

# SERIES HSD25

# NorthStar™ brand

## Harsh Duty Optical Encoder

- Compact Hubshaft Design with Field Replaceable Shaft Isolators
- Unbreakable Code Disc up to 3600PPR
- ATEX Certification Available for Intrinsically Safe Applications
- IP67 Sealing
- 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

### 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;

5 or 8 Pin M12 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)

### MECHANICAL

**Shaft Material:** 303 stainless steel (passivated)

**Bore Diameter:** 3/8", 10mm, 1/2", 5/8", 3/4".

Insulated inserts provided

**Bore runout:** 0.0005 TIR at midpoint

**Starting torque:** 6.5 in-oz. maximum (at 25°C);

10 in-oz (enhanced washdown version HSD27)

maximum (at 25C)

**Bearings:** 61805-2RZ

**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. Tether Available

**Disc material:** Metal or plastic

**Weight:** 20 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

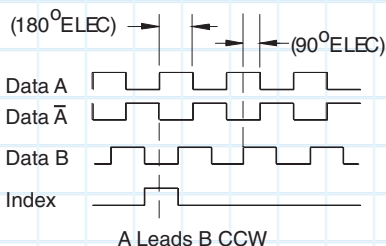
**Humidity:** 100%

**Enclosure Rating:** IP67

### DATA AND INDEX

Not all complements shown.

A shown for reference



**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: Format	Code 5: Output	Code 6: Termination	Code 7: Safety	Code 8: Housing/Tether
<b>HSD25</b>	□□□□	□	□	□	□	□	□

Ordering Information							
<b>HSD25</b> Size 23 Harsh-Duty, Optical Hub Shaft Encoder  <b>HSD27</b> Size 23 Enhanced Washdown Version	<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 2600</b> <b>0300 2540</b> <b>0360 3600</b>	<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>C</b> 3/4"	<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 5 is 3 or 4 and Code 8 is 0, 1, 2, C, D, E, 6, 7 or 8: <b>3</b> differential, bidirectional (A $\bar{A}$ B $\bar{B}$ )  available when Code 5 is 3 or 4 and Code 6 is 2, 3, 4, 7, 8, A to G, J, and Code 8 is 0, 1, 2, C, D, E, 6, 7 or 8: <b>4</b> differential, bidirectional with index (A $\bar{A}$ B $\bar{B}$ Z $\bar{Z}$ )	<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 k $\Omega$ Pullups (2222)  available when: Code 4 is 3, or 4 <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>0</b> 6 pin connector <b>1</b> 7 pin connector <b>2</b> 10 pin connector <b>3</b> 12 pin connector <b>4</b> 10 pin Bayonet 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>8</b> 12 pin connector, plus mating connector  <b>A</b> 18" (.5m) cable <b>B</b> 36" (1m) cable <b>C</b> 72" (2m) cable <b>D</b> 10' (3m) cable <b>E</b> 4m cable <b>F</b> 13" (.3m) cable with 10 pin connector plus mating connector <b>G</b> 13" (.3m) cable <b>J</b> 8 Pin M12 Connector  available when Code 5 is 0, 2, F or G <b>H</b> 5 Pin M12 Connector	<b>0</b> No ATEX <b>1</b> ATEX Type 1* Option  available when: Code 5 is 0, 2, 3, F or G <b>2</b> ATEX Type 2* Option  available when: Code 5 is 4 <b>3</b> ATEX Type 3* Option	<b>0</b> Cast Alum Housing; slotted tether <b>1</b> Nickel Housing; slotted tether <b>2</b> Stainless Housing; slotted tether <b>3</b> Redundant Outputs (Dual Connector Housing); slotted tether <b>4</b> Nickel Housing; Redundant Outputs; slotted tether <b>5</b> Stainless Housing, Redundant Outputs; slotted-tether <b>C</b> Cast Alum Housing; single-point tether <b>D</b> Nickel Housing; single-point tether <b>E</b> Stainless Housing; single-point tether <b>F</b> Redundant Outputs (Dual Connector Housing); single-point tether <b>G</b> Nickel Housing; Redundant Outputs ; single-point tether <b>H</b> Stainless Housing, Redundant Outputs; single-point tether <b>6</b> Same as "0" but no tether** <b>7</b> Same as "1" but no tether** <b>8</b> Same as "2" but no tether** <b>9</b> Same as "3" but no tether** <b>A</b> Same as "4" but no tether** <b>B</b> Same as "5" but no tether**

\*\*Note: Tether may be required for proper encoder operation and may be supplied by the customer or ordered as the following accessories:

- 113764-0001 Single Point Tether Kit
- 113766-0001 Slotted Tether Kit

\*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: When selecting ATEX models, ATEX voltages replace those shown in Code 5.

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

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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	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 #108615-* 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	BRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	8	ORN	ORG
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	3	YEL	YEL
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLACK
Case	—	—	G	GRN	G	GRN	G	GRN	9	—	—
N/C-SLD	F	—	E	—	—	—	E	—	7	—	—
Sig. A	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	BRN / WHT
Sig. B	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORN/WHT	ORG /WHT
Sig. Z	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	YEL / WHT
0 Volt Sense	—	—	—	—	—	—	—	—	2	GRN	—
5 Volt Sense	—	—	—	—	—	—	—	—	11	BLK/WHT	—

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

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

Encoder Function	Cable # 112859-5 Pin Single Ended		Cable # 112860-8 Pin Single Ended		Cable # 112860-8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	BLK	1	BRN	1	BRN
Sig. B	2	WHT	4	ORG	4	ORG
*Sig. Z	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig. A	—	—	—	—	3	BRN/WHT
Sig. B	—	—	—	—	5	ORG/WHT
*Sig. Z	—	—	—	—	8	YEL/WHT

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67. For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

\* Index not provided on all models. See ordering information

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

## DIMENSIONS inches [mm]

