



# Mechanical Encoders

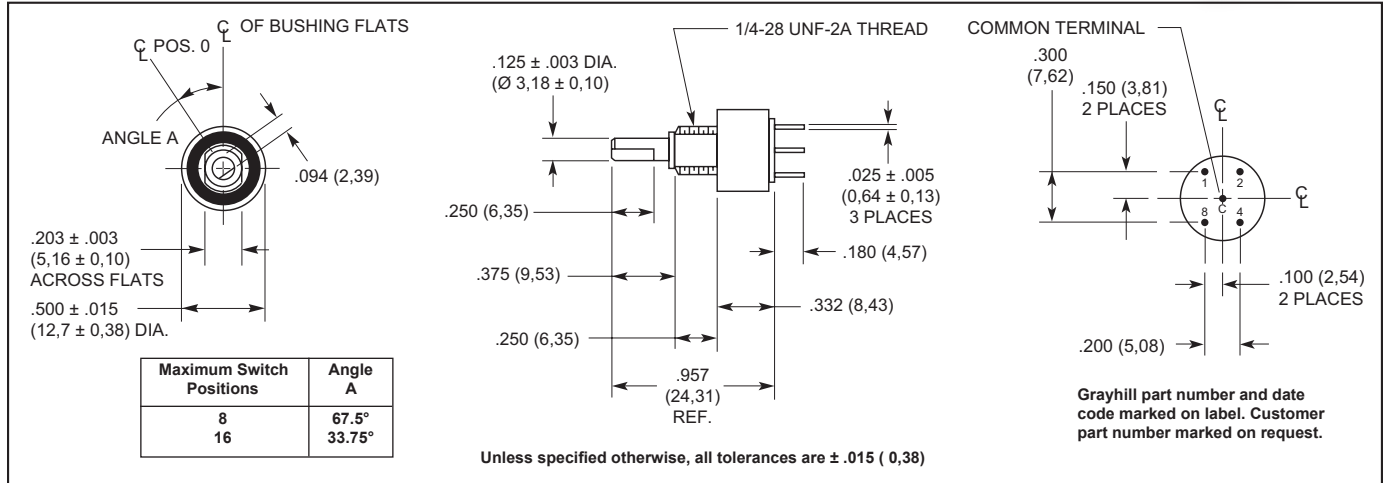
## SERIES 26 Binary and Gray Code

### AVAILABLE CODES

- Hexadecimal
- Octal
- BCD (Adjusted)
- Quadrative
- Custom (4-Bit, 16 position maximum)
- RoHS Compliant



### DIMENSIONS in inches (and millimeters)



Optical and Mechanical Encoders

### SPECIFICATIONS

#### Electrical Ratings

- Rated:** 25,000 cycles with logic compatible loads. Make and break 200 mA.
- Contact Resistance:** 500 milliohms maximum (less than 100 milliohms initially)
- Insulation Resistance:** 1000 megohms minimum (10,000 megohms initially)
- Dielectric Strength:** 250 Vac minimum

#### Materials and Finishes

- Panel Seal:** Silicone Rubber
- Shaft Seal:** Fluorosilicone
- Mounting Nut (mounting hardware—one per switch):** Brass, tin/zinc-plated
- Internal Tooth Lockwasher (mounting hardware):** Steel, tin/zinc-plated
- Detent Balls:** Carbon steel, nickel-plated
- Detent Spring:** Pretinned music wire
- Detent Rotor:** Thermoplastic
- Shaft, Stop Arm and Stop Pins:** Stainless steel
- Bushing:** Zamak II tin/zinc alloy, zinc-plated
- Switch Base:** Diallyl phthalate
- Printed Circuit Board:** NEMA Grade FR-4.
- Terminals:** Brass, gold-plated over nickel plate
- Contacts:** Copper alloy, gold-plated over nickel plate

#### Additional Characteristics

- Rotational Torque:** 4 to 8 oz-in initial
- Vibration Resistance:** 10 to 55 Hz at 0.060" double amplitude; no damage and no contact openings per MIL-STD-202, Method 201A
- Shock Resistance:** Passes medium requirement MIL-DTL-3786 (MIL-STD-202, Method 213)
- Stop Strength:** 5 in-lbs minimum

**Relative Humidity:** 90-95% at 40°C for 240 hours (MIL-STD-202 Method 103, Test Condition A)

**Thermal Cycling:** per MIL-STD-202, Method 107, Test Condition A, with an exception of -65°C as the low temperature

#### Shaft and Panel Seal

All switches are provided with a shaft and panel seal.

