NorthStar™ brand Encoder Installation Manual

NexGen RIM Tach 8500 Bearingless Encoder

Key Features

- **New Sensor Provides up to 0.075" of Air Gap, Over 50% More Than Competitive Models**
- **Expanded Resolution up to 2400PPR**
- **Redesigned Circuitry for On-Board Diagnostics with LED and Alarm Output**
- **Wide -40° to +100°C Temperature Range**
- **Optimized Pulse Wheel for Greater Shaft Holding Force and Ease of Assembly**

RoHS

CE

EN 61326

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 240 to 2400
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing male C-face end
Quadrature Phasing: 90° ± 45°
Duty Cycle: 50% ±15%

ELECTRICAL

Input Power Requirements: 5-24VDC, 95mA typical per sensor module, plus line driver load
Output Signals: Line Driver, 150mA source/sink
Frequency Response: 0 - 180kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit. Powered Short
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65. Optional MS3102 10 pin, Pigtail Cable, or Latching connector on cable extension

MECHANICAL

Shaft Speed: 7,000 RPM, max.
Mounting Configuration: 8.5" 180C face mount for NEMA MG1 standards
Housing Material: Cast Iron
Sensor Module Material: Stainless Steel
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 2.5" min
Radial Air Gap:
1200PPR or lower:
0.075", +0.015" / -0.070"
Above 1200PPR:
0.050", +0.015" / -0.040"
Allowable Shaft End-Play: ±0.150"
Allowable Shaft Runout: 0.005" TIR

ENVIRONMENTAL

Operating Temperature Range: -40°C to +100°C
Storage Temperature Range: -40°C to +125°C
Humidity: 100% RH
Shock: 200 G's Min.
Vibration: 18 G's @ 5-2000 Hz spectrum

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
N/C	4	Violet	C
Alarm †	5	n/a	F
Vcc (5-24 VDC)	6	Red	B
$\overline{B}$	7	Yellow	H
$\overline{A}$	8	Gray	G
N/C	9	Orange	I
Shield	10	Braid	J

N/C= No Connection
† Alarm not available with Pigtail cable. See Ordering Information

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

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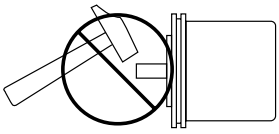
IMPORTANT INSTALLATION INFORMATION

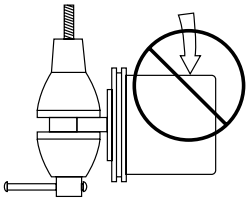
GENERAL GUIDELINES

Encoders provide quality measurements and long life when common sense, care, and accurate alignments are provided during installation. The following general guide-lines will help to ensure a trouble-free installation.

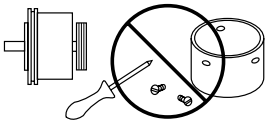
Mounting the Encoder



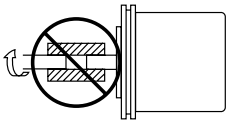
Do not shock the encoder.



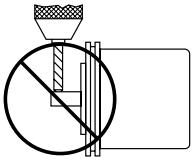
Do not subject the encoder to axial or radial shaft stresses.



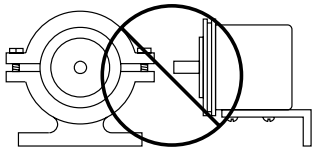
Do not disassemble the encoder.



Do not use a rigid coupling.



Do not tool the encoder or its shaft.



Do not use makeshift techniques to mount the encoder.

Wiring the Encoder

• Never connect or disconnect the encoder connector or wiring while power is ON. Doing so may damage the encoder.

• Power should always be connected to the + side of DC power.

• Common should always be connected to the - side of DC power.

• Never connect A, B, or Z to the + or - side of DC power.

ELECTRICAL CONNECTIONS

Cable - The use of shielded cable is recommended for all encoder installations. When a Dynapar brand encoder is ordered, the type of termination is generally defined (usually the last selectable code in Ordering Information). If a code for a cable was indicated, the encoder was manufactured to include a shielded cable. If any other type of termination was selected or if selection of termi-nation type was not requested, a cable assembly must be ordered. (The cable assembly easily hooks onto the encoder's connector making it ready for wiring).

To determine which cable assembly to order, refer to the Electrical Connections table (in the encoder's manual).

