

# SERIES HSD35

NorthStar™ brand

## Heavy Duty Optical Encoder

### Key Features

- Rugged Design Resists up to 400G Shock
- Stainless Steel Clamp and Hollow Shaft for Mill Duty
- Compact Design with Field Serviceable Connector for Solder-Less Connections
- Accommodates Shaft Sizes up to 1.25" (Electrically Isolated up to 1.125")
- Dual Isolated Output Option for Redundancy

HD  
Heavy Duty



## PRELIMINARY SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental, Optical  
**Resolution:** 1 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 CW shaft rotation viewing the shaft clamp end of the encoder  
**Quadrature Phasing:**  
 For resolutions 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°  
**Symmetry:**  
 For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°  
**Index:** 150° to 330°, A leads B, CW (from clamp end)  
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

### 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
Z*	9
No Connection	10

\* Index (Z) optional. See Ordering Information

### ELECTRICAL

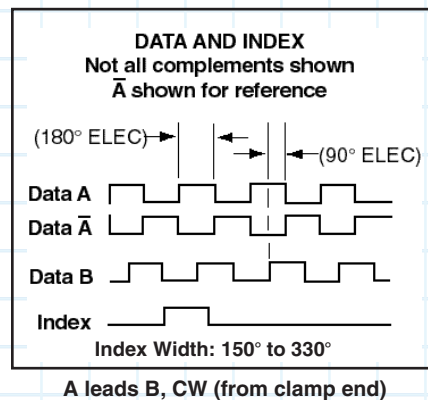
**Input Power:** 5-26VDC, 5-15VDC. 80 mA max., not including output loads.  
**Outputs:**  
 7272 Push-Pull: 40mA, sink or source  
 7272 Differential Line Driver: 40 mA, sink or source  
 7273 Open Collector: 40mA, sink max  
 4469 Differential Line Driver: 100mA, sink or source  
**Frequency Response:** 125 kHz (data & index)  
**Noise Immunity:** Tested to EN61326-1  
**Electrical Immunity:** Reverse polarity and short circuit protected with 7272 or 7273 line drivers only  
**Termination:** 10 Pin Latching Industrial Connector

### MECHANICAL

**Bore Diameter:** 6mm to 28mm, 1/4" to 1.25", electrically isolated  
**Mounting Configuration:** Hollow Bore, direct mount over shaft with multiple tether options available  
**Mating Shaft Length:** 1.25", Minimum, 1.60", Recommended  
**Shaft Speed:** 6000 RPM, Maximum (Enclosure Rating is IP64 at speed over 5000 RPM)  
**Starting Torque:** 11.0 in-oz. maximum (at 25°C)  
**Running Torque:** 5.0 in-oz. maximum (at ambient)  
**Bearings:** ABEC 3  
**Housing & Cover Material:** Hard Anodized and Powder Coated Aluminum  
**Shaft Material:** Stainless Steel  
**Disc Material:** Mylar  
**Weight:** 1.76lb (28 Oz) Typical

### ENVIRONMENTAL

**Standard Operating Temperature:** -40 to +85°C (0 to +70°C with 4469 line driver, see "Ordering Information"). At shaft speed above 3000 RPM, derate 10°C per 1000 RPM  
**Extended Temperature Range:** -40 to +100°C (See ordering information)  
**Storage Temperature:** -40 to +100°C  
**Shock:** 400G, 6mSec  
**Vibration:** 5 to 3000 Hz, 20G  
**Humidity:** Up to 98% (non-condensing)  
**Enclosure Rating:** IP67 (IP64 at shaft speeds above 5000 RPM)  
**Connector Rating:** IP65



