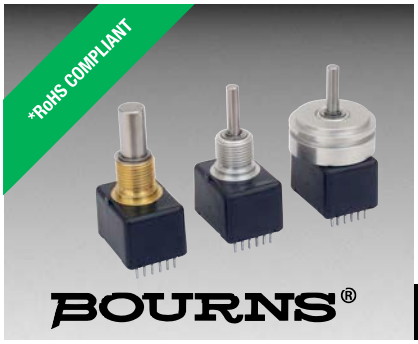


Features

- 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

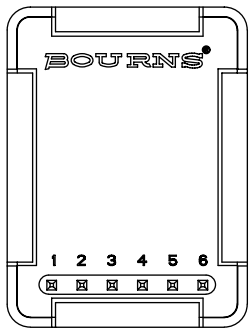
Operating Temperature Range	-40 °C to +125 °C (-40 °F to +257 °F)
Storage Temperature Range	-55 °C to +125 °C (-67 °F to +257 °F)
Humidity	MIL-STD-202, Method 103B, Condition B
Vibration	15 G
Shock	50 G
Rotational Life	
S Bushing (@1,000 rpm)	100,000,000 revolutions
T & W Bushings (@1,000 rpm with 250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

WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.
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Applications

- Material handling equipment
- Brushless DC motor commutation
- Robotics
- Automotive
- Industrial automation
- Petroleum refinery
- Medical (low/medium risk)*
- Office equipment
- Audio and broadcast equipment

EMS22Q - Non-Contacting Incremental Encoder

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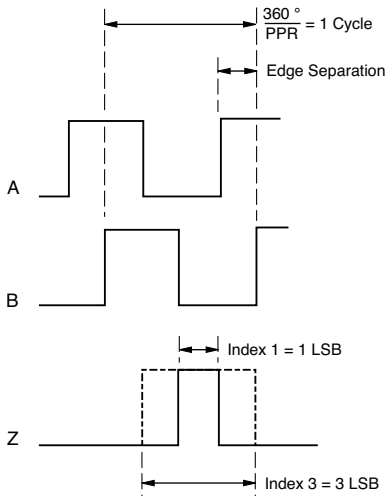
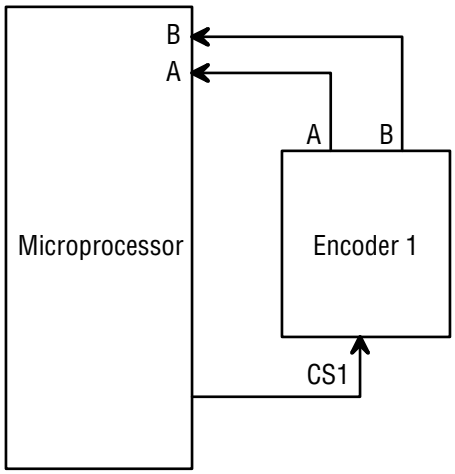
Output Type Waveform and Variant Table

