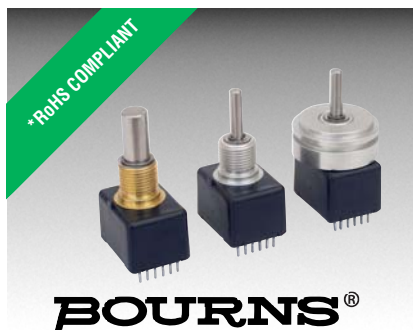




## Features

- 3.3 and 5 VDC voltage supply option
- Quadrature output
- Bushing or servo mount
- Non-contacting magnetic technology
- Small size
- CMOS and TTL compatible
- Resolution from 32-256 PPR
- Long life
- High operating speed
- Highly repeatable
- Sealed option
- Magnetic technology

## EMS22Q - Non-Contacting Incremental Encoder

### Electrical Characteristics

|                                           |                                         |
|-------------------------------------------|-----------------------------------------|
| Resolution .....                          | 32 to 256 PPR                           |
| Insulation Resistance (500 VDC) .....     | 1,000 megohms                           |
| Electrical Travel .....                   | Continuous                              |
| Supply Voltage .....                      | 5.0 VDC $\pm 10\%$ , 3.3 VDC $\pm 10\%$ |
| Supply Current .....                      | 20 mA maximum                           |
| Output Voltage                            |                                         |
| Low Output Level .....                    | Vss+0.4 V maximum                       |
| High Output Level .....                   | Vdd-0.5 V minimum                       |
| Output Current                            |                                         |
| With 4.5 VDC Supply Voltage .....         | 4 mA maximum                            |
| With 3.0 VDC Supply Voltage .....         | 2 mA maximum                            |
| Rise/Fall Time (Incremental Output) ..... | 500 ns maximum                          |
| Shaft RPM (Ball Bearing) .....            | 10,000 rpm maximum                      |
| Hysteresis .....                          | 0.7 °                                   |
| Accuracy                                  |                                         |
| Nominal .....                             | $\pm 0.7^\circ$ or better               |
| Worst Case .....                          | $\pm 1.4^\circ$                         |
| Output Transition Noise .....             | 0.12 ° RMS max.                         |

### Environmental Characteristics

|                                                        |                                       |
|--------------------------------------------------------|---------------------------------------|
| Operating Temperature Range .....                      | -40 °C to +125 °C (-40 °F to +257 °F) |
| Storage Temperature Range .....                        | -55 °C to +125 °C (-67 °F to +257 °F) |
| Humidity .....                                         | MIL-STD-202, Method 103B, Condition B |
| Vibration .....                                        | 15 G                                  |
| Shock .....                                            | 50 G                                  |
| Rotational Life                                        |                                       |
| S Bushing (@1,000 rpm) .....                           | 100,000,000 revolutions               |
| T & W Bushings (@1,000 rpm with 250 g side load) ..... | 50,000,000 revolutions                |
| IP Rating .....                                        | IP 65                                 |

### Mechanical Characteristics

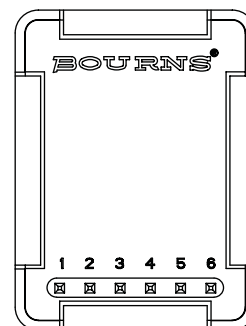
|                         |                                                                                                  |
|-------------------------|--------------------------------------------------------------------------------------------------|
| Mechanical Angle .....  | 360 ° Continuous                                                                                 |
| Torque                  |                                                                                                  |
| Starting .....          | 43 $\pm 21$ g-cm (0.6 $\pm 0.3$ oz-in.)                                                          |
| Running .....           | 29 $\pm 14$ g-cm (0.4 $\pm 0.2$ oz-in.)                                                          |
| Mounting Torque .....   | 203 N-cm (18 lb.-in.)                                                                            |
| Shaft End Play .....    | 0.30 mm (0.012 ") T.I.R. maximum                                                                 |
| Shaft Radial Play ..... | 0.12 mm (0.005 ") T.I.R. maximum                                                                 |
| Weight .....            | 11 gms. (0.4 oz.)                                                                                |
| Terminals .....         | Axial, radial or ribbon cable                                                                    |
| Soldering Condition     |                                                                                                  |
| Manual Soldering .....  | 96.5Sn/3.0Ag/0.5Cu solid wire or no-clean rosin cored wire<br>370 °C (700 °F) max. for 3 seconds |
| Wave Soldering .....    | 96.5Sn/3.0Ag/0.5Cu solder with no-clean flux<br>260 °C (500 °F) max. for 10 seconds              |
| Wash processes .....    | Not recommended                                                                                  |
| Marking .....           | Manufacturer's trademark, name, part number, and date code.                                      |
| Hardware .....          | One lockwasher and one mounting nut supplied with each encoder, except on servo mount versions.  |

### Pin Configuration

| Output Type    | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 |
|----------------|-------|-------|-------|-------|-------|-------|
| A/B Quadrature | A     | B     | GND   | Index | VCC*  | CS**  |

\* Can be 5 or 3.3 VDC depending on the version.

