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### Important Note

The information shown in these documents is for guidance only. No liability is accepted for any errors or omissions. The designer or user is solely responsible for the safe and proper application of the parts, assemblies or equipment described.

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## Incremental



- Double-Sealed Housing
- High Resolution Unbreakable Disk
- Electrically and Thermally Isolated
- Industrial Duty Connector
- NEMA 4X, 6 / IP66 or IP67 Rated
- Rugged Cast-Aluminum Housing

**HEAVY DUTY**

**NorthStar** 

### NUMBER OF PULSES

0015 / 0032 / 0100 / 0200 / 0240 / 0250 / 0500 / 0512 / 0600 / 1000 / 1024 / 1200 / 2000 / 2048 / 2500 / 4000 / 5000

### GENERAL INFORMATION

#### EXTREME HEAVY DUTY HOLLOWSHAFT ENCODER

NorthStar's HSD38 Extreme Duty Industrial Hollowshaft Encoder accepts up to 1" (25,4 mm) diameter shafts and operates reliably from -40 to +100°C. Its Hard Anodized finish enclosure exceeds IP66/IP67 and NEMA 6 enclosure requirements.

This robust encoder features a double-sealed housing that allows application where regulatory washdown and high pressure steam or caustic chemicals are present. Utilization of an advanced Opto ASIC with innovative packaging techniques enables the encoder to operate in high shock and vibration environments.

### APPLICATIONS

The HSD38 extreme duty encoder features simple installation on motor or machine shafts. It is often mounted on the back of motors where encoder feedback is needed in harsh environment applications. It is ideal for use in environments that demand heavy washdown protection.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Processing Equipment

#### Industries

Chemical, Food & Beverage, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

### TECHNICAL DATA mechanical

Housing diameter	96.52 mm
Shaft diameter	12 mm / 15 mm / 1/2" / 5/8" / 16 mm / 3/4" / 0.875" (Hubshaft)
Flange (Mounting of housing)	Tether
Mounting of shaft	Front clamping ring
Protection class shaft input (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Protection class housing (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Bearing life	max. 5 x 10 <sup>11</sup> revs.
Torque	< 2.8 Ncm

## Incremental

### TECHNICAL DATA mechanical (continued)

Vibration resistance (DIN EN 60068-2-6)	200 m/s <sup>2</sup> (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s <sup>2</sup> (11 msec)
Operating temperature	-40 °C ... +100 °C
Storage temperature	-40 °C ... +100 °C
Material shaft	Aluminum
Material housing	Hard anodized Aluminum
Weight	approx. 800 g
Connection	MS, radial Cable, radial with M12 connector

### TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

### ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

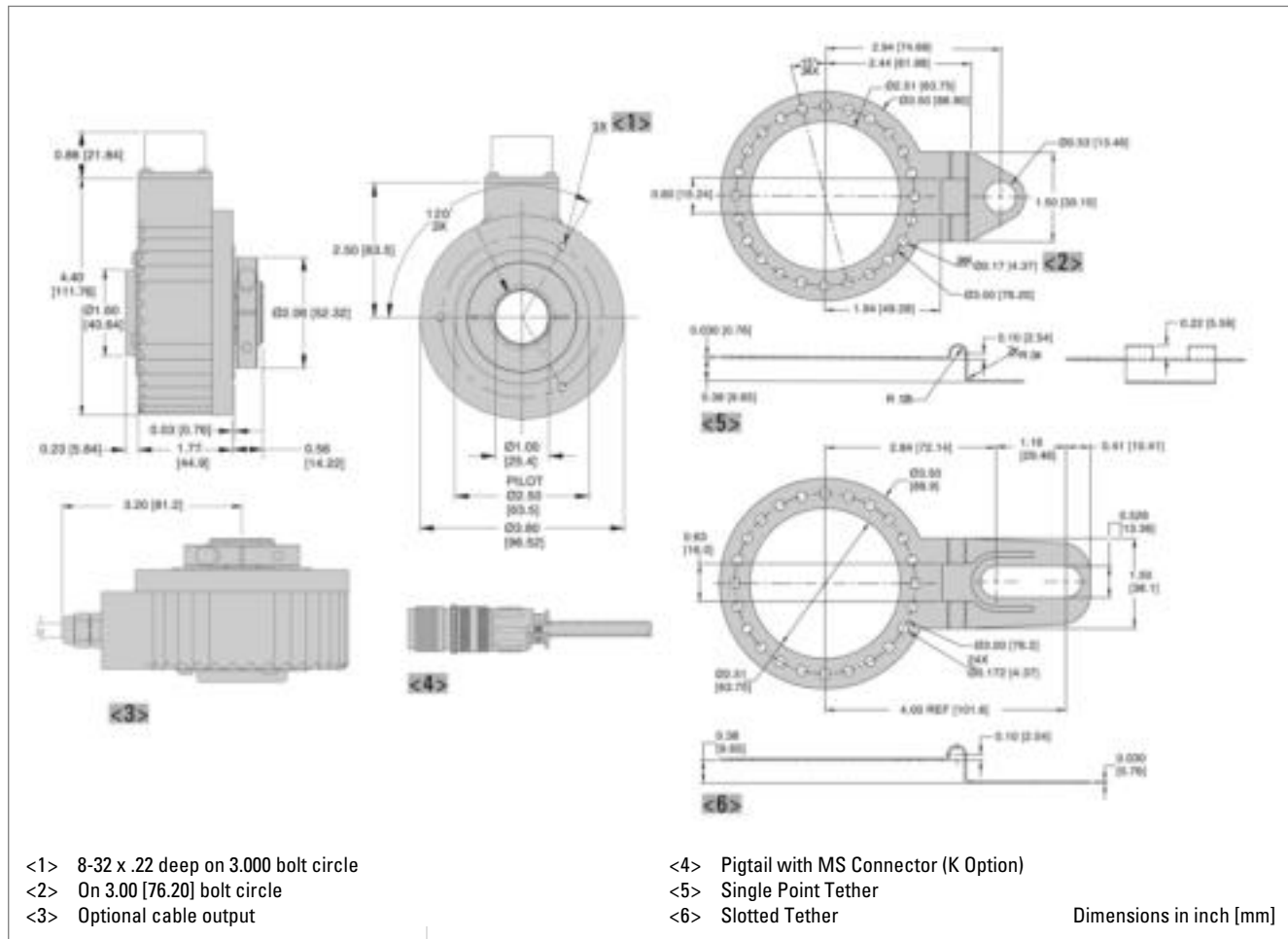
Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig. $\bar{A}$	--	--	--	--	C	brown/white	H	brown/white	violet
Sig. $\bar{B}$	--	--	--	--	E	orange/white	I	orange/white	brown
Sig. $\bar{Z}$	--	--	--	--	--	--	J	yellow/white	yellow

## Incremental

### ELECTRICAL CONNECTIONS 5 & 8 Pin M12 Accessory Cable

Encoder Function	Cable 5 Pin Single Ended		Cable 8 Pin Single Ended		Cable 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	black	1	brown	1	brown
Sig. B	2	white	4	orange	4	orange
Sig. Z	5	grey	6	yellow	6	yellow
Power +V	1	brown	2	red	2	red
Com	3	blue	7	black	7	black
Sig. $\bar{A}$					3	brown/white
Sig. $\bar{B}$					5	orange/white
Sig. $\bar{Z}$					8	yellow/white