ELECTRICAL CONNECTIONS (cont.)

In some cases, there may be more than one table or the table may be broken into sections due to different output types. If so, refer to the information listed for the output type selected for the encoder (in Ordering Information).

Wiring should be run through dedicated conduits or harnesses (not shared with any other wiring) which are spaced at least 12 inches apart. This protects the cable from physical damage while providing a degree of electrical isolation. Also, do not run cable in close proximity to other conductors which carry current to heavy loads such as motors, motor starters, contactors, or solenoids. Doing so could result in electrical transients in the encoder cable which cause undesired signal pulses.

NOTE: Never connect or disconnect the encoder connector or wiring while power is ON. Doing so may damage the encoder.

Grounding - DO NOT ground the encoder through both the machine and the cable wiring. Connect the shield at the input device only. **NOTE: If the shield is connected at both ends, grounding problems that degrade system performance may result.**

For European-based applications requiring CE compliance, cable length must not exceed 30m. Connect the shield to building ground on either the Encoder or Controls end. CE compliant products are tested to EN61326 EMC.

FEATURES

All encoders have the following electrical features:

• Power (+DC)

• Common

• Output Signal(s)

Power (also referred to as supply, power source, and power +V/VCC) is always +DC for encoders. **Therefore, power should always be connected to the positive (+) side of DC power.** In addition, encoder power should be regulated to within ±5% at the encoder and should be free of induced transients. Common (also referred to as Com, supply common, and ground) is generally a black wire (verify via Electrical Connections table). Common should always be connected to the negative (-) side of DC power.

All encoders have at least one output signal (A); however, it is common for encoders to have three signals A, B, Z (may also be referred to as C, X, or index). The outputs should each be connected to the receiving device at the appropriate terminal. NOTE: Never connect A, B, or Z to the + or - side of DC power.

IMPORTANT INSTALLATION INFORMATION

FEATURES (cont.)

When encoders have a differential line driver, there are two signals for each of the outputs. Each signal (A, B and Z) has a compliment or inverse ($\overline{A}$, $\overline{B}$ and $\overline{Z}$ referred to as A not, B not, and Z not). The signal and its compliment (i.e. A and $\overline{A}$) are separate outputs. Connect each output to a separate input.

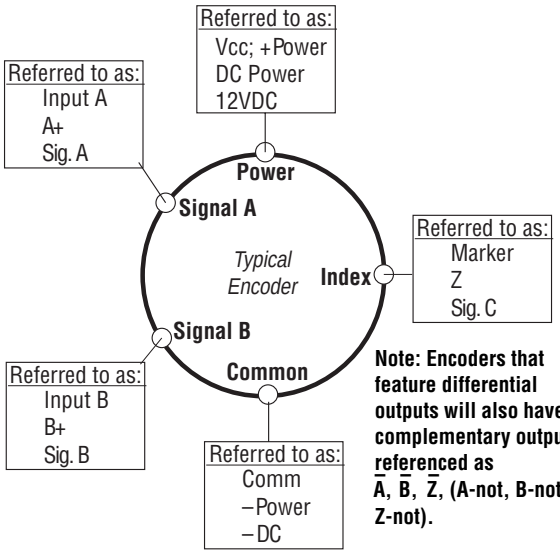
NOTE: Never connect these signals together or to the + or - side of DC power. Never connect differential signals to the same input.

CONNECTIONS

Obviously not all receiving devices are the same. However, connecting your encoder to one, no matter what type or brand it may be, is not difficult. As discussed in the previous section, all encoders have certain electrical features. Each of these features/functions are identified in the encoder's Electrical Connections table along with its corresponding pin and wire color. Each wire specified in the table must be connected to the receiving device.

Determining where to connect each wire is as easy as following the Electrical Connections table and matching each wire to the proper terminal on the receiving device. In general, no matter what type of receiving device you are using, the terminal strip is marked, indicating the proper location for each function/wire. These markings may either be numbers or text labels identifying functions. If they are numbers, the receiving device's manual should define what function corresponds to each number.

Since receiving devices are made by various manufacturers, not all text labels/references are the same. There are various ways to identify each function. Following are a few examples:



Note: Encoders that feature differential outputs will also have complementary outputs referenced as $\overline{A}$, $\overline{B}$, $\overline{Z}$, (A-not, B-not, Z-not).

