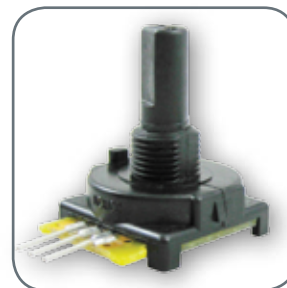




## Mechanical Encoders

### 510 Series



# 510 Series Mechanical Encoders

The 510 Series are manually operated, rotary encoders that supply a 2-bit gray code output for relative reference applications or a four-bit gray code output for absolute electrical reference applications. They combine the feel of a rotary switch with a digital output.

The “L” channel leads the “R” channel by 90° electrically in the clockwise position. This series has continuous electrical travel and has a rotational life of more than 100,000 shaft rotations with a positive detent feel.

These small encoders are commonly used in limited-space, panel-mounted applications where the need for costly, front-panel displays can be completely eliminated. Digital gray code outputs may eliminate the need for analog/digital converters.

## Key Features and Benefits

- **High resolution:** Up to 36 positions for applications that require high resolution
- **Gray code digital voltage output:** May eliminate the need for analog to digital converters, contributes to a more cost-effective solution
- **Wide operating temperature range of -40 °C to 105 °C [-40 °F to 221 °F]:** Helps minimize thermal performance issues
- **Mounting flexibility:** Horizontal or vertical mounting terminations promote flexibility in the application

## Potential Applications

### INDUSTRIAL






- Audio/visual equipment
- Smoke detectors
- Irrigation controls
- Oscilloscopes
- Robotics

### MEDICAL

- EKG and defibrillation machines

# Mechanical Encoders

**Table 1. Electrical Specifications**

Characteristic	Parameter				
	Termination B 3 Leads	Termination B 5 Leads	Termination C 3 Leads	Termination C 5 Leads	Termination D
					
Output	2-bit gray code, channel L leads channel R by 90° electrically CW	4-bit gray code, absolute electrical position output	2-bit gray code, channel L leads channel R by 90° electrically CW	4-bit gray code, absolute electrical position output	2-bit gray code, channel L leads channel R by 90° electrically CW
Closed circuit resistance	5 Ohm max.				
Open circuit resistance	100 kOhm min.				
Contact rating	250 mA at 28 Vdc max.				
Switching loads: 14 Vdc 115 Vac	150 mA 1.5 mA				
Dielectric	1000 Vac at sea level				
Rotational life	100,000 cycles at rated load, typ.				
Electrical travel	360%/continuous				

**Table 2. Mechanical Specifications**

Characteristic	Parameter				
	Termination B 2-bit	Termination B 4-bit	Termination C 2-bit	Termination C 4-bit	Termination D
Mechanical travel	360%/continuous				
Detent positions	16, 24, or 36 <sup>1</sup>	16	16, 24, or 36 <sup>1</sup>	16	16
Operating torque	21 mN m to 23 mN m [3 in-oz to 5 in-oz]				
Operating speed	50 rpm, max.				
Termination type	formed, C-30 type		straight, B-110 type		formed, C-30 type with mounting bracket
Material: housing, bushing, shaft terminals PCB	glass-reinforced thermoplastic tin-plated brass FR4				

<sup>1</sup>See Order Guide Tables on pp. 5-7.

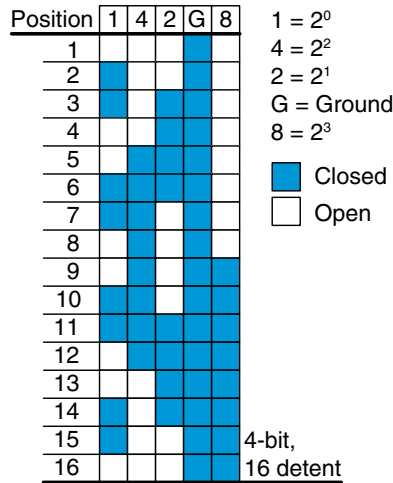
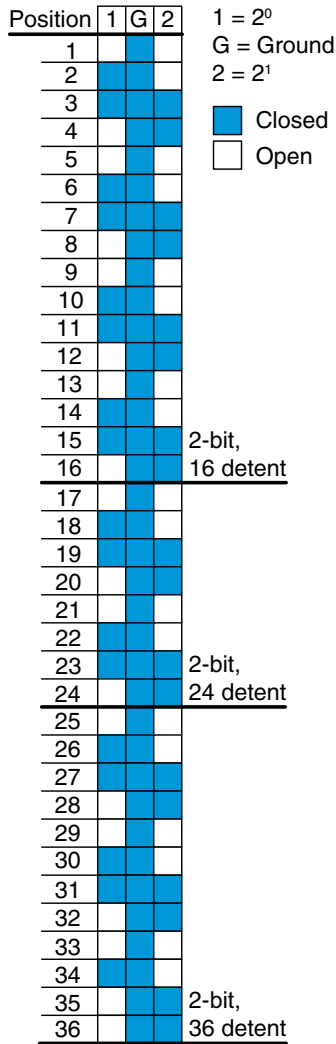
**Table 3. Environmental Specifications**

