

SERIES HSD37

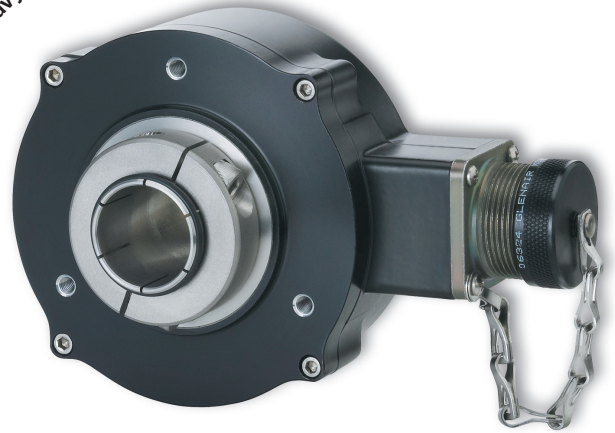
NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Unbreakable Code Disc up to 5000 PPR
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing
- IP67 Sealing
- 400G Shock and 20G Vibration Independently Validated

HD
Heavy Duty



CE
EN 61326-1



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 15 to 5000 PPR (pulses/revolution)
See Ordering Information

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 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°

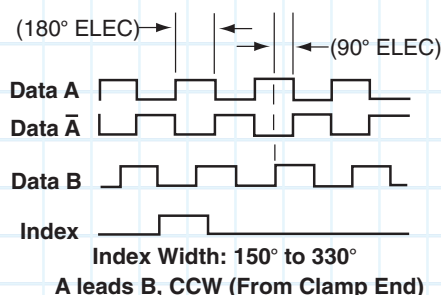
Symmetry:

For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°

Index: 150° to 330°, A leads B, CCW (From Clamp End)

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. 80 mA max., not including output loads.

Outputs:

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

2N2222 Open Collector: 250mA, sink max

Frequency Response: 125 kHz (data & index)

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected with 7272 or 7273 line drivers only

Termination: MS Connector; M12 Connector; M23 Connector; Cable Exit w/Seal.

Mating Connector:

6 Pin MS, Style MS3106A-14S-6S (MCN-N4)

7 Pin MS, Style MS3106A-16S-1S (MCN-N5)

10 Pin MS, Style MS3106A-18-1S (MCN-N6)

10 Pin Bayonet, MS3116-F12-10S (MCN-B1)

10 Pin, NEMA4 Style (MCN-N6N4)

12 Pin CW M23 Connector (MCN-C1)

Cable w/ 5 pin M12 Connector, (112859-XXXX)

Cable w/ 8 pin M12 Connector, (112860-XXXX)

Note: "MS" type mating connectors and pre-built cables are rated NEMA 12. "M12" Cable assemblies are rated IP67

MECHANICAL

Bore Diameter: 6-24mm, 1/4" - 1". Insulated inserts provided for bores under 1 inch (1" bore not electrically isolated for stainless shaft option)

Mounting Configuration: Hollow Bore, direct mount over shaft with multiple tether options

Bore Runout: ±0.0005 TIR at midpoint

Min. Shaft Engagement: 1.60" (Recommended)

Shaft Speed: 6000 RPM max

Starting Torque: 4.5 in.-oz. maximum (at 25°C)

Running Torque: 4.0 in.-oz. maximum (at ambient)

Bearings: 61806-ZZ

Housing and Cover: Hard Anodized Aluminum. Also available in Stainless Steel.

Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)

Disc Material: Mylar

Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C

Storage temperature: -40 to 100°C

Shock: 400G for 6msec duration

Vibration: 5 to 3000Hz @ 20G

Humidity: Up to 98% (non-condensing)

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: Shaft	Code 4: Output Format	Code 5: Termination	Code 6: Options	Code 7: Special Option
HSD37	☐ ☐ ☐ ☐	☐	☐	☐	☐	☐ ☐