LED STATUS LIGHT:

A multicolor LED Status light will indicate to the user the overall condition of the encoder. The LED is built into the encoder and does not require any additional wiring or power to activate it. There are 4 basic status conditions for the light:

1) **LED off:** No power to Encoder, Low supply voltage (<3.0VDC), Total Failure of Encoder
2) **LED Green:** Correct Power to Encoder, Ready to operate, No wheel movement Detected
3) **LED Flashing:** Unit operating, Unit sending pulses out
4) **LED Flashing Red:** Low power to encoder (<4.5VDC), Line Driver Failure, Line Driver Over-Temperature (generally caused by external short circuit), Line Driver Logic Failure

FREQUENTLY ASKED QUESTIONS

There are additional colored wires which are not referred to in the Electrical Specifications table. What do I do with them?

Do not connect them to the receiving device. Any unused encoder signal wires must be individually insulated and tied back. They should NEVER be in contact with common, power sources, or other output signal lines.

The encoder is correctly connected to the receiving device per the Electrical Specifications table and the receiving device's terminal strip label; however, it's counting in the wrong direction. What's wrong?

In order to reverse the counting direction, the output signal connections must be switched. If the encoder has a single ended output, swap A and B. If the encoder has a differential line driver, swap A and $\overline{A}$.

I've connected the encoder and it doesn't work (No Outputs). What can I do?

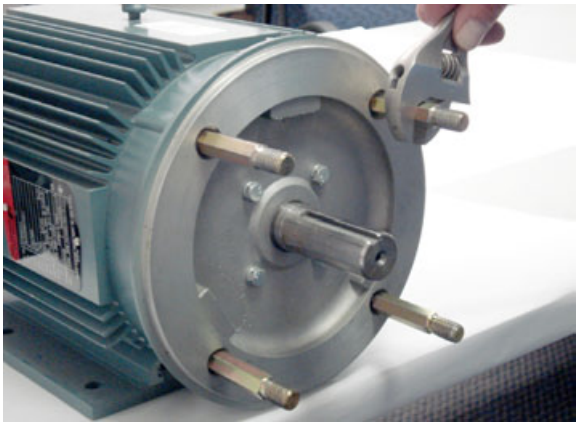
Many encoders have internal protection circuits which shut down the encoder to prevent damage if the input power is not correct or the outputs are overloaded. Check the following: Input Voltage (is it too high?); Input Polarity (is it reversed?); and Output Wiring (are they wired properly?).

I've read and followed the technical manual and these guidelines and the encoder still doesn't work properly. Help!?

Calm down - help is at your fingertips! Simply pick up the phone and dial our Applications Engineering Department at 1-800-234-8731 (US & Canada) or 847-662-2666 from 8:00 AM to 4:45 PM (Central time) Monday - Friday. One of our engineers will gladly help you solve the problem.