Characteristic	Parameter				
	Termination B 2-bit	Termination B 4-bit	Termination C 2-bit	Termination C 4-bit	Termination D
Operating temperature	-40 °C to 105 °C [-40 °F to 221 °F]				
Storage temperature	-55 °C to 120 °C [-67 °F to 248 °F]				
Sealing	Controls are not sealed for board washing. Consult Honeywell for details.				

# 510 Series

Figure 1. Output Information

## Incremental Output Graphs (Clockwise Rotation)



## Channel Graph

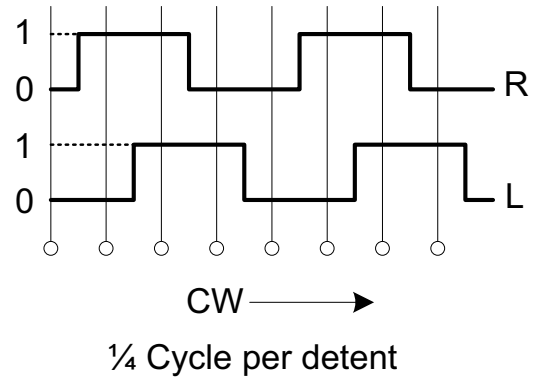
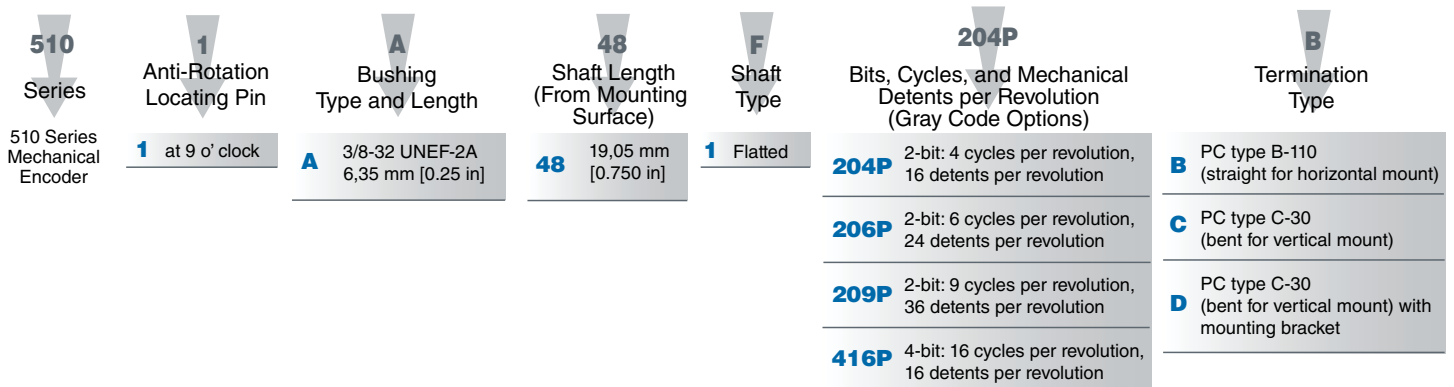


Figure 2. Nomenclature Tree

For example, **5101A48F204PB** defines a 510 Series Mechanical Encoder, anti-rotation locating pin at the 9 o' clock position, 3/8-32 UNEF-2A, 9,53 mm [0.25 in] bushing type and length, 19,05 mm [0.750 in] shaft length, flatted shaft, 2-bit: 4 cycles per revolution, 16 detents per revolution, PC type B-110 termination.



