



DYNAPAR™ Encoder Installation Manual

NorthStar™ brand

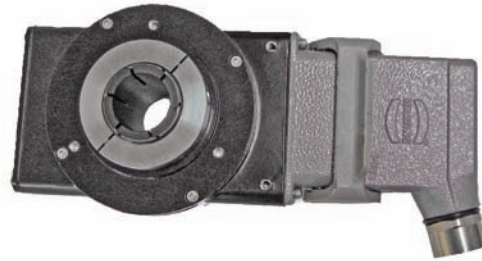
SERIES HSD35

Heavy Duty Hollowshaft Encoder

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Revision Level: G

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DESCRIPTION

The New Series HSD35 Heavy Duty Hollowshaft encoder is equipped with an unbreakable disk that handles the most severe shock and vibration. Its hollow shaft mount and anti-rotation tether reduce bearing wear and maintenance. Series HSD35 has electrical protection from overvoltage, reverse voltage, and output short circuits when ordered with standard operating temperature configuration.

Series HSD35 is not only electrically & thermally isolated (for shaft sizes 1.125" and under) but also environmentally sealed with shaft seals at both ends.

Series HSD35 also features field-serviceable connectors requiring no soldering, and dual isolated outputs to drive multiple devices or for redundancy.

KEY FEATURES

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

IMPORTANT INSTALLATION INFORMATION

Mounting the Encoder: Before Installation, ensure power is disconnected from encoder and motor or machine.

CAUTION: The loads applied to the encoder shaft must be in accordance with the specifications of this device.

Important Wiring Instructions: Use of shielded cable is recommended for all encoder installations. The shield should be connected to signal-ground at the receiving device only.

Connecting the shield at both ends can cause grounding problems that degrade system performance.

If possible, run the encoder cable through a dedicated conduit (not shared with other wiring). Use of conduit will protect the cable from physical damage and provide a degree of electrical isolation. Do not run the cable in close proximity to other conductors that carry current to heavy loads such as motors, motor starters, contactors, solenoids, etc. This practice can induce electrical transients in the encoder cable, potentially interfering with reliable data transmission.

Refer to Electrical Connections table for wiring information. To avoid possible damage, do not connect or disconnect the encoder connector or wiring while power is applied to the system.

CAUTION: Unused encoder signal wires must be individually insulated and under no circumstances be in contact with ground, voltage sources, or other signal lines.

MECHANICAL INSTALLATION

A. GENERAL OVERVIEW

The following instructions are meant to assist in proper installation of Dynapar brand, Series HSD35 hollowshaft encoders. The encoder is a speed and position transducer that when mounted to a rotating shaft, produces output pulses that are directly proportional to the shaft speed and direction. The hollowshaft encoder is attached to the motor shaft by using a clamp down collar. The HSD35 can accommodate several machine shaft diameters by selecting the appropriate bore size. During installation, certain physical properties associated with the mechanical coupling must be observed to ensure a long operation life of the encoder.

B. SHAFT EXTENSION

Solid shaft preferred, keyway allowed; flatted shaft must not be used. The minimum shaft engagement length that will allow support to encoder housing is 1.25", Shaft engagement length of 1.60" (40.6mm) or longer is recommended for reduced wobble. The longest shaft length as measured from the mounting face that will allow installation of the shaft cover is 2.60" (66 mm) maximum. Installations that employ a press-fit or screwed-on stub shaft adapter should align the stub shaft to 0.002" TIR or less with a dial indicator

C. TETHER POINT

For general industrial machinery and C-face motor installations, locate the tether hole at the nominal bolt circle location.

HOLE LOCATION	BOLT SIZE	BOLT SIZE	RECOMMENDED TORQUE
2.94"(75 mm)	3/8"(9.5 mm)	1/4"(6mm)	50-60 in-lbs
3.63" (92 mm)	1/2" (12 mm)	5/16"(8mm)	70-80in-lbs
2.5"-3.25" (63-82mm)	1/4" (6 mm)	3/8"(9.5mm)	100-125 in-lbs
		1/2"(12mm)	125-150 in-lbs

STEP 1: PREPARATION AND RECOMMENDED TOOLS

Disconnect power from equipment and encoder cable. Ensure that you have the proper tools. Typical tools that may be needed depending on the options chosen are:

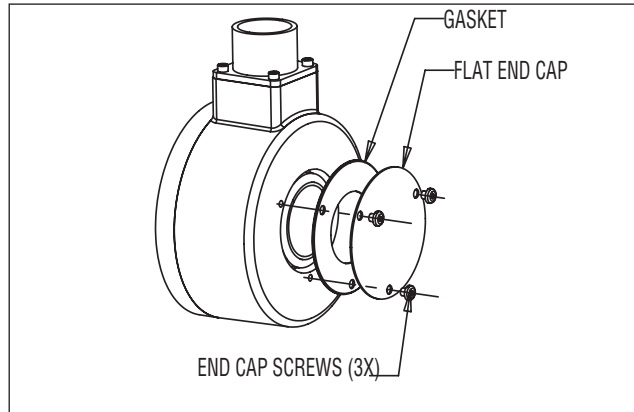
- #2 Phillips Screwdriver; 5/32" Hex Wrench(US); Caliper Gauge; Dial Indicator Gauge; 3/8", 1/2" or 1/4" T- handle Wrenches (tether options); Dynapar M100 encoder tester.

STEP 2: CHECK AND CLEAN THE MATING SHAFT

Ensure that the mating shaft is within proper tolerances. Recommended mating shaft diameter tolerances should be nominal +0.0000"/-0.0005" [0.00 to -0.13mm] and shaft runout TIR should be under 0.002".

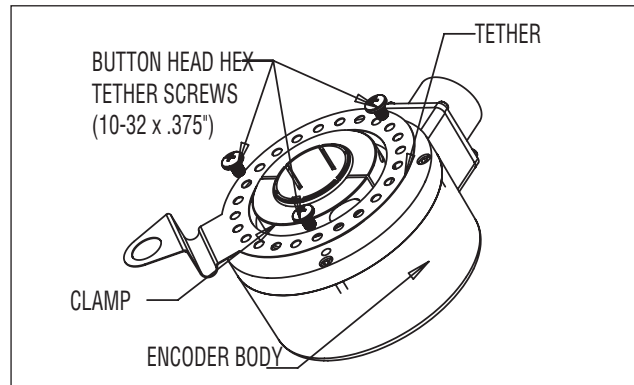
Clean the mating shaft of any burrs and check that mating shaft engagement is at least 1.25" inside the encoder shaft. Using a dial indicator gauge verify that the motor shaft Total Indicated Reading (TIR) is less than 0.002" [0.05 mm].

