

SERIES HSD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Through Hollow Shaft Design
- Dual Sealed Design for IP67 Protection
- Wide Operating Temperature Range from -40 to 100C
- Numerous Bore Size Options up to 1 inch

HD
Heavy Duty



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. Reverse Phasing, A Leads B for CW also available. See Code 7 in Ordering Information

Quadrature Phasing: 90° ± 15° electrical

Symmetry: 180° ± 18° 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

Frequency Response: 200 kHz (data and index)

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

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, NEMA4 Style (MCN-N6N4)

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

12 Pin CW M23 Connector (MCN-C1)

Cable with 5 Pin M12 Connector (112859-XXXX)

Cable with 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: 12mm - 20mm, 1/2" - 1". Insulated inserts provided for bores under 1 inch

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

Bore Tolerance:

1" bore: 1.0005" -0.0000" / +0.0010"

< 1" bore: Nominal -0.000" / +0.002"

Shaft Speed: 6000 RPM Maximum

Mating Shaft Requirements:

Configuration: Keyway allowed, Flat not allowed

Runout: ±0.025" (0.635mm) radial, typical

Endplay: ±0.050" (1.27mm) axial, typical

Length: 1.25", Minimum, 1.60", Recommended

Maximum Length (w/ cover on): 2.50" (63.5mm)

Starting Torque: 8 in-oz. maximum (at 25°C)

Running Torque: 5 in-oz. maximum (at 25°C)

Bearings: 61806-ZZ

Housing and Cover: Aluminum

Shaft Material: Stainless steel

Disc Material: Aluminum

Weight: 26 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C

Storage temperature: -40 to 100°C

Shock: 50G's for 11msec duration

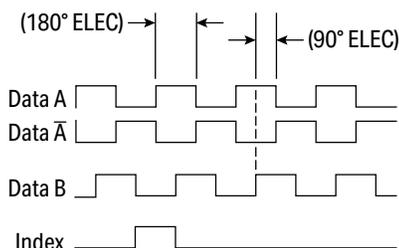
Vibration: 5 to 2000Hz @ 20 G's

Humidity: Up to 98% (non-condensing)

Enclosure Rating: IP67

STANDARD DATA AND INDEX

Not all complements shown
A̅ shown for reference



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

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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: Bore Size	Code 4: Format	Code 5: Output	Code 6: Termination	Code 7: Options	Code 8: Housing
HSD38	<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"/>
HSD38 Heavy Duty Hollowshaft Encoder	0015 0032 0050 0060 0100 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 3072 4000 4096 5000	Electrically isolated: 6 12mm 9 15 mm 7 1/2" 8 5/8" A 16mm C 3/4" D 20mm E 7/8" T 5/8" Stainless Steel Collar Clamp Not electrically isolated: G 1" H 1" Stainless Steel Collar Clamp	0 Single Ended, Unidirectional (A) 1 Single Ended, Bidirectional (AB) 2 Single Ended, Bidirectional with Index (ABZ) Available when Code 5 is 3 or 4 and Code 6 is 1, 2, 3, 4, 6, 7, 8, 9, A, B, C, D, G, J, K, P 3 Differential, Bidirectional (AABB) Available when Code 5 is 3 or 4 and Code 6 is 2, 3, 4, 7, 8, 9, A, B, C, D, G, J, K, P 4 Differential, Bidirectional with Index (AABBZZ)	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out (7272) Available when Code 4 is 3 or 4 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272)	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 10 pin Bayonet + mating connector 9 12 pin + mating connector A 18" (.5m) cable B 36" (1m) cable C 72" (2m) cable D 144" (4m) cable G 13" (.3m) cable J 8 pin M12 connector K 18" (.5m) Cable with 10-pin In-Line Connector P 1.5 ft (18") Cable with 10-pin Bulkhead Connector Available when Code 5 is 0 or 2 H 5 pin M12 connector L 5 pin M12 connector with special pinout	0 No Option 2 Reverse Phasing Only available when code 3 is G or H 1 Internally Isolated 1" Bore 3 Internally Isolated 1" Bore, and Reverse Phasing	0 Cast Aluminum Housing, Slotted Tether Included 6 Cast Aluminum Housing, No Tether C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4-1/2" C-Face) D Same as "0" with Cover Kit E Same as "C" with Cover Kit K Cast Aluminum Housing, Single-Point Tether Included (NEMA 8-1/2" C-Face) M Swivel-Rod Tether with Metric Hardware N Same as "K" with Cover Kit

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
114448-XXXX	10 Bayonet		differential line driver with index outputs
109209-XXXX	NEMA4 10 pin MS		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
114619-0001	Tether Kit	4.5" C-Face Single Point with 3/8" Bolt
114620-0001	Tether Kit	Slotted with T-Bolts for Standard AC Motor Fan Covers
114621-0001	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	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	
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	—	—
Signal \bar{A}	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Signal \bar{B}	—	—	—	—	E	ORG/WHT	I	ORG/WHT	J	ORG/WHT	1	ORG/WHT	BRN
Signal \bar{Z} [†]	—	—	—	—	—	—	J	YEL/WHT	K	YEL/WHT	4	YEL/WHT	YEL

