



Optical Encoders

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



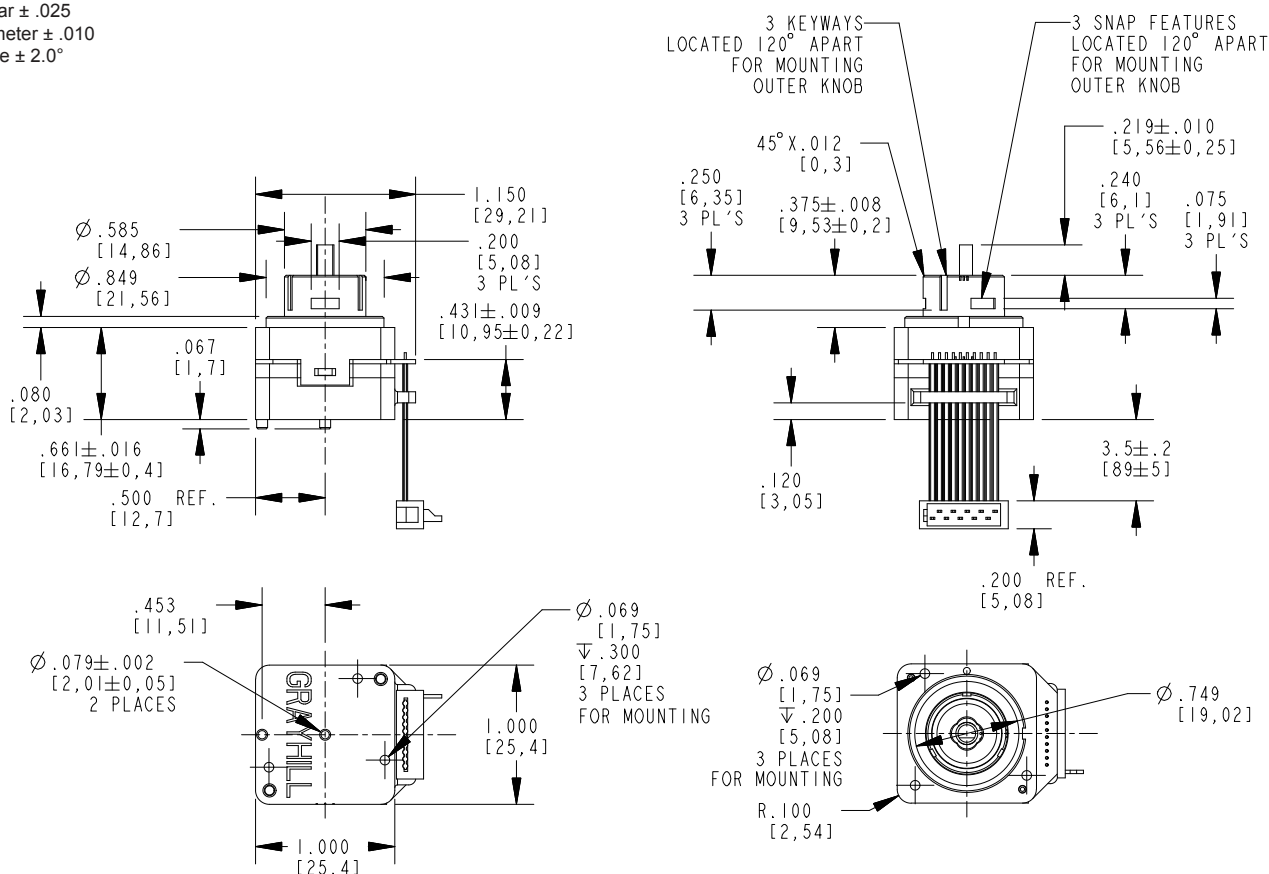
The 60C is a cost-effective replacement of a stationary mouse or trackball with improved control over cursor movement. An integral Schmitt Trigger is used to stabilize against noise and vibration.

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.