**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: Fixing	Code 5: Output Format	Code 6: Options	
<b>HSD35</b>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Ordering Information						
<b>HSD35</b> Heavy-duty, Hollowshaft Encoder	<b>0001 0512</b>	<b>0</b> 6mm	<b>Stamped Metal</b>	<b>Swivel Rod</b>	<b>0</b> Single Ended ABZ, 5-26VDC push-pull (7272)	<b>Blank</b> None
	<b>0003 0600</b>	<b>1</b> 1/4"	<b>0</b> None	<b>A</b> AC Motor Fan Cover Tether with T-bolt	<b>1</b> Single Ended ABZ, 5-26VDC O/C (7273)	
	<b>0010 0900</b>	<b>2</b> 5/16"	<b>1</b> 4.5" C-Face Tether	<b>B</b> 4.5" C-Face Tether with 3/8" Bolt	<b>2</b> Single Ended ABZ, 5-26VDC O/C w/2.2kOhm (7273)	
	<b>0012 1000</b>	<b>3</b> 8mm	<b>2</b> 8.5" C-Face Tether	<b>C</b> 8.5" C-Face Tether with 1/2" Bolt	<b>4</b> Differential AB only, 5-26, 5-26 out (7272)	
	<b>0015 1024</b>	<b>4</b> 3/8"	<b>3</b> Slotted Tether	<b>D</b> Same as "A" w/ Cover Kit	<b>5</b> Differential AB only, 5-26 in, 5V out (7272)	
	<b>0032 1200</b>	<b>5</b> 10mm	<b>4</b> Same as 1 w/ 56 C-Face Cover	<b>E</b> Same as "B" w/ Cover Kit	<b>A</b> Differential AB, 5-26V in, 5V out (4469)	
	<b>0050 1500</b>	<b>6</b> 12mm	<b>5</b> Same as 3 w/ Cover		<b>C</b> Differential AB, 5-15V in, 5-15V out (4469)	
	<b>0060 2000</b>	<b>7</b> 1/2"	<b>6</b> Same as 2 w/ 180 C-Face Cover		<b>6</b> Differential ABZ, 5-26 in, 5V out (7272)	
	<b>0100 2048</b>	<b>8</b> 5/8"			<b>7</b> Differential ABZ, 5-26 in, 5-26 out (7272)	
	<b>0120 2400</b>	<b>9</b> 15mm			<b>8</b> Differential ABZ, 5-26 in, 5V out (4469)	
	<b>0200 2500</b>	<b>A</b> 16mm			<b>9</b> Differential ABZ, 5-15 in, 5-15 out (4469)	
	<b>0240 3072</b>	<b>C</b> 19mm			<b>D</b> Dual Isolated Outputs, same as "6"	
	<b>0250 4000</b>	<b>D</b> 3/4"			<b>E</b> Dual Isolated Outputs, same as "7"	
	<b>0300 4096</b>	<b>E</b> 20mm			<b>F</b> Dual Isolated Outputs, same as "8"	
	<b>0360 5000</b>	<b>F</b> 7/8"			<b>G</b> Dual Isolated Outputs, same as "9"	
	<b>0500</b>	<b>G</b> 24mm			<b>H</b> Same as "0" with Extended temp range	
		<b>H</b> 1"			<b>J</b> Same as "1" with Extended temp range	
	<b>J</b> 1-1/8"			<b>K</b> Same as "2" with Extended temp range		
	<b>K</b> 1-1/4"			<b>L</b> Same as "4" with Extended temp range		
	<b>M</b> 14mm			<b>M</b> Same as "5" with Extended temp range		
	<b>N</b> 18mm			<b>N</b> Same as "6" with Extended temp range		
	<b>P</b> 25mm			<b>P</b> Same as "7" with Extended temp range		
	<b>R</b> 28mm			<b>Q</b> Same as "D" with Extended temp range		
				<b>R</b> Same as "E" with Extended temp range		
				<b>W</b> Differential ABZ, 10-24V in, 10-24V out (Mosfet)		

