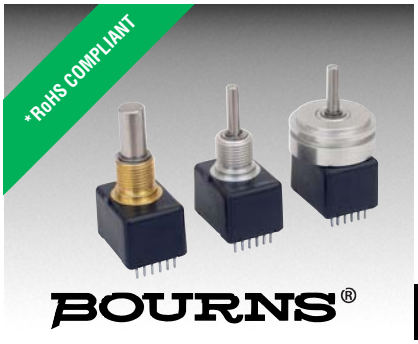



## Features

- 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 ±10 %, 3.3 VDC ±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 ..... ±0.7 ° or better
  Worst Case ..... ±1.4 °
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

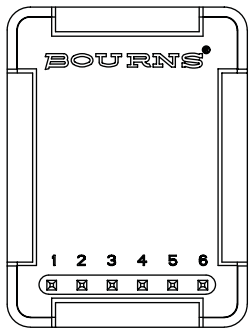
### Mechanical Characteristics

Mechanical Angle ..... 360 ° Continuous
Torque
  Starting ..... 43 ±21 g-cm (0.6 ±0.3 oz-in.)
  Running ..... 29 ±14 g-cm (0.4 ±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
    370 °C (700 °F) max. for 3 seconds
  Wave Soldering ..... 96.5Sn/3.0Ag/0.5Cu solder with no-clean flux
    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.




*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.
Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

## 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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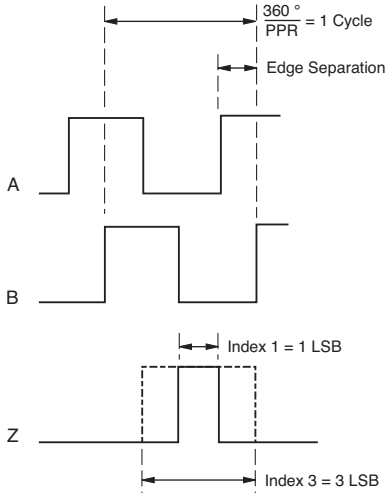
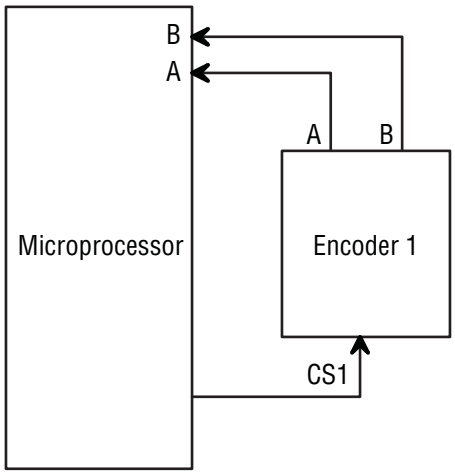
### Output Type Waveform and Variant Table

**Quadrature Output**




Minimum edge separation = 20*256/PPR (no missing pulses)

| PPR | 3.3 Vcc | 5.0 Vcc | Index 1 | Index 3 |
|---|---|---|---|---|
| 256 | X | | X | |
| 256 | X | | | X |
| 256 | | X | X | |
| 256 | | X | | X |
| 128 | X | | X | |
| 128 | X | | | X |
| 128 | | X | X | |
| 128 | | X | | X |
| 64 | X | | X | |
| 64 | X | | | X |
| 64 | | X | X | |
| 64 | | X | | X |
| 32 | X | | X | |
| 32 | X | | | X |
| 32 | | X | X | |
| 32 | | X | | X |




Chip Select Hardware Sample

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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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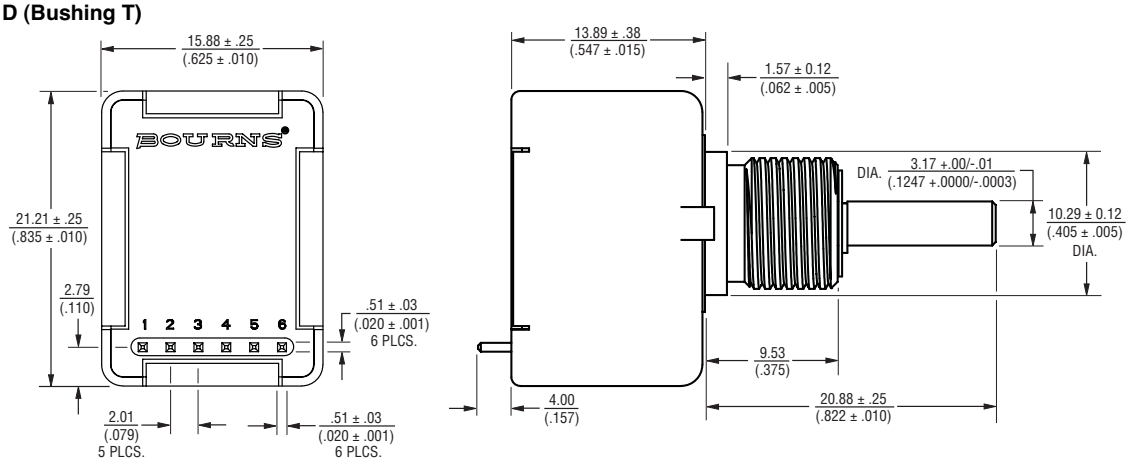
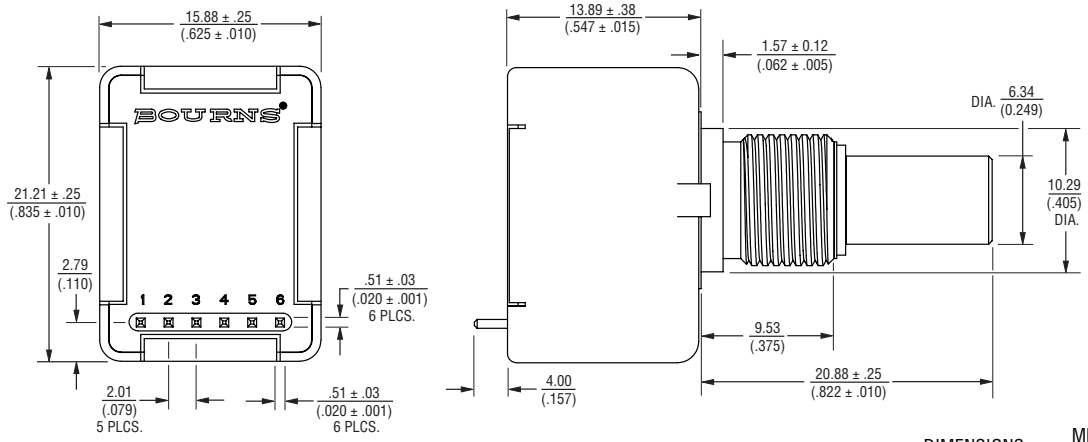
## Dimensional Drawings