STEP 3: INSTALL ENDCAP



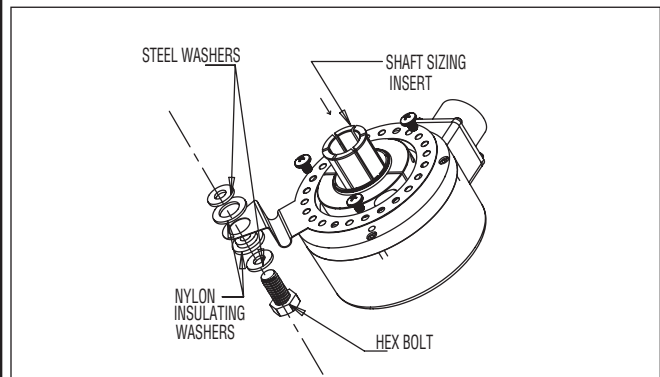
The encoder ships with an endcap to cover the back end of the encoder body, and although optional, is recommended for additional environmental protection. To install, remove the factory installed three screws at the back of the encoder, properly discard the removed back plate and the three screws. Unpack the endcap, gasket and the three screws from the factory supplied kit. Align the three holes and fasten the gasket and end cap to the encoder body as shown.

STEP 4: INSTALL THE TETHER ON ENCODER



Rotate the tether to the required orientation and tighten the tether arm to the encoder body using the three screws provided. The hollowshaft series encoder tethers can be rotated in 15 degree increments so that connector or cable exit can be conveniently located.

STEP 5: INSTALL WASHERS ON TETHER

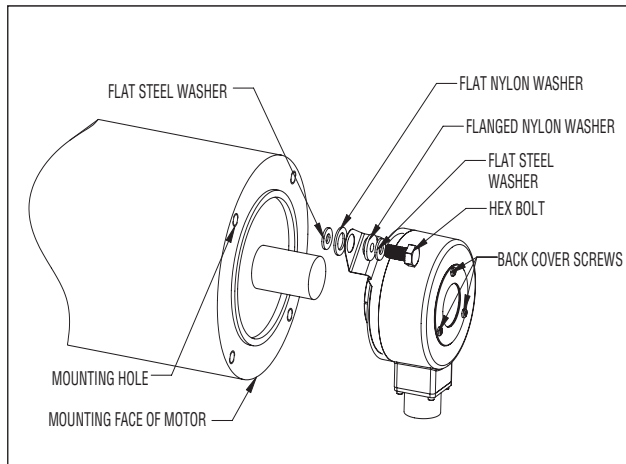


Slide the flat nylon washer on the side away from the bend and the flanged nylon washer on the side of the bend and press them together until they are fully seated in the tether hole. One steel washer is to be used on each side of the nylon washer.

STEP 6: SLIDE ENCODER ON SHAFT

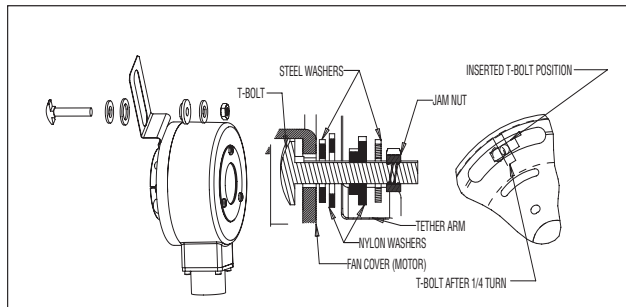
Carefully slide the encoder all the way down until the tether rests on the motor face without any stress on the tether. Do not tighten the shaft clamp on the encoder yet.

STEP 7A: SECURE TETHER TO MOUNTING FACE (MOTOR MOUNT)



Rotate the tether arm until it is at the correct orientation and is aligned with the mounting holes on the the motor or equipment. Install one steel washer on both sides of the nylon washer. Refer figure above. Fasten the tether arm to the motor or machine housing using the supplied 3/8" bolt (4.5" C-face applications) or 1/2" bolt (8.5" C-face applications). Ensure that there is no stress or flexing of the tether arm when secured.

STEP 7B: SECURE TETHER TO MOUNTING FACE (FAN COVER MOUNT)



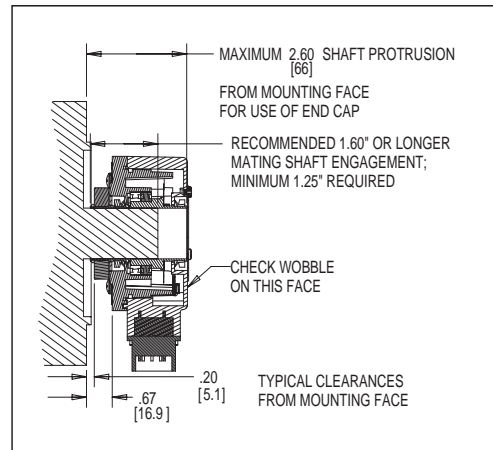
Slide and insert the T-bolt as shown in the figure into the fan cover. Use the supplied insulating hardware and washers as shown. Tighten the jamnut to firmly secure the tether.

STEP 8: TIGHTEN ENCODER CLAMP ONTO MATING SHAFT

Check to make sure that the tether is still in its "unstressed" condition. Adjust position of encoder on shaft if necessary and then tighten the shaft clamp on the encoder. Tighten clamp to stated torque value provided on encoder datasheet (50-55 in-lbs.).

NOTE: ENCODER MODELS WITH SPLIT CLAMPS HAVE TWO SCREWS TO TIGHTEN DOWN. PLEASE ENSURE THAT BOTH SCREWS ON THE CLAMP ARE TIGHTENED DOWN SECURELY. YOU MAY HAVE TO ROTATE THE SHAFT TO TIGHTEN BOTH SCREWS DOWN.

