

SERIES HSD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Premier Choice for Vector Motor OEMs
- Unbreakable Code Disc up to 5000 PPR
- Dual-Sealed Housing
- Electrically & Thermally Isolated Hollow shaft



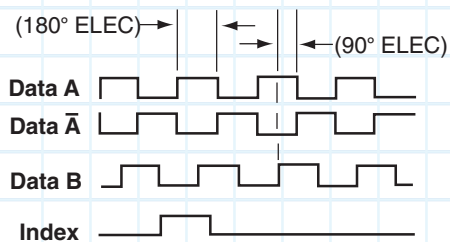
SPECIFICATIONS

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 to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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°, Reverse Phasing, A leads B for CW also available: See Code 7 in Ordering Information
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
 A̅ shown for reference



Index Width: 150° to 330°

A leads B, CCW (From Clamp End)

(Reverse phasing, A leads B for CW also available: See Code 7 in Ordering Information)

ELECTRICAL

Input Power: 5-26VDC. 50 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: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information
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)
 12 Pin CW M23 Connector (MCN-C1)
 Cable w/ 5 Pin M12 Connector, p/n 112859-xxxx
 Cable w/ 8 Pin M12 Connector, p/n 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: 6061-T6 Aluminum
Disc Material: Mylar
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

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"/>

Ordering Information

HSD38 Size 38 Heavy-duty, hollowshaft encoder	0015	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	0 Single Ended, Unidirectional (A)	0 5-26V in, 5-26V Open Collector out (7273)	0 6 pin connector 1 7 pin connector 2 10 pin connector 3 12 pin connector 4 10 pin Bayonet con- nector 5 6 pin + mating con- nector 6 7 pin + mating con- nector 7 10 pin + mating con- nector 8 10 pin Bayonet + mating connector 9 12 pin + mating connec- tor 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	0 No Option 1 Internally Isolated 1" Bore 2 Reverse Phasing, No Bore Isola- tion 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
	0032 0050 0060 0100 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 3072 4000 4096 5000		Available when Code 5 is 3 or 4 and Code 6 is 1, 2, 4, 6, 7, 8, 9, A, B, C, D, G, J, K, P, H, L: 3 Differential, Bidi- rectional (AĀ BB̄̄)	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, H, L: 4 Differential, Bidi- rectional with Index (AĀ BB̄̄ ZZ̄̄)			

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
- 112123-XXXX** 6 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
- 114448-XXXX** 10 Bayonet, 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

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** Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

- 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 bayonet, style MS3116-F12-10S (MCN-B1)
- 12 Pin CW M23 Connector (MCN-C1)

Accessory Kits

- 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
- 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

*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.

SERIES HSD38



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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 1400635XXXX **Cable # 109209-XXXX 10 Pin Dif 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	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. A	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. B	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. Z*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

5 & 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.

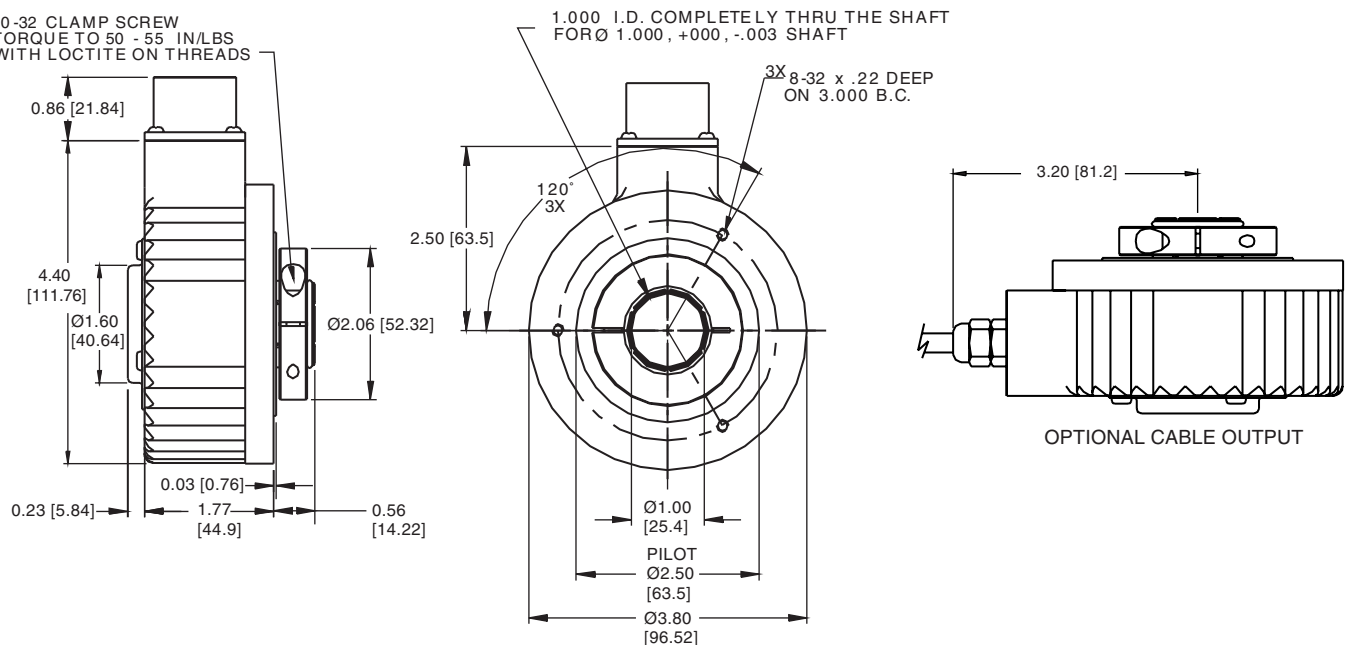
Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	BLK	1	BRN	1	BRN
Sig. B	2	WHT	4	ORG	4	ORG
Sig. Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig. A	—	—	—	—	3	BRN/WHT
Sig. B	—	—	—	—	5	ORG/WHT
Sig. Z*	—	—	—	—	8	YEL/WHT