### Shaft Style D (Bushing T)

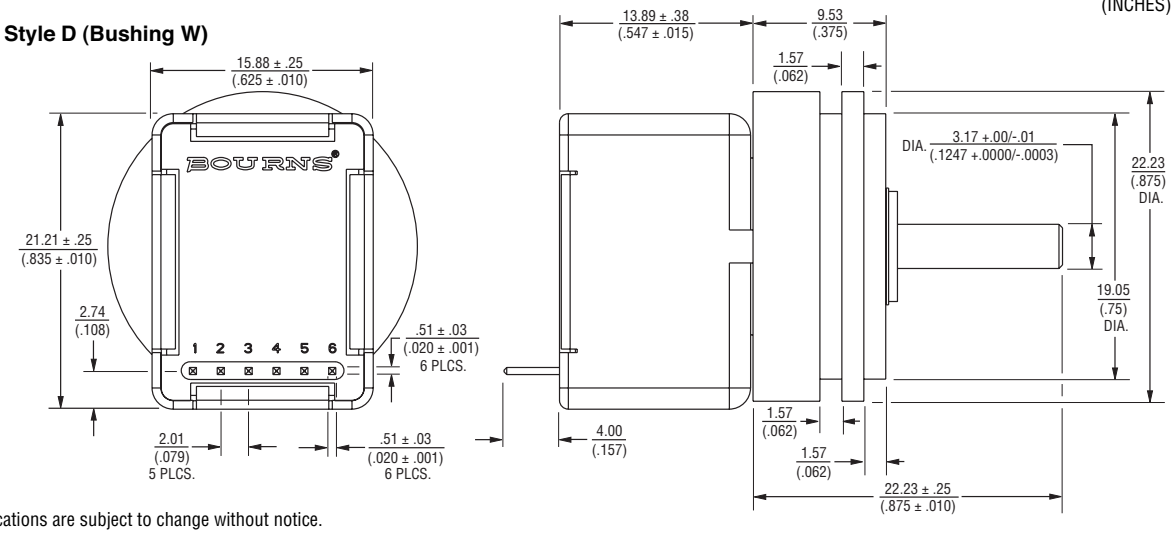



### Shaft Style B (Bushing S)




DIMENSIONS: MM / (INCHES)

### Shaft Style D (Bushing W)

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# EMS22Q - Non-Contacting Incremental Encoder

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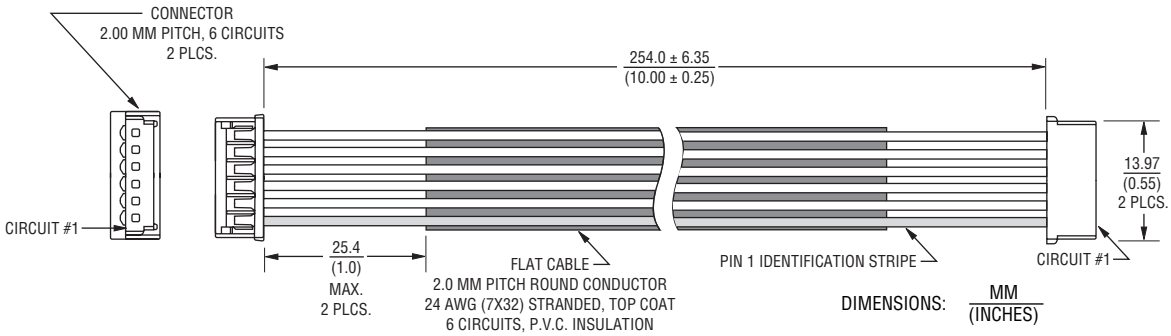
## Product Dimensions

### 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 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) |

| 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) |

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

| 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 |

| 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

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http://moschip.ru/get-element

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