DYNAPAR™

PRODUCT CATALOG

Encoders and Resolvers

• INNOVATION • CUSTOMIZATION • DELIVERY

Dynapar™ NorthStar™ HENGSTLER® Harowe™

Number 1.

Dynapar Rated Number 1 Encoder and Resolver Supplier For Two Years In A Row

Dynapar Rated Number 1 Supplier of Encoders and Resolvers by Control Design Magazine

In an unaided survey of 22,000 automation professions by Control Design Magazine, Dynapar was rated the number 1 supplier of rotary encoders and resolvers two years in a row.

Contact your Dynapar representative today for any and all requests or questions regarding product information, product configurations, service and repairs, quotes or to place an order.

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FEATURED PRODUCTS

DYNAPAR™

DYNAPAR 2017

AD37S — PAGE 2.49

KEY FEATURES:

- Single Cable Solution for 2 and 4 Wire Applications
- Meets SIL 2 PLd, SIL3 PLe and Category 3 Functional Safety Requirements
- High Resolution up 20 Bit Single-turn and 12 Bit Multi-turn
- Motor Winding Temperature Sensor Input
- Stores Motor and Drive Data on "Electronic Data Sheets"

AI25 EtherCAT — PAGE 2.17

KEY FEATURES:

- Extremely Fast Cycle Times (62.5 µs)
- Best In Class Shock and Vibration Resistance (400G, 30G)
- Up to 22 Bit Single-Turn Resolution and ± 35" / (±0.009°) Absolute Accuracy
- Programmable Device Configurations To Meet Custom Application Requirements
- Device Data: Position, Speed, Temperature, Diagnostic Data, Alarms

HSD35M — PAGE 1.123

KEY FEATURES:

- Rugged Magnetic 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

HSD44M — PAGE 1.85

KEY FEATURES:

- Extremely Heavy Duty Magnetic Encoder with Nema 6/ IP67 Rating
- Designed and Built Specifically for Traction Drives in Rail Applications
- Phased-Array Sensor Technology to Provide High Shock and Vibration Resistance
- Optimized for Ease of Installation and Survival in Harsh Environments

ISD37 — PAGE 4.21

KEY FEATURES:

- Triple certified U.S./Canadian, ATEX and IECEx in hazardous locations to create a Class 1 Div. 1, Zone 0 Solution
- Dual Isolated Outputs Available for Redundancy
- Unbreakable Code Disc up to 5000 PPR
- Coupled with the IS Barrier to create a complete Intrinsically Safe Solutions
- 300g Shock and 20g Vibration Resistance and IP67 Sealing

RH25 — PAGE 3.21

KEY FEATURES:

- Rugged, Housed Resolver now available in a Hub-shaft Design
- Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings
- High Temperature Rating of 125°C Continuous Duty
- Rugged Housing with IP54 Rating
- Various Connector Options

HS35R — PAGE 1.101

KEY FEATURES:

- Phased Array Sensor for Reliable Signal Output
- Unbreakable Code Disc up to 5000 PPR
- Rugged Design Withstands up to 400g Shock and 20g Vibration
- Heavy Duty Design Rated for IP67
- Customizable Mounting Options including Torque Arm with Optional Grounding Strap

NORTHSTAR TACHOMETERS — SECTION 1

KEY FEATURES:

- Largest Non-Contact Sensing Gap on the Market
- Active LED for Troubleshooting and Diagnostics
- Improved Concentric Shaft Clamping Design
- Increased Resolutions
- NexGen RIM Tach Sensor Module and Wheel are Reverse Compatible with Previous Generations RIM Tach Series

Corporate Overview

Quality, Reliability, Innovation, Customization, Delivery

Dynapar is considered one of the leading suppliers of motion feedback products in the world and has been engineering and manufacturing encoders in Gurnee, Illinois since 1955. With over 60+ years of experience, our breadth of product offering has served us well in many sectors from heavy duty industries such as oil and gas, paper and steel, aerospace and defense, rail and other off-highway vehicles, to industrial duty applications such as factory automation and elevator, to servo applications such as robotics and medical equipment, to light duty applications such as office equipment and printers. Our brand stands for quality and reliability, innovation, customization, fast delivery, and customer service. As a testament to these values, for the second year in a row in 2016 Control Design readers voted us the top encoder and resolver manufacturer.

Throughout the years, Dynapar has expanded its North American presence to a global platform with a wide selection of the industry's most trusted brands in motion feedback control, including NorthStar heavy duty optical and harsh duty magneto resistive encoders, Hengstler Euro-Spec incremental and absolute encoders, Dynapar incremental encoders, and Harowe resolvers. With the expansion of our company, Dynapar now maintains manufacturing and engineering capabilities in North America, Europe, China and Brazil to serve all of our customers across the globe with customized, innovative motion feedback technologies.

Quality and Reliability are two attributes our customers can expect from Dynapar. Dynapar is an ISO 9001 certified facility which consistently produces reliable, quality products that meet our customer's unique requirements. Dynapar manufactures durable, robust encoders that stand the test of time. In many applications, you will find Dynapar encoders that have been in operation for over 20 years and are still vigorously doing the job.

We strongly believe in our products and we back that with a 2-year warranty in addition to maintaining our own service and repairs department. At Dynapar, our professional repair staff is eager to help with any questions, concerns or troubles you are having with your encoder. We make sure that you experience the least amount of downtime with our quick turn-around and dedicated repair team.

Innovation is ingrained into the fabric of our company. We pride ourselves of being at the forefront of feedback technology, making advances to our products through a detailed understanding of the voice of our customers.

Dynapar has been leading the way through many breakthrough product lines starting with the first true vector-duty hollow shaft encoder, to the first Heavy Duty Magnetic Tachometers with interchangeable modules and upgrade kits to the first real battery-less absolute encoders using a unique technology that reads absolute position and many more. Currently, Dynapar is launching the new AD37S Safety4Wire® encoder, one of its most technologically advanced products, designed to provide high levels of functional safety in servo motor control systems.

We are constantly building on our strong presence in a number of industries designing unique, leading edge motion feedback to bring our customers the next generation in encoders and resolvers.

Customization is a trademark at Dynapar. Our manufacturing process and engineering capability make it easier for us to do customized products. Our custom capabilities allow our customers to meet the varied specifications of feedback application. Shafts, tethers, cables, connectors, and housings can all be modified to give you what you need. If you require customization, our dedicated team of engineers design the precise encoder to your unique specifications quickly.

Fast Delivery is a customer requirement, and at Dynapar we take pride in operational excellence. All Dynapar and NorthStar encoders are built to order allowing for fast delivery and 3-day lead times on most models.

Customer Dedication

Customer Service and Dedicated Support Teams

Customer Satisfaction is of the utmost importance to Dynapar. We continue to be a leader in motion feedback control because of the dedication we have to our customers. Please contact us for any and all requests or questions regarding product information, product configurations, service and repairs, quotes or to place an order. Pricing, quoting and ordering information can be obtained via our website, or by calling, faxing or e-mailing us.with customized, innovative motion feedback technologies.

Crossovers and Retrofits

Dynapar offers direct replacements for all major encoder manufacturers with 3-day average lead times and next day shipping capabilities. If you are looking for a discontinued product, would like to replace your current encoder or become a new partner with Dynapar Corporation, we are here to help you find a solution. We've created an easy-to-use competitive part locator on our website so you can find the Dynapar product that offers the same functionality as your current feedback solution and our team of technical experts can guide you to find a compatible solution. Just visit us at www.dynapar.com/crossovers or contact our technical applications experts today and we will make sure you have a replacement encoder that works within your specific applications.

Try Dynapar

TryDynapar is a unique initiative that allows our customers to trial our products simply and risk free. This bold program represents our commitment to demonstrating our product quality, engineering expertise and factory support of the Dynapar encoder line to the market at large, with no strings attached. TryDynapar is available on over 20 product families of incremental and absolute encoders, with thousands of configurations available. After testing our products risk free for 30 days, if you are not completely satisfied with your encoder, send it back at no charge. Visit us at www.dynapar.com/TRYDYNAPAR to learn more or to place your risk free trial.

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Technology Overview

If there's any one truism in engineering it is that there's no one perfect solution – there's only the best solution for the application at hand. When it comes to feedback devices, OEMs have a wide range of options. Should you use a resolver or an encoder? If you need an encoder, should you select an Incremental or an absolute encoder? Should you opt for an optical or a magnetic device? What is the most appropriate mounting configuration? Do you need ingress protection (IP), and if so, to what level? How about resolution? The sheer variety of choices can be overwhelming, but while you're well advised to work closely with your vendor to make a final decision, there are a few main things to consider when narrowing down the right feedback options for your system.

There are two main types of feedback devices: Encoders (both incremental and absolute) and Resolvers. Also, within encoders there are two main sensing technologies used today: Optical and Magnetic.

INCREMENTAL ENCODERS

Incremental encoders provide speed, direction and relative position feedback by generating a stream of pulses proportional to the rotation of a motor or driven shaft. Single channel incremental encoders can measure speed while dual channel or quadrature encoders (AB) can interpret direction based on the phase relationship between the 2 channels. Indexed quadrature encoders (ABZ) are also available for homing location at startup. Incremental encoders are typically used in cut-to-length, crane or hoist, web based or continuous stream processing (such as pulp, paper, steel) and heavy vehicle applications.

ABSOLUTE ENCODERS

Absolute rotary encoders measure actual position by generating a stream of unique digital codes (instead of pulses) that represent the encoder's actual position. Single turn absolute encoders output codes that are repeated every full revolution and do not output data to indicate how many revolutions have been made. Multi-turn absolute encoders output a unique code for each shaft position through every rotation, up to 4,096 revolutions. Unlike incremental encoders, absolute encoders will retain correct position even if power fails without homing at startup. Absolute encoders are typically used in CNC, medical and robot applications where high resolution is required and absolute feedback reduces power up sequences.

RESOLVERS

A resolver is a rugged, analog device that can provide position and velocity feedback for a wide range of demanding applications, from wood processing to semiconductor fabrication, from radiation treatment machines to steel mills. Because the resolver is an analog device and the electrical outputs are continuous through one complete mechanical revolution, the single speed (2-pole) devices offer infinite theoretical resolution. Resolvers can be frameless or housed and are used in applications that are environmentally demanding. This means extreme temperatures, shock and vibration. These applications can be aerospace, military, CNC, off highway vehicles and radioactive (for example nuclear reactors and medical)

TECHNOLOGY OVERVIEW

OPTICAL SENSING

Optical encoders use light (optics) to identify unique positions for the encoder. Optical encoder engines can bring almost unparalleled resolution and accuracy for both incremental and absolute encoders. This makes an optical encoder a desirable choice where precision matters. With modern phased-array technology, an optical encoder is increasingly able to perform in much tougher environments which require a combination of durability and resolution

MAGNETIC SENSING

A magnetic encoder uses magnetic fields to identify position for the encoder. Magnetic encoder engines typically excel in areas where most other encoder technologies fail. They are more robust in nature and are designed to output reliable digital feedback in the most demanding and harshest of application environments with high shock and vibration, contaminated areas,

It is also important to note the distinction between resolution and accuracy. The illustration in **Figure 1** shows that although there is the same number of transitions in a rotation, they can clearly be in the incorrect real position if the feedback device has poor accuracy. The application engineer must pay very close attention to the accuracy of high resolution devices; it can be misleading.

RESOLUTION AND ACCURACY

Resolution is the number of measuring segments or units in one revolution of an encoder shaft or one inch or mm of a linear scale. Shaft encoders are available with resolutions up to 10,000 pulses per revolution (PPR) directly, and 40,000 PPR by edge-detection of the A and B channels, while linear encoders are available with resolutions measured in microns. The bottom line is, the selected encoder must have resolution equal to or better than that required by the application. But resolution is not the whole story.

Accuracy and resolution are different, and it is possible to have one without the other. **Figure 1** shows a distance X divided into 24 increments or "bits." If X represents 360° of shaft rotation, then one revolution has been resolved into 24 parts. While there are 24 bits of resolution, the 24 parts are not uniform. This transducer could not be used to measure position, velocity or acceleration with any accuracy. On the other hand, in **Figure 1** the distance X is divided into 24 equal parts. Each increment represents exactly 1/24 of a revolution.

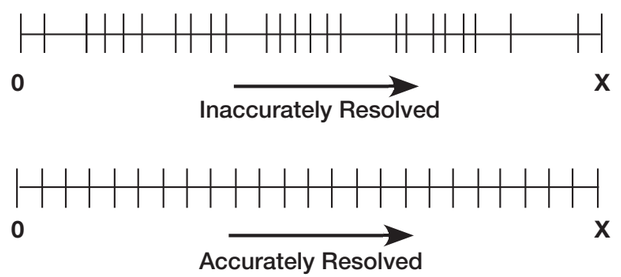


Figure 1: Resolution and Accuracy

This transducer operates with accuracy as well as resolution. Accuracy, however, can be independent of resolution. A transducer may have a resolution of only two parts per revolution, yet its accuracy could be ±6 arc seconds.

FEEDBACK DEVICES

Encoders provide feedback for a wide range of motion tasks from positioning a patient in an MRI machine to bottling beverages at 300 units per minute. When it comes to specifying an encoder, users must make decisions about a number of key characteristics. Are they tracking linear or rotary motion? Should they use optical or magnetic technology? And, perhaps most essential to the success of the application, should they choose an incremental or an absolute encoder? Even when incremental and absolute encoders are based on the same sensing mechanism, the two deliver very different performance.

As the name suggests, an absolute encoder maintains a record of its position within some absolute coordinate system, whereas an incremental encoder outputs incremental changes from a predefined home position. As a result, an incremental encoder requires additional electronics (typically a PLC, counter, or drive) to count pulses and convert the data into speed or motion, while an absolute encoder produces digital words identifying absolute location. Not surprisingly, incremental encoders are typically better suited to simpler, lower performance applications, while absolute encoders are most often used in more complex, mission-critical applications with higher speed and position control requirements. The correct choice of output type depends on the application.

INCREMENTAL ENCODER OVERVIEW

An incremental encoder can be used in positioning and motor speed feedback applications. An incremental encoder provides excellent speed and distance feedback and, since there are few sensors involved, the systems are both simple and inexpensive. An incremental encoder is limited by only providing change information, so the encoder requires a reference device to calculate motion.

