Shafted Encoder

Key Features

- Hubshaft with Spring Tether for Simplified Installation
- Industry Standard 2.0” Size
- IP66 Sealing Option

**SPECIFICATIONS**

**STANDARD OPERATING CHARACTERISTICS**

**Code:** Incremental, Optical  
**Resolution:** 1 to 2540 PPR (pulses/revolution)  
**Accuracy:** (worst case any edge to any other edge) <1024 PPR (metal disk): ±7.5 arc-min.  
≥1024 PPR (glass disk): ±2.5 arc-min.  
**Format:** Two channel quadrature (AB) with optional Index (Z) and complementary outputs  
**Phase Sense:** A leads B for CCW shaft rotation as viewed from the shaft end of the encoder  
**Quadrature Phasing:** 90° ± 22.5° electrical  
**Symmetry:** 180° ± 18° electrical  
**Index:** 180° ± 18° electrical (gated with B low)  
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

**ELECTRICAL**

**Power Input:** 5 to 26 VDC at 80 mA max., not including output loads  
**Outputs:**  
- 7273 Open Collector: 40mA, sink max  
- 7272 Push-Pull: 40mA, sink or source  
- 4469 Differential Line Driver: 100mA, sink or source  
**Frequency Response:** 100 kHz min. (index 75 kHz min. for extended temperature range)  
**Termination:** MS Connector, M12 Connector, Cable Exit  
**Noise Immunity:** Tested to EN61326-1  
**Electrical Immunity:** Reverse polarity and short circuit protected  
**Mating Connector:**  
- 6 pin, style MS3106A-14S-6S (MCN-N4)  
- 7 pin, style MS3106A-16S-1S (MCN-N5)  
- 10 pin, style MS3106A-18-1S (MCN-N6)  
- 10 pin, NEMA4 style (MCN-N6N4)  
**Cable:** w/ 5 pin M12 Connector (112859-xxxx)  
**Cable:** w/ 8 pin M12 Connector (112860-xxxx)

**MECHANICAL**

**Bore Diameter:** 1/4”, 3/8”, 1/2”, 5/8”  
**Mating Shaft Requirements:**  
- Length: 0.38” min., 0.50” max.  
- Runout: 0.010” max. TIR  
- Endplay: ±0.025” max.  
**Shaft Speed:**  
- Resolutions ≤1024 PPR: 10,000 RPM max.  
- Resolutions >1024 PPR: 5,000 RPM max.  
**Starting Torque:** (max at 25 °C)  
- without shaft seal: 1.0 oz-in;  
- with shaft seal: 3.0 oz.–in  
**Moment of Inertia:** 3.0 x 10⁻⁴ oz–in–sec²  
**Housing and Cover:** Aluminum  
**Disc Material:** Glass or Mylar (PPR Dependant)  
**Weight:** 10 oz. max.

**ENVIRONMENTAL**

**Operating Temperature:**  
- Standard: 0 to +70 °C  
- Extended: 0 to +85 °C  
**Storage Temperature:** -40 to +90 °C  
**Shock:** 50 G’s for 11 milliseconds duration  
**Vibration:** 5 to 2000 Hz at 20 G’s  
**Humidity:** Up to 98% (non-condensing)  
**Enclosure Rating:** NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, wash-down) when ordered with shaft seal and either M12 connector or watertight cable exit
## Ordering Information

To order, complete the model number with code numbers from the table below:

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>H2</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Code 1: Model
- **1**: Unidirectional (Channel A only)
- **2**: Bidirectional (Channels A and B)
- **3**: Bidirectional with Index (Channels A, B and Z)

### Code 2: PPR
- **0**: 5/8" Dia. Hub Shaft and flex coupling
- **1**: 3/8" Dia. Hub Shaft and flex coupling
- **2**: 1/2" Dia. Hub Shaft and flex coupling
- **3**: 1/4" Dia. Hub Shaft and flex coupling

### Code 3: Housing
- **0**: Servo Mount
- **C**: Same as "0" above includes protective cover kit for mounting on fan cover

### Code 4: Bore
- **2**: 5/8" Dia. Hub Shaft and flex coupling
- **3**: 3/8" Dia. Hub Shaft and flex coupling
- **5**: 1/2" Dia. Hub Shaft and flex coupling
- **6**: 1/4" Dia. Hub Shaft and flex coupling

### Code 5: Face Mount
- **0**: No Shaft Seal
- **5**: Shaft Seal

### Code 6: Shaft Seal
- **0**: No Shaft Seal
- **5**: Shaft Seal

### Code 7: Electrical
- **0**: 5-26V in, 5-26V Open Collector out
- **1**: 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups
- **2**: 5-26V in, 5-26V Push-Pull out
- **A**: Same as "0" with extend. temp range
- **B**: Same as "1" with extend. temp range
- **C**: Same as "2" with extend. temp range

### Code 8: Termination
- **0**: 6 Pin Conn, End Mount
- **1**: 6 Pin Conn, Side Mount
- **2**: 7 Pin Conn, End Mount
- **3**: 7 Pin Conn, Side Mount
- **4**: 10 Pin Conn, End Mount
- **5**: 10 Pin Conn, Side Mount
- **7**: 18" Cable, Side Exit
- **9**: 36" Cable, Side Exit
- **B**: 10" Cable, Side Exit
- **2**: 25" Cable, Side Exit
- **N**: 5 Pin M12 Connector, End Mount
- **P**: 5 Pin M12 Connector, Side Mount
- **R**: 8 Pin M12 Connector, End Mount
- **Q**: 8 Pin M12 Connector, Side Mount