STEP 9: GOOD INSTALLATION CHECK POINT



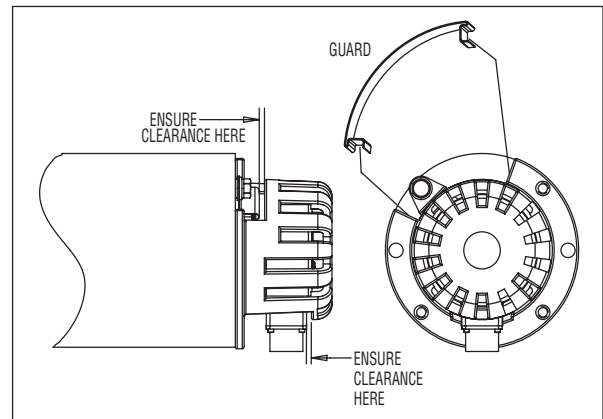
Follow the 3 step installation check to ensure a good installation thus far. Refer to figure above for key reference dimensions

A. Check clearances from mounting face. Ensure you have a minimum clearance of 1/16" between the encoder shaft and any non-rotating surface closest to the encoder shaft

B. Check tether installation. Make sure that the tether is unstressed. There should be no visible bending or deflection on any surface of the tether. Visible tether deflections should be corrected immediately. If the tether is bent or distorted, DO NOT USE, and call the factory for a replacement tether. Tether installation is critical to the long life of the bearings and improper tether installation will lead to excessive bearing loads and encoder failure.

C. Check wobble of encoder housing. Turn the shaft by hand and make sure that the shaft turns freely and does not produce excessive runout/wobble of the encoder. Most encoder installations will have wobble arising from shaft tolerances. Measure the wobble on the visible back face of the encoder. A wobble of less than 0.007" TIR will not have any adverse effect on encoder performance. In general, the lower the TIR of runout, the better.

STEP 10: BASKET GUARD INSTALLATION (optional)



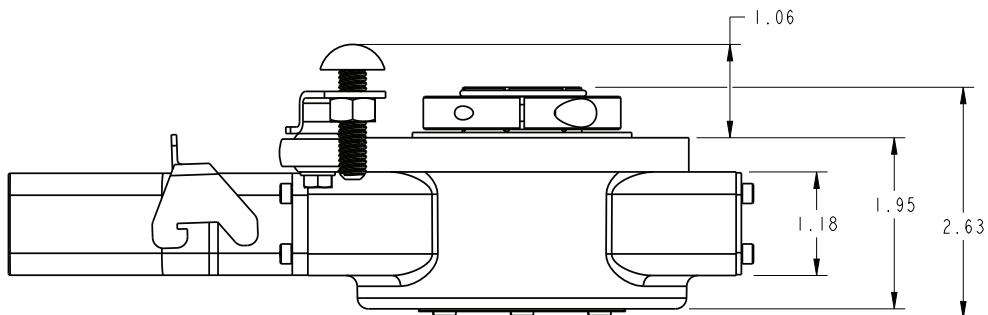
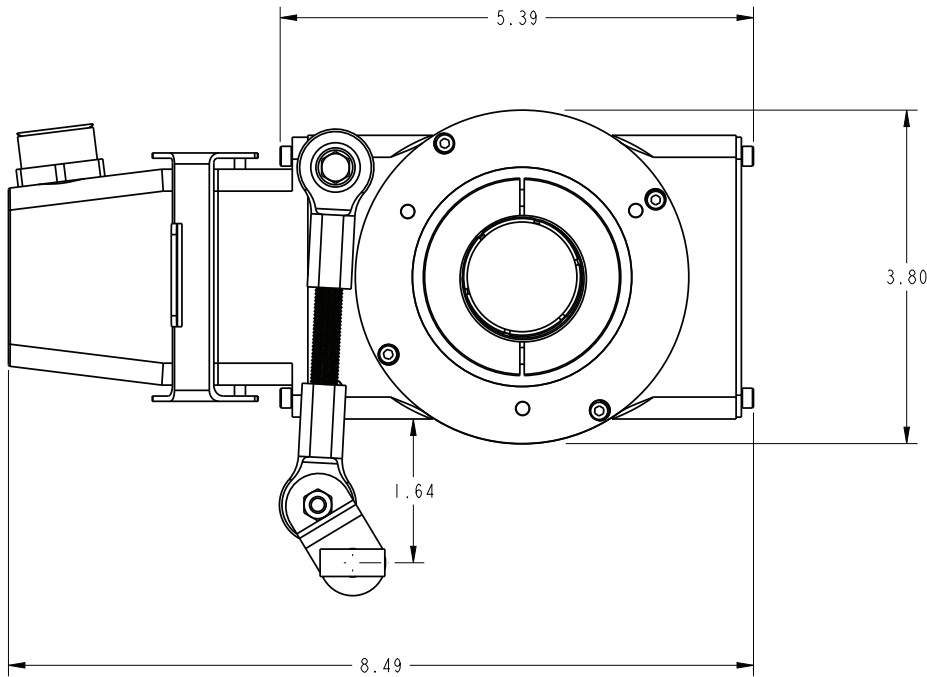
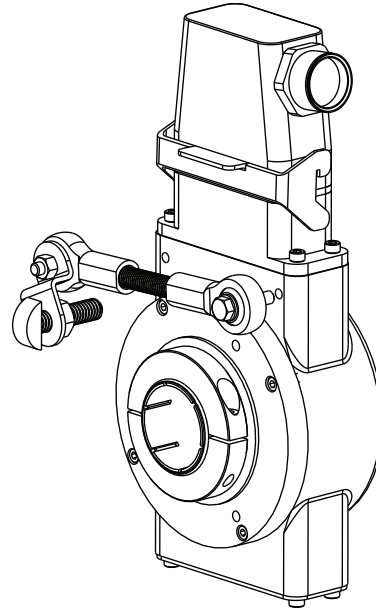
After installation of the encoder place the accessory cover over the encoder with the large opening over the connector or cable and shorter opening positioned over the tether. Ensure the cover is fully seated on the motor face and secure with bolts and washers provided. When mounting to a fan cover instead of a 56C face cover, center cover and drill 3 mounting holes(0.17") in diameter. Then use the 3 #10-24 self tapping screws and washers provided. Install the warning label in the most conspicuous position. Snap guard is to be used as shown (use if required).

TETHER INSTALLATION

Rod Tether Mounting Options

The unique hollow shaft design of the HSD35 allows the encoder to be mounted on all motor shaft applications. There are three typical mounting applications described in this manual.