\*\* Active low chip select pin; if not used connect pin 6 to GND.



Applications

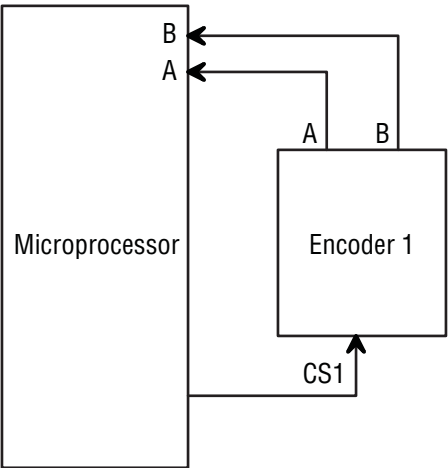
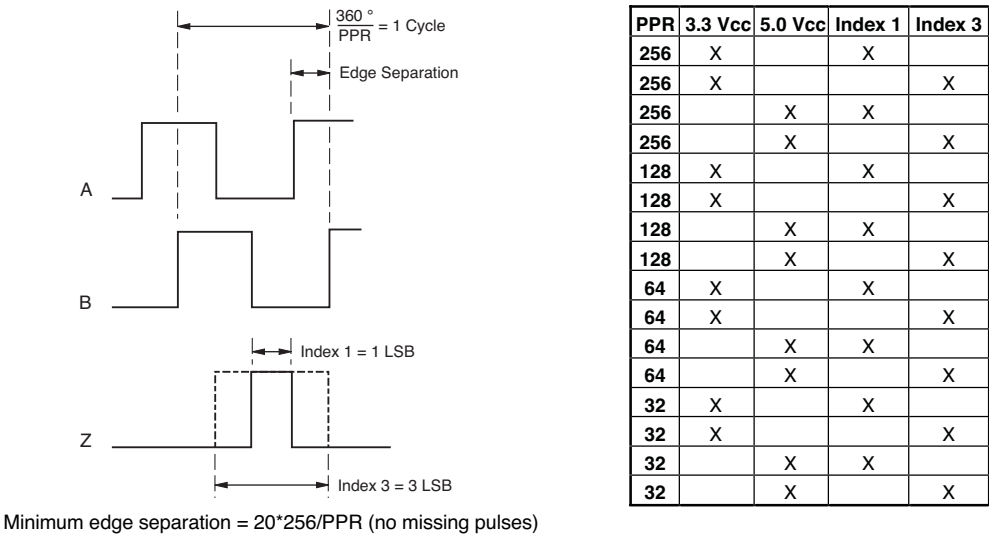
- Material handling equipment
  - Brushless DC motor commutation
  - Robotics
  - Automotive
  - Industrial automation
  - Petroleum refinery
- Medical
  - Office equipment
  - Audio and broadcast equipment

EMS22Q - Non-Contacting Incremental Encoder

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Output Type Waveform and Variant Table

Quadrature Output



Chip Select Hardware Sample

Consult factory for options not shown, including:

