

# SERIES HSD25

# NorthStar™ brand

## Harsh Duty Optical Encoder

### Key Features

- 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:  $90^\circ \pm 15^\circ$  electrical; For resolutions over 625 PPR:  $90^\circ \pm 30^\circ$  electrical

**Symmetry:**

For resolutions to 1024PPR:  $180^\circ \pm 18^\circ$  electrical  
For resolutions over 1024PPR:  $180^\circ \pm 25^\circ$  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)

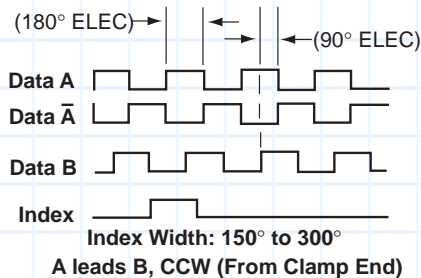
7 pin, style MS3106A-16S-1S (MCN-N5)

10 pin, style MS3106A-18-1S (MCN-N6)

10 pin, NEMA 4 style (604505 & 604506)

### DATA AND INDEX

Not all complements shown  
A shown for reference



### MECHANICAL

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

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

Insulated inserts provided

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

**Bearings:** 61805-2RZ

**Bearing life:**  $5 \times 10^9$  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. 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

**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: Output Format	Code 5: Termination	Code 6: Options	Code 7: Special Options
□□□ <b>25</b>	□□□□	□	□	□	□	□□

Ordering Information

<b>HSD25</b> Heavy Duty Hub Shaft Encoder  <b>ISD25</b> ATEX Intrinsically Safe Hub Shaft 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> 6mm <b>1</b> 1/4" <b>2</b> 5/16" <b>3</b> 8mm <b>4</b> 3/8" <b>5</b> 10mm <b>6</b> 12mm <b>7</b> 1/2" <b>8</b> 5/8" <b>9</b> 15mm <b>A</b> 16mm <b>C</b> 19mm <b>D</b> 3/4"	<b>0</b> Single Ended ABZ, 5-26VDC push-pull <b>1</b> Single Ended ABZ, 5-26VDC Open collector (7273) <b>2</b> Single Ended ABZ, 5-26VDC Open collector (2222) <b>3</b> Single Ended ABZ, 5-26VDC Open collector (2222) w/2.2kOhm <i>Options 4 &amp; 5 not available when Code 5 is H; and Code 6 is 3, 4, 5</i> <b>4</b> Differential AB only, 5-26 in, 5-26 out (7272) <b>5</b> Differential AB only, 5-26 in, 5V out (7272) <i>Options 6 &amp; 7 not available when Code 5 is 0, 1, 5, 6, H; and Code 6 is 3, 4, 5</i> <b>6</b> Differential ABZ, 5-26 in, 5V out (7272) <b>7</b> Differential ABZ, 5-26 in, 5-26 out (7272)	<b>0</b> 6 pin <b>1</b> 7 pin <b>2</b> 10 pin <b>4</b> 10 pin Bayonet <b>5</b> 6 pin+mating <b>6</b> 7 pin+mating <b>7</b> 10 pin+mating <b>8</b> 12 CW pin+mating <b>A</b> .5m (18") cable <b>C</b> 1m (36") cable <b>D</b> 2m (72") cable <b>E</b> 3m (120") cable <b>L</b> 4m (144") cable <b>H</b> 5 pin M12 <b>J</b> 8 pin M12 <b>K</b> 1.5 ft (18") cable w/ in line 10pin connector <b>M</b> 5 ft (60") cable <b>N</b> 10 ft (120") cable	<b>0</b> No Options <b>1</b> Slotted Tether <b>2</b> Single point tether <b>3</b> No tether, Dual isolated outputs <b>4</b> Slotted Tether, Dual isolated Outputs <b>5</b> Single Point Tether, Dual isolated Outputs	<b>Blank</b> None <b>01</b> Nickel Plated <b>02</b> Stainless Steel
	<p><b>**Note:</b> 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</p> <p>† <b>NOTE:</b> Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.</p>		<p><b>Following options are only available when Code 1 is ISD25</b></p> <p><b>A</b> Single Ended ABZ, 7-26 in, 7-26 out push-pull (7272)  <b>C</b> Single Ended ABZ, 5V in, 5V out push-pull (7272)  <b>D</b> Single Ended ABZ, 7-26V in, 5V out Open Collector (7273)  <b>E</b> Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222)  <b>F</b> Single Ended ABZ, 7-26V in, 7-26V out Open Collector w/2.2kOhm pullup (2222)</p> <p><i>Options G, H &amp; J not available when Code 5 is H and Code 6 is 3, 4, 5</i></p> <p><b>G</b> Differential AB only, 5V in, 5V out (7272)  <b>H</b> Differential AB only, 7-26 in, 7-26 out (7272)  <b>J</b> Differential AB only, 7-26 in, 5V out (7272)</p> <p><i>Options K, L &amp; M not available when Code 5 is 0, 1, 5, 6, H and Code 6 is 3, 4, 5</i></p> <p><b>K</b> Differential ABZ, 5V in, 5V out (7272)  <b>L</b> Differential ABZ, 7-26 in, 7-26 out (7272)  <b>M</b> Differential ABZ, 7-26 in, 5V out (7272)</p>		<p><b>Note:</b></p> <p><b>10 foot Cable Assemblies with MS Connector</b>  <b>108594-0010</b> 6 Pin MS, Cable Assy. For Use with Single Ended Outputs  <b>108595-0010</b> 7 Pin MS, Cable Assy. For Use with Single Ended Outputs  <b>108596-0010</b> 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs  <b>1400635-0010</b> 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs  <b>109209-0010</b> NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs</p> <p><b>15 foot Cable Assemblies with M12 Connector</b>  <b>112859-0015</b> 5 Pin M12, Cable Assy. For Use with Single Ended Outputs  <b>112860-0015</b> 8 Pin M12, Cable Assy. For Use with Single Ended Outputs  <b>112860-0015</b> 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs</p> <p><b>Mating Connectors (no cable)</b>                      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, NEMA 4 style (604505 &amp; 604506)</p>	