Ordering Information						
HSD37 Heavy Duty Hollowshaft Encoder	0015	Electrically isolated:	0 Single Ended ABZ, 5-26VDC push-pull (7272)	0 6 pin connector	0 No Options	Blank None
	0032		1 Single Ended ABZ, 5-26VDC open collector (7273)			
	0050	0 6mm	2 Single Ended ABZ, 5-26VDC open collector (2222)	1 7 pin connector	1 Slotted Tether	01 Nickel Plated
	0060	1 1/4"	3 Single Ended ABZ, 5-26VDC open collector w/1kOhm (2222)	2 10 pin connector	2 Single Point 4.5" C-Face Tether	02 Stainless Steel
	0100	2 5/16"	<i>Options 4 & 5 not available when Code 5 is H</i>		3 Single Point 8.5" C-Face Tether	
	0200	3 8mm	4 Differential AB only, 5-26VDC in, 5-26V out (7272)	4 10 pin Bayonet connector	4 Dual Isolated Outputs, No Tether	
	0240	4 3/8"	5 Differential AB only, 5-26VDC in, 5V out (7272)	5 6 pin+mating connector	5 Dual Isolated Outputs, Slotted Tether	
	0250	5 10mm	<i>Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H</i>		6 Dual Isolated Outputs, 4.5" C-Face Tether	
	0500	6 12mm	6 Differential ABZ, 5-26VDC in, 5V out (7272)	6 7 pin+mating connector	7 Dual Isolated Outputs, 8.5" C-Face Tether	
	0512	7 1/2"	7 Differential ABZ, 5-26VDC in, 5-26 out (7272)	7 10 pin+mating connector	A Swivel Rod Tether	
	0600	8 5/8"		8 12 pin+mating connector	C Metric Swivel Rod Tether	
	1000	9 15mm		9 10 pin Bayonet+mating connector	D Dual Isolated Outputs, Swivel Rod Tether	
	1024	A 16mm		A .5m (20") cable	E Dual Isolated Outputs, Metric Swivel Rod Tether	
	1200	C 19mm		C 1m (39") cable		
	2000	D 3/4"		D 2m (79") cable		
	2048	E 20mm		H 5 pin M12 connector		
	3072	F 7/8"		J 8 pin M12 connector		
	4000	G 24mm		K 1.5 ft (18") cable w/ in line 10pin connector		
	4096	R 1"		M 5 ft (60") cable		
	5000	Not electrically isolated:		N 10 ft (120") cable		
		H 1"		P 1.5 ft (18") Cable with 10-pin Bulkhead Connector		
		P 25mm		<i>Available when Code 6 is 0, 1, 2, 3, A, C</i>		
				T Terminal box w/conduit entry		

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
- 1400635XXXX** 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
- 114448-XXXX** 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*

- 115901-XXXX** 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

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.

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
- MCN-B1** 10 Pin Bayonet, style MS3116-F12-10S
- MCN-C1** 12 Pin CW M23 Connector

Accessories

- 114573-0001** Tether Kit, 4.5" C-Face Single Point with 3/8" Bolt
- 114574-0001** Tether Kit for Standard AC Motor Fan Covers with T-Bolt
- 114575-0001** Tether Kit, 8.5" C-Face Single Point with 1/2" Bolt

The following Cover Kits are not compatible when Code 5 is T

- 114591-0001** Cover Kit, 56 C-Face
- 114592-0001** Cover Kit, Fan Cover
- 114593-0001** Dual Cover Kit, 56 C-Face
- 114594-0001** Dual Cover Kit, Fan Cover

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ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS and M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	A	BRN	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\bar{Z}^*$	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