HOW AN INCREMENTAL ENCODER WORKS

When an incremental encoder moves, it generates a stream of pulses proportional to the rotation of the shaft (rotary encoder) or distance traveled (linear encoder). In the case of an optical design, a patterned disc or linear strip passing between an LED and a photo-sensor alternately passes or blocks the beam, producing an analog signal; additional circuitry, often in the form of an onboard ASIC, converts this signal to a square wave. Magnetic encoder designs can be based on any one of a variety of mechanisms but typically involve rotating a magnetic field to generate a voltage pulse or a change in resistance that can be converted into a pulse.

Single-channel incremental encoders feature a single stream of output pulses. As a result, they can only provide limited information. Based on the resolution of the encoder— i.e., the number of pulses per revolution in a rotary design or millimeters/inches of travel in a linear design—the external electronics can count pulses to calculate speed, or track offset relative to some reference coordinate (home), which can be used to determine position. Single-channel designs provide good solutions for applications like single-direction conveyor systems.

Although they are simple, robust, and economical, single-channel incremental encoders have an important limitation—they cannot be used to determine direction of motion. That task requires more input, typically from a dual-channel design that generates output over two distinct channels (“A” and “B”), which are 90° out of phase with each other. One channel will always lag the other. By determining whether “A” lags “B” or “B” lags “A”, you can determine the direction you are moving. These dual-channel designs are sometimes called quadrature encoders due to the four rise and fall points of their signal output. The direction of travel determines which channel goes high first, allowing the processor to easily monitor direction of motion **(see Figure 2)**. Resolution can be increased by as much as a factor of four by triggering on the leading and/or trailing edge of the pulses for one or both channels.

Quadrature encoders provide robust solutions for challenging applications. In a high-vibration environment, for example, a single-channel encoder might misinterpret the pulse stream generated by an axis wavering about a set point as a real displacement. A quadrature encoder would be able to recognize the changes in direction and ignore the pulse stream or filter it out as noise.

Incremental encoders can also include an additional channel known as the index, or Z channel. This track causes the encoder to generate a pulse once per revolution for a rotary encoder or at a specific position for a linear encoder **(see Figure 3)**. The Z channel can be used as a mark to identify the starting position of the encoder. Another term for this is the “Home Position”. For high-speed applications, it can be an easy way to indicate a single revolution, which can then be calculated with time to yield RPMs.

COMMUTATION (U, V, W) CHANNELS

Commutation (U, V, W) channels **(see Figure 4)** can also be provided on some encoders. These signals are aligned to the commutation windings found on servo motors. They also ensure that the drive or amplifier for those motors apply current to each winding in the correct sequence and at the correct level.

INCREMENTAL ENCODER APPLICATIONS

Applications suitable for incremental encoders are generally simple, only requiring a direct connection between the encoder and the control device regardless of whether it is a counter, PLC, or drive.

In theory, incremental encoders are applied where velocity control is important to the process such as:

- Determining motor speed control for web processing both in the uptake and roller synchronization
- Precise acceleration on crane lifting applications when lifting, holding and lowering the load
- Classically used in the acceleration and deceleration for drive motor applications in electric hybrid or off highway vehicles
- Accurately controlling conveyor speed and position in Food and Beverage
- Camera synchronization for accurate positioning, identification and sorting in packaging applications
- Pump speed monitoring to identify movement in petrochemical industries

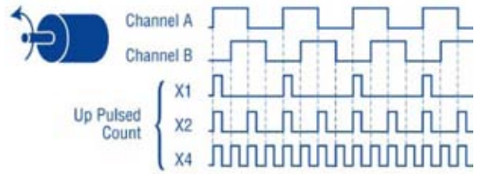


Figure 2: A quadrature encoder generates two pulse streams that are 90° out of phase with one another. As a result, the system can determine directionality by monitoring which channel leads in phase. Triggering off of the leading and or trailing edges of the pulses can increase resolution by up to four times.

Figure 3: Code disc for an optical quadrature encoder shows the inner ring for the Z channel, which generates a single pulse per revolution. The outer bands correspond to the A channel and B channel; notice that they are offset by 90°.

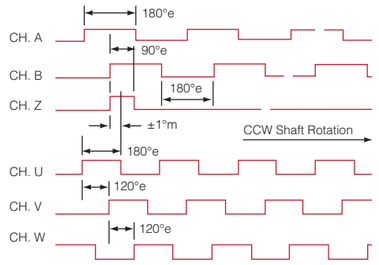


Figure 4: Commutation Channels

ABSOLUTE ENCODER OVERVIEW

Every absolute rotary encoder is used to determine the speed or position of something – the difference is in how that encoder determines that movement. The “how” defines what type of encoder works in your application. Absolute encoders work in situations where accuracy for both speed and position, fail tolerance, and interoperability matters more than system simplicity.

HOW AN ABSOLUTE ENCODER WORKS

Absolute encoders provide an effective alternative suitable for high-reliability applications. An absolute encoder generates output as digital words that identify its position as a static reference point within an absolute coordinate system. As a result, even in the event of power outage, an absolute encoder maintains record of its absolute position. Upon restart, the system can resume motion immediately, without rehoming. Because absolute encoders output data as a digital word, absolute encoders are compatible with a range of communications protocols and busses, including BiSS, synchronous serial interface (SSI), DeviceNet, Profibus, Interbus, CANopen, CanLayer2, Parallel and a number of Ethernet-based protocols.

Most often absolute encoders use either geared or wiegand wire technology. An absolute “geared” rotary encoder features a code disc attached to the shaft and a fixed mask that allows the system to essentially create a unique binary identifier for each point of travel (linear versions operate analogously, but for the sake of simplicity, we’ll focus on rotary versions here). As the code disc rotates atop the fixed mask, the system periodically reads out the identifier, outputting it as a multi-bit digital word. The associated controller or drive polls the encoder to capture position data that it can use directly or process into velocity information.

In the case of an optical encoder, the fixed mask features alternating transparent and opaque regions. Similarly, the code disc is patterned with transparent and opaque regions to define a set of rings (tracks) and periodic radial zones on those tracks **(see Figure 5)**; each track is read out by a different LED/photosensor pair. The code disc sits atop the fixed mask, which typically sits atop a sensing ASIC that contains the detector array and associated electronics. As the code disc turns, its transparent regions periodically overlay the transparent regions on the fixed mask, allowing the optical signal to pass through to the detector to generate a pulse. Each track on the code disc corresponds to a specific bit in the output; the number of tracks n generates 2n radial positions. The common standard for absolute encoders is 12 bits, or 4096 positions per rotation, although some designs offer 22 bits (4.19M positions) or more. Magnetic encoders operate analogously, substituting magnetic coding for optical coding.

***Figure 5**: Code disc for an optical absolute encoder features one track for each bit of resolution. The number of bits n (2n) corresponds to 2n radial positions.*

Some applications involving long travel distances may require a multi-turn design, in which a secondary disc (or discs) geared to the primary code disc tracks the number of rotations of the primary. Each time the primary disk completes a revolution, the secondary disk indexes. This design thus assigns a unique coordinate for each shaft position corresponding to each revolution of the index disc, up to 65,536 revolutions.

The latest innovation in absolute encoders is the wiegand wire technology. The wiegand wire technology allows you to count the number of shaft turns so you can gather position information simply without the need for batteries or gears. Instead, wiegand wire technology incorporates magnets which are used to tighten the wire until it is so tense that it physically creates a release. This release or snap of the wire creates a voltage spike that in turn represents itself as a pulse to provide you the feedback you desire. With this new technology, the absolute encoder becomes simpler, more reliable and robust.

Applications that use absolute encoders are usually more complex, requiring both hardware and software implementation in order to interact with other electronics in the system (PLC, drive, etc.).

ABSOLUTE ENCODER APPLICATIONS

The absolute rotary encoder itself understands the positioning information – it doesn’t need to rely on outside electronics to provide a baseline index for the encoder position. Absolute encoders enable applications which rely on non-linear positioning to work without additional external components.

In real life, absolute encoders are applied when the position is key to the process such as:

- Determining multi-axis orientation for CNC machines used in parts manufacturing
- Automatically determining the height of scissor beds used in hospitals
- Accurately positioning multiple stabilizers for large vehicles like cranes or aerial lifts
- Moving automatic doors or bays without a limiting switch
- Continuing robotic movement cleanly even after a power failure

Especially when compared to resolvers and incremental encoders, the obvious strength of absolute encoders is how their positioning accuracy affects the overall application performance.

ENCODER APPLICATIONS

An Encoder is designed to be versatile and customizable to fit a wide variety of applications. The five broad categories of applications based on environment are:

- Hazardous Duty: relates to areas where flammable liquids, vapors, gases or combustible dusts are likely to occur in quantities sufficient enough to cause a fire or explosion.
- Heavy Duty: demanding environment with a high probability of contaminants and moisture, higher temperature, shock, and vibration requirements as seen in pulp, paper, steel, wood mills, rail and off highway vehicles.
- Industrial Duty: general factory operating environment which requires standard IP ratings, moderate shock, vibration, and temperature specs as seen in food and beverage, textile, generally factory automation plants.
- Servo/ small motor Duty: controlled environment with high accuracy and temperature requirements such as robotics, electronics, and semiconductors.
- General Purpose/ Office: commercial environments with little temperature variations, are fairly clean, and not generally subjected to high shock loading or moisture such as office printers, copiers and laboratory equipment.

RESOLVER OVERVIEW

Resolvers are electromechanical precursors to encoders, based on technology going back to World War II. An electrical current creates a magnetic field along a central winding. There are two windings that are perpendicular to each other. One winding is fixed in place, and the other one moves as the object moves. The changes in the strength and location of the two interacting magnetic fields allow the resolver to determine the motion of the object.

Because the resolver is an analog device and the electrical outputs are continuous through one complete mechanical revolution, the theoretical resolution of a single speed resolver is infinite. Because of its simple transformer design and lack of any on-board electronics, the resolver is a much more rugged device than most any other feedback device. It is the best choice for those applications where reliable performance is required in high temperature, high shock and vibration, radiation and contamination environments. In these conditions, the resolver is the sensible design alternative for shaft angle encoding.

HOW A RESOLVER WORKS

A resolver functions as an electromechanical position transducer which is essentially a variable coupling or rotary transformer. Like all transformers, the resolver requires an AC carrier or reference signal (input excitation) to be applied to the primary winding, contained in the rotor. The resulting changing magnetic field in the primary winding induces a voltage in the secondary stator windings.

The secondary of the resolver stator consists of two sets of windings that are at right angles to each other. The magnitude of the magnetic coupling between the primary and the secondary varies according to the position of the rotating element (rotor) which then varies the amplitude of the output voltage. The amplitude of the reference or input signal is modulated by the sine and the cosine of the rotor angle to produce the sine and cosine output signals on the two secondary windings as shown in **Figure 6**.

Typically, there is one sine and one cosine wave per mechanical revolution which provides absolute position. A multi-speed resolver creates multiple sine and cosine waves throughout a revolution, which increases accuracy but at the expense of absolute position.

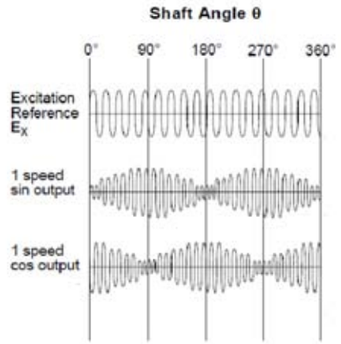


***Figure 6**:* Resolver Waveforms

RESOLVER APPLICATIONS

The simplicity of the resolver design makes it reliable in many standard and extreme applications, extreme temperatures, high shock and vibration, radiation and contamination (dirt, oil, grease, etc.) are present. Resolvers are the ideal candidate for applications such as servo motors, factory automation, steel and paper production, oil and gas production, jet engine fuel systems, aircraft flight surface actuators, communication position systems, missile fin actuators and land based military vehicles just to name a few. (Aerospace, Military and CNC)

Notes

ENCODER ENGINES

At the heart of every encoder lies the encoder engine that converts motion into a signal that can be translated by external electronics into speed or position. Most encoders operate based on either optical or magnetic sensing principles. Each of the two types of encoder engines has its own set of benefits and limitations. In general, optical encoders are good choices for applications requiring high resolution and/or low cost, while magnetic encoders are the best choice for harsh environments. That said, there are no hard and fast rules—some optical encoders carry a hazardous environment rating suitable for the oil and gas industry, while some magnetic encoders can be quite compact and affordable. Building a successful system requires knowing the options, understanding the pitfalls, and matching the attributes of the encoder engine to the needs of the application.

THE TECHNOLOGY OF OPTICAL ENCODER ENGINES

As the name implies, optical encoders use light (optics) to identify unique positions for the encoder. Traditional optical absolute and incremental encoders have four main components **(Figure 7)**:

- Light source (an LED light)
- Moveable disk
- Sensor
- Fixed mask

The disk will have as many tracks as signals (A, B, Z, etc.), and the mask will have windows for each track. The windows on the mask will also have a size proportionate to the window size on the disk. In manufacturing, the mask is fastened directly to the sensor. This allows for one sensor to be used with several resolution options.

The LED shines through one side of the optical shaft encoder. The disk has a series of tracks on it, similar to the concentric grooves in an LP. The mask has a corresponding track for every track on the disk of the optical encoder, and small perforations, called windows, are cut along the tracks in the mask. As the disk moves, different windows in the mask are covered or open, showing the movement and position of the optical encoder. Each arc in the rotation indicates a different position and has a different pattern of open/closed windows.

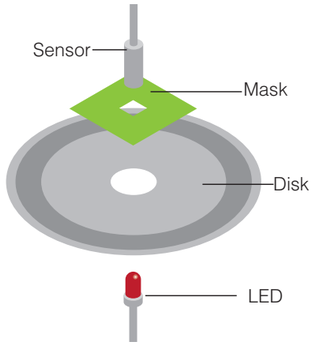


Figure 7: Traditional Optical Encoder Engine

The sensor behind the mask identifies the optical encoders' current pattern. Each sensor represents one single signal for the optical encoder. A track can contain two sensors, which are offset to give two slightly different signals produced at the same time. These offset signals can be used by the optical encoder engine to determine more detailed motion information, like speed. A second track can be used to give an index pulse once per revolution, providing a method to orient the signals. Then lastly, some modern optical engines use 4 or more window tracks for increased reliability and signal integrity. An even more reliable cousin to basic mask optical encoders is phased-array optical encoders.

