

# SERIES HD25

**NorthStar™ brand**

## Harsh Duty Optical Encoder

### Key Features

- Size 25 Heavy-Duty Encoder with Single or Dual Isolated Outputs
- Unbreakable Code Disc up to 5000 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 5000 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° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical  
**Symmetry:**  
 For resolutions to 1024 PPR: 180° ± 18° electrical  
 For resolutions over 1024 PPR: 180° ± 25° 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, 5-15VDC dependant on output type. 80 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  
 2N2222 Open Collector: 250mA, sink max  
 4469 Differential Line Driver: 100mA, sink or source  
**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, 5, 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, NEMA4 style (MCN-N6N4)  
 Cable w/ 5 pin M12 Connector (112859-XXXX)  
 Cable w/ 8 pin M12 Connector (112860-XXXX)

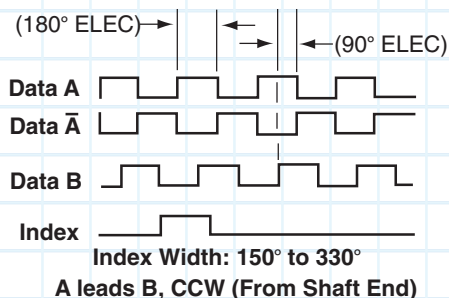
### MECHANICAL

**Shaft Sizes:** 10mm, 12mm, 3/8"  
**Shaft Speed:** 6,000 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 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.  
**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



**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>HD25</b> □	□□□□	□	□	□	□

Ordering Information					
Size 25 Heavy Duty Encoder	<b>0001 0625</b> <b>0024 0720</b> <b>0025 0900</b> <b>0035 1000</b>	<b>0</b> 3/8" Dia. Shaft with flat	<b>0</b> 5-26V in, 5-26V Open Collector out (7273)	<b>1</b> 6 Pin Connector	<b>0</b> Standard Housing
<b>1</b> Unidirectional	<b>0040 1024</b>	<b>4</b> 10mm Dia. Shaft, with flat	<b>2</b> 5-26V in, 5-26V Push-Pull out (7272)	<b>3</b> 7 Pin Connector	<b>1</b> Nickel Finish Housing
<b>2</b> Bidirectional	<b>0050 1200</b>	<b>6</b> 12mm Dia. Shaft	<b>F</b> 5-26V in, 5-26V Open Collector out (2222)	<b>5</b> 10 Pin Connector	<b>2</b> Stainless Steel Housing
<b>3</b> Bidirectional with Index	<b>0060 1250</b> <b>0100 1440</b> <b>0120 1524</b> <b>0192 1600</b> <b>0200 1800</b> <b>0240 2000</b> <b>0250 2048</b> <b>0256 2500</b> <b>0300 2540</b> <b>0360 2600</b> <b>0500 3600</b> <b>0512 4096</b> <b>0600 5000</b>	<b>7</b> 3/8" Dia Shaft w/ Flat, 4 Hole 2.00" BC	<b>G</b> 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)	<b>9</b> 5 Pin M12 Connector	Available when: Code 4 is 0, 2, 3, 4
			Available when: Code1 is 1, 2 and Code 5 is 3,5 or A through P, or Code 1 is 3 and code 5 is 5 or A through P:	<b>A</b> 8 Pin M12 Connector	<b>3</b> Redundant Outputs (Dual Connector Housing).
			<b>3</b> 5-26V in, 5-26V Dif- ferential Line Driver out (7272)	<b>D</b> 18" Sealed Cable	<b>4</b> Nickel Finish Housing with Redundant Outputs.
			<b>4</b> 5-26V in, 5V Dif- ferential Line Driver out (7272)	<b>E</b> 3' Sealed Cable	<b>5</b> Stainless Steel Housing with Redundant Outputs.
			<b>6</b> 5-15V in, 5-15V Dif- ferential Line Driver out (4469)	<b>F</b> 6' Sealed Cable	
				<b>G</b> 10' Sealed Cable	
				<b>H</b> 15' Sealed Cable	
				<b>P</b> 5m Sealed Cable	

**Cable Assemblies with MS Connector**

- 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
- 1400635XXX** 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

**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

**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.



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## ELECTRICAL CONNECTIONS

### 6, 7 & 10 Pin MS Connectors and Cables - When Code 5 = 1, 3, 5, or D-P

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 # 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

