



Features

- 3.3 and 5 VDC voltage supply option
- Absolute
- Bushing or servo mount
- Non-contacting magnetic technology
- Small size
- CMOS and TTL compatible
- Resolution: 1024 positions
- Long life
- High operating speed
- Highly repeatable
- Sealed option
- Magnetic technology

EMS22A - Non-Contacting Absolute Encoder

Electrical Characteristics

Resolution	1024 positions
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
Linearity	0.5 %
Accuracy	
Nominal	$\pm 0.7^\circ$ or better
Worst Case	$\pm 1.4^\circ$
Output Transition Noise	0.12 $^\circ$ RMS max.

Environmental Characteristics

Operating Temperature Range	-40 $^\circ$ C to +125 $^\circ$ C (-40 $^\circ$ F to +257 $^\circ$ F)
Storage Temperature Range	-55 $^\circ$ C to +125 $^\circ$ C (-67 $^\circ$ F to +257 $^\circ$ 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 $^\circ$ 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 $^\circ$) T.I.R. maximum
Shaft Radial Play	0.12 mm (0.005 $^\circ$) 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 $^\circ$ C (700 $^\circ$ F) max. for 3 seconds
Wave Soldering	96.5Sn/3.0Ag/0.5Cu solder with no-clean flux 260 $^\circ$ C (500 $^\circ$ 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 (DI) ⁽¹⁾	Pin 2 (CLK)	Pin 3	Pin 4 (DO)	Pin 5	Pin 6
Absolute	Digital Input	Clock	GND	Digital Output	VCC ⁽²⁾	CS

(1) Pin 1 (DI) should be grounded when in a single sensor configuration.

(2) Can be 5 or 3.3 VDC depending on the version.



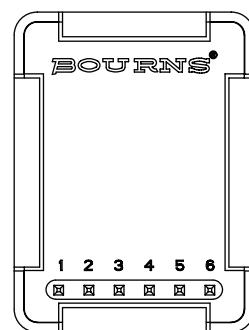
WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

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Users should verify actual device performance in their specific applications.

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Applications

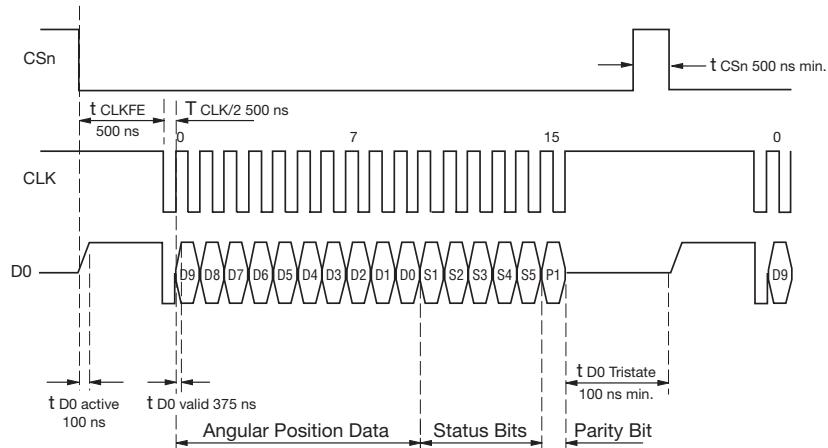
- Material handling equipment
- Brushless DC motor commutation
- Robotics
- Automotive
- Industrial automation
- Petroleum refinery
- Medical (low/medium risk)*
- Office equipment
- Audio and broadcast equipment

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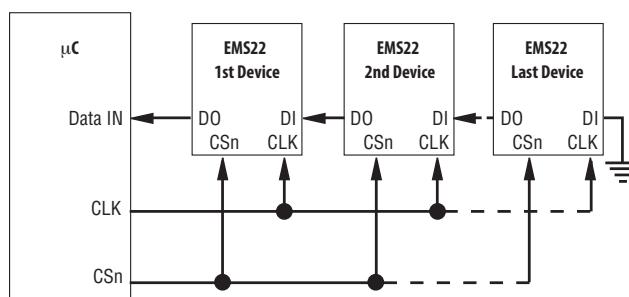
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Output Type Waveform and Variant Table