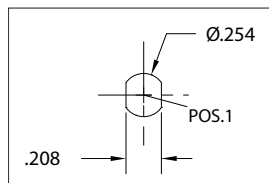
### OPTIONS

#### Adjustable Stop Switches

The switch may have continuous rotation, or be adjusted to limit the rotation. The panel seal ring can be removed to expose the stop pin holes on the front of the switch. Two stop pins and panel seal o-ring are supplied with the switch. One or both may be used to limit the rotation as desired.

Custom encoders with options such as custom code output, 1/4" shaft diameter, factory set stops and longer shaft terminal lengths are

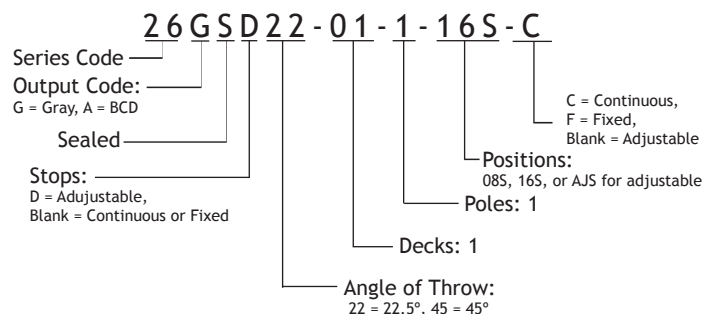
#### Recommended Panel Cutout



### CODE AND TRUTH TABLE

Switch Position	Code Position	BCD Output*				Gray Output*			
		1	2	4	8	1	2	4	8
1	0								
2	1	●				●			
3	2		●			●	●		
4	3	●	●				●		
5	4			●			●	●	
6	5	●		●		●	●	●	
7	6		●	●		●		●	
8	7	●	●	●				●	
9	8				●			●	●
10	9	●			●	●		●	●
11	10		●		●	●	●	●	●
12	11	●	●		●		●	●	●
13	12			●	●		●		●
14	13	●		●	●	●	●		●
15	14		●	●	●	●			●
16	15	●	●	●	●				●

\*Dot indicates terminal tied to common.





## Mechanical Encoders

### SERIES 26

Pull to Turn

Isolated Positions

BCD or Gray Code

Shaft & Panel Seal

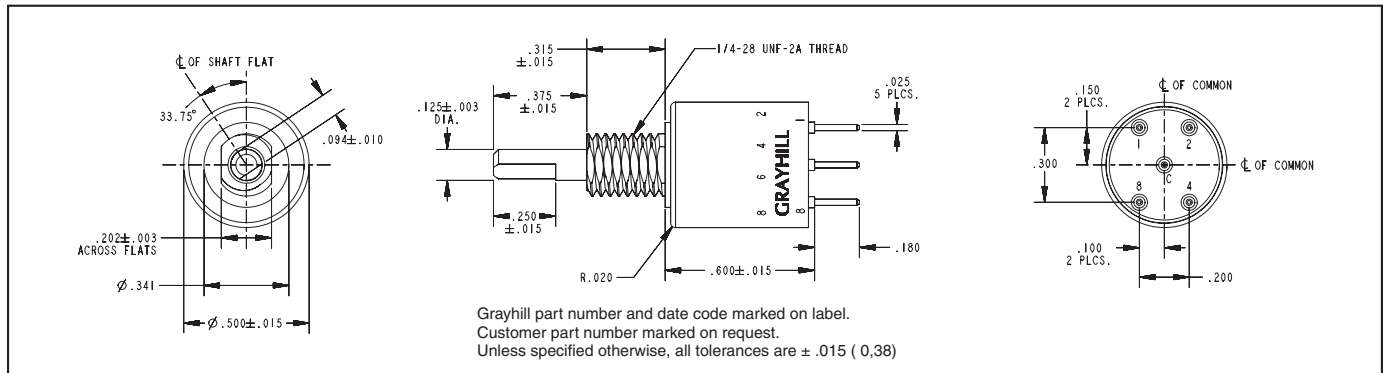


### DESCRIPTION

An isolated position is one that cannot be reached by normal rotation. This version of the Series 26 mechanical encoder requires that the operator Pull-To-Turn in order to reach the isolated position. To rotate out of the isolated position, the operator must Pull-to-Turn again.