1. Mounting to a NEMA 4.5" C-face motor
2. Mounting to a NEMA 8.5" C-face motor
3. Mounting to a motor with a fan shroud



MOUNTING TO A NEMA 4.5" C-FACE MOTOR

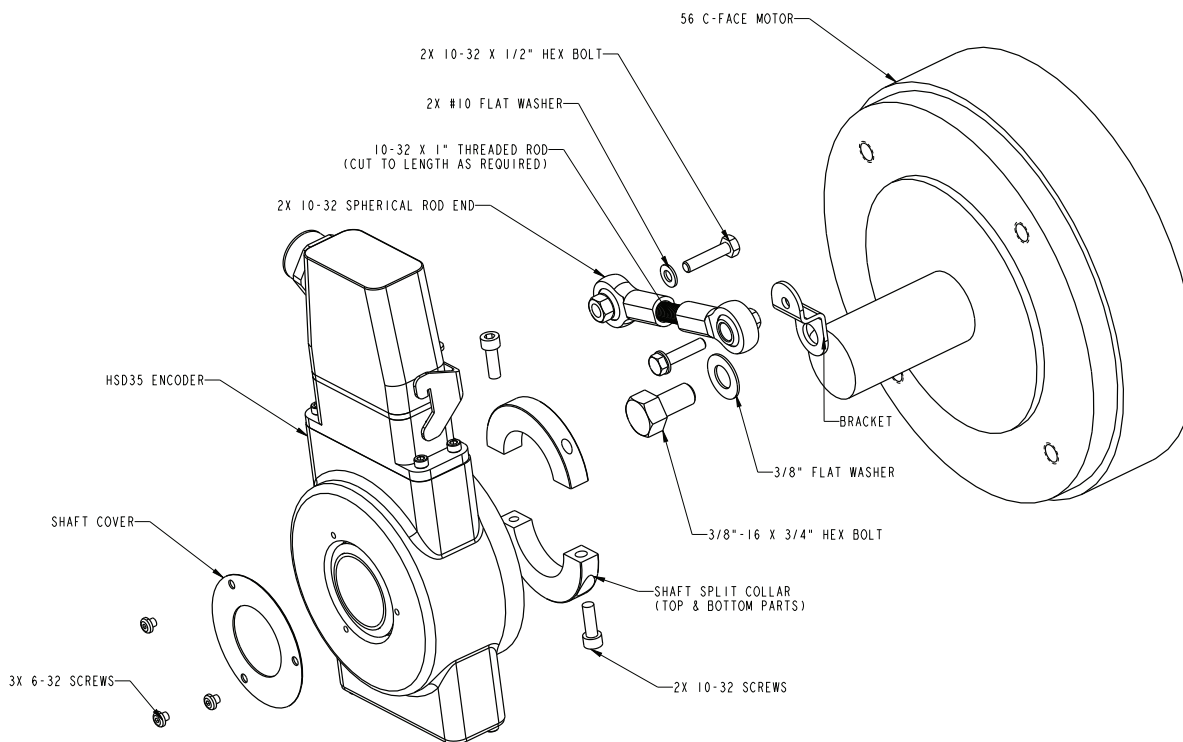


Figure 3: Components for Mounting on NEMA 4.5" 56 C-face motor.

1. Locate the torque arm mounting hole on the motor side of the HSD35. Insert the 10-32 bolt through the rod end of the torque arm assembly. Tighten the 10-32 bolt to 30 in-lbs.
 2. Mount the bracket to one of the four 3/8" holes on the 5.875" bolt circle of the motor C-face using the .375 16 UNC bolt. Align bracket to form a straight line from motor shaft to bracket mounting hole (see Figure 2). Torque = 200 in-lbs.
 3. Loosely attach the split shaft collar over the motor mounting sleeve of the HSD35. Finger tighten 10-32 socket head cap screws in split collar so that the collar in both parts aligns with the notches in mounting sleeve.
 4. Slide the HSD35, with the split shaft collar and torque arm loosely attached, over the motor shaft. While installing the encoder, engage the torque arm by inserting the 10-32 x 1/2" hex bolt into the tapped hole in the bracket. Tighten to 30 in-lbs.
 5. Position the encoder to produce approximately a 60° angle from the motor shaft to the torque arm motor mounting hole, in the bracket.
 6. Without the encoder being completely tightened, set the axial alignment so that no part of the torque arm assembly touches the motor, but is perpendicular to the encoder body. Position should be as close to C-face as possible but not flush with motor (generally 0.12" - 0.15").
 7. Tighten 10-32 x 1/2" bolt, in bracket, to 30 in-lbs.
 8. Tighten 10-32 socket head cap screws, in split shaft collar, to 30 in-lbs. (Try maintaining the split in the shaft collar with notches in the motor mounting sleeve on the HSD35.)
- NOTE: Verify installation by checking clearance between the torque arm assembly and motor C-face. The minimum motor shaft length required should be approximately 1.5".**
9. For stub shaft applications, mount shaft cover using the three 6-32 pan head screws.