MECHANICAL IINSTALLATION

1.0 Insert Studs



1.1 Insert (4) 1/2”-13 UNC Studs into Motor face.

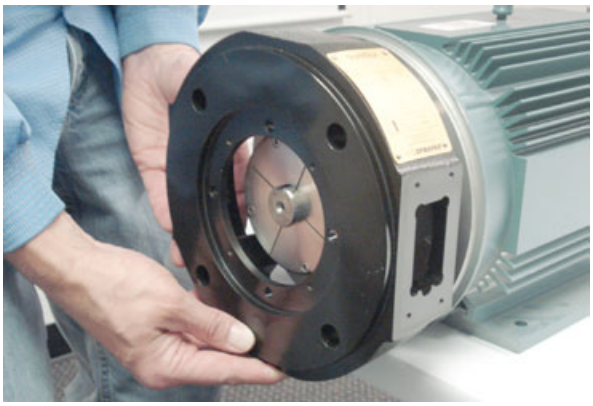
1.2 Tighten to a nominal 60ft-lbs

2.0 Slide Pulsewheel onto Shaft

2.1 Slide Pulsewheel onto the shaft. Leave it loose at this time.

2.2 Anti-seize may be used on the shaft & C-face to reduce future corrosion

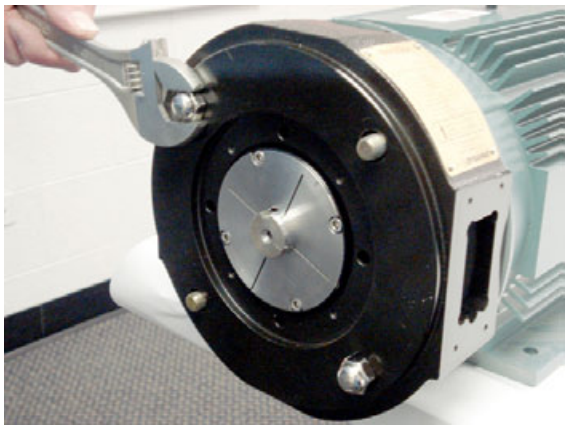
3.0 Mount Housing



3.1 Slide Housing on to Studs and seat. Fit onto 8.5 ” C-Face.

3.2 A rubber mallet may be used to fully seat the housing.

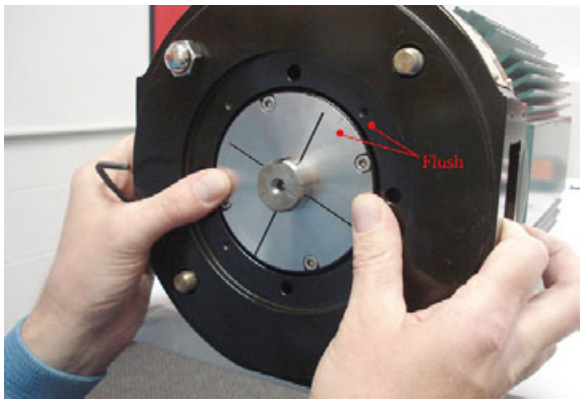
4.0 Tighten Acorn Nuts



4.1 Install (4) 1/2”-13 UNC Acorn Nuts onto the studs.

4.2 Tighten to a nominal 50 ft-lbs.

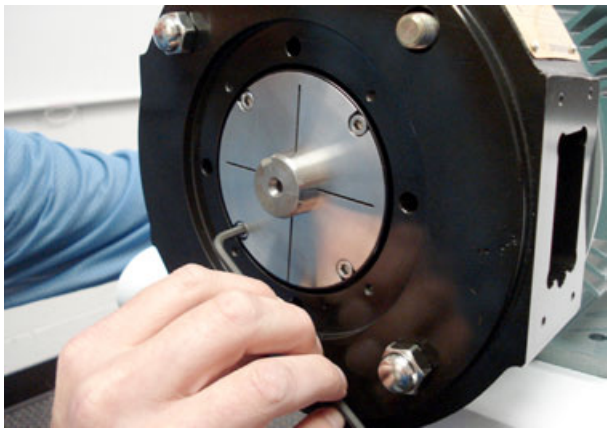
5.0 Position the Pulsewheel



5.1 Position the Pulsewheel to its correct position under the sensor modules by sliding it along the shaft until the front face is flush with cover surface of the housing.

