

SERIES HSD37

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Unique Sealing Design Offers Improved Ingress Protection
- Anodized Aluminum, Stainless Steel or Nickel Plated Housing
- Dual Isolated Outputs Available for Redundancy
- Quadrature Resolution up to 20,000 PPR
- Numerous Bore Size Options up to 1 inch

HD
Heavy Duty



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, optical
Resolution: 1 to 20,000 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: 90° ± 30° electrical
Symmetry: 180° ± 25° electrical
Index: 180° default gated to B low
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC, 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
Frequency Response: 200 kHz (data and index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity (All Models); Short Circuit Protection (7272 and 7273 line drivers only)
Termination: MS Connector; M12 Connector; M23 Connector; Cable Exit with 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 with 5 pin M12 Connector, (112859-XXXX)
 Cable with 8 pin M12 Connector, (112860-XXXX)

MECHANICAL

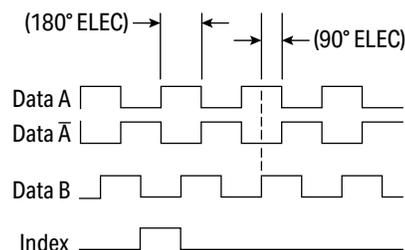
Bore Diameter: 6-25mm, 1/4" - 1". Insulated inserts provided for bores under 1 inch (1" and 25mm non-electrically isolated option available)
Mounting Configuration: Hollow Bore, direct mount over shaft with multiple tether options
Bore Runout: ±0.0005 TIR at midpoint
Min. Shaft Engagement: 1.60" (Recommended)
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 and Nickel Plated
Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)
Disc Material: Aluminum
Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C
Storage temperature: -40 to 100°C
Shock: 400G for 6ms duration
Vibration: 5 to 3000Hz @ 20G
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67

STANDARD DATA AND INDEX

Not all complements shown
 A shown for reference



Index Width: 180° Default
 A leads B, CCW (from clamp end)

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

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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 Options	
HSD37	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	
HSD37 Heavy Duty Hollowshaft Encoder	Enter Custom PPR from 1 to 20,000 Examples: 0001 = 1 PPR 0256 = 256 PPR 1000 = 1000 PPR 9999 = 9999 PPR A000 = 10,000 PPR B000 = 11,000 PPR C999 = 12,999 PPR . . G000 = 16,000 PPR G384 = 16,384 PPR H000 = 17,000 PPR J000 = 18,000 PPR K000 = 19,000 PPR L000 = 20,000 PPR Note: Letter "I" is skipped and not use	Electrically Isolated (Stainless Steel Shaft, Non-Metallic Insert)	Available for all Code 5 options	0 6 pin connector 1 7 pin connector 2 10 pin connector 3 12 pin connector 4 10 pin Bayonet connector 5 6 pin+mating connector 6 7 pin+mating connector 7 10 pin+mating connector 8 12 pin+mating connector 9 10 pin Bayonet+mating connector A .5m (20") cable C 1m (39") cable D 2m (79") cable H 5 pin M12 connector J 8 pin M12 connector K 1.5 ft (18") cable w/ in line 10pin connector M 5 ft (60") cable N 10 ft (120") cable P 1.5 ft (18") Cable with 10-pin Bulkhead Connector	0 No Options 1 Slotted Tether 2 Single Point 4.5" C-Face Tether 3 Single Point 8.5" C-Face Tether 4 Dual Isolated Outputs, No Tether 5 Dual Isolated Outputs, Slotted Tether 6 Dual Isolated Outputs, 4.5" C-Face Tether 7 Dual Isolated Outputs, 8.5" C-Face Tether A Swivel Rod Tether C Metric Swivel Rod Tether D Dual Isolated Outputs, Swivel Rod Tether E Dual Isolated Outputs, Metric Swivel Rod Tether	Blank None 01 Nickel Plated 02 Stainless Steel	
		0 6mm 1 1/4" 2 5/16" 3 8mm 4 3/8" 5 10mm 6 12mm 7 1/2" 8 5/8" 9 15mm A 16mm C 19mm D 3/4" E 20mm F 7/8" G 24mm	Single Ended ABZ, 5-26VDC push-pull (7272) Single Ended ABZ, 5-26VDC open collector (7273) Single Ended ABZ, 5-26VDC open collector (2222) Single Ended ABZ, 5-26VDC open collector w/1kOhm (2222)	Options 4 and 5 not available when Code 5 is H Differential AB only, 5-26VDC in, 5-26V out (7272) Differential AB only, 5-26VDC in, 5V out (7272)	Options 6 and 7 not available when Code 5 is 0, 1, 5, 6, H Differential ABZ, 5-26VDC in, 5V out (7272) Differential ABZ, 5-26VDC in, 5-26 out (7272)	Available when Code 6 is 0, 1, 2, 3, A, C Terminal box w/conduit entry	
		Electrically Isolated (Anodized Aluminum Shaft)	Options 4 and 5 not available when Code 5 is H				
	Not Electrically Isolated (Stainless Steel Shaft)						

