MODEL HD2
Incremental Optical Rotary Encoder

- 2.0” diameter, heavy duty encoder
- LED light source
- Flange or servo mount configuration
- 100KHz frequency response

The Model HD2 has been designed for rugged OEM applications where reliability is a prime consideration. Features such as 100K hours MTBF, LED light source, 80 pound (350N) axial and radial shaft loading capability, 100 KHz frequency response and 50G’s shock specifications allow the Model HD2 to be used in machine tool, robotic and other harsh environmental usage applications. The Model HD2 2.0” diameter housing is available in flange or servo mount configurations, each with three pilot types available, and can be provided with a variety of bolt circles allowing easy mounting. For high ambient noise or long transmission length applications, the Model HD2 can be supplied with an RS422 compatible line driver. In the line driver configurations, the Model HD2 provides a ½ cycle wide gated zero reference output and
**ELECTRICAL**

**Resolution range:** Up to 1,024 cycles per shaft revolution, (4096 counts after quadrature).
- **Light source:** Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg’s spec).
- **Light sensor:** Silicon photo voltaic cells.
- **Excitation voltage:** +5, +12, +15, +24 and +30 VDC ± 5%.
- **Output format:** Two count channels (A & B) in phase quadrature with a zero reference output.
  - **Quadrature:** 90° ± 22° (at 10 KHz output frequency).
  - **Symmetry:** 180° ± 18° (at 10 KHz output frequency).
- **Rise and fall time:** 1 microsecond max. into 1,000pf load capacitance.
- **Frequency response:** DC to 100 KHz all channels.
- **Zero reference width:** 1 ± ½ cycle or ½ cycle gated, depending on electronic configuration.
- **ZR alignment:** Full cycle: approximately centered on the rising edge of channel A.
  - ½ cycle aligns with negative transition of channel B.
- **Phase sense:** Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the shaft side of the unit.
- **Output:** See table 1

**MECHANICAL**

- **Shaft loading:** 80 Lbs. Axially (350N) and radial (maximum).
- **Shaft radial run-out:** .001 T.I.R. (.025mm).
- **Starting torque @ 25°C:** Models with shaft seal: 2.0 oz. Inch (maximum).
- **Shaft angular acceleration:** 10⁵ Radian / sec² (maximum).
- **Moment of inertia:** 3.0 x 10 to the –4 oz.-in.-sec squared.
- **Bearing type:** 52100 Bearing, steel (petroleum grade steel standard)
- **Bearing life:** 1.5 x 10 to the ⁹ revolutions (minimum) at full shaft loading.
- **Max. operating speed:** 6000 RPM (continuous duty) or 100KHz count channel output frequency, whichever occurs first.
- **Slew speed:** 7,000 RPM (maximum).
- **Weight:** 10 oz. (maximum).
- **Error:** Instrument error: ± 3 arc minutes.
- **Connectors:** MS3102R16-1P (10 pin type) connectors can be supplied with any output configuration.
  - MS3102R16S-1P (7 pin type) and MS3102R14S-6P (6 pin type) connectors are available for only single ended TTL outputs.
- **Cable description:** Individually shielded twisted pairs plus an overall shield.
  - Cables contain 10 conductors.
- **Housing material:** Aluminum.
- **Cover material:** Aluminum.
- **Shaft material:** 303 series stainless steel.

**ENVIRONMENTAL**

- **Operating temperature:** 0°C to +70°C
- **Storage temperature range:** -25°C TO +90°C
- **Shock:** 50 G for 11 millisecond duration.
- **Vibration:** 20 Hz to 2000 Hz @ 20 G.
- **Humidity:** To 98% R.H. (non-condensing).
- **Enclosure rating:** NEMA 13
ALL ELECTRONICS WITH LINE DRIVER OUTPUTS WILL GET A 1/2 CYCLE GATED ZR.
ALL OTHER ELECTRONICS WILL GET FULL CYCLE ZR
** OPTIONAL 1/4 CYCLE ZR ( AB HIGH )

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>CONNECTOR/CABLE PIN/COLOR DESIGNATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABLE</td>
<td>10 PIN</td>
</tr>
<tr>
<td>ORANGE</td>
<td>A</td>
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<tr>
<td>YELLOW</td>
<td>B</td>
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<tr>
<td>BROWN</td>
<td>C</td>
</tr>
<tr>
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<td>D</td>
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<tr>
<td>E</td>
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<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>MAXIMUM CURRENT REQUIREMENTS ( MILLIAMPERES )</th>
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<tbody>
<tr>
<td>SUPPLY VOLTAGE</td>
<td>SINGLE ENDED TTL</td>
</tr>
<tr>
<td>+5V</td>
<td>150</td>
</tr>
<tr>
<td>+12V</td>
<td>150</td>
</tr>
<tr>
<td>+15V</td>
<td>150</td>
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<tr>
<td>+24V</td>
<td>150</td>
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<tr>
<td>+30V</td>
<td>150</td>
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</tbody>
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FIGURE 5 FACE MOUNT OPTIONS

HD2
- - -
SHAFT DIAMETER: F = 0.2495 / 0.2497
E = 0.3745 / 0.3747
M = 0.3932 / 0.3935
6 = 0.3745 / 0.3747
(H25 EQUIV.)
SHAFT SEAL:
0 = NO SEAL
1 = W / SEAL
ELECTRONICS TYPE
6 = DIFFERENTIAL LINE DRIVER (RS422)
E = SQUARE WAVE S, E, (7406) W/PULLUPS
K = LINE DRIVER (88C30 12V / 15V OUTPUTS)
LINE COUNT (CYCLES / REV)
SPECIAL MOD CODE
See Table 3 for Disc resolutions
CONNECTION TYPE:
E6 = 6 PIN END MOUNT **
E7 = 7 PIN END MOUNT **
S6 = 6 PIN SIDE MOUNT **
S7 = 7 PIN SIDE MOUNT **
S0 = 10 PIN SIDE MOUNT
ECE = END CABLE 18"
SC = SIDE CABLE 18"
** NOT AVAILABLE WITH ELECTRONIC TYPES HAVING COMPLEMENTS

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Table 3
Available Disc Resolutions
60, 100, 635, 1000, 1024