



HEAVY DUTY ENCODERS & RESOLVERS GUIDE

DYNAPAR 2010

Dynapar has been designing and manufacturing tough, reliable encoders for over 5 decades. Leading Dynapar's Heavy Duty line up is the NorthStar™ brand of heavy duty Magnetic and Optical encoders.

The **NorthStar line of MAGNETO-RESISTIVE (MR) encoders** uses state-of-the-art "direct read" sensing technology to precisely track machine speed for optimum control. It is resistant to common mill contaminants such as water, oil, grease, dirt, and designed to operate in hostile environments where shock and vibration are the norm. This provides the customer with reliable digital output for the life of the encoder and is why it is the most requested Magneto-resistive encoder today. It is also the standard by which other MR encoder manufactures strive to match.

NorthStar SLIMTach and RIMTach encoders have proven themselves in tough steel and paper mill applications and other hostile environments where downtime is not an option. These tough tachs are offered in C-face bearingless, hollow shaft with oversized bearings, and foot-mounted configurations.

The new **NorthStar line of OPTICAL encoders** incorporates patented phased array opto-ASIC technology that is setting the standard for future tough and reliable optical designs. This technology, along with other innovations from NorthStar, drastically improves the reliability of optical encoders. It is the reason major oil & gas companies specify NorthStar HD Optical Encoders for their demanding applications in extreme temperatures and hazardous environments.

The product is also well suited for use in other demanding applications as heavy rail traction drives, wind turbines, and severe wash down processing equipment. These applications benefit from

- High resolution unbreakable code discs
- Phased array ASIC that eliminates potentiometers and manufacturing error
- Seals and housings that provide IP67 rating
- ATEX certification for Intrinsically Safe application requirements
- Oversized bearings for increased life
- PCB designs for high shock and vibration resistance
- Industrial grade components rated for -40 to 100+ C



Regardless of the NorthStar encoder used, you can rely on Dynapar for reliable feedback in tough environments. NorthStar encoders are made right here in the USA using the advanced cellular manufacturing concept, ensuring Just-In-Time delivery to meet your needs.

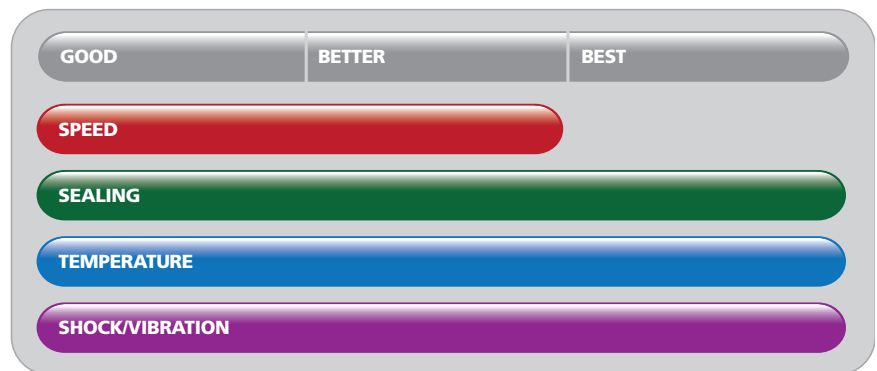


Heavy Duty encoders and resolvers are designed to survive some of the toughest environments. Paper and steel mills, aerospace applications, and food and beverage processing machinery are all areas that benefit from heavy duty encoders. Using magnetic, inductive, or specially designed optical technology, their tight sealing, heavy-duty bearings (where applicable), and high temperature range all suit them for use in harsh environments.

HEAVY DUTY ENCODER GENERAL PERFORMANCE DATA



RIMTach 8500 Pictured





OPTICAL - INCREMENTAL

| | | | | | | | | |
|-----------------------------|---|---|---|---|--|---|---|--|
| |  |  |  |  |  |  |  | |
| Product | HD20 | HD25 | HSD25 | HSD37 | HSD38 | DWD38 | HSD44 | |
| Shaft/Bore Sizes | 3/8" or 10mm Shaft | 3/8" or 10mm Shaft | 3/8" to 3/4" Shaft | 12mm to 1" hollow shaft | 6mm to 1-1/4" hollow shaft | 1"-14UNS x 5/8"-18 Threaded Shaft or 1"-14UNS Threaded Shaft | 5/8" / 16mm isolated hub shaft | |
| Available Resolutions (PPR) | 1 to 3600 | 1 to 5000 | 1 to 3600 | 15 to 5000 | 15 to 5000 | 15 to 5000 | 1024 or 2048 | |
| Input Voltage (VDC) | 5-26 or 7-26 | 5-26 or 7-26 | 5-26 or 7-26 | 5-26 | 5-15 or 5-26 | 5-26 or 7-26 | 5-30 | |
| Operating Temperature (°C) | -40 to +100 (40 to +80 ATEX) | -40 to +100 (40 to +80 ATEX) | -40 to +100 (40 to +80 C ATEX) | -40 to +100 (40 to +80 C ATEX) | -40 to +100 | -40 to +100 (40 to +80 ATEX) | -40 to +100 | |
| Enclosure Rating | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 | |
| Special Features | ATEX certification available | Dual isolated outputs available | Compact hub shaft design | ATEX certification available | Rugged bearing structure | Draw works threaded shaft | Isolated coupling compensates for motor shaft endplay | |
| Page Number | 1.04 | 1.06 | 1.08 | 1.16 | 1.20 | 1.24 | 1.26 | |

MAGNETIC - INCREMENTAL

| | | | | | | | |
|-----------------------------|---|---|---|--|---|---|--|
| |  |  |  |  |  |  | |
| Product | SLIM Tach® SL56 | SLIM Tach® RL67 | SLIM Tach® SL85 | SLIM Tach® SL1250 | RIM Tach® 8500 | RIM Tach® 1250 | |
| Shaft/Bore Sizes | 5/8" to 2-7/8" Standard, Up to 3.75" Available | 5/8" to 2-7/8" Standard, Up to 3.75" Available | 5/8" to 2-7/8" Standard, Up to 3.75" Available | 5/8" to 2-7/8" Standard, Up to 3.75" Available | 5/8" to 2-7/8" Standard, Up to 3.75" Available | 5/8" to 2-7/8" Standard, Up to 8" Available | |
| Available Resolutions (PPR) | 64 to 2048 | 64 to 2048 | 64 to 2048 | 64 to 2048 | 60 to 1200 | 60 to 2048 | |
| Input Voltage (VDC) | 5 to 15 or 5 to 26 | 5 to 15 or 5 to 26 | 5 to 15 or 5 to 26 | 5 to 15 or 5 to 26 | 5 to 15 or 15 to 26 | 5 to 15 or 15 to 26 | |
| Operating Temperature (°C) | -40 to +90 (opt to +120) | -40 to +90 (opt to +120) | -40 to +90 (opt to +120) | -40 to +90 (opt to +120) | -40 to +80 | -40 to +80 | |
| Enclosure Rating | Resistant to grease, salt water, dust | Resistant to grease, salt water, dust | Resistant to grease, salt water, dust | Resistant to grease, salt water, dust | Resistant to grease, salt water, dust | Resistant to grease, salt water, dust | |
| Special Features | Bearingless design | Bearingless design | Bearingless design | Bearingless design | Bearingless design with removable sensors | Bearingless design with removable sensors | |
| Page Number | 1.42 | 1.44 | 1.46 | 1.50 | 1.52 | 1.54 | |



OPTICAL - INCREMENTAL

OPTICAL - ABSOLUTE

INDUCTIVE - RESOLVER

| | | | | | | | |
|-----------------------------|--|--|-------------------------------|--|----------------------------|------------------------------|-----------------------------|
| | | | | | | | |
| HSD35 | EN42 | EN44 | H56 Rotopulser® | X25 | AX70/71 | R25 Resolver | Product |
| 6mm to 1-1/4" hollow shaft | 5/8" to 1", 15mm, 16mm | 5/8" / 16 mm Integral coupling | 5/8" | 1/4" or 3/8" | 10mm shaft | Shaft Size: 0.3745" (9.51mm) | Shaft/Bore Sizes |
| 1 to 5000 | 15 to 5000 | 1024 or 2048 | 1 to 2500 | 1 to 5000 | Up to 16 bit ST, 12 bit MT | Single speed or Multi-Speed | Available Resolutions (PPR) |
| 5-15 or 5-26 | 5-15 or 5-26 | 5-15 or 5-26 | 5-26 | 5-26 | 10-30 | 2 to 8 Vrms | Input Voltage (VDC) |
| -40 to +100 | -50 to +100 | -50 to +100 | -40 to +85 | 0 to +70 | -40 to +60 or -40 to +40 | Up to 125 | Operating Temperature (°C) |
| IP65 | IP67 | IP67 | NEMA 4/ IP66 | NEMA 4/ IP66 | IP64 or IP67 | IP65 | Enclosure Rating |
| Field serviceable connector | Barrier-less ATEX Zone 1 Certification | Barrier-less ATEX Zone 1 Certification | Encoder within encoder design | NEC Class 1&2, Div 1&2, Groups C,D,E,F,G | Explosion proof | Shock resistant to 200g | Special Features |
| 1.12 | 1.28 | 1.30 | 1.32 | 1.34 | 1.66 | 1.70 | Page Number |

MAGNETIC - INCREMENTAL

MAGNETIC ABSOLUTE

| | | | | | | |
|------------------------------------|---------------------------|------------------------------------|---|-------------------------------|-------------------------|-----------------------------|
| | | | | | | |
| RIM Tach® 6200 (4) | SLIM Tach® HS56 | SLIM Tach® HS60 | RIM Tach® HS85 | R45 Rotopulser® | AR62/63 | Product |
| 5/8" | 5/8" to 1-1/8" | 1-1/8" to 2-7/8" hollow shaft | 5/8" to 2-7/8" Standard, Up to 4.5" Available | 5/8" or 7/8" | 3/8" or 10mm shaft | Shaft/Bore Sizes |
| 60 to 2048 | 64 to 2048 | 64 to 2048 | 60 to 2048 | 60 | 12 bit | Available Resolutions (PPR) |
| 5 to 15 or 15 to 26 | 5-15 or 5-26 | 5-15 or 5-26 | 5-15 or 5-26 | 5 to 26 | 10-30 | Input Voltage (VDC) |
| -40 to +70 | -20 to +80 | -20 to +80 | -20 to +70 | -40 to +85 | -40 to +100 | Operating Temperature (°C) |
| Immune to grease, salt water, dust | Resistant to grease, dust | Immune to grease, salt water, dust | Immune to grease, salt water, dust | Immune to grease, water, dust | IP67 or IP69k | Enclosure Rating |
| Shafted foot-mount or face mount | Hollowshaft design | Large bore Hollowshaft design | Hollow shaft design with removable sensors | 56C-face mounting | Shock resistant to 200g | Special Features |
| 1.56 | 1.58 | 1.60 | 1.62 | 1.40 | 1.64 | Page Number |

SERIES HD20

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Size 20 Heavy-Duty Encoder with Single or Dual Isolated Outputs
- ATEX Certification Available for Intrinsically Safe Applications
- Unbreakable Code Disc up to 3600PPR
- Special Housing and Seals for IP67 Rating
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing

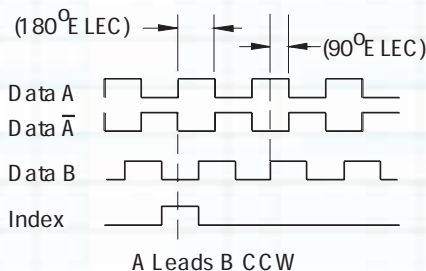


SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 3600 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: For resolutions to 625PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
 For resolutions to 1024PPR: 180° ± 18° electrical
 For resolutions over 1024PPR: 180° ± 25° electrical
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.
 A shown for reference



ELECTRICAL

Input Power: 5-26VDC; 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: 2N2222, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/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, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft speed: 6000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Shaft runout: 0.0005 TIR at midpoint
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10⁸ revs at rated shaft Loading,
 5 x 10¹¹ revs at 10% of rated shaft loading.
 (manufacturers' specs)
Housing and cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel.
Disc material: Metal or plastic
Weight: 14 ounces, typical

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 #108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable #108596-7 Pin Dif Line Drv w/o Idx | | Cable # 1400635- or 109209-(NEMA4) 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 | BRN | A | BRN | A | BRN | A | BRN | GREEN |
| Sig. B | D | ORG | B | ORG | B | ORG | B | ORG | BLUE |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | ORANGE |
| Power +V | B | RED | D | RED | D | RED | D | RED | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | BLACK |
| Case | — | — | G | GRN | G | GRN | G | GRN | WHITE |
| N/C | F | — | E | — | — | — | E | — | — |
| Sig. A | — | — | — | — | C | BRN/WHT | H | BRN/WHT | VIOLET |
| Sig. B | — | — | — | — | E | ORG/WHT | I | ORG/WHT | BROWN |
| Sig. Z | — | — | — | — | — | — | J | YEL/WHT | YELLOW |

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12.
 For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.



SERIES HD20

Ordering Information

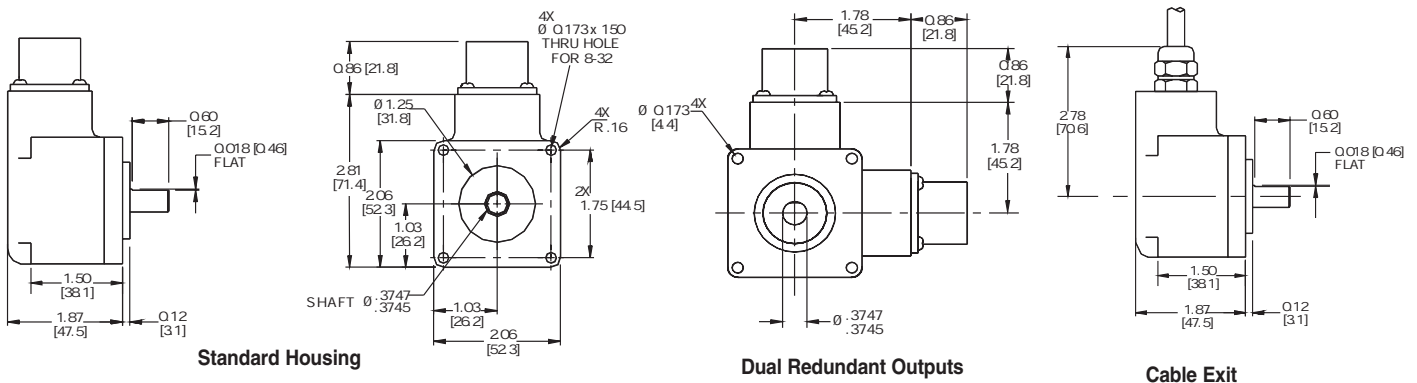
To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Shaft | Code 4: Electrical | Code 5: Termination | Code 6: Options |
|---------------|-------------|---------------|--------------------|---------------------|-----------------|
| HD20 □ | □□□□ | □ | □ | □ | □ |

Ordering Information

| | | | | | |
|--|--|---|--|--|--|
| <p>Size 20 Extreme Heavy Duty Encoder</p> <p>1 Unidirectional 2 Bidirectional 3 Bidirectional with Index</p> | <p>0001 0500 0010 0512 0024 0600 0025 0625 0035 0720 0040 1000 0060 1024 0100 1200 0120 1250 0192 1440 0200 2000 0240 2048 0250 2500 0256 2540 0300 2600 0360 3600</p> | <p>0 3/8" Dia. Shaft with flat 4 10mm Dia. Shaft, no flat</p> | <p>0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)</p> <p>available when: Code 1 is 1,2 and Code 5 is 3 through H, or Code 1 is 3 and Code 5 is 5 through H:</p> <p>3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272)</p> | <p>1 6 Pin Connector 3 7 Pin Connector 5 10 Pin Connector D 18" Sealed Cable E 3' Sealed Cable F 6' Sealed Cable G 10' Sealed Cable H 15' Sealed Cable</p> | <p>0 No Options 1 Nickel Finish Housing 2 Stainless Steel Housing A Same as "0" w/ ATEX Type 1 B Same as "1" w/ ATEX Type 1 C Same as "2" w/ ATEX Type 1</p> <p>Available when Code 4 is 0, 2, 3, F or G</p> <p>G Same as "0" w/ ATEX Type 2 H Same as "1" w/ ATEX Type 2 I Same as "2" w/ ATEX Type 2</p> <p>Available when Code 4 is 4</p> <p>M Same as "0" w/ ATEX Type 3 N Same as "1" w/ ATEX Type 3 O Same as "2" w/ ATEX Type 3</p> <p>Available when Code 4 is 0, 2, F or G</p> <p>3 Redundant Outputs (Dual Connector Housing). See † NOTE 4 Nickel Finish Housing with Redundant Outputs. See † NOTE 5 Stainless Steel Housing with Redundant Outputs. See † NOTE D Same as "3" w/ ATEX Type 1. See †NOTE E Same as "4" w/ ATEX Type 1. See †NOTE F Same as "5" w/ ATEX Type 1. See †NOTE J Same as "3" w/ ATEX Type 2. See †NOTE K Same as "4" w/ ATEX Type 2. See †NOTE L Same as "5" w/ ATEX Type 2. See †NOTE P Same as "3" w/ ATEX Type 3. See †NOTE Q Same as "4" w/ ATEX Type 3. See †NOTE R Same as "5" w/ ATEX Type 3. See †NOTE</p> <p>† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.</p> |
| <p>Notes:</p> <p>10 foot Cable Assemblies with MS Connector</p> <p>108594-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs</p> <p>108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended Outputs</p> <p>108596-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs</p> <p>1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs</p> <p>109209-0010 NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs</p> <p>Mating Connectors (no cable)</p> <p>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, NEMA 4 style (604505 & 604506)</p> | | | | | |
| <p>*Note: Available ATEX Certified Options</p> <p>ATEX Type 1: ATEX Certified; 5V in, 5V out only</p> <p>ATEX Type 2: ATEX Certified; 7-26V in, 7-26V out</p> <p>ATEX Type 3: ATEX Certified; 7-26V in, 5V out</p> <p>NOTE: ATEX voltages replace those shown in Code 4.</p> | | | | | |

DIMENSIONS inches [mm]



SERIES HD25

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Size 25 Heavy-Duty Encoder with Single or Dual Isolated Outputs
- ATEX Certification Available for Intrinsically Safe Applications
- Unbreakable Code Disc up to 5000PPR
- Special Housing and Seals for IP67 Rating
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing

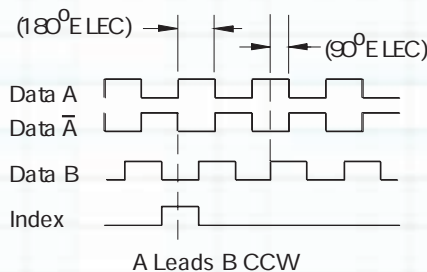


SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 5000 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: For resolutions to 625PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
 For resolutions to 1024PPR: 180° ± 18° electrical
 For resolutions over 1024PPR: 180° ± 25° electrical
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.
 A shown for reference



ELECTRICAL

Input Power: 5-26VDC, 5-15VDC dependant on output type. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: 2N2222, 4469, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/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, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft Speed: 6,000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Shaft runout: 0.0005 TIR at midpoint
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10⁸ revs at rated shaft Loading, 5 x 10¹¹ revs at 10% of rated shaft loading. (manufacturers' specs)
Housing and cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel.
Disc material: Metal or plastic
Weight: 14 ounces, typical

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS, 5 Pin M12, 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 #108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable #108596-7 Pin Dif Line Drv w/o ldx | | Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/ldx | | Cable # 112859-M12, 5 Pin Single Ended | | Cable Exit with Seal |
|------------------|----------------------------------|------------|-----------------------------------|------------|--|------------|---|------------|--|------------|----------------------|
| | 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 | 4 | BLK | GREEN |
| Sig. B | D | ORG | B | ORG | B | ORG | B | ORG | 2 | WHT | BLUE |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | 5 | GRY | ORANGE |
| Power +V | B | RED | D | RED | D | RED | D | RED | 1 | BRN | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | 3 | BLU | BLACK |
| Case | — | — | G | GRN | G | GRN | G | GRN | — | — | WHITE |
| N/C | F | — | E | — | — | — | E | — | — | — | — |
| Sig. A | — | — | — | — | C | BRN/WHT | H | BRN/WHT | — | — | VIOLET |
| Sig. B | — | — | — | — | E | ORG/WHT | I | ORG/WHT | — | — | BROWN |
| Sig. Z | — | — | — | — | — | — | J | YEL/WHT | — | — | YELLOW |

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12.

For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

ENVIRONMENTAL

Operating Temperature: -40 to 100°C
Operating Temperature ATEX: -40 to 80°C
Storage temperature: -40 to 100°C
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

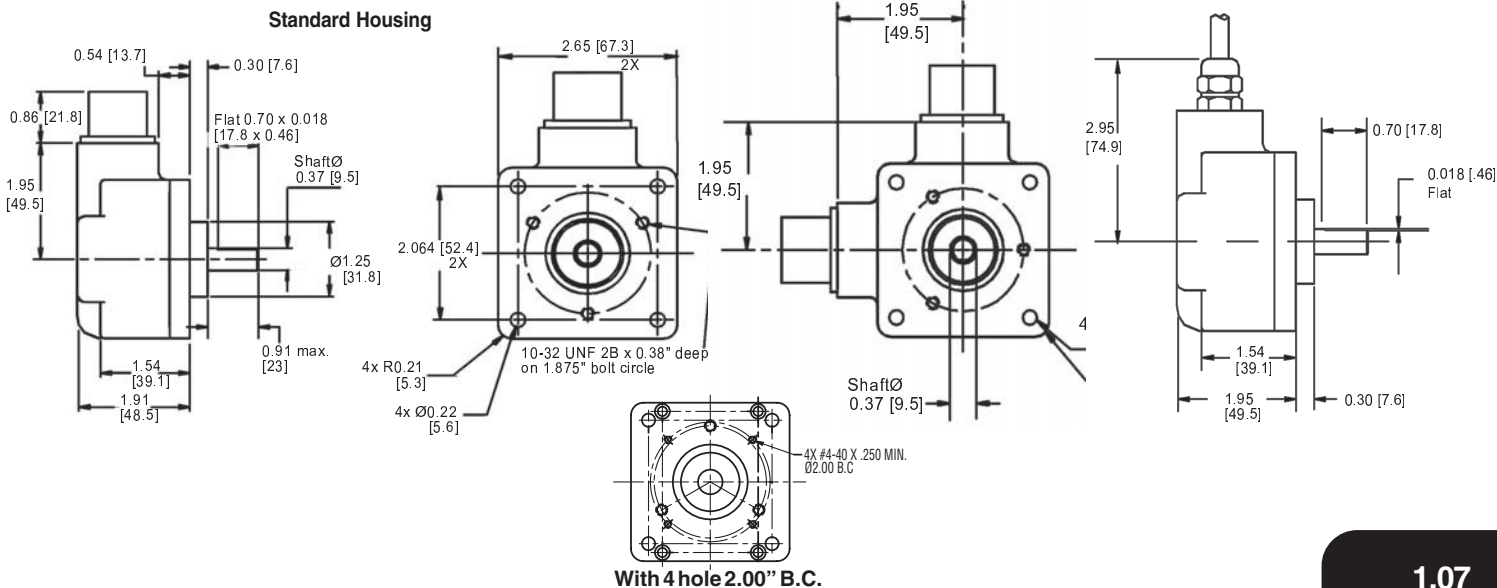
SERIES HD25

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: Electrical | Code 5: Termination | Code 6: Options |
|---|--|---|--|--|---|
| HD25 □ | □□□□ | □ | □ | □ | □ |
| Ordering Information | | | | | |
| Size 25 Extreme Heavy Duty Encoder 1 Unidirectional 2 Bidirectional 3 Bidirectional with Index | 0001 0625 0024 0720 0025 0900 0035 1000 0040 1024 0050 1200 0060 1250 0100 1440 0120 1524 0192 1600 0200 1800 0240 2000 0250 2048 0256 2500 0300 2540 0360 2600 0500 3600 0512 4096 0600 5000 | 0 3/8" Dia. Shaft with flat 4 10mm Dia. Shaft, with flat 6 12mm Dia. Shaft 7 Same as option 0 with 4 hole 2.00" B.C. | 0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222) Available when: Code 1 is 1, 2 and Code 5 is 3,5 or D through P, or Code 1 is 3 and code 5 is 5 or D through P: 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) 6 5-15V in, 5-15V Differential Line Driver out (4469) | 1 6 Pin Connector 3 7 Pin Connector 5 10 Pin Connector 9 5 Pin M12 Connector D 18" Sealed Cable E 3' Sealed Cable F 6' Sealed Cable G 10' Sealed Cable H 15' Sealed Cable P 5m Sealed Cable *Note: Available ATEX Certified Options ATEX Type 1: ATEX Certified; 5V in, 5V out only ATEX Type 2: ATEX Certified; 7-26V in, 7-26V out ATEX Type 3: ATEX Certified; 7-26V in, 5V out ATEX Type 4: ATEX Certified; 5-15V in, 5-15V out NOTE: ATEX voltages replace those shown in Code 4. † NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details. | 0 No Options 1 Nickel Finish Housing 2 Stainless Steel Housing 3 Redundant Outputs (Dual Connector Housing). See † NOTE 4 Nickel Finish Housing with Redundant Outputs. See † NOTE 5 Stainless Steel Housing with Redundant Outputs. See † NOTE A Same as "0" w/ ATEX Type 1 B Same as "1" w/ ATEX Type 1 C Same as "2" w/ ATEX Type 1 D Same as "3" w/ ATEX Type 1. See † NOTE E Same as "4" w/ ATEX Type 1. See † NOTE F Same as "5" w/ ATEX Type 1. See † NOTE Available when Code 4 is 0-3, F or G G Same as "0" w/ ATEX Type 2 H Same as "1" w/ ATEX Type 2 I Same as "2" w/ ATEX Type 2 J Same as "3" w/ ATEX Type 2. See † NOTE K Same as "4" w/ ATEX Type 2. See † NOTE L Same as "5" w/ ATEX Type 2. See † NOTE Available when Code 4 is 4 M Same as "0" w/ ATEX Type 3 N Same as "1" w/ ATEX Type 3 O Same as "2" w/ ATEX Type 3 P Same as "3" w/ ATEX Type 3. See † NOTE Q Same as "4" w/ ATEX Type 3. See † NOTE R Same as "5" w/ ATEX Type 3. See † NOTE Available when Code 4 is 6: S Same as 0, w/ATEX Type 4 T Same as 1, w/ATEX Type 4 U Same as 2, w/ATEX Type 4 V Same as 3, w/ATEX Type 4. See † NOTE W Same as 4, w/ATEX Type 4. See † NOTE Y Same as 5, w/ATEX Type 4. See † NOTE |
| Note: 10 foot Cable Assemblies with MS Connector 108594-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs 108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended Outputs 108596-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs 1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs 109209-0010 NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index 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, NEMA 4 style (604505 & 604506) | | | | | |

DIMENSIONS inches [mm]



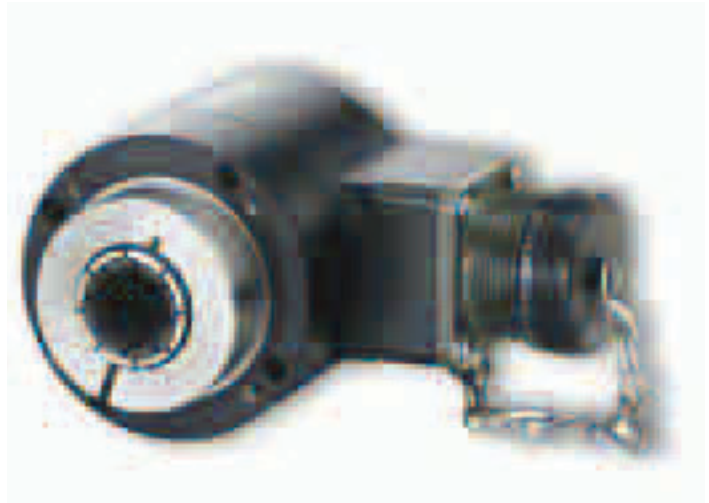
SERIES HSD25

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Compact Hubshaft Design with Field Replaceable Shaft Isolators
- Unbreakable Code Disc up to 3600PPR
- ATEX Certification Available for Intrinsically Safe Applications
- IP67 Sealing
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 1 to 3600 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: For resolutions to 625PPR: $90^\circ \pm 15^\circ$ electrical; For resolutions over 625 PPR: $90^\circ \pm 30^\circ$ electrical

Symmetry:

For resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical

For resolutions over 1024PPR: $180^\circ \pm 25^\circ$ electrical

Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC

Outputs: 2N2222. ET7272, ET7273

Frequency Response: 125 kHz (data & index)

Termination: 6, 7, or 10 pin MS Connector; 5 or 8 Pin M12 Connector; Cable exit w/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, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)

Bore Diameter: 3/8", 10mm, 1/2", 5/8", 3/4".

Insulated inserts provided

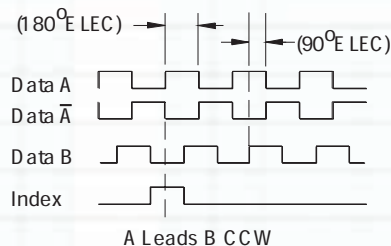
Bore runout: 0.0005 TIR at midpoint

Starting torque: 6.5 in-oz. maximum (at 25°C)

DATA AND INDEX

Not all complements shown.

A shown for reference



Bearings: 61805-2RZ

Bearing life: 5×10^8 revs at rated shaft

Loading,

5×10^{11} revs at 10% of rated shaft loading.

(manufacturers' specs)

Housing and cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel. Tether Available

Disc material: Metal or plastic

Weight: 20 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C

Operating Temperature ATEX: -40 to 80°C

Storage temperature: -40 to 100°C

Shock: 50G's for 11msec duration

Vibration: 5 to 2000Hz @ 20 G's

Humidity: 100%

Enclosure Rating: IP67



SERIES HSD25

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: Output Format | Code 5: Termination | Code 6: Options | Code 7: Special Options |
|--|---|--|--|--|--|---|
| □□□25 | □□□□ | □ | □ | □ | □ | □□ |
| Ordering Information | | | | | | |
| HSD25 Heavy Duty Hub Shaft Encoder ISD25 ATEX Intrinsically Safe Hub Shaft Encoder | 0001 0500 0010 0512 0024 0600 0025 0625 0035 0720 0040 1000 0060 1024 0100 1200 0120 1250 0192 1440 0200 2000 0240 2048 0250 2500 0256 2540 0300 2600 0360 3600 | 0 6mm 1 1/4" 2 5/16" 3 8mm 4 3/8" 5 10mm 6 12mm 7 1/2" 8 5/8" 9 15mm A 16mm C 19mm D 3/4" | 0 Single Ended ABZ, 5-26VDC push-pull 1 Single Ended ABZ, 5-26VDC Open collector (7273) 2 Single Ended ABZ, 5-26VDC Open collector (2222) 3 Single Ended ABZ, 5-26VDC Open collector (2222) w/2.2kOhm <i>Options 4 & 5 not available when Code 5 is H; and Code 6 is 3, 4, 5</i> 4 Differential AB only, 5-26 in, 5-26 out (7272) 5 Differential AB only, 5-26 in, 5V out (7272) <i>Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H; and Code 6 is 3, 4, 5</i> 6 Differential ABZ, 5-26 in, 5V out (7272) 7 Differential ABZ, 5-26 in, 5-26 out (7272) | 0 6 pin 1 7 pin 2 10 pin 5 6 pin+mating 6 7 pin+mating 7 10 pin+mating 8 12 CW pin+mating A .5m (18") cable C 1m (36") cable D 2m (72") cable E 3m (120") cable L 4m (144") cable H 5 pin M12 J 8 pin M12 K 1.5 ft (18") cable w/ in line 10pin connector M 5 ft (60") cable N 10 ft (120") cable | 0 No Options 1 Slotted Tether 2 Single point tether 3 No tether, Dual isolated outputs 4 Slotted Tether, Dual isolated Outputs 5 Single Point Tether, Dual isolated Outputs | Blank None 01 Nickel Plated 02 Stainless Steel |
| | <p>**Note: Tether may be required for proper encoder operation and may be supplied by the customer or ordered as the following accessories:</p> <p>113764-0001 Single Point Tether Kit 113766-0001 Slotted Tether Kit</p> <p>† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.</p> | | | <p>Following options are only available when Code 1 is ISD25</p> <p>A Single Ended ABZ, 7-26 in, 7-26 out push-pull (7272) C Single Ended ABZ, 5V in, 5V out push-pull (7272) D Single Ended ABZ, 7-26V in, 7-26V out Open Collector (7273) E Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222) F Single Ended ABZ, 7-26V in, 7-26V out Open Collector w/2.2kOhm pullup (2222)</p> <p><i>Options G, H & J not available when Code 5 is H and Code 6 is 3, 4, 5</i></p> <p>G Differential AB only, 5V in, 5V out (7272) H Differential AB only, 7-26 in, 7-26 out (7272) J Differential AB only, 7-26 in, 5V out (7272)</p> <p><i>Options K, L & M not available when Code 5 is 0, 1, 5, 6, H and Code 6 is 3, 4, 5</i></p> <p>K Differential ABZ, 5V in, 5V out (7272) L Differential ABZ, 7-26 in, 7-26 out (7272) M Differential ABZ, 7-26 in, 5V out (7272)</p> | | |
| <p>Note:</p> <p>10 foot Cable Assemblies with MS Connector</p> <p>108594-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs 108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended Outputs 108596-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs 1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs 109209-0010 NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs</p> <p>15 foot Cable Assemblies with M12 Connector</p> <p>112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs 112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs 112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs</p> <p>Mating Connectors (no cable)</p> <p>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, NEMA 4 style (604505 & 604506)</p> | | | | | | |

SERIES HSD25

NorthStar™ brand

ELECTRICAL CONNECTIONS

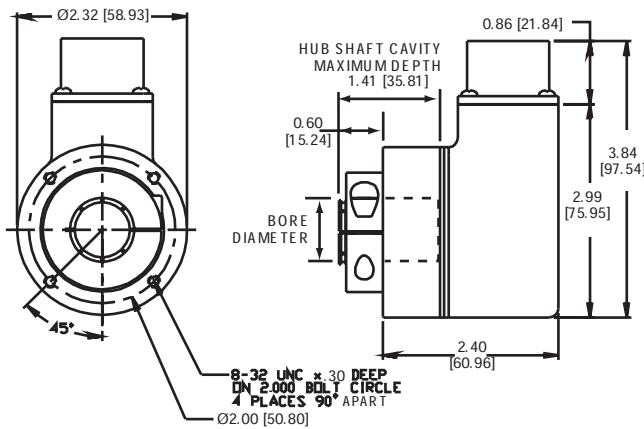
6, 7 & 10 Pin MS Connectors and Cables

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.