Absolute Output

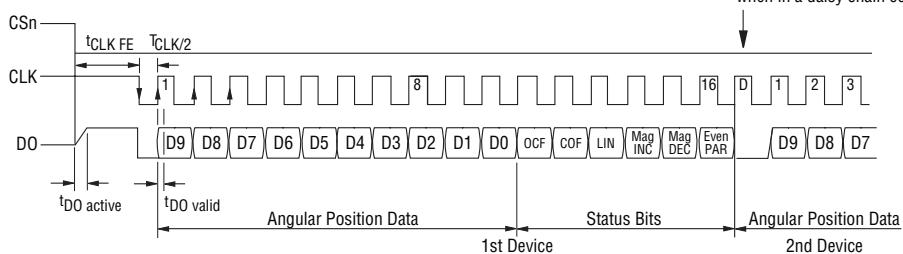


Data Content	Description
D9:D0	Absolute angular position data
S1	End of offset compensation algorithm
S2	Cordic overflow indicating an error in cordic part
S3	Linearity alarm
S4	Increase in magnetic magnitude
S5	Decrease in magnetic magnitude
P1	Even parity for detecting bits 1-15 transmission error



Daisy Chain Hardware Configuration

D is an extra clock cycle between sensor readings when in a daisy chain configuration.



Daisy Chain Mode Data Transfer

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Consult factory for options not shown, including:

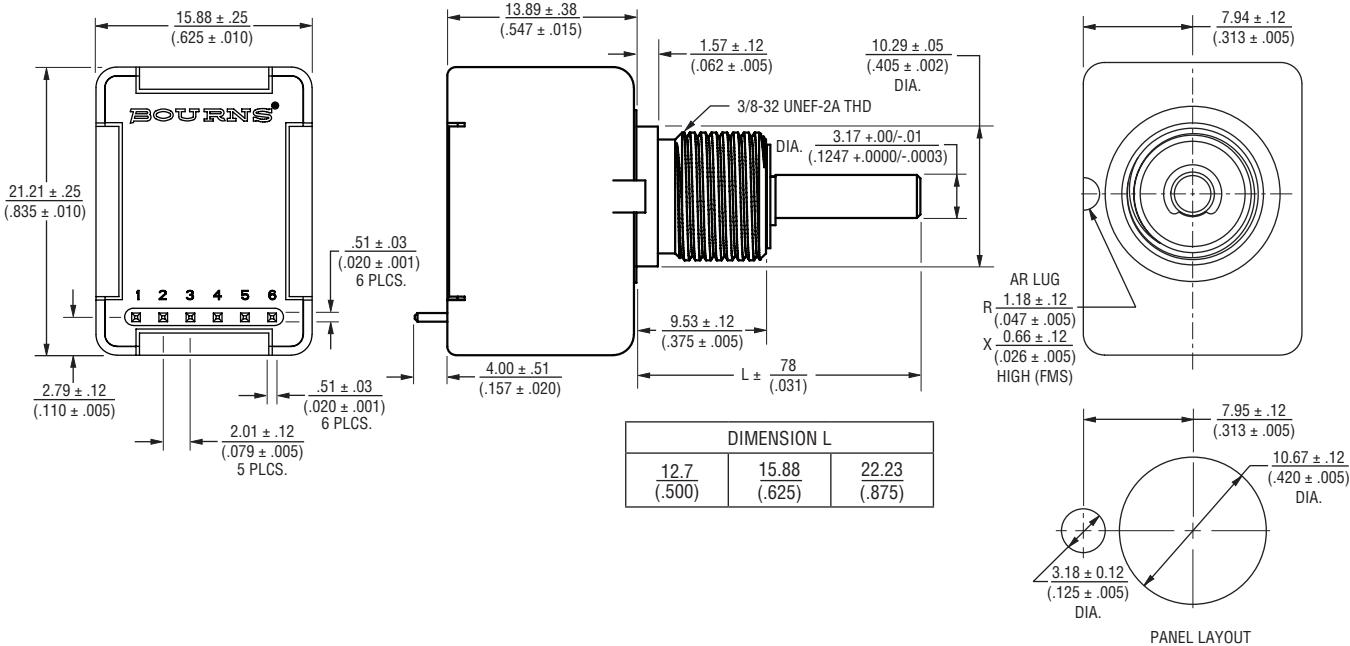
- Wire lead or cable options
- Connectors
- Non-standard resolutions
- Special shaft/bushing sizes and features
- Special performance characteristics
- PCB mounting bracket

