

## INCREMENTAL ENCODERS

## SERIES HS20

Dynapar™ brand

## Sealed Hollowshaft Encoder

## Key Features

- Hollowshaft Design Eliminates Brackets and Couplings
- Electrically Isolated Shaft Design
- Compact Size for Tight Mounting Constraints

IND  
Industrial Duty

## SPECIFICATIONS

## STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental, Optical**Resolution:** 50 to 2540 PPR (pulses/revolution)**Accuracy:** (worst case any edge to any other edge) <1024 PPR (metal disk):  $\pm 7.5$  arc-min. $\geq 1024$  PPR (glass disk):  $\pm 2.5$  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:**  $90^\circ \pm 22.5^\circ$  electrical**Symmetry:**  $180^\circ \pm 18^\circ$  electrical**Index:**  $180^\circ +18^\circ/-135^\circ$  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:**

5 to 26 VDC at 100 mA max., not including output loads

**Outputs:**

7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

**Frequency Response:** 100 kHz min. (index 75 kHz min. for extended temperature range)**Noise Immunity:** Tested to EN61326-1**Electrical Immunity:** Reverse polarity and short circuit protected**Termination:** MS Connector, M12 Connector, Cable Exit**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:** 6mm to 16 mm, 1/4" to 5/8"**Shaft Speed:** 6000 RPM max.**Shaft Bore Tolerance:** Nominal  $+0.0002"/+0.0008"$  ( $+0.005/+0.020$  mm)**Mating Shaft Requirements:**Runout:  $\pm 0.005"$  ( $\pm 0.13$ 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<sup>2</sup>**Housing and Cover:** Aluminum**Disc Material:** Glass or Metal (PPR Dependant)**Weight:** 10 oz. max.

## ENVIRONMENTAL

**Operating Temperature:****Standard:** 0 to  $+70^\circ$  C**Extended:** 0 to  $+85^\circ$  C**Storage Temperature:**  $-40$  to  $+85^\circ$  C**Shock:** 50 G's for 11 milliseconds duration**Vibration:** 5 to 2000 Hz at 2.5 G's**Humidity:** to 98% without condensation**Enclosure Rating:** NEMA4/IP65 (dust proof, washdown)

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Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Bore Size	Code 4: Fixing	Code 5: Format	Code 6: Output	Code 7: Termination	Code 8: Options
<b>HS20</b>	□□□□	□	□	□	□	□	□□
Ordering Information							
<b>HS20</b> Size 20 heavy-duty, sealed hollowshaft encoder	Metal Disk: <b>0050 0300</b> <b>0060 0360</b> <b>0100 0400</b> <b>0180 0720</b> <b>0200 0800</b> <b>0250 1000</b> <b>0256 1024</b>  Glass Disk: <b>1200 1968</b> <b>1250 2000</b> <b>1270 2048</b> <b>1500 2400</b> <b>1600 2500</b> <b>1800 2540</b>	<b>0</b> 6 mm <b>1</b> 1/4" <b>2</b> 5/16" <b>3</b> 8 mm <b>4</b> 3/8" <b>5</b> 10 mm <b>6</b> 12 mm <b>7</b> 1/2" <b>8</b> 5/8" <b>9</b> 15 mm <b>A</b> 16 mm <b>B</b> 14 mm	<b>0</b> None - customer supplied <b>1</b> Clearance hole for 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face) <b>3</b> Slotted hole for bolt on 1.87" to 2.95" radius <b>4</b> Same as '1', w/ protective cover kit <b>5</b> Same as '3', w/ Protective cover kit	<b>0</b> single ended, unidirectional (A) <b>1</b> single ended, bidirectional (AB) <b>2</b> single ended, bidirectional with index (ABZ)  Available when Code 6 is 3, 4, A or B: <b>3</b> differential, bidirectional ( AA BB )  Available when Code 6 is 3, 4, A or B and code 7 is 2, or 7 thru G or J <b>4</b> differential, bidirectional with index ( AA BB ZZ )	<b>0</b> 5-26V in, 5-26V open collector out <b>1</b> 5-26V in, 5-26V open collector out w/ 2.2kΩ pullups <b>2</b> 5-26V in, 5-26V push-pull out  Available when Code 5 is 3 or 4: <b>3</b> 5-26V in, 5V line driver out <b>4</b> 5-26V in, 5-26V line driver out <b>A</b> same as '3' with extended temp. <b>B</b> same as '4' with extended temp.	<b>0</b> 6 pin connector <b>1</b> 7 pin connector <b>2</b> 10 pin connector <b>5</b> 6 pin connector, plus mating connector <b>6</b> 7 pin connector, plus mating connector <b>7</b> 10 pin connector, plus mating connector <b>A</b> 18" cable <b>B</b> 36" cable <b>C</b> 72" cable <b>D</b> 10' cable <b>F</b> 13" cable with 10 pin connector plus mating connector <b>G</b> 13" cable <b>J</b> 8 Pin M12 Connector  Available when Code 5 is 0 thru 2 <b>H</b> 5 Pin M12 Connector	Available when Code 7 is 0 thru 7:  <b>PS</b> LED Output Indicator

**Cable Assemblies with MS Connector\***

- 112123-XXXX** 6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- 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

**Accessory Kits**

- 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

**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

\*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.