ACCESSORIES

Cable Assemblies with MS Connector			
SKU	Pins		Use with...
108594-XXXX	6 Pin MS	Connector, Cable Assembly	single ended outputs
108595-XXXX	7 Pin MS		single ended outputs
108596-XXXX	7 Pin MS		differential line driver without index outputs
1400635XXXX	10 Pin MS		differential line driver with index outputs
109209-XXXX	NEMA4 10 pin MS		differential line driver with index outputs
114448-XXXX	10 Bayonet		differential line driver with index outputs

Cable Assemblies with M23 Connector			
SKU	Pins		Use with...
115901-XXXX	12 pin M23	Connector, Cable Assembly	differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector			
SKU	Pins		Use with...
112859-XXXX	5 Pin M12	Connector, Cable Assembly	single ended outputs
112860-XXXX	8 Pin M12		single ended outputs
112860-XXXX	8 Pin M12		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)		
SKU	Pins	Style
MCN-N4	6 pin	MS3106A-14S-6S
MCN-N5	7 pin	MS3106A-16S-1S
MCN-N6	10 pin	MS3106A-18-1S
MCN-N6N4	10 pin	NEMA4
MCN-B1	10 Pin Bayonet	MS3116-F12-10S
MCN-C1	12 Pin CW	M23 Connector

Tether Kits		
SKU	Kit	Kit Type
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

Cover Kits (Note: These are not compatible with Terminal Box versions)		
SKU	Kit	Kit Type
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 AND 10 PIN MS AND M23 CONNECTORS AND CABLES

Connector and 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 Diff Line Driver without Index		Cable # 109209-XXXX* or 1400635XXXX 10 Pin Diff Line Driver with Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable # 115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color Code	Pin	Wire Color Code	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	A	BRN	5	BRN	GRN
Signal B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORG	BLU
Signal 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
Common	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	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	J	ORG/WHT	1	ORG/WHT	BRN
Sig. \bar{Z} [†]	—	—	—	—	—	—	J	YEL/WHT	K	YEL/WHT	4	YEL/WHT	YEL

5 AND 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
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
Common	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:

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)

Cable Configuration (Table 2): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum

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

"MS" Type mating connectors and pre-build cables are rated NEMA 12

"M12" Cable assemblies are rated IP67

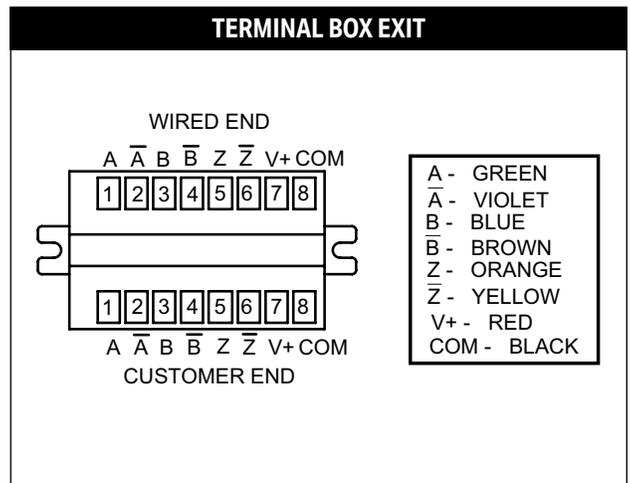
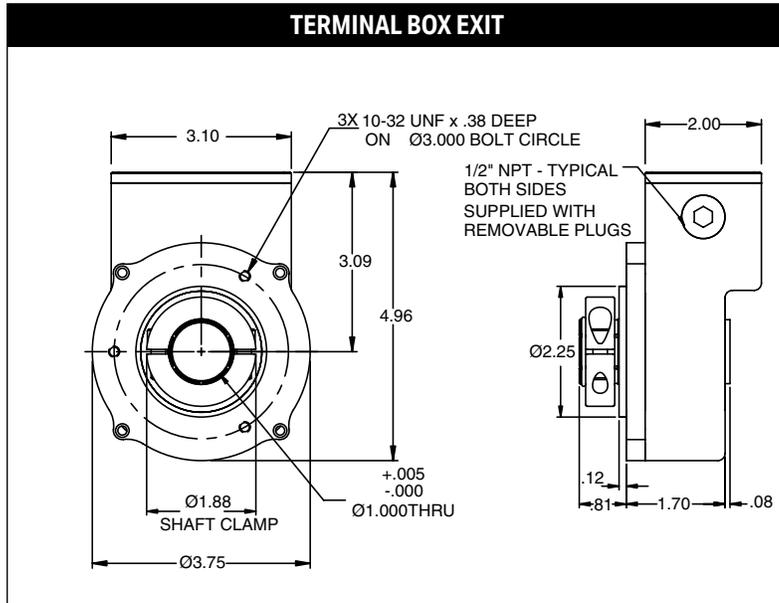
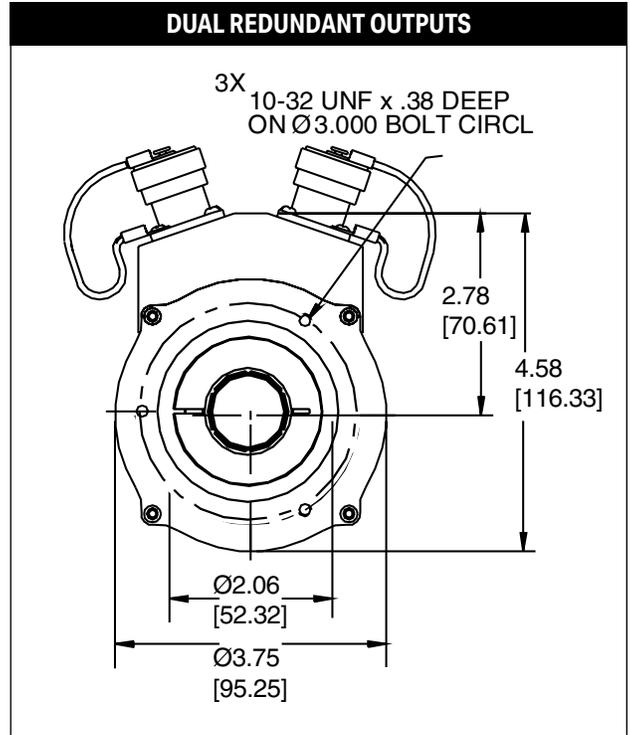
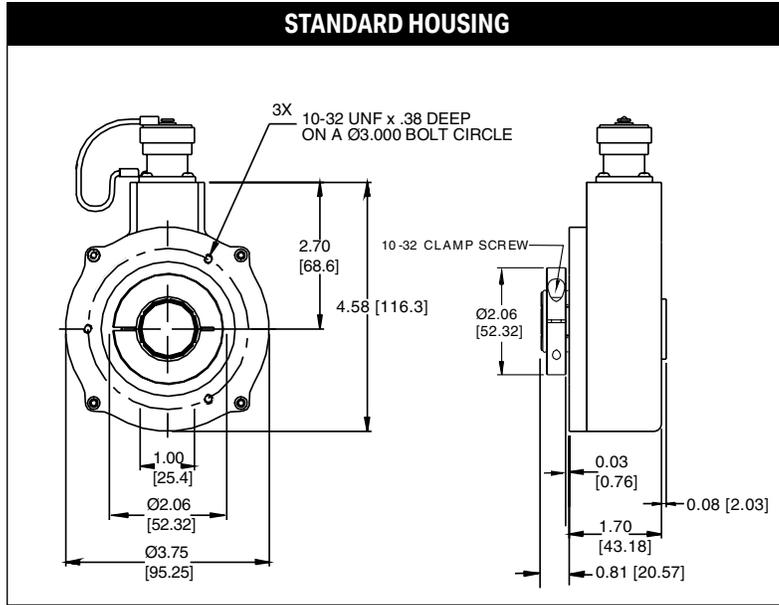
*For watertight applications, use NEMA 4 10 pin cable and connector 109209-XXXX