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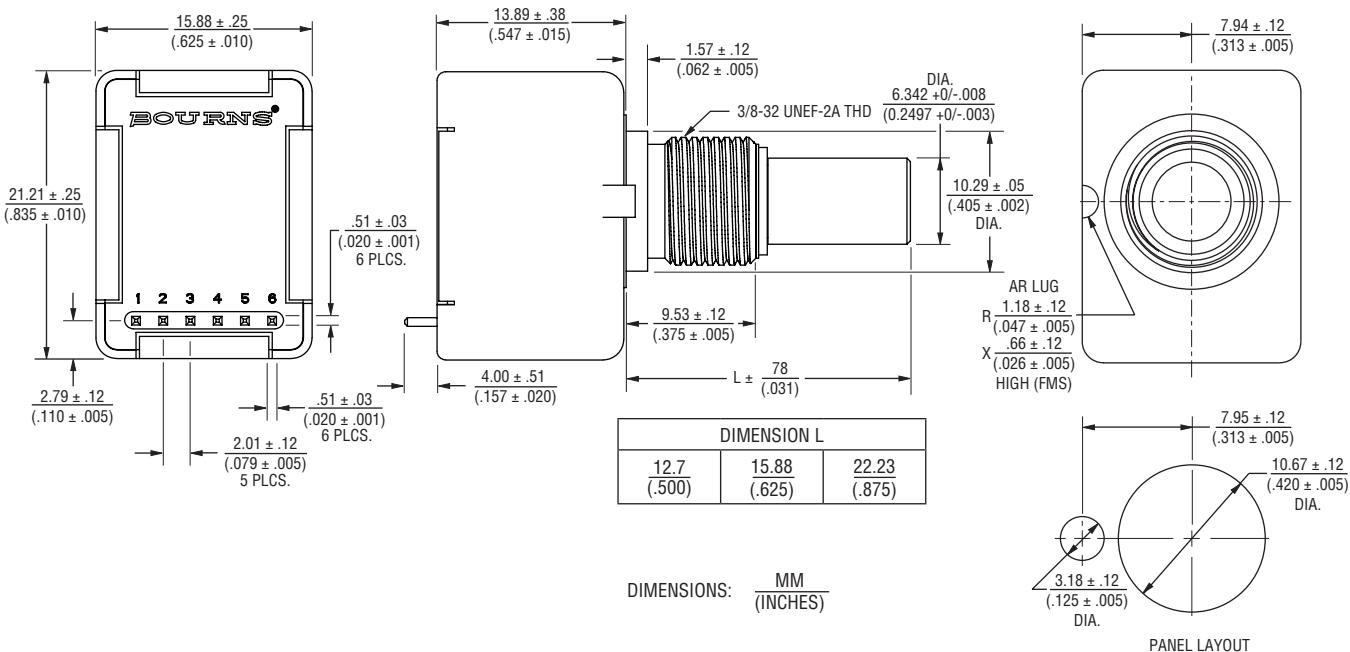
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Product Dimensions

Shaft Style D (Bushing T)



Shaft Style B (Bushing S)