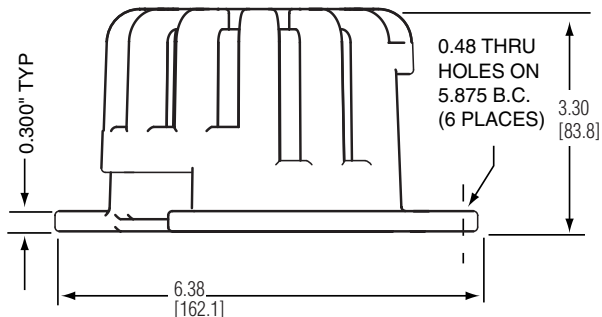
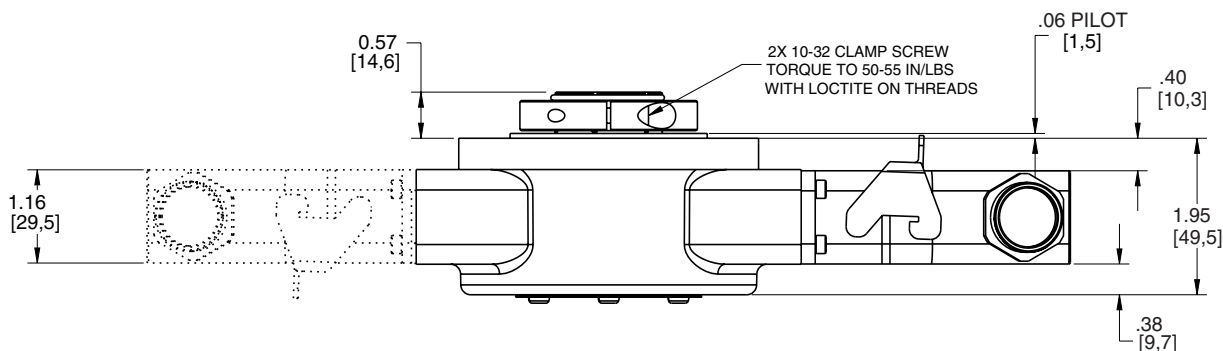
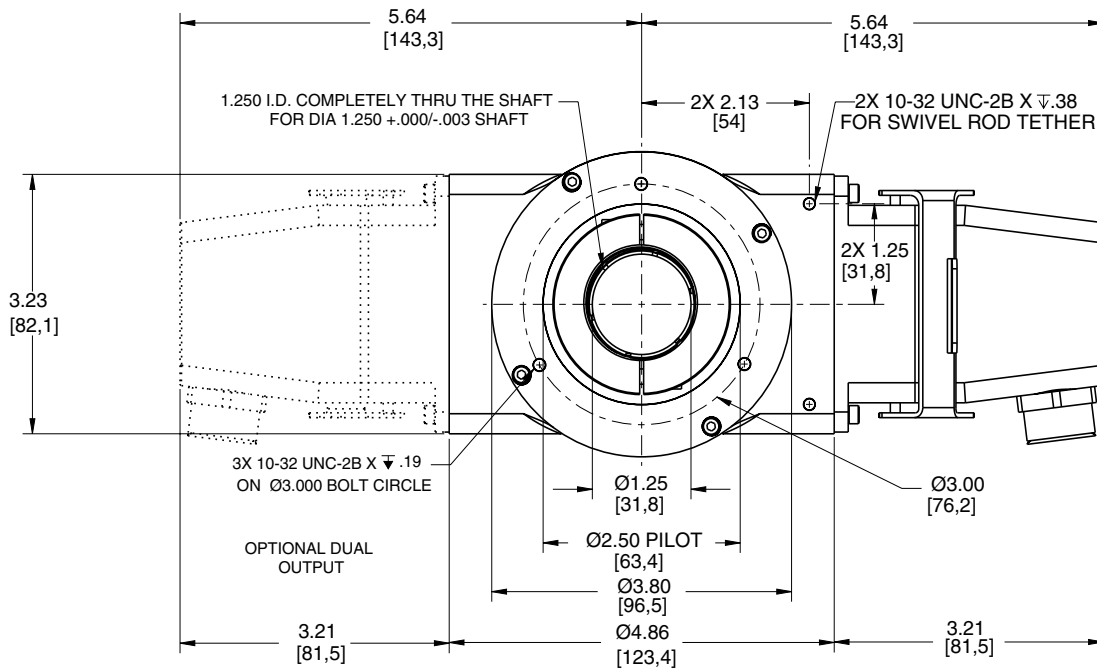
**Accessory Kits:**