MOUNTING TO A NEMA 8.5" C-FACE MOTOR

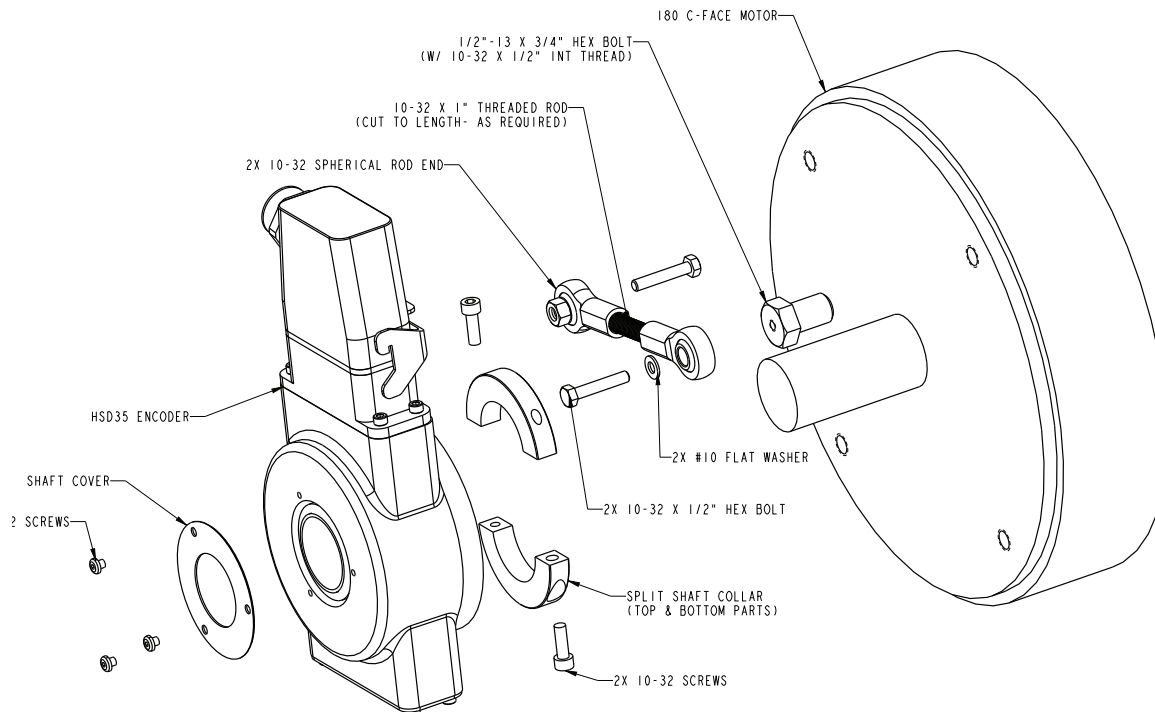


Figure 4: Components for Mounting on NEMA 8.5" 180C-face motor.

1. Locate the torque arm mounting hole on the motor side of the encoder. Insert the 10-32 bolt through the rod end of the torque arm. Tighten the 10-32 bolt to 30 in-lbs.
 2. Mount the 1/2 x 13 hex-bolt into one of the four holes on the 7.25 bolt circle of the motor C-face. Torque to 500 in-lbs.
 3. Loosely attach the split shaft collar the over motor mounting sleeve of the HSD35. Finger tighten 10-32 socket head cap screws in split collar so that the collar in both parts aligns with the notches in mounting sleeve.
 4. Slide the HSD35, with the split shaft collar and torque arm loosely attached, over the motor shaft. While installing the encoder, engage the torque arm by inserting the 10-32 x 1/2" hex bolt into the tapped hole in the 1/2 x 13 hex-bolt. Tighten to 30 in-lbs.
 5. Position the encoder to produce approximately a 60° angle from the motor shaft to the torque arm motor mounting hole, in the 1/2 x 13 hex-bolt.
 6. Without the encoder being completely tightened, set the axial alignment so that no part of the torque arm assembly touches the motor, but is perpendicular to the encoder body. Position should be as close to C-face as possible but not flush with motor (generally 0.12 0.15).
 7. Tighten 10-32 x 1/2" bolt, in 1/2 x 13 hex-bolt, to 30 in-lbs.
 8. Tighten 10-32 socket head cap screws, in split shaft collar, to 30 in-lbs. (Try maintaining the split in the shaft collar with notches in the motor mounting sleeve on the HSD35.)
- NOTE: Verify installation by checking clearance between the torque arm assembly and motor C-face. The minimum motor shaft length required should be approximately 1.5.**
9. For stub shaft applications, mount shaft cover using the three 6-32 pan head screws.

MOUNTING TO A MOTOR WITH A FAN SHROUD

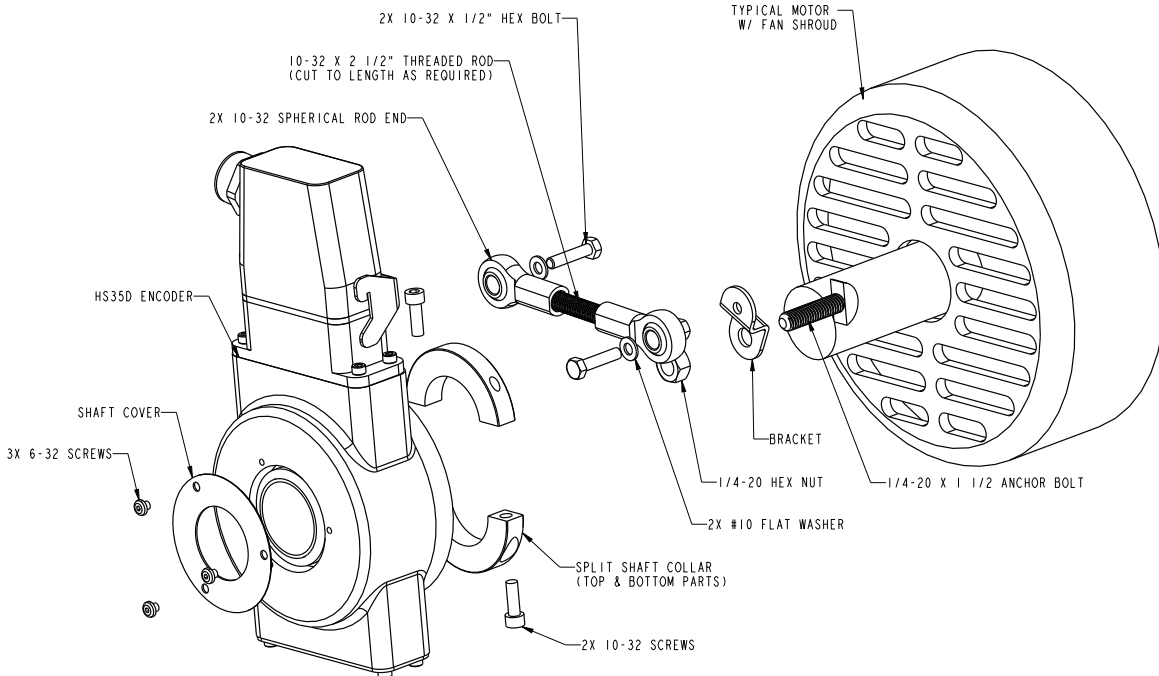


Figure 5: Components for Mounting on Fan Shroud Motor.

NOTE: If only the opposite drive end of the motor is available and has a fan shroud, you must use the special anchor bolt and bracket on the end of the torque arm. Figure 6 shows the bracket and bolt attached to the fan shroud.