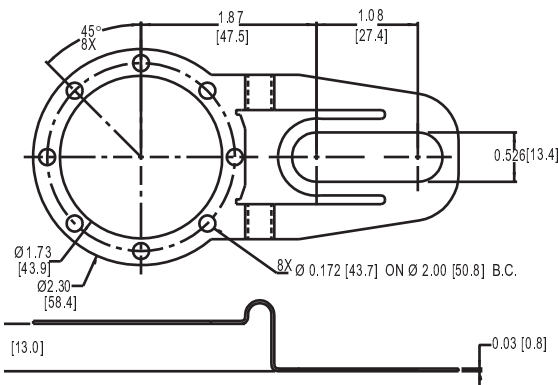
| Encoder Function | Cable # 108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable # 108596-7 Pin Diff Line Drv w/o I/O | | Cable # 140035- or 109209- (NEMA) 10 Pin Diff Line Drv w/O | | Cable #108615- 12 Pin CCW | | Cable Exit with Seal |
|------------------|-----------------------------------|------------|-----------------------------------|------------|--|------------|--|------------|---------------------------|------------|----------------------|
| | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | |
| Sig. A | E | BRN | A | BRN | A | BRN | A | BRN | 5 | BRN | BRN |
| Sig. B | D | ORG | B | ORG | B | ORG | B | ORG | 8 | ORN | ORG |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | 3 | YEL | YEL |
| Power +V | B | RED | D | RED | D | RED | D | RED | 12 | RED | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | 10 | BLK | BLACK |
| Case | — | — | G | GRN | G | GRN | G | GRN | 9 | — | — |
| N/C-SLD | F | — | E | — | — | — | E | — | 7 | — | — |
| Sig. A | — | — | — | — | C | BRN/WHT | H | BRN/WHT | 6 | BRN/WHT | BRN/WHT |
| Sig. B | — | — | — | — | E | ORG/WHT | I | ORG/WHT | 1 | ORN/WHT | ORG/WHT |
| Sig. Z | — | — | — | — | — | — | J | YEL/WHT | 4 | YEL/WHT | YEL/WHT |
| 0 Volt Sense | — | — | — | — | — | — | — | — | 2 | GRN | — |
| 5 Volt Sense | — | — | — | — | — | — | — | — | 11 | BLK/WHT | — |

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67. For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

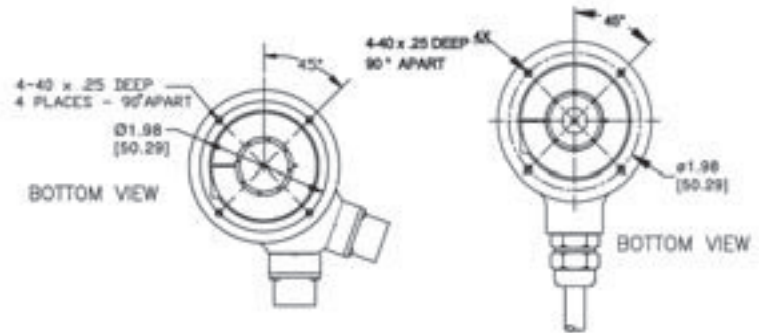
DIMENSIONS inches [mm]



Standard Housing

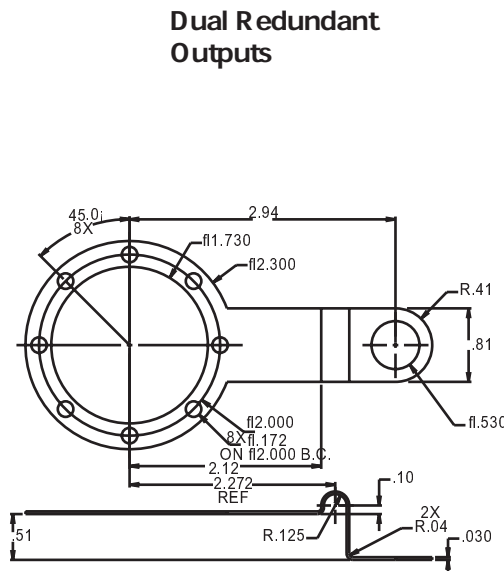


Slotted Tether



Dual Redundant Outputs

Cable Exit



Single Point Tether

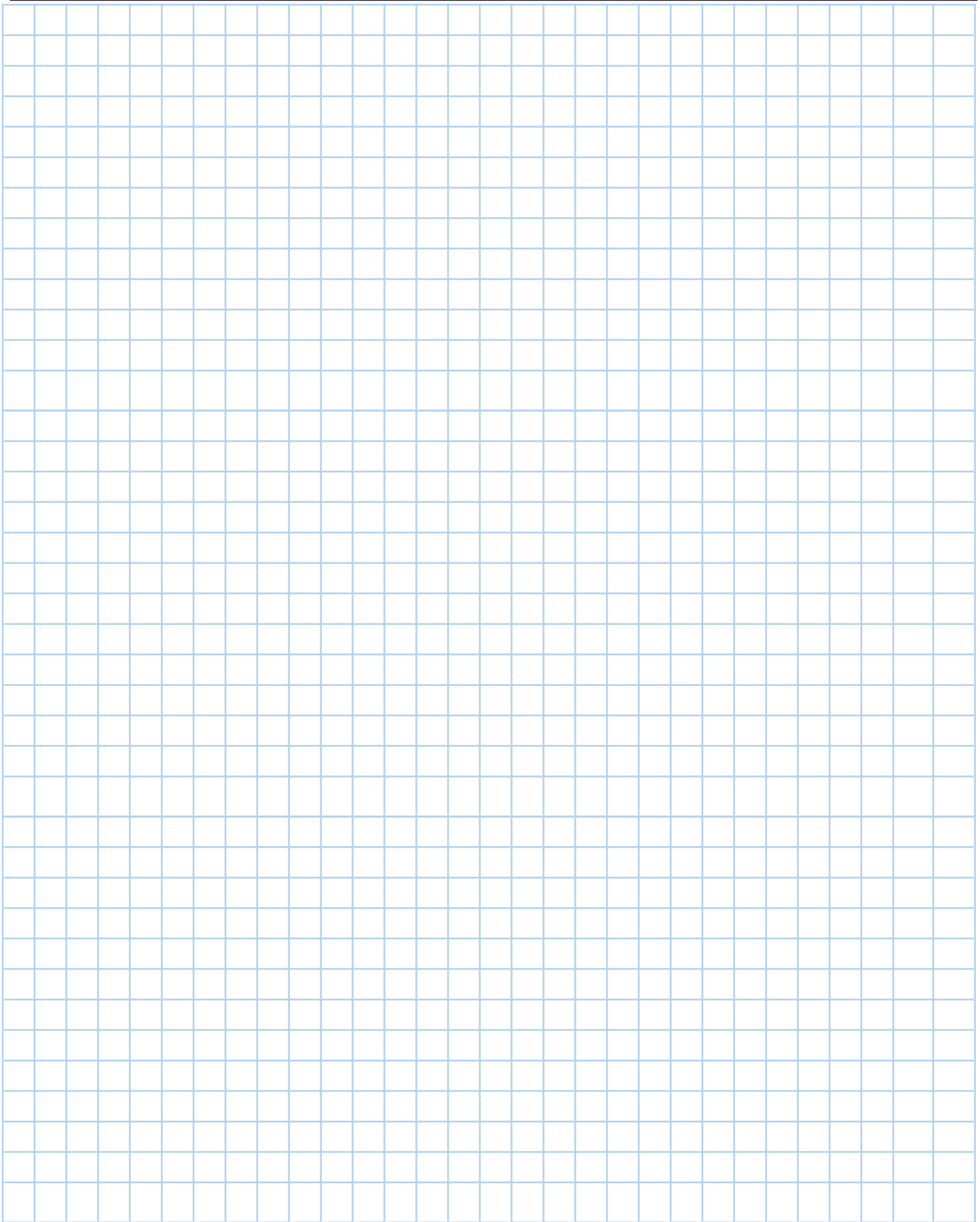
5 & 8 Pin M12 Accessory Cables when Code 5= H or J

Connector pin numbers and cable assembly wire color information is provided here for reference.

| Encoder Function | Cable # 112859-5 Pin Single Ended | | Cable # 112860-8 Pin Single Ended | | Cable # 112860-8 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 |

* Index not provided on all models. See ordering information

Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum



SERIES HSD35

NorthStar™ brand

Heavy Duty Optical Encoder

Key Features

- Rugged Design Resists up to 400g Shock
- Stainless Steel Clamp and Hub 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



PRELIMINARY SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 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 to 1200 PPR: $90^\circ \pm 15^\circ$ electrical; For resolutions over 1250 PPR: $90^\circ \pm 30^\circ$ electrical
Symmetry:
 For resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical
 For resolutions over 1024PPR: $180^\circ \pm 25^\circ$ electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL CONNECTIONS

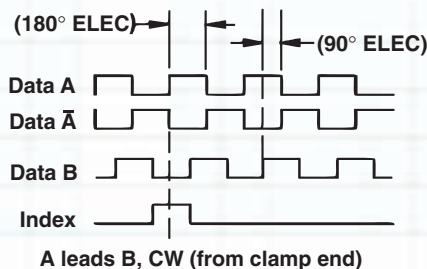
| Signal | Connector Pin |
|-----------------|---------------|
| Common | 1 |
| B | 2 |
| A | 3 |
| Z * | 4 |
| Case (optional) | 5 |
| Vcc 5-26VDC | 6 |
| B | 7 |
| A | 8 |
| Z * | 9 |
| No Connection | 10 |

* Index (Z) optional. See Ordering Information

ELECTRICAL

Input Power: 5-26VDC, 5-15VDC. 50 mA max., not including output loads.
Outputs: ET7272, ET7273, 4469
Frequency Response: 125 kHz (data & index)
Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information
Mating Connector: 10 pin style HA-10

DATA AND INDEX Not all complements shown A shown for reference



MECHANICAL

Shaft Material: Stainless Steel
Bore Diameter: 6mm to 28mm, 1.4" to 1.25", electrically isolated
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: 8.0 in-oz. maximum (at 25°C)
Running torque: 5.0 in-oz. maximum (at ambient)
Bearings: ABEC 3
Housing and cover: Hard Anodized and Powder Coated Aluminum
Disc material: Plastic or metal (unbreakable)
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: 100%
Enclosure Rating: IP67 (IP64 at shaft speeds above 5000RPM)
Connector Rating: IP65

Replaces the Magcoder HS35M (shown below)



Contact Customer Service for appropriate replacement model. +1.800.873.8731

SERIES HSD35

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 | |
|--|---|--|--|---|--|-------------------|
| HSD35 | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Ordering Information | | | | | | |
| HSD35 Heavy-duty, hollowshaft encoder | 0001 0512 0003 0600 0010 0900 0012 1000 0015 1024 0032 1200 0050 1500 0060 2000 0100 2048 0120 2400 0200 2500 0240 3072 0250 4000 0300 4096 0360 5000 0500 | 0 6mm 1 1/4" 2 5/16" 3 8mm 4 3/8" 5 10mm 6 12mm 7 1/2" 8 5/8" 9 15mm A 16mm C 19mm D 3/4" E 20mm F 7/8" G 24mm H 1" J 1-1/8" K 1-1/4" M 14mm N 18mm P 25mm R 28mm | Stamped Metal 0 None 1 4.5" C-Face tether 2 8.5" C-Face tether 3 Slotted tether 4 Same as 1 w/cover 5 Same as 3 w/cover | Swivel Rod A AC motor fan cover tether with T-bolt B 4.5" C-face tether with 3/8" bolt C 8.5" C-face tether with 1/2" bolt D Same as "A" w/ cover kit E Same as "B" w/ cover kit | 0 Single Ended ABZ, 5-26VDC push-pull 1 Single Ended ABZ, 5-26VDC O/C 2 Single Ended ABZ, 5-26VDC O/C w2.2kOhm 4 Differential AB only, 5-26, 5-26 out (7272) 5 Differential AB only, 5-26 in, 5V out (7272) A Differential AB, 5-26V in, 5V out (4469) C Differential AB, 5-15V in, 5-15V out (4469) 6 Differential ABZ, 5-26 in, 5V out (7272) 7 Differential ABZ, 5-26 in, 5-26 out (7272) 8 Differential ABZ, 5-26 in, 5V out (4469) 9 Differential ABZ, 5-15 in, 5-15 out (4469) D Dual isolated outputs, same as "6" E Dual isolated outputs, same as "7" F Dual isolated outputs, same as "8" G Dual isolated outputs, same as "9" H Same as "0" with Extended temp range J Same as "1" with Extended temp range K Same as "2" with Extended temp range L Same as "4" with Extended temp range M Same as "5" with Extended temp range N Same as "6" with Extended temp range P Same as "7" with Extended temp range Q Same as "D" with Extended temp range R Same as "E" with Extended temp range | Blank None |

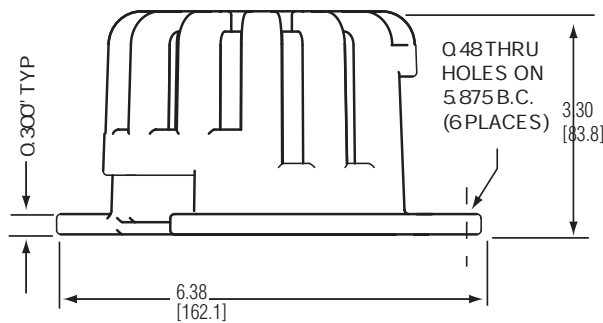
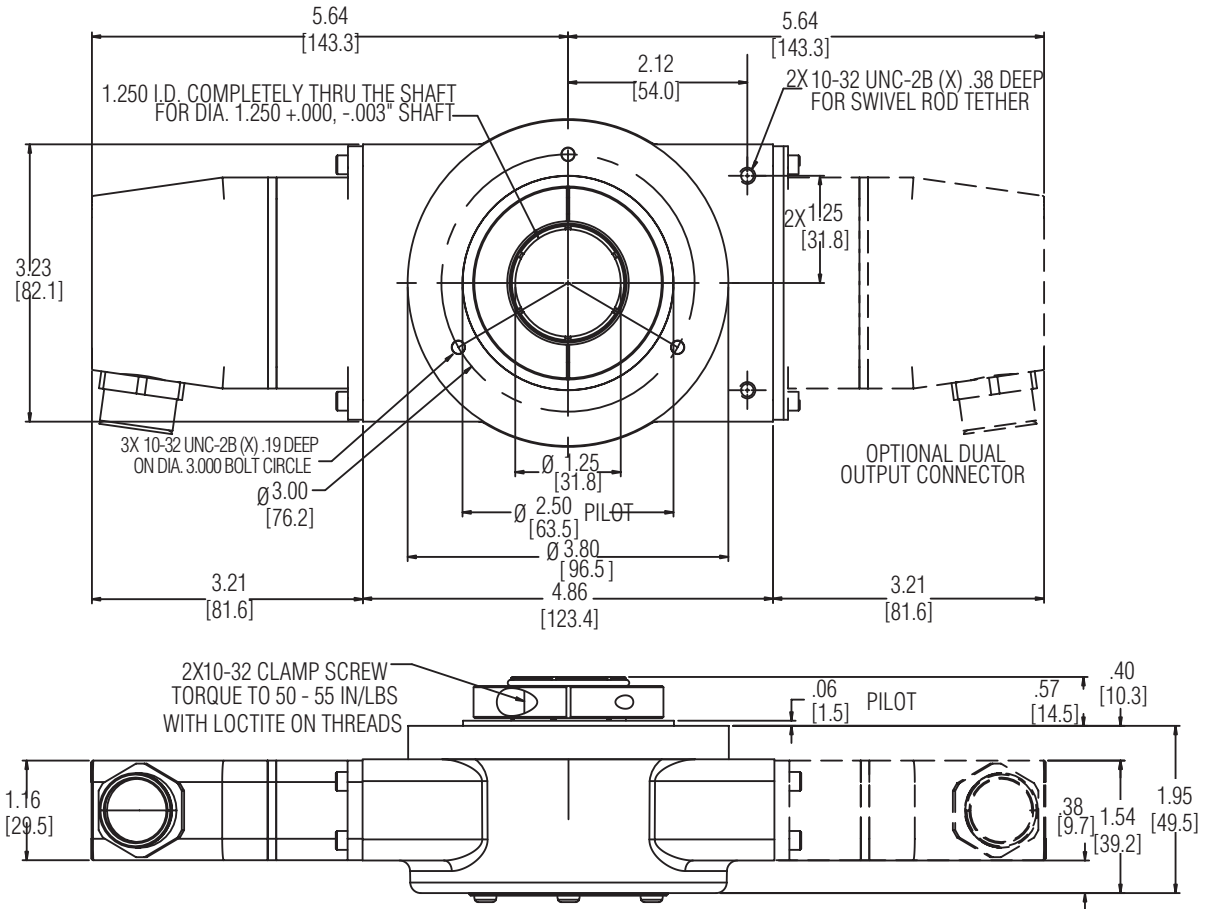
Accessory Kits:

- 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, 56C face (single or dual output)
- 114623-0001** Cover Kit, Fan cover (single or dual output)

SERIES HSD35

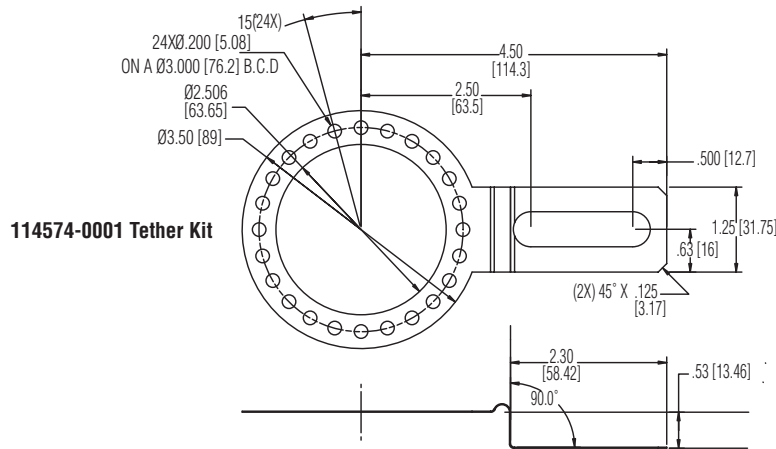
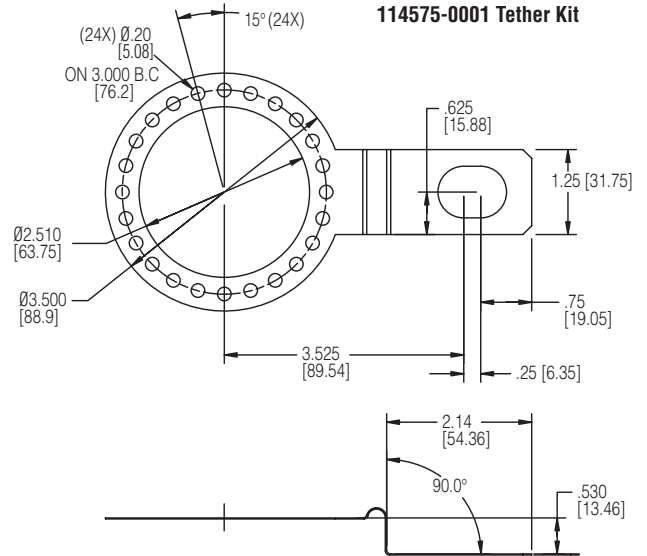
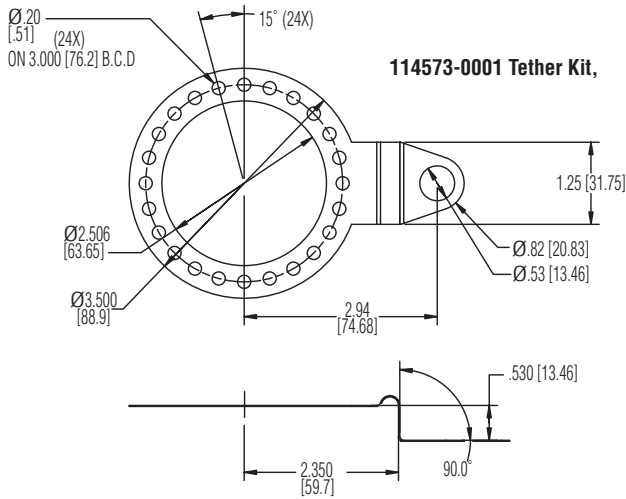
NorthStar™ brand

DIMENSIONS inch
[mm]



OPTIONAL SAFETY COVER(S)

DIMENSIONS inch [mm]



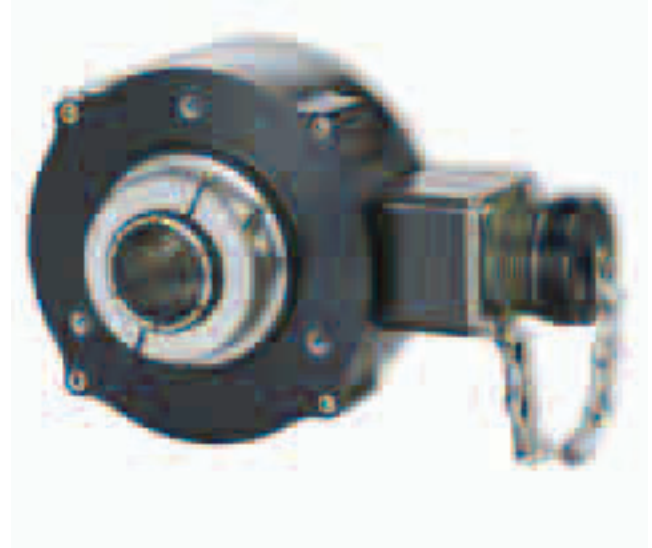
SERIES HSD37

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Unbreakable Code Disc up to 5000PPR
- ATEX Certification Available for Intrinsically Safe Applications
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum, Stainless Steel, or Nickel Plated Housing
- IP67 Sealing



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 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: $90^\circ \pm 15^\circ$ electrical; For resolutions over 1250 PPR: $90^\circ \pm 30^\circ$ electrical

Symmetry:

For resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical

For resolutions over 1024PPR: $180^\circ \pm 25^\circ$ electrical

Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: ET7272, ET7273

Frequency Response: 125 kHz (data & index)

Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information

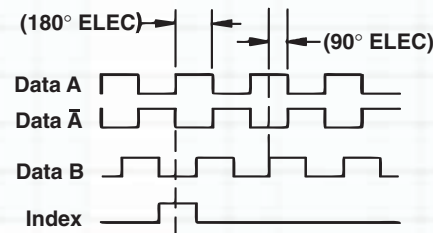
Mating Connector:

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 (607545-0001)
10 pin, NEMA 4 style (604505 & 604506)
Cable w/ 5 pin M12 connector, p/n 112859-xxx
Cable w/ 8 pin M12 connector, p/n 112860-xxx

DATA AND INDEX

Not all complements shown

\bar{A} shown for reference



A leads B, CCW (From Clamp End)

MECHANICAL

Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)

Bore Diameter: 1.00", 0.875", 0.750", 0.625", 0.500", 16mm, 15mm, 12mm. Insulated inserts provided for bores under 1 inch (1" bore not electrically isolated for stainless shaft option)

Bore runout: ± 0.0005 TIR at midpoint

Min. Shaft Engagement: 1.60" (Recommended)

Starting torque: 4.5 in-oz. maximum (at 25°C)

Running torque: 4.0 in-oz. maximum (at ambient)

Bearings: 61806-ZZ

Bearing life: 5×10^8 revs at rated shaft Loading,

5×10^{11} revs at 10% of rated shaft loading. (manufacturers' specs)

Housing and cover: Hard Anodized Aluminum.

Also available in Stainless Steel.

Disc material: Metal or plastic

Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C

Operating Temperature ATEX: -40 to 80°C

Storage temperature: -40 to 100°C

Shock: 400g for 6msec duration

Vibration: 5 to 3000Hz @ 20g

Humidity: 100%

Enclosure Rating: IP67

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67

SERIES HSD37

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 | Code 7: Special Option |
|--------------------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|---|
| <input type="checkbox"/> SD37 | <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 | | | | | | |
|--|---|---|--|---|---|---|
| HSD37 Heavy Duty Hollowshaft Encoder | 0015 0032 0050 0060 0100 | 0 6mm 1 1/4" 2 5/16" 3 8mm 4 3/8" | 0 Single Ended ABZ, 5-26VDC push-pull 1 Single Ended ABZ, 5-26VDC open collector (7273) 2 Single Ended ABZ, 5-26VDC open collector (2222) 3 Single Ended ABZ, 5-26VDC open collector w/1kOhm (2222) | 0 6 pin connector 1 7 pin connector 2 10 pin connector 4 10 pin Bayonet connector 5 6 pin+mating connector 6 7 pin+mating connector 7 10 pin+mating connector 8 12 CW pin+mating connector 9 10 pin Bayonet+mating connector | 0 No options 1 Slotted Tether 2 Single point 4.5" C-face tether 3 Single point 8.5" C-face tether 4 Dual Isolated Outputs, No tether 5 Dual Isolated Outputs, Slotted Tether 6 Dual Isolated Outputs, 4.5" c-face tether 7 Dual Isolated Outputs, 8.5" c-face tether A Swivel Rod tether C Metric Swivel Rod tether D Dual Isolated Outputs, Swivel Rod Tether E Dual Isolated Outputs, Metric Swivel Rod Tether | Blank None 01 Nickel Plated 02 Stainless Steel |
| ISD37 ATEX Intrinsically Safe | 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 3072 4000 4096 5000 | 5 10mm 6 12mm 7 1/2" 8 5/8" 9 15mm A 16mm C 19mm D 3/4" E 20mm F 7/8" G 24mm H 1" Non Isolated P 25mm Non Isolated R 1" Isolated | <i>Options 4 & 5 not available when Code 5 is H</i> 4 Differential AB only, 5-26, 5-26 out (7272) 5 Differential AB only, 5-26 in, 5V out (7272) <i>Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H</i> 6 Differential ABZ, 5-26 in, 5V out (7272) 7 Differential ABZ, 5-26 in, 5-26 out (7272) | A .5m (18") cable C 1m (36") cable D 2m (72") cable H 5 pin M12 connector J 8 pin M12 connector K 1.5 ft (18") cable w/ in line 10pin connector M 5 ft (60") cable N 10 ft (120") cable T Terminal box w/conduit entry | | |
| | | | Following options are only available when Code 1 is ISD37 A Single Ended ABZ, 7-26V in, 7-26V out push-pull (7272) C Single Ended ABZ, 5V in, 5V out push-pull (7272) D Single Ended ABZ, 7-26V in, 7-26 out push-pull (7272) E Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222) F Single Ended ABZ, 7-26V in, 7-26V out Open Collector with 1kOhm (2222) <i>Options G, H & J not available when Code 5 is H</i> G Differential AB only, 5V in, 5V out (7272) H Differential AB only, 7-26 in, 7-26 out (7272) J Differential AB only, 7-26 in, 5V out (7272) <i>Options K, L, M not available when Code 5 is 0, 1, 5, 6, H</i> K Differential ABZ, 5V in, 5V out (7272) L Differential ABZ, 7-26 in, 7-26 out (7272) M Differential ABZ, 7-26 in, 5V out (7272) | | | |

Accessories

- 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

The following Cover Kits are not compatible when Code 5 is T

- 114591-0001** Cover Kit, 56C face
- 114592-0001** Cover Kit, fan cover
- 114593-0001** Dual Cover Kit, 56C face
- 114594-0001** Dual Cover Kit, fan cover

10 foot Cable Assemblies with MS Connector

- 108594-0010** 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108595-0010** 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108596-0010** 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- 1400635-0010** 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
- 109209-0010** NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs

15 foot Cable Assemblies with M12 Connector

- 112859-0015** 5 Pin M12, Cable Assy. For Use with Single Ended Outputs

- 112860-0015** 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
- 112860-0015** 8 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 (607545-0001)
- 10 pin, NEMA 4 style (604505 & 604506)

SERIES HSD37

NorthStar™ brand

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. HSD 37 models with direct cable exit carry the color coding as shown in the right hand column.

| Encoder Function | Cable # 108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable # 108596-7 Pin Dif Line Driver with Index | | Cable # 140635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/idx | | Cable # 114448-* 10 Pin Bayonet | | Cable Exit with Seal |
|------------------|-----------------------------------|------------|-----------------------------------|------------|---|------------|--|------------|---------------------------------|------------|----------------------|
| | 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 | BRN |
| Sig. B | D | ORN | B | ORG | B | ORG | B | ORG | B | ORG | ORN |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | C | YEL | YEL |
| Power +V | B | RED | D | RED | D | RED | D | RED | D | RED | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | E | — | BLACK |
| Case | — | — | G | GRN | G | GRN | G | GRN | F | BLK | — |
| N/C-Shield | F | — | E | — | — | — | E | — | G | GRN | — |
| Sig. A | — | — | — | — | C | BRN/WHT | H | BRN/WHT | H | BRN/WHT | BRN / WHT |
| Sig. B | — | — | — | — | E | ORG/WHT | I | ORG/WHT | J | ORG/WHT | ORG / WHT |
| Sig. Z | — | — | — | — | — | — | J | YEL/WHT | K | YEL/WHT | YEL / WHT |

