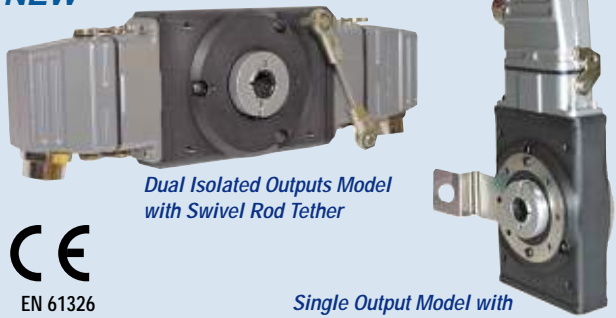


**NEW**



*Dual Isolated Outputs Model with Swivel Rod Tether*

*Single Output Model with Stamped Metal Tether*



EN 61326



Hazardous Location Certification Available  
Class I, Division 2, Groups A, B, C & D  
Class II Division 2, Groups F & G

## Series HSD35

- *Field serviceable connectors require no soldering*
- *Dual output option available for redundancy*
- *Redesigned one-piece hub for less runout and jitter*
- *Can accommodate up to 1-1/4" diameter shaft*
- *New more rigid unbreakable disk in 1024 and 2048 PPR*
- *New improved seals and gasketed cover*
- *Electrically isolated and Thermally insulated*
- *Hazardous Location Certification Available*

### Harsh-Duty Optical Encoder

#### DESCRIPTION

The NorthStar brand Series HSD35 Sealed Hollowshaft encoder is designed for easy installation on motor or machine shafts. Its hollowshaft design eliminates the need for a flexible shaft coupling, mounting bracket, flower pot, or flange adapter which reduces installation depth and also lowers total cost.

It is equipped with an unbreakable disk that resists contamination and meets the demands of the most severe shock and vibration generating processes. Its floating shaft mount and spring tether eliminate bearing loads and flexible shaft couplings to eliminate wear and maintenance.

Series HSD35 has complete electrical protection from overvoltage, reverse voltage, and output short circuits. In addition, the Series HSD35 is not only electrically & thermally isolated, but also environmentally sealed with shaft seals at both ends.

Series HSD35 encoders can be provided with optional hazardous location certification that allows use in environments stated in: Class I, Division 2, Group A: atmospheres such as acetylene; Class I, Division 2, Group B: atmospheres such as hydrogen; Class I, Division 2, Group C: atmospheres such as ethyl ether and ethylene; Class I, Division 2, Group D: atmospheres such as acetone, ammonia, benzene, butane, cyclopropane, ethanol, gasoline, hexane, methanol, methane, natural gas, naphtha, and propane; Class II, Division 2, Groups F & G: atmospheres containing combustible carbonaceous dusts, including carbon black, charcoal, coal, or coke dusts, and combustible dusts including flour, grain and wood.

Classifications of hazardous locations are subject to the approval of the authority having jurisdiction. Refer to Article 500 of the National Electrical Code (NEC) or Section 18 of the Canadian Electrical Code (CEC).

#### APPLICATIONS:

The HSD35 hollow shaft digital encoder is ideal for motor and machine applications. Flexible mounting and adjustable tether, provide high tolerance to shaft vibration.

A hazardous location certification option can be provided when the environment requires NEC/CEC Class 1 & 2, Division 2 classification.

- Converting Machinery
- Material Handling
- Pickling Equipment
- Processing Equipment

#### INDUSTRIES

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

#### FEATURES/BENEFITS

##### Mechanical and Environmental

- Unbreakable code disk
- Flexible mounting
- Operating temperature of -40 to +70C.  
Optional 0 to +100C

##### Electrical

- Short circuit protection and reverse polarity protection

**Harsh-Duty Optical Encoder**

# Series HSD35

## Harsh-Duty Optical Encoder... For Hazardous Environment Use

### SPECIFICATIONS

#### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental  
**Resolution:** 1 to 2500 PPR (pulses/revolution)  
**Accuracy:** (worst case any edge to any other edge) ±7.5 arc-min.  
**Format:** Two channel quadrature (AB) with optional Index (Z) and complementary outputs  
**Phase Sense:** A leads B for CW shaft rotation viewing the shaft clamp end of the encoder  
**Quadrature Phasing:** 90° ± 22.5° electrical  
**Symmetry:** 180° ± 18° electrical  
**Index:** 180° ± 18° electrical (gated with B low)  
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

#### ELECTRICAL

**Input Power:** (each output)  
 4.5 min. to 26 VDC max. at 100 mA max., not including output loads  
**Outputs:**  
 7273 Open Collector: 30 VDC max., 40 mA sink max.  
 7272 Push-Pull and Differential Line Driver: 40 mA sink or source  
 4469 Differential Line Driver: 100 mA sink or source  
**Frequency Response:** 100 kHz min.  
**Electrical Protection:** Overvoltage, reverse voltage and output short circuit protected  
**Noise Immunity:** Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference  
**Mating Connector:**  
 10 pin-style HA-10