THE TECHNOLOGY OF OPTICAL ENCODER ENGINES (Cont.)

Phased-array optical encoders use multiple signal outputs to average together to create a single signal that is delivered by the engine. These multiple signals that are used by an optical shaft encoder are called the array. By using averages instead of a single reading, phased array-optical encoders have much more stable signals so they can be used in unfriendly environments, such as mining or heavy manufacturing, where vibrations or shock could affect a traditional mask optical shaft encoder. In addition, they require less precision during manufacturing than traditional mask optical encoders. Manufacturers can easily install these modules without the need of precision fixtures and align disks without the use of microscopes. This allows simpler encoder designs for lower costs, yet higher reliability. **Figure 8** shows the cross sectional side view of the disk, and how the components are used to provide a proper signal.

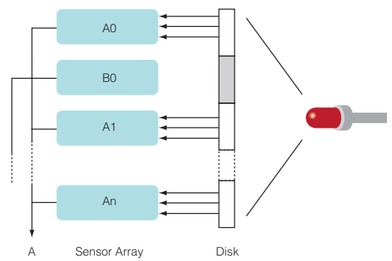


Figure 8: Phased Array Technology

OPTICAL ENCODER APPLICATIONS

The bulk of encoders in production today utilize optical sensing. Optical encoder engines also known as the "workhorse" of the sensing technology world can bring almost unparalleled accuracy and resolution to both incremental and absolute encoders. This makes an optical encoder a desirable choice where resolution matters, from medical equipment to office equipment like printers and copiers. With phased-array technology, an optical encoder is increasingly able to perform in much tougher environments which require a combination of durability and resolution, like crane operations and automated vehicle guidance.

Look at the demands of your application – whether it is the delicate movement of a medical device or the high speed, precision of robotic assembly line units – to determine whether an optical encoder can offer the required performance in your applications:

- High precision
- Good resistance to shock and vibration in industrial applications
- High operating RPMs on incremental encoders
- Multi-turn/multi-gear absolute encoders, which require a lifetime cumulative rotation count

THE TECHNOLOGY OF MAGNETIC ENCODER ENGINES

An optical encoder uses light (optics) to identify unique positions for the encoder. A magnetic encoder uses the same principle to determine a position as an optical encoder, but it does it using magnetic fields rather than light.

With an incremental magnetic encoder, a magnetized wheel spins over a plate of magneto-resistive sensors. Just as the disk spins over the mask to let light through in predictable patterns, the wheel causes predictable responses in the sensor, based on the strength of the magnetic field. The magnetic response is fed through a signal conditioning electrical circuit.

The number of magnetized pole pairs on the wheel pole, the number of sensors, and the type of electrical circuit all work together to determine the resolution of the magnetic encoder.

The wheel is magnetized mainly with 480, 512, and 600 pole pairs. The amount of sensors and the signal conditioning circuit logic combine to multiply or divide the number of pole pairs to result in several different resolution options using only the three different wheels. The key to using magnetism as the element to produce a signal is that it is unaffected by very demanding environments – including dust, moisture, and extreme temperatures, and shock.

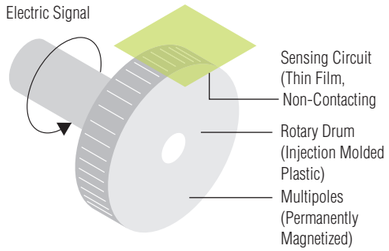


Figure 9: Incremental Magnetic Technology

In absolute magnetic technology, there is a single pole pair rotating above a sensing element. The resolution is dependent upon the ability of the sensing element or ASIC (application specific integrated circuit). In both absolute and incremental magnetic encoders, the engine allows for use in applications that are equal to or more demanding than the phased array engine capabilities.

The innovation of phased array technology has dramatically improved optical technology. Similarly, magnetic phased array systems have benefited in the same way increasing resolution, compactness and reliability of magnetic encoder systems. Their designs spread data capture across multiple detectors, averaging out errors and increasing sensitivity.

Magnetic phased arrays use hall sensor elements arranged in a pattern to match the magnetic wheel and those signals are then interpolated to the desired resolution. This magnetic phased array technology is now available in an IC Chip which integrates both the sensor and the processor in the same chip which considerably decreases the chip count and pc board complexity for a robust, compact, easily manufacturable component. Magnetic Hall Phased Array technology represents the leading edge technology in magnetic encoders today.

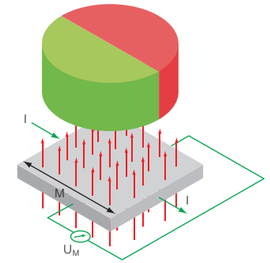


Figure 10: A Hall-array sensor averages the signal over multiple detectors to deliver robust, high-resolution performance that is insensitive to misalignment, shock, and vibration.

MAGNETIC ENCODER APPLICATIONS

Magnetic encoders can be extraordinarily robust. Because magnetic encoders are based on an inductive effect, they do not require bearings, which removes a point of failure from the system. Typically, the electronics are encapsulated so that they are not exposed to the elements. As a result, the devices can operate covered in dust in a sawmill or splashed daily in a washdown environment without any special protection.

A magnetic encoder is designed to output reliable digital feedback in the most demanding and harshest of application environments. Applications for this technology usually require broad temperature specifications, high shock and vibration resistance, robust sealing, and contaminant protection all while focusing on output signal reliability, easy installation, and downtime reduction. Popular applications for magnetic encoders include position and velocity feedback in Steel, Pulp, Paper, Web Production Lines & Lumber mills.

DYNAPAR™

Encoder Mounting Styles

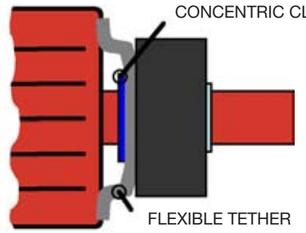
Encoders are a physically small component of a complex closed-loop feedback system that allow manufacturers to make quality parts or move objects from point A to point B in a swift smooth motion. If you break down this system into its major physical components, it most often includes a motor, a drive or amplifier, a brake, and an encoder. When it comes to mounting, the encoder requires the most thought.

Encoders are the component in motion control systems that provide feedback to drives for accurate speed and position control. Selecting the appropriate encoder involves considering environmental, electrical and mechanical factors, and will largely depend on your application requirements. Encoders are available in numerous mounting styles, and these different styles dictate how encoders integrate or "mount" into motion control systems. Encoder mounting styles are typically classified as shafted, hollow-shaft, hub-shaft and bearingless. The appropriate mounting selection can optimize both the life and performance of the encoder.

HOLLOW-SHAFT

The motor or machine shaft extends through the hollow encoder shaft and is affixed by a concentric clamp. A flexible tether or torque arm attaches to the motor or machine surface to prevent the encoder body from rotating with the shaft.

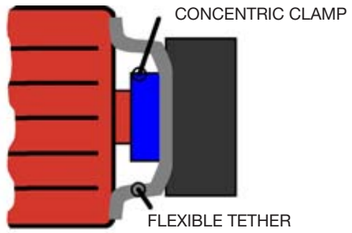
NOTE: Eliminates the need for a coupling, and allows the encoder to be moved to the correct position for tethering without shaft modifications. Product Examples: HS35R (page 1.101), HS20 (page 1.95).



HUB-SHAFT

A hub shaft encoder is similar to the hollow-shaft configuration, except the shaft does not extend through the encoder.

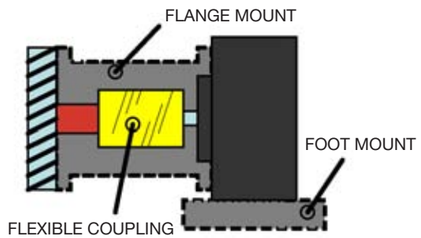
NOTE: Eliminates the need for a coupling, but may require a more precise shaft length to properly locate the encoder for tethering. This type provides improved sealing, as there is no opening on the back of the encoder. Product Examples: AI25 (2.07 - 2.29), HSD25 (page 1.77), E14 (page 1.03).



SHAFTED WITH COUPLING

The original encoder configuration, a shafted encoder requires two special interfaces to properly mount the unit. The first is an encoder mount, which is typically either a mounting flange or a foot mount. The second is a flexible coupling, which compensates for shaft misalignment while providing little or no backlash.

NOTE: This solution is typically used when a hollow or hub-shafted solution cannot work. It requires care in aligning the encoder and driven shafts. Product Examples: E14IC (page 1.05), HR26 (page 1.53).



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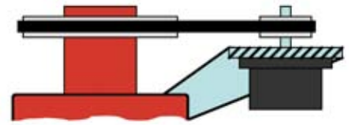
SHAFTED WITH BELT

A shafted encoder can be interfaced to a driven shaft by a belt. This is often done when the driven shaft is too large for coupling, or the application is space constrained and the encoder must be located to the side.

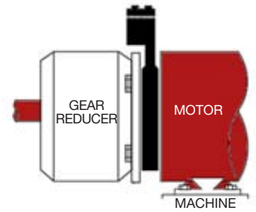
NOTE: The additional mechanical hardware adds cost and complexity to the system. Product Examples: H56 (page 1.63), RIM6200 (page 1.67).



C-FACE

NEMA motor come with standard interface dimensions on the face for mounting an aligning accessories. Common face mount dimensions are 4.5", 8.5", and 12.5".
C-face encoders mount the housing to the motor face, and mount a wheel to the motor shaft separately. These are bearing-less.

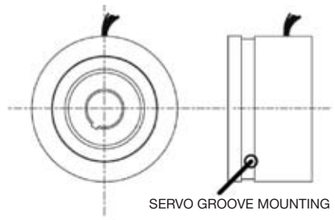
NOTE: Bearing-less solution eliminates a wear component. Product Examples: ST5 (page 1.163), ST8 (page 1.171).



FRAMELESS RESOLVER

Designed for standard resolver motor mounts, the resolver rotor mounts to the shaft, and the resolver housing mounts to the motor face. A clip secures the resolver housing via a groove, as shown.

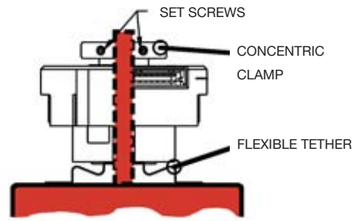
NOTE: A frameless resolver mount is a bearing-less solution that makes a rugged resolver technology even more rugged. Product Examples: HAROMAX 15 (page 3.05), HAROMAX 21 page 3.09).



SERVO FLEX-MOUNT

This style of encoder mount is designed as a drop-in replacement for frameless resolvers. The encoder quickly clips into place. Flex mount designs include the ability to make fine adjustments to align for motor commutation.

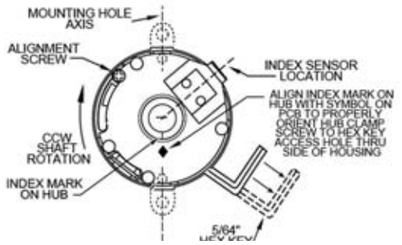
NOTE: The rigid encoder design incorporates bearings, which allows it to be used on motors that have higher shaft axial play and radial run-out. Product Examples: F14 (page 1.91), F18 (page 1.93).



SERVO KIT

The encoder is a modular assembly, eliminating the bearings, similar to the frameless resolver. The encoder housing affixes to the face of the motor, and the encoder disk is fastened to the motor shaft.

NOTE: Ideal for motors with tight tolerance on axial and radial shaft run-out. Bearing-less design eliminates a wear component. Product Examples: M53 (page 1.147), M15 (page 1.143), M602/832 Module (page 1.149).



Encoder Duty Classifications

As a leading supplier in the motion feedback controls industry, Dynapar's comprehensive line of encoders and resolvers are integral to your daily operations. We can help you design the perfect solution for your specific application need and get your facility running efficiently. From traditional manufacturing to many of today's automation industries, market leaders around the world are using Dynapar motion feedback for their applications.

There are five major categories of motion feedback devices which are differentiated by the demands of the operating environment. These run from hazardous duty (the most demanding environment with potential for fire or explosion) to general purpose (the most controlled environment). When looking for an encoder which meets your application requirements, make sure to look for the appropriate duty class icons found throughout our Catalog, our Feedback Quick Reference Guide and our Technical Data Sheets.

HAZ HAZARDOUS DUTY ENCODERS

Hazardous Areas or Hazardous Locations relate to areas where flammable liquids, vapors, gases or combustible dusts are likely to occur in quantities ample to cause a fire or explosion. If your encoder is going into an environment where explosive gas or dust may be present, determine what level of protection is required and then look for an encoder that carries at the least the minimum requirement. Below are several protection methods and levels they achieve.

Intrinsically Safe Encoders: A common type of protection class for encoders is Intrinsic Safety (Ex ia). Encoders classified in this area can be approved for use in either IEC Zone 0 or NEC500 Class 1 Division 1. Intrinsically safe encoders are used in conjunction with an energy limiting electronic device commonly known as an IS Barrier. This device, in Zener, opto-isolated or galvanic, limits the energy allowed in the circuit such that any arcs or sparks in this equipment has insufficient energy (heat) to ignite a vapor.

Flame Proof Encoders: Flame proof (Ex D) equipment construction is such that it can withstand an internal explosion and provide relief of the external pressure via flamegap(s) such as the labyrinth created by threaded fittings or machined flanges. The escaping (hot) gases must sufficiently cool down along the escape path that by the time they reach the outside of the enclosure not to be a source of ignition of the outside, potentially ignitable surroundings. Both optical and magneto-resistive encoders are available in one piece designs. Encoders classified in this area can be approved for use in either IEC Zone 1 or NEC505 Class 1 Zone 1.

Encapsulated Encoders: Devices utilizing encapsulation have the electronics encased in a resin type material to isolate them from the surrounding atmosphere. Encoders classified in this area can be approved for use in either IEC Zone 1 or NEC505 Class 1 Zone 1.

Non Incendive Encoders: Equipment is non-incendive or non-sparking and approved for IEC Zone 2 and NEC500 Class 1 Division 2.

A multitude of options exist for applying encoders successfully in hazardous locations. Each has its own pros and cons, and ultimately the end user or design engineer must factor several things into account such as level requirement, electrical requirements, IP ratings and physical size and total cost of ownership.

Please see following charts for an outline of how to understand Area Classifications and IP Ratings.