For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

5 & 8 Pin M12 Accessory Cables when Code 5= H or J

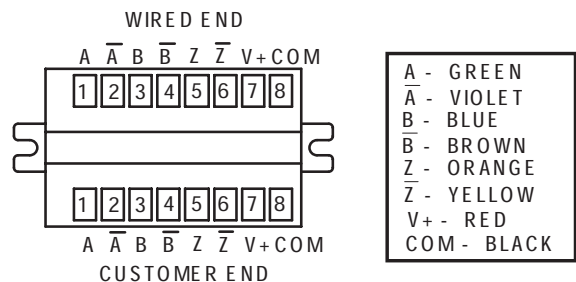
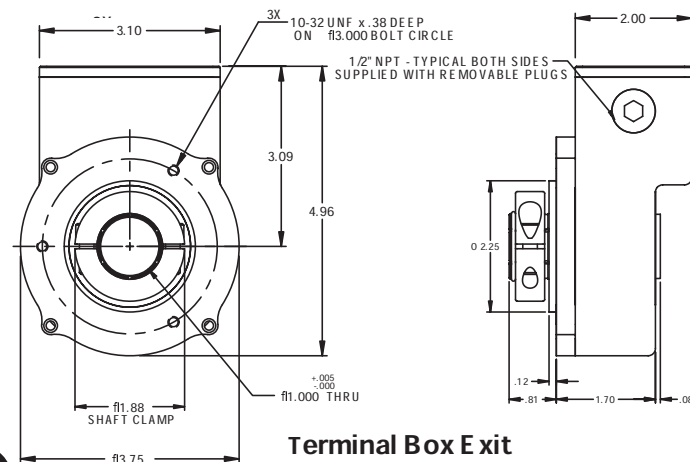
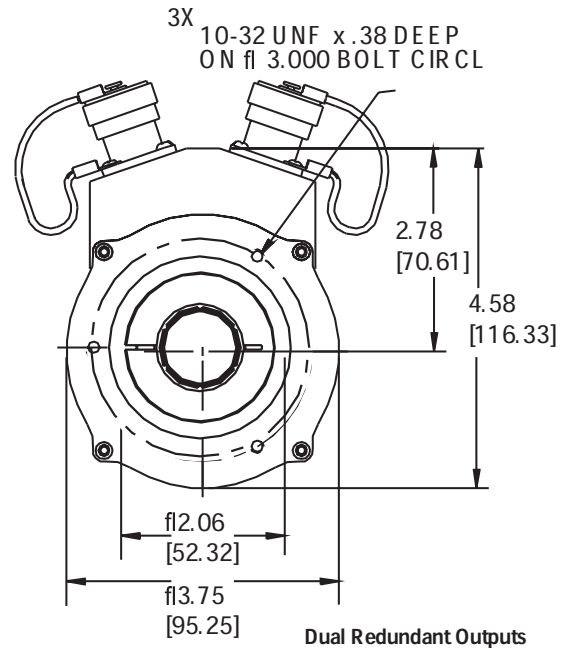
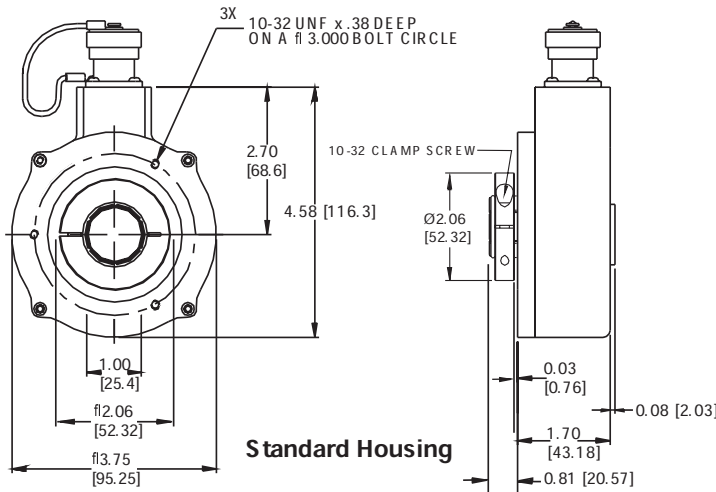
Connector pin numbers and cable assembly wire color information is provided here for reference.

| Encoder Function | Cable # 112859-5 Pin Single Ended | | Cable # 112860-8 Pin Single Ended | | Cable # 112860-8 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 |

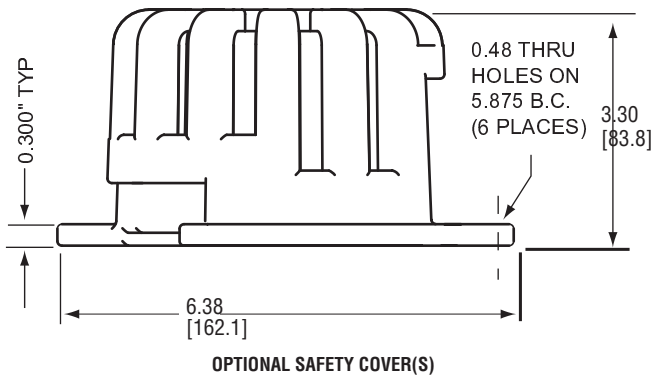
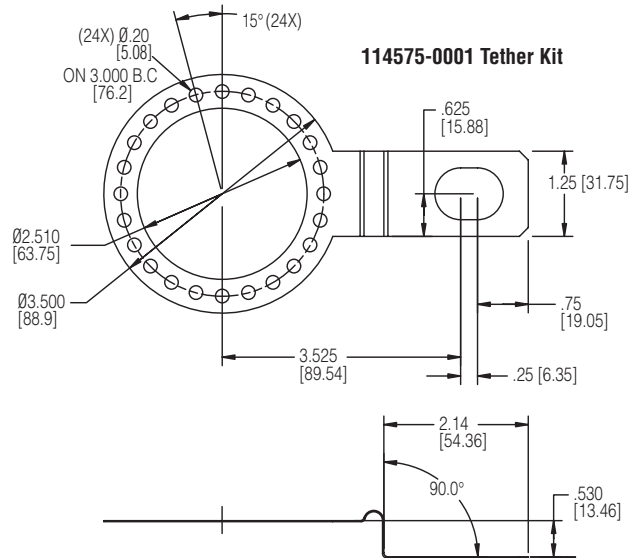
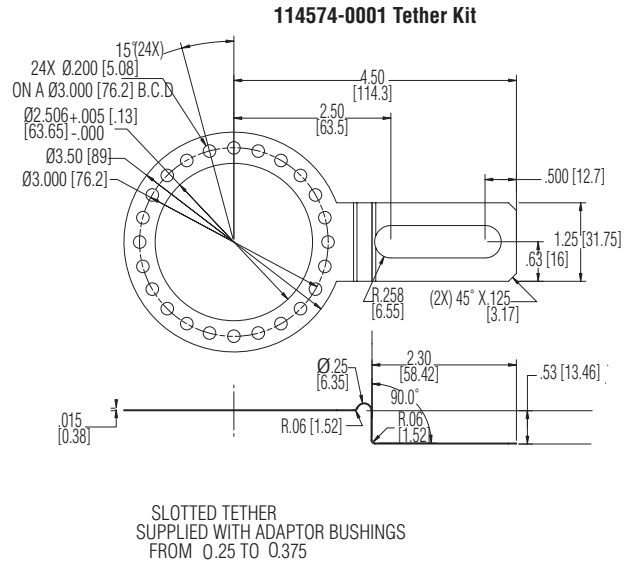
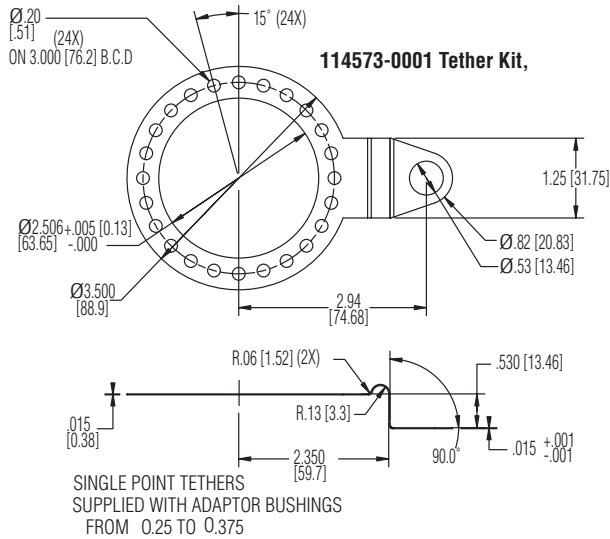
* Index not provided on all models. See ordering information

Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

DIMENSIONS (inches [mm])



DIMENSIONS (inches [mm])



SERIES HSD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 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: $90^\circ \pm 15^\circ$ electrical; For resolutions over 1250 PPR: $90^\circ \pm 30^\circ$ electrical

Symmetry:

For resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical

For resolutions over 1024PPR: $180^\circ \pm 25^\circ$ electrical

Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC. 50 mA max., not including output loads.

Outputs: ET7272, ET7273

Frequency Response: 125 kHz (data & index)

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 (607545-0001)

10 pin, NEMA 4 style (604505 & 604506)

Cable w/ 5 pin M12 connector, p/n 112859-xxx

Cable w/ 8 pin M12 connector, p/n 112860-xxx

MECHANICAL

Shaft Material: 6061-T6 Aluminum

Bore Diameter: 1.00", 0.875", 0.750", 0.625", 0.500", 16mm, 15mm, 12mm. Insulated inserts provided for bores under 1 inch

Bore Tolerance:

1" bore: 1.0005" -0.0000" / +0.0010"

< 1" bore: Nominal -0.000" / +0.002"

Mating Shaft Requirements:

Configuration: Keyway allowed, Flat not allowed

Runout: $\pm 0.025"$ (0.635mm) radial, typical

Endplay: $\pm 0.050"$ (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 ambient)

Bearings: 61806-ZZ

Bearing life: 5×10^8 revs at rated shaft Loading,

5×10^{11} revs at 10% of rated shaft loading.

(manufacturers' specs)

Housing and cover: Hard Anodized Aluminum.

Disc material: Metal or plastic (unbreakable)

Weight: 26 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C

Storage temperature: -40 to 100°C

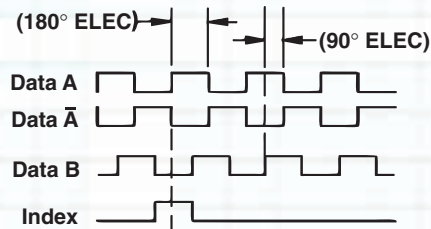
Shock: 50G's for 11msec duration

Vibration: 5 to 2000Hz @ 20 G's

Humidity: 100%

Enclosure Rating: IP67

DATA AND INDEX Not all complements shown A shown for reference



A leads B, CCW (From Clamp End)

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

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67

SERIES HSD38

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 | □□□□ | □ | □ | □ | □ | □ | □ |
| Ordering Information | | | | | | | |
| HSD38 Size 38 heavy-duty, hollowshaft encoder | 0015 0032 0050 0060 0100 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 3072 4000 4096 5000 | 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 not electrically isolated: G 1" H 1" Stainless Steel Collar | 0 single ended, unidirectional (A) 1 single ended, bidirectional (AB) 2 single ended, bidirectional with index (ABZ) available when Code 5 is 3 or 4 and Code 6 is 1, 2, 4, 6, 7, 8, A, G, J or K: 3 differential, bidirectional (AĀ BB) available when Code 5 is 3 or 4 and Code 6 is 2, 4, 8, 7, A, G, J or K: 4 differential, bidirectional with index (AĀ BB ZZ) | 0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out available when: Code 4 is 3 or 4 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) | 0 6 pin connector 1 7 pin connector 2 10 pin connector 4 10 pin Bayonet connector 5 6 pin connector, plus mating connector 6 7 pin connector, plus mating connector 7 10 pin connector, plus mating connector 8 10 pin Bayonet connector plus mating connector 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 available when: Code 5 is 0 or 2 H 5 pin M12 connector | 0 No Option 1 Internally Isolated 1" bore 2 Reverse Phasing (A leads B, CW) | 0 Cast Aluminum Housing, Slotted Tether Included 6 Cast Aluminum Housing, No Tether C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" 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) N Same as "K" with Cover Kit |

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, 56C face
- 114592-0001** Cover Kit, fan cover
- 114593-0001** Dual Cover Kit, 56C face
- 114594-0001** Dual Cover Kit, fan cover

10 foot Cable Assemblies with MS Connector

- 108594-0010** 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108595-0010** 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
- 108596-0010** 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- 112123-0010** 6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
- 1400635-0010** 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
- 114448-0010** 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs
- 109209-0010** NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs

10 foot Cable Assemblies with M23 Connector

- 108615-0010** 12 Pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CCW

15 foot Cable Assemblies with M12 Connector

- 112859-0015** 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
- 112860-0015** 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
- 112860-0015** 8 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 (607545-0001)
- 10 pin, NEMA 4 style (604505 & 604506)

SERIES HSD38

NorthStar™ brand

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. HSD37 models with direct cable exit carry the color coding as shown in the right hand column.

| Encoder Function | Cable # 108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable # 108596-7 Pin Dif Line Driver with Index | | Cable # 1400635-; Cable # 109209-10 Pin Dif Line Driver with Index | | Cable # 14448-10 Pin Bayonet | | 12 Pin (CW) (if used) | Cable Exit with Seal |
|------------------|-----------------------------------|------------|-----------------------------------|------------|---|------------|--|------------|------------------------------|------------|-----------------------|----------------------|
| | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color |
| Sig. A | E | BRN | A | BRN | A | BRN | A | BRN | A | BRN | 5 | GREEN |
| Sig. B | D | ORN | B | ORG | B | ORG | B | ORG | B | ORG | 8 | BLUE |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | C | YEL | 3 | ORANGE |
| Power +V | B | RED | D | RED | D | RED | D | RED | D | RED | 12 | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | E | — | 10 | BLACK |
| Case | — | — | G | GRN | G | GRN | G | GRN | F | BLK | 9 | WHITE |
| M/C-Shield | F | — | E | — | — | — | E | — | G | GRN | 7 | — |
| SigA | — | — | — | — | C | BRN/WHT | H | BRN/WHT | H | BRN/WHT | 6 | VIOLET |
| SigB | — | — | — | — | E | ORG/WHT | I | ORG/WHT | J | ORG/WHT | 1 | BROWN |
| SigZ | — | — | — | — | — | — | J | YEL/WHT | K | YEL/WHT | 4 | YELLOW |

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.

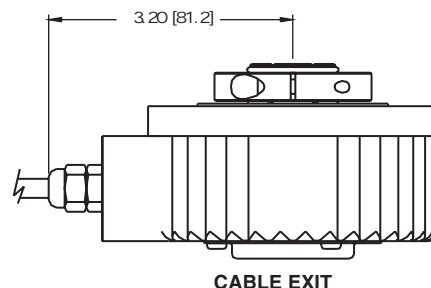
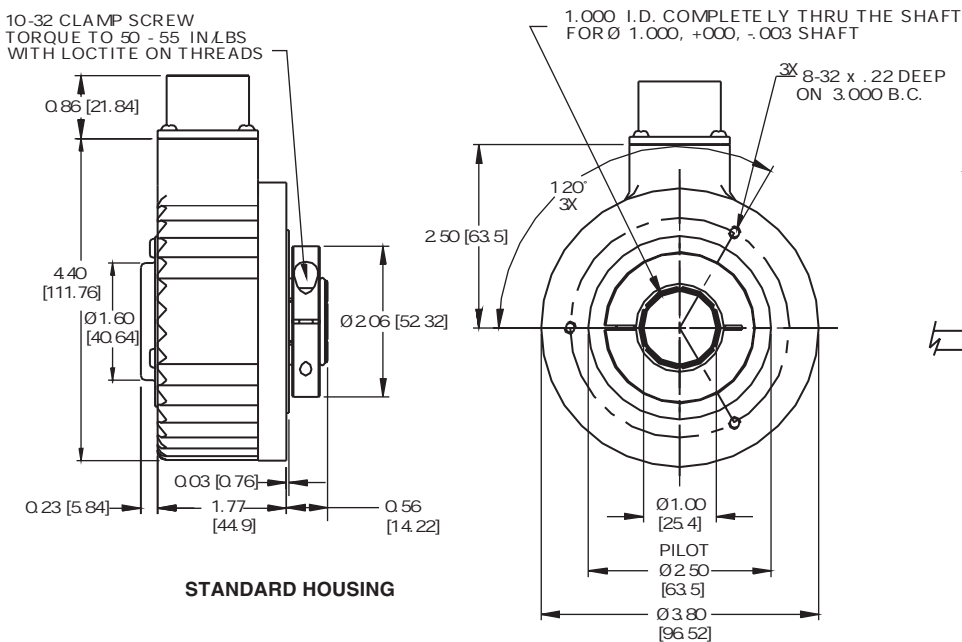
| Encoder Function | Cable # 112859-5 Pin Single Ended | | Cable # 112860-8 Pin Single Ended | | Cable # 112860-8 Pin Differential | |
|------------------|-----------------------------------|------------|-----------------------------------|------------|-----------------------------------|------------|
| | 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 |

* Index not provided on all models. See ordering information
Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

- * Note: 1) Standard cable length is 10 feet but may be ordered in any length in 5 foot increment. For example, -0020 is a 20 foot cable.
2) "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67
3) For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

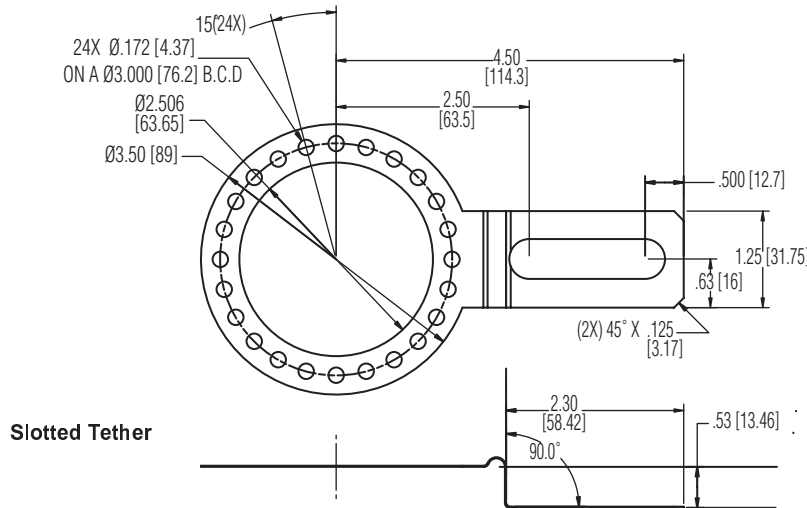
DIMENSIONS [mm]

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

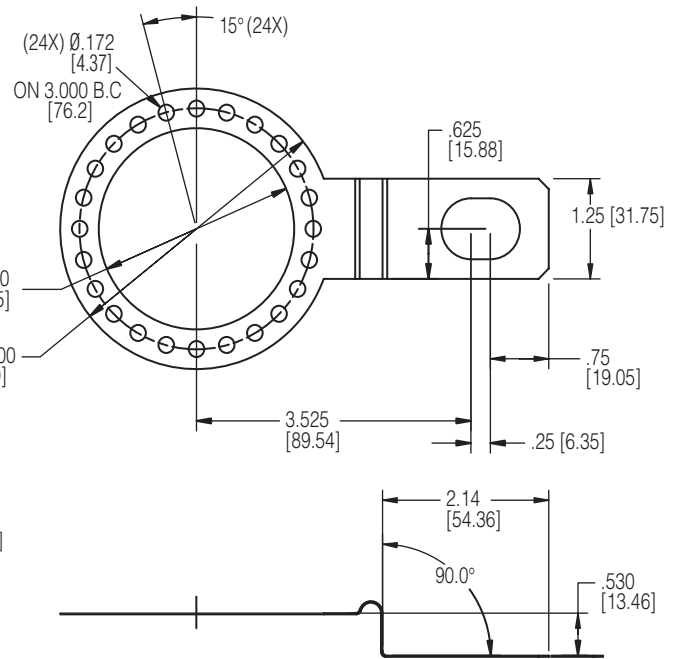


SERIES HSD38

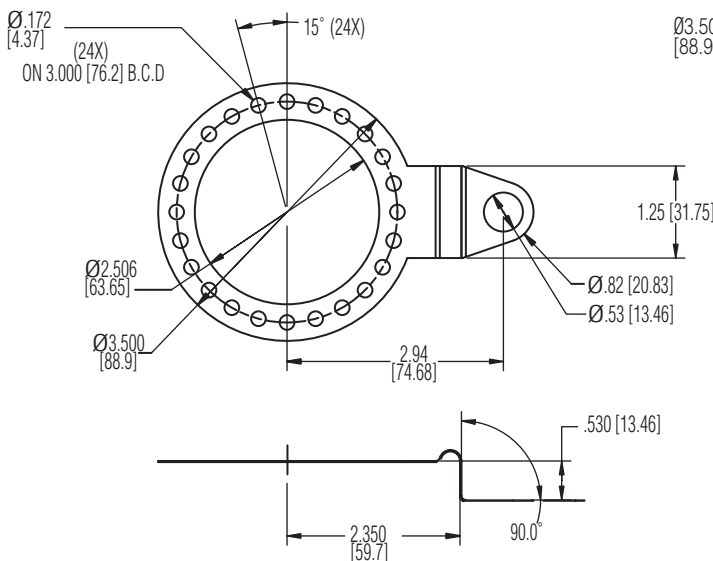
DIMENSIONS inch [mm]



Slotted Tether



Single Point Tether for 8-1/2" C-Face



Single Point Tether for 4-1/2" C-Face

SERIES DWD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- Draw Works Threaded Shaft with Field Replaceable Adapters for Reduced Downtime
- ATEX Certification Available for Intrinsically Safe Requirements
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum or Stainless Steel Housing
- NAMUR Sensor Output Available



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 5000 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: For resolutions to 1200 PPR: $90^\circ \pm 15^\circ$ electrical; For resolutions over 1250 PPR: $90^\circ \pm 30^\circ$ electrical
Symmetry:
 For resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical
 For resolutions over 1024PPR: $180^\circ \pm 25^\circ$ electrical

Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL CONNECTIONS

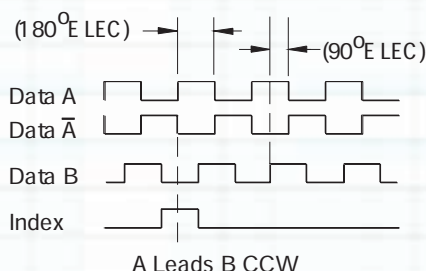
6, 7 & 10 Pin MS Connectors and Cables

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 #108594-6 Pin Single Ended | | Cable # 108595-7 Pin Single Ended | | Cable #108596-7 Pin Dif Line Drv w/o Idx | | Cable # 1400635- or 109209-(NEMA4) 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 | BRN | A | BRN | A | BRN | A | BRN | BRN |
| Sig. B | D | ORG | B | ORG | B | ORG | B | ORG | ORG |
| Sig. Z | C | YEL | C | YEL | — | — | C | YEL | YEL |
| Power +V | B | RED | D | RED | D | RED | D | RED | RED |
| Com | A | BLK | F | BLK | F | BLK | F | BLK | BLK |
| Case | — | — | G | GRN | G | GRN | G | GRN | — |
| N/C | F | — | E | — | — | — | E | — | — |
| Sig. A | — | — | — | — | C | BRN/WHT | H | BRN/WHT | BRN/WHT |
| Sig. B | — | — | — | — | E | ORG/WHT | I | ORG/WHT | ORG/WHT |
| Sig. Z | — | — | — | — | — | — | J | YEL/WHT | YEL/WHT |

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12.
 For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

DATA AND INDEX
 Not all complements shown.
 \bar{A} shown for reference



ELECTRICAL

Input Power: 5-26VDC; 50 mA max., not including output loads. ATEX: 5VDC, 5-26VDC
Outputs: 2N2222, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/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, NEMA 4 style (604505 & 604506)

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 Material: 300 series stainless steel
Bore loading: Up to 20 lbs axial and radial
Bore runout: 0.0005 TIR at midpoint
Starting/Running torque: 4.5/4.0 in-oz. maximum (at 25°C)
Bearings: 61806-ZZ
Bearing life: 5×10^8 revs at rated shaft Loading,
 5×10^{11} revs at 10% of rated shaft loading. (manufacturers' specs)
Housing and cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel.
Disc material: Metal or plastic
Weight: 35 ounces, typical

ENVIRONMENTAL

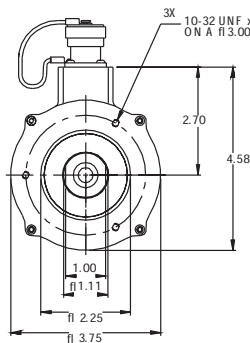
Operating Temperature: -40 to 100°C
Operating Temperature ATEX: -40 to 80°C
Storage temperature: -40 to 100°C
Shock: 400g for 6msec duration
Vibration: 5 to 3000Hz @ 20g
Humidity: 100%
Enclosure Rating: IP67

Ordering Information

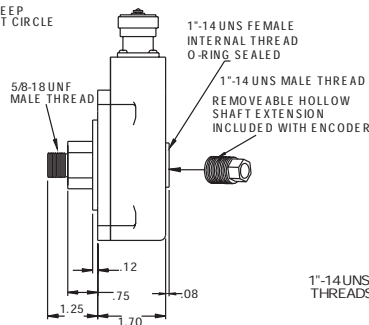
To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Shaft | Code 4: Output Format | Code 5: Termination | Code 6: Options |
|---|---|---|--|--|--|
| □□□ 38 | □□□□ | □ | □ | □ | □ |
| Ordering Information | | | | | |
| DWD38 Draw Works Encoder ISW38 ATEX Intrinsically Safe | 0015 0032 0050 0060 0100 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 4000 4096 5000 | 0 1"-14 UNS x 5/8" - 18 UNF Threaded Shaft 1 1"-14 UNS Threaded Shaft 2 1"-14 UNS x 5/8" - 18 UNF Field Replaceable Threaded Shaft | 0 Single Ended ABZ, 5-26VDC push-pull 1 Single Ended ABZ, 5-26VDC open collector (7273) 2 Single Ended ABZ, 5-26VDC open collector (2222) 3 Single Ended ABZ, 5-26VDC open collector w/1kOhm (2222) <i>Options 4 & 5 not available when Code 5 is H</i> 4 Differential AB only, 5-26, 5-26 out (7272) 5 Differential AB only, 5-26 in, 5V out (7272) <i>Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H</i> 6 Differential ABZ, 5-26 in, 5V out (7272) 7 Differential ABZ, 5-26 in, 5-26 out (7272) Following options are only available when Code 1 is ISW38 A Single Ended ABZ, 7-26V in, 7-26V out push-pull (7272) C Single Ended ABZ, 5V in, 5V out push-pull (7272) D Single Ended ABZ, 7-26V in, 5V out push-pull (7272) E Single Ended ABZ, 7-26V in, 7-26V out Open Collector (7273) F Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222) G Single Ended ABZ, 7-26V in, 7-26V out Open Collector w/ 1kOhm (2222) <i>Options H, J & K not available when Code 5 is H</i> H Differential AB only, 5V in, 5V out (7272) J Differential AB only, 7-26 in, 7-26 out (7272) K Differential AB only, 7-26 in, 5V out (7272) <i>Options L, M, P not available when Code 5 is 0, 1, 5, 6, H</i> L Differential ABZ, 5V in, 5V out (7272) M Differential ABZ, 7-26 in, 7-26 out (7272) P Differential ABZ, 7-26 in, 5V out (7272) N Namur output, 15mA max | 0 6 pin connector 1 7 pin connector 2 10 pin connector 5 6 pin+mating connector 6 7 pin+mating connector 7 10 pin+mating connector 8 12 CW pin+mating connector A .5m (18") cable C 1m (36") cable D 2m (72") cable H 5 pin M12 connector J 8 pin M12 connector K 1.5 ft (18") cable w/ in line 10pin connector M 5 ft (60") cable N 10 ft (120") cable | 0 Aluminum housing 1 Nickel finish housing 2 Stainless Steel housing 3 Dual Isolated Outputs, Aluminum Housing 4 Dual Isolated Outputs, Nickel Housing 5 Dual Isolated Outputs, Stainless Steel Housing |
| <p>Note: 10 foot Cable Assemblies with MS Connector 108594-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs 108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended Outputs 108596-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs 1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs 109209-0010 NEMA4 10 pin MS, Cable Assy. For use with differential line driver with index outputs</p> <p>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, NEMA 4 style (604505 & 604506)</p> <p>† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.</p> | | | | | |

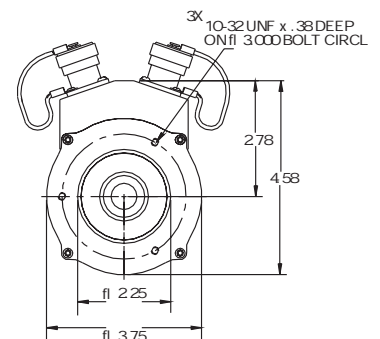
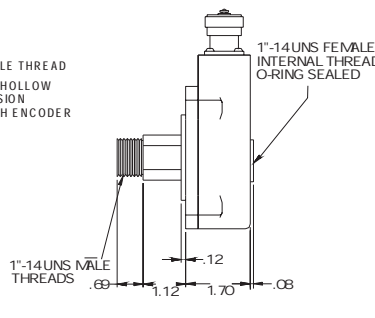
DIMENSIONS inches [mm]



With Convertable Shaft



With Non-Convertible Shaft



Redundant Version

SERIES HSD44

NorthStar™ brand

Extreme Heavy Duty Encoder

Key Features

- O-Ring Housing with Pilot Seals Against Motor for the Ultimate in Protection
- Isolated Coupling Compensates for Motor Shaft Runout and Endplay
- Perfect for Off-Highway Vehicle Applications with High Shock and Vibration
- Unbreakable Code Disc



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1024 PPR (pulses/revolution), Others at special order
Format: Two channel quadrature (AB) with 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° ± 15° electrical
Symmetry: 180° ± 18° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pF
Electrical Immunity: 50 Meg ohm minimum encoder shaft/frame to all connector pins

ELECTRICAL

Input Power: 5-30VDC. 50 mA max., not including output loads.
Outputs: 5 -30 Volts DC, TTL
Frequency Response: 125 kHz (data & index)
Termination: 18" pigtail or 18" pigtail with MS Connector. See Ordering Information
Mating Connector: 10 pin MS, style MS3106A-18-1S (MCN-N6)

MECHANICAL

Mechanical Interface: Electrically isolated stainless steel shaft flex coupling
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Coupling: 16mm or 5/8", flexible
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Bearing life: 5 x 10⁸ revs at rated shaft Loading, 5 x 10¹¹ revs at 10% of rated shaft loading. (manufacturers' specs)
Housing Material: Aluminum Alloy, Black Anodized
Disc material: Stainless steel
Weight: 4 lbs.