### Code 9: Options
- **0**: Available when Code 8 is 0 to 5:
- **PS**: LED Output Indicator Option

### Cable Assemblies with MS Connector*
- **108594-XXXX**: 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
- **108595-XXXX**: 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
- **108596-XXXX**: 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- **1400635XXXX**: 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
- **109209-XXXX**: NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

### Cable Assemblies with M12 Connector*
- **112859-XXXX**: 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
- **112860-XXXX**: 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
- **112860-XXXX**: 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

### Mating Connectors (no cable)
- **MCN-N4**: 6 pin, style MS106A-14S-6S
- **MCN-N5**: 7 pin, style MS106A-16S-1S
- **MCN-N6**: 10 pin, style MS106A-18-1S
- **MCN-N6N4**: 10 pin, NEMA4 style

### Notes
- **Note**: Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.
### CONNECTIONS

**SERIES H20 Hubshaft**

6, 7 & 10 Pin MS Connectors and Cables - Code 8= 0 to 9, B to M

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. Models with direct cable exit carry the color coding as shown in the right hand column.

#### Table 1

<table>
<thead>
<tr>
<th>Encoder Function</th>
<th>Cable # 108594-XXXX 6 Pin Single Ended</th>
<th>Cable # 108595-XXXX 7 Pin Single Ended</th>
<th>Cable # 108596-XXXX 7 Pin Diff Line Driver w/o Index</th>
<th><strong>Cable # 109209-XXXX or 1400635XXXX 10 Pin Diff Line Driver w/ Index</strong></th>
<th>Cable Exit with Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin</td>
<td>Wire Color</td>
<td>Pin</td>
<td>Wire Color</td>
<td>Pin</td>
</tr>
<tr>
<td>Sig. A</td>
<td></td>
<td>BRN</td>
<td>A</td>
<td>BRN</td>
<td>A</td>
</tr>
<tr>
<td>Sig. B</td>
<td></td>
<td>ORN</td>
<td>B</td>
<td>ORG</td>
<td>B</td>
</tr>
<tr>
<td>Sig. Z*</td>
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<td>C</td>
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<td>Power +V</td>
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<td>RED</td>
<td>D</td>
<td>RED</td>
<td>D</td>
</tr>
<tr>
<td>Com</td>
<td></td>
<td>BLK</td>
<td>F</td>
<td>BLK</td>
<td>F</td>
</tr>
<tr>
<td>Case</td>
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<td>—</td>
<td>G</td>
<td>GRN</td>
<td>G</td>
</tr>
<tr>
<td>N/C</td>
<td></td>
<td>F</td>
<td>E</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sig. A</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sig. B</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sig. Z*</td>
<td></td>
<td>—</td>
<td>—</td>
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</tr>
</tbody>
</table>

#### Table 2

5 & 8 Pin M12 Accessory Cables when Code 8= N to R

Connector pin numbers and cable assembly wire color information is provided here for reference.

<table>
<thead>
<tr>
<th>Encoder Function</th>
<th>Cable # 112850-XXXX 5 Pin Single Ended</th>
<th>Cable # 112860-XXXX 8 Pin Single Ended</th>
<th>Cable # 112860-XXXX 8 Pin Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pin</td>
<td>Wire Color</td>
<td>Pin</td>
</tr>
<tr>
<td>Sig. A</td>
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<td>1</td>
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<tr>
<td>Sig. B</td>
<td>2</td>
<td>WHT</td>
<td>4</td>
</tr>
<tr>
<td>Sig. Z*</td>
<td>5</td>
<td>GRY</td>
<td>6</td>
</tr>
<tr>
<td>Power +V</td>
<td>1</td>
<td>BRN</td>
<td>2</td>
</tr>
<tr>
<td>Com</td>
<td>3</td>
<td>BLU</td>
<td>7</td>
</tr>
<tr>
<td>Sig. A</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sig. B</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Sig. Z*</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

1) Cable Configuration (Table 1): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (Table 2): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67
**DIMENSIONS**

**Series H20 Hubshaft**

**Cover Option:** C, F

**Code 8: Terminations**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 2</td>
<td>6, 7 Pin End MS Conn</td>
<td>2.25&quot;</td>
</tr>
<tr>
<td>1, 3</td>
<td>6, 7 Pin Side MS Conn</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10 Pin End MS Conn</td>
<td>2.25&quot;</td>
</tr>
<tr>
<td>5</td>
<td>10 Pin Side MS Conn</td>
<td>2.25&quot;</td>
</tr>
<tr>
<td>7, 9, B, D, F, H, K, M</td>
<td>Side Exit Cable</td>
<td>1.68&quot;</td>
</tr>
</tbody>
</table>

**HUB I.D.**

- Nom.: +0.001" -0.000"
- Min. = 0.35" Max. = 0.55"

**Shaft Length**

- 0.22"

**HUB I.D. Nom.**

- +0.0001" -0.0002"

**Clearance**

- For (3) 4-40 @ 2.25" B.C.

**Dimensions**

<table>
<thead>
<tr>
<th>Part</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>N, Q</td>
<td>2.51&quot;</td>
<td>2.25&quot;</td>
</tr>
<tr>
<td>P, R</td>
<td>2.58&quot;</td>
<td>2.25&quot;</td>
</tr>
</tbody>
</table>

**Technical Support**

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