AREA CLASSIFICATIONS

European and IEC Classification	Definition of Zone Division	North American Classification
Zone 0 (Gases / Vapors)	An area in which an explosive mixture is continuously present or present for long periods	Class I Division 1 (Gases)
Zone 1 (Gases / Vapors)	An area in which an explosive mixture is likely to occur in normal operation	Class I Division 1 (Gases)
Zone 2 (Gases / Vapors)	An area in which an explosive mixture is not likely to occur in normal operation and if it occurs will exist only for a short time	Class I Division 2 (Gases)
Zone 20 (Dusts)	An area in which an explosive mixture is continuously present or present for long periods	Class II Division 1 (Dusts)
Zone 21 (Dusts)	An area in which an explosive mixture is likely to occur in normal operation	Class II Division 1 (Dusts)
Zone 22 (Dusts)	An area in which an explosive mixture is not likely to occur in normal operation and if it occurs will exist only for a short time	Class II Division 2 (Dusts)

Nearly all industrial applications present some sort of challenging environmental conditions, making the choice of housing and IP rating an essential part of encoder specification. Producing an optimal product or system requires a clear understanding of the IP rating system and a thorough knowledge of the application (see table 3 for Dynapar Examples).

To buy an encoder that will last, you have to pay close attention to IEC 60529 details like duration and pressure of exposure to solid objects and liquids. How do you choose the correct IP rating for your application?

Encoder housings provide protection for devices by preventing the entry of solids and liquids that might damage the electronics. Although most countries and regions have their own enclosure standards, such as DIN 40050 from the German Institute for Standardization or NEMA 250 from the U. S. National Electrical Manufacturers Association, IEC 60529 is the primary international standard governing electrical enclosures. IEC 60529 defines enclosure performance based on a two-digit code of the form IPxy, where x refers to the enclosure's ability to keep out solid materials (see table 1) and y describes protection from liquids (see table 2). An IP54 rating, for example, means the device is protected against dust and against water splashed from all directions. In general, the higher the number, the greater the degree of protection provided.

Table 1. Protection against solid objects (meaning of first digit in code)

x	Protection Provided
0	No protection
1	Protected against solid objects > 50-mm (2-in.) diameter
2	Protected against solid objects > 12.5-mm (0.5-in.) diameter
3	Protected against solid objects > 2.5-mm (0.1-in.) diameter
4	Protected against solid objects > 1.0-mm (0.04-in.) diameter
5	Limited protection against dust (no harmful deposit)
6	Fully protected against dust (dust tight)

Table 2. Protection against liquids (meaning of second digit in code)

y	Protection Provided
0	No protection
1	Protected against vertically dripping water for 10 min.
2	Protected against vertically dripping water for 10 min. when tilted 15° from vertical
3	Protected against spraying water for 5 min. when tilted up to 60° from vertical
4	Protected against water splashed from any direction for 5 min.
5	Protected against low pressure water sprayed from all directions for 3 min.
6	Protected against high volume jets of water from all directions for 3 min.
7	Protected against 30 min. of immersion in water to a depth of 1 m (3.3 ft.)
8	Protected against immersion in water to manufacturer-specified pressure
9K*	Protected against high-pressure and high-temperature water jets

** Per German standard DIN 40050-9*

Table 3. Encoder enclosure rating examples

Application	Dynapar Encoder	Enclosure Rating	Protection
Light Duty	Series E14	IP54	Limited protection against dust and splashing water
Light Industrial Duty	Series H20 without shaft seals	IP54	Limited protection against dust and splashing water
Industrial Duty	Series H20 with shaft seals	IP66	Fully protected against dust and large volumes of water from all directions
Heavy Duty	Series HSD37	IP67	Fully protected against dust and 30 min. of immersion in water to a depth of 1 m (3.3 ft.)
Heavy Duty	Series AR62/AR63	IP69K	Fully protected against dust and high temperature, high-pressure jets of water from all directions

ENCODER DUTY CLASSIFICATIONS

Hazardous Duty applications typically benefit from:

- Triple certified U.S./Canadian, ATEX, and IECEx
- High resolution unbreakable code discs
- Reliable signal transmission
- Seals and housings that provide at least IP67 rating
- PCB designs for high shock and vibration resistance
- Industrial grade components rated for -40 to 100+ C

Most Popular Heavy Duty Industries:

- Oil and Gas
- Paper and Steel
- Aerospace
- Food and Beverage
- Chemical
- Mining
- Power

Heavy Duty Applications:

- Top Drives
- Iron Roughnecks
- Wirelines
- Logging
- Coil Tubing
- Cementing and Fracing/Blenders
- Winch
- Propulsion Systems
- Completion and Production Equipment
- Drawworks Drum Applications
- Coal Dust Environments
- Petro Chemical Handling
- Bottling Machines
- Mixers
- Ethanol Plants
- Enameling
- Production Line
- Silo Works

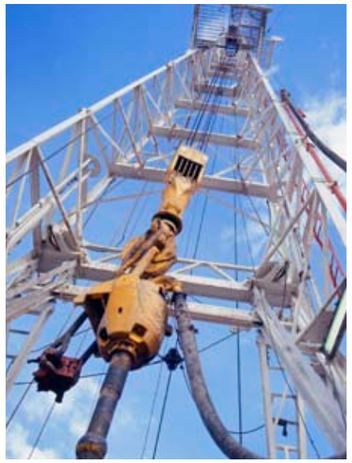
HD HEAVY DUTY ENCODERS & RESOLVERS

As the name implies, heavy duty encoders and resolvers can take the most abuse and they are designed to survive some of the toughest environments. Dynapar has been designing and manufacturing tough, reliable motion feedback devices for over 6 decades. Leading Dynapar's Heavy Duty products 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.

NorthStar™ SLIM Tach and RIM Tach 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 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.



Dynapar's Heavy Duty products typically benefit from:

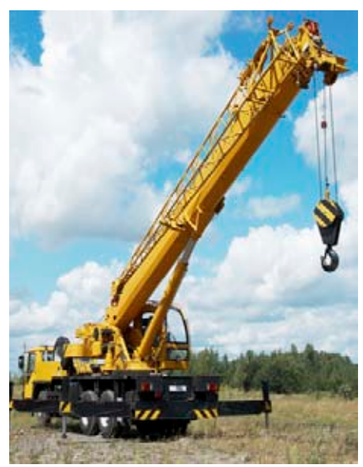
- High resolution unbreakable code discs
- Phased array ASIC that eliminates potentiometers and manufacturing error
- Seals and housings that provide at least IP67 rating
- ATEX certification for Intrinsically Safe application requirements
- Oversized bearings for increased life
- PCB designs for high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

Most Popular Heavy Duty Industries:

- Pulp and Paper
- Steel
- Oil and Gas
- Aerospace
- Food and Beverage
- Chemicals
- Rail
- Mining
- Off Highway Vehicle

Heavy Duty Applications:

- Extruders
- Pickling Equipment
- Processing Equipment
- Paper Machines
- Test Stands
- Traction Motor Speed Feedback
- Mud Pumps
- Winches and Capstans
- Top Drives
- Drawworks Drums
- Iron Roughnecks
- Catwalks
- Pipe and handling cranes



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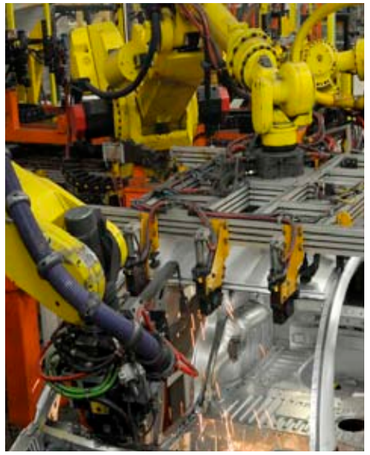
IND

INDUSTRIAL DUTY ENCODERS AND RESOLVERS

The most common class of motion feedback devices is the industrial encoder or resolver. Dynapar's industrial duty products are versatile and well-suited for today's factories and manufacturing environments.

Often considered the "workhorse" of the motion feedback world, industrial duty encoders achieve a good compromise between ruggedness and performance. An industrial encoder can take punishing operating environments almost as well as heavy duty encoders – rough factories with contamination from dust, particulates, and moisture, in addition to moderate shock and temperature. An industrial encoder offers excellent speed and positioning performance. This class of industrial encoders and resolvers are versatile. The hollow- shaft variety of industrial duty encoders is often the preferred choice of vector motor OEM's for speed feedback.



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Dynapar's Industrial Duty products typically benefit from:

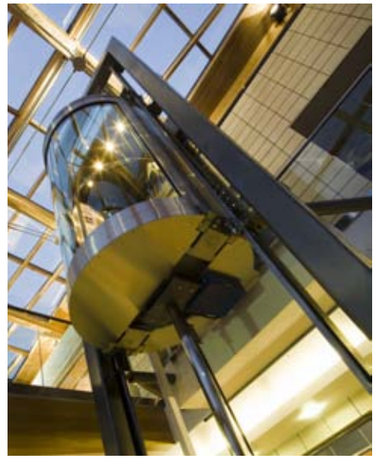
- Dual row ball bearings for long life
- Optional shaft seals for environmental protection
- Unbreakable code disks on select models
- High resolution capability up to 10,000 PPR on select models
- Variety of communication options on absolute encoders
- True batteryless mult-turn positioning on absolute models

Most Popular Industrial Duty Industries:

- Factory Automation
- Food and Beverage
- Pharmaceuticals
- Off Highway Vehicles
- Medical
- Pulp & Paper
- Steel
- Elevator

Industrial Duty Applications:

- Machine Tool Positioning
- Printing Equipment
- Medical Equipment
- Material Handling Machinery
- Cut-to-Length Applications
- Converting Machinery
- Packaging Equipment
- Pickling Equipment
- Processing Equipment
- CNC Machines
- Car Plants
- Pick n Place
- Wafer Production



SSM SERVO/ SMALL MOTOR DUTY ENCODERS AND RESOLVERS

Servo/Small Motor Duty encoders and resolvers, unlike both heavy duty and industrial duty encoders and resolvers, actually reside inside a motor housing. Rotary encoders designed for servomotor duty face special challenges such as high temperatures, high peak speeds, and commutation. Ease of installation is equally important, so Dynapar offers “One Size Fits All” mounting — Our size 15 frameless resolvers, absolute encoders, and commutation encoders are physically interchangeable. This gives the brushless motor customer unlimited flexibility in feedback options, while using the same motor shaft and endbell.

Dynapar’s Servo Motor Duty encoders offer:

- High 120°C operating temperatures that won’t downgrade motor ratings
- Up to 10,000PPR and commutation tracks up to 32 pole at 12,000 rpm
- Drop-in replacement for all mounting configurations

To meet the lightning-quick communication response brushless servomotors require, Dynapar offers the Hengstler absolute encoder family designed especially for high-performance servo feedback. These encoders provide features such as:

- Fast response with either SSI or BiSS communication protocol
- High 22-bit resolution for the ultimate in low-speed smoothness
- Integrated diagnostics that monitor temperature and other safety parameters to monitor system performance

Dynapar also provides Harowe™ brand ultra-performance resolvers, long recognized as the benchmark in the brushless motor industry. Harowe resolvers provide reliable analog output in some of the harshest conditions where shock, vibration, temperature extremes, and even radiation are present.

The new HaroMax line of frameless resolvers combine traditional resolver reliability with

- Machine-wound stators for unparalleled accuracy
- Tough anodized aluminum housings with low mass for weight savings
- Ultra-high 155°C temperature rating for the toughest servo applications

For those OEM’s customers with special requirements, Dynapar has an engineering team ready to tackle custom modifications whether electrical, mechanical, or environmental in nature. With these custom products manufactured across the globe, Dynapar supports today’s servomotor manufacturers by combining high performance with fast delivery.

This class of encoders and resolvers is specifically suited to use on small-to mid-size stepper and servo motors. They typically have limited sealing due to their use inside motor housings, but are capable of very high speeds and high temperatures, a benefit due to being in such close proximity to motor windings. These encoders typically come from the factory ready to mount to common motor back shafts.

ENCODER DUTY CLASSIFICATIONS

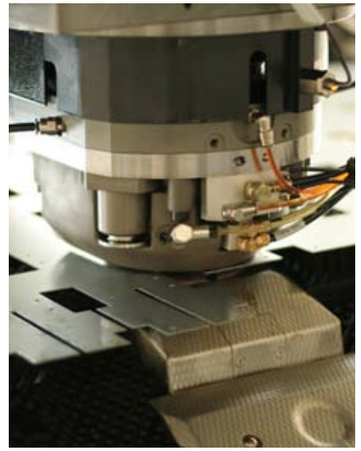
SSM SERVO/ SMALL MOTOR DUTY ENCODERS AND RESOLVERS (CONT.)

Servo/Small Motor Duty Industries:

- Pharmaceutical
- Elevators
- Medical

Servo/Small Motor Duty Applications:

- BLDC, Brushed DC and Stepper Motors
- Elevators, Automated Doors, Escalators
- Catscans
- Robotic Arms
- Surgical Robots
- Robotics
- Ultrasound Equipment
- CNC Factory Machines
- Lab Equipment
- Pharmaceuticals
- Wafer Production



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GP

GENERAL PURPOSE/ OFFICE EQUIPMENT DUTY ENCODERS

General Purpose encoders are used in more consumer-facing applications with fairly clean environments, little temperature variation, low to moderate shock and vibration and no moisture or humidity. General Purpose or Light Duty encoders are commonly referred to as “commercial duty” due to their frequent use in commercial or office automation products. Although intended for use in commercial applications, these encoders are manufactured with industrial features.

Dynapar general purpose encoders are especially suited for applications using small motors and actuators in relatively clean environments such as office printers, copiers, and laboratory equipment. Their compact dimensions and advanced circuitry make them well-suited for many applications too small to accept “standard” encoders such as desk top and bench top testing equipment and precision actuators.