5.2 The clamp screws may need to be loosened to allow easy sliding.

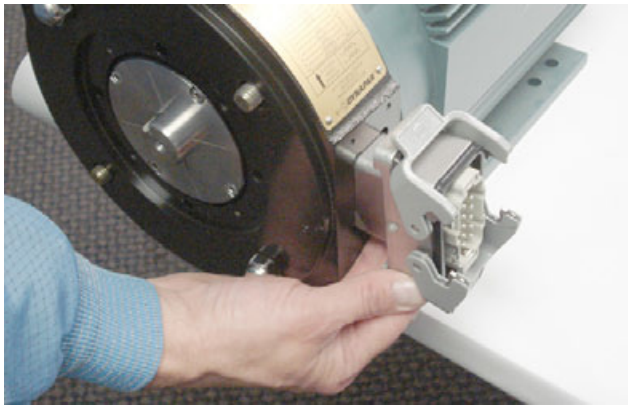
6.0 Tighten Shaft Clamp



6.1 Tighten (4) M5 X .08 screws in a star pattern (nominal 35 in-lbs) to secure the wheel in the correct position.

MECHANICAL IINSTALLATION

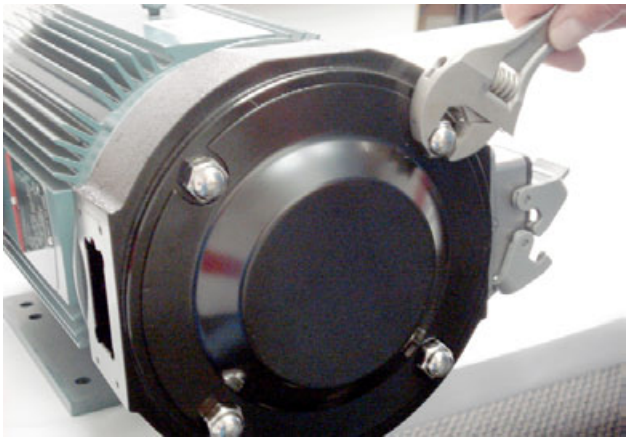
7.0 Install Sensor Module



7.1 Insert Sensor module,

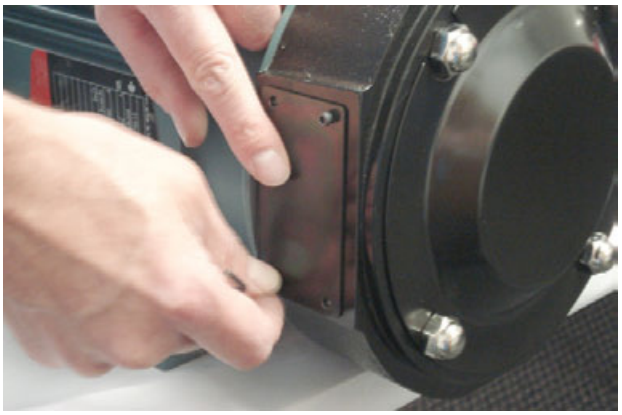
7.2 Secure the Sensor Module with (4) #6 X 32UNC screws. Tighten to a nominal 5in-lbs.

8.0 Install Cover



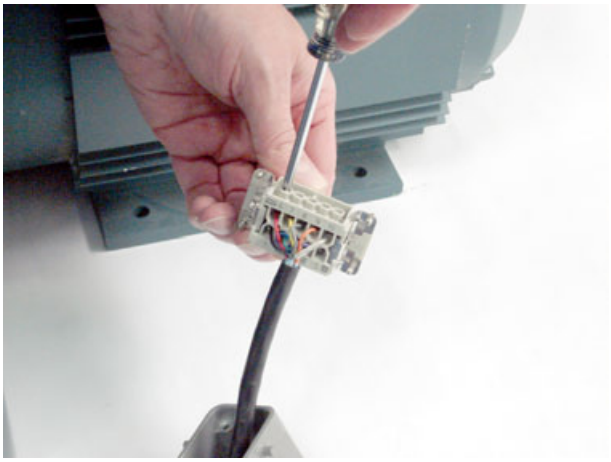
8.1 Mount appropriate cover if one is required.

9.0 Install Side Cover



9.1 Mount Side cover if only one sensor module is used.

10.0 Wire Connector Hood



10.1 Wire connector hood insert.

10.2 Test unit for function acording to application requirements.

10.3 Assemble hood cover.

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: Electrical Output	Code 6: Termination
RT8	□□□□	□	□□□	□	□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Electrical Output	Code 6: Termination
RT8 RIMTach 8500 Heavy Duty Encoder	**0060** **0480** **0064** **0512** **0075** **0600** **0120** **0960** **0128** **1024** **0150** **1200** **0240** **1920** **0256** **2048** **0300** **2400**	**L** No Index **Z** With Index Signal Output	**V04** 5/8" **V05** 7/8" **V06** 1.00" **V07** 1-1/8" **V09** 1-3/8" **V10** 1-1/2" **V11** 1-5/8" **V12** 1-3/4" **V13** 1-7/8" **V14** 2.00" **V15** 2-1/8" **V16** 2-1/4" **V17** 2-3/8" **V18** 2-1/2" **V19** 2-7/8" Additional shaft sizes available, consult factory **End Of Shaft** **F01** 1-1/8" EOS **F06** 2-1/8" EOS **F08** 2-3/8" EOS **F10** 2-7/8" EOS **F44** 4400 Series Motors **F47** 4700 Series Motors **F60** 6000 Series Motors **F68** 6800 Series Motors	**1** 5-26VDC in, 5-26VDC Line Driver out (IC-WE), Single output **2** 5-26VDC in, 5-26VDC Line Driver out (IC-WE), Dual output	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" Pigtail (Not available with Alarm output) **Q** Latching industrial connector on 18" cable

DIMENSIONS inch [mm]