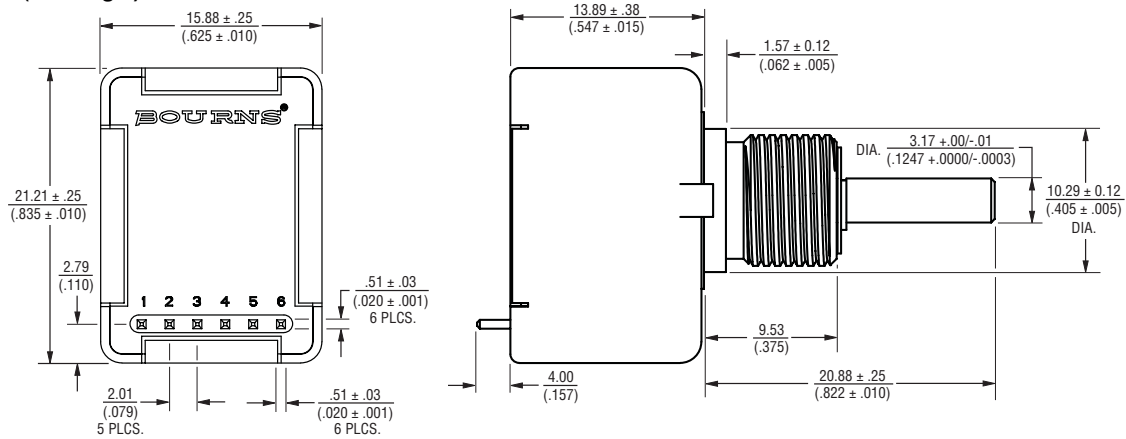
- Wire lead or cable options
- Connectors
- Non-standard resolutions
- Special shaft/bushing sizes and features
- Special performance characteristics
- PCB mounting bracket

## EMS22Q - Non-Contacting Incremental Encoder

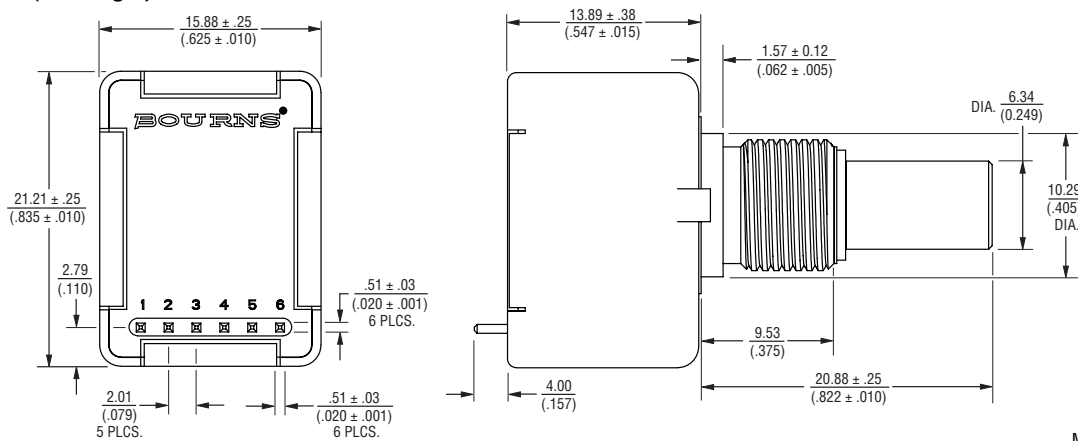
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### Dimensional Drawings

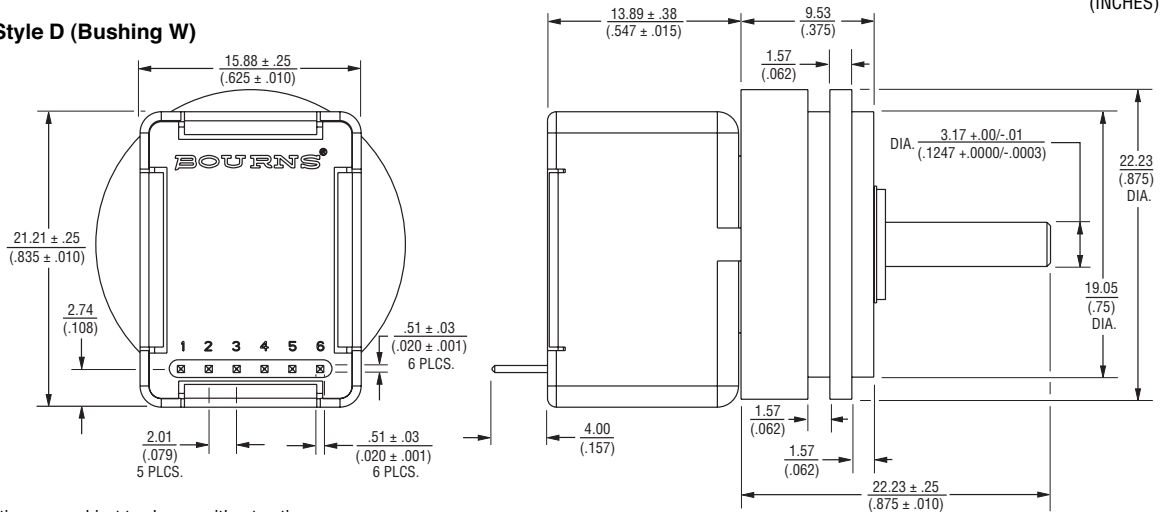
#### Shaft Style D (Bushing T)