ELECTRICAL CONNECTIONS

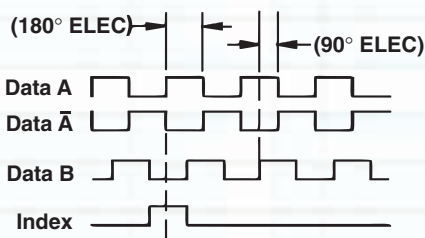
| Function | Pin | Wire Color |
|----------------|-----|------------|
| Sig. A | A | BRN |
| Sig. B | B | ORG |
| Sig. Z | C | YEL |
| Power +V | D | RED |
| Com. | F | BLK |
| Case | G | GRN |
| N/C | E | — |
| Sig. \bar{A} | H | BRN/WHT |
| Sig. \bar{B} | I | ORG/WHT |
| Sig. \bar{Z} | J | YEL/WHT |

ENVIRONMENTAL

Operating Temperature: -40 to 100°C
Storage temperature: -40 to 100°C
Shock: 400g, 6mSec
Vibration: 5-3000 Hz, 20g
Humidity: 98%, non-condensing
Enclosure Rating: NEMA 6

DATA AND INDEX

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



A leads B, CCW (From Clamp End)

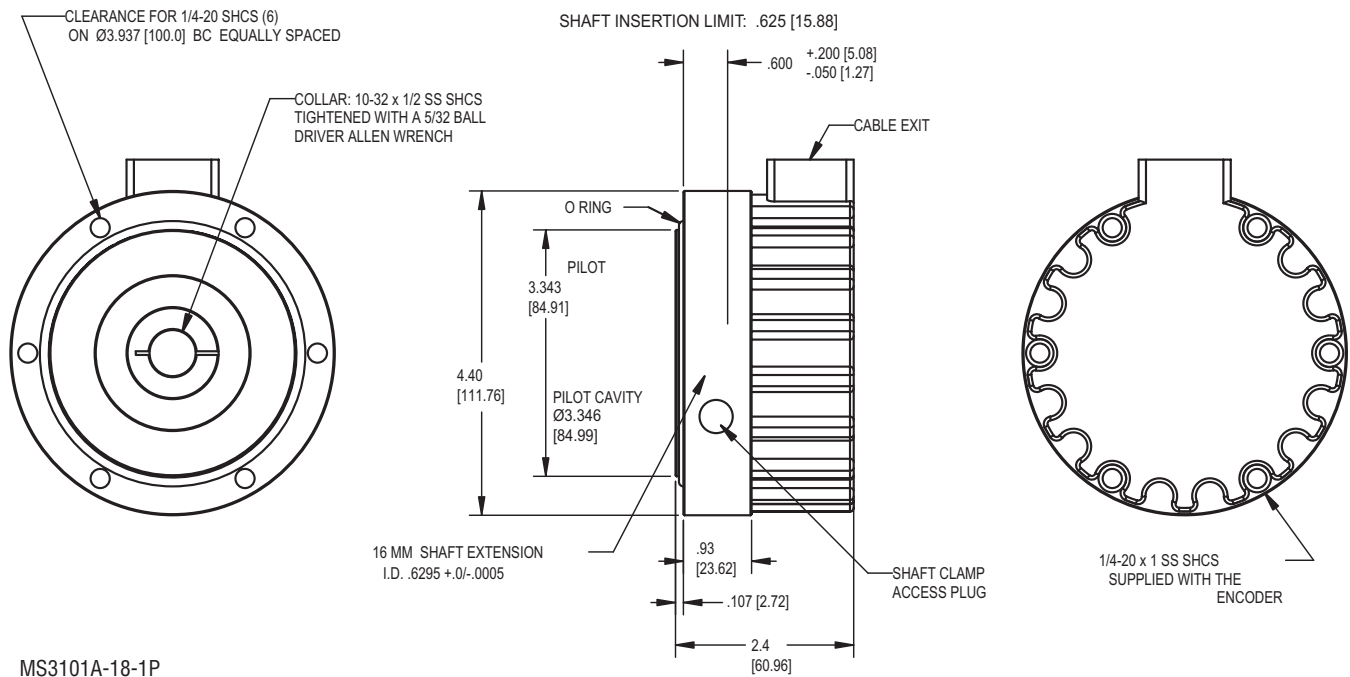
Ordering Information

| Part Number | Description |
|------------------|---|
| HSD44T1024A3A | Extreme Heavy Duty Encoder with 18 inch pigtail wire connections |
| HSD44T1024A3A-01 | Extreme Heavy Duty Encoder with 18 inch pigtail wire connections and extended pilot (.156") |
| HSD44T1024A3K | Extreme Heavy Duty Encoder with 18 inch pigtail with 10 pin MS connector |
| HSD44T1024A3K-01 | Extreme Heavy Duty Encoder with 18 inch pigtail with 10 pin MS connector and extended pilot (.156") |

Accessories

| Part Number | Description |
|----------------|---------------------------------|
| HSD44ADAPTER45 | 4-1/2" NEMA Motor Adapter Plate |
| HSD44ADAPTER85 | 8-1/2" NEMA Motor Adapter Plate |

DIMENSIONS (in. [mm])



MS3101A-18-1P

SERIES EN42

NorthStar™ brand

Zone 1 Heavy Duty Encoder

Key Features

- Encapsulated Electronics with Increased Safety Interface for Zone 1 Use
- Innovative Design Eliminates Need for I.S. Barriers
- Industry-leading -50 to +100°C Temperature Range
- High current line driver for long cable runs
- Perfect for use in Oilfield Drilling Motor Applications



Ex ia mb e IIC T4 Gb



SPECIFICATIONS

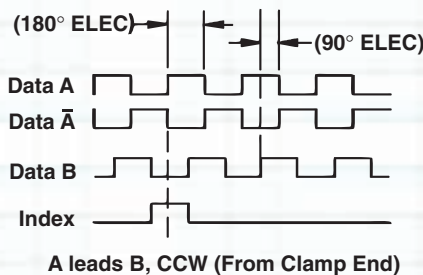
STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z, ungated), and complementary outputs
Index: 180 degrees ±18 degrees (electrical), ungated
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: 180° ± 18° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Voltage: 5-15VDC, 5-26VDC (see ordering information)
Input Current: 65mA max., not including output loads
Outputs: TC4428, 125mA Max per channel W/ ATEX output format 0, 2 (See ordering information); 10mA max per channel @100C, 15mA max per channel @95C w/ATEX output format 1, 3 (See ordering information)
Frequency Response: 125 kHz (data & index)
Termination: Terminal block - Ex screwless w/ spring cage-clamp; Optional Ex gland with "S" seal for armored or non-armored cables .33" to .53" O.D. (See ordering information)

DATA AND INDEX Not all complements shown A shown for reference



ELECTRICAL CONNECTIONS

| Encoder Function | Terminal Box Connection |
|------------------|-------------------------|
| Sig. A | 1 |
| Sig. \bar{A} | 2 |
| Sig. B | 3 |
| Sig. \bar{B} | 4 |
| Sig. Z | 5 |
| Sig. \bar{Z} | 6 |
| Power +V | 7 |
| Com | 8 |

MECHANICAL

Shaft Material: Stainless steel or anodized aluminum (See ordering information)
Bore Diameter: 1.00", 0.875, 0.750", 0.625", 16mm, 15mm. Insulated inserts provided for bores under 1 inch
Mating Shaft length: 2.0", Minimum; 2.5", Recommended
Shaft Speed: 3600RPM Maximum continuous; 6000RPM Peak
Starting torque: 8.0 in-oz. maximum (at 25°C)
Running Torque: 5.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Bearing Life: 5 x 10⁸ revs at rated shaft Loading, 5 x 10¹¹ revs at 10% of rated shaft loading. (manufacturers' specs)
Housing and Cover: Hard Anodized Aluminum.
Disc Material: Metal or Plastic
Weight: 6.5 lb, typical

ENVIRONMENTAL

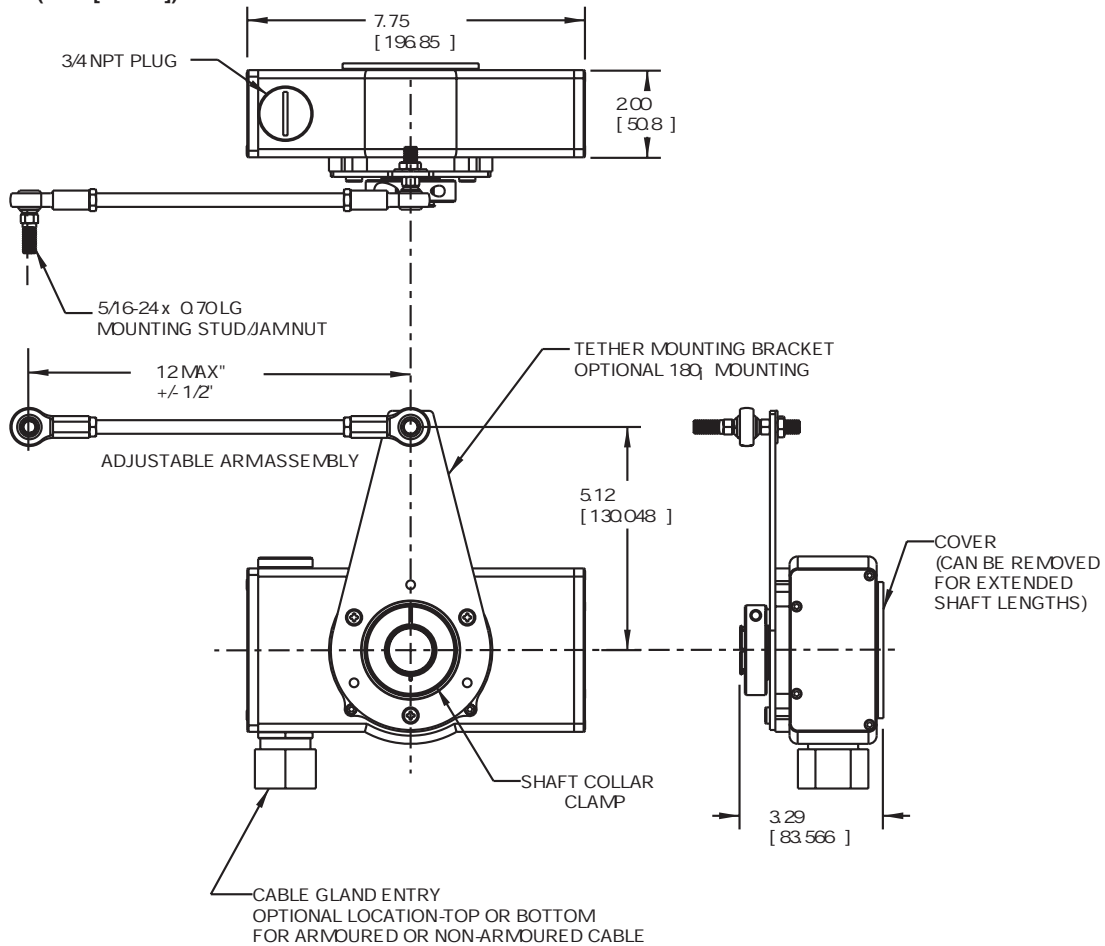
Operating Temperature: -50 to 100°C
Storage temperature: -50 to 100°C
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

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: ATEX Output Format | Code 5: Termination | Code 6: Tether | Code 7: Cover |
|--|---|---|--|---|--|------------------------------|
| EN42 | □□□□ | □ | □ | □ | □ | □ |
| Ordering Information | | | | | | |
| EN42 ATEX Zone 1 Barrier-Less Hollowshaft Encoder | 0015 0032 0100 0200 0240 0250 0500 0512 0600 1000 1024 1200 2000 2048 2500 4000 5000 | 8 5/8" 9 15 mm A 16mm D 3/4" F 7/8" H 1" Non-Isolated R 1" Isolated | 0 Differential AB, 5-15V in, 5-15V out 1 Differential AB, 5-26V in, 5V out 2 Differential ABZ, 5-15V in, 5-15V out 3 Differential ABZ, 5-26V in, 5V out | 0 Dual Exit Terminal block, no gland 1 Dual Exit Terminal block, 3/4" NPT, with Ex gland including S seal for .33" to .53" o.d. non-armored cables 2 Dual Exit Terminal block, 3/4" NPT, with Ex gland including S seal for .33" to .53" o.d. armored cables | 0 None 1 Heavy Duty 5/16" Swivel Rod Tether | 0 Standard Flat cover |

DIMENSIONS (Inch [metric])



SERIES EN44

NorthStar™ brand

Extreme Heavy Duty Encoder

Key Features

- Encapsulated Electronics with Increased Safety Interface for Zone 1 Use
- Innovative Design Eliminates Need for I.S. Barriers
- Industry-leading -50 to +100°C Temperature Range
- High current line driver for long cable runs
- Perfect for use in Oilfield Drilling Motor Applications



Ex ia mb e IIC T4 Gb



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

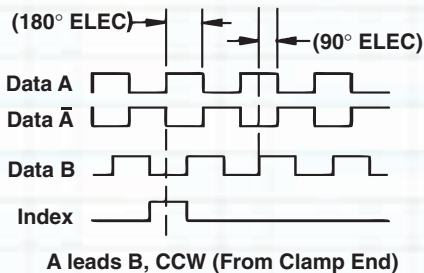
Code: Incremental
Resolution: 1024, 2048 PPR
Format: Two channel quadrature (AB) with optional Index (Z, ungated), and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 PPR: 90° ± 30° electrical
Symmetry: 180° ± 18° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf
Electrical Immunity: 500VAC hypot from encoder shaft/frame to all connector pins

ELECTRICAL

Input Voltage: 5-15VDC, 5-26VDC (see ordering information)
Input Current: 65mA max., not including output loads
Outputs: TC4428, 125mA Max per channel W/ ATEX output format 0, 2 (See ordering information); 10mA max per channel @100C, 15mA max per channel @95C w/ATEX output format 1, 3 (See Ordering Information)
Frequency Response: 125 kHz (data & index)
Termination: Terminal block - Ex screwless w/ spring cage-clamp; Optional Ex gland with "S" seal for armored or non-armored cables .33" to .53" O.D. (See ordering information)

DATA AND INDEX

Not all complements shown
 Ā shown for reference



ELECTRICAL CONNECTIONS

| Encoder Function | Terminal Box Connection |
|------------------|-------------------------|
| Sig. A | 1 |
| Sig. Ā | 2 |
| Sig. B | 3 |
| Sig. B̄ | 4 |
| Sig. Z | 5 |
| Sig. Z̄ | 6 |
| Power +V | 7 |
| Com | 8 |

MECHANICAL

Mechanical Interface: Stainless steel shaft clamp
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Coupling: 16mm or 5/8", flexible
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Bearing life: 5 x 10⁸ revs at rated shaft Loading, 5 x 10¹¹ revs at 10% of rated shaft loading. (manufacturers' specs)
Housing Material: Aluminum Alloy, Black Anodized
Disc material: Stainless steel
Weight: 6 lb. 6 oz, typical

ENVIRONMENTAL

Operating Temperature: -50 to 100°C
Storage temperature: -50 to 100°C
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

* 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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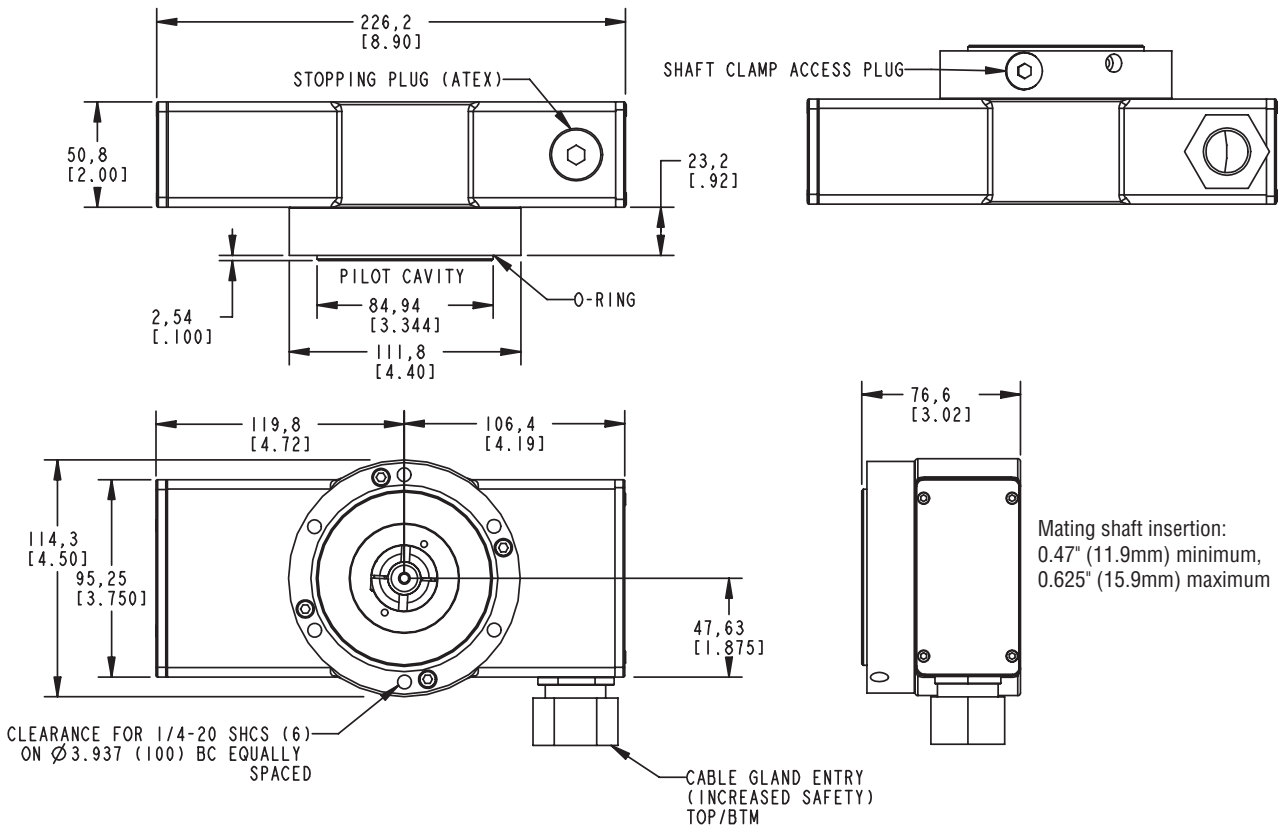
SERIES EN44

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: ATEX Output Format | Code 5: Termination |
|--|---|--------------------------|--|---|
| EN44 | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Ordering Information | | | | |
| EN44 ATEX Zone 1 Barrier-Less Hubshaft Encoder | 1024 2048 | A 16mm (5/8") | 0 Differential AB, 5-15V in, 5-15V out 1 Differential AB, 5-26V in, 5V out 2 Differential ABZ, 5-15V in, 5-15V out 3 Differential ABZ, 5-26V in, 5V out | 0 Dual Exit Terminal block, no gland 1 Dual Exit Terminal block, 3/4" NPT, with Ex gland including S seal for .33" to .53" o.d. non-armored cables 2 Dual Exit Terminal block, 3/4" NPT, with Ex gland including S seal for .33" to .53" o.d. armored cables |

DIMENSIONS (Inch [metric])



SERIES H56

Dynapar™ brand

Heavy Duty Encoder

Key Features

- Encoder-Within-Encoder Design
- Large Outer Bearings Isolate Shaft Loads
- Foot Mount or 56C Mace Mount Easily Replaces BC42 and 46 Tachs



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 as viewed from the C-face of the encoder
Quadrature Phasing: $90^\circ \pm 22.5^\circ$ electrical
Symmetry: $180^\circ \pm 18^\circ$ electrical
Index: $180^\circ \pm 18^\circ$ 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:
 6 pin, style MS3106A-14S-6S (MCN-N4);
 10 pin, style MS3106A-18-1S (MCN-N6)
 Pluggable Screw-Terminal (110532-0001)

ELECTRICAL CONNECTIONS

*This is a mating connector/cable assembly described in the Encoder Accessories section of this catalog. Color-coding information is provided here for reference.

| Function (lf) | Cable #14002090010* 6 Pin Single Ended | | Twisted Pairs Cable #14004190010* 10 Pin Differential | | Pluggable Screw Terminal Pin Number |
|----------------|---|------------|--|------------|-------------------------------------|
| | Pin | Wire Color | Pin | Wire Color | |
| Sig. A | B | RED | B | RED | 3 |
| Sig. \bar{A} | — | — | G | BLK | 8 |
| Sig. B | D | BLU | D | BLU | 7 |
| Sig. \bar{B} | — | — | H | BLK | 2 |
| Sig. Z | A | GRN | A | GRN | 4 |
| Sig. \bar{Z} | — | — | I | BLK | 9 |
| +V | E | WHT | E | WHT | 6 |
| Common | C | BLK | C | BLK | 1 |
| Shield | F | SHIELD | F | SHIELD | 10 |

MECHANICAL

Bearing Life: see table, below
Shaft Loading: 100 lbs. radial, 50 lbs. axial
Shaft Speed: 3600 RPM max.
Starting Torque: 15 oz-in max.;
Moment of Inertia: 7.9×10^{-4} oz-in-sec²
Weight: 144 oz. (9 lbs.)

ENVIRONMENTAL

Operating Temperature: -40 to +80 °C
Storage Temperature: -40 to +80 °C
Shock: 50 G's for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 2.5 G's
Humidity: to 98% without condensation
Enclosure Rating: NEMA4/IP66 (dust proof, washdown)

Bearing Life versus Load

| Radial | Axial | Revolutions |
|--------|-------|----------------------|
| 75 | 15 | 1.3×10^{10} |
| 75 | 25 | 6.4×10^9 |
| 100 | 25 | 4.1×10^9 |
| 100 | 50 | 1.3×10^9 |

Ordering Information

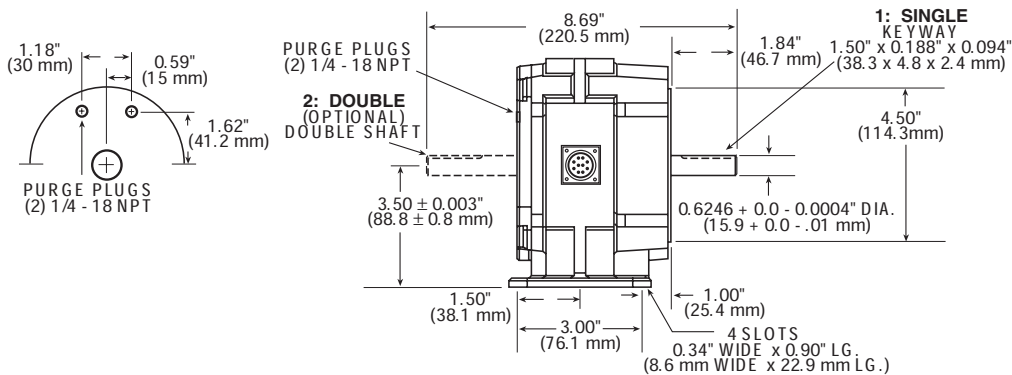
To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Shaft | Code 4: Format | Code 5: Electrical | Code 6: Termination | Code 7: Options | |
|--|-------------|---------------|--|--|--|--------------------------------|----------------------------------|
| H56 | □□□□ | □ | □ | □ | □ | □□ | |
| Ordering Information | | | | | | | |
| H56 Mill Duty, 56C-Face or Foot Mount Rotopulser® | 0001 | 0300 | 1 Single | Compliments available when Code 5 is 3 or 4 | 0 5-26V in, 5-26V open collector out | 0 MS Connector(s) | available when Code 6 is 0 or 1: |
| | 0002 | 0360 | 2 Double | | | | |
| | 0003 | 0400 | 2 Single, bidirectional quadrature (AB) | 2 5-26V in, 5-26V single ended push-pull out | 2 Pluggable screw terminal connector(s) | PS LED Output Indicator | |
| | 0005 | 0500 | 3 Single, bidirectional quadrature with index (ABZ) | 3 5-26V in, 5V differential line driver out (7272) | 3 Pluggable screw terminal(s), plus mating connector(s) | | |
| | 0006 | 0512 | 4 Dual, isolated bidirectional quadrature (dual AB) | 4 5-26V in, 5-26V differential line driver out (7272) | | | |
| | 0010 | 0600 | 6 Dual, isolated bidirectional quadrature with index (dual ABZ) | 5 5-26V in, 5V Differential Line Driver out (4469) | | | |
| | 0012 | 0625 | | 6 5-15V in, 5-15V Differential Line Driver out (4469) | | | |
| | 0025 | 0720 | | | | | |
| | 0050 | 0900 | | | | | |
| | 0060 | 1000 | | | | | |
| | 0064 | 1024 | | | | | |
| | 0100 | 1200 | | | | | |
| | 0120 | 1270 | | | | | |
| | 0128 | 1500 | | | | | |
| | 0180 | 1800 | | | | | |
| | 0200 | 2000 | | | | | |
| | 0240 | 2048 | | | | | |
| | 0250 | 2400 | | | | | |
| | | 2500 | | | | | |

DIMENSIONS inches [mm]

Code 3: Shaft

Purge Plug Location

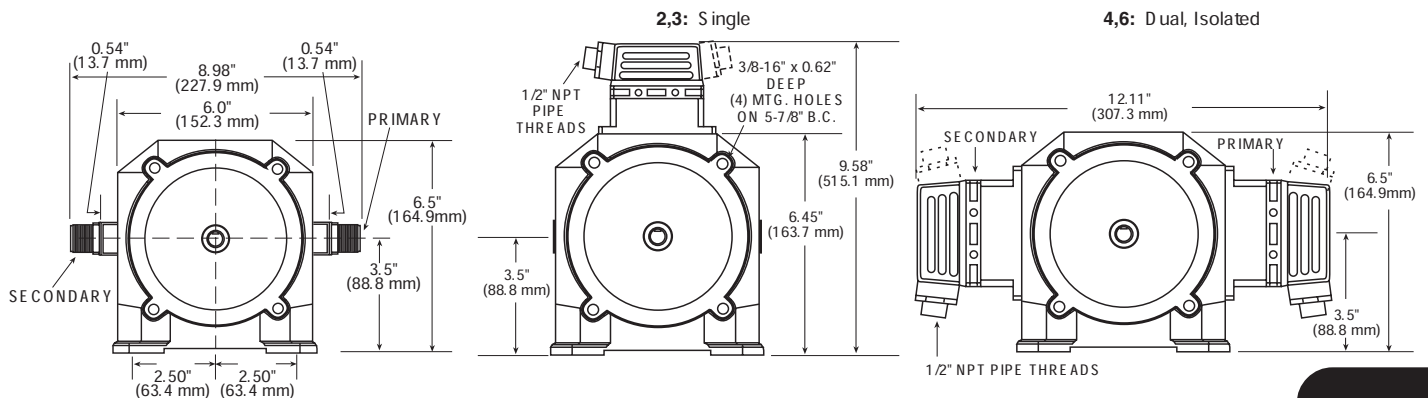


Code 6: Termination

0,1: MS Connectors
Shown with LED Output Indicator Option
Code 9: PS

2,3: Pluggable Screw Terminals

Code 4: Format



SERIES X25

Dynapar™ brand

For Hazardous Location Application

Key Features

- Approved for NEC Class 1&2, Div 1&2, Groups C,D,E,F,G
- Rugged Enclosure with 1/2" Conduit Entry
- High 5000 PPR Capability



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 5000 PPR (pulses/revolution)
Accuracy: (Worst case any edge to any other edge) ≤ 1024 PPR (metal disk): ± 7.5 arc-min.
 > 1024 PPR (glass disk): ± 2.5 arc-min.
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CCW shaft rotation as viewed from the shaft end of the encoder
Quadrature Phasing: $90^\circ \pm 25^\circ$ electrical
Symmetry: $90^\circ \pm 25^\circ$ electrical
Index: 2540 PPR and below: $180^\circ \pm 25^\circ$ electrical; Greater than 2540 PPR: $90^\circ \pm 25^\circ$ electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 4.5 min. to 26 VDC max. at 80 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
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

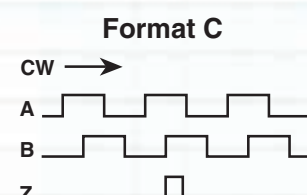
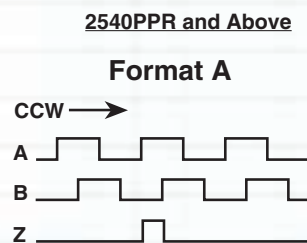
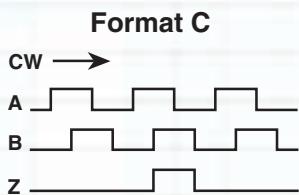
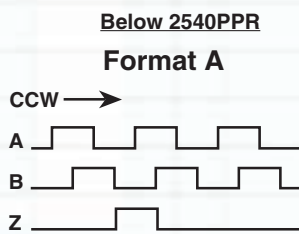
MECHANICAL

Shaft Loading: 40 lbs. radial, 40 lbs. axial
Shaft Speed: 5,000 RPM max.
Shaft Runout: 0.001" max. TIR
Starting Torque: (max at 25 °C) 2.0 oz.-in
Moment of Inertia: 9.0×10^{-4} oz-in-sec²

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C;
Storage Temperature: -40 to +90 °C
Shock: 50 G's for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 2 G's
Humidity: to 98% without condensation
Weight: 4.5 lbs. (2.0 kg)
Enclosure Rating: NEMA4X/IP56 (dust proof, washdown)

OUTPUT FORMAT



SERIES X25

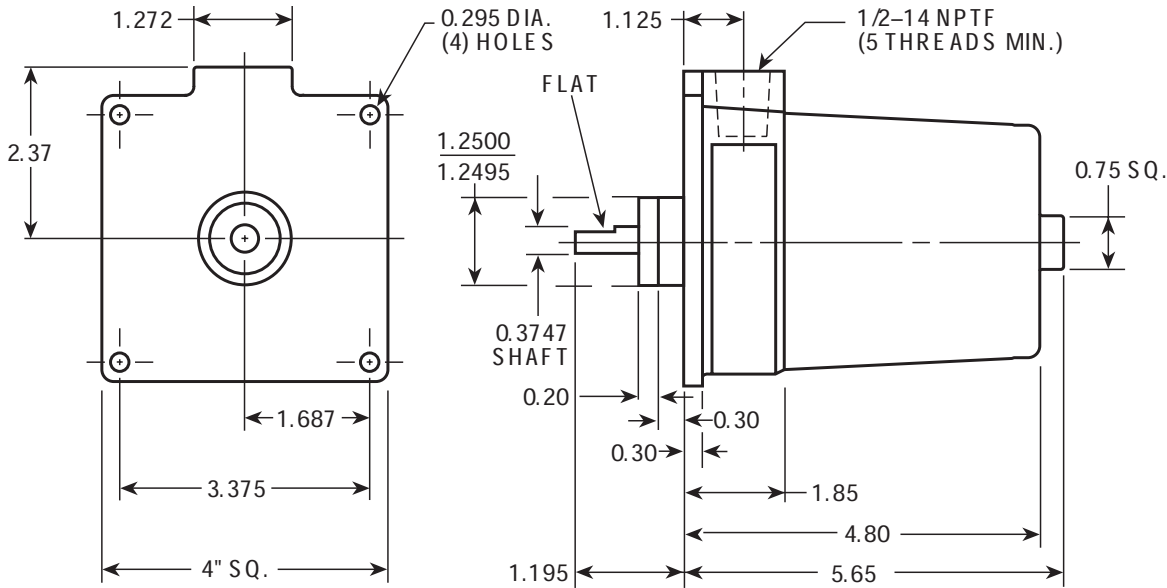
Ordering Information

To order, complete the model number with code numbers from the table below.

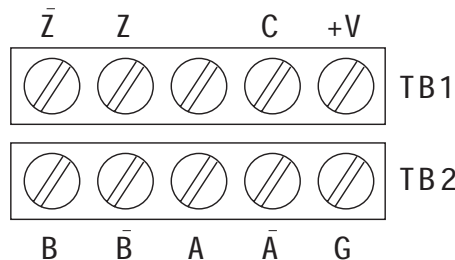
| Code 1: Model | Code 2: Pulses/Rev | Code 3: Mechanical | Code 4: Output | Code 5: Electrical |
|---|---|--|--|---|
| X25 | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| X25 Explosion Proof, Shielded Bearings with Shaft Seal | 0001 0360 1600 0005 0400 1800 0010 0500 1968 0012 0512 2000 0025 0600 2048 0050 0635 2400 0060 0720 2500 0086 0768 2540 0100 0800 3000 0120 0900 3400 0180 1000 3600 0200 1024 3750 0240 1200 4000 0250 1250 4096 0254 1270 4800 0256 1500 5000 0300 | 0 3/8" Shaft 1 1/4" Shaft | 0 Single Ended, no index, Format C 1 Single Ended, with index, Format C 2 Differential, no Index, Format C 3 Differential, with index, Format C 4 Single Ended, with index, Format A 5 Differential, with index, Format A | 0 5-26V in; 5-26V Open Collector with 2.2k Ω Pullup out 1 5-26V in; 5-26V Open Collector out 2 5-26V in; 5V Totem Pole out 3 5-26V in; 5V Line Driver out 4 5-26V in; 5-26V Line Driver out |

DIMENSIONS

Approximate Dimensions (in inches)



Terminal Board Connections



Screw terminals with pressure plates that accept #14 AWG to #22 AWG.

SERIES 60

Dynapar™ brand

Heavy Duty Rotopulser®

Key Features

- Heavy-duty bearings with 1/2" diameter shaft
- LED optical light source
- Unbreakable disk
- Wide selection of resolutions available up to 2500 PPR
- Servo ring and face mount options



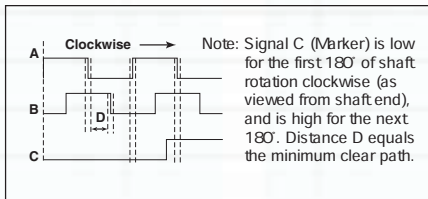
SPECIFICATIONS

ELECTRICAL

Power Requirements: 5 to 15 VDC max.
115 mA max. plus load requirements

Frequency Response: 50 kHz

Minimum Free Path: Between any A and B transition, will not be less than 12.5% of one full electrical cycle. This includes effects of jitter, phase and symmetry shifts.



