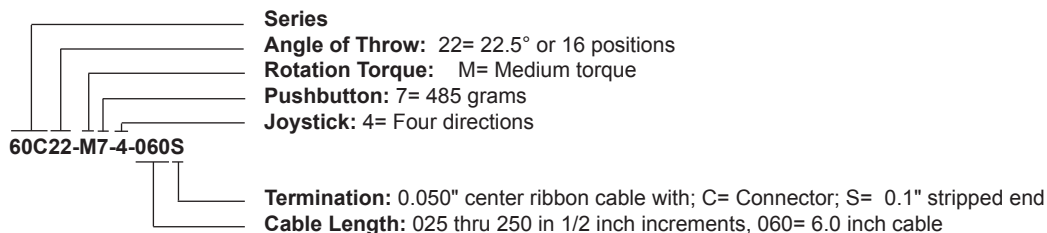
**Bushing:** Thermoplastic  
**Shaft Outer:** Thermoplastic  
**Cable ASM:** .050 round conductor flat cable, PVC coated. Conductors are stranded, top-coated wire  
**Solder:** 95.5% SN, 4% AG, 0.5% CU  
**Dome:** Stainless steel

This product series is ROHS Compliant.

#### OPTIONS

Contact Grayhill for custom terminations, rotational torque, number of positions, shaft configurations, and resolutions. Control knobs are also available.

### ORDERING INFORMATION



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

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

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