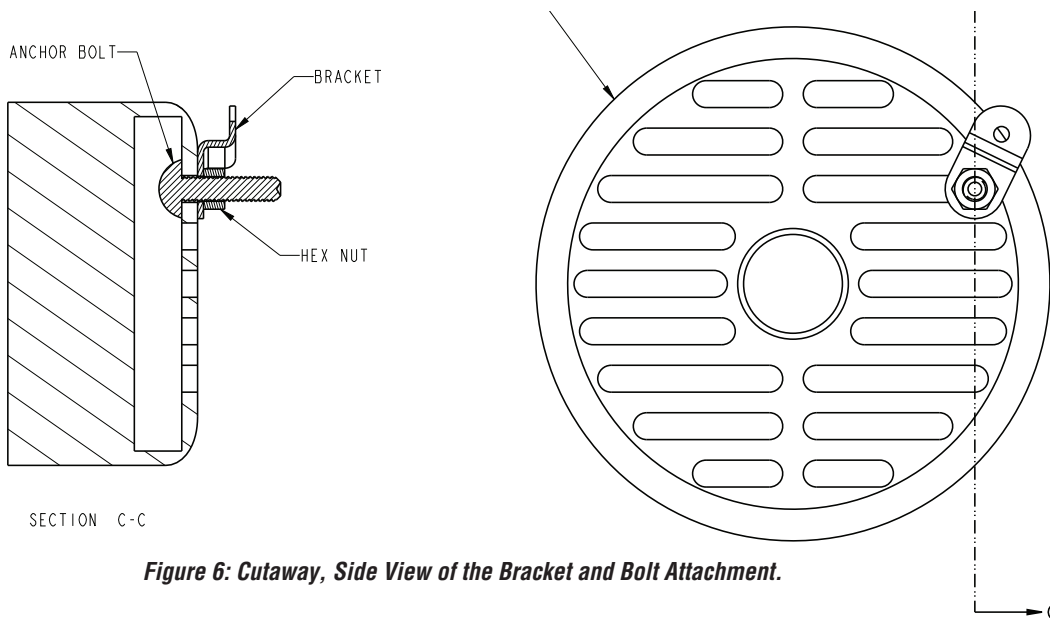


Figure 6: Cutaway, Side View of the Bracket and Bolt Attachment.

MOUNTING TO A MOTOR WITH A FAN SHROUD (CONT.)

1. Locate the torque arm mounting hole on the motor side of the encoder. Insert the 10-32 bolt through the rod end of the torque arm. Tighten the 10-32 bolt to 30 in-lbs.
 2. Arrange the anchor bolt (1/4 bolt) and lug. Slide the anchor bolt head into the fan shroud through an available vent slot.
 3. Rotate the bolt 90° so that the anchor bolt catches to the inside of the fan shroud. Align lug to form a straight line from shaft to anchor. Once positioned, tighten the hex nut with approximately 25in-lbs torque.
 4. Loosely attach the split shaft collar the over motor mounting sleeve of the HSD35. Finger tighten 10-32 socket head cap screws in split collar so that the collar in both parts aligns with the notches in mounting sleeve.
 5. Slide the HSD35, with the split shaft collar and torque arm loosely attached, over the motor shaft. While installing the encoder, engage the torque arm by inserting the 10-32 x 1/2" hex bolt into the tapped hole in the bracket. Tighten to 30 in-lbs.
 6. Position the encoder to produce approximately a 60° angle from the motor shaft to the torque arm motor mounting hole, in the bracket.
 7. Without the encoder being completely tightened, set the axial alignment so that no part of the torque arm assembly touches the motor, but is perpendicular to the encoder body. Position should be as close to C-face as possible but not flush with motor (generally 0.12-0.15").
 8. Tighten 10-32 x 1/2" bolt, in bracket to 30 in-lbs.
 9. Tighten 10-32 socket head cap screws, in split shaft collar, to 30 in-lbs. (Try maintaining the split in the shaft collar with notches in the motor mounting sleeve on the HSD35.)
- NOTE: Verify installation by checking clearance between the torque arm assembly and motor C-face. The minimum motor shaft length required should be approximately 1.5".**
10. For stub shaft applications, mount shaft cover using the three 6-32 pan head screws.

ELECTRICAL INSTALLATION

Electrical connections are through a standard 1/2 inch NPT liquid tight fitting (PG16 optional).

Interconnection cable recommendations are as follows: stranded copper, 24 through 16 gage, braided or foil with drain wire shielding of 0.05 μ F maximum total mutual or direct capacitance and outer sheath insulated. Shrink tubing may be placed over any non-insulated wires. If shielded twisted pair wire is used, do not cross channels. Keep together each pair of complementary channel outputs in a single twisted pair (e.g., A and \bar{A}). An example of this type of cable is Belden 9730 or Belden 9728. Note:



Reversing power and common should not damage the unit. However, applying power to any of the sensor outputs may cause damage.

The encoder requires 5 to 26 volts DC on pin 6 and common on pin 1. Other electrical connections are as listed in Table 1.



We recommend a liquid tight termination if the application involves contaminants.

Wiring Information

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

* Index (Z) optional. See Ordering Information

ELECTRICAL INSTALLATION (CONT.)

Quick Release Connector Hood Wiring

To install the Quick Release Connector, perform the following steps:

1. Remove the four screws that hold the terminal block in place from mating connector hood. Remove the terminal block from the hood.
2. Insert wiring through the liquid tight flexible seal and the mating connector hood. Enough wire should be left exposed to comfortably reach the terminal block.
3. Wire to terminal block according to the wire code in Table 1. A similar wiring list is attached to the enclosure.
4. Replace the terminal block in the connector hood. Insert and tighten the four mounting screws.
5. Tighten the liquid tight fitting on the housing.
6. OPTIONAL: In some hostile environments, seal between connector body and sensor module can be improved by applying a