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

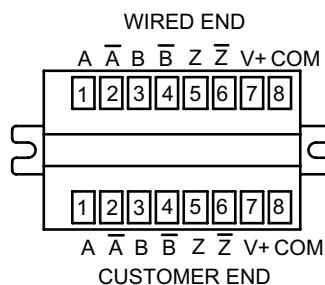
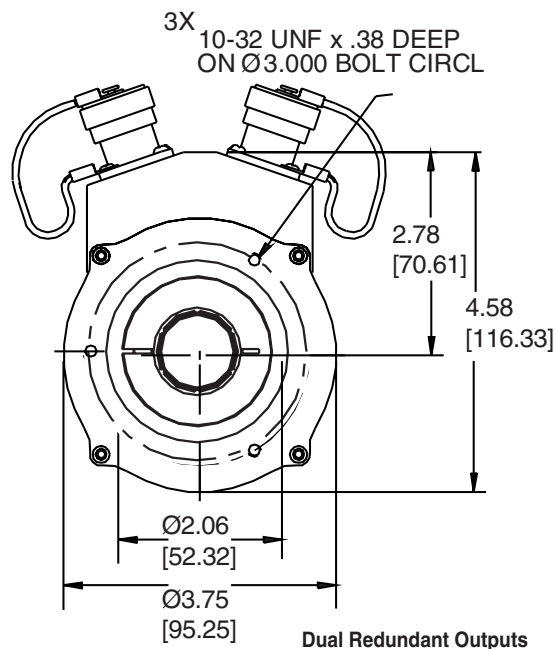
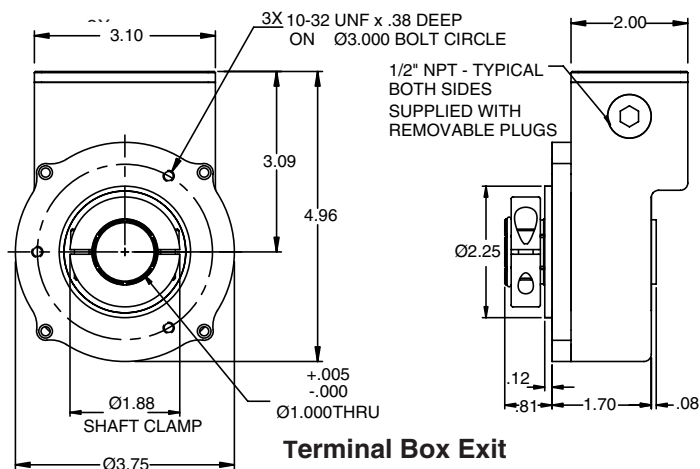
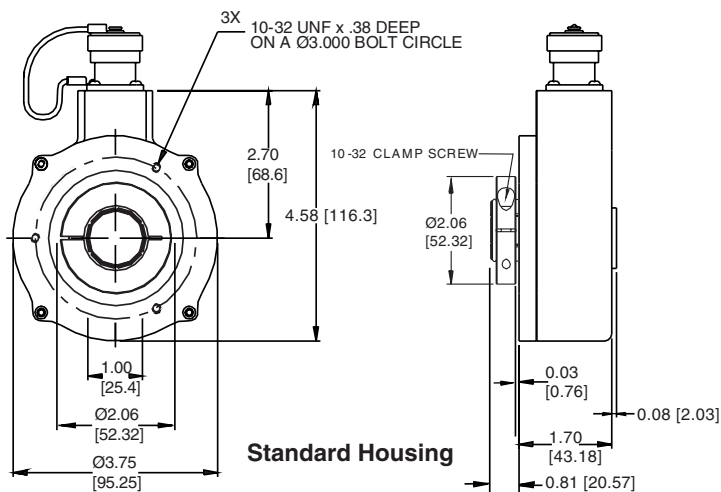
Connector pin numbers and cable assembly wire color information is provided here for reference.

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\bar{A}$	—	—	—	—	3	BRN/WHT
Sig. $\bar{B}$	—	—	—	—	5	ORG/WHT
Sig. $\bar{Z}^*$	—	—	—	—	8	YEL/WHT

NOTES:

- 1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 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])