# Mechanical Encoders

Table 510-A Order Guide

Catalog Listing	Electrical	Mechanical	RoHS Compliant	Mounting Hardware
	Number of Bits	Detent Positions		
510E1A48F204PB	2	16	yes	none
510E1A48F206PB	2	24	yes	none
510E1A48F209PB	2	36	yes	none

**Dimensional Drawing (For reference only: mm [in.]**

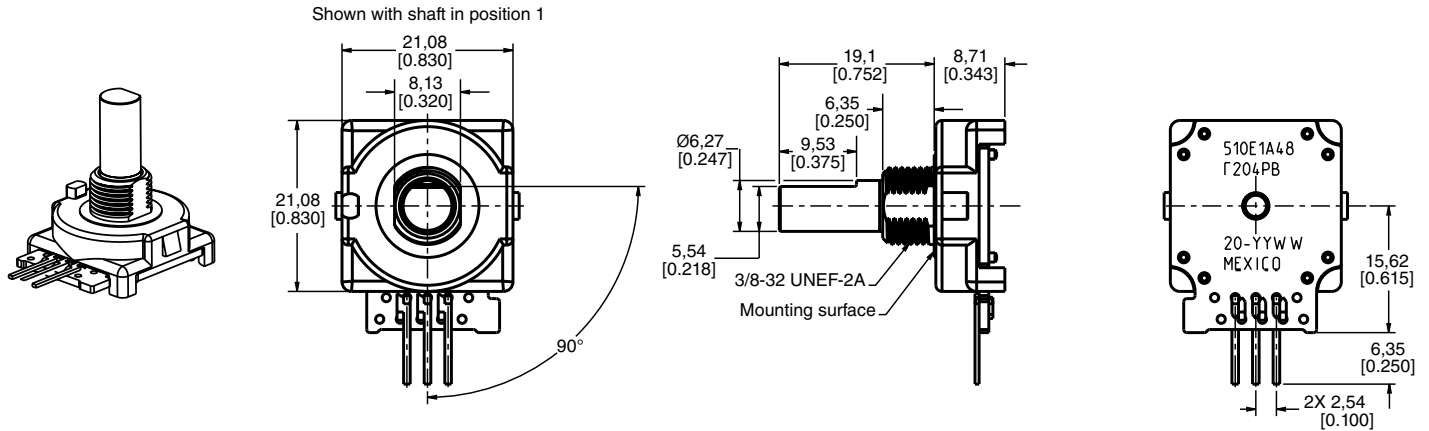
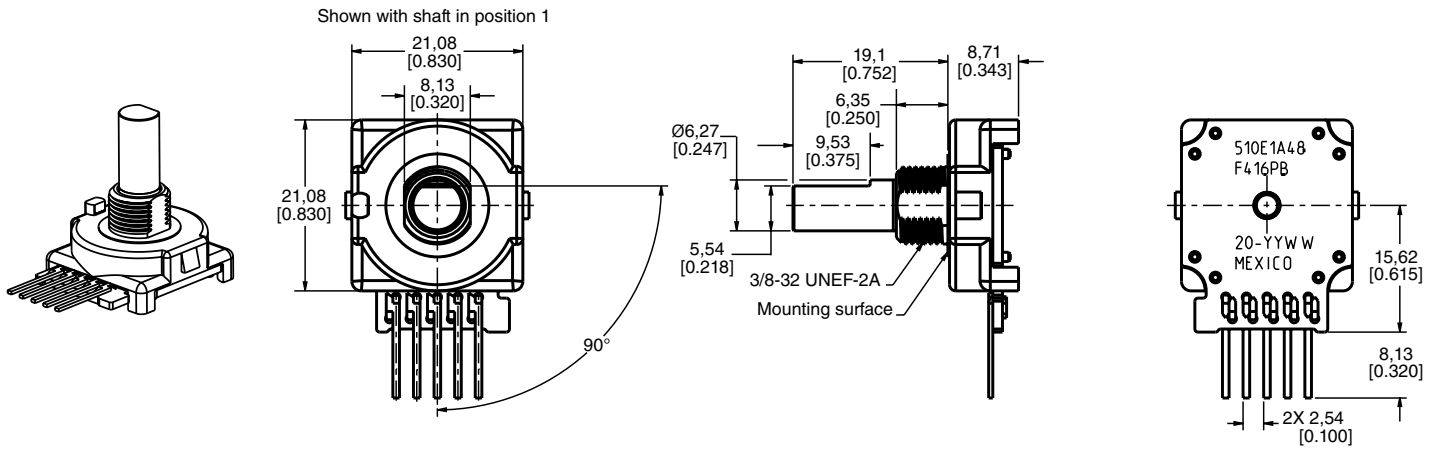


Table 510-B Order Guide

Catalog Listing	Electrical	Mechanical	RoHS Compliant	Mounting Hardware
	Number of Bits	Detent Positions		
510E1A48F416PB	4	16	yes	none

**Dimensional Drawing (For reference only: mm [in.]**



# 510 Series

Table 510-C Order Guide

Catalog Listing	Electrical	Mechanical	RoHS Compliant	Mounting Hardware
	Number of Bits	Detent Positions		
510E1A48F204PC	2	16	yes	none
510E1A48F206PC	2	24	yes	none
510E1A48F209PC	2	36	yes	none

Dimensional Drawing (For reference only: mm [in].)