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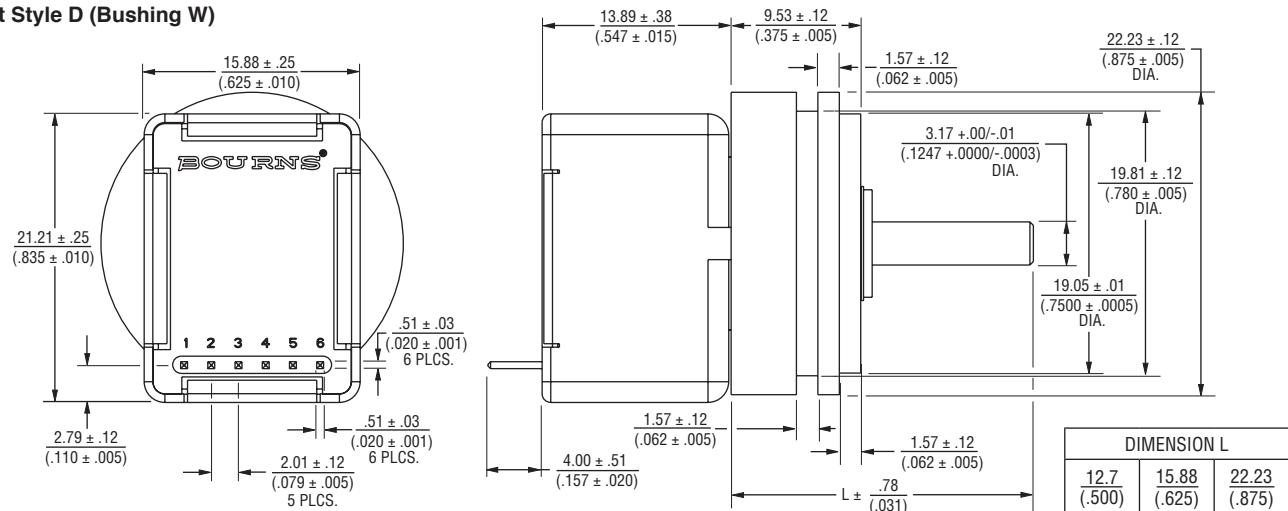
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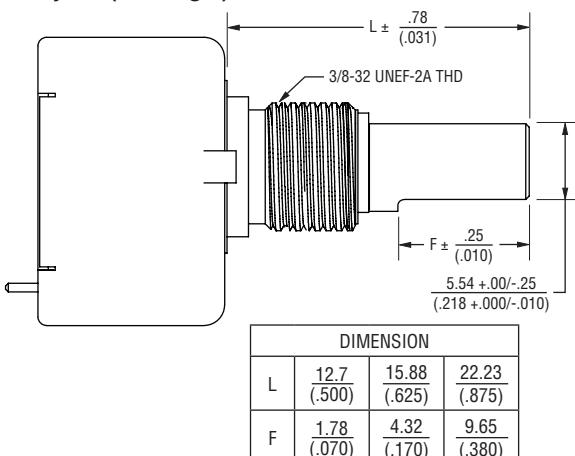
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Product Dimensions

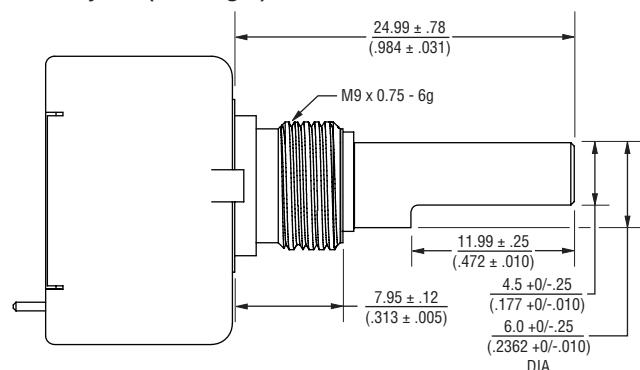
Shaft Style D (Bushing W)