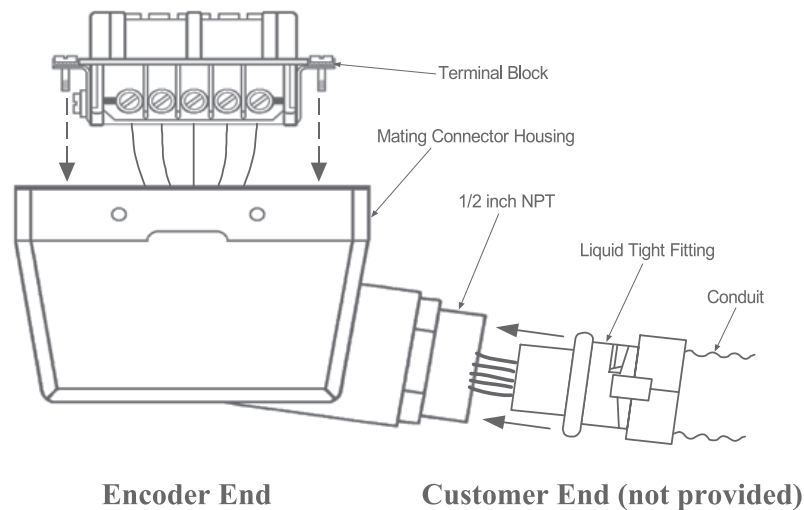


Figure 7: Industrial Latching Connector

Uninstalling the MagCoder

1. Loosen the 10-32 socket head cap screws in split shaft collar. Loosen 10-32 x • hex bolt attached to the bracket or bolt on the motor. Carefully remove the Magcoder and torque arm assembly.
2. Perform the installation steps in reverse order.

Returning Equipment to Dynapar

If it is necessary to return the unit for repair or replacement, a Return Goods Authorization (RGA) number must be obtained from a factory representative before returning the equipment to our service department. When returning an instrument for service, the following information must be provided before we can attempt any repair.

1. Instrument model and serial number.
2. User's name, company, address, and phone number.
3. Malfunction symptoms.
4. Description of system.
5. Returned Goods Authorization number.

Please consult the factory for shipping instructions.

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:

Resolutions to 1024PPR: $180^\circ \pm 18^\circ$ electrical
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, 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

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

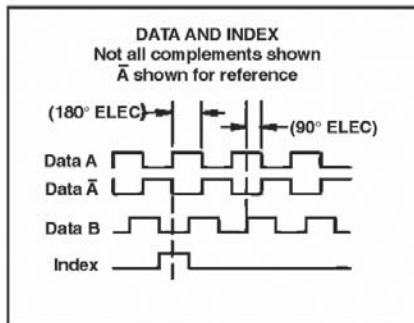
Shock: 400g, 6mSec

Vibration: 5 to 3000 Hz, 20g

Humidity: 100%

Enclosure Rating: IP67 (IP64 at shaft speeds above 5000RPM)