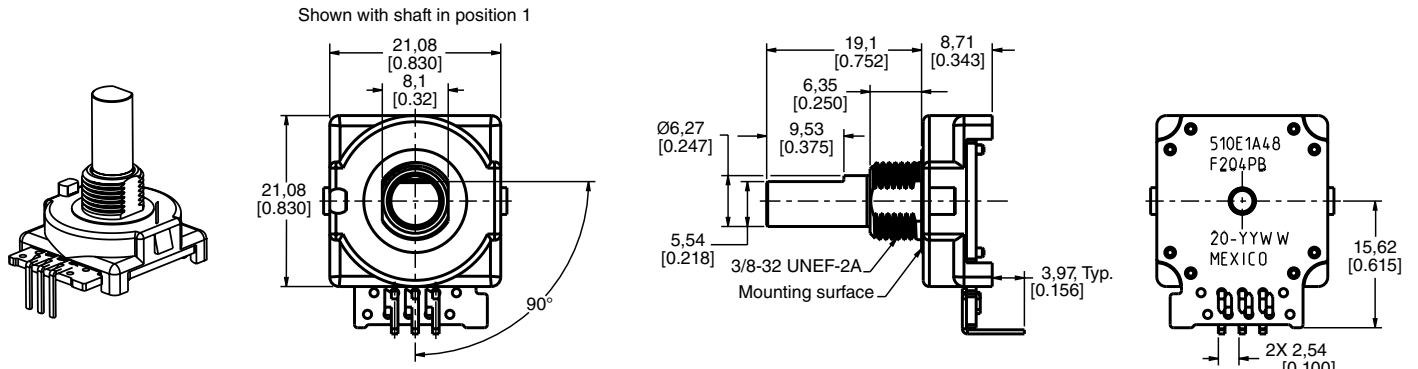
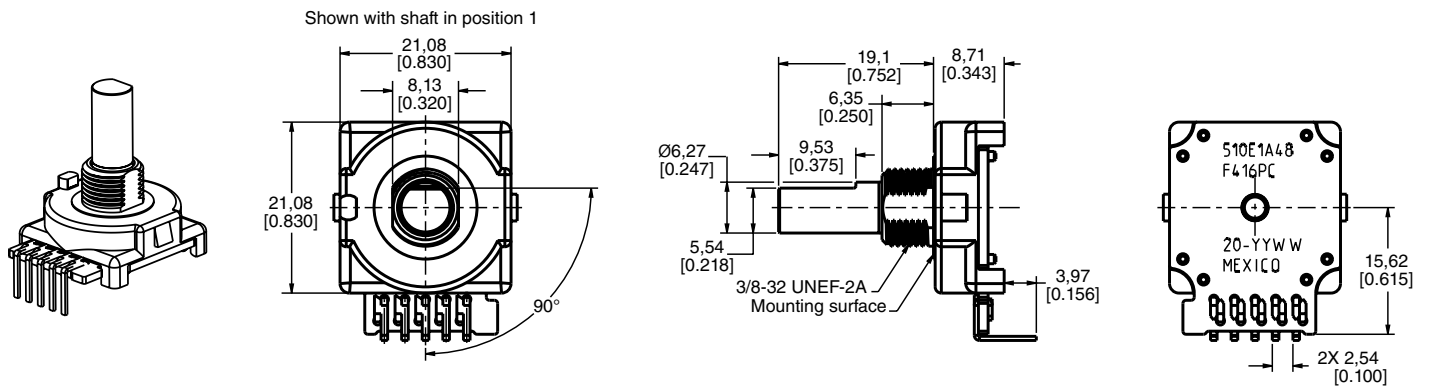


Table 510-D Order Guide

Catalog Listing	Electrical	Mechanical	RoHS Compliant	Mounting Hardware
	Number of Bits	Detent Positions		
510E1A48F416PC	4	16	yes	none

Dimensional Drawing (For reference only: mm [in].)