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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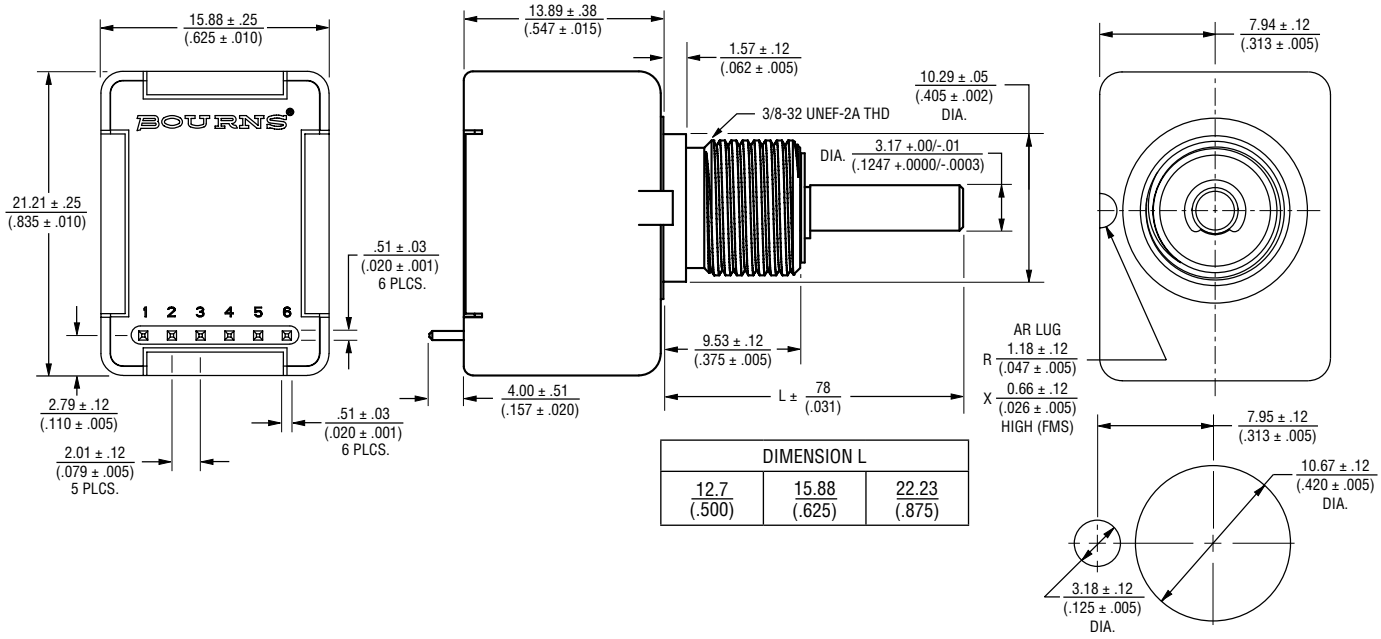
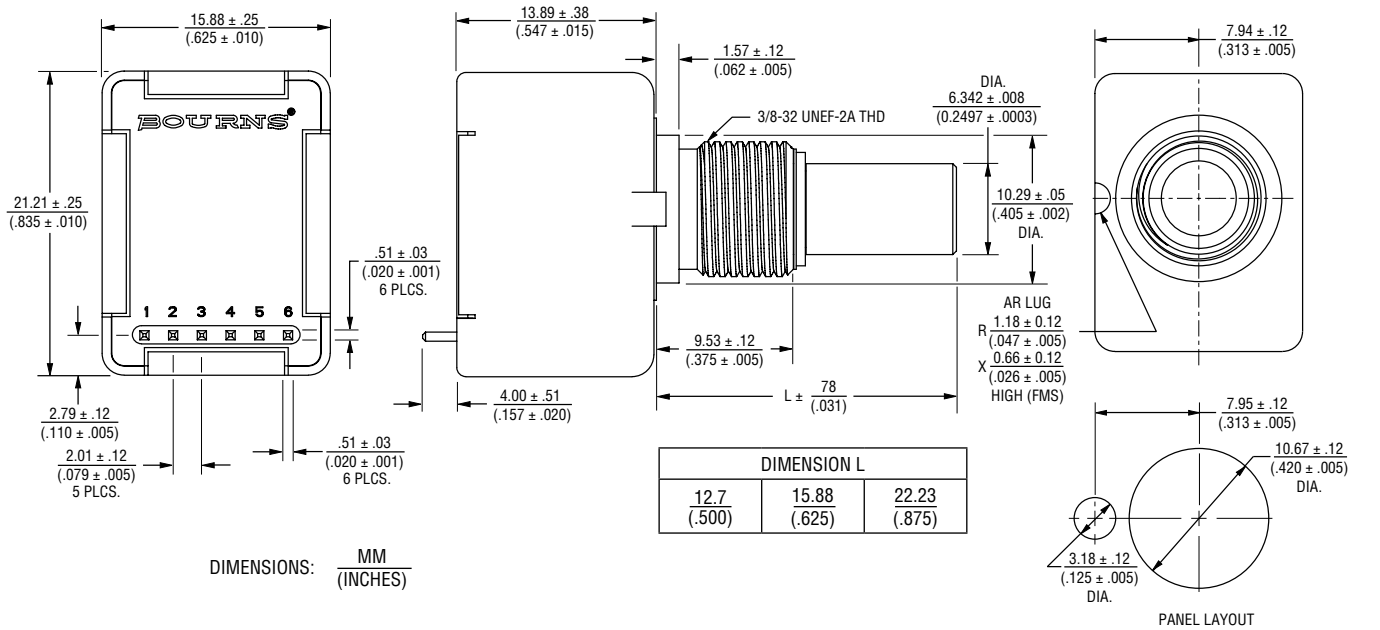
Dimensional Drawings

Shaft Style D (Bushing T)



DIMENSION L		
12.7 (.500)	15.88 (.625)	22.23 (.875)

Shaft Style B (Bushing S)



DIMENSION L		
12.7 (.500)	15.88 (.625)	22.23 (.875)

DIMENSIONS: MM (INCHES)