**Mating Connectors (no cable)**

- MCN-N4** 6 pin, style MS3106A-14S-6S
- MCN-N5** 7 pin, style MS3106A-16S-1S
- MCN-N6** 10 pin, style MS3106A-18-1S
- MCN-N6N4** 10 pin, NEMA4 style

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## ELECTRICAL CONNECTIONS

## 6, 7 &amp; 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.  
Models with direct cable exit carry the color coding as shown in the right hand column.

Table 1										
Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 112123-XXXX 6 Pin Dif Line Driver without Index		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN
Signal B	D	ORN	D	ORG	B	ORG	B	ORG	B	ORG
Signal Z*	C	YEL	—	—	C	YEL	—	—	C	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED
N/C	F	—	—	—	E	—	—	—	E	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN
Signal $\bar{A}$	—	—	C	BRN/WHT	—	—	C	BRN/WHT	H	BRN/WHT
Signal $\bar{B}$	—	—	F	ORG/WHT	—	—	E	ORG/WHT	I	ORG/WHT
Signal $\bar{Z}^*$	—	—	—	—	—	—	—	—	J	YEL/WHT

## 5 &amp; 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 2						
Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\bar{A}$	—	—	—	—	3	BRN/WHT
Signal $\bar{B}$	—	—	—	—	5	ORG/WHT
Signal $\bar{Z}^*$	—	—	—	—	8	YEL/WHT

## NOTES:

- 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

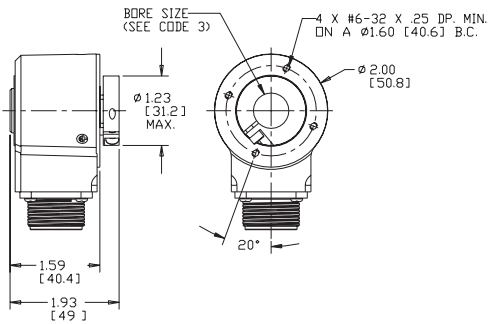


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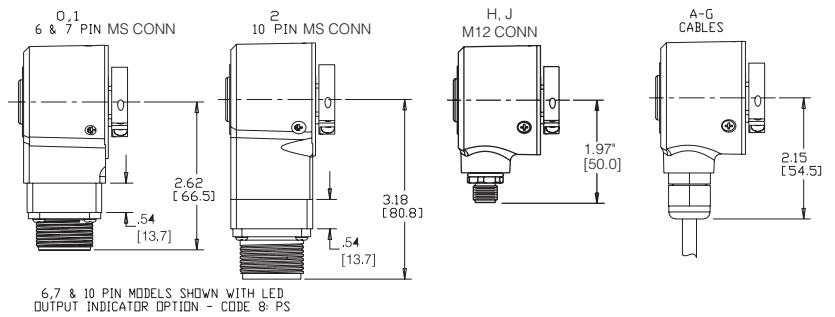
SERIES HS20

DIMENSIONS

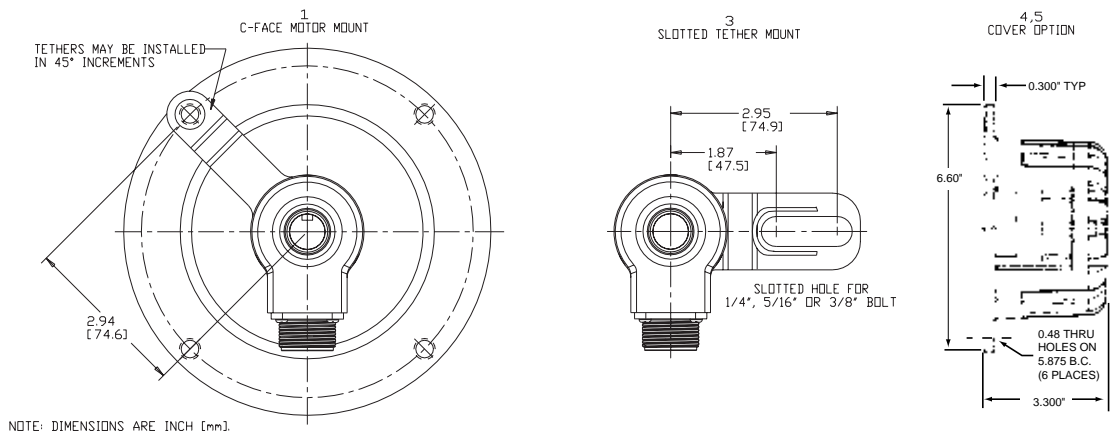
DIMENSIONS



CODE 7: TERMINATION



CODE 4: FIXING



NOTE: DIMENSIONS ARE INCH [mm].