5 AND 8 PIN M12 ACCESSORY CABLES WHEN CODE 6 = H OR J

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	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 24 AWG (output signals), plus 2 twisted pairs 22 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

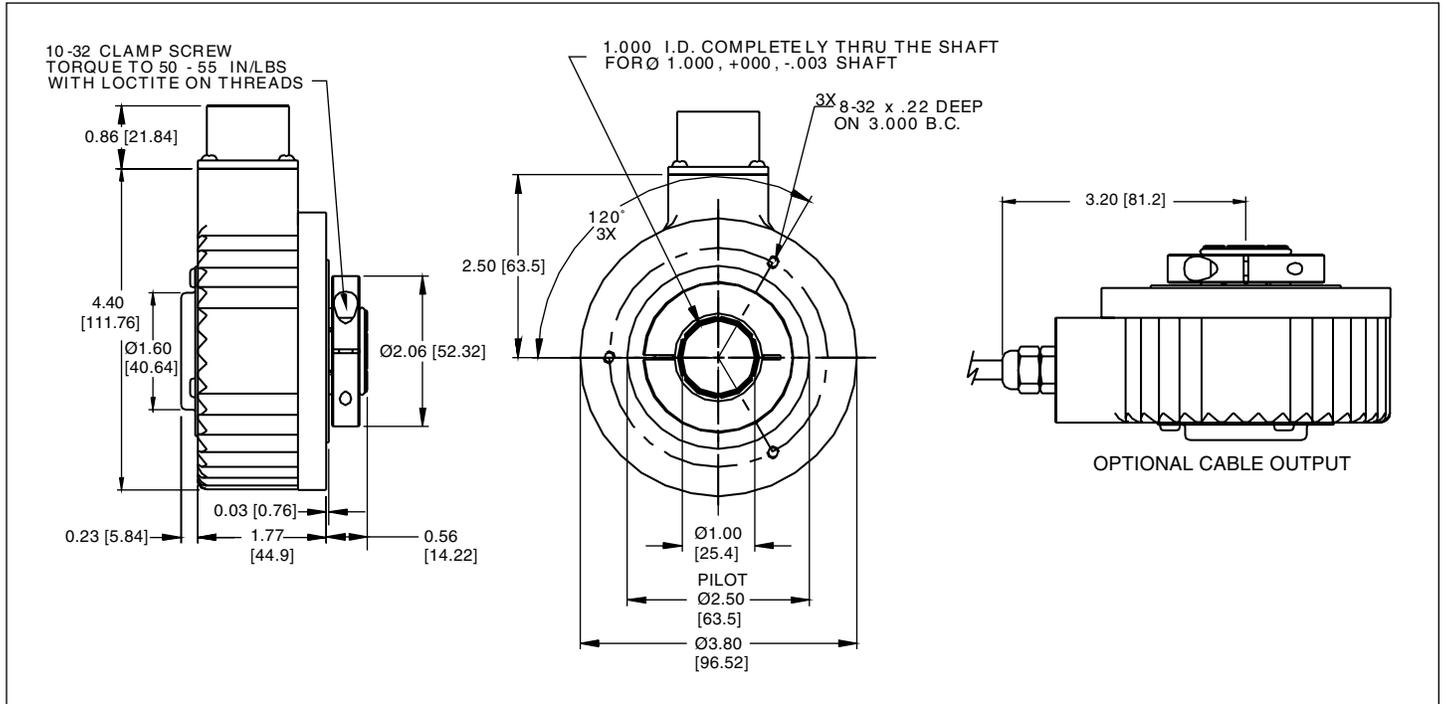
*For watertight applications, use NEMA4 10 pin cable and connector 109209-XXXX