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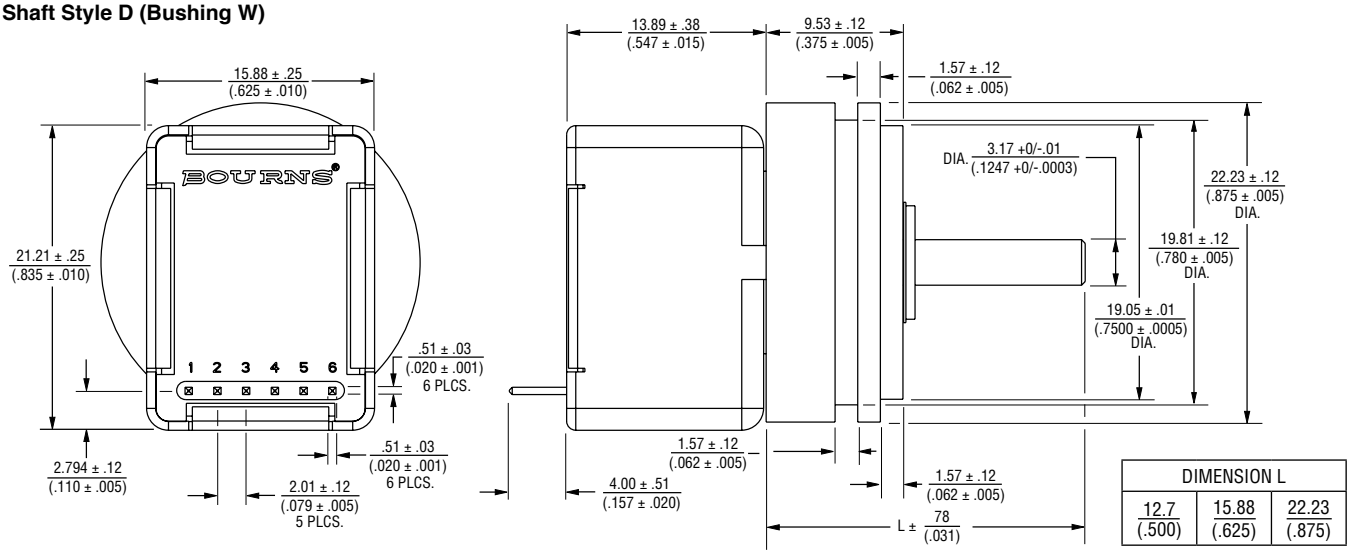
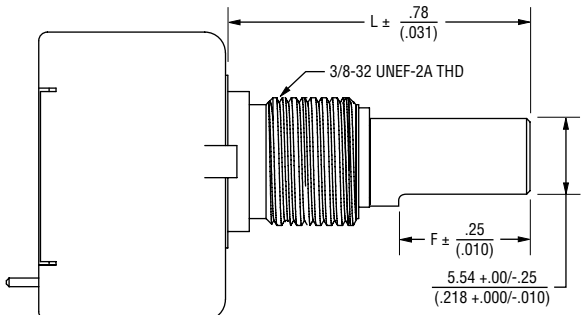
Product Dimensions (Continued)

Shaft Style D (Bushing W)



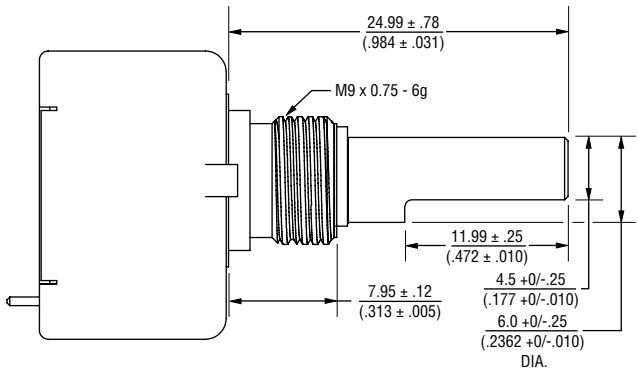
DIMENSION L		
12.7 (.500)	15.88 (.625)	22.23 (.875)

Shaft Style C (Bushing S)

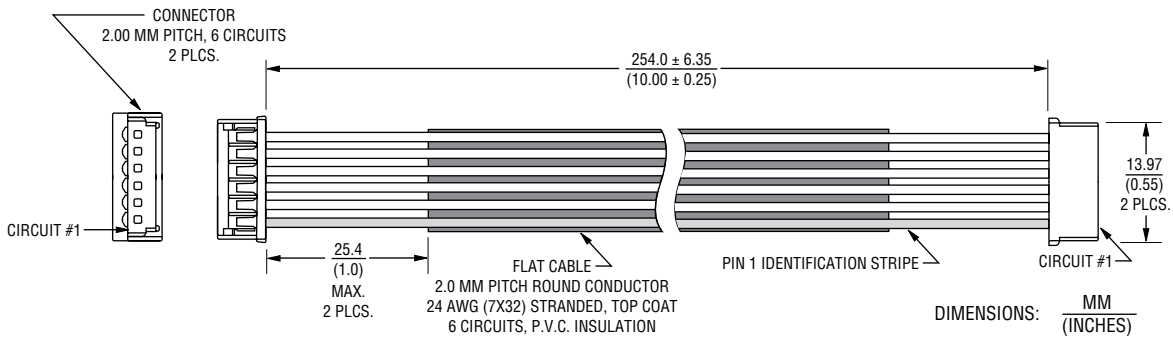


DIMENSION			
L	12.7 (.500)	15.88 (.625)	22.23 (.875)
F	1.78 (.070)	4.32 (.170)	9.65 (.380)

Shaft Style M (Bushing D)



Cable Assembly



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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)

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
M	6 mm Dia., Flatted End	D

TERMINAL CONFIGURATION**

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

OUTPUT TYPE

Code	Description
Q	**Quadrature**

* Shaft length measured from mounting surface.

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

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