General Purpose or Light Duty products typically benefit from:

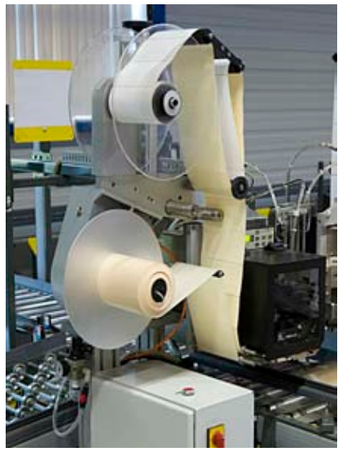
- Metal housings
- O-ring seals
- Precision bearings

General Purpose or Light Duty Industries:

- Factory Automation
- Medical
- Small Motor Feedback

General Purpose or Light Duty Applications:

- Industrial Equipment
- Assembly Machinery
- Phototypesetters and Printers
- Robotics
- Medical Diagnostic Equipment
- Motor-mounted Feedback
- Computer Peripherals
- Office Equipment (copiers, faxes and computer



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Before choosing an encoder that is right for your application, please ask yourself the following questions:

1. What is the complexity level of your application?
2. What parameters (speed, position, direction) do you need to control?
3. Can your application afford to rehome if powered down?
4. What performance level (in pulses-per-revolution and accuracy) does your application require?
5. How will the encoder/resolver communicate with other electronics in the system?
6. Does your application require communication via one of several protocols?
7. How cost sensitive is your application?
8. Does your application involve dirt and dust or do you simply need to prevent the incursion of foreign bodies like screwdrivers, wires, or fingers?
9. Does it involve exposure to liquids? If so, what kind of liquids?
10. Will the encoder/resolver need to survive only occasional exposure or will it be ongoing? Will the exposure take place at high pressure and/or high volumes?
11. What is the operating temperature for the application?

Once you have the answers to these questions, you can then make an informed decision that best meets your application.

QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Incremental

	SHAFTED												
	GP 	GP 	GP 	IND 	HD 		IND 	IND 	GP 	GP 	HD 	IND 	
Product	**E12**	**E14**	**E14IC**	**H20**	**HD20**		**NexGen Qube**	**H58**	**E23**	**EC23**	**HD25**	**HA725**	**Product**
Encoder Size	1.2"	1.4"	1.4"	2.0"	2.0"		2.25"	58mm	2.3"	2.3"	2.5"	2.5"	**Encoder Size**
Mounting Type	Shafted	Shafted	Shafted	Shafted	Shafted		Shafted	Shafted	Shafted	Shafted	Shafted	Shafted	**Mounting Type**
Shaft/Bore Size	1/8″	1/8″ or 1/4"	1/4" or 3/8"	1/4″, 3/8" or 10mm	3/8″ or 10mm		6mm, 1/4″ or 3/8"	6 or 10mm	1/4"	1/4"	3/8", 10mm, or 12mm	3/8"	**Shaft/Bore Size**
Resolutions (PPR)	250 - 1024	100 - 2540	100 - 2540	1 - 2540	1 - 3600		1 - 3600	1 - 2540	1 - 2540	3000 - 5000	1 - 5000	8192 - 10,000	**Resolutions PPR)**
Input Voltage (VDC)	5, 12, 15	5, 12, 15	5, 12, 15	5-26	5-26		5-26	5-26	5-26	5-26	5-26	5 or 10-30	**Input Voltage (VDC)**
Operating Temperature (°C)	0 to +70	0 to +70	0 to +70	0 to +70 (-40 to +85 opt.)	-40 to +100		-40 to +100	0 to +70 (-40 to +85 opt.)	0 to +70	0 to +70	-40 to +100	0 to +70	**Operating Temperature (°C)**
Enclosure Rating	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54 (NEMA 4/IP66 opt.)	IP67		IP67 with shaft seals	NEMA 12/IP54 (NEMA 4/ IP66 opt.)	NEMA 12/IP54	NEMA 12/IP54	IP67	NEMA 4/IP66	**Enclosure Rating**
Shock/ Vibration	N/A	N/A	N/A	50g / 20g	50g / 20g		100g / 20g	50g / 20g	50g / 2g	50g / 20g	50g / 20g	50g / 2g	**Shock/ Vibration**
Sensing Engine	Optical	Optical	Optical	Optical	Optical		Optical	Optical	Optical	Optical	Optical	Optical	**Sensing Engine**
Certifications	RoHS	RoHS	RoHS	CE, RoHS	CE, RoHS		CE, RoHS	CE, RoHS	RoHS	RoHS	CE, RoHS	CE, RoHS	**Certifications**
Special Features	Sub-Compact 1.2" Diameter	Rugged Metal Housing	Integrated Coupling	Reliable Dual-Row Bearing Design	Unbreakable Code Disc and Special Housing and Seals		Economical Anodized Housing	Euro-Standard 58mm Mounting	Screw Terminal Connections	High 5000 PPR Capability	Dual Isolated Outputs Available	Direct-Read Resolution up to 10,000 PPR	**Special Features**
Page Number	1.01	1.03	1.05	1.07	1.11		1.15	1.19	1.23	1.25	1.27	1.31	**Page Number**

	SHAFTED												
	IND 	IND 	IND 	IND 	IND 	IND 	IND 		HD 	HD 	HD 	HD 	HD	
Product	**HA25**	**HC25**	**HR25**	**HA26**	**HC26**	**HR26**	**H42**		**60 Rotopulser**	**60P Rotopulser**	**H56 Rotopulser**	**HD35R**	**Rim Tach NexGen 6200**	**Rim Tach 6200**	**Product**
Encoder Size	2.5"	2.5"	2.5"	2.5"	2.5"	2.5"	2.5"		3.5" servo mount	4.5" C-Face or Foot Mount	4.5" C-Face or Foot Mount	110mm IEC Euro Flange	4.5" C-Face or Foot Mount	4.5" C-Face or Foot Mount	**Encoder Size**
Mounting Type	Shafted	Shafted	Shafted	Shafted	Shafted	Shafted	Shafted		Shafted	Shafted	Shafted	Shafted	Shafted	Shafted	**Mounting Type**
Shaft/Bore Size	1/4″ or 3/8"	1/4″ or 3/8"	1/4″ or 3/8"	1/4", 3/8" or 1/2"	1/4", 3/8" or 1/2"	1/4", 3/8" or 1/2"	3/8"		1/4″ or 1/2"*	5/8" Shaft (Single or Dual)	5/8"	11mm	5/8"	5/8"	**Shaft/Bore Size**
Resolutions (PPR)	1 - 2540	3000 - 5000	1 - 1024	1 - 2540	3000 - 5000	1 - 1024	1 - 600		1 - 2500	1 - 2500	1 - 5000	1 - 5000	60 - 2400	60 - 1200	**Resolutions (PPR)**
Input Voltage (VDC)	5-26	5-26	5-26	5-26	5-26	5-26	5-26		5-15	5-15	5-26	5-26	5-26	5-26	**Input Voltage (VDC)**
Operating Temperature (°C)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70		0 to +54	0 to +54	-40 to +80	-40 to +85	-40 to +100	-40 to +70	**Operating Temperature (°C)**
Enclosure Rating	NEMA 12/IP54 (NEMA 4/IP66 opt.)	NEMA 12/IP54 (NEMA 4/IP66 opt.)	NEMA 12/IP54 (NEMA 4/IP66 opt.)	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54		NEMA 12/IP54	NEMA 12/IP54 NEMA 4/IP66 opt	NEMA 4/ IP66	IP67	NEMA 4 & 12, IP65 at Connector	NEMA 4 & 12, IP65 at Connector	**Enclosure Rating**
Shock/ Vibration	50g / 20g	50g / 20g	50g / 20g	50g / 20g	50g / 20g	50g / 20g	50g / 20g		N/A	N/A	50g / 2.5g	400g / 20g	30g / 18g	30g / 18g	**Shock/ Vibration**
Sensing Engine	Optical	Optical	Optical	Optical	Optical	Optical	Optical		Optical	Optical	Optical	Optical	Magnetic	Magnetic	**Sensing Engine**
Certifications	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS		N/A	N/A	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	**Certifications**
Special Features	Wide Range of Resolutions Available	High 5000 PPR Capability	Unbreakable Code Disc	Integral Coupling and Flange	High 5000 PPR Resolution Capability	Unbreakable Code Disc	Simplified Economical Design		Dual Shaft Output Option	Mill-Duty Foot or Face Mount Design	Large Outer Bearings Isolate Shaft Loads	Improved Seal Design for Increased Moisture Resistance	Delivers a 70 Thousandths Air Gap; Replaceable Sensors	Foot-Mount or 56-C Face Mount	**Special Features**
Page Number	1.33	1.37	1.41	1.45	1.49	1.53	1.57		1.59	1.61	1.63	1.65	1.67	1.69	**Page Number**

QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Incremental

	HUB-SHAFT					HUB-SHAFT		HOLLOW-SHAFT					
	GP 	IND 	HD 	HD 	HD 	HD 		SSM 	SSM 	SSM 	SSM 	IND 	SSM 	
Product	**E14H**	**H20 Hubshaft**	**HSD25**	**RR25**	**HSD44**	**HSD44M**		**F10**	**F15**	**F14**	**F18**	**HS20**	**HC20**	**Product**
Encoder Size	1.4"	2.0"	2.5"	2.5"	4.4"	4.4"		1.25"	1.4"	1.55"	1.96"	2.0"	2.0"	**Encoder Size**
Mounting Type	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft		Hollow Shaft	Hollow Shaft	Hollow Shaft	Hollow Shaft	Hollow-Shaft	Hollow Shaft	**Mounting Type**
Shaft/Bore Size	1/4" to 5/8", 6mm to 14mm	1/4", 3/8", 1/2" or 5/8"	6mm - 19mm or 1/4" - 3/4"	1" or 1-1/8"	16mm	16mm		6mm	3/8"	1/4", 6mm, 8mm	1/4˝ to 1/2˝ 6 to 12mm	1/4˝ to 5/8" 6mm to 16mm	6mm, 8mm	**Shaft/Bore Size**
Resolutions (PPR)	100 - 2540	1 - 2540	1 - 3600	180 - 512	15 - 5000	15 - 5000		1024 - 2048	1024 - 2048	1000 - 5000	500 - 4096	50 - 2540	500 - 2500	**Resolutions (PPR)**
Input Voltage (VDC)	5, 12, 15	5-26	5-26	5-28	5-30	5-30		5	5	5	5	5-26	5-26	**Input Voltage (VDC)**
Operating Temperature (°C)	0 to +70	0 to +70 (-40 to +85 opt.)	-40 to +100	–20 to +85	-30 to +100	-30 to +100		0 to +120	0 to +120	0 to +120	0 to +120	0 to +70 (-40 to +85 opt.)	0 to +120	**Operating Temperature (°C)**
Enclosure Rating	NEMA 12/IP54	NEMA 12/IP54 (NEMA 4/ IP66 opt.)	IP67	IP67	NEMA 6	NEMA 6		N/A	N/A	NEMA 1/ IP40 (w/cover)	NEMA 1/ IP40 (w/cover)	NEMA 4/IP65	IP51	**Enclosure Rating**
Shock/ Vibration	N/A	50g / 20g	50g / 20g	50g / 10g	400g / 20g	400g / 20g		N/A	N/A	N/A	N/A	50g / 2.5g	N/A	**Shock/ Vibration**
Sensing Engine	Optical	Optical	Optical	Magnetic	Optical	Magnetic		Optical	Optical	Optical	Optical	Optical	Optical	**Sensing Engine**
Certifications	RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS		CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	**Certifications**
Special Features	Hub Shaft with Flex Tether	Hub Shaft with Spring Tether	Field Replaceable Shaft Isolators	Corrosion Resistant Construction; Ideal for the Ag Industry	For use in Heavy-Rail Traction Drive Applications	For use in Heavy-Rail Traction Drive Applications		Compact 1.0" Diameter Servo Ring Mount	Industry Standard Size 15 Servo Mounting	Non-Marring Hollow Shaft	Under 2.0" Dia Package with High 4096 PPR Capability	Electrically Isolated Hollow Shaft	Economical Servomotor Feedback	**Special Features**
Page Number	1.71	1.73	1.77	1.81	1.83	1.85		1.87	1.89	1.91	1.93	1.95	1.99	**Page Number**

	HOLLOW-SHAFT									SPECIALTY	MODULAR / KIT					
	IND 	HD 	HD 	HD 	HD 	HD 	HD 	HD 		HD 	HD 	SSM 	SSM 	SSM 	SSM 	SSM 	
Product	**HS35R**	**HS35M**	**HSD37**	**HSD35**	**HSD35M**	**HSD38**	**Slim Tach HS56**	**Slim Tach HS60**		**Rim Tach HS85**	**DWD38**	**E9**	**M9**	**M15**	**M53**	**M602/M832**	**Product**
Encoder Size	3.75"	3.75"	3.75"	3.8"	3.8"	3.8"	5.5"	5.5"		14"	3.75"	0.9"	0.9"	1.6"	2.0"	NA	**Encoder Size**
Mounting Type	Hollow-Shaft	Hollow-Shaft	Hollow-Shaft	Hollow-Shaft	Hollow-Shaft	Hollow-Shaft	Hollow Shaft	Hollow Shaft		Hollow Shaft	Specialty Hollow Shaft	Modular/Kit	Modular/Kit	Modular/Kit	Modular/Kit	Modular/Kit	**Mounting Type**
Shaft/Bore Size	6mm to 28mm 1/4" to 1-1/4"	6mm to 28mm 1/4" to 1-1/4"	6mm - 25mm or 1/4" - 1"	6mm - 28mm, or 1/4" - 1 1/4"	6mm - 28mm, or 1/4" - 1 1/4"	12mm - 20mm or 1/2" - 1"	5/8" - 1 1/8"	1 1/8" - 2 7/8"		1 1/8" - 4 1/2" or 25mm - 70mm	1˝-14UNS x 5/8˝-18 Threaded Shaft or 1˝ 14UNS Threaded Shaft	1.5 to 4mm, .125", .156"	1.5 to 4mm, .125", .156"	1/8˝ or 3/8˝ 6 to 10mm	1/4˝ to 1/2˝ 6 to 12mm	1/4", 3/8", 6mm, 8mm, 10mm	**Shaft/Bore Size**
Resolutions (PPR)	1 - 5000	256, 512, 1024, 2048	15 - 5000	1 - 5000	256, 512, 1024, 2048	15 - 5000	64 - 2048	64 - 2048		60 - 2048	15 - 5000	100 - 512	100 - 512	200 - 1024	500 - 2048	1 - 5000	**Resolutions (PPR)**
Input Voltage (VDC)	5-26	5-26	5-26	5-26	5-26	5-26	5-26	5-26		5-26	5-26	5	5	5	5 or 12	5	**Input Voltage (VDC)**
Operating Temperature (°C)	-40 to 85 (-40 to +100 opt.)	-40 to +120	-40 to +100	-40 to +100	-40 to +120	-40 to +100	-20 to 80	-20 to 80		-20 to +70	-40 to +100	-20 to +100	-20 to +100	0 to +120	0 to +120	-40 to +100	**Operating Temperature (°C)**
Enclosure Rating	IP67	IP67	IP67	IP67 (IP64 at Shaft Speeds Above 5000 RPM)	IP67 (IP64 at Shaft Speeds Above 5000 RPM)	IP67	NEMA 4 &12, IP65	NEMA 4 &12, IP65		NEMA 4 &12, IP65	IP67	N/A	N/A	NEMA 1/ IP50 (with cover)	NEMA 1/ IP50 (w/cover)	Unsealed Housing	**Enclosure Rating**
Shock/ Vibration	400g / 20g	400g / 20g	400g / 20g	400g / 20g	400g / 20g	50g / 20g	30g / 18g	30g / 18g		30g / 18g	400g / 20g	N/A	N/A	N/A	N/A	N/A	**Shock/ Vibration**
Sensing Engine	Optical	Magnetic	Optical	Optical	Magnetic	Optical	Magnetic	Magnetic		Magnetic	Optical	Optical	Optical	Optical	Optical	Optical	**Sensing Engine**
Certifications	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS		CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	RoHS	**Certifications**
Special Features	Shock Resistant to 400g	Top of the line Vector Duty Encoder now available in Magnetic	Operates in High Shock and Vibration Environments	Stainless Steel Clamp and Hub Shaft for Mill Duty	Mill Duty Encoder now available in Magnetic	Electrically & Thermally Isolated Hollow shaft	Ideal for TEFC AC Motor Mounting	Encapsulated Electronics Resist Moisture and Contamination		Hollow Shaft Design Mounts Easily to Large Motor Shafts	Stackable Encoder Options Available	Super-Compact Size for Small Motors	Up to 512 PPR Resolution	Easy Installation Without Special Tools	Up to 2048 PPR with Commutation Tracks	Tool-Less Gapping	**Special Features**
Page Number	1.101	1.107	1.113	1.119	1.123	1.127	1.131	1.133		1.135	1.137	1.139	1.141	1.143	1.147	1.149	**Page Number**