# Mechanical Encoders

Table 510-E Order Guide

Catalog Listing	Electrical	Mechanical	RoHS Compliant	Mounting Hardware
	Number of Bits	Detent Positions		
510E1A48F209PC	2	36	yes	mounting bracket

Dimensional Drawing (For reference only: mm [in].)

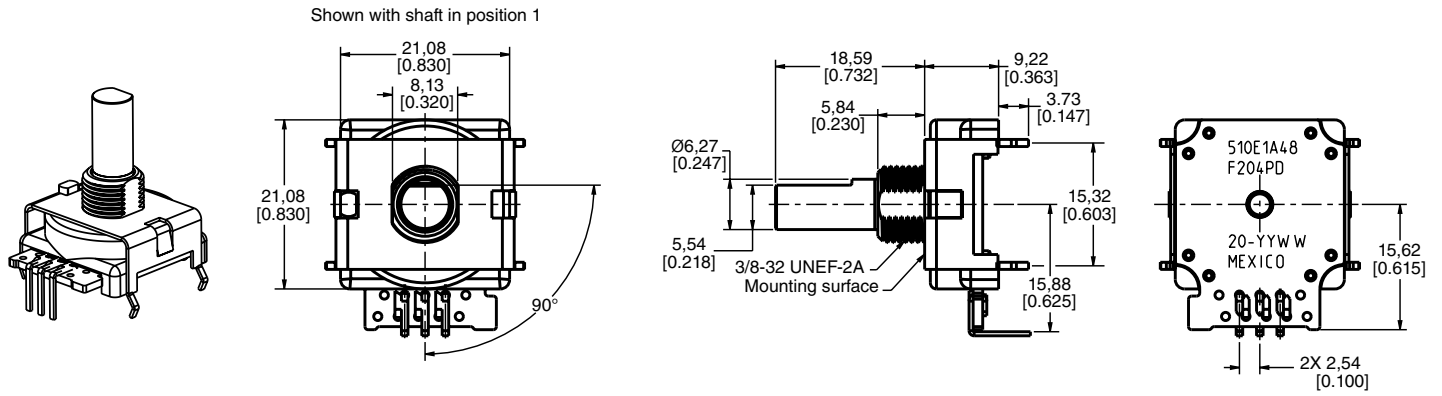
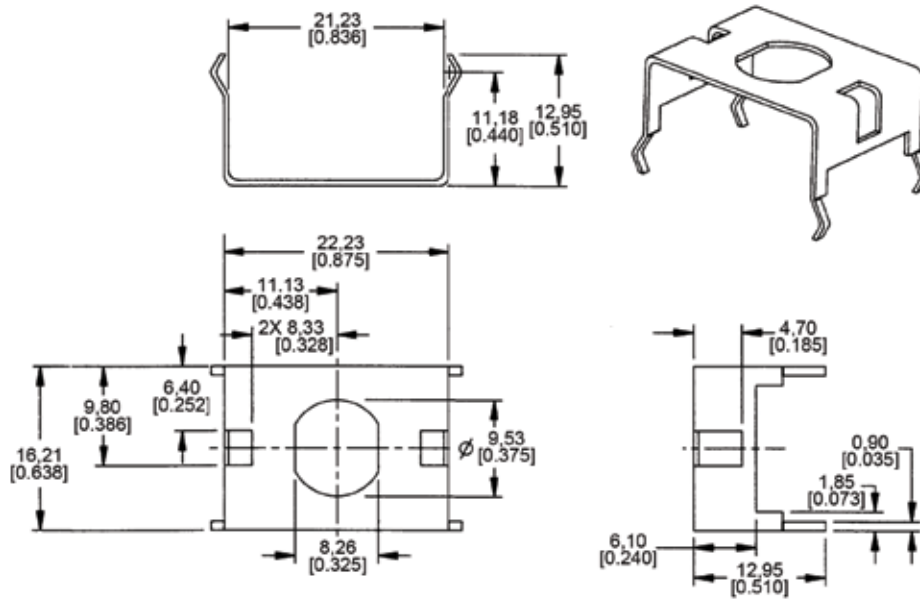


Figure 3. 510BKT Mounting Bracket (available separately)





## ADDITIONAL INFORMATION

The following associated literature is available at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product Range Guide
- Product Line Guide
- Installation Instructions

### Find out more

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**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING**

#### **MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

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