**EMS22A - Non-Contacting Absolute Encoder**

**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

**Electrical Characteristics**
- **Resolution**: 1024 positions
- **Insulation Resistance (500 VDC)**: 1,000 megohms
- **Electrical Travel**:
  - Continuous
- **Supply Voltage**:
  - With 3.0 VDC Supply Voltage: 5.0 VDC ±10 %, 3.3 VDC ±10 %
  - With 4.5 VDC Supply Voltage: 3.0 VDC ±10 %
- **Supply Current**: 20 mA maximum
- **Output Voltage**:
  - Low Output Level: Vss+0.4 V maximum
  - High Output Level: Vdd-0.4 V maximum
- **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**: ±0.7 ° or better
- **Accuracy**:
  - Nominal: ±1.4 °
  - 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
  - Wave Soldering: 96.5Sn/3.0Ag/0.5Cu solder with no-clean flux
  - Wash processes: 370 °C (700 °F) max. for 3 seconds
  - Not recommended
- **Marking**: Manufacturer’s trademark, name, part number, and date code.

**Pin Configuration**

<table>
<thead>
<tr>
<th>Output Type</th>
<th>Pin 1 (DI) (1)</th>
<th>Pin 2 (CLK)</th>
<th>Pin 3</th>
<th>Pin 4 (DO)</th>
<th>Pin 5</th>
<th>Pin 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute</td>
<td>Digital Input</td>
<td>Clock</td>
<td>GND</td>
<td>Digital Output</td>
<td>VCC (2)</td>
<td>CS</td>
</tr>
</tbody>
</table>

(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.

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**WARNING** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

Applications
- Material handling equipment
- Brushless DC motor commutation
- Robotics
- Automotive
- Industrial automation
- Petroleum refinery

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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 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

**EMS22A - Non-Contacting Absolute Encoder**

**Product Dimensions**

**Shaft Style D (Bushing T)**

**Shaft Style B (Bushing S)**

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ems22a - non-contacting absolute encoder

how to order

ems22a 50 - b28 - ls6

index channel

code 1 description
0 no index

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 description
6 1024

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

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

output type

code description notes
a cw absolute see note 1 below
b ccw absolute see note 2 below

* 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.
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