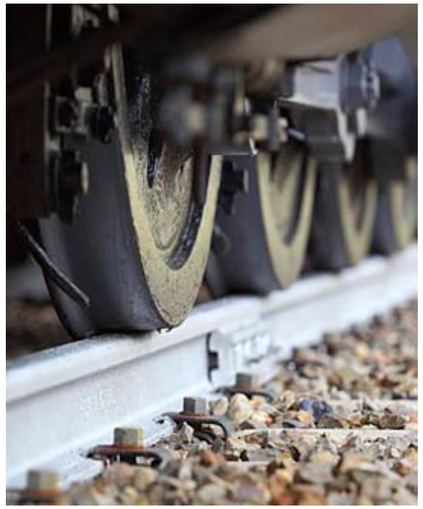
QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Incremental

	BEARINGLESS HD	HD	HD	HD	HD	HD	HD		HD	HD	HD	HD	HD	HD	HD	BEARINGLESS HD	
Product	**HDP18**	**HDP30**	**HDN58**	**R45 Rotopulser**	**Slim Tach NexGen ST56**	**Slim Tach SL56**	**Slim Tach NexGen ST67**		**Slim Tach RL67**	**Slim Tach NexGen ST85**	**Slim Tach SL85**	**Rim Tach NexGen 8500**	**Rim Tach 8500**	**Rim Tach NexGen 1250**	**Rim Tach 1250**	**Slim Tach SL1250**	**Product**
Encoder Size	18mm	30mm	58mm	4.5" C-Face	4.5" C-Face	4.5" C-Face	4.5" C-Face		4.5" C-Face	8.5" C-Face	8.5" C-Face	8.5" C-Face	8.5" C-Face	12.5" C-Face	12.5" C-Face	12.5" C-Face	**Encoder Size**
Mounting Type	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless		Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	**Mounting Type**
Shaft/Bore Size	1/2" to 1 1/2"	1/2" to 1 1/2"	1/2" to 1 1/2"	5/8˝ or 7/8˝	5/8" - 2 7/8" or 16mm - 80mm	5/8" - 2 7/8"	5/8" - 2 7/8" or 16mm - 80mm		5/8" - 2 7/8"	5/8" - 2 7/8" or 16mm - 80mm	5/8" - 2 7/8"	5/8" - 2 7/8" or 16mm - 80mm	5/8" - 2 7/8"	5/8" - 2 7/8" or 16mm - 80mm	5/8" - 2 7/8"	5/8" - 2 7/8" or 16mm - 80mm	**Shaft/Bore Size**
Resolutions (PPR)	256	8 - 512	8 - 512	60	64 - 2048	64 - 1024	64 - 2048		64 - 1024	64 - 2048	64 - 1024	60 - 2400	60 - 1200	60 - 2400	60 - 1200	64 - 1024	**Resolutions (PPR)**
Input Voltage (VDC)	6-30	6-30	6-30	5-26	5-26	5-26	5-26		5-26	5-26	5-26	5-26	5-26	5-26	5-26	5-26	**Input Voltage (VDC)**
Operating Temperature (°C)	-25 to +80	-25 to +80	-25 to +70	-40 to +85	-40 to +100 Extended -40 to +120	-40 to +90 Extended -40 to +100	-40 to +100 Extended -40 to +120		-40 to +90 Extended -40 to +100	-40 to +100 Extended -40 to +120	-40 to +90 Extended -40 to +100	-40 to +100	-40 to +90 Extended -40 to +100	-40 to +100	-40 to +80	-40 to +90 Extended -40 to +100	**Operating Temperature (°C)**
Enclosure Rating	IP68	IP68	Connector Dependent IP65, IP67 or IP68	N/A	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector		NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	NEMA 4&12, IP65 at Connector	**Enclosure Rating**
Shock/ Vibration	N/A	N/A	50g / 10g	20g / 2.5g	300g / 20g	30g / 18g	300g / 20g		30g / 18g	300g / 20g	30g / 18g	200g / 18g	30g / 18g	200g / 18g	30g / 18g	30g / 18g	**Shock/ Vibration**
Sensing Engine	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic		Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	Magnetic	**Sensing Engine**
Certifications	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS		CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	CE, RoHS	**Certifications**
Special Features	Incremental & Absolute Output's Available; Completely Sealed & Encapsulated Electronics	Incremental & Absolute Output's Available; CAN SAE J1939 Communication Protocol	Incremental & Absolute Output's Available; Wide Sensing Envelope is Tolerant to Misalignment	56C-face Ring Kit Motor Mounting and Field-Replaceable Readhead for Easy Service	Mounts to 56 and 140 C-Face Motors; Replaceable Wheels	Mounts to 56 and 140 C-Face Motors; Thin Profile Can be Sandwiched Between Motor & Reducer	Mounts to Reliance 6.75 Recess, 56 and 140 C-Face Motors; Replaceable Wheels		Mounts to Reliance Motors (6.75 fit and 56 and 140 C-Face); Large Air Gap of 0.060	Mounts to 180 C-Face Motors; Replaceable Wheels	Mounts to 180 C-Face Motors; Dual C-Face Versions Available	Circuitry for On-Board Diagnostics with LED and Alarm; Replaceable Wheels and Sensors	Mounts to 180-C Face Motors	Circuitry for On-Board Diagnostics with LED and Alarm; Replaceable Wheels and Sensors	Mounts to 250-C Face Motors (12.5 Diameter Mounting Flange)	Mounts to 250-C Face Motors; Requires only 1.4" of Motor Shaft	**Special Features**
Page Number	1.153	1.157	1.159	1.161	1.163	1.165	1.167		1.169	1.171	1.173	1.177	1.179	1.181	1.183	1.185	**Page Number**

NOTE: Additional bore sizes available for all RIM Tach and SLIM Tach models, please consult factory.



QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Absolute

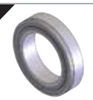
	SHAFTED														SHAFTED	
	SSM 	SSM 	IND 	IND 	IND 	IND 	IND 		IND 	IND 	IND 	IND 	SSM 	HD 	
Product	**AD34**	**AD25**	**AI25**	**AI25**	**AI25**	**AI25**	**AI25**		**AI25**	**AI25**	**AI25**	**AI25**	**AC36**	**AR62/63**	**Product**
Protocols	BiSS, SSI	BiSS, SSI	BiSS	CANOpen	CANLayer2	DeviceNet	EtherCAT		Interbus	Parallel	Profibus	SSI	BiSS/SSI	SSI, CANOpen, Analog	**Protocols**
Encoder Size	37.5 mm	58 mm	58 mm, or 2.5"	58 mm, or 2.5"	58 mm, or 2.5"	58 mm, or 2.5"	58 mm, or 2.5"		58 mm, or 2.5"	58 mm, or 2.5"	58 mm, or 2.5"	58 mm, or 2.5"	37.5 mm	58 mm or 2.5"	**Encoder Size**
Mounting Type	Shafted	Shafted	Shafted	Shafted	Shafted	Shafted	Shafted		Shafted	Shafted	Shafted	Shafted	Shafted	Shafted	**Mounting Type**
Shaft/Bore Size	6mm	10mm	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝		6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6mm & 10mm & 3/8˝	6 mm	3/8", 10 mm	**Shaft/Bore Size**
Resolutions (PPR)	Up to 19 bit Single-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn,12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn		Up to 12 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 17 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	12 Bit Single-Turn, 12, 13 and 16 Bit Multi-Turn	**Resolutions (PPR)**
Input Voltage (VDC)	5 or 7-30	5	5 or 10-30	10-30	10-30	10-30	7-30		10-30	5 or 10-30	10-30	5 or 10-30	5 or 7-30	10-30	**Input Voltage (VDC)**
Operating Temperature (°C)	-15 to +120	-15 to +120	–40 to +100	–40 to +85	–40 to +85	–40 to +85	–40 to +85		–40 to +85	–40 to +100	–40 to +85	–40 to +100	–40 to +100	-40 to +100	**Operating Temperature (°C)**
Enclosure Rating	IP40	IP40	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67		IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64	IP67/ IP69k	**Enclosure Rating**
Shock/ Vibration	100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 10g	400g / 30g		100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 10g	200g / 20g	**Shock/ Vibration**
Sensing Engine	Optical	Optical	Optical	Optical	Optical	Optical	Optical		Optical	Optical	Optical	Optical	Optical	Magnetic	**Sensing Engine**
Certifications	CE, RoHS	CE, RoHS	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL		CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS	**Certifications**
Special Features	Notched Shaft Installs Easily. Eliminates Coupling Issues	Special Conical Shaft for Concentric Motor Mounting	High speed 6 wire serial protocol encoder	Terminal strip and dip switches allow for easy installation and configuration	High precision fully integrated opto ASIC technology	Allows Interoperability	High data transmission efficiency with short cycle times		Lower Noise Sensitivity	Data is transferred in parallel over several lines	Capable Of Sending Complex Communications when time Is Critical	Ideal for demanding motion control applications with high accuracy	Compact Construction can directly replace corresponding incremental encoders	Copes with extreme acceleration, drastic climate change. Can work normally under water.	**Special Features**
Page Number	2.01	2.05	2.07	2.11	2.13	2.15	2.17		2.21	2.23	2.27	2.29	2.33	2.37	**Page Number**

	HUB-SHAFT										HOLLOW-SHAFT	SAFETY	
	IND 	IND 	IND 	IND 	IND PIC?	IND 	IND 		IND 	IND 	SSM 	SSM 	SSM 	SSM 	HD 	
Product	**AI25**	**AI25**	**AI25**	**AI25**	**AI25**	**AI25**	**AI25**		**AI25**	**AI25**	**AC36**	**AD35**	**AD36**	**AD36**	**AD37S**	**Product**
Protocols	BiSS	CANOpen	CANLayer2	DeviceNet	EtherCAT	Interbus	Parallel		Profibus	SSI	BiSS/SSI	BiSS, SSI	BiSS, SSI	BiSS, SSI	Acuro Link	**Protocols**
Encoder Size	58 mm	58 mm	58 mm	58 mm	58 mm	58 mm	58 mm		58 mm	58 mm	37.5 mm	37.5 mm	37.5 mm	37.5 mm	39.3 mm	**Encoder Size**
Mounting Type	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft		Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hub-Shaft	Hollow-Shaft	Integrated Double-Cardanic Coupling Hub	**Mounting Type**
Shaft/Bore Size	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"		10mm, 12mm, 3/8˝ &1/2"	10mm, 12mm, 3/8˝ &1/2"	8 mm	8mm	8mm	8mm	Shaft with Integrated Coupling Hub	**Shaft/Bore Size**
Resolutions (PPR)	Up to 22 bit Single-Turn,12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	Up to 12 bit Single-Turn, 12 bit Multi-Turn	Up to 14 bit Single-Turn, 12 bit Multi-Turn		Up to 14 bit Single-Turn, 12 bit Multi-Turn	Up to 17 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	Up to 22 bit Single-Turn, 12 bit Multi-Turn	Up to 20 bit Single-Turn, 12 bit Multi-Turn	**Resolutions (PPR)**
Input Voltage (VDC)	5 or 10-30	10-30	10-30	10-30	7-30	10-30	5 or 10-30		10-30	5 or 10-30	5 or 7-30	5 or 7-30	5 or 7-30	5 or 7-30	7 - 12	**Input Voltage (VDC)**
Operating Temperature (°C)	–40 to +100	–40 to +85	–40 to +85	–40 to +85	–40 to +85	–40 to +85	–40 to +100		–40 to +85	–40 to +100	–40 to +100	–15 to +120	-15 to +120	-15 to +120	-20 to +105	**Operating Temperature (°C)**
Enclosure Rating	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67		IP64 or IP67	IP64 or IP67	IP64	IP40	IP40	IP40	IP40	**Enclosure Rating**
Shock/ Vibration	100g / 10g	100g / 10g	100g / 10g	100g / 10g	400g / 30g	100g / 10g	100g / 10g		100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 10g	100g / 20g	**Shock/ Vibration**
Sensing Engine	Optical	Optical	Optical	Optical	Optical	Optical	Optical		Optical	Optical	Optical	Optical	Optical	Optical	Magnetic	**Sensing Engine**
Certifications	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL		CE, RoHS, UL	CE, RoHS, UL	CE, RoHS, UL	CE, RoHS	CE, RoHS	CE, RoHS	SIL2 PLd SIL3 PLe	**Certifications**
Special Features	High speed 6 wire serial protocol encoder	Terminal strip and dip switches for easy installation and configuration	High precision fully integrated opto ASIC technology	Allows Interoperability	High data transmission efficiency with short cycle times	Lower Noise Sensitivity	Data is transferred in parallel over several lines		Capable of Complex Communications when time Is Critical	For demanding motion control applications with high accuracy	Compact Design can replace corresponding incremental encoders	Short Mounting Depth Allows Installation in Tight Motor Endbells	Compact Dimensions Compatible with Size 15 Resolvers	Compact Dimensions Compatible with Size 15 Resolvers	SIL2 safety in servo motor control systems	**Special Features**
Page Number	2.07	2.11	2.13	2.15	2.17	2.21	2.23		2.27	2.29	2.33	2.41	2.45	2.45	2.49	**Page Number**

QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Resolvers

	FRAMELESS								HOUSED						
	HD 	HD 	HD 	HD 	HD 	HD 	HD 		SSM 	SSM 	HD 	HD 	HD 	HD 	
Product	**Size 10**	**Size 15**	**HaroMax 15**	**Size 21**	**HaroMax 21**	**Size 31**	**Size 55**		**Size 11**	**R11**	**R25**	**RF25**	**RH25**	**R56**	**Product**
Resolver Size	1.0"	1.5"	1.5"	2.1"	2.1"	3.1"	5.5"		1.1"	1.1"	2.5"	2.5"	2.5"	5.6"	**Resolver Size**
Mounting Type	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless	Bearingless		Shafted	Shafted	Servo/ Flange	Flange	Hub Shaft	Foot/ C-Face	**Mounting Type**
Shaft/Bore Size	Up to 1/4"	Up to 12mm	Up to 12mm	Up to 20mm	Up to 20mm	Up to 40mm	Up to 92mm		0.120" (3.05mm)	0.120" (3.05mm)	3/8"	3/8"	5/8"	5/8"	**Shaft/Bore Size**
Accuracy	+/- 15 arcmin Single speed	+/- 7 arcmin Single speed +/- 4 arcmin Multiple speeds	16 arcmin spread Single speed	+/- 7 arcmin Single speed +/- 4 arcmin Multiple speeds	18 arcmin spread Single speed	+/- 10 arcmin Single speed +/- 5 arcmin Multiple speeds	+/- 30 arcmin Single speed +/- 2 arcmin Mutiple speeds		+/- 7 arcmin	+/- 20 arcmin	+/- 7 arcmin Single speed +/- 2 arcmin Multiple speeds	+/- 10 arcmin Single speed 10 arcmin spread Two speed	+/- 7 arcmin Maximum	+/- 10 arcmin Single speed 10 arcmin spread Two speed	**Accuracy**
Input Voltage (Vrms)	2-10	2-10	2-10	2-10	2-10	2-10	2-10		2-26	2-6	2-26	26	2-10 (see order info)	26	**Input Voltage (Vrms)**
Operating Temperature (°C)	Up to 200	Up to 200	Up to 155	Up to 200	Up to 155	Up to 200	Up to 200		Up to 125	Up to 125	-55 to +125	-55 to +125	-55 to +125	-40 to +120	**Operating Temperature (°C)**
Enclosure Rating	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	IP65	IP65	IP54	IP66	**Enclosure Rating**
Sensing Engine	Inductive	Inductive	Inductive	Inductive	Inductive	Inductive	Inductive		Inductive	Inductive	Inductive	Inductive	Inductive	Inductive	**Sensing Engine**
Shock/ Vibration	50g / 10g	50g / 10g	50g / 10g	50g / 10g	50g / 10g	N/A	N/A		N/A	N/A	200g / 40g	200g / 40g	N/A	50g / 10g	**Shock/ Vibration**
Certifications	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	RoHS	RoHS	N/A	RoHS	**Certifications**
Special Features	Radiation Hardened Available	Radiation Hardened Available	Machine Wound Stator	Radiation Hardened Available	Machine Wound Stator	Radiation Hardened Available	Radiation Hardened Available		Radiation Hardened	Radiation Hardened	Optional Connectors & Locations	Optional Connectors & Locations	N/A	Latching Connector	**Special Features**
Page Number	3.01	3.03	3.05	3.07	3.09	3.11	3.13		3.15	3.15	3.17	3.19	3.21	3.25	**Page Number**

QUICK REFERENCE GUIDE

DYNAPAR™

Quick Reference - Hazardous Duty

	SHAFTED INCREMENTAL			HUB-SHAFT INCREMENTAL			HOLLOW-SHAFT INCREMENTAL			SPECIALTY INCREMENTAL	SHAFTED ABSOLUTE			
	HAZ 	HAZ 	HAZ 	HAZ 	HAZ 		HAZ 	HAZ 	HAZ 	HAZ 	HAZ 	HAZ 	HAZ 	
Product	**Hazardous HD20**	**Hazardous HD25**	**X25**	**ISD25**	**EN44**		**Hazardous HSD35**	**ISD37**	**EN42**	**ISW38**	**AX65**	**AX70/71**	**AX73**	**Product**
Encoder Size	2.0”	2.5”	4”	2.5”	4.4”		3.8"	3.75"	3.8”	3.75”	59 mm Servo Mount	70 mm Face Mount	73.5 mm Face Mount	**Encoder Size**
Mounting Type	Shafted	Shafted	Shafted	Hub-Shaft	Hub-Shaft		Hollow-Shaft	Hollow-Shaft	Hollow-Shaft	Specialty Hollow Shaft	Shafted	Shafted	Shafted	**Mounting Type**
Shaft/Bore Size	3/8", 10mm	3/8", 10mm, 12mm	1/4" or 3/8"	6mm - 19mm or 1/4" - 3/4"	16mm		6mm - 28mm, or 1/4" - 1 1/4"	6mm - 25mm 1/4" - 1”	15mm-16mm or 5/8" - 1"	1”-14UNS x 5/8”-18 Threaded Shaft or 1”-14UNS Threaded Shaft	10 mm	10 mm	10 mm	**Shaft/Bore Size**
Resolutions (Bits)	1 - 3600	1 - 5000	1 - 5000	1 - 3600	1024 and 2048		1 - 5000	15 - 5000	15 - 5000	15 - 5000	12 Bit Single-Turn, 12, 13 and 16 Bit Multi-Turn	10 - 22 Bit Single-Turn, 12 Bit Multi-Turn	14 Bit Single-Turn, 12 Bit Multi-Turn	**Resolutions (Bits)**
Input Voltage (VDC)	5-26	5-26	5-26	5 or 7-26	7-26 or 10-30		5-26	5 or 7-26	7-26 or 10-30	5 or 7-26	10-30	5 or 10-30	10-30	**Input Voltage (VDC)**
Operating Temperature (°C)	-40 to +80	-40 to +80	0 to +70	-40 to +80	-50 to +100		-40 to +85	-40 to +80	-50 to +100	-40 to +80	-40 to +60	-40 to +60	-40 to +70	**Operating Temperature (°C)**
Enclosure Rating	IP67	IP67	NEMA 4X / IP56	IP67	IP67		IP67	IP67	IP67	IP67	IP66/IP67	IP64/IP67	IP67	**Enclosure Rating**
Sensing Engine	Optical	Optical	Optical	Optical	Optical		Optical	Optical	Optical	Optical	Magnetic	Optical	Optical	**Sensing Engine**
Shock/ Vibration	50g / 20g	50g / 20g	50g / 2g	50g / 20g	50g / 20g		400g / 20g	400g / 20g	50g / 20g	400g / 20g	200g / 30g	100g / 10g	100g / 10g	**Shock/ Vibration**
Certifications	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, UL	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, CSA, ATEX, IECEx		CE, RoHS, UL	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, CSA, ATEX, IECEx	CE, RoHS, ATEX, IECEx	CE, RoHS, ATEX, IECEx, AEx	CE, RoHS, ATEX, IECEx	**Certifications**
Special Features	Ideal for Corrosive Environments with Stringent Wash-down Requirements	Ideal for Corrosive Environments with Stringent Wash-down Requirements	NEC Class 1&2, Div 1&2, Groups C, D, E, F, G	Field Replaceable Shaft Isolators	Triple Certified Encoder for Hazardous Locations		Field Serviceable Connector for Solder-Less Connections	Operates in High Shock and Vibration Environments	Encapsulated Electronics with Increased Safety Interface for Zone 1 Use	Draw Works Threaded Shaft with Field Replaceable Adapters	Extreme Robust Explosionproof Absolute Multiturn Encoder	Pressure Resistant Housing for Explosive Environments	Extreme corrosion resistance: high grade stainless steel housing	**Special Features**
Page Number	4.01	4.03	4.07	4.09	4.13		4.17	4.21	4.27	4.31	4.35	4.39	4.43	**Page Number**

DYNAPAR™

Incremental Encoders

An incremental encoder can be used in positioning and motor speed feedback applications which includes servo/light-, industrial- or heavy-duty applications.

Incremental encoders provide speed, direction and relative position feedback by generating a stream of pulses proportional to the rotation of a motor or driven shaft. Single channel incremental encoders can measure speed while dual channel or quadrature encoders (AB) can interpret direction based on the phase relationship between the 2 channels. Since there are few sensors involved, the systems are both simple and inexpensive. An incremental encoder is limited by only providing change information, so the encoder requires a reference device to calculate motion used.

INCREMENTAL ENCODERS

DYNAPAR™

Incremental Encoder Highlights

HS35R — PAGE 1.101

KEY FEATURES:
- Phased Array Sensor for Reliable Signal Output
- Unbreakable Code Disc up to 5000 PPR
- Rugged Design Withstands up to 400g Shock and 20g Vibration
- Heavy Duty Design Rated for IP67
- Customizable Mounting Options including Torque Arm with Optional Grounding Strap

SLIM Tach ST56 — PAGE 1.163

KEY FEATURES:
- Redesigned Using Our Revolutionary Sensor Technology to Provide a Large Air Gap of 0.060”
- Redesigned Circuitry for On-Board Diagnostics with LED and Alarm Output
- Bearingless Design Mounts to 56 and 140 C-Face Motors
- Thin 3/4” Profile Saves Space and Can be “Sandwiched” Between Motor & Reducer

HSD44M — PAGE 1.85

KEY FEATURES:
- Extremely Heavy Duty Magnetic Encoder with Nema 6/ IP67 Rating
- Designed and Built Specifically for Traction Drives in Rail Applications
- Phased-Array Sensor Technology to Provide High Shock and Vibration Resistance
- Optimized for Ease of Installation and Survival in Harsh Environments

RIM Tach RT8 — PAGE 1.177

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

HSD35M — PAGE 1.123

KEY FEATURES:
- Rugged Magnetic 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

HD25 — PAGE 1.27

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

Section 1

SERIES E12

Dynapar™ brand

Miniature Encoder

GP
General Purpose

RoHS

Key Features

- **Rugged Metal Housing**
- **Sub-Compact 1.2” Diameter**
- **Up to 1024 PPR with Optional Index**

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 250 to 1024 PPR (pulses/ revolution)

Format: Two channel quadrature (AB)with optional Index (Z) outputs

Phase Sense: A leads B for CW shaft rotation as viewed from the shaft end of the encoder

Accuracy: ±3 x (360 ° ÷PPR)or ± 2.5 arc-min worst case pulse to any other pulse, whichever is less

Quadrature Phasing: 90 ° ± 36 ° electrical

Symmetry: 180 ° ± 18 ° electrical

Index: 90 ° ± 25 ° (gated with A and B high)

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

ELECTRICAL

Input Power: 5 VDC ± 5% at 80 mA max.; 12 or 15 VDC ± 10% at 80 mA max.; not including output loads

Outputs:

7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

Frequency Response: 100 kHz min.

Termination: Cable

Cable: PVC Jacket, 105°C rated, overall foil shielded; 28 AWG wires

Electrical Connections

Function (If Used)	Wire Color Code
Supply	Red
Common	Black
Signal A	White
Signal B	Green
Signal Z	Orange
Floating	Shield

MECHANICAL

Shaft Size: 1/8”

Shaft Loading: 1 lb. radial,1 lb.axial max.

Shaft Speed: 5,000 RPM max.

Starting Torque:

Shielded Bearing: 0.1 oz-in max. at 25 °C
Sealed Bearing: 0.3 oz-in max.at 25 °C

Running Torque:

Shielded Bearing: 0.08 oz-in max.at 25 °C;
Sealed Bearing: 0.2 oz-in max. at 25 °C

Mechanical Bearing Life: 16 x 10^{6} revolutions at max. load

Moment of Inertia: 1.13 x 10^{-5} oz –in –sec ^{2}

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 3.0 oz.max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

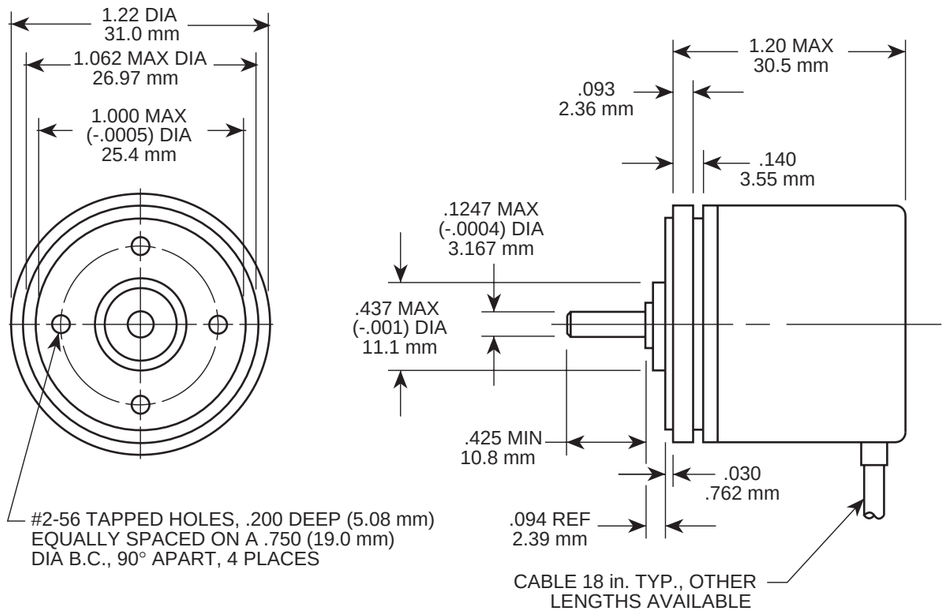
SERIES E12

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: Voltage	Code 6: Termination
E12	□□□□	□	□	□	□
E12 Size 12, Light Duty Enclosed	**0250** **0256** **0360** **0500** **0600** **1000** **1024**	**0** Sealed Bearing **1** Shielded Bearing	**0** Unidirectional **2** Bidirectional, no Index **3** Bidirectional, with Index	**0** 5 VDC **1** 12 VDC **2** 15 VDC	**0** 18” Cable **1** 3’ Cable **2** 6’ Cable **3** 10’ Cable **4** 15’ Cable

Dimensions (inches/mm)



SERIES E14

Dynapar™ brand

Miniature Encoder

GP
General Purpose

Key Features

- **Rugged Metal Housing**
- **Optional Differential Line Driver Outputs**
- **Up to 2540 PPR with Optional Index**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 100 to 2540 PPR (pulses/ revolution)

Format: Two channel quadrature (AB) with optional Index (Z)outputs

Phase Sense: A leads B for CW shaft rotation as viewed from the shaft end of the encoder

Accuracy: ±3 x (360 ° ÷PPR) or ± 2.5 arc-min worst case pulse to any other pulse,whichever is less

Quadrature Phasing: 90 ° ± 36 ° electrical

Symmetry: 180 ° ± 18 ° electrical

Index: 90 ° ± 25 ° (gated with A and B high)

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

ELECTRICAL

Input Power: 5 VDC ± 5% at 80 mA max.;
12 or 15 VDC ± 10% at 80 mA max.; not including output loads

Outputs:

7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

Frequency Response: 100 kHz min.