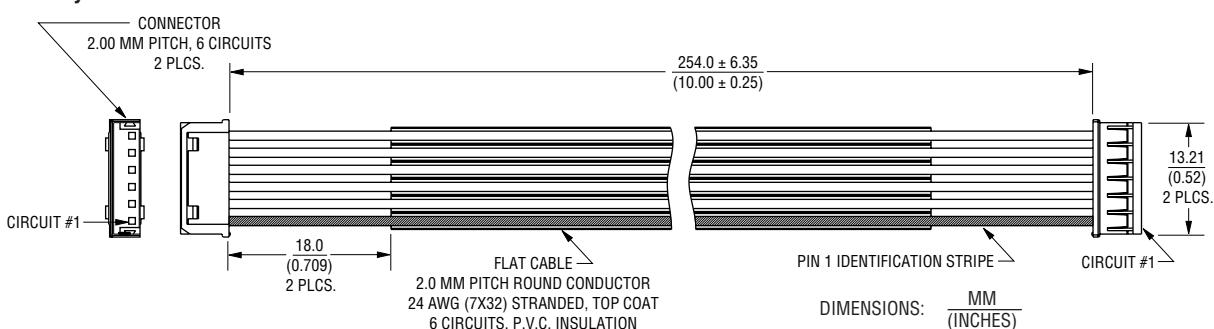
Shaft Style C (Bushing S)



Shaft Style M (Bushing D)



Cable Assembly



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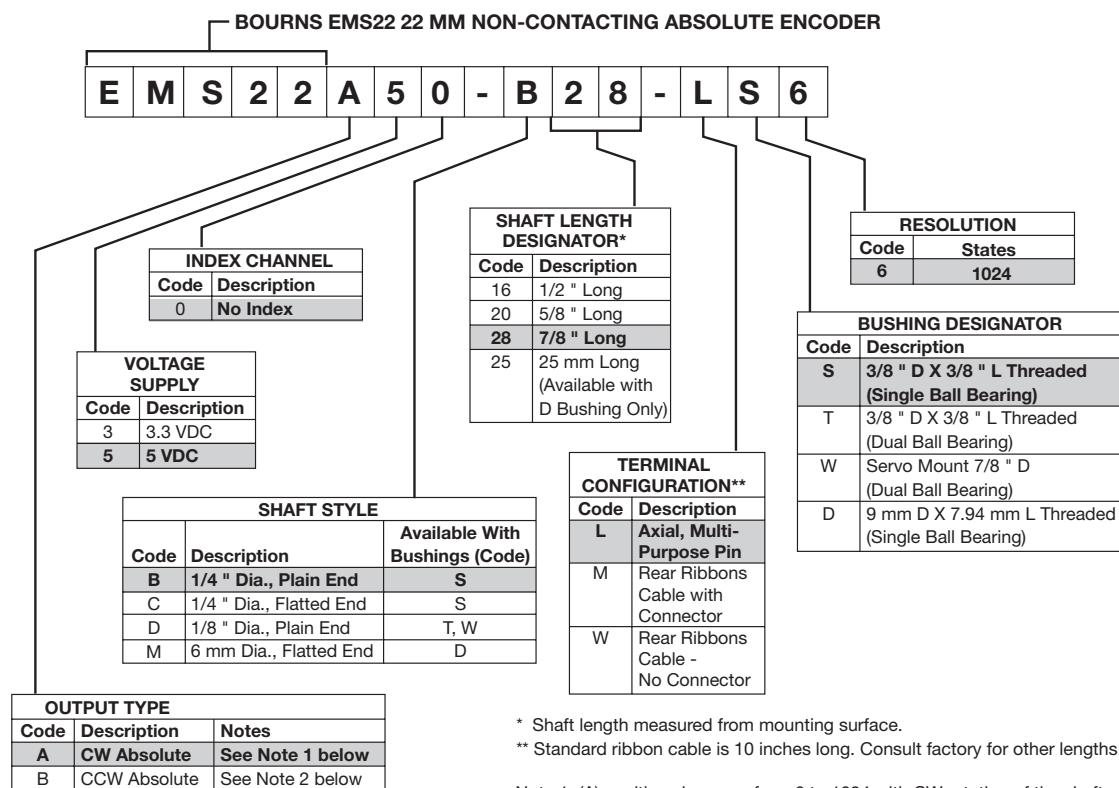
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How To Order



* Shaft length measured from mounting surface.

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

Note 1: (A) positions increase from 0 to 1024 with CW rotation of the shaft.

Note 2: (B) positions increase from 0 to 1024 with CCW rotation of the shaft.

REV. 06/20

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