NOTES:

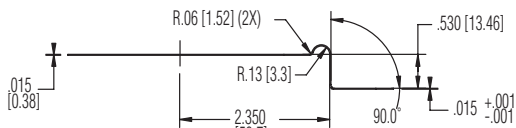
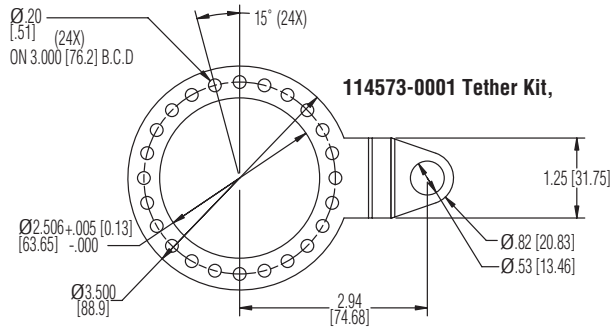
- 1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
- 2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
- 3) Standard cable 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 1400635XXXX or 109209-XXXX.
- 6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
- 7) "M12" Cable assemblies are rated IP67

DIMENSIONS inch [mm]

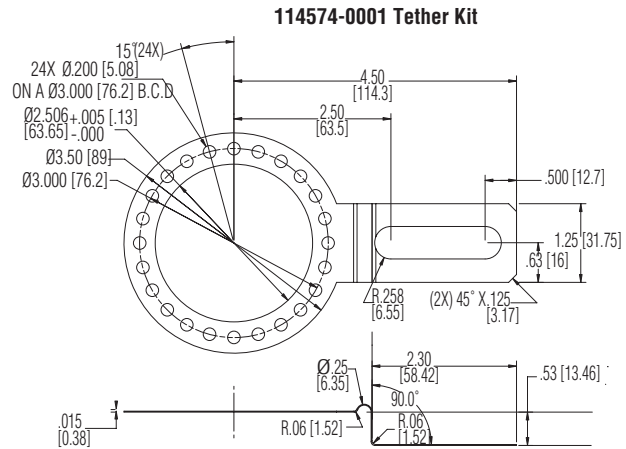
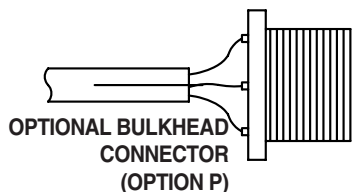
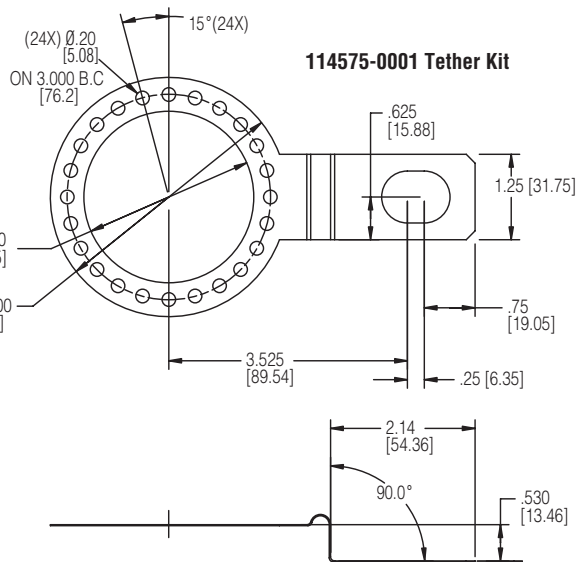
10-32 CLAMP SCREW
TORQUE TO 50 - 55 IN/LBS
WITH LOCTITE ON THREADS



DIMENSIONS inch [mm]



SINGLE POINT TETHERS
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375



SLOTTED TETHER
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375