#### Shaft Style B (Bushing S)



#### Shaft Style D (Bushing W)



DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$

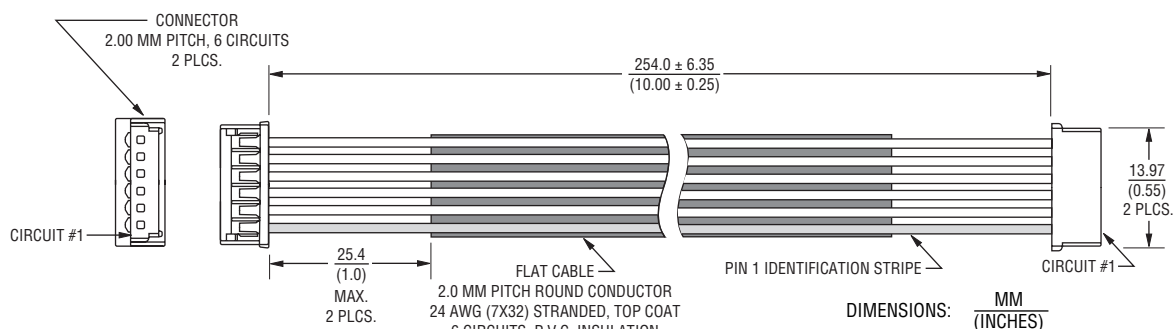
Specifications are subject to change without notice.  
Customers should verify actual device performance in their specific applications.

# EMS22Q - Non-Contacting Incremental Encoder

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## Product Dimensions

### Cable Assembly



## How To Order

### BOURNS EMS22 22 MM NON-CONTACTING INCREMENTAL ENCODER

**E M S 2 2 Q 5 1 - B 2 8 - L S 4**

| INDEX CHANNEL |             |
|---------------|-------------|
| Code          | Description |
| 1             | 1 LSB       |
| 3             | 3 LSB       |

| VOLTAGE SUPPLY |             |
|----------------|-------------|
| Code           | Description |
| 3              | 3.3 VDC     |
| 5              | 5 VDC       |

| SHAFT STYLE |                         |                                |
|-------------|-------------------------|--------------------------------|
| Code        | Description             | Available With Bushings (Code) |
| B           | 1/4 " Dia., Plain End   | S                              |
| C           | 1/4 " Dia., Flatted End | S                              |
| D           | 1/8 " Dia., Plain End   | T, W                           |
| R           | 6 mm Dia., Slotted End  | D                              |
| M           | 6 mm Dia., Flatted End  | D                              |

| SHAFT LENGTH DESIGNATOR* |                                            |
|--------------------------|--------------------------------------------|
| Code                     | Description                                |
| 16                       | 1/2 " Long                                 |
| 20                       | 5/8 " Long                                 |
| 28                       | 7/8 " Long                                 |
| 25                       | 25 mm Long (Available with D Bushing Only) |

| TERMINAL CONFIGURATION** |                                   |
|--------------------------|-----------------------------------|
| Code                     | Description                       |
| L                        | Axial, Multi-Purpose Pin          |
| M                        | Rear Ribbons Cable with Connector |
| W                        | Rear Ribbons Cable - No Connector |

| RESOLUTION |     |
|------------|-----|
| Code       | PPR |
| 1          | 32  |
| 2          | 64  |
| 3          | 128 |
| 4          | 256 |

| BUSHING DESIGNATOR |                                                   |
|--------------------|---------------------------------------------------|
| Code               | Description                                       |
| S                  | 3/8 " D X 3/8 " L Threaded (Single Ball Bearing)  |
| T                  | 3/8 " D X 3/8 " L Threaded (Dual Ball Bearing)    |
| W                  | Servo Mount 7/8 " D (Dual Ball Bearing)           |
| D                  | 9 mm D X 7.94 mm L Threaded (Single Ball Bearing) |

| OUTPUT TYPE |             |
|-------------|-------------|
| Code        | Description |
| Q           | Quadrature  |

\* Shaft length measured from mounting surface.

\*\* Standard ribbon cable is 10 inches long. Consult factory for other lengths.

REV. 07/12

Specifications are subject to change without notice.

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