#### ELECTRICAL CONNECTIONS

Signal	Connector Pin
Common	1
B	2
A	3
Z *	4
Case (optional)	5
Vcc 5-26 VDC	6
B̄	7
Ā	8
Z̄ *	9
No Connection	10

\* Index (Z) optional. See Ordering Information

#### MECHANICAL

**Bearing Life:** 80,000 hours at 3600 RPM; 128,000 hours at 1800 RPM  
**Shaft Loading:** 40 lbs. radial, 30 lbs. axial  
**Shaft Speed:** 3600 RPM max. (*Important: see Operating Temperature derating for >1800 RPM*)  
**Shaft Bore Tolerance:** Nominal +0.0003"/+0.0005" (+0.008/+0.013 mm)  
**Mating Shaft Requirements:**  
 Runout: ±0.025" (±0.63 mm) radial typical  
 Endplay: ±0.050" (±1.27 mm) axial typical  
 Minimum Length: 1.25" (32 mm) recommended  
 Maximum Length: 2.0" (51 mm) to fit inside cover  
 Solid shaft recommended; keyway allowed; flatted shaft should not be used  
**Starting Torque:** 5.0 oz-in max.  
**Running Torque:** 4.5 oz.-in max.  
**Moment of Inertia:**  
 ≤ 5/8" bore: 7.9 x 10<sup>-4</sup> oz-in-sec<sup>2</sup>  
 > 5/8" bore: 25.6 x 10<sup>-4</sup> oz-in-sec<sup>2</sup>  
**Weight:** 28 oz. max. Environmental

#### ENVIRONMENTAL

**Operating Temperature:**  
 Standard: -40 to +70 °C  
 Extended: 0 to +100 °C  
 ≤ 5/8" bore: Derate 5 °C per 1000 RPM above 1800 RPM  
 > 5/8" bore: Derate 10 °C per 1000 RPM above 1800 RPM.  
**Storage Temperature:** -40 to +90 °C  
**Shock:** 50 G's for 11 milliseconds duration  
**Vibration:** 5 to 2000 Hz at 20 G's  
**Humidity:** to 98% without condensation  
**Enclosure Rating:** NEMA4/IP67  
**Connector Rating:** NEMA4/IP65  
**Hazardous Location Certification:**  
 Available as *Optional Feature*. Class I, Division 2, Group A, B, C & D; Class II, Division 2, Groups F & G. CSA File No. LR86404

Replaces the Magcoder HS35M (shown below)



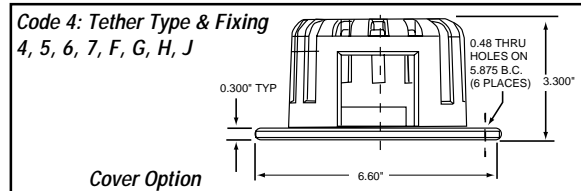
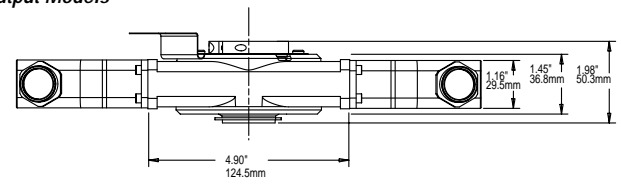
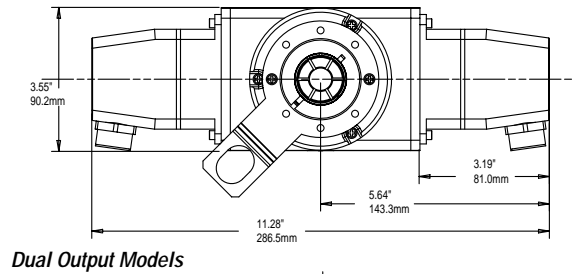
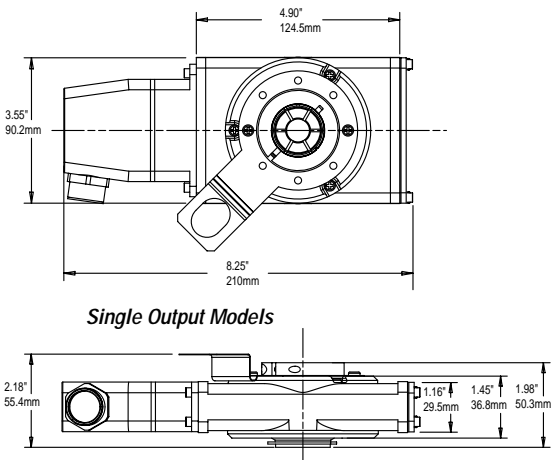
Contact Customer Service for appropriate replacement model. +1.800.873.8731