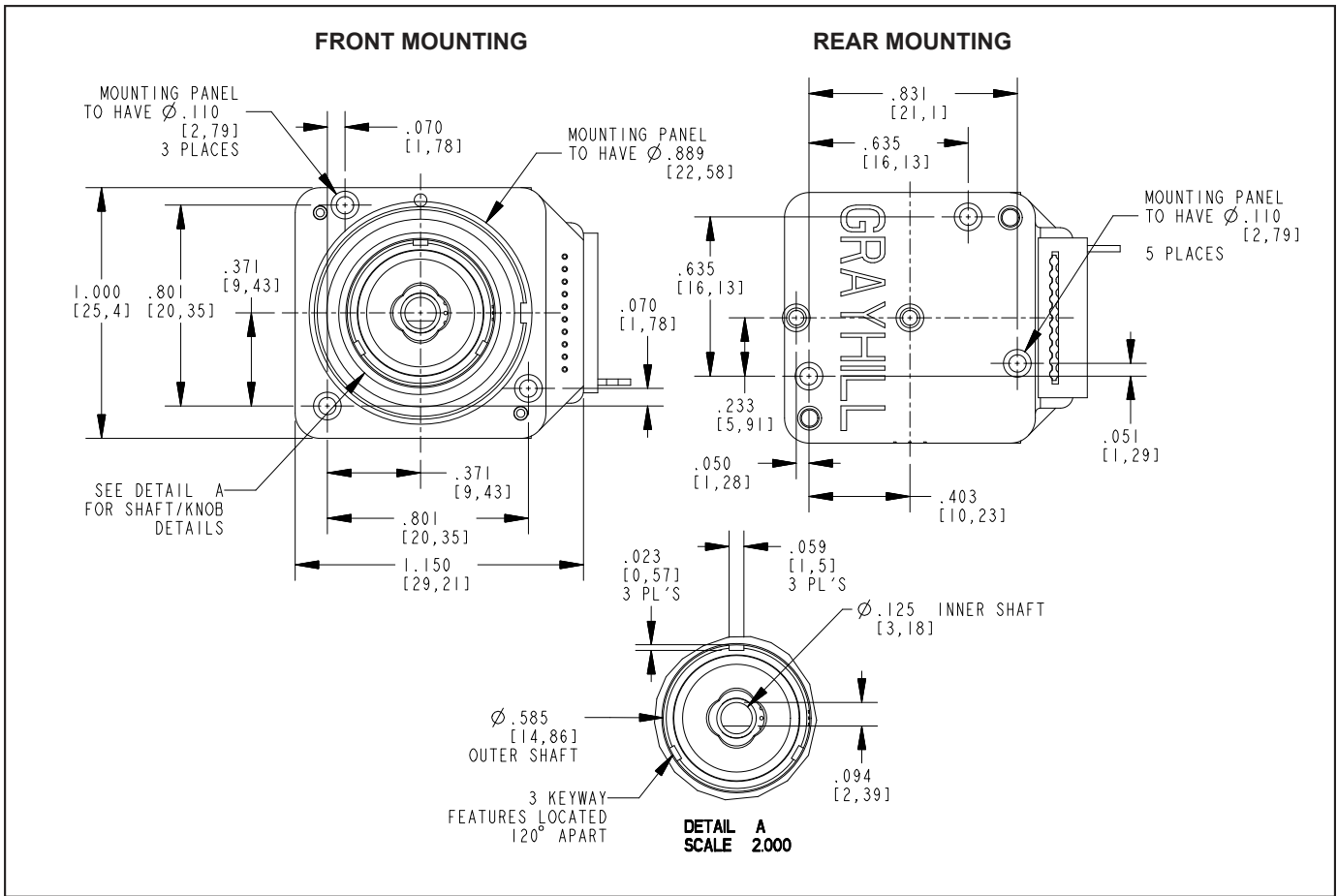
DIMENSIONS in inches (and millimeters)

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	○	○

HIGH
OUTPUT A
LOW

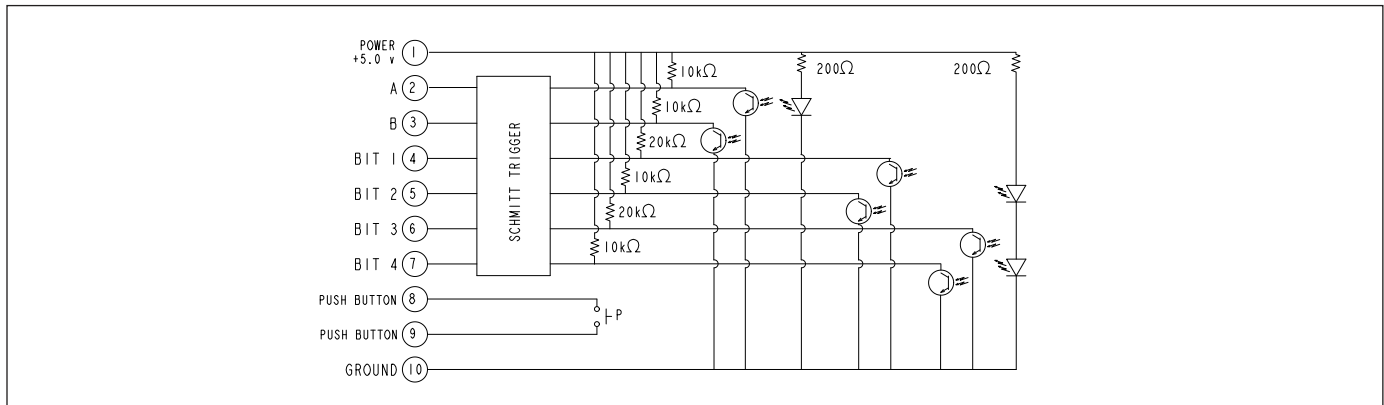
HIGH
OUTPUT B
LOW

POS. #1 POS. #2 POS. #3 POS. #4 POS. #5 POS. #6



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

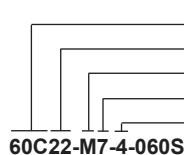
Bushing: Thermoplastic
Shaft Outer: Thermoplastic
Cable ASM: .050 round conductor flat cable, PVC coated. Conductors are stranded, top-coated wire
Solder: 95.5% SN, 4% AG, 0.5% CU
Dome: Stainless steel

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



Series

Angle of Throw: 22= 22.5° or 16 positions

Rotation Torque: M= Medium torque

Pushbutton: 7= 485 grams

Joystick: 4= Four directions

Termination: 0.050" center ribbon cable with; C= Connector; S= 0.1" stripped end

Cable Length: 025 thru 250 in 1/2 inch increments, 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.