Connector Rating: IP65

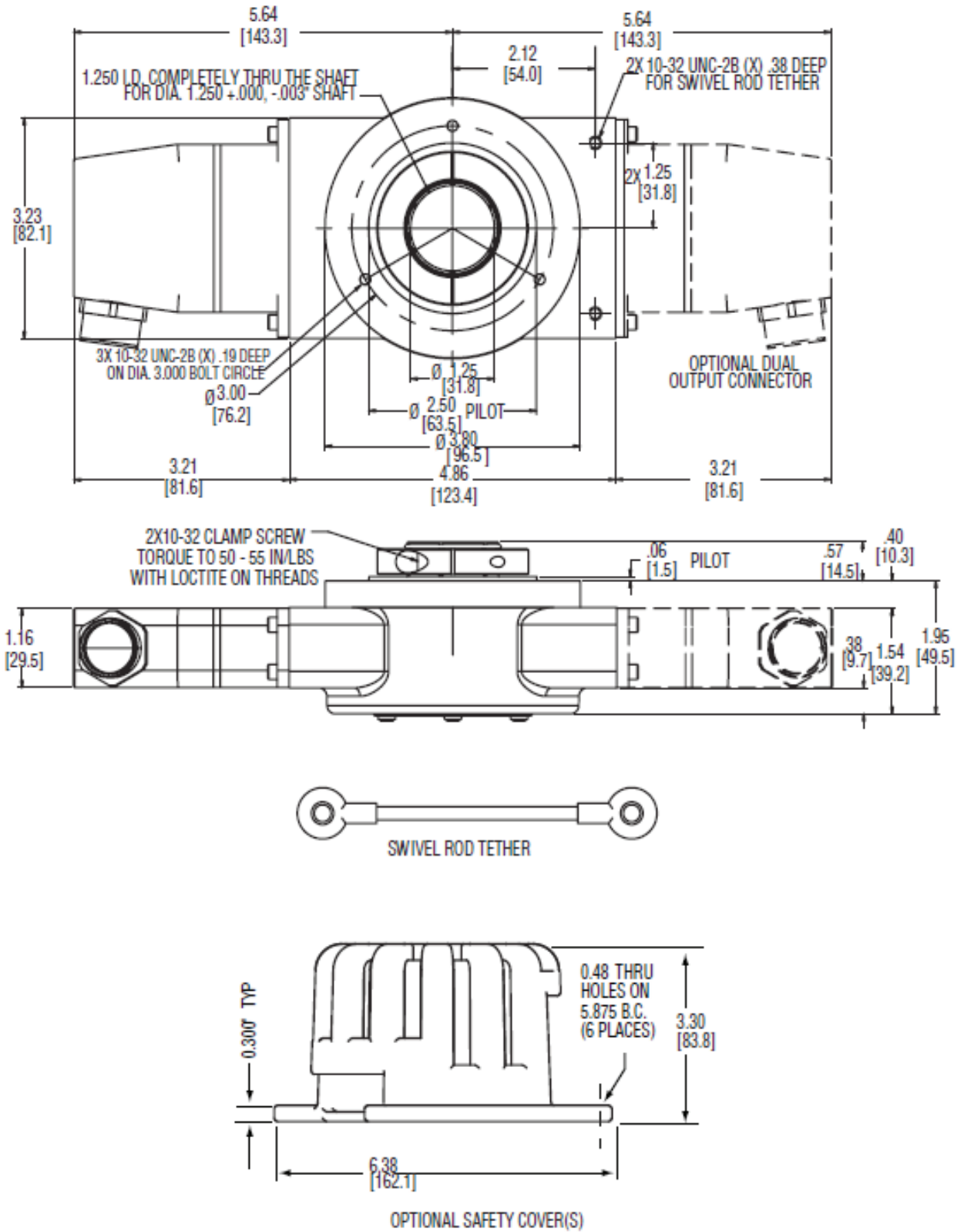


ELECTRICAL CONNECTIONS

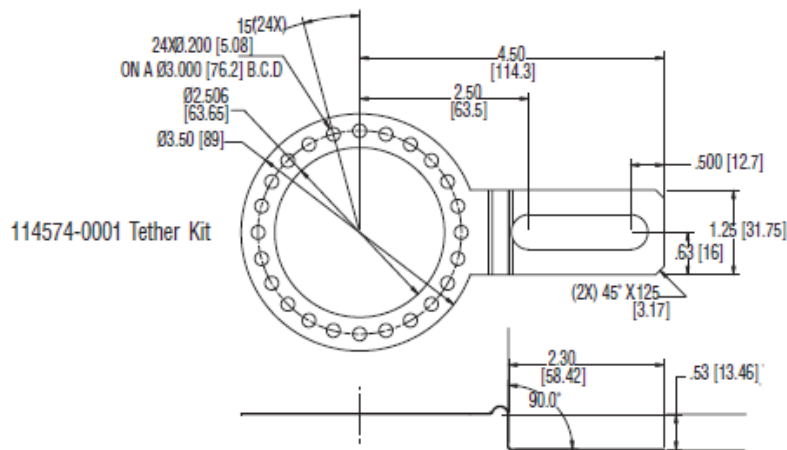
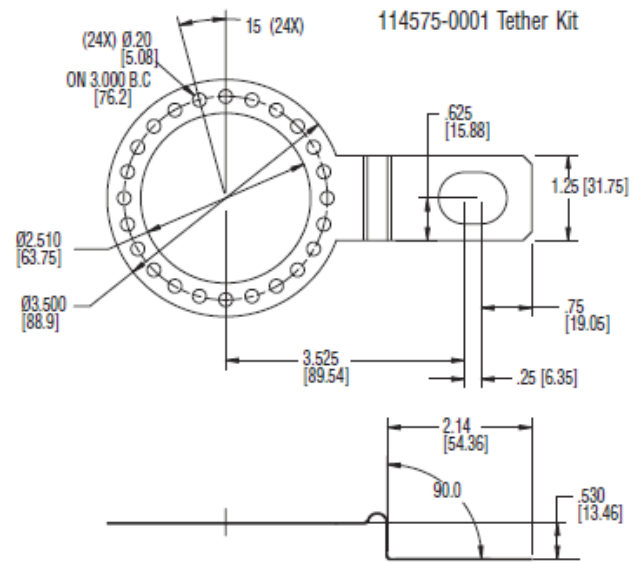
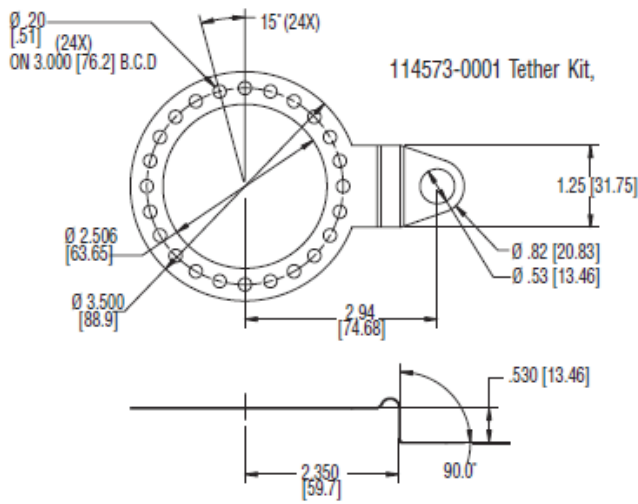
Signal	Connector Pin
Common	1
B	2
A	3
Z *	4
Case (optional)	5
Vcc 5-26 VDC	6
B̅	7
A̅	8
Z *	9
No Connection	10

* Index (Z) optional. See Ordering Information

DIMENSIONS ^{inch}
[mm]



DIMENSIONS ^{inch}
[mm]



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: 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

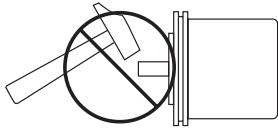
Accessory Kits:

- 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)

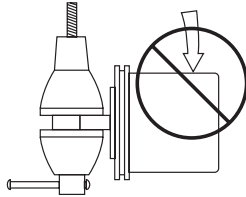
GENERAL GUIDELINES

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.

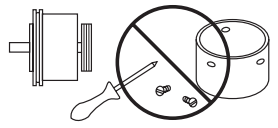
Mounting the Encoder



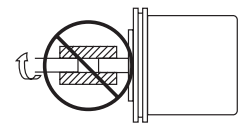
Do not shock the encoder.



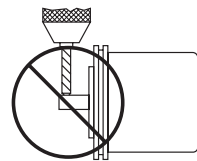
Do not subject the encoder to axial or radial shaft stresses.



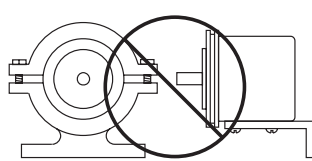
Do not disassemble the encoder.



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 termination 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 $\pm 5\%$ 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 (A, B and Z referred to as A not, B not, and Z not). The signal and its compliment (i.e. A and \bar{A}) are separate outputs. Connect each output to a separate input.

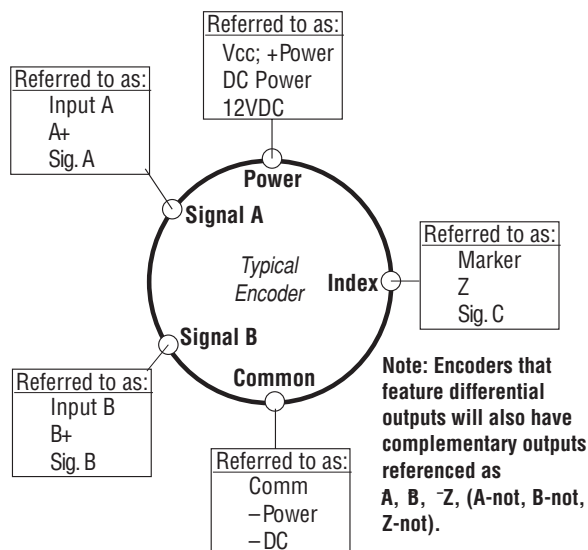
NOTE: Never connect these signals together or to the + or - side of DC power. Never connect differential signals to the same input.

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:



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 \bar{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.