DESCRIPTION
The Dynapar brand Series HS20 Sealed Hollowshaft encoder is designed for easy installation on motor or machine shafts. Its hollowshaft design eliminates the need for a flexible shaft coupling, mounting bracket, flower pot, or flange adapter. This not only reduces the installation depth, but also lowers total cost.

The Series HS20 Sealed Hollowshaft’s floating shaft mount and spring tether minimize bearing loads and eliminate flexible shaft couplings to reduce wear and maintenance.

SPECIFICATIONS
STANDARD OPERATING CHARACTERISTICS
Code: Incremental
Resolution: 1 to 2540 PPR (pulses/revolution)
Accuracy: (worst case any edge to any other edge) \(\leq 1024\) PPR (metal disk): \(\leq 7.5\) arc-min.
\(>1024\) PPR (glass disk): \(\leq 2.5\) arc-min.
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the hub clamp end of the encoder
Quadrature Phasing: 90° ± 22.5° electrical
Symmetry: 180° ±18° electrical
Index: 180° +18°/135° electrical (gated with B low)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL
Input Power: 4.5 min. to 26 VDC max. at 100 mA max., not including output loads
Outputs: 7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line
Driver: 40 mA sink or source

Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN61326-1 EMC (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
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);
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL
Bearing Life: (at maximum tether loading)
Standard tether: \(5 \times 10^9\) revolutions
Slotted tether: \(8 \times 10^9\) revolutions
Shaft Speed: 6000 RPM max.
Shaft Bore Tolerance: Nominal \(+0.0002"/+0.0008" (+0.005/+0.020 mm)
Mating Shaft Requirements:
Runout: \(\leq 0.005" (\leq 0.13\) mm) radial, max.
Endplay: \(\pm 0.050" (\pm 1.27 \) mm) axial, max.
Length: 0.80" (20 mm), minimum
Starting Torque: 3.0 oz-in max.
Moment of Inertia: 5.1 \times 10^{-4} oz–in–sec^2
Weight: 10 oz. max.

ENVIRONMENTAL
Operating Temperature:
Standard: 0 to +70° C
Extended: –40 to +85° C
Storage Temperature: –40 to +85° C
Shock: 50 G’s for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 2.5 G’s
Humidity: 98% without condensation
Enclosure Rating: NEMA4/IP65 (dust proof, washdown)
IMPORTANT ENCODER INSTALLATION INFORMATION

Mounting the Encoder: The encoder should be mounted such that its shaft is in close as possible alignment with the axis of the driving machine or motor shaft.

**CAUTION:** The loads applied to the encoder shaft must be in accordance with the specifications of this device.

Important Wiring Instructions: Use of shielded cable is recommended for all encoder installations. The shield should be connected to signal-ground at the receiving device only.

**Grounding:** For applications with high ground potential differences, DO NOT ground the encoder through both machine and controls end. Connect the shield at the controls end only. NOTE: If the shield is connected at both ends, grounding problems that degrade system performance can result.

**CE Grounding Measures** – For best EMC immunity the cable screen must be grounded on both encoder and controls end. For cable lengths longer than 30m or outdoor applications, additional measures must be implemented to comply with CE requirements. Connection of the encoder to DC power supply network is prohibited if CE compliance is required. CE-compliant products are tested to EN61326-1 EMC.

In all cases, system CE compliance is ultimately the responsibility of the manufacturer integrating the encoder.

*Connecting the shield at both ends can cause grounding problems that degrade system performance.*

If possible, run the encoder cable through a dedicated conduit (not shared with other wiring). Use of conduit will protect the cable from physical damage and provide a degree of electrical isolation. Do not run the cable in close proximity to other conductors that carry current to heavy loads such as motors, motor starters, contactors, solenoids, etc. This practice can induce electrical transients in the encoder cable, potentially interfering with reliable data transmission.

Refer to Electrical Connections table for wiring information. To avoid possible damage, do not connect or disconnect the encoder connector or wiring while power is applied to the system.

**CAUTION:** Unused encoder signal wires must be individually insulated and under no circumstances be in contact with ground, voltage sources, or other signal lines.
## Models Information

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HS20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Information

- **Metal Disk:**
  - Code 0: 6 mm
  - Code 1: 1/4" (6 mm)
  - Code 2: 5/16" (8 mm)
  - Code 3: 3/8" (10 mm)
  - Code 4: 1/2" (15 mm)
  - Code 5: A (16 mm)

- **Glass Disk:**
  - Code 6: 0 mm
  - Code 7: 1 mm
  - Code 8: 2 mm
  - Code 9: 3 mm
  - Code A: 4 mm

### Termination

- **Hybrid Pin:**
  - Code 0: 6 pin connector
  - Code 1: 7 pin connector
  - Code 2: 8 pin connector (with mating connector)
  - Code 3: 9 pin connector (with mating connector)

- **Legacy Pin:**
  - Code 4: 10 pin connector
  - Code 5: 11 pin connector
  - Code 6: 12 pin connector