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

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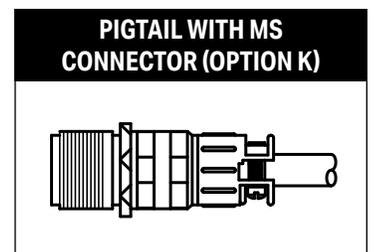
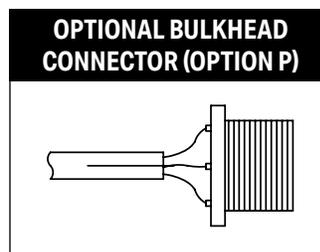
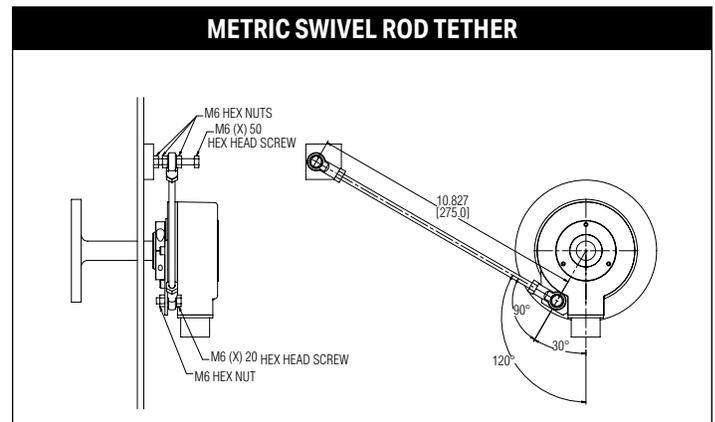
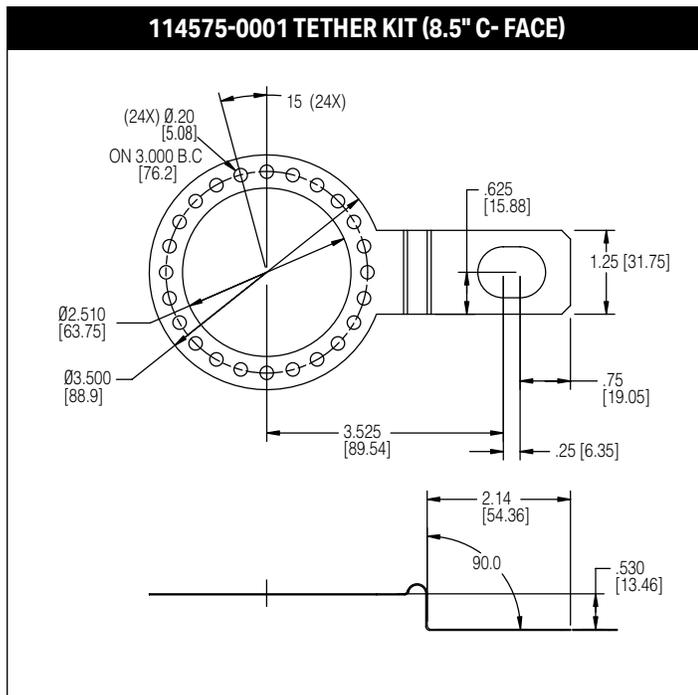
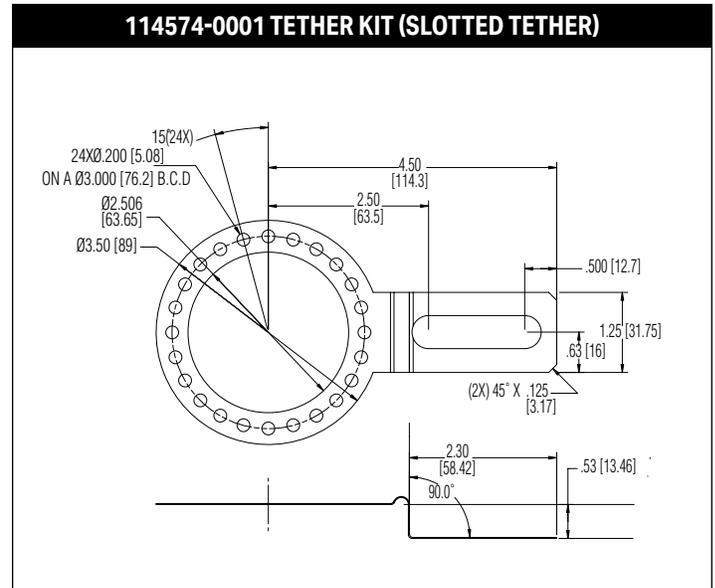
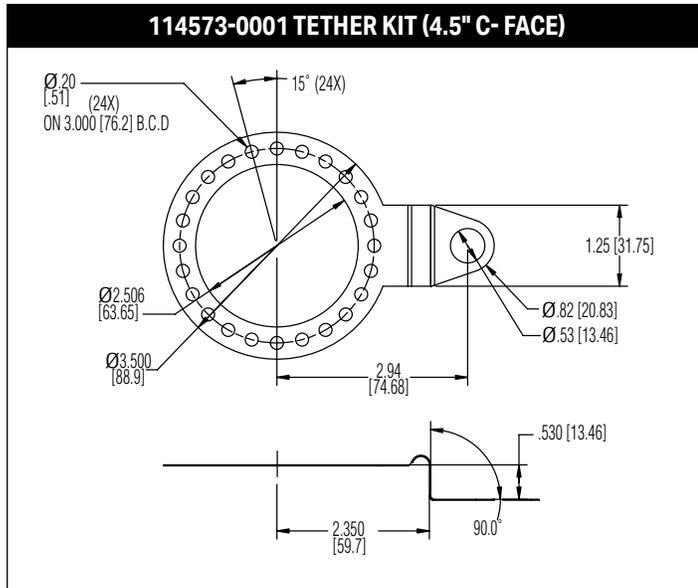
Dimensions: inch [mm]



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