Differential Output: 7272, 40 mA sink/source; connections
Mating Connector: Style MS3106A-18-1S; Dynapar Part No. MCN-N6

Single-Ended Output: 7272, 40 mA sink/source; Mating Connector: Style MS3106A-14S-6S; Dynapar Part No. MCN-N4

ELECTRICAL CONNECTIONS

| Single-Ended Output (6-pin) | | |
|-----------------------------|------------|--|
| Function (If Used) | MS Pin No. | #14002090010* Cable Accessory Color Code |
| Signal A | B | RED |
| Signal B | D | BLUE |
| Signal C (Marker) | A | GREEN |
| +V | E | WHITE |
| Common | C | BLACK |
| Shield | F | SHIELD |

| Differential Line Driver (10-pin) | | |
|-----------------------------------|------------|--|
| Function (If Used) | MS Pin No. | #14004190010* Cable Accessory Color Code |
| Signal A | B | RED |
| Signal A | G | BLACK |
| Signal B | D | BLUE |
| Signal B | H | BLACK |
| Signal C (Marker) | A | GREEN |
| Signal C | I | BLACK |
| +V | E | WHITE |
| Common | C | BLACK |
| Shield | F | SHIELD |
| Not Used | J | |

*This is a mating connector/cable assembly described in the Encoder Accessories section of this catalog. Color-coding information is provided here for reference.

MECHANICAL

Weight: 26 oz.

Speed Range: Up to 3600 RPM

Shaft Loading: Radial: 15 lbs. overhung; Axial: 5 lbs.

Inertia: 170 gm-cm²

Starting Torque: 0.45 oz-in (0.30 oz-in for 1/4 in. dia. shaft)

Running Torque: 0.35 oz-in (0.15 oz-in for 1/4 in. dia. shaft)

Shaft Diameters: 1/4", 1/2" (-0.0003"/-0.0007")

ENVIRONMENTAL

Enclosure Rating: NEMA 12 / IP54;

Temperature Range: 0-54°C

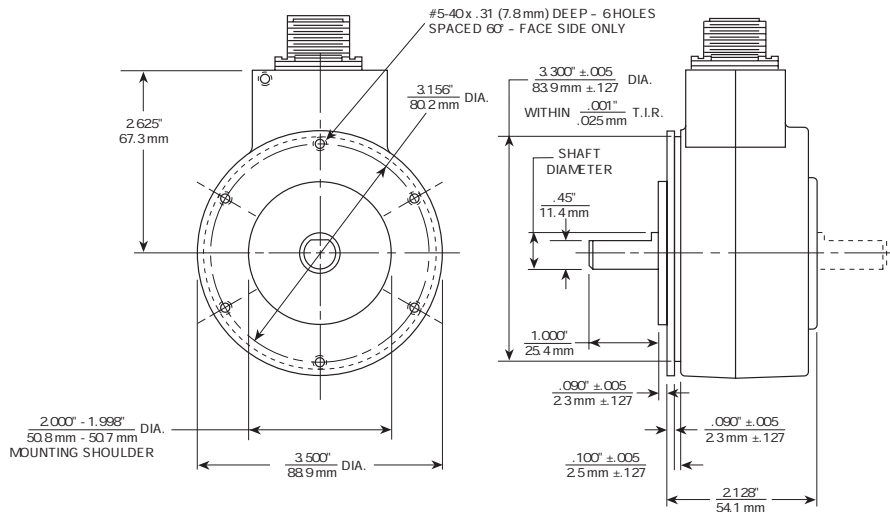
SERIES 60

Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: Housing | Code 3: Shaft | Code 4: Output | Code 5: Voltage | Code 6: Pulses/Rev | Code 7: Wiring | Code 8: Misc |
|--|---|--|---|----------------------|---|-----------------------|---|
| 6 □ | □ | □ | □ | F | □ □ □ □ | A | □ |
| 2 Bidirectional, Heavy Duty 3 Bidirectional with Marker, Heavy Duty | A Standard Housing for Single Shaft C Standard Housing for Double Shaft H Hand-Held Housing with Double Shaft and two 12" Circumference Measuring Wheels | A 1/2" Dia, 1.0" Len with Flat B 1/2" Dia, 1.0" Len without Flat C 1/2" Dia, 1.5" Len with Flat D 1/2" Dia, 1.5" Len without Flat Available when Code 2 = A or C: G 1/4" Dia, 1.0" Len without Flat H 1/4" Dia, 1.0" Len with Flat | E Single Ended Available when Code 2 = A or C: D Differential | F 5 to 15 VDC | 0001 0150 0530 0002 0180 0550 0004 0192 0600 0005 0200 0625 0006 0203 0720 0010 0240 0750 0012 0250 0800 0015 0256 0805 0018 0300 0833 0020 0306 0900 0025 0315 1000 0040 0360 1024 0045 0375 1200 0050 0382 1270 0060 0384 1500 0064 0390 1800 0090 0400 2000 0096 0402 2160 0100 0430 2250 0120 0450 2400 0125 0500 2500 0127 0508 0128 0512 | A MS Connector | 0 No Shaft Seals Available when Code 3 = A, B, C, or D: B Shaft Seals |

DIMENSIONS inches [mm]



Hand-Held Speed Monitor



(Includes a Series 60 and dual 12" measuring wheels)

A Series 60H hand-held speed monitor is available as an accessory for web or roll calibration of steel, rubber, or paper continuous processes. These units are typically used as accessories for occasional calibration of a system speed, draw, or readout.

These hand-held monitors may be ordered with any PPR from the Series 60 code table. However, typical calibration applications with 12" measuring wheels use 60 PPR or 120 PPR, and provide excellent calibration resolution from zero up to full speeds. Refer to electrical connections 6-pin chart for pin-out functions of Series 62H.

Order Model No. 62H-AEF-___-AO.

SERIES 60P

Dynapar™ brand

Heavy Duty Rotopulser[®]

Key Features

- Classic Mill-Duty Foot or Face Mount Design
- MS Connector or 1/2" Conduit Entry
- Unbreakable Code Disc



SPECIFICATIONS

ELECTRICAL

Power Requirements: 5 to 15 VDC max.
 115 mA max. plus load requirements
 Output: TC1428 Differential Line Driver,
 40 mA Sink/ Source
 Frequency Response: 50 kHz
 Minimum Free Path: Between any A and B
 transition (Distance D) will not be less than
 12.5% of one full electrical cycle. This
 includes effects of jitter, phase and
 symmetry shifts.
 Mating Connector: 10- pin: style MS3106A- 18- 1S,
 Dynapar Part No. MCN- N6

ELECTRICAL OUTPUT

Note: Signal C (Marker) is low for the first 180° of shaft rotation clockwise (as viewed from shaft end), and is high for the next 180°.

ELECTRICAL CONNECTIONS

Single-Ended Output

| Function (If Used) | Cable #14002090010* 6 PIN | | Twisted Pairs Cable #14004190010* 10 PIN | | Terminal Strip Connector No. |
|--------------------|------------------------------|--------|---|--------|------------------------------|
| | Pin | Color | Pin | Color | |
| Signal A | B | RED | B | RED | 1 |
| Signal \bar{A} | - | - | G | BLK | 12 |
| Signal B | D | BLU | D | BLU | 3 |
| Signal \bar{B} | - | - | H | BLK | 11 |
| Signal C (Marker) | A | GRN | A | GRN | 4 |
| Signal \bar{C} | - | - | I | BLK | 10 |
| +V | E | WHT | E | WHT | 5 |
| Common | C | BLK | C | BLK | 2 |
| Shield | F | SHIELD | F | SHIELD | 6 |
| Not Used | - | - | J | - | 7, 8, 9 |

*This is a mating connector/cable assembly described in the Encoder Accessories section of this catalog. Color-coding information is provided here for reference.

Dual Isolated Output

| Function (If Used) | Code 4 is K or L | | | Code 4 is M* | |
|--------------------|------------------|----------------|-----------------|----------------|------------------|
| | 6 PIN Primary | 10 PIN Primary | 7 PIN Secondary | 10 PIN Primary | 10 PIN Secondary |
| Signal A | B | B | A | B | B |
| Signal \bar{A} | - | G | C | G | G |
| Signal B | D | D | B | D | D |
| Signal \bar{B} | - | H | E | H | H |
| Signal C | A | A | (No Marker) | - | (No Marker) |
| Signal \bar{C} | - | I | (No Marker) | - | (No Marker) |
| Primary Power | E | E | D | E | E |
| Primary Common | C | C | F | C | C |
| Secondary Power | - | - | - | - | J |
| Secondary Common | - | - | - | - | I |
| Shield | F | F | G | F | F |
| Not Used | - | J | - | A, I, J | A |

*To provide quick backup, jumper cable assembly pins E & J and C & I; then, if the primary output fails, move the connection from the primary to secondary connector.

MECHANICAL

Slew Speed: 3600 RPM
 Shaft Diameter: 5/ 8"
 Inertia: 285 gm- cm 2 max.
 Typical Starting Torque: 15 oz- in
 Bearings: Motor Duty Bearings
 Weight: 10 lbs.
 Shaft Loading: Radial: 45 lbs. overhung;
 Axial: 15 lbs.

ENVIRONMENTAL

Operating Temp. Range: 0 to 54 °C
 Enclosure Rating: NEMA 12 / IP54;
 NEMA 4 / IP66 with optional shaft seals

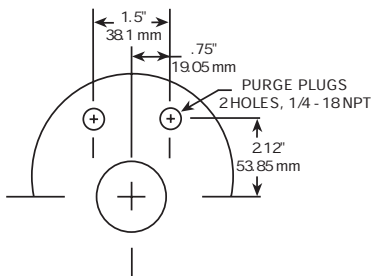
Ordering Information

To order, complete the model number with code numbers from the table below:

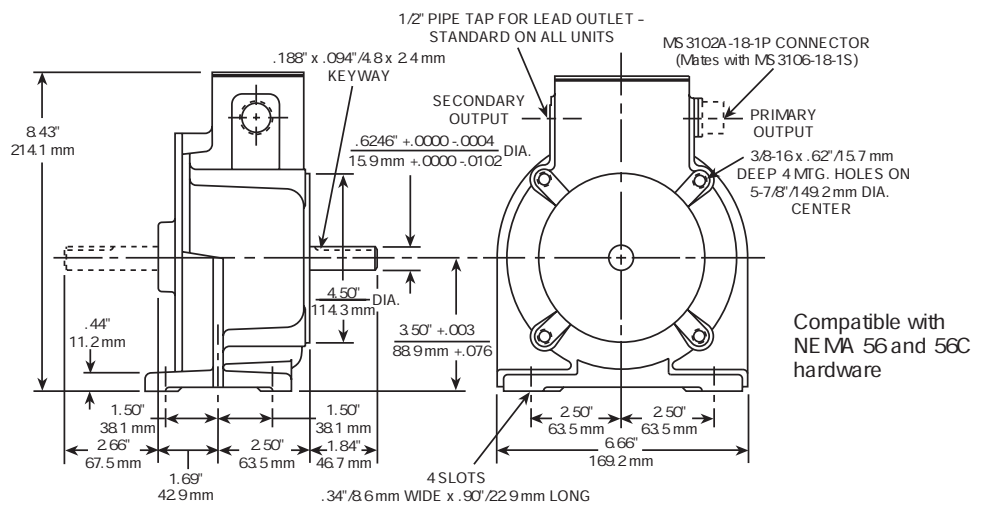
| Code 1: Model | Code 2: Housing | Code 3: Shaft | Code 4: Output | Code 5: Voltage | Code 6: Pulses/Rev | Code 7: Wiring | Code 8: Misc |
|--|--------------------|--|---|----------------------|--|--|---|
| 6 □ | P □ | □ | □ | F □ | □ □ □ □ | □ | □ |
| 2 Bidirectional, Heavy Duty 3 Bidirectional with Marker, Heavy Duty | P Mill Duty | M 5/8" Dia, Single Shaft with Keyway N 5/8" Dia, Double Shaft with Keyway | D Differential E Single Ended K Single Ended, Dual Isolated, 6 and 7 pin connectors L Differential, Dual Isolated, 10 and 7 Pin Connectors Available when Code 1 is 62: M Differential, Dual Isolated, 10 and 10 Pin Connectors | F 5 to 15 VDC | 0001 0096 0360 0750 0002 0100 0375 0800 0004 0120 0382 0805 0005 0125 0384 0833 0006 0127 0390 0900 0010 0128 0400 1000 0012 0150 0402 1024 0015 0180 0430 1200 0018 0192 0450 1250 0020 0200 0500 1270 0025 0203 0508 1500 0040 0240 0512 1800 0045 0250 0530 2000 0050 0256 0550 2160 0060 0300 0600 2250 0064 0306 0625 2400 0090 0315 0720 2500 | A MS Connector Available when Code 4 is D or E: T Terminal Strip | O No Purge Plugs, No Shaft Seals A Purge Plugs, No Shaft Seals B No Purge Plugs, Shaft Seals C Purge Plugs and Shaft Seals |

DIMENSIONS inches [mm]

Purge Plug Location



Approximate Dimensions



Compatible with NEMA 56 and 56C hardware

SERIES R45

Dynapar™ brand

Bearingless Ring Kit

Key Features

- 56C-face Ring Kit Motor Mounting
- Dependable Gear Tooth & Pickup Design
- Field-Replaceable Readhead for Easy Service
- Thin 5/8" Profile Saves Valuable Space



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 60 PPR (pulses/revolution), optional 120 PPR with X2 output

Format: Single channel unidirectional (A), or two channel quadrature (AB) outputs

Quadrature Phasing: $90^\circ \pm 45^\circ$ electrical

Symmetry: $180^\circ \pm 36^\circ$ electrical

ELECTRICAL

Input Power: (not including output loads)
Single ended 4.5 min. to 16.5 VDC max. at 50 mA max.;

Open collector and differential line driver: 4.5 min. to 26 VDC max. at 75 mA max.

Outputs:

Single ended with 2 k Ω pullup: 16.5 VDC max., 20 mA sink at 0.5 V max.;

Open Collector: 30 VDC max., 40 mA sink max.;

7272 Differential Line Driver: 40 mA sink or source

Frequency Response: 10 kHz min.

Electrical Protection: Overvoltage and reverse voltage to 30 VDC; output short circuit protected to Common or other outputs, to +V (differential line driver only)

Noise Immunity: Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

Terminations:

Wire leads: 7" long min., 18 AWG;

Screw terminals: accept 22 to 14 AWG solid or stranded wires

ELECTRICAL CONNECTIONS

| Function (If Used) | Wire Color | Terminal |
|--------------------|------------|----------|
| Signal X2 | ORG | 1 |
| Signal B | BRN | 2 |
| Signal A | YEL | 3 |
| +V in | RED | 4 |
| Common | BLK | 5 |
| Signal \bar{A} | WHT | 6 |
| Signal \bar{B} | GRN | 7 |
| Signal $\bar{X2}$ | BLU | 8 |

MECHANICAL

Motor frame sizes: 56C, 143TC, 145TC, 182C and 184C

Motor shaft/hub sizes: 5/8", 7/8" nominal

Housing: Cast Aluminum, chromate finish

Gear: 1010 Steel

Moment of Inertia: 0.0035 in-lb-sec²

Shaft Speed: 5,000 RPM max.

Readhead to gear gap: 0.020" nominal, 0.030 max.

Allowable Endplay: ± 0.060

ENVIRONMENTAL

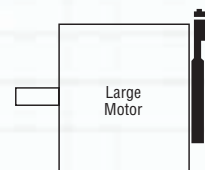
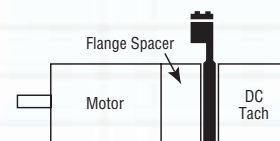
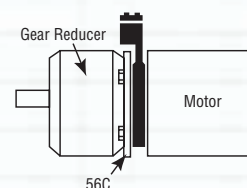
Operating Temperature: -40 to +85 °C

Storage Temperature: -40 to +90 °C

Shock: 20 G's for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 2.5 G's

Humidity: to 98% without condensation



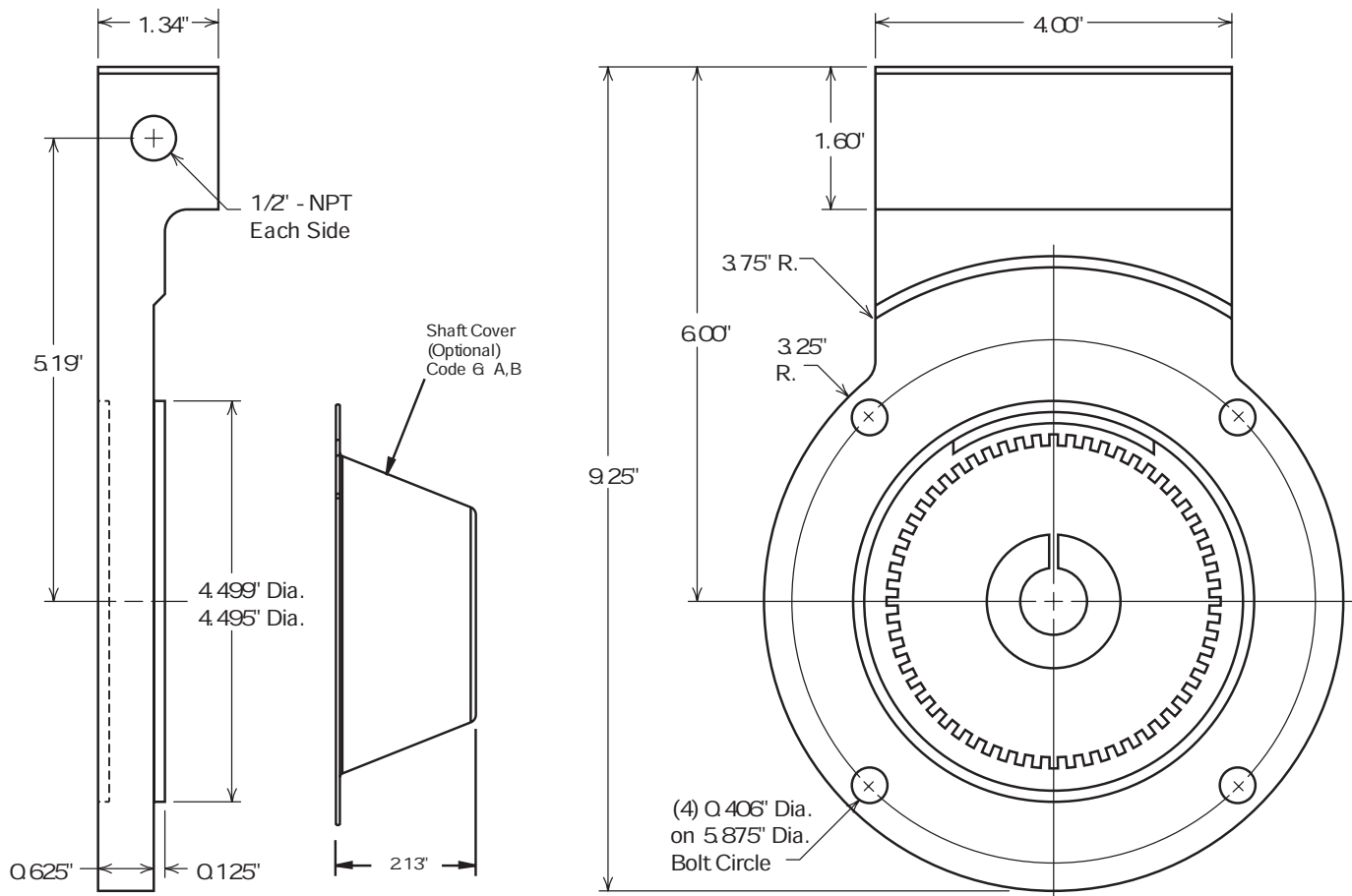
Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Gear, Bore | Code 4: Output | Code 5: Electrical | Code 6: Termination |
|--|---|--|--|---|---|
| R45 | <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 | | | | | |
| R45 Motor Mount Ring, for NEMA 4-1/2" C-Face Motors | 0060 | 0 no gear, readhead only 1 5/8" bore (56C) 2 7/8" bore (143TC, 145TC, 182C, 184C) | 0 no readhead, gear only 1 single channel (A), unidirectional 2 dual channel (AB), bidirectional 3 dual channel (AB), bidirectional with unidirectional (X2) speed output | 0 no readhead, gear only Available when Code 4 is 1, 2 or 3: 1 5-15V in, 5-15V single ended out 2 5-26V in, 5-26V differential line driver out 3 5-26V in, 5-26V open collector out | 0 no readhead, gear only Available when Code 4 is 1, 2 or 3: 1 wire leads 2 screw terminals A Same as 1, with protective cover B Same as 2, with protective cover |
| 112122-0001 R45 protective shaft cover accessory | | | | | |

Example Model number: 5/8" bore, gear only = R0000601000

DIMENSIONS



SERIES SL56

NorthStar™ brand

Bearingless Encoder

Key Features

- **Bearingless Design Mounts to 56 and 140 C-Face Motors**
- **Thin 3/4" Profile Saves Space and Can be "Sandwiched" Between Motor & Reducer**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Contaminants**
- **Anodized Aluminum Housing with Field-Serviceable Connector**
- **Single or Dual Isolated Outputs Available**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: $90^\circ \pm 22^\circ$
Symmetry: $180^\circ \pm 54^\circ$
Index: 270° , ungated (optional gated to falling B edge)
Number of Output Modules: Single or Dual Redundant

ELECTRICAL

Input Voltage Requirement: 5-15 or 5-26 Volts DC

Current Requirement:

With Electrical Option L or H: 45 mA typical per sensor module plus line driver load
 With Electrical Option V or 5: 65 mA typical per sensor module plus line driver load

Output Signals:

With Elec Option L or H: 5-15 V Line Driver, 150mA

With Elec Option V: 5-26 V Line Driver, 100mA
 With Elec Option 5: 5V Line Driver, 150mA

Frequency Response: 0 - 120kHz Data & Index

Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit

Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65; MS connector or pig-tail

MECHANICAL

Max. Shaft Speed: 5,000 RPM
Mounting Configuration: 4.5" 56C face mount for NEMA MG1 standards
Housing Material: Cast Aluminum (Stainless Steel optional)
Acceleration Rate: 12,000 rpm/sec max
Shaft Length Required: 0.7" min
Allowable Shaft End-Play: $\pm 0.045"$
Allowable Shaft Runout: 0.002" TIR
Weight: Aluminum: 1.7 lbs (0.77 kg); Stainless: 3 lbs (1.36 kg)

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E18-IT# | Conduit Box |
|---------------|---------------|---------------|----------------|-------------|
| Common | 1 | Black | F | 1 |
| B | 2 | Green | B | 5 |
| A | 3 | Blue | A | 3 |
| Z * | 4 | Violet | C | 7 |
| No Connection | 5 | — | E | — |
| Vcc (5-15VDC) | 6 | Red | D | 2 |
| B | 7 | Yellow | I | 6 |
| A | 8 | Gray | H | 4 |
| Z * | 9 | Orange | J | 8 |
| Shield | 10 | Braid | G | — |

* Index (Z) optional. See Ordering Information

ENVIRONMENTAL

Operating Temperature Range:
 Standard: -40°C to $+90^\circ\text{C}$
 Extended: -40°C to $+120^\circ\text{C}$
Storage Temperature Range: -40°C to $+120^\circ\text{C}$
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

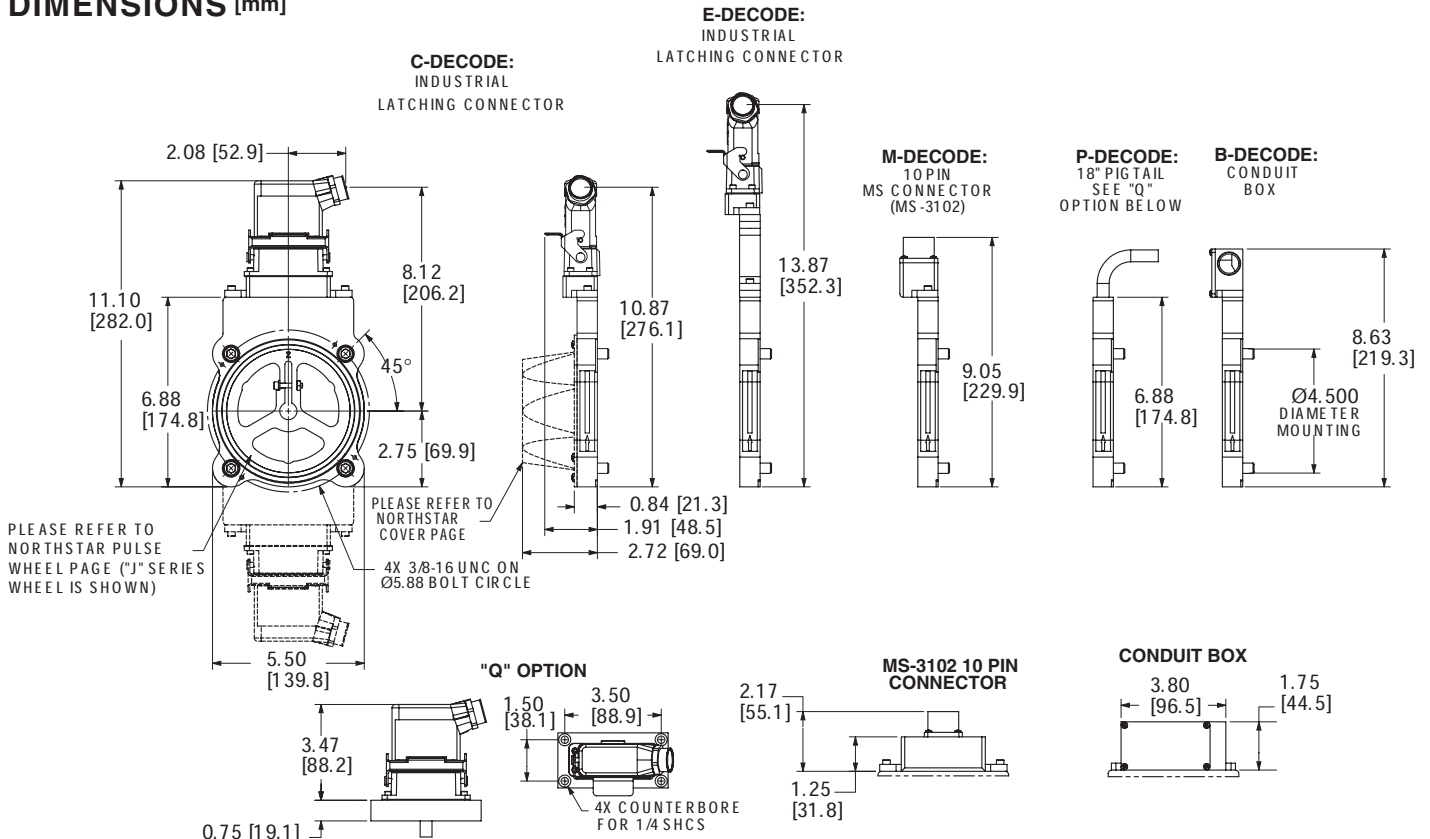
Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical | Code 7: Cover/Adapter |
|--|---|---|--|---|---|---|
| <input type="checkbox"/> 5 | <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"/> | <input type="checkbox"/> |
| Ordering Information | | | | | | |
| S5 Motor Mount Ring, for 4 1/2" C-Face Motors (56C) Single Output | 0064 | L No Index Available when Code 2 is 0512, 1024 or 2048 | J04 5/8" bore | B Conduit box | L 5-15V in, 5-15V Line Driver (4428) out | C Standard Cover |
| | 0128 | | J05 7/8" bore | C Latching Industrial Connector with 1/2" NPT | | |
| 0256 | G Gated Index (Z, Z̄) Z Differential Index (Z, Z̄) | J06 1.00" bore | E 3" extended height Latching Industrial Connector with 1/2" NPT | V 5-26V in, 5-26V Line Driver (IC-WE) out | F Flat Thru-hole cover | |
| 0512 | | J07 1-1/8" bore | | | | M 10 pin MS Connector |
| 1024 | Additional Shaft Sizes Available Up to 3.75" Maximum | K09 1-3/8" bore | P 18" pigtail cable | Differential, bidirectional signals (A, Ā, B, B̄) | T Flat No Hole Cover | |
| 2048 | | K10 1-1/2" bore | | | | Q Latching Industrial Connector on 18" pigtail cable |
| D5 Motor Mount Ring, for 4 1/2" C-Face Motors (56C) Dual Output | | | K11 1-5/8" bore | Available when Code 1 is S5 and Code 4 is J04 thru J07: | | |
| | | | K12 1-3/4" bore | | S 18" pigtail cable with stainless steel housing | |
| | | | K13 1-7/8" bore | | | |
| | | | K14 2.00" bore | | | |
| | | | K15 2-1/8" bore | | | |
| | | | K16 2-1/4" bore | | | |
| | | | K17 2-3/8" bore | | | |
| | | | K18 2-1/2" bore | | | |
| | | | K19 2-7/8" bore | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS ^{inch} [mm]



SERIES RL67

NorthStar™ brand

Bearingless Encoder

Key Features

- **Designed for Reliance Motors (6.75" fit and 56 and 140C-Face)**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Contaminants**
- **Anodized Aluminum Housing With Field-Serviceable Connector**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)

ELECTRICAL

Input Voltage Requirement: 5-15 or 5-26 Volts DC

Current Requirement:

With Electrical Option L or H: 45 mA typical per sensor module plus line driver load
 With Electrical Option V or 5: 65 mA typical per sensor module plus line driver load

Output Signals:

With Elec Option L or H: 5-15 V Line Driver, 150mA

With Elec Option V: 5-26 V Line Driver, 100mA
 With Elec Option 5: 5V Line Driver, 150mA

Frequency Response: 0 - 120kHz Data & Index

Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit

Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65

MECHANICAL

Shaft Speed: 7,000 RPM
Mounting Configuration: 4.5" diameter, 56 C motor face or accessory flange to meet NEMA MG1-4 standards or mounts directly in the 6.75" machined accessory recess of the 4.5" accessory flange found on Reliance RPM™ motors

Housing Material: Cast Aluminum

Acceleration Rate: 12,000 rpm/sec max

Shaft Length Required: 2.5" min

Allowable Shaft End-Play: ± 0.045"

Allowable Shaft Runout: 0.003" TIR

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E18-IT# |
|---------------|---------------|---------------|----------------|
| Common | 1 | Black | F |
| B | 2 | Green | B |
| A | 3 | Blue | A |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | E |
| Vcc (+ VDC) | 6 | Red | D |
| B | 7 | Yellow | I |
| A | 8 | Gray | H |
| Z * | 9 | Orange | J |
| Shield | 10 | Braid | G |

* Index (Z) optional. See Ordering Information

ENVIRONMENTAL

Operating Temperature Range: -40°C to +90°C

Storage Temperature Range: -40°C to +120°C

Humidity: to 98% RH (non-condensing)