Harsh-Duty Optical Encoder

**Series HSD35**

Harsh-Duty Optical Encoder... For Hazardous Environment Use

**DIMENSIONS** inches [mm]



**ORDERING INFORMATION**

Code 1: Model	Code 2: PPR	Code 3: Bore	Code 4: Tether Type & Fixing	Code 5: Format	Code 6: Output	Code 7: Options
<b>HSD35</b>	□□□□	□	□	□	□	□□

Ordering Information								
HSD35 Size 35 heavy-duty, sealed hollow shaft encoder with industrial latching connector (1/2" NPT)	0001	0300	0 6 mm	<b>Stamped Metal</b>	<b>Swivel Rod</b>	0 single ended, unidirectional (A)	0 5-26V in, 5-26V open collector out	<b>D2</b> Hazardous Location Certified (see specifications)
	0002	0360	1 1/4"	0 None - customer supplied	<b>A</b> Standard Tether	1 single ended, bidirectional (AB)	1 5-26V in, 5-26V open collector out w/ 2.2kΩ pullups	
	0003	0400	2 5/16"	1 Clearance hole for 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C face)	<b>B</b> 56C Tether	2 single ended, bidirectional with index (ABZ)	2 5-26V in, 5-26V push-pull out	
	0005	0500	3 8 mm	2 Clearance hole for 1/2" bolt on 7.25" dia. bolt circle (to fit 8-1/2" NEMA C-face)	<b>C</b> 180C Tether	available when Code 6 is 3, 4, 5, 6, A or B:	available when Code 5 is 3, 4 or 5:	
	0006	0512	4 3/8"	3 Slotted hole for bolt on 2.5" to 4.0" radius (to fit standard AC motor fan cover slots)	<b>D</b> 56C Tether with protective guard	3 differential, bidirectional (AA BB)	3 5-26V in, 5V line driver out (7272)	
	0007	0600	5 10 mm	Available when Code 5 is 0-4:	<b>E</b> 180C Tether with protective guard	4 differential, bidirectional with index (AA BB ZZ)	4 5-26V in, 5-26V line driver out (7272)	
	0010	0720	6 12 mm	4 Same as '1', w/ cover kit	Available when Code 5 is 5:	5 5-26V in, 5V Differential Line Driver out (4469)	5 5-26V in, 5V Differential Line Driver out (4469)	
	0012	0800	7 1/2"	5 Same as '3', w/ cover kit	<b>F</b> Same as 'A', w/ cover kit	6 5-15V in, 5-15V Differential Line Driver out (4469)	6 5-15V in, 5-15V Differential Line Driver out (4469)	
	0025	0900	8 5/8"	6 Same as '1' w/ dual cover kit	<b>G</b> Same as 'B', w/ cover kit	5 Dual isolated differential, bidirectional w/index (AABBZZ)	A same as '3' with extended temp. to 100°C	
	0050	1000	9 15 mm	7 Same as '3' w/ dual cover kit	Available when Code 5 is 0-4:		B same as '4' with extended temp. to 100°C	
0060	1024	A 16 mm		<b>H</b> Same as 'A' w/ dual cover kit				
0064	1200	B 19 mm		<b>J</b> Same as 'B' w/ dual cover kit				
0100	1270	C 3/4"						
0120	1500	D 20 mm						
0128	1800	E 7/8"						
0180	2000	F 24 mm						
0200	2048	G 1"						
0240	2400	H 1-1/8"						
0250	2500	J 14 mm						
		K 18 mm						
		M 25 mm						
		N 28 mm						
		P 1-1/4"						

109473-0001	Stamped Tether kit (clearance hole for 3/8" bolt on 5.88" dia. bolt circle)	110533-0001	Cover Kit, 56C face
109473-0002	Stamped Tether kit (clearance hole for 1/2" bolt on 7.25" dia. bolt circle)	110533-0002	Cover Kit, fan cover
109473-0003	Stamped Tether kit (slotted hole for bolt on 2.5" to 4.0" radius)	110533-0003	Dual Cover Kit, 56C face
112121-0001	Spare Hub Clamp (Bore size Code 3: 0 - 9)	110533-0004	Dual Cover Kit, fan cover
112121-0002	Spare Hub Clamp (Bore size Code 3: A - H)	106-764	Spare Mating Connector
756-042-01	Rod tether kit, standard		
756-043-01	Rod tether kit, 56C		
756-044-01	Rod tether kit, 180C		

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For additional information or a full-line catalog, contact Dynapar Customer Service or visit our web site.

\* Specifications are for base models with standard features only unless otherwise noted. Specifications subject to change without notice in accordance with our DBS policy of continuous improvement. All product and brand names are trademarks of their respective owners. All rights reserved.

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NorthStar brand HSD35 Data Sheet (2/08)

Satellite Locations:  
North America: North Carolina, South Carolina, Connecticut, Massachusetts, New York, Canada, British Virgin Islands • Europe: United Kingdom, Italy, France, Germany, Spain, Slovakia • Latin America: Brazil • Asia: China, Japan, Korea, Singapore



*Factory Automation Worldwide Brands: Dynapar™ • Harowe™ • Hengstler™ • NorthStar™*

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