### 5 & 8 Pin M12 Accessory Cables when - When Code 5 = 9 or A

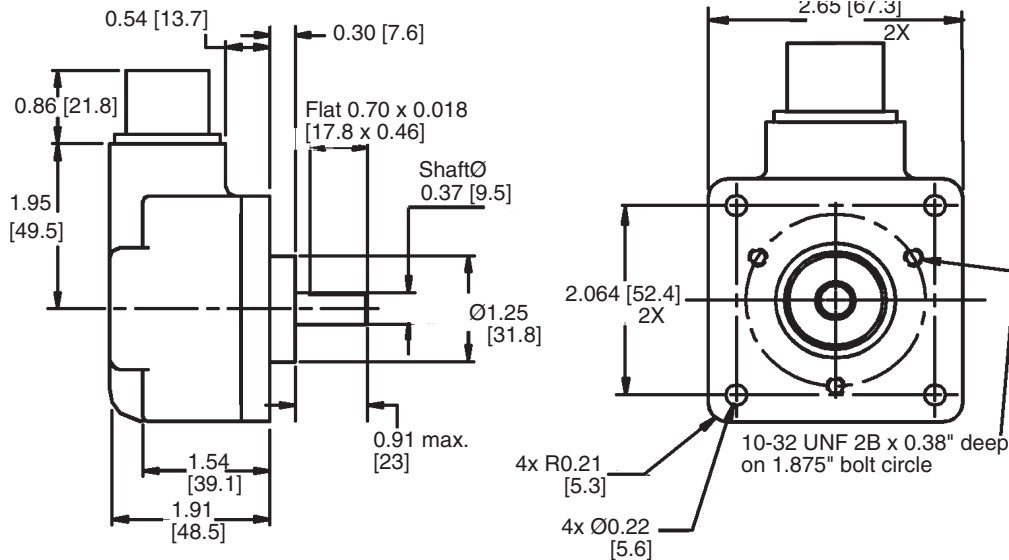
Connector pin numbers and cable assembly wire color information is provided here for reference.

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

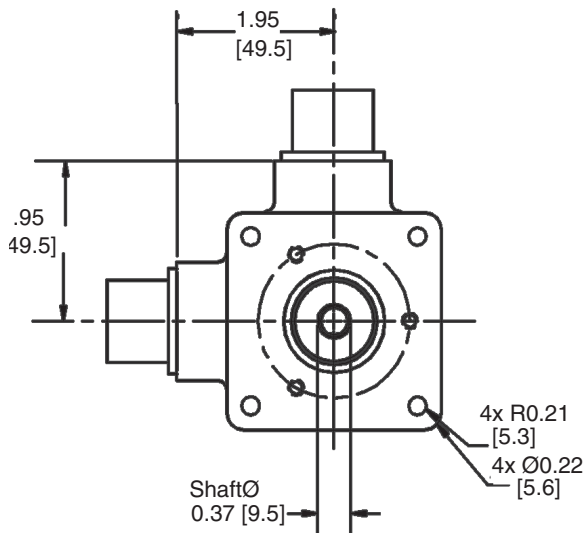
#### NOTES:

- 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

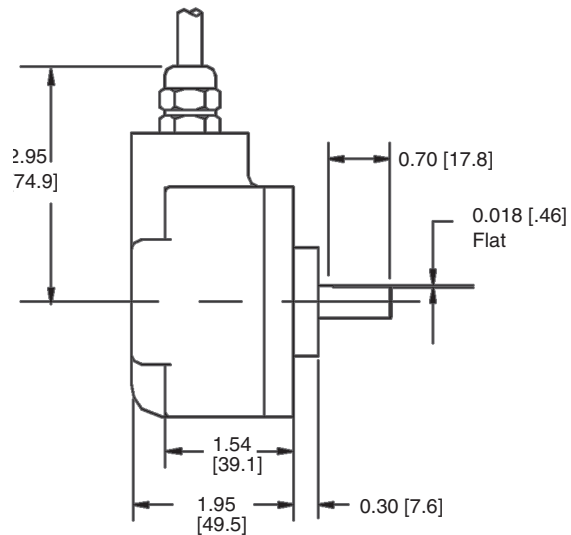
**DIMENSIONS** inches [mm]



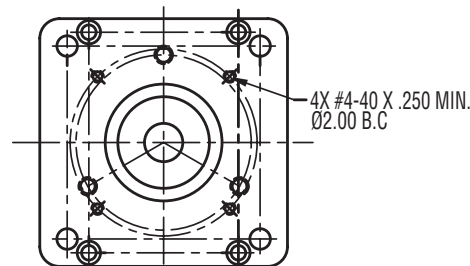
**Standard Housing**



**Dual Redundant Outputs**



**Cable Exit**



**With 4 Hole 2.00" BC**