- 114573-0001** Tether Kit, 4.5" C-Face Single Point with 3/8" bolt
- 114574-0001** Tether Kit for Standard AC Motor Fan Covers with T-bolt
- 114575-0001** Tether Kit, 8.5" C-Face Single Point with 1/2" bolt
- 756-042-01** Rod Tether, AC Motor Fan Cover with T-bolts
- 756-043-01** Rod Tether Kit, 4.5" C-Face with 3/8" bolt
- 756-044-01** Rod Tether Kit, 8.5" C-Face with 1/2" bolt
- 114622-0001** Cover Kit, 56 C-Face (single or dual output)
- 114928-0001** Cover Kit, 180 C-Face (single or dual output)
- 114623-0001** Cover Kit, Fan Cover (single or dual output)

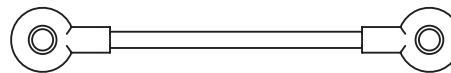
# SERIES HSD35



**DIMENSIONS** <sup>inch</sup>  
[mm]



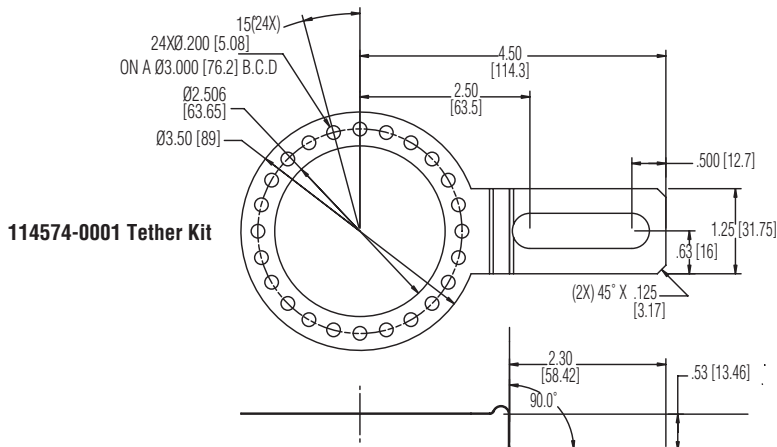
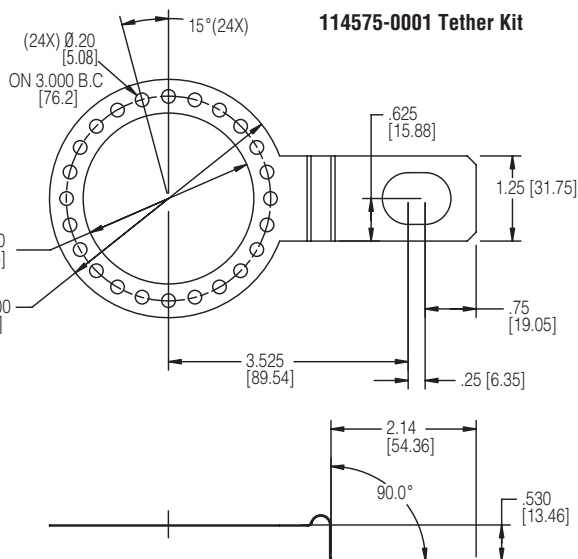
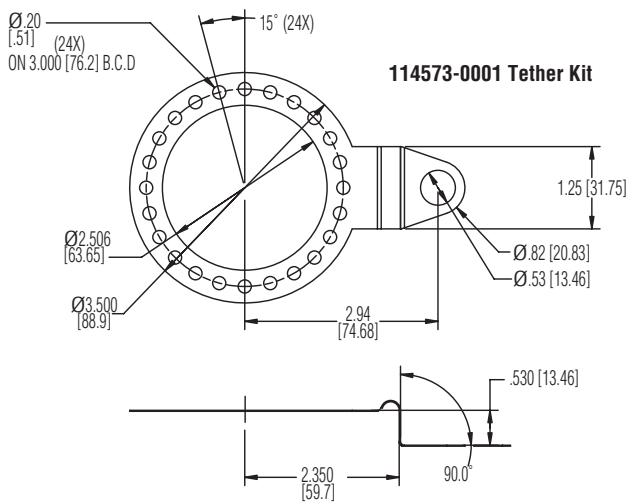
OPTIONAL SAFETY COVER(S)



SWIVEL ROD TETHER

**Note\*** See accessories section on page two for Swivel Rod Part Numbers

**DIMENSIONS** inch [mm]



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