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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 Diff Line Drv w/o ldx		Cable # 1400635- or 109209- (NEMA4) 10 Pin Diff Line Drv w/ldx		Cable #108615-* 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	7	—	—
Sig. A	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. B	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. Z	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	YEL
0 Volt Sense	—	—	—	—	—	—	—	—	2	GRN	—
5 Volt Sense	—	—	—	—	—	—	—	—	11	BLK/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.

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

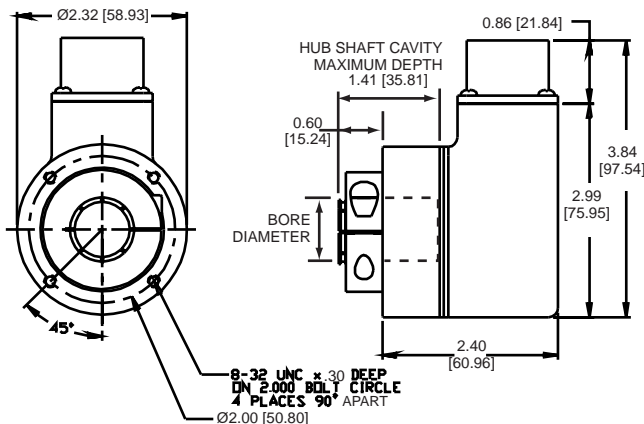
Connector pin numbers and cable assembly wire color information is provided here for reference.

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

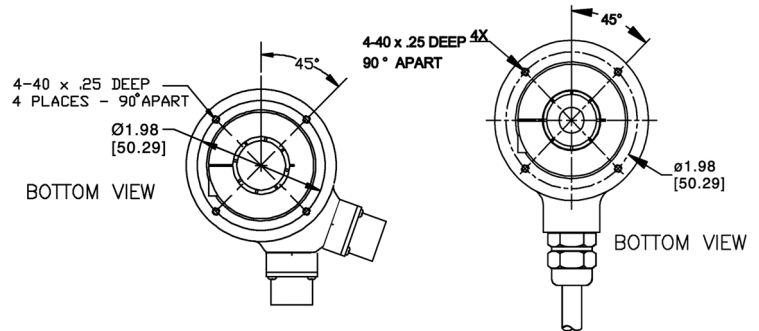
\* Index not provided on all models. See ordering information

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

## DIMENSIONS inches [mm]

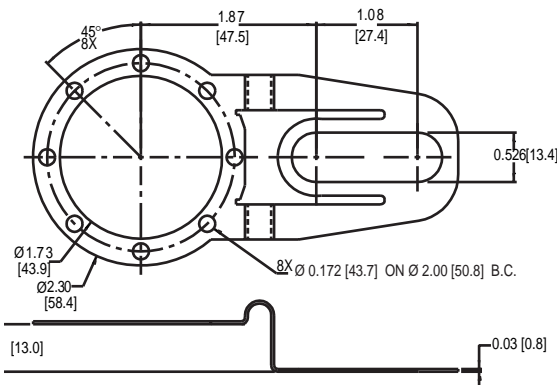


Standard Housing

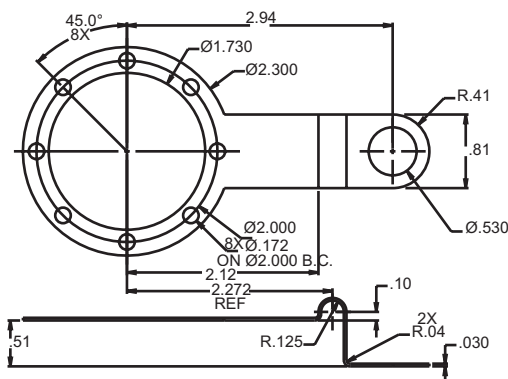


Dual Redundant Outputs

Cable Exit



Slotted Tether



Single Point Tether



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