

# SERIES ISW38

NorthStar™ brand

## Hazardous Duty Encoder

### Key Features

- Draw Works Threaded Shaft with Field Replaceable Adapters for Reduced Downtime
- ATEX, UL and IECEx Certified for Hazardous Duty Applications
- Class I, Division 1 and Zone 0 Certified
- Anodized Aluminum or Stainless Steel Housing
- NAMUR Sensor Output Available

HAZ  
Hazardous Duty



II1G  
Ex ia op is IIB T4 Ga

E116133  
Class 1, Div 1 Group C&D

### SPECIFICATIONS

#### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental, Optical

**Resolution:** 1 to 9,000 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:**  $90^\circ \pm 30^\circ$  electrical

**Symmetry:**  $180^\circ \pm 25^\circ$  electrical

**Index:**  $180^\circ$  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:** 5VDC, 7-26VDC

##### Outputs:

2N2222 Open Collector: 250mA, sink max

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 (All models); Short circuit protection (7272 and 7273 line drivers only)

**Termination:** 6, 7, or 10 pin MS Connector; M23 Connector; Cable exit with 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)

12 pin CW, M23 Connector (MCN-C1)

Cable with 5 pin M12 Connector (112859-XXXX)

Cable with 8 pin M12 Connector (112860-XXXX)

#### MECHANICAL

##### Shaft Sizes:

1"-14 UNS x 5/8" - 18 UNF Threaded Shaft;

1"-14 UNS Threaded Shaft;

1"-14 UNS x 5/8" - 18 UNF Field Replaceable Threaded Shaft

**Shaft Speed:** 6000 RPM max

**Bore Loading:** Up to 20 lbs axial and radial

**Bore Runout:** 0.0005 TIR at midpoint

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

**Running Torque:** 4.0 in-oz. max (at 25°C)

**Bearings:** 61806-ZZ

**Housing and Cover:** Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel

**Shaft Material:** 300 series stainless steel

**Disc Material:** Aluminum

**Weight:** 35 ounces, typical

#### ENVIRONMENTAL

**Operating Temperature:** -40 to 80°C

**Storage temperature:** -40 to 100°C

**Shock:** 400g for 6ms duration

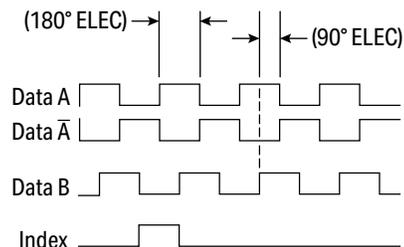
**Vibration:** 5 to 3000Hz @ 20g

**Humidity:** Up to 98% (non-condensing)

**Enclosure Rating:** IP67

#### STANDARD DATA AND INDEX

Not all complements shown  
 $\bar{A}$  shown for reference



Index Width:  $180^\circ$  Default  
 A leads B, CCW (from shaft 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: Shaft	Code 4: Output Format	Code 5: Termination	Code 6: Options
<b>ISW38</b>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ISW38 Hazardous Duty Encoder	Enter Custom PPR from 0001 to 9000 Examples: <b>0001</b> = 1 PPR <b>0256</b> = 256 PPR <b>1024</b> = 1024 PPR <b>8192</b> = 8192 PPR <b>9000</b> = 9000 PPR	<b>0</b> 1"-14 UNS x 5/8" - 18 UNF Threaded Shaft <b>1</b> 1"-14 UNS Threaded Shaft <b>2</b> 1"-14 UNS x 5/8" - 18 UNF Field Replaceable Threaded Shaft	<b>A</b> Single Ended ABZ, 7-26VDC in, 7-26V out push-pull (7272) <b>C</b> Single Ended ABZ, 5VDC in, 5V out push-pull (7272) <b>D</b> Single Ended ABZ, 7-26VDC in, 5V out push-pull (7272) <b>E</b> Single Ended ABZ, 7-26VDC in, 7-26V out Open Collector (7273) <b>F</b> Single Ended ABZ, 7-26VDC in, 7-26V out Open Collector (2222) <b>G</b> Single Ended ABZ, 7-26VDC in, 7-26V out Open Collector with 1kOhm (2222)	<b>0</b> 6 pin connector <b>1</b> 7 pin connector <b>2</b> 10 pin connector <b>3</b> 12 pin connector <b>5</b> 6 pin+mating connector <b>6</b> 7 pin+mating connector <b>7</b> 10 pin+mating connector <b>8</b> 12 pin+mating connector <b>A</b> .5m (18") cable <b>C</b> 1m (36") cable <b>D</b> 2m (72") cable <b>H</b> 5 pin M12 connector <b>J</b> 8 pin M12 connector <b>K</b> 1.5 ft (18") cable with inline 10 pin connector <b>M</b> 5 ft (60") cable <b>N</b> 10 ft (120") cable	<b>0</b> Aluminum Housing <b>1</b> Nickel Finish Housing <b>2</b> Stainless Steel Housing <b>3</b> Dual Isolated Outputs, Aluminum Housing† <b>4</b> Dual Isolated Outputs, Nickel Housing† <b>5</b> Dual Isolated Outputs, Stainless Steel Housing† † Simultaneous use of redundant outputs will void ATEX certification and is not allowed. Consult factory for details.
			Options H, J and K not available when Code 5 is H <b>H</b> Differential AB only, 5VDC in, 5V out (7272) <b>J</b> Differential AB only, 7-26VDC in, 7-26V out (7272) <b>K</b> Differential AB only, 7-26VDC in, 5V out (7272)		
			Options L, M, P not available when Code 5 is 0, 1, 5, 6, H <b>L</b> Differential ABZ, 5VDC in, 5V out (7272) <b>M</b> Differential ABZ, 7-26VDC in, 7-26V out (7272) <b>P</b> Differential ABZ, 7-26VDC in, 5V out (7272)		
			Option N available only when Code 2 is 0015 and Code 6 is 0, 1, or 2 <b>N</b> Namur output*, 15mA max		
			* Hazardous certification for Namur output covered under separate certificate.		