Shock (Sensor Module): 1 meter drop test, 30 G's Min

Vibration: 18 G's @ 5-2000 Hz spectrum

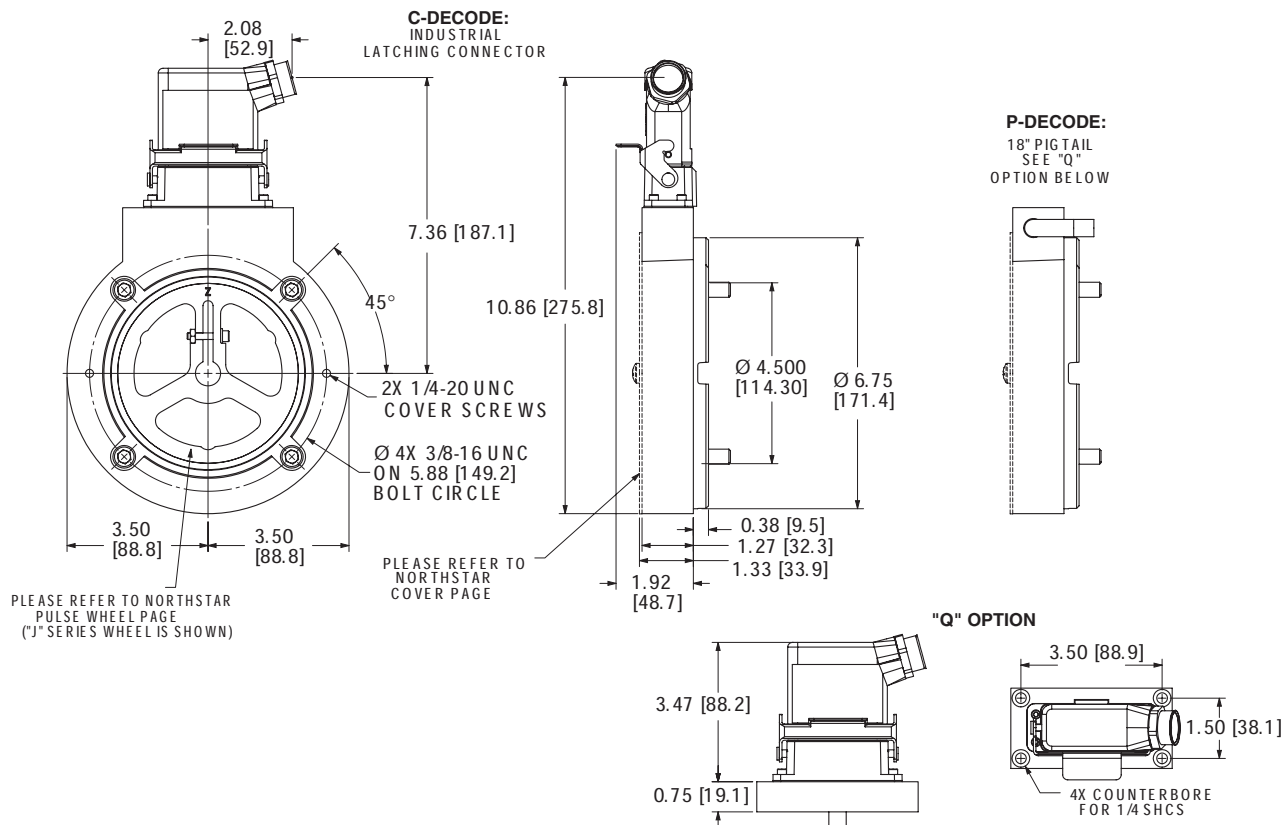
Ordering Information

To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical | Code 7: Cover | | |
|--|--|---|---|--|--|--|------------------------------|---|
| S6 | □□□□ | □ | □□□ | □ | □ | □ | | |
| Ordering Information | | | | | | | | |
| S6 Motor Mount Ring, for 4 1/2" NEMA 56-C C-Face Motors or Reliance Electric Style 6.75" Recess | 0064 | L No Index | J04 5/8" bore | C Latching Industrial Connector with 1/2" NPT | L 5-15V in, 5-15V Line Driver (4428) out | C Standard cover | | |
| | 0128 | Available when Code 2 is 0512, 1024 or 2048 | J05 7/8" bore | | | | M 10 pin MS Connector | H Same as L with extended temp. to 120°C |
| | 0256 | | J06 1.00" bore | P 18" pigtail cable | V 5-26V in, 5-26V Line Driver (IC-WE) out | | | |
| | 0512 | J07 1-1/8" bore | Q Latching Industrial Connector on 18" pigtail cable | | | 5 5-15V in, 5V Line Driver (4428) out | | |
| | 1024 | G Gated Index (Z, Z̄) | | K09 1-3/8" bore | Differential, bidirectional signals (A, Ā, B, B̄) | | | |
| | | 2048 | Z Differential Index (Z, Z̄) | K10 1-1/2" bore | | | | |
| | | | K11 1-5/8" bore | | | | | |
| | | | K12 1-3/4" bore | | | | | |
| | | | K13 1-7/8" bore | | | | | |
| | | | K14 2.00" bore | | | | | |
| K15 2-1/8" bore | | | | | | | | |
| K16 2-1/4" bore | | | | | | | | |
| K17 2-3/8" bore | | | | | | | | |
| K18 2-1/2" bore | | | | | | | | |
| K19 2-7/8" bore | Additional Shaft Sizes Available Up to 3.75" Maximum | | | | | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS ^{inch} [mm]



SERIES SL85

NorthStar™ brand

Bearingless Encoder

Key Features

- **Bearingless Design Mounts to 180 C-Face Motors**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water, and Other Contaminants**
- **Dual-C-Face Versions Available for “Sandwich” Mounting**
- **Single or Dual Isolated Outputs Available**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)
Number of Output Modules: Single or Dual Redundant

ELECTRICAL

Input Power Requirements: 5-15 Volts DC, 45 mA typical per sensor module plus line driver load
Output Signals: Line Driver, 150mA source/sink
Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65

MECHANICAL

Max: Shaft Speed: 5,000 RPM
Mounting Configuration: 8.5" 180C face mount for NEMA MG1 standards
Housing Material: Cast Aluminum
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 1.0" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR

ENVIRONMENTAL

Operating Temperature Range: -40°C to +90°C
Storage Temperature Range: -40°C to +120°C
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E18-IT# |
|-----------------|---------------|---------------|----------------|
| C ommon | 1 | B lack | F |
| B | 2 | G reen | B |
| A | 3 | B lue | A |
| Z * | 4 | V iolet | C |
| N o C onnection | 5 | — | E |
| V cc (5-15 VDC) | 6 | R ed | D |
| B̄ | 7 | Y ellow | I |
| Ā | 8 | G ray | H |
| Z * | 9 | O range | J |
| S hield | 10 | B raid | G |

* Index (Z) optional. See Ordering Information

Ordering Information

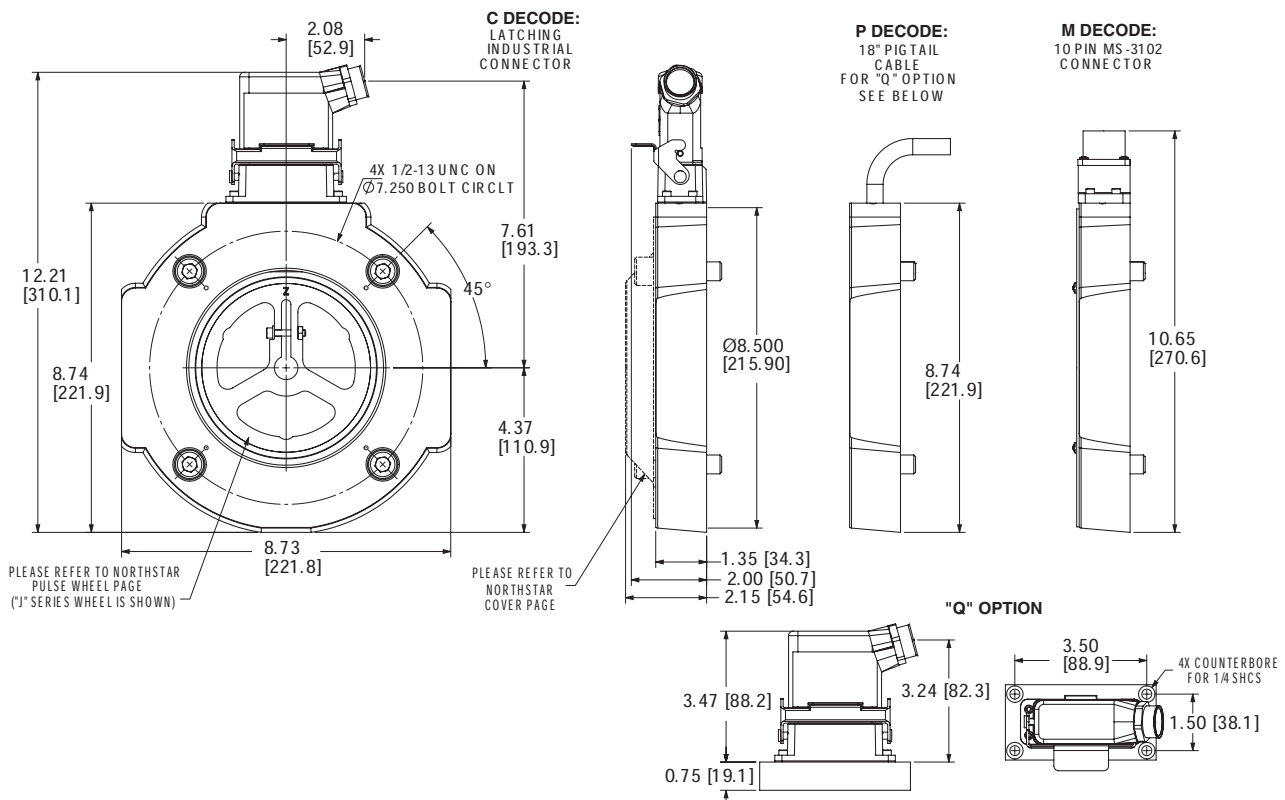
To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical | Code 7: Cover/Adapter |
|--|---|---|--|--|--|--|
| <input type="checkbox"/> 8 | <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"/> | <input type="checkbox"/> |
| Ordering Information | | | | | | |
| S8 Motor Mount Ring, for 8 1/2" C-Face Motors (180C) Single Output D8 Motor Mount Ring, for 8 1/2" C-Face Motors (180C) Dual Output | 0064 0128 0256 0512 1024 2048 | L No Index Available when Code 2 is 0512, 1024 or 2048 G Gated Index (Z, Z̄) Z Differential Index (Z, Z̄) | J04 5/8" bore J05 7/8" bore J06 1.00" bore J07 1-1/8" bore K09 1-3/8" bore K10 1-1/2" bore K11 1-5/8" bore K12 1-3/4" bore K13 1-7/8" bore K14 2.00" bore K15 2-1/8" bore K16 2-1/4" bore K17 2-3/8" bore K18 2-1/2" bore K19 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum End of Shaft Mounting for GE & Emerson Motors N01 1.125" EOS N06 2.375" EOS N08 2.625" EOS N10 2.875" EOS | C Latching Industrial Connector with 1/2" NPT M 10 pin MS Connector Double C-face Sandwich Version D 1" Extended height connector E 3" extended height connector P 18" pigtail cable Q Latching Industrial Connector on 18" pigtail cable | L 5-15V in, 5-15V Line Driver (4428) out H Same as L with extended temp. to 120°C V 5-26V in, 5-26V Line Driver (IC-WE) out 5 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, Ā, B, B̄) | C Standard Flat Cover E Extra heavy duty steel pie pan cover F Flat Thru-hole cover <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Grounding brush kits available for End of Shaft Mounting, Consult Factory for ordering </div> |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS ^{inch} [mm]

STANDARD HOUSING – SINGLE C-FACE



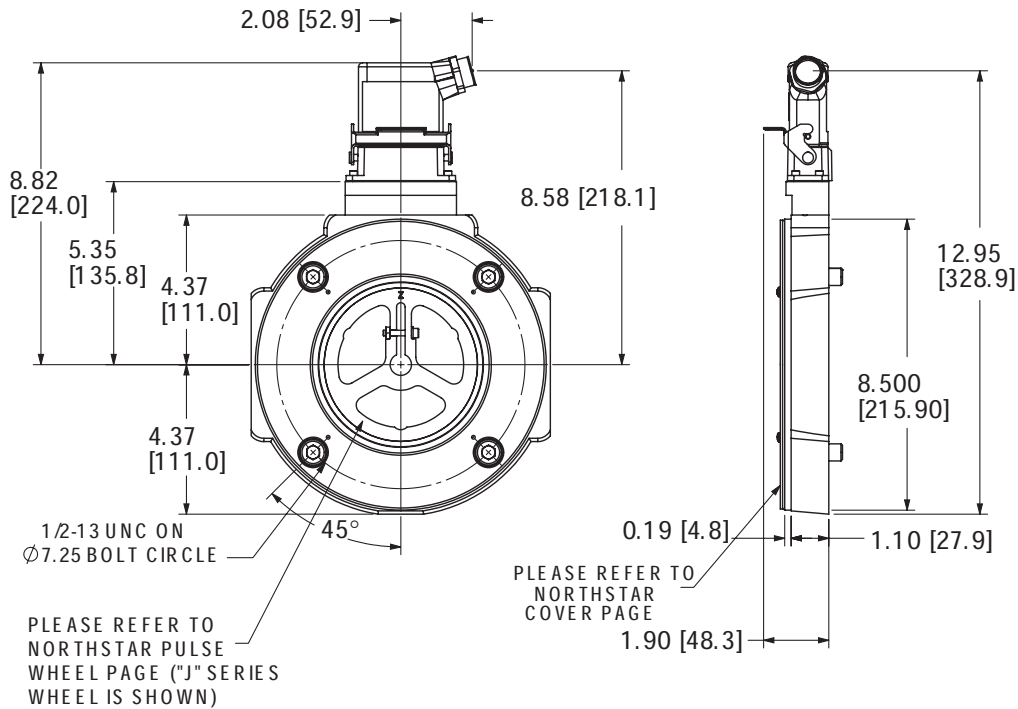
SERIES SL85

NorthStar™ brand

DIMENSIONS inch [mm]

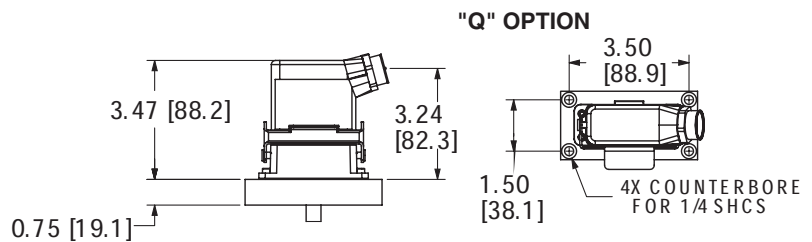
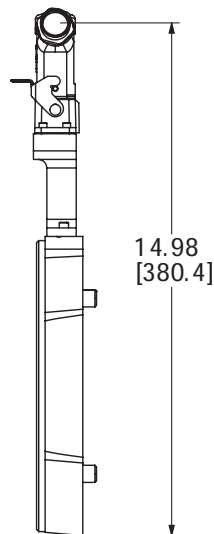
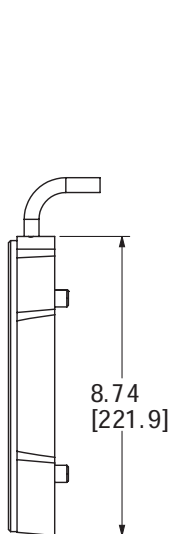
DOUBLE C-FACE HOUSING

D-DECODE:
DOUBLE C-FACE
INDUSTRIAL
1" EXTENDED HEIGHT
LATCHING CONNECTOR



P-DECODE:
DOUBLE C-FACE
18" PIGTAIL
SEE "Q"
OPTION BELOW

E-DECODE:
DOUBLE C-FACE
3" EXTENDED HEIGHT
INDUSTRIAL
LATCHING CONNECTOR

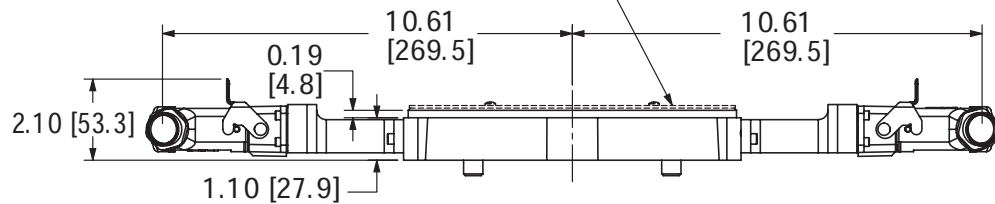
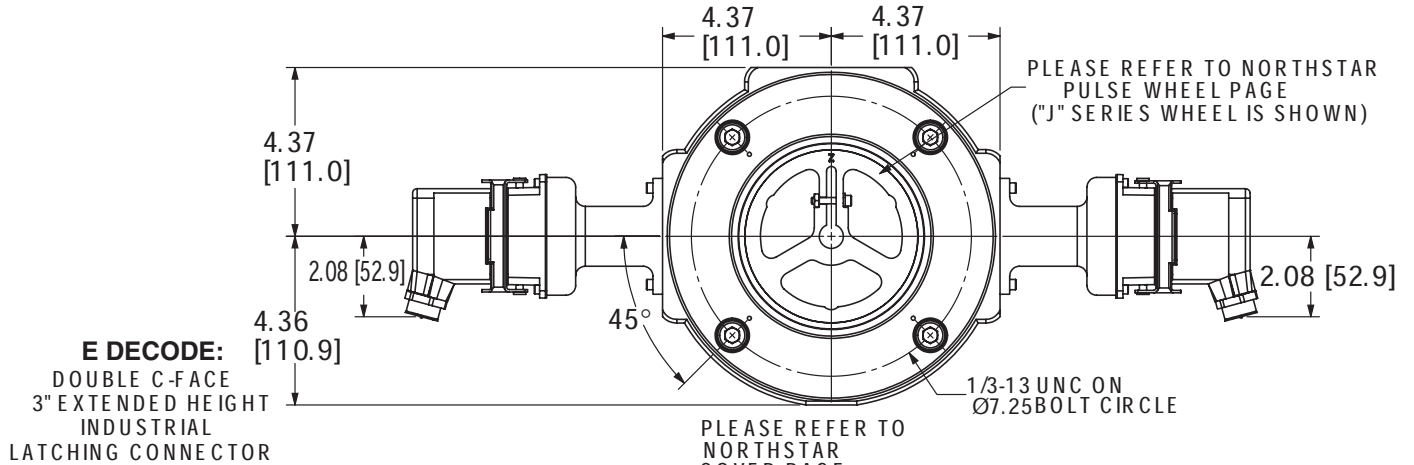




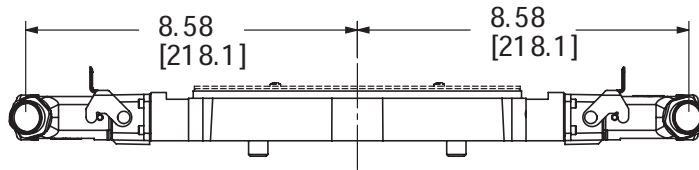
SERIES SL85

DIMENSIONS ^{inch} [mm]

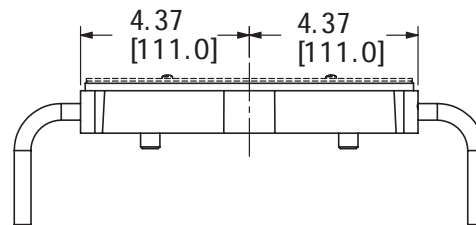
DUAL OUTPUT HOUSING



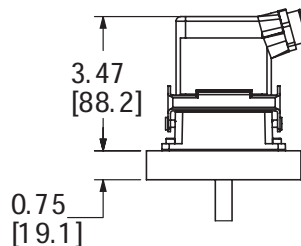
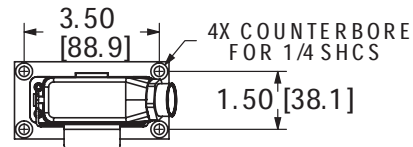
D DECODE:
DOUBLE C-FACE
1" EXTENDED HEIGHT
INDUSTRIAL
LATCHING CONNECTOR



P DECODE:
DOUBLE C-FACE
18" PIG TAIL
SEE "Q" OPTION
AT RIGHT



"Q" OPTION



SERIES SL1250

NorthStar™ brand

Bearingless Encoder

Key Features

- **Bearingless Design Mounts to 250C Face Motors and Requires only 1.4" of Motor Shaft**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Common Contaminants**
- **Single or Dual Isolated Outputs Available**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Pulses per Revolution: 64-1024

Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end

Quadrature Phasing: $90^\circ \pm 22^\circ$

Symmetry: $180^\circ \pm 54^\circ$

Index: 270° , ungated (optional gated to falling B edge)

ELECTRICAL

Input Voltage Requirement: 5-15 or 5-26 Volts DC

Current Requirement:

With Electrical Option L or H: 45 mA typical per sensor module plus line driver load

With Electrical Option V or 5: 65 mA typical per sensor module plus line driver load

Output Signals:

With Elec Option L or H: 5-15 V Line Driver, 150mA

With Elec Option V: 5-26 V Line Driver, 100mA

With Elec Option 5: 5V Line Driver, 150mA

Frequency Response: 0 - 120kHz Data & Index

Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit

Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65; MS connector or pig-tail

MECHANICAL

Shaft Speed: 5,000 RPM

Mounting Configuration: 12.5" C face mount for NEMA MG1-4 standards (excluding C-Face runout)

Housing Material: Cast Aluminum

Acceleration Rate: 12,000 rpm/sec max

Shaft Length Required: 1.1" min

Allowable Shaft End-Play: $\pm 0.045"$

Allowable Shaft Runout: 0.003" TIR

Weight: 11 lbs.

ENVIRONMENTAL

Operating Temperature Range:

Standard: -40°C to $+90^\circ\text{C}$

Extended: -40°C to $+120^\circ\text{C}$

Storage Temperature Range: -40°C to $+120^\circ\text{C}$

Humidity: to 98% RH (non-condensing)

Shock (Sensor Module): 1 meter drop test, 30 G's Min

Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E18-IT# |
|---------------|---------------|---------------|----------------|
| Common | 1 | Black | F |
| B | 2 | Green | B |
| A | 3 | Blue | A |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | E |
| Vcc (5-15VDC) | 6 | Red | D |
| \bar{B} | 7 | Yellow | I |
| \bar{A} | 8 | Gray | H |
| \bar{Z} * | 9 | Orange | J |
| Shield | 10 | Braid | G |

* Index (Z) optional. See Ordering Information

SERIES SL1250

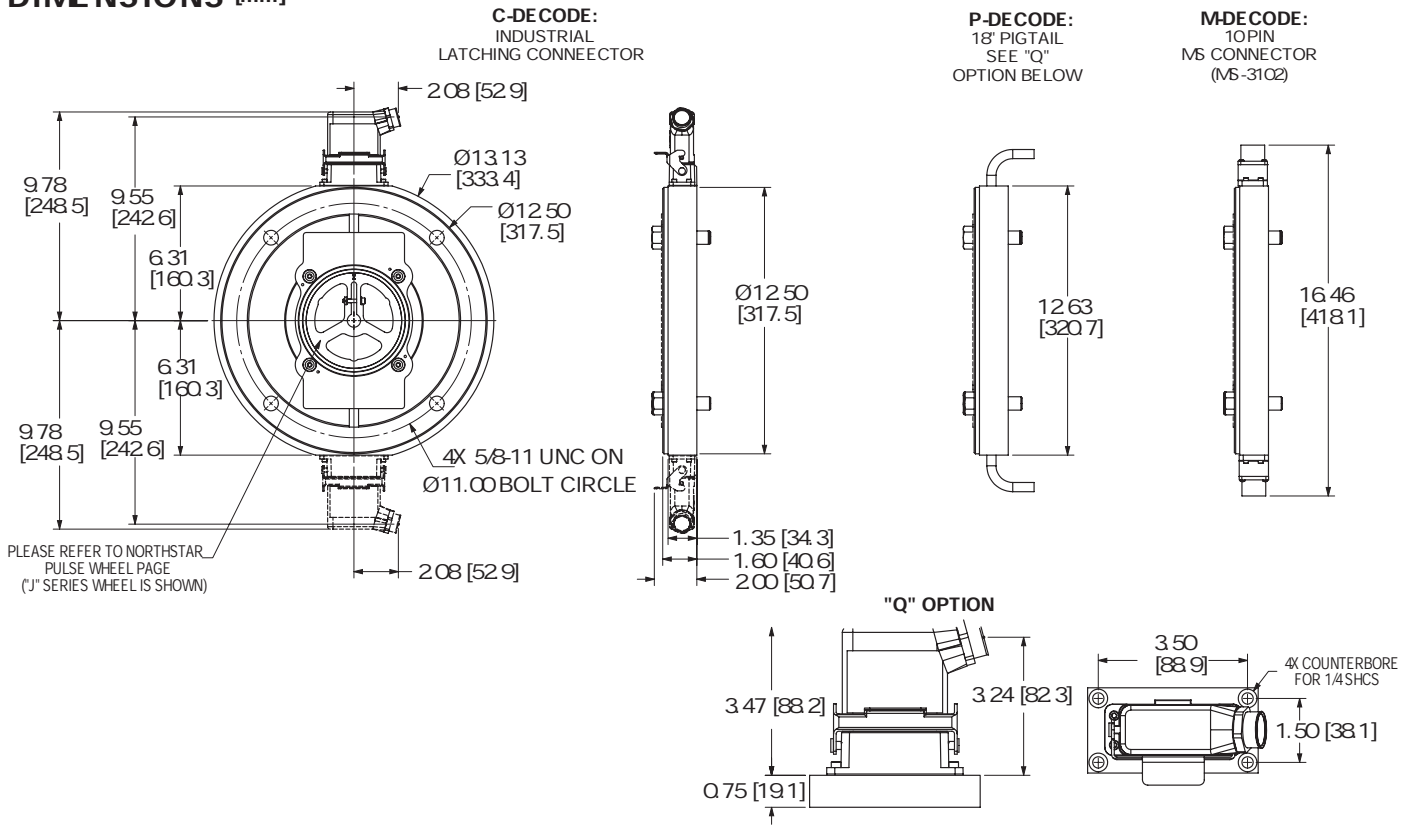
Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical | Code 7: Cover/Adapter |
|--|---|---|---|--|--|--|
| □ 1 | □□□□ | □ | □□□ | □ | □ | □ |
| Ordering Information | | | | | | |
| S1 Motor Mount Ring, for 12 1/2" NEMA C-Face Motors Single Output D1 Motor Mount Ring, for 12 1/2" NEMA C-Face Motors Dual Output | 0064 0128 0256 0512 1024 | L No Index | J04 5/8" bore J05 7/8" bore J06 1.00" bore J07 1-1/8" bore | C Latching Industrial Connector with 1/2" NPT | L 5-15V in, 5-15V Line Driver (4428) out H Same as L with extended temp. to 120°C | C No Cover F Flat Thru-hole cover |
| | | G Gated Index (Z, Z̄) Z Differential Index (Z, Z̄) | K09 1-3/8" bore K10 1-1/2" bore K11 1-5/8" bore K12 1-3/4" bore K13 1-7/8" bore K14 2.00" bore K15 2-1/8" bore K16 2-1/4" bore K17 2-3/8" bore K18 2-1/2" bore K19 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum | D 1" extended height Latching industrial connector with 1/2" NPT M 10 pin MS Connector P 18" pigtail cable Q Latching Industrial Connector on 18" pigtail cable | V 5-26V in, 5-26V Line Driver (IC-WE) out 5 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, Ā, B, B̄) | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS inch [mm]



SERIES RIM8500

NorthStar™ brand

Bearingless Encoder

Key Features

- Compact, Bearingless Design Mounts to 180C Face Motors
- Sensor Modules are Removable On-The-Fly and Require No Gapping
- Stainless Steel and Ductile Cast Iron Construction for Harsh Mill Environments
- Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Common Contaminants



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 60-1200
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: $90^\circ \pm 22^\circ$
Symmetry: $180^\circ \pm 54^\circ$
Index: 270° , ungated (optional gated to falling B edge)

ELECTRICAL

Input Power Requirements: 5-15 Volts DC, 45 mA typical per sensor module plus line driver load
Output Signals: Line Driver, 150mA source/sink
Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65

MECHANICAL

Shaft Speed: 7,000 RPM
Mounting Configuration: 8.5" 180C face mount for NEMA MG1 standards
Housing Material: Cast Iron/Stainless Steel
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 2.5" min
Allowable Shaft End-Play: $\pm 0.050"$
Allowable Shaft Runout: 0.003" TIR

ENVIRONMENTAL

Operating Temperature Range: -40°C to $+80^\circ\text{C}$
Storage Temperature Range: -40°C to $+120^\circ\text{C}$
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 310Æ 18IT# |
|---------------|---------------|---------------|---------------|
| Common | 1 | Black | A |
| B | 2 | Green | E |
| A | 3 | Blue | D |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | — |
| Vcc (5-15VDC) | 6 | Red | B |
| \bar{B} | 7 | Yellow | H |
| \bar{A} | 8 | Gray | G |
| \bar{Z} * | 9 | Orange | I |
| Shield | 10 | Braid | J |

* Index (Z) optional. See Ordering Information

SERIES RIM8500

Ordering Information

To order, complete the model number with code numbers from the table below:

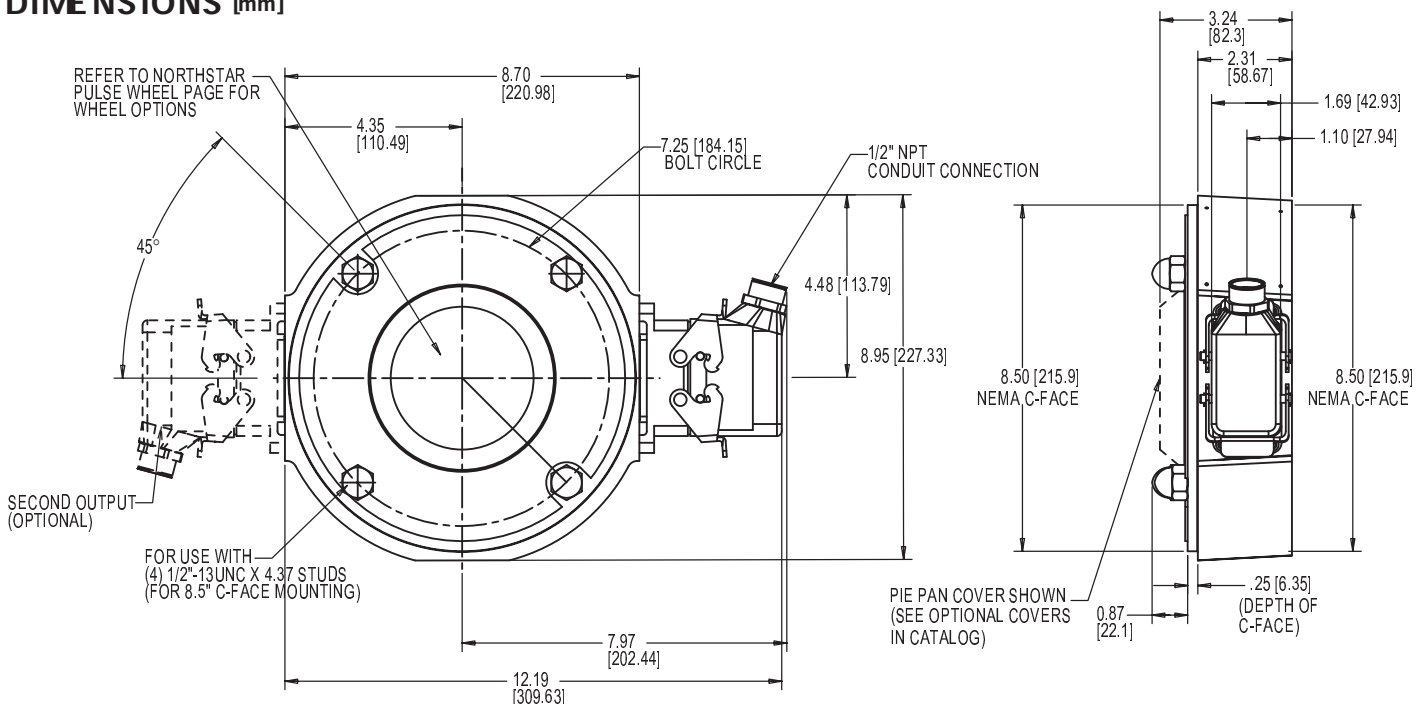
| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Output | Code 6: Electrical | Code 7: Termination |
|---------------|-------------|---------------|--------------------|----------------|--------------------|---------------------|
| R8 | □□□□ | □ | □□□ | □ | □ | □ |