- **Cable:**
  - Code 7: 13" (0.3m) cable
  - Code 8: 13" (0.3m) cable
  - Code 9: 13" (0.3m) cable

### Fixing

- **Metal Disk:**
  - Code 0: None - customer supplied
  - Code 1: 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face)
  - Code 2: 5/16" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face)

- **Glass Disk:**
  - Code 3: 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face)
  - Code 4: 5/16" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face)

### Format

- **Hybrid Pin:**
  - Code 0: Single ended, unidirectional
  - Code 1: Single ended, bidirectional
  - Code 2: Single ended, bidirectional with index

- **Legacy Pin:**
  - Code 3: Differential, bidirectional
  - Code 4: Differential, bidirectional with index

### Output

- **Hybrid Pin:**
  - Code 5: 5-26V in, 5-26V open collector out
  - Code 6: 5-26V in, 5-26V push-pull out

- **Legacy Pin:**
  - Code 7: 5-26V in, 5-26V line driver out
  - Code 8: 5-26V in, 5-26V line driver out
  - Code 9: 5-26V in, 5-26V line driver out

### Termination

- **Hybrid Pin:**
  - Code 0: 6 pin connector
  - Code 1: 7 pin connector
  - Code 2: 8 pin connector (with mating connector)

- **Legacy Pin:**
  - Code 3: 9 pin connector (with mating connector)
  - Code 4: 10 pin connector (with mating connector)

### Tether Kit

- **Hybrid Pin:**
  - Code 5: 11" (0.3m) cable
  - Code 6: 11" (0.3m) cable
  - Code 7: 11" (0.3m) cable

- **Legacy Pin:**
  - Code 8: 11" (0.3m) cable
  - Code 9: 11" (0.3m) cable

- **Protective Cover Accessory:**
  - Code 0: Protective cover kit
  - Code 1: Protective cover kit

### Additional Information

- **112096-0001:** Tether Kit (clearance hole for 3/8" bolt on 5.88" diameter bolt-circle)
- **112096-0002:** Tether Kit (slotted hole for bolt on 1.87" to 2.75" radius)
- **112105-0001:** Protective Cover Accessory
### Wiring Information

#### 6, 7 & 10 Pin MS Connectors and Cables - Code 7= 0 to 7, A to G

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HS20 models with direct cable exit carry the same color coding as shown for each output configuration.

<table>
<thead>
<tr>
<th>Encoder Function</th>
<th>Cable #108594-* 6 Pin Single Ended</th>
<th>Cable #112123-* 6 Pin Dif Line Drv w/o Idx</th>
<th>Cable #108596-* 7 Pin Dif Line Drv w/o Idx</th>
<th>Cable #108595-* 7 Pin (If Used)</th>
<th>Cable #1400635-* 10 Pin (If Used)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. A</td>
<td>E</td>
<td>BRN</td>
<td>E</td>
<td>BRN</td>
<td>A</td>
</tr>
<tr>
<td>Sig. B</td>
<td>D</td>
<td>ORN</td>
<td>D</td>
<td>ORN</td>
<td>B</td>
</tr>
<tr>
<td>Sig. Z</td>
<td>C</td>
<td>YEL</td>
<td>—</td>
<td>—</td>
<td>C</td>
</tr>
<tr>
<td>Power +V</td>
<td>B</td>
<td>RED</td>
<td>B</td>
<td>RED</td>
<td>D</td>
</tr>
<tr>
<td>N/C</td>
<td>F</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>E</td>
</tr>
<tr>
<td>Com</td>
<td>A</td>
<td>BLK</td>
<td>A</td>
<td>BLK</td>
<td>F</td>
</tr>
<tr>
<td>Case</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>G</td>
</tr>
<tr>
<td>Sig. A</td>
<td>—</td>
<td>—</td>
<td>C</td>
<td>BRN/WHT</td>
<td>C</td>
</tr>
<tr>
<td>Sig. B</td>
<td>—</td>
<td>—</td>
<td>F</td>
<td>ORN/WHT</td>
<td>E</td>
</tr>
<tr>
<td>Sig. Z</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

#### Cable Configuration:
PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)

---

### 5 & 8 Pin M12 Accessory Cables when Code 7= H or J

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

<table>
<thead>
<tr>
<th>Encoder Function</th>
<th>Cable # 112859-5 Pin Single Ended</th>
<th>Cable # 112860-8 Pin Single Ended</th>
<th>Cable # 112860-8 Pin Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. A</td>
<td>4</td>
<td>BLK</td>
<td>1</td>
</tr>
<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>

* Index not provided on all models. See ordering information

#### Cable Configuration:
PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

---

Customer Service:
Tel.: +1.800.873.8731  
Fax: +1.847.662.4150  
custserv@dynapar.com

Technical Support:
Tel.: +1.800.234.8731  
Fax: +1.847.782.5277  
dynapar.techsupport@dynapar.com

European Sales Representative:
Hengstler GmbH  
Uhlandstrasse 49, 78554 Aldingen - Germany  
www.hengstler.de