### DIMENSIONED DRAWINGS



## Incremental

### ORDERING INFORMATION

Type	Number of pulses	Shaft Ø	Format	Output	Connection	Safety	Housing, Tether, Options
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>HSD38</b>	<b>15 ... 5000</b>	<b>6</b> 12 mm <b>7</b> 12.7 mm (1/2") <b>8</b> 5/8" <b>9</b> 15 mm <b>A</b> 16 mm <b>C</b> 3/4" <b>E</b> 7/8" <b>G</b> 1"	<b>0</b> single ended, unidirectional (A) <b>1</b> single ended, bidirectional (AB) <b>2</b> single ended, bidirectional with index (ABZ) <b>3</b> differential, bidirectional (A↔A B↔B) <b>4</b> differential, bidirectional with index (A↔A B↔B Z↔Z)	<b>0</b> 5-26V in, 5-26V Open Collector out (7273) <b>2</b> 5-26V in, 5-26V Push-Pull out <b>3</b> 5-26V in, 5-26V Differential Line Driver out (7272) <b>4</b> 5-26V in, 5V Differential Line Driver out (7272)	<b>0</b> 6 pin connector <b>1</b> 7 pin connector <b>2</b> 10 pin connector <b>5</b> 6 pin connector plus mating connector <b>6</b> 7 pin connector plus mating connector <b>7</b> 10 pin connector plus mating connector <b>A</b> Cable 0,5 m <b>G</b> Cable, 0.3 m <b>H</b> M12 connector, 5 pole <b>J</b> M12 connector, 8 pole <b>K</b> 0.5 m cable with 10 pin in-line connector	<b>0</b> Reserved for Future Options	<b>0</b> Cast Aluminum Housing, Slotted Tether <b>C</b> Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" C-face) <b>6</b> Cast Aluminum Housing, No Tether

## Incremental



- Single or Dual output - NAMUR available
- Well suited for DrawWorks/ oil field application
- ATEX Certification available for Intrinsically Safe application
- High Resolution Unbreakable Disk
- Industrial Duty Connector
- NEMA 4X / IP67 Rated
- Nickel or Stainless Steel Housing available
- Option: removable shaft with thread
- Option: redundant output

**HEAVY DUTY**

**NorthStar** CE

### NUMBER OF PULSES

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### GENERAL INFORMATION

#### HARSH- DUTY OPTICAL ENCODER - DRAWWORKS

The DWD38 Harsh-Duty Optical Encoder is an Industrial Hollow Shaft design that operates reliably from -40 to +100°C. Its Hard Anodized finish exceeds IP66/IP67 and NEMA 6 enclosure requirements.

The DWD38 is a preferred choice as a DrawWorks encoder by the Oil Field industry and is also commonly used in high shock and vibration environments such as Food Processing, Material Handling and Packaging Equipment applications.

Extremely robust, the DWD38 encoder is also available in Stainless Steel to meet NEMA 4x and 6P requirements. A unique labyrinth double-sealed housing allows operation when regulatory washdown and high pressure steam or caustic chemicals are required.

It is also available in an Intrinsically Safe version, certified to ATEX EEx ia IIB T4, when used with the appropriate IS Barrier.

### APPLICATIONS

The DWD38 Harsh-Duty Optical Encoder is ideal for DrawWorks application and corrosive environments that demand heavy washdown protection. This compact, special-duty encoder is designed to exceed IP66/IP67 and NEMA 6 enclosure requirements with a PPR range through 5000. ATEX certification is also available for intrinsically safe applications.

- DrawWorks and other Oilfield
- Converting Machinery
- Material Handling
- Packaging Equipment
- Pickling Equipment
- Processing Equipment

#### INDUSTRIES

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in very harsh environments.

### TECHNICAL DATA mechanical

Housing diameter	3.75"
Flange (Mounting of housing)	Synchro flange

## Incremental

### TECHNICAL DATA mechanical (continued)

Protection class shaft input (EN 60529)	IP67 or NEMA 6
Protection class housing (EN 60529)	IP67 or NEMA 6
Shaft load axial / radial	Max.: 100 N / 100 N
Bearing life	max. 5 x 10 <sup>11</sup> revs.
Vibration resistance (DIN EN 60068-2-6)	200 m/s <sup>2</sup> (5 to 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s <sup>2</sup> (11 msec)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Storage temperature	-40 °C ... +100 °C
Material shaft	Stainless Steel
Material housing	Hard anodized Aluminum, Stainless Steel
Connection	MS, radial Cable, radial

### TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V ATEX: DC 5 V ATEX: DC 5 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Standard output versions	RS422: A, B, N, $\bar{A}$ , $\bar{B}$ , $\bar{N}$ NPN-O.C.: A, B, N Push-pull: A, B, N

### ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig $\bar{A}$	--	--	--	--	C	brown/white	H	brown/white	violet
Sig $\bar{B}$	--	--	--	--	E	orange/white	I	orange/white	brown
Sig $\bar{Z}$	--	--	--	--	--	--	J	yellow/white	yellow