

# SERIES HD20

NorthStar™ brand

## Harsh Duty Optical Encoder

### Key Features

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

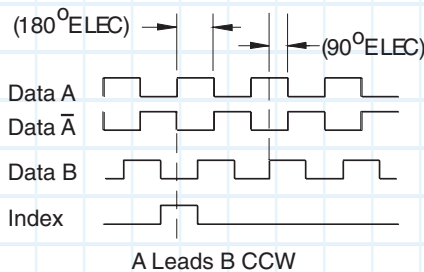


## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental  
**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 625PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical  
**Symmetry:**  
 For resolutions to 1024PPR: 180° ± 18° electrical  
 For resolutions over 1024PPR: 180° ± 25° electrical  
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

**DATA AND INDEX**  
 Not all complements shown.  
 A shown for reference



### ELECTRICAL

**Input Power:** 5-26VDC; 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC  
**Outputs:** 2N2222, ET7272, ET7273  
**Frequency Response:** 125 kHz (data & index)  
**Termination:** 6, 7, or 10 pin MS Connector; 18" 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)

### MECHANICAL

**Shaft Material:** 303 stainless steel (passivated)  
**Shaft speed:** 6000 RPM, maximum  
**Shaft loading:** Up to 100 lbs axial and radial  
**Shaft runout:** 0.0005 TIR at midpoint  
**Starting torque:** 2.5 in-oz. maximum (at 25°C)  
**Bearings:** 5200 ZZ double row  
**Bearing life:** 5 x 10<sup>8</sup> revs at rated shaft Loading,  
 5 x 10<sup>11</sup> revs at 10% of rated shaft loading. (manufacturers' specs)  
**Housing and cover:** Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel.  
**Disc material:** Metal or plastic  
**Weight:** 14 ounces, typical

### ENVIRONMENTAL

**Operating Temperature:** -40 to 100°C  
**Operating Temperature ATEX:** -40 to 80°C  
**Storage temperature:** -40 to 100°C  
**Shock:** 50G's for 11msec duration  
**Vibration:** 5 to 2000Hz @ 20 G's  
**Humidity:** 100%  
**Enclosure Rating:** IP67

### 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	Cable #108594-6 Pin Single Ended		Cable # 108595-7 Pin Single Ended		Cable #108596-7 Pin Dif Line Drv w/o Idx		Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/Idx		Cable Exit with Seal Wire Color
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	GREEN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	BLUE
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	ORANGE
Power +V	B	RED	D	RED	D	RED	D	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	BLACK
Case	—	—	G	GRN	G	GRN	G	GRN	WHITE
N/C	F	—	E	—	—	—	E	—	—
Sig. A	—	—	—	—	C	BRN/WHT	H	BRN/WHT	VIOLET
Sig. B	—	—	—	—	E	ORG/WHT	I	ORG/WHT	BROWN
Sig. Z	—	—	—	—	—	—	J	YEL/WHT	YELLOW

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12.  
 For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

**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> □	□□□□	□	□	□	□

**Ordering Information**

<p>Size 20 Extreme Heavy Duty Encoder</p> <p>1 Unidirectional 2 Bidirectional 3 Bidirectional with Index</p>	<p><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></p>	<p><b>0</b> 3/8" Dia. Shaft with flat <b>4</b> 10mm Dia. Shaft, no flat</p>	<p><b>0</b> 5-26V in, 5-26V Open Collector out (7273) <b>2</b> 5-26V in, 5-26V Push-Pull out <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)</p> <p>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)</p>	<p><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</p>	<p><b>0</b> No Options <b>1</b> Nickel Finish Housing <b>2</b> Stainless Steel Housing <b>A</b> Same as "0" w/ ATEX Type 1 <b>B</b> Same as "1" w/ ATEX Type 1 <b>C</b> Same as "2" w/ ATEX Type 1</p> <p>Available when Code 4 is 0, 2, 3, F or G <b>G</b> Same as "0" w/ ATEX Type 2 <b>H</b> Same as "1" w/ ATEX Type 2 <b>I</b> Same as "2" w/ ATEX Type 2</p> <p>Available when Code 4 is 4 <b>M</b> Same as "0" w/ ATEX Type 3 <b>N</b> Same as "1" w/ ATEX Type 3 <b>O</b> Same as "2" w/ ATEX Type 3</p> <p>Available when Code 4 is 0, 2, F or G <b>3</b> Redundant Outputs (Dual Connector Housing). See † NOTE <b>4</b> Nickel Finish Housing with Redundant Outputs. See † NOTE <b>5</b> Stainless Steel Housing with Redundant Outputs. See † NOTE <b>D</b> Same as "3" w/ ATEX Type 1. See †NOTE <b>E</b> Same as "4" w/ ATEX Type 1. See †NOTE <b>F</b> Same as "5" w/ ATEX Type 1. See †NOTE <b>J</b> Same as "3" w/ ATEX Type 2. See †NOTE <b>K</b> Same as "4" w/ ATEX Type 2. See †NOTE <b>L</b> Same as "5" w/ ATEX Type 2. See †NOTE <b>P</b> Same as "3" w/ ATEX Type 3. See †NOTE <b>Q</b> Same as "4" w/ ATEX Type 3. See †NOTE <b>R</b> Same as "5" w/ ATEX Type 3. See †NOTE † NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.</p>
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**10 foot Cable Assemblies with MS Connector**

- 108594-0010** 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108595-0010** 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108596-0010** 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- 1400635-0010** 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
- 109209-0010** NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs

**Mating Connectors (no cable)**

- 6 pin, style MS3106A-14S-6S (MCN-N4)
- 7 pin, style MS3106A-16S-1S (MCN-N5)
- 10 pin, style MS3106A-18-1S (MCN-N6)

\*Note: Available ATEX Certified Options

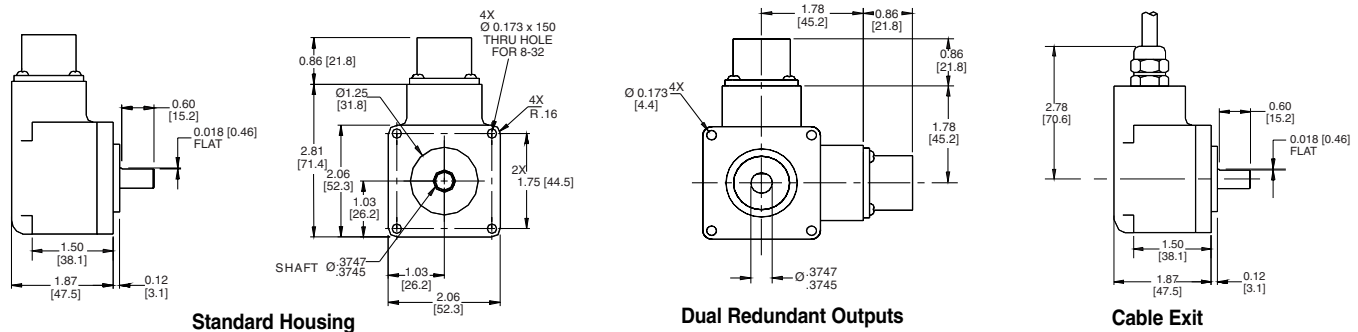
**ATEX Type 1:** ATEX Certified; 5V in, 5V out only

**ATEX Type 2:** ATEX Certified; 7-26V in, 7-26V out

**ATEX Type 3:** ATEX Certified; 7-26V in, 5V out

NOTE: ATEX voltages replace those shown in Code 4.

**DIMENSIONS inches [mm]**



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