Use isolated positions to protect a switch position from indiscriminate rotation. This feature is typically used for positions such as “calibrate”, “off” and/or “stand-by”.

### DIMENSIONS in inches (and millimeters)



### SPECIFICATIONS

#### Electrical Ratings

**Rated:** 25,000 cycles with logic compatible loads. Make and break 200 mA.

**Contact Resistance:** 500 milliohms maximum (less than 100 milliohms initially)

**Insulation Resistance:** 1000 megohms minimum (10,000 megohms initially)

**Dielectric Strength:** 250 Vac minimum

#### Materials and Finishes

**Panel Seal:** Silicone Rubber

**Shaft Seal:** Fluorosilicone

**Mounting Nut:** Brass, tin/zinc-plated

**Lockwasher:** Steel, tin/zinc-plated

**Detent Balls:** Carbon steel, nickel-plated

**Detent Spring:** Pretinned music wire

**Detent Rotor:** Thermoplastic

**Shaft, Stop Arm and Pins:** Stainless steel

**Bushing:** Zamak 3 zinc alloy, tin plate

**Switch Base:** Diallyl phthalate

**Printed Circuit Board:** NEMA Grade FR-4

**Terminals:** Brass, gold over nickel plate

**Contacts:** Copper alloy, gold over nickel

#### Additional Characteristics

**Shaft Vertical Travel:**  $.050 \pm .010$

**Pull Force Required:** 1.75 +/- .75 lbs.

**Rotational Torque:** 7 to 13oz-in

**Vibration Resistance:** 10 to 55 Hz at 0.060" double amplitude; no damage and no contact openings per MIL-STD-202, Method 201A

**Shock Resistance:** Passes medium requirement per MIL-DTL-3786

**Stop Strength:** 5 in-lbs minimum

**Mounting Strength:** 15 in-lbs max

**Relative Humidity:** 90-95% at 40°C for 240 hours (MIL-STD-202 Method 103, Test Condition A)

### OPTIONS

#### Isolated Positions

The Grayhill system for isolating positions lets you choose the positions to be isolated. Grayhill inserts isolation posts next to the positions to be isolated. Consider a continuous rotation switch with a 22.5° angle of throw. The terminals are listed here from 1 through 16 with a space between each to indicate where isolation posts might be inserted.

16 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

To isolate position 1 and position 2 from all other positions and from each other, indicate isolation posts as shown here:

16P1P2P3 4 5 6 7 8 9 10 11 12 13 14 15 16

To isolate just position 1, describe like this:

16P1P2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

To isolate positions 1 and 2 from all other positions, but not from each other, do this:

16P1 2P3 4 5 6 7 8 9 10 11 12 13 14 15 16

#### Fixed Stop Switches

The switch may have continuous rotation, or specified to limit the rotation.

When a 1-pole switch has less than the maximum number of positions, consider also the stop system. Following is the arrangement for a 6 position switch with the position 1 isolated.

STOP 1P2 3 4 5 6 STOP

The word “STOP” indicates the conventional switch stops, which limit rotation to positions 1 through 6. To isolate position 1 we insert only one isolation post—between terminals 1 and 2. The stop system already prevents rotation beyond terminal 1.

### CODE AND TRUTH TABLE

Switch Position	Code Position	BCD Output*				Gray Output*			
		1	2	4	8	1	2	4	8
1	0								
2	1	●				●			
3	2		●			●	●		
4	3	●	●				●		
5	4			●			●	●	
6	5	●		●		●	●	●	
7	6		●	●		●		●	
8	7	●	●	●				●	
9	8				●			●	●
10	9	●			●	●		●	●
11	10		●		●	●	●	●	●
12	11	●	●		●		●	●	●
13	12			●	●		●		●
14	13	●		●	●	●	●		●
15	14		●	●	●	●			●
16	15	●	●	●	●				●

\*Dot indicates terminal tied to common.

### ORDERING INFORMATION

Due to the vast number of possible configurations of isolated positions and stop arrangements, each Series 26 Pull-to-Turn Mechanical Encoder will be assigned a unique part number. For example, part 26YY50202 is a 16 position gray code switch with positions 1 and 16 isolated and a STOP at each extreme.

Contact Grayhill or an authorized representative to create a part number and obtain pricing.