Ordering Information

| | | | | | | | |
|--|-------------|-------------|---|--|---|--|---|
| R8 Motor Mount Ring, for Nema 8 1/2" C-Face Motors (180C) | 0060 | 0300 | L No Index | J04 5/8" bore | 1 Single 2 Dual (Isolated) Differential, bidirectional signals (A, \bar{A} , B, \bar{B}) | L 5-15V in, 5-15V Line Driver (4428) out H Same as L with extended temp. to 120°C R 15-26V in, 15V Line Driver (4428) out 5 5-15V in, 5V Line Driver (4428) out | C Latching Industrial Connector with 1/2" NPT M 10 pin MS Connector P 18" Pigtail Q Latching industrial connector on 18" cable |
| | 064 | 0480 | Available when Code 2 is 0480, 0512, 0600, 0960 | J05 7/8" bore | | | |
| | 0075 | 0512 | Code 2 is 0480, 0512, 0600, 0960 | J06 1.00" bore | | | |
| | 0120 | 0600 | 1024 or 1200 | J07 1-1/8" bore | | | |
| | 0128 | 0960 | G Gated Index (Z, \bar{Z}) | K09 1-3/8" bore | | | |
| | 0150 | 1024 | Z Differential Index (Z, \bar{Z}) | K10 1-1/2" bore | | | |
| | 0240 | 1200 | | K11 1-5/8" bore | | | |
| | 0256 | | | K12 1-3/4" bore | | | |
| | | | | K13 1-7/8" bore | | | |
| | | | | K14 2" bore | | | |
| | | | | K15 2-1/8" bore | | | |
| | | | | K16 2-1/4" bore | | | |
| | | | | K17 2-3/8" bore | | | |
| | | | | K18 2-1/2" bore | | | |
| | | | | K19 2-7/8" bore | | | |
| | | | | Additional Shaft Sizes Available Up to 3.75" Maximum | | | |
| | | | | End of shaft mounting for GE & Emerson Motors | | | |
| | | | | E01 1.125" EOS | | | |
| | | | | E06 2.125" EOS | | | |
| | | | | E08 2.375" EOS | | | |
| | | | | E10 2.875" EOS | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS inch [mm]



SERIES RIM 1250

NorthStar™ brand

Bearingless Encoder

Key Features

- **Bearingless Design Mounts to 250C Face Motors (12.5" Diameter Mounting Flange)**
- **Sensor Modules are Removable On-The-Fly and Require No Gapping**
- **Stainless Steel and Ductile Cast Iron Construction for Harsh Mill Environments**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Common Contaminants**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 60-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)

ELECTRICAL

Input Power Requirements: 5-15 Volts DC, 45 mA typical per sensor module plus line driver load
Output Signals: Line Driver, 150mA source/sink
Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65

MECHANICAL

Shaft Speed: 7,000 RPM (J or K wheels); 3600 RPM (TL wheels)
Mounting Configuration: 12.5" face mount for NEMA MG1 standards
Housing Material: Cast Iron/Stainless Steel
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 3.0" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR

ENVIRONMENTAL

Operating Temperature Range: -40°C to +80°C
Storage Temperature Range: -40°C to +120°C
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E 18IT # |
|---------------|---------------|---------------|-----------------|
| Common | 1 | Black | A |
| B | 2 | Green | E |
| A | 3 | Blue | D |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | — |
| Vcc | 6 | Red | B |
| B̄ | 7 | Yellow | H |
| Ā | 8 | Gray | G |
| Z̄ * | 9 | Orange | I |
| Shield | 10 | Braid | J |

* Index (Z) optional. See Ordering Information

SERIES RIM 1250

Ordering Information

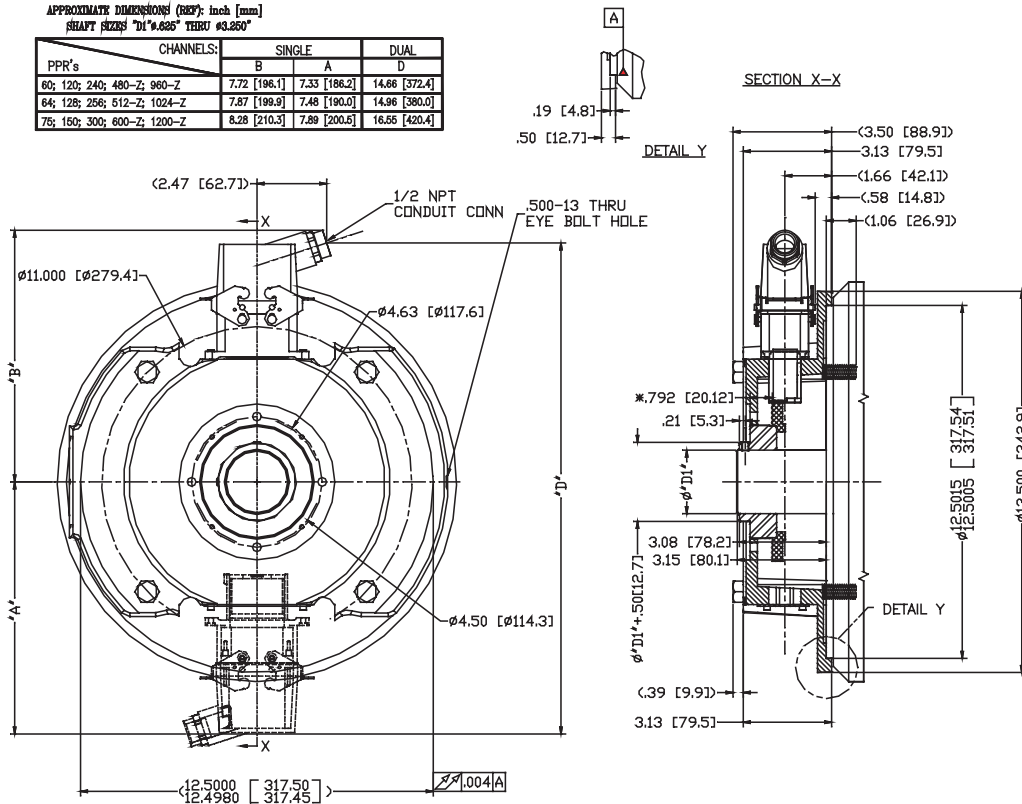
To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Output | Code 6: Electrical | Code 7: Termination | |
|---|--|--|---|---|---|---|--|
| R1 | □□□□ | □ | □□□ | □ | □ | □ | |
| Ordering Information | | | | | | | |
| R1 Motor Mount Ring, for 12-1/2" C-Face Motors | 0060 0064 0075 0120 0128 0150 0240 0256 | 0300 0480 0512 0600 0960 1024 1200 2048 | L No Index Available when Code 2 is 0480, 0512, 0600, 0960, 1024, 1200 or 2048 G Gated Index (Z, Z) Z Differential Index (Z, Z) | J04 5/8" bore J05 7/8" bore J06 1.00" bore J07 1-1/8" bore K09 1-3/8" bore K10 1-1/2" bore K11 1-5/8" bore K12 1-3/4" bore K13 1-7/8" bore K14 2" bore K15 2-1/8" bore K16 2-1/4" bore K17 2-3/8" bore K18 2-1/2" bore K19 2-7/8" bore Additional Shaft Sizes Available Up to 8.00" Maximum | 1 Single 2 Dual (Isolated) Differential, bidirectional signals (A, \bar{A} , B, \bar{B}) | L 5-15V in, 5-15V Line Driver (4428) out R 15-26V in, 15V Line Driver (4428) out 5 5-15V in, 5V Line Driver (4428) out | C Latching Industrial Connector with 1/2" NPT M 10 pin MS Connector P 18" Pigtail |

DIMENSIONS inch [mm]

APPROXIMATE DIMENSIONS (REF): inch [mm]
SHAFT SIZE: $D1 \pm 0.005$ THRU $\#3.250$ "

| PPR's | CHANNELS: | | SINGLE | | DUAL | |
|-----------------------------|--------------|--------------|---------------|---|------|---|
| | B | A | B | A | D | D |
| 60; 120; 240; 480-Z; 960-Z | 7.72 [196.1] | 7.33 [186.2] | 14.66 [372.4] | | | |
| 64; 128; 256; 512-Z; 1024-Z | 7.87 [199.9] | 7.48 [190.0] | 14.96 [380.0] | | | |
| 75; 150; 300; 600-Z; 1200-Z | 8.28 [210.3] | 7.89 [200.5] | 16.55 [420.4] | | | |



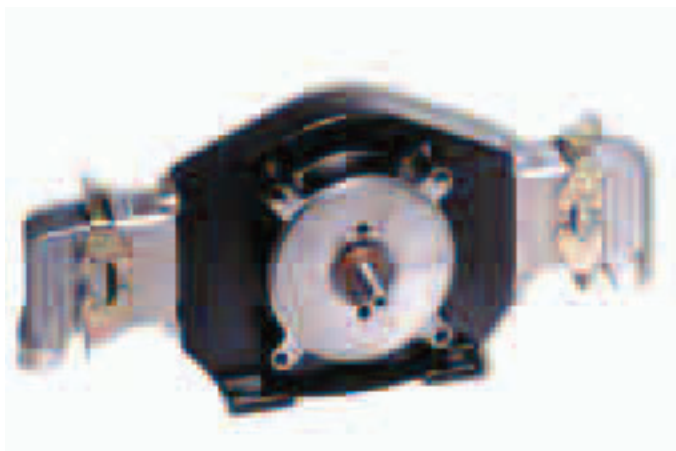
SERIES RIM 6200

NorthStar™ brand

Severe Duty Encoder

Key Features

- Foot-Mount or 56-C Face Mount Ideal for "Flower Pot" or Belt Drive Applications
- Extra Heavy Duty Bearings for Long Life
- Stainless Steel and Ductile Cast Iron Construction
- Sensor Modules are Removable On-The-Fly and Provide up to 2048PPR



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Pulses per Revolution: 60-2048

Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end

Quadrature Phasing: $90^\circ \pm 22^\circ$

Symmetry: $180^\circ \pm 54^\circ$

Index: 270° , ungated (optional gated to falling B edge)

ELECTRICAL

Input Voltage Requirement: 5-15 or 15-26 Volts DC

Current Requirement:

With Electrical Option L: 45 mA typical per sensor module plus line driver load

With Electrical Option R: 65 mA typical per sensor module plus line driver load

With Electrical Option 5: 65 mA typical per sensor module plus line driver load

Output Signals:

With Elec Option L: 5-15 V Line Driver, 150mA

With Elec Option R: 15 V Line Driver, 150mA

With Elec Option 5: 5V Line Driver, 150mA

Frequency Response: 0 - 120kHz Data & Index

Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit

Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65

MECHANICAL

Shaft Speed: 7,000 RPM

Mounting Configuration: 4.5" [115mm] diameter, 56 C motor face or accessory flange to meet NEMA MG1-4 standards; foot mount with 4 slotted bolt holes

Housing Material: Cast Iron/Stainless Steel

Acceleration Rate: 3600 rpm/sec max

Shaft : 0.625" (16mm) diameter with standard key, single or double ended

Shaft Material Options: Hot Rolled Carbon Steel or Stainless steel

Shaft Axial/Radial Loading:

Hot Rolled Steel: 50 lbf axial, 50 lbf radial

Stainless Steel: 35 lbf axial, 35 lbf radial

ENVIRONMENTAL

Operating Temperature Range: -40°C to $+70^\circ\text{C}$

Storage Temperature Range: -40°C to $+120^\circ\text{C}$

Humidity: to 98% RH (non-condensing)

Shock (Sensor Module): 1 meter drop test, 30 G's Min

Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E 18-IT# |
|---------------|---------------|---------------|-----------------|
| Common | 1 | Black | A |
| B | 2 | Green | E |
| A | 3 | Blue | D |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | — |
| Vcc | 6 | Red | B |
| B | 7 | Yellow | H |
| A | 8 | Gray | G |
| Z * | 9 | Orange | I |
| Shield | 10 | Braid | J |

* Index (Z) optional. See Ordering Information

SERIES RIM 6200

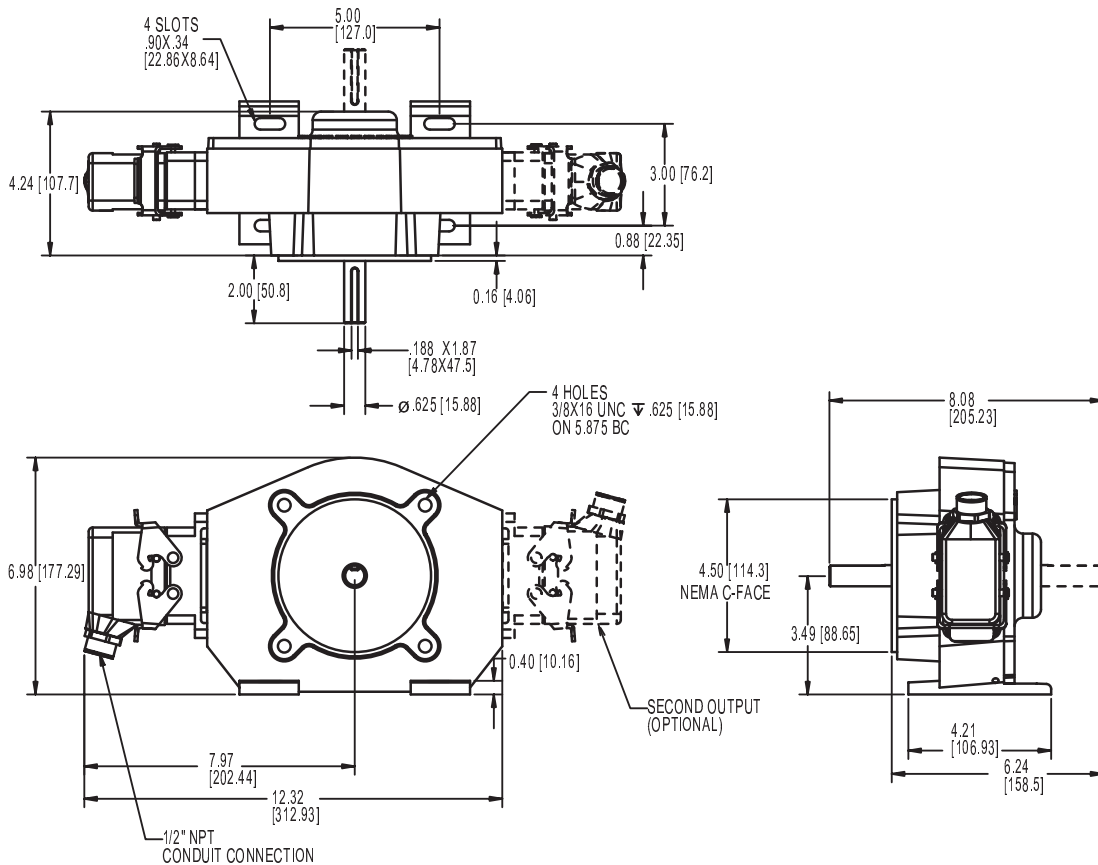
Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Shaft | Code 5: Output | Code 6: Electrical | Code 7: Termination |
|---------------------------------------|-------------|--|--|--|---|--|
| R6 | □□□□ | □ | □□□ | □ | □ | □ |
| Ordering Information | | | | | | |
| R6 Foot Mount or Close Coupled | 0060 | L No Index Available when Code 2 is 0480, 0512, 0600, 0960 1024, 1200 or 2048 G Gated Index (Z, \bar{Z}) Z Differential Index (Z, \bar{Z}) | A Single Shaft, Stainless Steel | 1 Single Output | L 5-15V in, 5-15V Line Driver (4428) out | C Latching Industrial Connector with 1/2" NPT |
| | 0064 | | B Dual Shaft, Stainless Steel | | | |
| | 0075 | | S Single Shaft, Steel D Dual Shaft, Steel | Differential, bidirectional signals (A, \bar{A} , B, \bar{B}) | R 15-26V in, 15V Line Driver (4428) out | M 10 pin MS Connector |
| | 0120 | | | | | |
| | 0128 | | | | | |
| | 0150 | | | | | |
| | 0240 | | | | | |
| | 0256 | | | | | |
| | 0300 | | | | | |
| | 0480 | | | | | |
| 0512 | | | | | | |
| 0600 | | | | | | |
| 0960 | | | | | | |
| 1024 | | | | | | |
| 1200 | | | | | | |
| 2048 | | | | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS ^{inch} [mm]



SERIES HS56

NorthStar™ brand

Hollow Shaft Encoder

Key Features

- **Hollowshaft Design with Heavy-Duty Bearings Ideal for TEFCAC Motor Mounting**
- **Magneto-Resistive Technology**
- **Accommodates Shaft Sizes from 5/8" to 1-1/8"**
- **Stainless Steel and Anodized Aluminum Construction**
- **Dual Isolated Outputs Available for Redundancy**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)

ELECTRICAL

Input Voltage Requirement: 5-15 or 5-26 Volts DC
Current Requirement:
 With Electrical Option L: 45 mA typical per sensor module plus line driver load
 With Electrical Option V or 5: 65 mA typical per sensor module plus line driver load

Output Signals:

With Elec Option L: 5-15 V Line Driver, 150mA
 With Elec Option V: 5-26 V Line Driver, 100mA
 With Elec Option 5: 5V Line Driver, 150mA

Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit

Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65; MS connector or pig-tail

MECHANICAL

Mating Shaft Sizes: 5/8" to 1-1/8"
Shaft Speed: 3,600 RPM
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Housing Material: Hard Anodized Aluminum W/Stainless Steel Hub
Acceleration Rate: 3,600 rpm/sec max
Shaft Length Required: 2.0" min
Allowable Shaft End-Play: ± 0.150" (tether limit)
Allowable Shaft Runout: 0.015" TIR typical (rpm dependent)

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E 18-IT# |
|---------------|---------------|---------------|-----------------|
| Common | 1 | Black | F |
| B | 2 | Green | B |
| A | 3 | Blue | A |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | E |
| Vcc + | 6 | Red | D |
| B | 7 | Yellow | I |
| A | 8 | Gray | H |
| Z * | 9 | Orange | J |
| Shield | 10 | Braid | G |

* Index (Z) optional. See Ordering Information

ENVIRONMENTAL

Operating Temperature Range: -20°C to +80°C
Storage Temperature Range: -40°C to +120°C
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

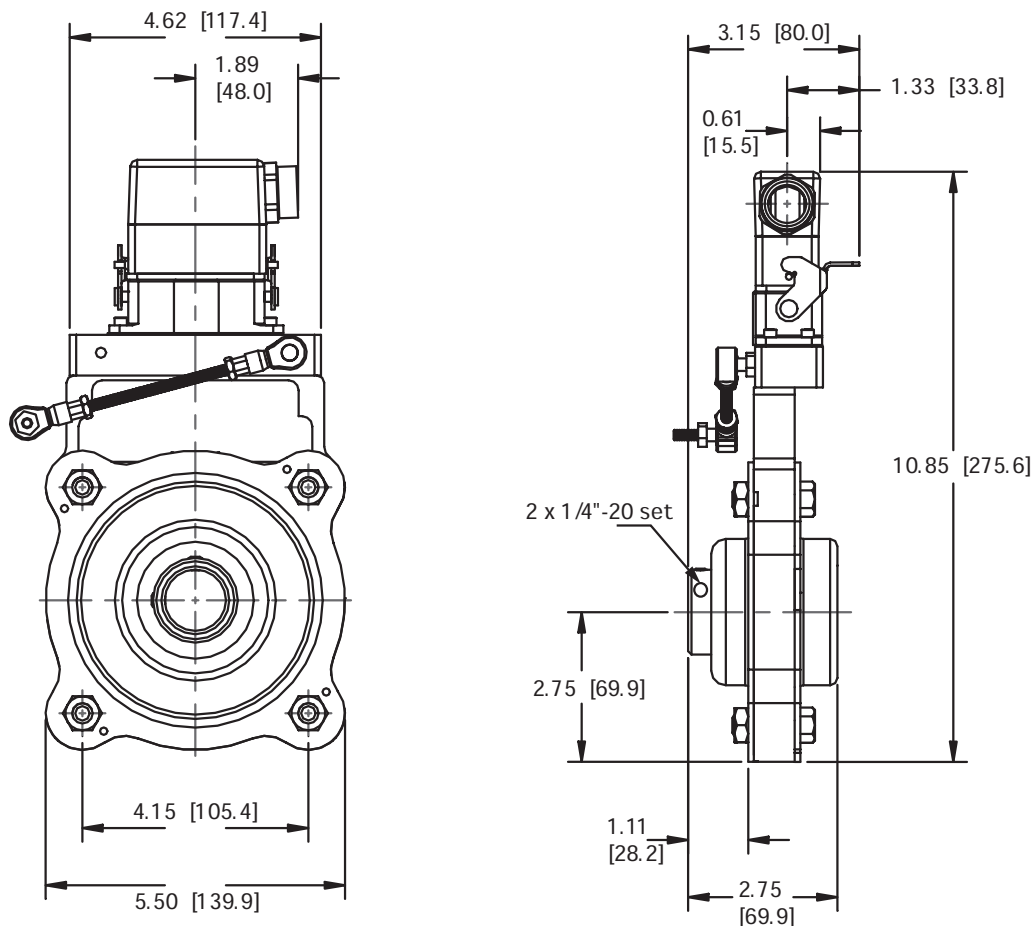
Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical |
|--|---|---|----------------------------|--|--|
| H □ | □□□□ | □ | □□□ | □ | □ |
| Ordering Information | | | | | |
| H5 Hollow Shaft Mount | 0064 | L No Index Available when Code 2 is 0512, 1024 or 2048 | J04 5/8" bore | C Latching Industrial Connector with 1/2" NPT | L 5-15V in, 5-15V Line Driver (4428) out |
| | 0128 | | J05 7/8" bore | | |
| HD Hollow Shaft Mount Dual Output | 0256 | G Gated Index (Z, \bar{Z}) Z Differential Index (Z, \bar{Z}) | J06 1.00" bore | M 10 pin MS Connector | V 5-26V in, 5-26V Line Driver (IC-WE) out |
| | 0512 | | J07 1-1/8" bore | | |
| | 1024 | | P 18" pigtail cable | | |
| 2048 | Q Latching Industrial Connector on 18" pigtail cable | Differential, bidirectional signals (A, \bar{A} , B, \bar{B}) | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS ^{inch} [mm]



SERIES HS60

NorthStar™ brand

Hollowshaft Encoder

Key Features

- Industry-Leading 2-7/8" Hollowshaft Capability
- Multi-Stage Sealing for Wash-Down Applications
- Stainless Steel Shaft for Corrosion Resistance
- Dual-Split Clamping Collar for Positive Shaft Engagement
- Oversized Bearings for Long Service Life
- Magnetic Sensor Technology and Encapsulated Electronics Resist Moisture and Contamination



EN 61326



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: Once per revolution

ELECTRICAL

Input Voltage Requirement: 5-15 or 5-26 Volts DC
Current Requirement:
 With Electrical Option L: 45 mA typical per sensor module plus line driver load
 With Electrical Option V or 5: 65 mA typical per sensor module plus line driver load
Output Signals:
 With Elec Option L: 5-15 V Line Driver, 150mA
 With Elec Option V: 5-26 V Line Driver, 100mA
 With Elec Option 5: 5V Line Driver, 150mA
Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65; MS connector or pig-tail

MECHANICAL

Mating Shaft Sizes: 1-1/8" to 2-7/8"
Shaft Speed: Labyrinth Shaft Seal: 3,600 RPM; V-Ring Shaft Seal: 1,000 RPM
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Housing Material: Hard Anodized Aluminum W/Stainless Steel Hub
Acceleration Rate: 3,600 rpm/sec max
Shaft Length Required: 2.36" min
Allowable Shaft End-Play: ± 0.150" (tether limit)
Allowable Shaft Runout: 0.015" TIR typical (rpm dependent)

ENVIRONMENTAL

Operating Temperature Range: -20°C to +80°C
Storage Temperature Range: -40°C to +120°C
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E18-IT# |
|---------------|---------------|---------------|----------------|
| Common | 1 | Black | F |
| B | 2 | Green | B |
| A | 3 | Blue | A |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | E |
| Vcc + | 6 | Red | D |
| B | 7 | Yellow | I |
| A | 8 | Gray | H |
| Z * | 9 | Orange | J |
| Shield | 10 | Braid | G |

* Index (Z) optional. See Ordering Information

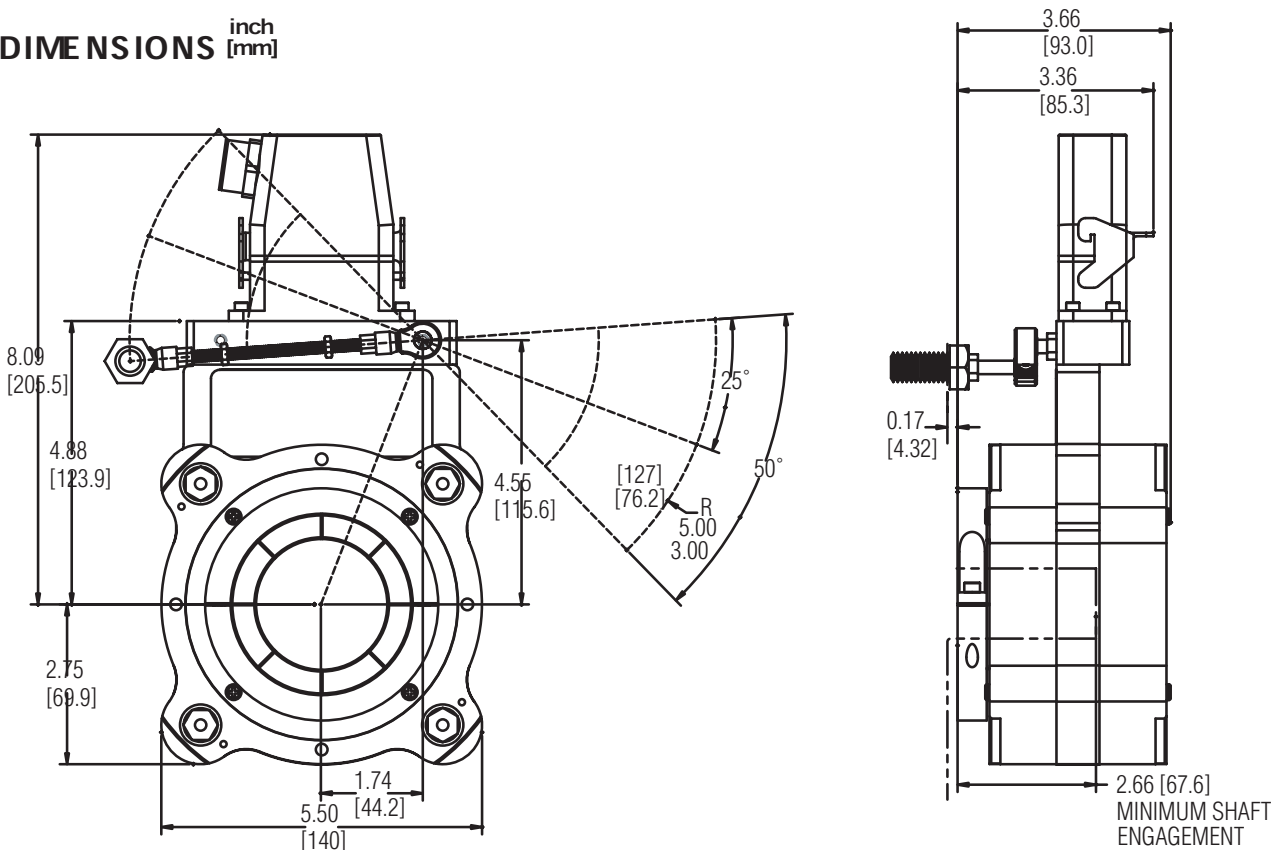
Ordering Information

To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Termination | Code 6: Electrical | Code 7: Seal |
|---|-------------|--|--|--|--|--|
| 6 | □□□□ | □ | T□□ | □ | □ | □ |
| Ordering Information | | | | | | |
| H6 HS60 Hollowshaft, single output | 0064 | L No index available when code 2 is 0512, 1024, or 2048 | T01 1-1/8" | C Latching Industrial Connector with 1/2" NPT | L 5-15VDC in, 5-15V Line driver (4428) out | L Labyrinth seal |
| | 0128 | | T02 1-3/8" | | | |
| D6 Dual output | 0256 | G With Gated, differential index | T03 1-5/8" | M 10 pin MS Connector | V 5-26VDC in, 5-26V Line driver (IC-WE) out | V V-ring seal |
| | 0512 | | T04 1-7/8" | | | |
| | 1024 | | T05 2.00" | | | |
| | 2048 | | T06 2-1/8" | | | |
| | | Z With differential index | T07 2-1/4" | P 18" pigtail cable | 5 5-15VDC in, 5V Line driver (4428) out Differential, bidirectional signals | |
| | | | T08 2-3/8" | | | Q Latching industrial connector on 18" pigtail cable |
| | | | T09 2-1/2" | | | |
| | | | T10 2-7/8" | | | |
| | | | <i>Metric bore sizes available. Consult factory for details.</i> | | | |

Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS inch
[mm]



SERIES HS85

NorthStar™ brand

Hollow Shaft Encoder

Key Features

- **Hollowshaft Design Mounts Easily to Large Motor Shafts, up to 4 1/2" in Diameter**
- **Magneto-Resistive Technology with Removable On-The-Fly Sensor Modules**
- **Multiple Bore Sizes Available, Including Tapered Shafts**
- **Stainless Steel and Ductile Cast Iron Construction**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 60-2048
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)

ELECTRICAL

Input Voltage Requirement: 5-15 or 15-26 Volts DC
Current Requirement:
 With Electrical Option L: 45mA typical per sensor module plus line driver load
 With Electrical Option R: 65mA typical per sensor module plus line driver load
 With Electrical Option 5: 65mA typical per sensor module plus line driver load
Output Signals:
 With Elec Option L: 5-15 V Line Driver, 150mA
 With Elec Option R: 15 V Line Driver, 150mA
 With Elec Option 5: 5V Line Driver, 150mA
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 & 12, IP65; MS connector or pig-tail

MECHANICAL

Mating shaft sizes: 1-1/8" to 4-1/2", straight or tapered bore
Shaft Speed: 3,600 RPM
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Housing Material: Cast Iron/Stainless Steel
Acceleration Rate: 3,600 rpm/sec max
Allowable Shaft End-Play: 0.25" (Subject to RPM Limitation)
Allowable Shaft Runout: 0.010" TIR (Subject to RPM Limitation)

ELECTRICAL CONNECTIONS

| Signal | Connector Pin | Pigtail Cable | MS 3102E 18-IT# |
|---------------|---------------|---------------|-----------------|
| Common | 1 | Black | A |
| B | 2 | Green | E |
| A | 3 | Blue | D |
| Z * | 4 | Violet | C |
| No Connection | 5 | — | — |
| Vcc | 6 | Red | B |
| B | 7 | Yellow | H |
| A | 8 | Gray | G |
| Z * | 9 | Orange | I |
| Shield | 10 | Braid | J |

* Index (Z) optional. See Ordering Information

ENVIRONMENTAL

Operating Temperature Range: -20°C to +70°C
Storage Temperature Range: -40°C to +120°C
Humidity: to 98% RH (non-condensing)
Shock (Sensor Module): 1 meter drop test, 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum

SERIES HS85

Ordering Information

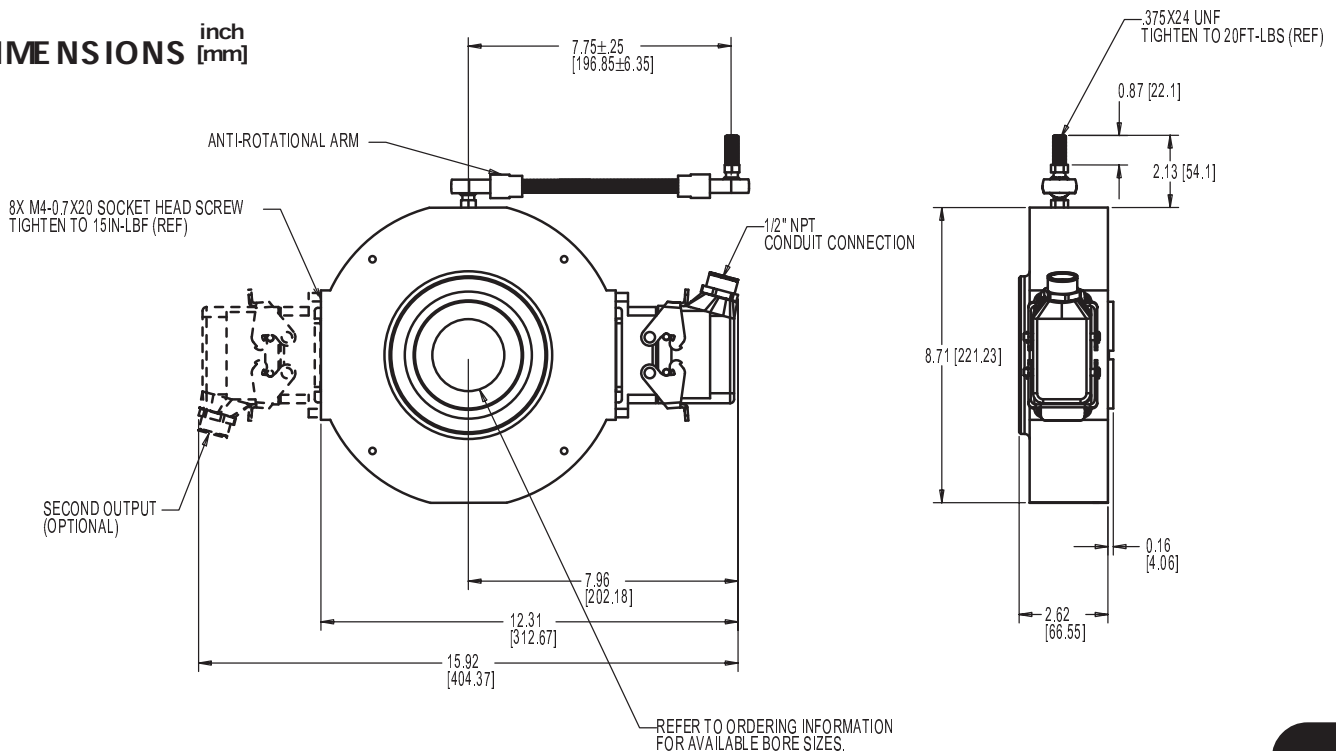
To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: PPR | Code 3: Index | Code 4: Wheel Bore | Code 5: Output | Code 6: Electrical | Code 7: Termination |
|---------------|-------------|---------------|--------------------|----------------|--------------------|---------------------|
| H8 | □□□□ | □ | □□□ | □ | □ | □ |

Ordering Information

| | | | | | | | |
|---|-------------|-------------|---|--|---|---|--|
| H8 Hollow Shaft | 0060 | 0300 | L No Index Available when Code 2 is 0480, 0512, 0600, 0960, 1024, 1200 or 2048 | Thru-bores T01 1-1/8" bore T02 1-3/8" bore T03 1-5/8" bore T04 1-7/8" bore T05 2.00" bore T06 2-1/8" bore T07 2-1/4" bore T08 2-3/8" bore T09 2-1/2" bore T10 2-7/8" bore | 1 Single 2 Dual (Isolated) Differential, bidirectional signals (A, \bar{A} , B, \bar{B}) | L 5-15V in, 5-15V Line Driver (4428) out R 15-26V in, 15V Line Driver (4428) out 5 5-15V in, 5V Line Driver (4428) out | C Latching Industrial Connector with 1/2" NPT M 10 pin MS Connector P 18" Pigtail |
| | 0064 | 0480 | | | | | |
| | 0075 | 0512 | | | | | |
| | 0120 | 0600 | | | | | |
| | 0128 | 0960 | | | | | |
| | 0150 | 1024 | | | | | |
| | 0240 | 1200 | G Gated Index (Z, \bar{Z}) | | | | |
| | 0256 | 2048 | Z Differential Index (Z, \bar{Z}) | | | | |
| Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels | | | | Bores with 1.25" per foot taper P01 1-1/8" bore P02 1-3/8" bore P03 1-5/8" bore P04 1-7/8" bore P05 2.00" bore P06 2-1/8" bore P07 2-1/4" bore P08 2-3/8" bore P09 2-1/2" bore P10 2-7/8" bore Additional Shaft Sizes Up to 4.50" Maximum Available (thru and taper shaft) Call factory for details | | | |

DIMENSIONS inch [mm]



SERIES AR62/AR63

ACURO™ brand

Magnetic Absolute Encoder

Key Features

- 12 Bit Single-Turn Resolution, up to 16 Bit Multi-Turn
- Oversized Bearings for up to 3x Life of Standard Absolute Encoders
- Wide -40° to 100°C Temperature Range
- Submersible — IP69k Sealing Available
- Rated to 200g Shock, 20g Vibration for Harsh Environments
- Stainless Steel or Aluminum Housing

NEW!



