BEI's MIL-257 Series incremental encoders were designed to meet military demands for an optical encoder. By incorporating all the latest state-of-the-art advances and the most widely used resolutions, the MIL-257 series offers medium resolution, high accuracy, and high reliability suitable for most military applications.

The electronics were designed to meet the stringent requirements of MIL-STD-454 to insure the highest level of quality and reliability. Seals at the connector and housing provide reliable protection for the electronics and optics assemblies against water spray and oil mist. An optional (at no extra cost) shaft seal provides additional protection from fluid contamination.

**FEATURES:**
- Single solid state LED light source
- Single substrate photo-cell array
- Printed wirings boards designed to MIL-STD-275 and procured per MIL-P-55110
- Integrated circuits screened per MIL-STD-833, Level B
- Complementary digital outputs from DS7830 line drivers
- Resolution to 10,160 pulses per turn
- Incremental output code of two signals phased 90 elec. deg. apart
- All units 100% inspected for electrical and mechanical features
- Meets or exceeds applicable portions of MIL-STD-610 Methods 514.3 and 516.3.

**OPTIONS:**
- Zero reference signal
- Side or end exit connector
- Shaft seal
- Special shaft configuration
- Square or round mtg. flange
- Other disk resolutions
- Mil-Temp (Non 883 Screen) Parts
- Connector pin-outs or wire colors to customer requirements
- Anodized housing
- Screened LED and photodetectors

**MODEL NUMBER STRUCTURE**

<table>
<thead>
<tr>
<th>STANDARD DISK RESOLUTIONS AVAILABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>0090</td>
</tr>
<tr>
<td>0094</td>
</tr>
<tr>
<td>0098</td>
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<tr>
<td>0100</td>
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<td>0120</td>
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<td>0200</td>
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<td>0256</td>
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<tr>
<td>0360</td>
</tr>
<tr>
<td>0500</td>
</tr>
<tr>
<td>0600</td>
</tr>
</tbody>
</table>

**ELECTRONICS OPTION**
- [A] Line Driver Output
- [B] Line Driver Output w/ Dr. Sens. (1x Disk Res)
- [C] Line Driver Output w/ Dr. Sens. (2x Disk Res)
- [D] Line Driver Output w/ Dr. Sens. (4x Disk Res)

**ZERO REFERENCE OPTION**

**SEAL OPTION**
- [S] Bearing Seals
- [SS] Shaft Seal

**HOUSING OPTION**
- [D] Square Flange
- [E] 1.250 Dia Pilot
- [G] 2.500 Dia Pilot

**FACE MOUNTING OPTION**
- [1, 2, 3, 4]

**CONNECTOR MOUNTING OPTION**
- [E] End Mount
- [S] Side Mount

**NOTE:** Any disk resolution less than 2540 is available with any of the std. options on special order.
## CONNECTOR PIN FUNCTIONS MS3102R18-1P

<table>
<thead>
<tr>
<th>PIN</th>
<th>A OPTION ELECTRONICS</th>
<th>B.C.D. OPTION ELECTRONICS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CCW ROTATION</td>
<td>CW ROTATION</td>
</tr>
<tr>
<td>A</td>
<td>(A) Count-Signal output (LEAD)</td>
<td>(A) Count-Signal output (LAG)</td>
</tr>
<tr>
<td>H</td>
<td>(A) Count-Signal output comp</td>
<td>(A) Count-Signal output comp</td>
</tr>
<tr>
<td>B</td>
<td>(B) Count-Signal output (LAG)</td>
<td>(B) Count-Signal output (LEAD)</td>
</tr>
<tr>
<td>I</td>
<td>(B) Count-Signal output comp</td>
<td>(B) Count-Signal output comp</td>
</tr>
<tr>
<td>C</td>
<td>(C) Zero-ref output</td>
<td>(C) Zero-ref output</td>
</tr>
<tr>
<td>J</td>
<td>(C) Zero-ref output comp</td>
<td>(C) Zero-ref output comp</td>
</tr>
<tr>
<td>E</td>
<td>SPARE</td>
<td>SPARE</td>
</tr>
<tr>
<td>D</td>
<td>+5 VDC input</td>
<td>+5 VDC input</td>
</tr>
<tr>
<td>F</td>
<td>Circuit Ground</td>
<td>Circuit Ground</td>
</tr>
<tr>
<td>G</td>
<td>Case Ground</td>
<td>Case Ground</td>
</tr>
</tbody>
</table>

**NOTE:** ABOVE OUTPUT CONFIGURATIONS ASSUME ROTATION AS VIEWED FROM SHAFT END.

## SPECIFICATIONS

### ELECTRICAL

**Power:**
- A Option: +5.0 +/- 0.25 Vdc at 150 mA max.
- B, C, D Option: +5.0 +/- 0.25 Vdc at 385 mA max.

**Output Logic Level:**
- Binary "1": 1.8 Vdc min. at -40mA source
- Binary "0": 0.5 Vdc max. at +40mA sink

**Risetime and Falltime:** 200 nsec. max. (measured from 10% to 90% level)

**Pulse Width:**
- (B, C & D Option): 4 usec +1/-2 usec

**Output Frequency Range:** 0 to 50 KHz or 5000 rpm

**Code:** Incremental-Two count tracks phased 90 +/- 30 electrical degrees apart-2540 ctp max on disk.

**Accuracy:**
- Bit-to-Bit: 4 arc sec rms typical
- Absolute: 20 arc sec rms typical

### MECHANICAL

**Weight:** 20.0 oz. max.

**Torque:**
- (at 21 degrees centigrade)
  - Starting: 1.00 oz-in max. without seal
  - 1.50 oz-in max. with sealed Brg.
  - 5.00 oz-in max. with seal

**Shaft Load:**
- Radial: 35.0 lbs max. 1/4" from bearing flange
- Axial: 40.0 lbs max.

**Moment of Inertia:** 0.000041 oz-in-sec²

**Slew Speed:** 5,000 rpm max.

**Acceleration:** 750,000 rad/sec² max.

### RELIABILITY

**Bearing Fatigue Life:** 2E8 rev. at max. rated load

**Electronics MTBF:**
- 1,800,000 hours calculated per MIL-HDBK-217D for a ground, fixed environment using MIL-STD-883, Level B and screened LED and photodector

### ENVIRONMENTAL

**Temperature:**
- Operating: -55°C to +85°C
- Storage: -65°C to +95°C

**Altitude:** 70,000 ft max.

**Vibration:** Meets or exceeds MIL-STD-810, Method 514.3, Category 7b, (7.3 gms).

**Shock:** 50 g's at 11 msec per MIL-STD-810, Method 516.3, Procedure I(b).

**Humidity:** 99% rh max.