[†] Index not provided on all models. See ordering information

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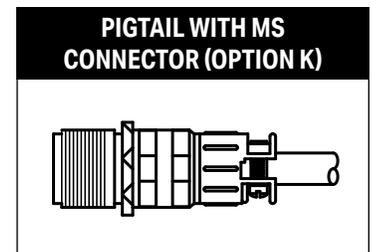
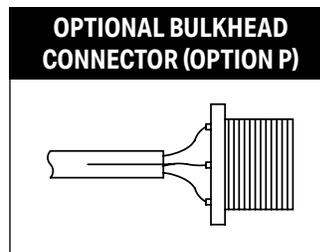
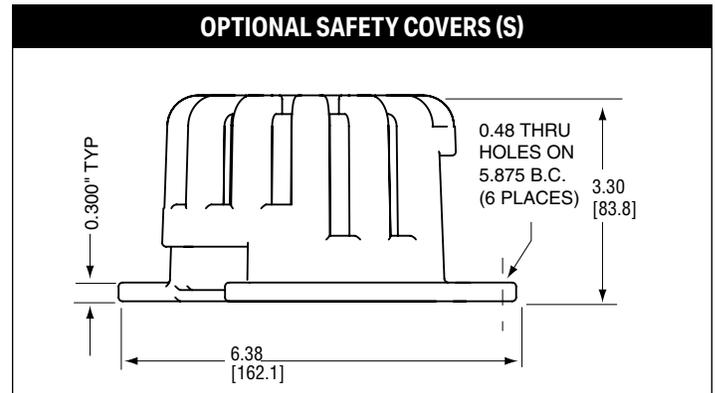
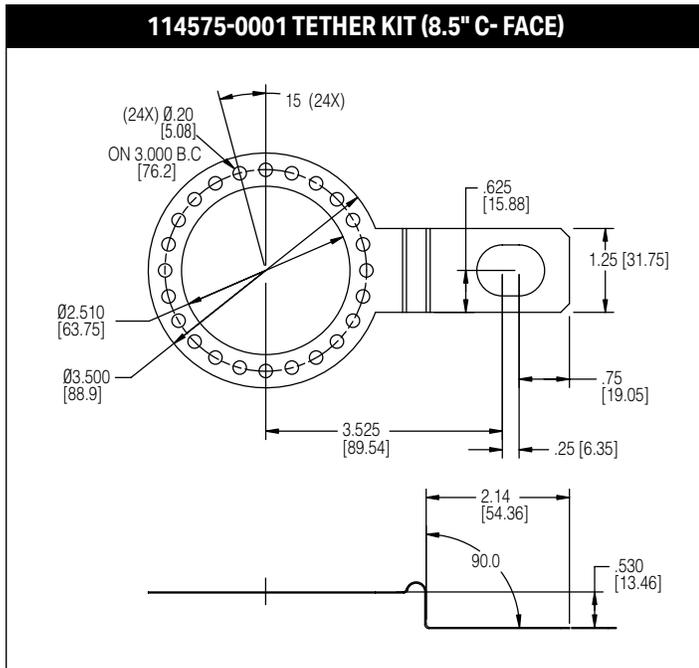
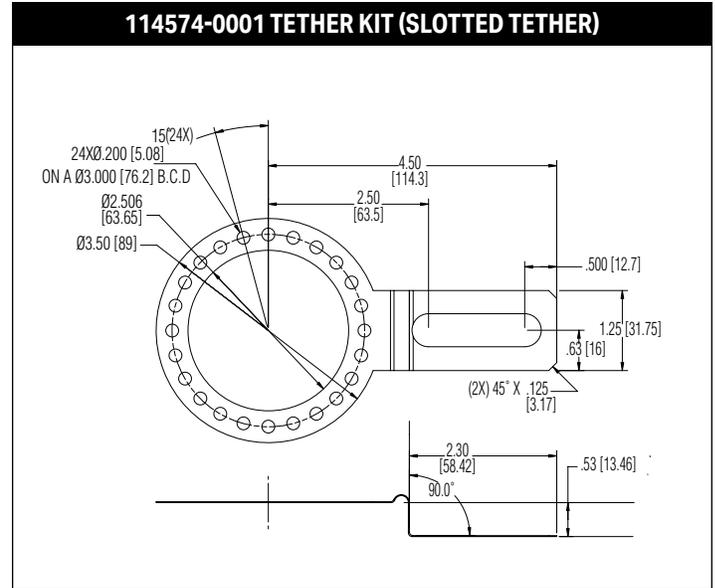
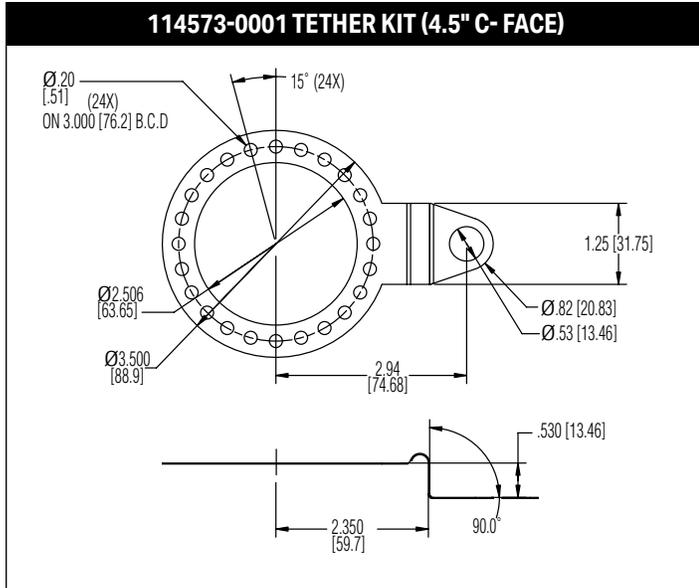
Dimensions: inch [mm]



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Dimensions: inch [mm]



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