## 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

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-C1	12 Pin	CW M23 Connector

Cable Assemblies with M23 Connector			
SKU	Pins		Use with...
115901-XXXX	12 pin M23, CW	Connector, Cable Assembly	differential line driver with index outputs

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.

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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 # 115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Signal A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	GRN
Signal B	D	ORG	B	ORG	B	ORG	B	ORG	8	ORG	BLU
Signal Z <sup>†</sup>	C	YEL	C	YEL	—	—	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Common	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C	F	—	E	—	—	—	E	—	7	—	—
Signal Ā	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Signal B̄	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORG/WHT	BRN
Signal Z <sup>†</sup>	—	—	—	—	—	—	J	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.

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 <sup>†</sup>	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Common	3	BLU	7	BLK	7	BLK
Signal Ā	—	—	—	—	3	BRN/WHT
Signal B̄	—	—	—	—	5	ORG/WHT
Signal Z <sup>†</sup>	—	—	—	—	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

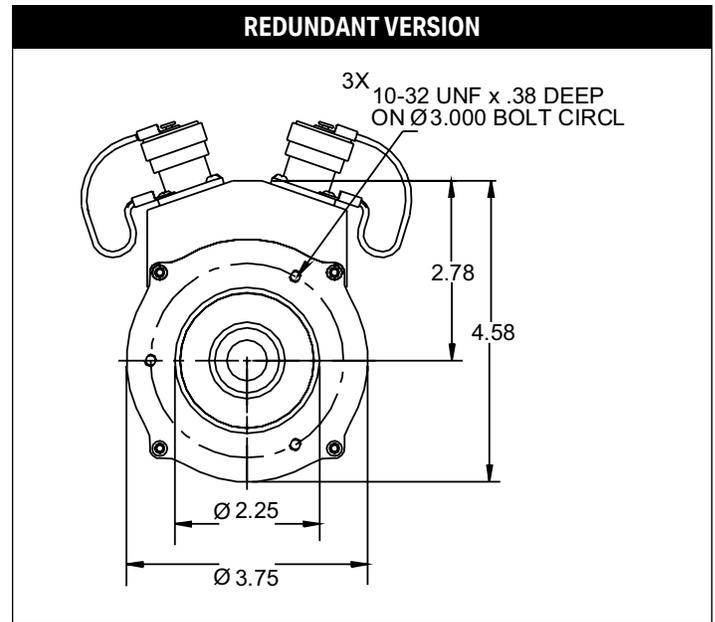
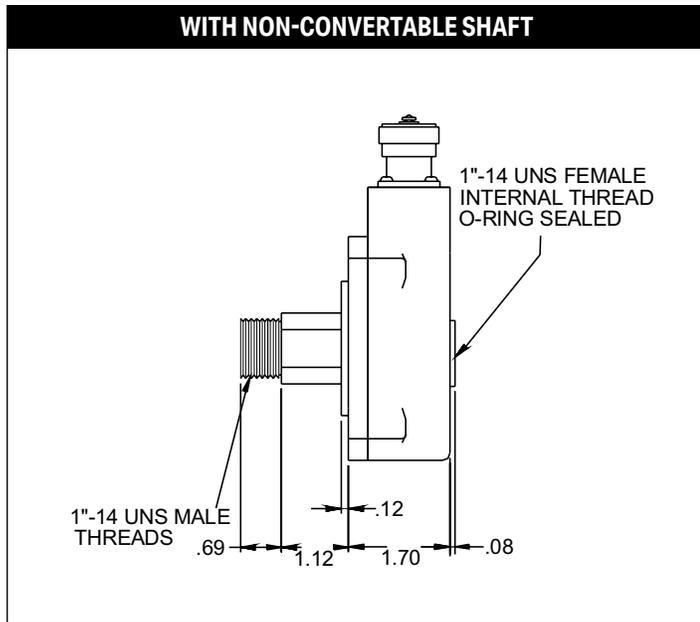
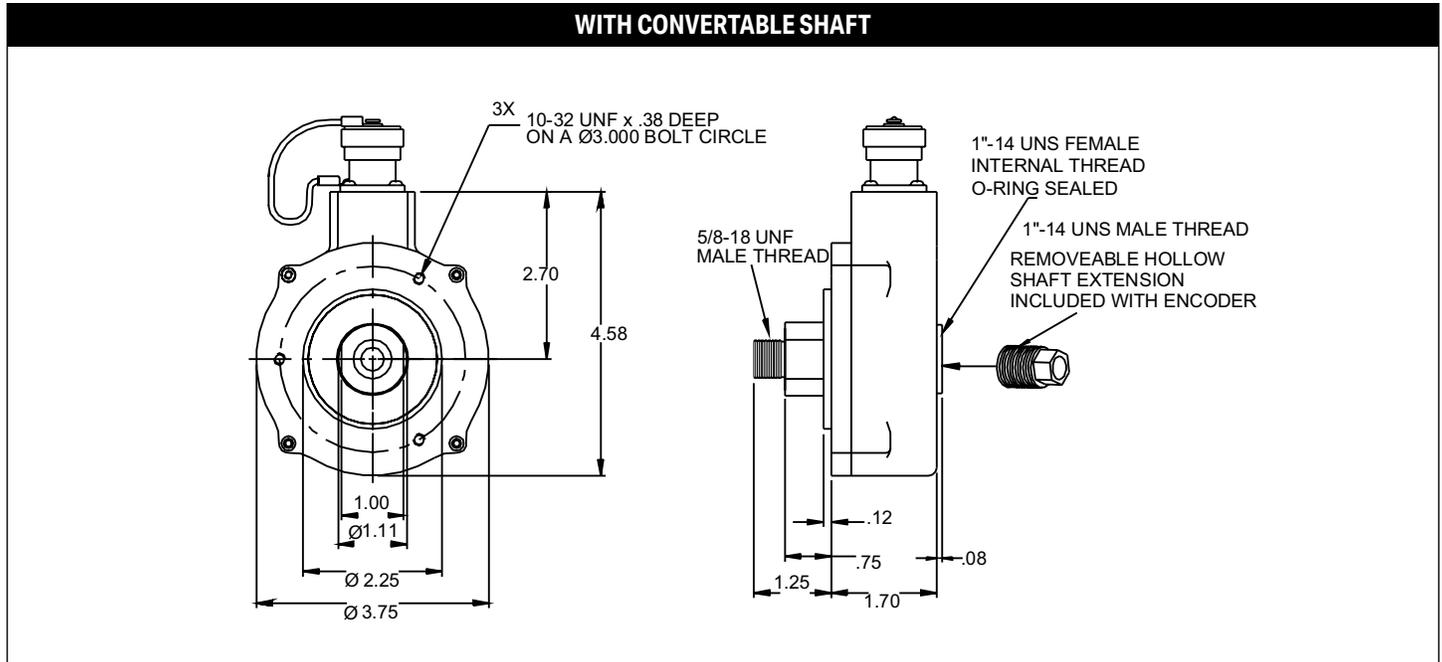
\*For watertight applications, use NEMA4 10 pin cable and connector 109209-XXXX

<sup>†</sup> Index not provided on all models. See ordering information

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Dimensions: inch [mm]



Worldwide Brands: NorthStar™ • Dynapar™ • Hengstler™ • Harowe™

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