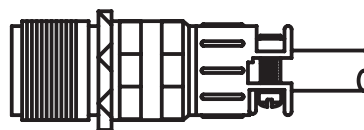
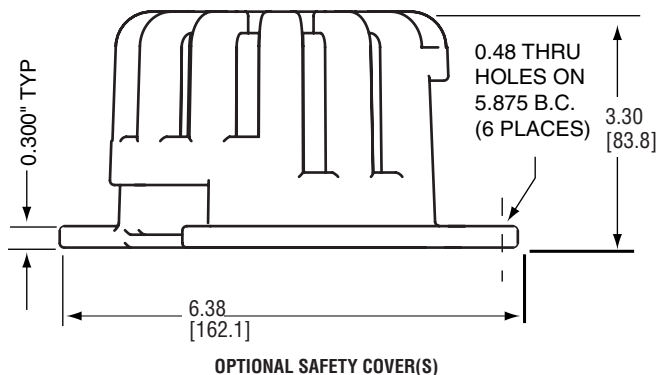
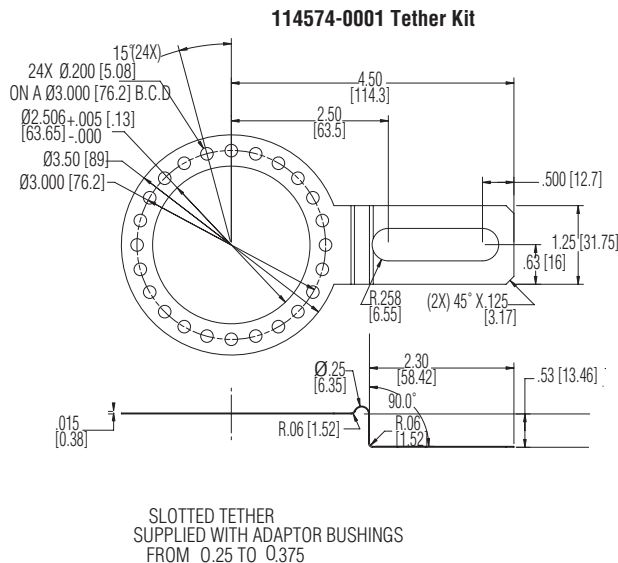
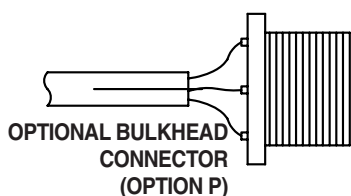
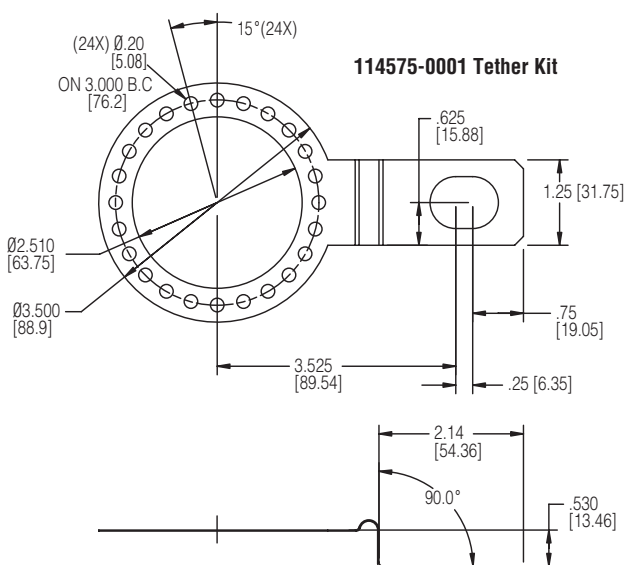
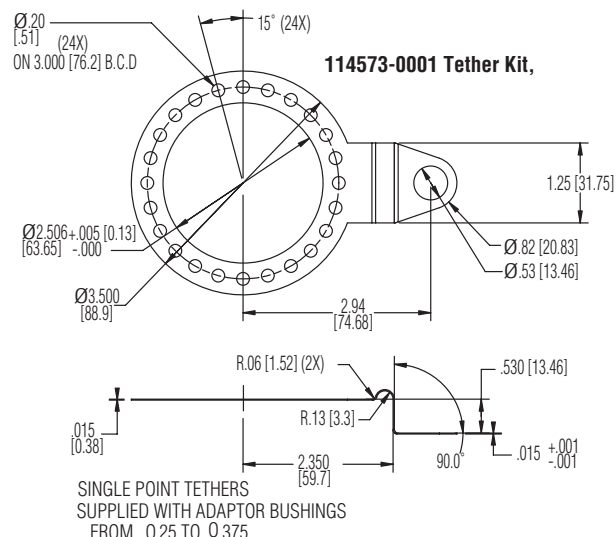


A -	GREEN
$\bar{A}$ -	VIOLET
B -	BLUE
$\bar{B}$ -	BROWN
Z -	ORANGE
$\bar{Z}$ -	YELLOW
V+ -	RED
COM -	BLACK

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DIMENSIONS (inches [mm])



PIGTAIL WITH MS CONNECTOR (OPTION K)



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