

# SERIES HD20

**NorthStar™ brand**

## Harsh Duty Optical Encoder

### Key Features

- Size 20 Heavy-Duty Encoder with Single or Dual Isolated Outputs
- Unbreakable Code Disc up to 3600 PPR
- Special Housing and Seals for IP67 Rating
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing

**HD**  
Heavy Duty



## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental, Optical  
**Resolution:** 1 to 3600 PPR (pulses/revolution)  
**Format:** Two channel quadrature (AB) with optional Index (Z), and complementary outputs  
**Phase Sense:** A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder  
**Quadrature Phasing:** For resolutions to 625 PPR:  $90^\circ \pm 15^\circ$  electrical; For resolutions over 625 PPR:  $90^\circ \pm 30^\circ$  electrical  
**Symmetry:**  
 For resolutions to 1024 PPR:  $180^\circ \pm 18^\circ$  electrical  
 For resolutions over 1024 PPR:  $180^\circ \pm 25^\circ$  electrical  
**Index:** 150° to 330° A leads B, CCW (From Shaft End)  
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pF

### ELECTRICAL

**Input Power:** 5-26VDC; 80 mA max., not including output loads.  
**Outputs:**  
 2N2222 Open Collector: 250mA, sink max  
 7272 Push-Pull: 40mA, sink or source  
 7272 Differential Line Driver: 40 mA, sink or source  
 7273 Open Collector: 40mA, sink max  
**Frequency Response:** 125 kHz (data & index)  
**Noise Immunity:** Tested to EN61326-1  
**Electrical Immunity:** Reverse polarity and short circuit protected  
**Termination:** 6, 7, or 10 pin MS Connector; Cable exit w/seal  
**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)

### MECHANICAL

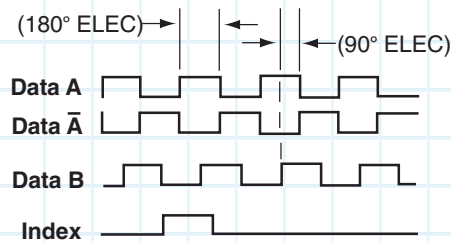
**Shaft Size:** 10mm, 3/8"  
**Shaft Speed:** 6000 RPM, maximum  
**Shaft Loading:** Up to 100 lbs axial and radial  
**Starting Torque:** 2.5 in-oz. maximum (at 25°C)  
**Bearings:** 5200 ZZ double row  
**Bearing life:**  $5 \times 10^8$  revs at rated shaft Loading,  $5 \times 10^{11}$  revs at 10% of rated shaft loading. (manufacturers' specs)  
**Housing and Cover:** Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel.  
**Shaft Material:** 303 stainless steel (passivated)  
**Disc Material:** Plastic  
**Weight:** 14 ounces, typical

### ENVIRONMENTAL

**Operating Temperature:** -40 to 100°C  
**Storage Temperature:** -40 to 100°C  
**Shock:** 50G's for 11msec duration  
**Vibration:** 5 to 2000Hz @ 20 G's  
**Humidity:** Up to 98% (non-condensing)  
**Enclosure Rating:** IP67

### DATA AND INDEX

Not all complements shown  
 A shown for reference



Index Width: 150° to 330°

A leads B, CCW (From Shaft End)

## Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Shaft	Code 4: Electrical	Code 5: Termination	Code 6: Options
<b>HD20</b> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ordering Information					
Size 20 Heavy Duty Encoder	<b>0001 0500</b> <b>0010 0512</b> <b>0024 0600</b> <b>0025 0625</b> <b>0035 0720</b> <b>0040 1000</b> <b>0060 1024</b> <b>0100 1200</b> <b>0120 1250</b> <b>0192 1440</b> <b>0200 2000</b> <b>0240 2048</b> <b>0250 2500</b> <b>0256 2540</b> <b>0300 2600</b> <b>0360 3600</b>	<b>0</b> 3/8" Dia. Shaft with flat  <b>4</b> 10mm Dia. Shaft, no flat	<b>0</b> 5-26V in, 5-26V Open Collector out (7273)  <b>2</b> 5-26V in, 5-26V Push-Pull out (7272)  <b>F</b> 5-26V in, 5-26V Open Collector out (2222)  <b>G</b> 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)  Available when: Code 1 is 1,2 and Code 5 is 3 through H, or Code 1 is 3 and Code 5 is 5 through H:  <b>3</b> 5-26V in, 5-26V Differential Line Driver out (7272)  <b>4</b> 5-26V in, 5V Differential Line Driver out (7272)	<b>1</b> 6 Pin Connector  <b>3</b> 7 Pin Connector  <b>5</b> 10 Pin Connector  <b>D</b> 18" Sealed Cable  <b>E</b> 3' Sealed Cable  <b>F</b> 6' Sealed Cable  <b>G</b> 10' Sealed Cable  <b>H</b> 15' Sealed Cable	<b>0</b> No Options <b>1</b> Nickel Finish Housing <b>2</b> Stainless Steel Housing  Available when: Code 4 is 0, 2  <b>3</b> Redundant Outputs (Dual Connector Housing). <b>4</b> Nickel Finish Housing with Redundant Outputs. <b>5</b> Stainless Steel Housing with Redundant Outputs.

### Cable Assemblies with MS Connector

<b>108594-XXXX</b>	6 Pin MS, Cable Assy. For Use with Single Ended Outputs
<b>108595-XXXX</b>	7 Pin MS, Cable Assy. For Use with Single Ended Outputs
<b>108596-XXXX</b>	7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
<b>1400635XXXX</b>	10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
<b>109209-XXXX</b>	NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs

### Mating Connectors (no cable)

<b>MCN-N4</b>	6 pin, style MS3106A-14S-6S
<b>MCN-N5</b>	7 pin, style MS3106A-16S-1S
<b>MCN-N6</b>	10 pin, style MS3106A-18-1S
<b>MCN-N6N4</b>	10 pin, NEMA4 style

\*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.

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## ELECTRICAL CONNECTIONS

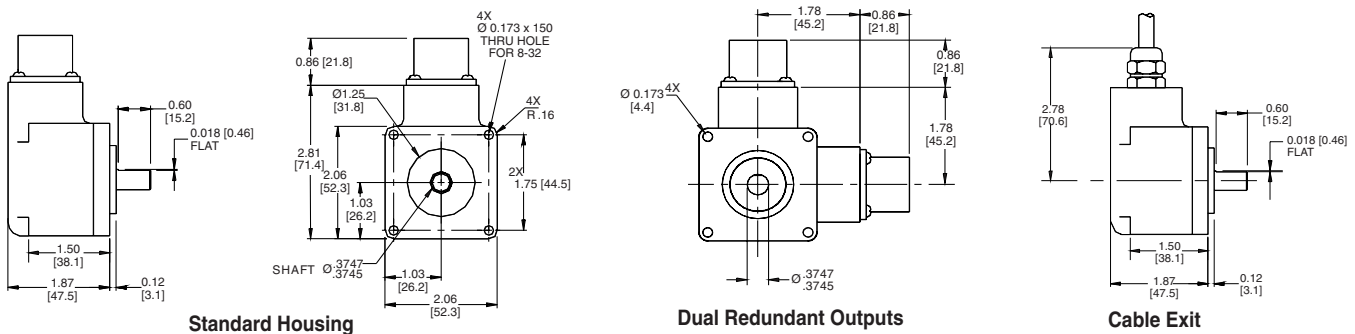
### 6, 7 & 10 Pin MS Connectors and Cables

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.

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

- 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) 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
- 3) \*Index not provided on all models. See ordering information.
- 4) \*\*For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
- 5) "MS" Type mating connectors and pre-build cables are rated NEMA 12

## DIMENSIONS



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