SPECIFICATIONS

ELECTRICAL

Supply voltage: 5VDC, 10-30VDC, or 17-30VDC (see "Ordering Information")

EMC: EN 61326 (external protective circuit required)

Resolution singleturn: 12 Bit

Resolution multiturn: 12, 13, 16 Bit

Absolute accuracy: ±0.6°

Repeatability: ±0.2°

Parametrization: Preset

MECHANICAL

Housing diameter: 58 mm

Mounting depth: 32 mm

Shaft diameter: 3/8", 10 mm

Flange: Synchro clamping or 2.5" Square flange

Protection Class (EN 60529): Housing & Shaft, IP67 or IP69k

Shaft load: axial 300 N max.; radial 300 N max.

ENVIRONMENTAL

Shaft speed (maximum): 5000 rpm

Vibration resistance: (DIN EN 60068-2-6) 200 m/s²

Shock resistance: (DIN EN 60068-2-27) 2000 m/s² (6 ms)

Operating temperature: -40 °C to +100 °C

Connection: Cable, radial; M12 connector, radial

ELECTRICAL CONNECTIONS – BiSS / SSI

| Cable Color | PIN | Signal |
|-------------|--------|-------------------|
| Yellow | 6 | Clock |
| Pink | 5 | Data |
| Green | 4 | Clock |
| Grey | 8 | Data |
| White | 1 | UB |
| Brown | 2 | 0V |
| Red | 3 | Preset (set to 0) |
| Screen | Screen | Screen |

ELECTRICAL CONNECTIONS – CANopen

| Color cable | PIN | Signal |
|-------------|--------|---------------|
| Yellow | 6 | CAN in+ |
| Green | 4 | CAN in- |
| Pink | 3 | CAN out+ |
| Grey | 7 | CAN out- |
| Bue | n.c. | n.c. |
| Red | n.c. | n.c. |
| White | 1 | UB |
| Brown | 2 | 0 V |
| Screen | Screen | Screen Screen |

ELECTRICAL CONNECTIONS – Analog

| Cable Color | PIN | Signal |
|---------------------|--------|---|
| Pink | 6 | 0 to 10 V (max. 5mA) |
| Blue | 7 | 0 to 20 mA or 4 to 20 mA (current output) |
| Grey | 5 | AGND |
| Red | 8 | preset (set to 0) |
| White | 1 | UB |
| Brown | 2 | 0 V |
| Yellow ¹ | 4 | Diagnostic 1 |
| Green ¹ | 3 | Diagnostic 2 |
| Screen | Screen | Screen |

1. Diagnostic signals only for service purposes. The cable wires have to be isolated.

SERIES AR62/AR63

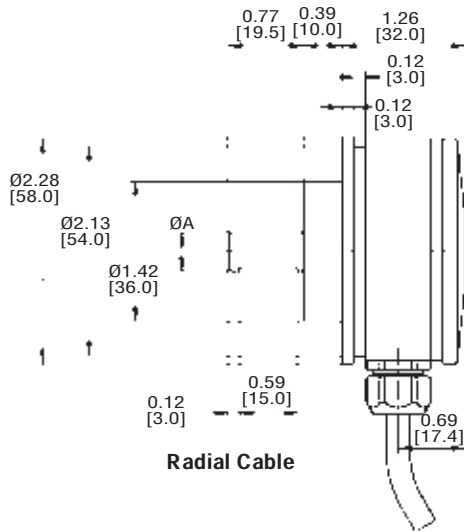
Ordering Information

To order, complete the model number with code numbers from the table below:

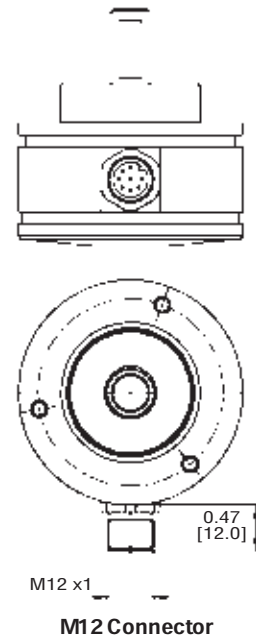
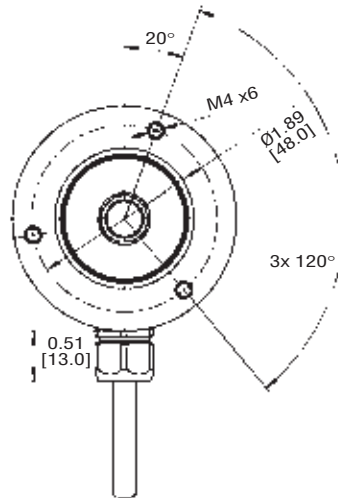
| Code 1: Model | Code 2: Resolution | Code 3: Voltage | Code 4: Mounting | Code 5: Protection | Code 6: Shaft Size | Code 7: Interface | Code 8: Connection | Code 9: Cable Length |
|--------------------------|--|--|-------------------------------|---------------------------------|--|--|---|--|
| Ordering Information | | | | | | | | |
| AR62 | <input type="text" value="12"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| AR62 Aluminum | 0012 12 bit single-turn | A 5 VDC E 10-30VDC | L Synchro, Clamping | 7 IP67 9 IP69k | 2 10mm "2" is available only when Code 4 is L | BI BiSS SG SSI-Gray SB SSI-Binary OL CAN Open | B Radial Cable Available when Code 1 is AR62 and code 5 is 7 | Blank 1.5m DD 3m FO 5m KO 10m PO 15m UO 20m VO 25m WO 30m XO 40m YO 50m |
| AR63 Stainless | 1212 12 bit single turn, 12 bit multi-turn 1312 12 bit single turn, 13 bit multi-turn 1612 12 bit single turn, 16 bit multi-turn | "F" is available only when Code 7 is AV or A4 F 17-30VDC | Q Square Flange | | 6 3/8" "6" is available only when Code 4 is Q | Available only when Code 2 is 0012, 1212, or 1612 AV Analog, 0-10V A4 Analog, 4-20mA | 8 M12 radial connector, 8-pin | |

DIMENSIONS inch [mm]

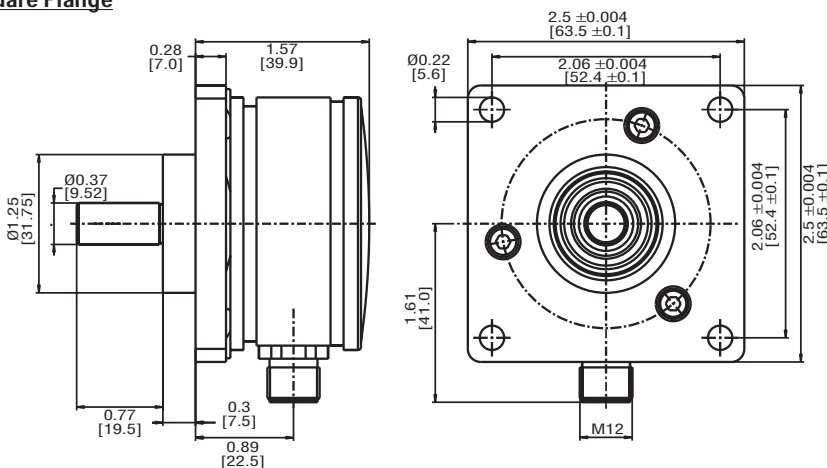
Synchro Clamping



ØA: See "Ordering Information" Code 6



Square Flange



SERIES AX70/AX71

ACURO™ brand

Magnetic Absolute Encoder

Key Features

- Up to 17 bit of Singleturn, 12 bit of True Multiturn Absolute Positioning
- ATEX Certification for Explosion Proof Requirements
- Stainless Steel or Aluminum Housing
- Multiple Communication Options



EN 61326



E Ex d II C T6/T4

NEW!



SPECIFICATIONS

ELECTRICAL - DeviceNet / CANopen

| Parameter | DeviceNet | CANopen |
|-------------------------------|---|---|
| Supply voltage: | DC 10-30 V | DC 10-30 V |
| Current consumption ST/MT: | max.250 mA | max.250 mA |
| Profile/ Protocol: | DeviceNet according to Rev. 2.0, programmable encoder | CANopen according DS 301 with encoder profile DSP 406 |
| Output code: | Binary | Binary |
| Resolution Singleturn: | 10 - 14 Bit | 10 - 16 Bit |
| Resolution Multiturn: | 12 Bit | 12 Bit |
| Baud rate: | set via Bus | set via Bus |
| Bus termination: | External resistor | External resistor |
| MAC-ID: | set via Bus | - |
| Node ID: | - | set via Bus |
| Integrated special functions: | - | Speed, acceleration, round axis, limit values |
| Programmable: | Resolution, Preset, Direction | Resolution, Preset, Limits value, Direction |
| Connection: | Cable axial | Cable axial |

ELECTRICAL CONNECTIONS - DeviceNet / CANopen

| Color | DeviceNet | CANopen |
|--------|-------------------------------------|-------------|
| Yellow | CAN in+ | CAN in+ |
| Green | CAN in - | CAN in - |
| Pink | CAN out+ | CAN out+ |
| Grey | CAN out - | CAN out - |
| Blue | DRAIN | CAN GND in |
| Black | DRAIN | CAN GND out |
| White | UB in | UB in |
| Brown | 0 V in | 0 V in |
| Screen | Screen connected to encoder housing | |



SERIES AX70/AX71

ELECTRICAL - SSI/ SSI-P

| Parameter | SSI | SSI-P |
|-----------------------|--------------------------|--|
| Supply voltage | DC 10-30 V | DC 10-30 V |
| Max. current w/o load | 220 mA (ST), 250 mA (MT) | 250 mA (ST /MT) |
| Resolution singleturn | 10 -17 Bit | 10 -17 Bit |
| Resolution multiturn | 12 Bit | 12 Bit |
| Output code | Binary,Gray | Binary,Gray |
| Drives | Clock and Data /RS422 | Clock and Data /RS422 |
| Control inputs | Direction | Direction, Preset 1, Preset 2 |
| Alarm output | Alarm bit (SSI Option) | Alarm bit |
| Parametrization | N/A | Resolution, Code type, Direction, Warning, Output format, Alarm, Preset values |

Note: Parameterization is programmable with WIN SSI software

SSI / SSI-P RECOMMENDED DATA TRANSFER RATE (bei SSI)

| Cable length | Frequency |
|--------------|-----------|
| <50 m | <400 kHz |
| <100 m | <300 kHz |
| <200 m | <200 kHz |
| <400 m | <100 kHz |

The max. data transfer rate depends on the cable length.

For Clock /Clock and Data /Data please use twisted pairs. Use shielded cable.

ELECTRICAL CONNECTIONS — SSI

| Wire Color | Pin No. | SSI Function |
|---------------|---------|-----------------|
| White 0.14 mm | 12 | Vcc 10 to 30VDC |
| Brown 0.14 mm | 11 | 0 V Gnd. |
| Green | 10 | Clock |
| Yellow | 9 | Clock |
| Gey | 8 | Data |
| Pink | 7 | Data |
| Blue | 3 | Direction |
| Black | 4 | 0 V Gnd. |

ELECTRICAL CONNECTIONS — SSI-P

| Wire Color | Pin No. | SSI-P Function |
|---------------|---------|-------------------------------------|
| White 0.14 mm | 6 | RS232 RxD |
| Brown 0.14 mm | 5 | RS232 TxD |
| Green | 10 | Clock |
| Yellow | 9 | Clock |
| Gey | 8 | Data |
| Pink | 7 | Data |
| Blue | 3 | Direction |
| Black | 4 | 0 V signal output |
| Red | 1 | Preset 1 |
| Violet | 2 | Preset 2 |
| Brown 0.5 mm | 11 | 0 V supply voltage |
| White 0.5 mm | 12 | DC 10 ...30 V |
| Screen | — | Screen connected to encoder housing |

ELECTRICAL - Profibus

| Parameter | Profibus |
|------------------------------|--|
| Supply voltage | 10-30 VDC |
| Max. current w/o load | 220 mA (ST),250 mA (MT) |
| Resolution singleturn | 10 -14 Bit |
| Resolution multiturn | 12 Bit |
| Output code | Binary |
| Profile/protocol | Profibus DP with encoder profile class C2 (parameterizable) |
| Parametrization | Resolution,Preset,Direction |
| Integrated special functions | Speed, Acceleration, Operating time |
| Baud rate | Automatically set within a range of 9.6 Kbaud through 12 Mbaud |
| Device address | Set via Bus |
| Bus termination resistor | External mounting |

ELECTRICAL CONNECTIONS — Profibus

| Wire Color | Profibus Function |
|--------------|------------------------------|
| Yellow | B in |
| Green | A in |
| Pink | B out |
| Grey | A out |
| Blue | GND1 (M5V ¹) |
| Brown | VCC1 (P5V ¹) |
| White 0.5 mm | DC 10 - 30 V |
| Brown 0.5 mm | 0 V |
| Screen | Connected to encoder housing |

¹ used for power supply for an external bus termination resistor

MECHANICAL - All Types

Shaft diameter: 10 mm (Solid shaft)
Mounting: Clamping flange
Max. Shaft load: Axial= 40 N; Radial= 100 N
Max. shaft speed: T4= 10 000 rpm; T6= 6000 rpm
Torque: ≤1 Ncm
Moment of inertia: approx. 20 gcm²
Material shaft: Stainless Steel
Material housing: AX 70= Aluminum; AX 71= Stainless Steel
Weight: AX 70= approx. 1.4 kg; AX 71= approx. 4.8 kg
Connection: Cable, axial

ENVIRONMENTAL - All Types

Protection class, shaft (EN 60529): T4= IP64 or IP67; T6= IP64
Protection class, housing (EN 60529): T4= IP65 or IP67;
 T6= IP65 (IP64 for CANopen or DeviceNet)
Vibration resistance (DIN EN 60068-2-6): 100 m/s² (10 to 500 Hz)
Shock resistance (DIN EN 60068-2-27): 1000 m/s² (6 ms)
Operating temperature: T4= -40°C to +60°C;
 T6= -40°C to +40°C
Storage temperature: -25°C to +85°C
¹ No dust explosion-proof (D) for IP64

T6 = Highest permissible surface temperature +85°C (max. speed = 6000 /min⁻¹)
 T4 = Highest permissible surface temperature +130°C (max. speed = 10,000 /min⁻¹)

SERIES AX70/AX71

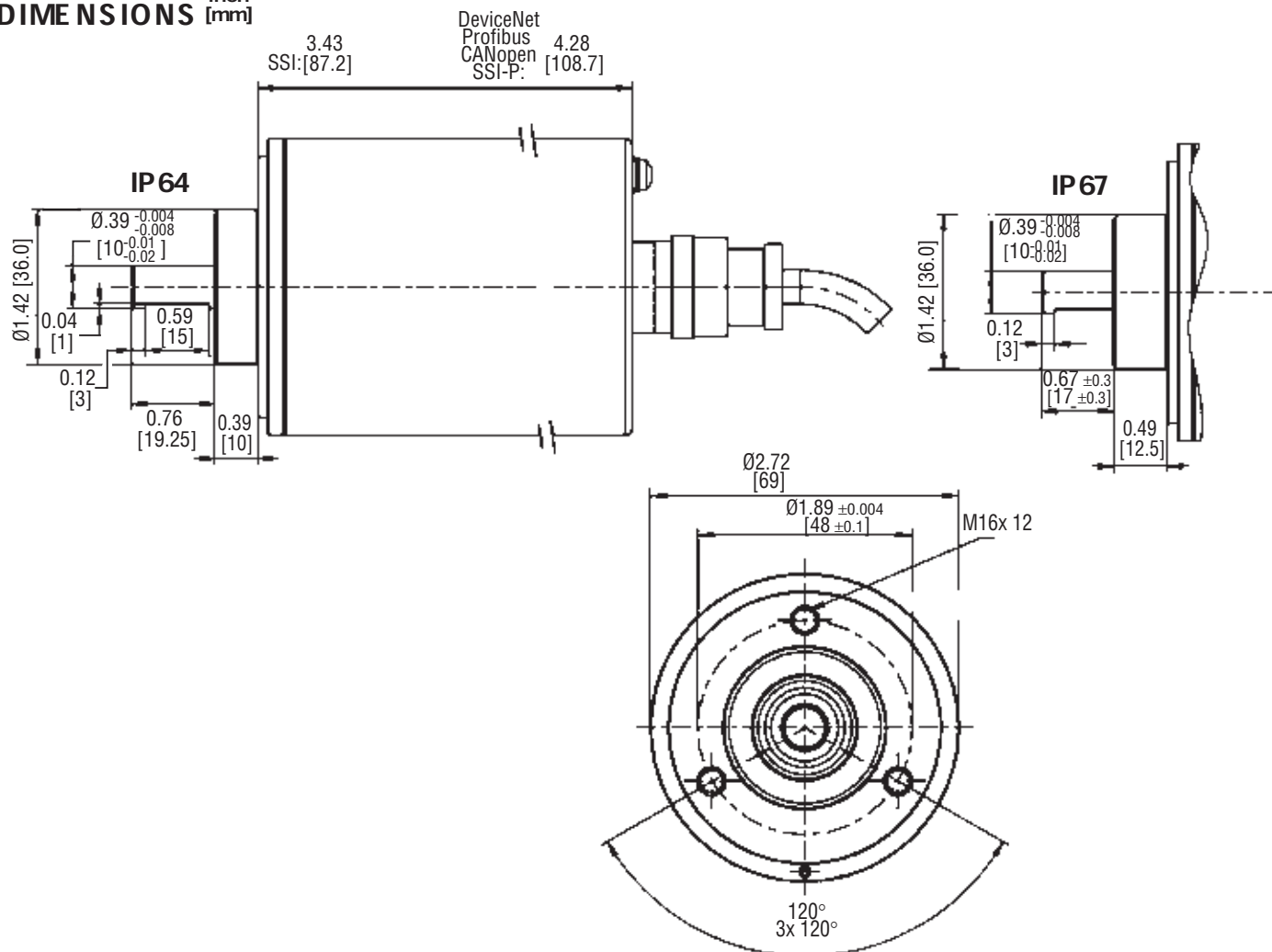
ACURO™ brand

Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model | Code 2: Resolution | Code 3: Voltage | Code 4: Mounting | Code 5: Protection Class | Code 6: Shaft Size | Code 7: Interface | Code 8: Connection | Code 9: Cable Length | |
|---|---|---|-------------------------------------|-----------------------------|--------------------------------|--------------------------|--|--------------------------|--|
| Ordering Information | | | | | | | | | |
| AX70 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Acuro Series AX70 Heavy Duty Absolute encoder, Aluminum Housing AX71 Stainless Steel Housing | SSI Only Single Turn 0010 0012 0013 0014 0017 Multi Turn 1212 1213 1214 1217 | CAN, Profibus, DeviceNet Single Turn 0014 Multi Turn 1214 | A 5 VDC E 10-30VDC | K Clamping Flange | 4 IP64 7 IP67 | 2 10mm | SB SSI-Binary SG SSI-Gray SP SSI-Programmable DP Profibus DP VD DeviceNet CL CAN-L2 OL CAN-Open | A Axial Cable | FO 5m KO 10m PO 15m UO 20m VO 25m |

DIMENSIONS inch [mm]





NOTES

Large grid area for notes.

SERIES R25

Harowe™ brand

Heavy Duty Resolver

Key Features

- Rugged Housing with IP65 Rating
- Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings
- Withstands 200g Shock and 40g Vibration



Most Models



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

| Electrical Kit | Speed (Number of Poles) | Transformer Ratio (V in/V out) | Input Voltage (Vrms) | Max. Current Input (mA) | Reference Frequency (Hz) | Phase Shift (nominal) | Primary Winding |
|----------------|-------------------------|--------------------------------|----------------------|-------------------------|--------------------------|-----------------------|-----------------|
| 1A | 1 (2) | 0.500 | 5.3 | 3 | 4000 | -3 | Stator |
| 1B | 1 (2) | 0.500 | 4.0 | 25 | 5000 | -6 | Rotor |
| 1C | 1 (2) | 0.470 | 4.25 | 55 | 7000 | +4 | Rotor |
| 1D | 1 (2) | 0.500 | 7.0 | 25 | 2500 | +6 | Rotor |
| 1E | 1 (2) | 0.950 | 7.0 | 12 | 5000 | -8 | Rotor |
| 1F | 1 (2) | 1.000 | 2.0 | 10 | 5000 | -8 | Rotor |
| 1H | 1 (2) | 1.069 | 8 | 17 | 2600 | 8 | Rotor |
| 1J | 1 (2) | 0.454 | 26 | 22 | 2400 | 6 | Rotor |
| 1K | 1 (2) | 0.454 | 26 | 65 | 2400 | 8 | Rotor |
| 1M * | 1 (2) | 0.5 | 4 | 25 | 5000 | -6 | Rotor |
| 2A | 2 (4) | 0.250 | 8.0 | 20 | 4000 | +5.5 | Rotor |
| 3A | 3 (6) | 0.470 | 4.25 | 55 | 7000 | +5.5 | Rotor |
| 3B | 3 (6) | 0.95 | 7 | 12 | 5000 | 4 | Rotor |

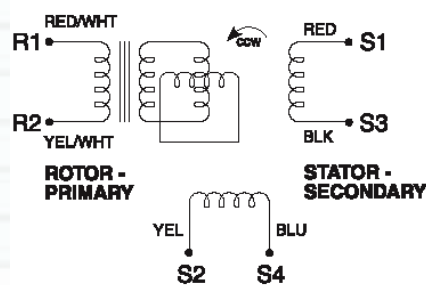
*Radiation Hardened

MECHANICAL

- Inertia:** 0.0040 oz-in-sec²
- Friction:** 2 oz-in (5 oz-in w/shaft seal)
- Shaft Load: (max.)** 40 lb (axial), 60 lb (radial)
- Shaft Material:** #416 S/S
- Play: (max.)** Radial: .0015 in @ 1 lb load; End: .005 in @ 5 lb load
- Bearing Life:** 2 x 10⁸ revs at rated shaft loading

ELECTRICAL CONNECTIONS

| Connector: MS3106F- | 16S-1S | 18-1S | |
|---------------------|--------|-------|---------------|
| Signal | Pin | Pin | Cable Color |
| R1 (Rotor Hi) | A | A | White |
| R2 (Rotor Lo) | B | H | Black w/White |
| S1 (Cos Hi) | C | B | Green |
| S3 (Cos Lo) | D | I | Black w/Green |
| S4 (Sin Lo) | F | C | Blue |
| S2 (Sin Hi) | E | J | Black w/Blue |
| N/C | G | G | — |

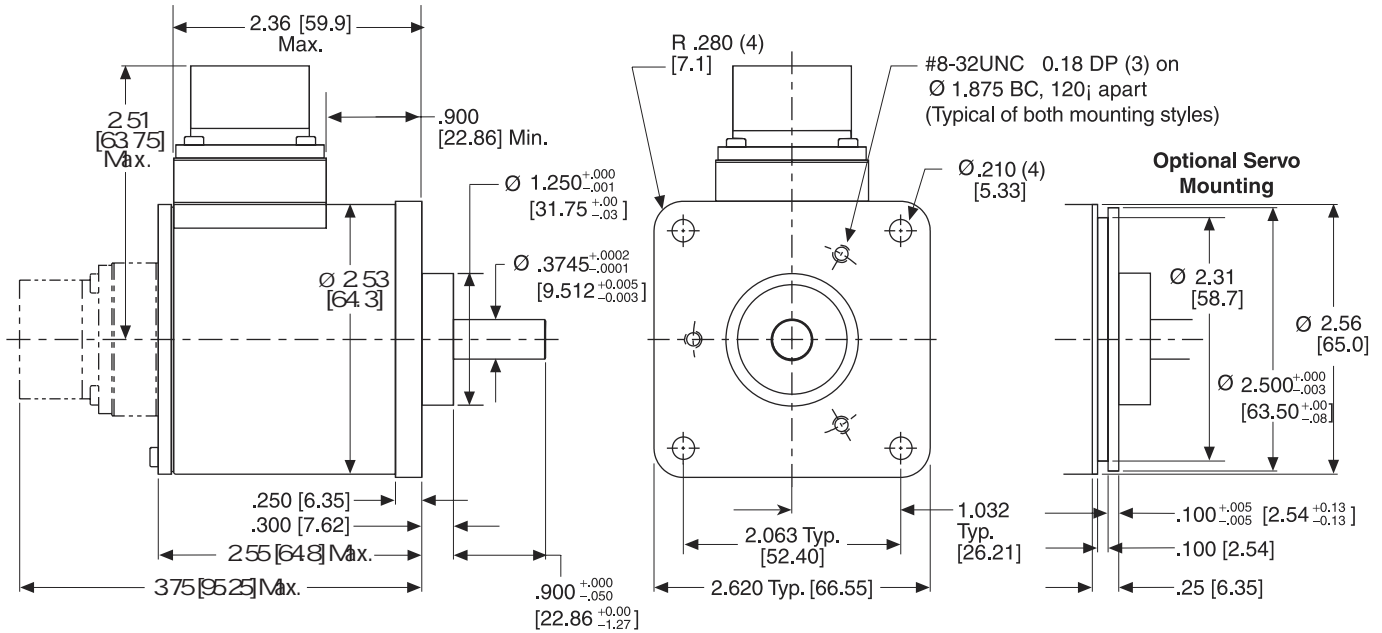


Ordering Information

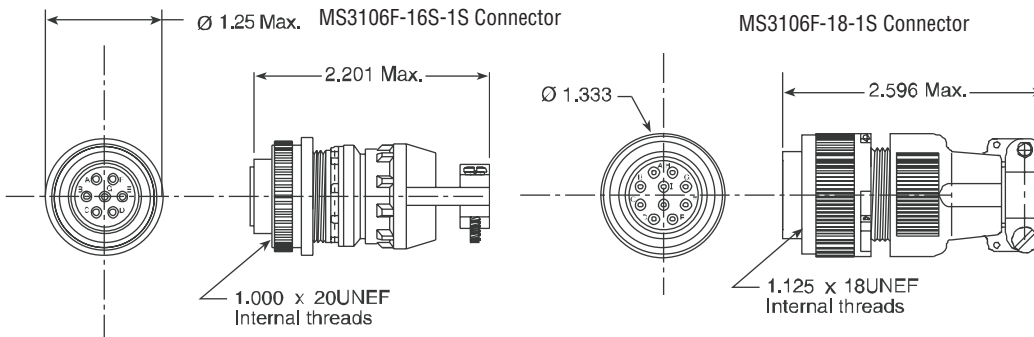
To order, complete the model number with code numbers from the table below.

| Code 1: Model | Code 2: Mounting | Code 3: Connector Type | Code 4: Conn. Exit | Code 5: Shaft | Code 6: Seal | Code 7: Elec. Parts Kit | Code 8: Accuracy | Code 9: Special |
|---------------------------------|------------------------|-------------------------|--------------------|--|------------------------|-----------------------------------|-----------------------------|---------------------------------------|
| R 25 | □ | □ | □ | □ | □ | □ □ | □ □ | 00 |
| Ordering Information | | | | | | | | |
| R25 Heavy-duty, resolver | F Flange | B MS3102E-16S-1P | R Rear Exit | R Round | Y Shaft Seal | Available when Code 8 is 07 to 20 | 02 2 arc min | 00 Factory Assigned Designator |
| | S Servo | C MS3102E-18-1P | S Side Exit | F Round with flat | N No Shaft Seal | 1A 1E 1J | 03 3 arc min | |
| | | F FLYING LEADS | | W Round with 2 flats @ 90 degrees | | 1B 1F 1K | 04 4 arc min | |
| | | G MS3112E-10-6P | | | | 1C 1H 1M | 05 5 arc min | |
| | L MS3112-18-11P | | | | | 1D | 07 7 arc min | |
| | P PT02E-14-19-P | | | | | Available when Code 8 is 04 to 10 | 10 10 arc min | |
| | | | | | | 2A | 2S 20 arc min Spread | |
| | | | | | | Available when Code 8 is 02 to 10 | 15 15 arc min | |
| | | | | | | 3A 3B | 20 20 arc min | |

DIMENSIONS inches [mm]



Note: Dimensions are dependent on Connector type - Shown with B = MS3102E-16S-1P



Accessories:

- CA-18-R-0010** 10 ft.cable with MS3106F-18-1S Connector
- CA-16-R-0010** 10 ft.cable with MS3106F-16S-1S Connector

Note: Part numbers listed with -0010 are for 10 Foot Cable; use -0050 for 50 Foot Cable, etc