Termination: Cable

MECHANICAL

Shaft Sizes: 1/8” or 1/4”

Shaft Loading: 5 lb. radial, 3 lb. axial max.

Shaft Speed: 5,000 RPM max.

Starting Torque:

Shielded Bearing: 0.1 oz-in max. at 25 °C
Sealed Bearing: 0.43 oz-in max. at 25 °C

Running Torque:

Shielded Bearing: 0.08 oz-in max. at 25 °C
Sealed Bearing: 0.42 oz-in max. at 25 °C

Moment of Inertia: 3.8 x 10^{-5} oz –in –sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 3.0 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

Electrical Connections

Wire Color Code	Function		
	Standard Outputs 5, 12, or 15 VDC	w/ Line Driver Outputs	
		Unidirectional	Bidirectional
Red	Power Source	Power Source	Power Source
Black	Common	Common	Common
White	Signal A	Signal A	Signal A
Green	Signal B (if used)	Signal $\overline{A}$	Signal B
Orange	Signal Z (if used)	No Connection	Signal $\overline{B}$
Blue	No Connection	No Connection	Signal $\overline{A}$
Shield	Floating	Floating	Floating
White/Black	——	——	Signal Z (if used)
Red/Black	——	——	Signal $\overline{Z}$ (if used)

by DYNAPAR™

SERIES E14

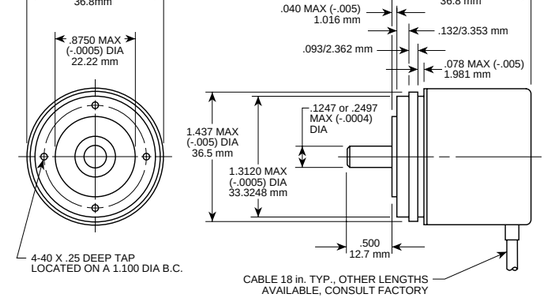
Ordering Information

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

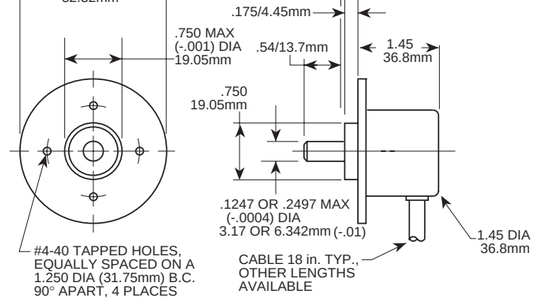
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mounting	Code 4: Mechanical	Code 5: Output	Code 6: Electrical	Code 7: Termination
E14	□□□□	□	□	□	□	□
E14 Size 14, Light Duty Enclosed	**0100** **0750** **0200** **0900** **0250** **1000** **0256** **1024** **0300** **1250** **0400** **1500** **0500** **2000** **0600** **2048** **0720** **2500** **2540**	**0** Size E14 **1** Size E20 Servo **2** Size E20 Flange Available when code 4 is 2 **3** Size EC80 Flange	**0** 1/4” Shaft, Sealed Bearing **1** 1/8” Shaft, Sealed Bearing **2** 1/4” Shaft, Shielded Bearing **3** 1/8” Shaft, Shielded Bearing	**0** Single Ended, Unidirectional **2** Single Ended, Bidirectional, no Index **3** Single Ended, Bidirectional, with Index **4** Differential, Unidirectional **6** Differential, Bidirectional, no Index **7** Differential, Bidirectional, with Index	**0** 5 VDC **1** 12 VDC **2** 15 VDC	**0** 18” Cable **1** 3’ Cable **2** 6’ Cable **3** 10’ Cable **4** 15’ Cable

Dimensions (inches/mm)

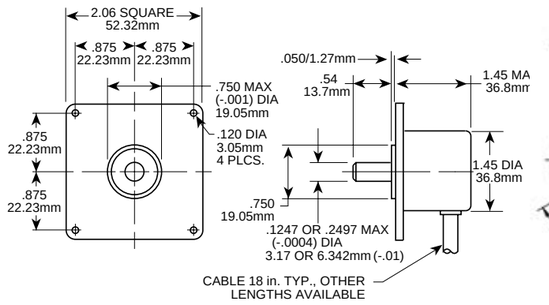
Code 3: 0



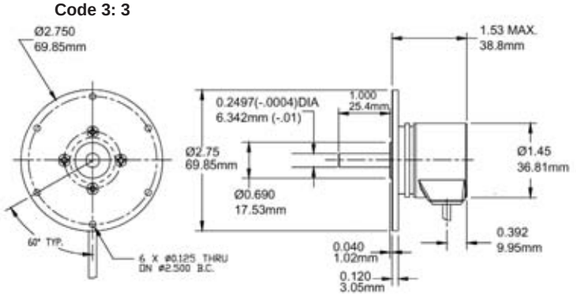
Code 3: 1



Code 3: 2



Code 3: 3



SERIES E14IC

Dynapar™ brand

Miniature Encoder

Key Features

- **Integrated coupling and "top-hat" for simple installation**
- **Compatible with NEMA size 23 and 24 motors**
- **Optional differential line driver outputs**

GP
General Purpose

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 100 to 2540 PPR (pulses/revolution)

Format: Two channel quadrature (AB) with optional Index (Z) outputs

Phase Sense: A leads B for CW shaft rotation as viewed from the shaft end of the encoder; Reverse phasing available, see Ordering Information

Accuracy: ±3 x (360° ÷ PPR) or ± 2.5 arc-min worst case pulse to any other pulse, whichever is less

Quadrature Phasing: 90° ± 36° electrical

Symmetry: 180° ± 18° electrical

Index: 90° ± 25° (gated with A and B high)

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

ELECTRICAL

Input Power:
5 VDC ± 5% at 80 mA max.;
12 or 15 VDC ± 10% at 80 mA max.; not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

Frequency Response: 100 kHz min.

Termination: Cable, Cable with DB25 Connector

MECHANICAL

Bore Diameter: 1/4", 3/8"

Shaft Speed: 5,000 RPM max.

Starting Torque: 0.1 oz-in max. at 25 °C

Running Torque: 0.08 oz-in max. at 25 °C

Moment of Inertia: 3.8 x 10^{-5} oz–in–sec^2

Bearing Life: (16 x 10^6 ÷ RPM) hours min.

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 7.0 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

Electrical Connections

Wire Color Code	Function			DB 25 Connector Pin Number
	Single Ended Outputs	Differential Outputs		
		Unidirectional	Bidirectional	
Red	Power Source	Power Source	Power Source	23
Black	Common	Common	Common	14
White	Signal A	Signal A	Signal A	1
Green	Signal B (if used)	Signal $\overline{A}$	Signal B	3
Orange	Signal Z (if used)	No Connection	Signal $\overline{B}$	4
Blue	No Connection	No Connection	Signal $\overline{A}$	2
Shield	Floating	Floating	Floating	8
White/Black	——	——	Signal Z (if used)	5
Red/Black	——	——	Signal $\overline{Z}$ (if used)	6

by DYNAPAR™

SERIES E14IC

Ordering Information

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

Code 1: Model	Code 2: Pulses/Rev	Code 3: Mounting	Code 4: Mechanical	Code 5: Output	Code 6: Electrical	Code 7: Termination
E14	□□□□	**0**	□	□	□	□
E14 Size 14, with Integral Shaft Coupling	**0100** **0750** **0200** **0900** **0250** **1000** **0256** **1024** **0300** **1250** **0400** **1500** **0500** **2000** **0600** **2048** **0720** **2500** **2540**	**0** Size E14	**A** NEMA Size 23 Flange Mount with 1/4" Motor Shaft Coupling **B** NEMA Size 23 Flange Mount with 3/8" Motor Shaft Coupling **C** NEMA Size 34 Flange Mount with 3/8" Motor Shaft Coupling	**0** Single Ended, Unidirectional **2** Single Ended, Bidirectional, no Index **3** Single Ended, Bidirectional, with Index **4** Differential, Unidirectional **6** Differential, Bidirectional, no Index **7** Differential, Bidirectional, with Index **8** Differential, Bidirectional, with Index, Reversed Phasing	**0** 5 VDC **1** 12 VDC **2** 15 VDC	**0** 18" Cable **1** 3' Cable **2** 6' Cable **3** 10' Cable **4** 15' Cable available when Code 5 = 7 or 8: **5** 10' Cable, DB25 Connector **7** 25' Cable, DB25 Connector

Flange Adapter Ordering Codes

Factory Option Code	Motor Frame Size	Motor Shaft Diameter	Model No. of Coupling Only
A	23	1/4"	605106-1
B	23	3/8"	605106-3
C	34	3/8"	605106-3

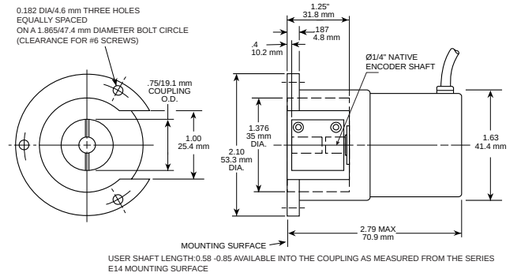
Other couplings available; consult factory.

Field Installed Kit:

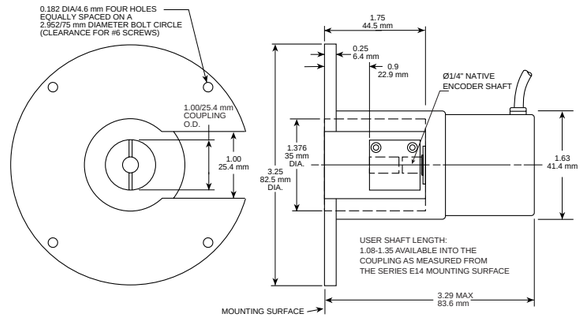
Field installed kits are available by ordering either Model No. E14-N1 (integral housing and mounting hardware for NEMA size 23 motors) or Model No. E14-N2 (integral housing & mounting hardware for NEMA size 34 motors), and the appropriate coupling listed in the table left.

Dimensions (inches/mm)

E14 for NEMA Size 23 Motors



E14 for NEMA Size 34 Motors



SERIES H20

Dynapar™ brand

Shafted Encoder

IND Industrial Duty

Key Features

- Reliable Dual-Row Bearing Design
- IP66 Sealing Option
- Optional Unbreakable Code Disc

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 2540 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° ± 22.5° electrical

Symmetry: 180° ± 18° electrical

Index: 180° ± 18° electrical (gated with B low)

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

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exit
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, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-xxxx)
Cable w/ 8 pin M12 Connector (112860-xxxx)

MECHANICAL

Shaft Sizes: 10mm, 1/4" or 3/8"

Shaft Loading: (at 0.25" from encoder face)
Resolutions ≤1024 PPR: 80 lbs. radial, axial
Resolutions >1024 PPR: 40 lbs. radial, axial

Shaft Speed:
Resolutions ≤1024 PPR: 10,000 RPM max.
Resolutions >1024 PPR: 5,000 RPM max.

Starting Torque: (max at 25 °C)
without shaft seal: 1.0 oz-in;
with shaft seal: 2.0 oz.-in

Moment of Inertia: 3.0 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disk Material: Glass or plastic (PPR Dependant)
Weight: 10 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G's for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G's

Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, washdown) when ordered with shaft seal and either M12 connector or watertight cable exit

by DYNAPAR™

SERIES H20

Ordering Information

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

Code 1: Model	Code 2: PPR	Code3: Housing	Code 4: Shaft	Code 5: Face Mount	Code 6: Pilot, Seal	Code 7: Electrical	Code 8: Termination	Code 9: Options
H2□	□□□□	□	□	□	□	□	□	□
Ordering Information								
1 Unidirectional **2** Bidirectional **3** Bidirectional with Index	**0001** **0600** **0005** **0800** **0010** **0900** **0012** **1000** **0050** **1024** **0060** **1200** **0100** **1250** **0120** **1270** **0200** **1500** **0240** **1600** **0250** **1800** **0256** **1968** **0300** **2000** **0360** **2048** **0400** **2400** **0500** **2500** **0512** **2540**	**0** Servo Mount **1** Flange Mount	**0** 3/8" Dia. Shaft with flat **1** 1/4" Dia. Shaft, no flat **4** 10mm Dia. Shaft, no flat	**0** no face mount available when Code 3 is 0: **1** (4) #10-32 @ 1.63" BC **2** (3) #4-40 @ 1.50" BC **3** (3) #6-32 @ 1.75" BC available when Code 3 is 1: **4** (4) #6-32 @ 2.00" BC	**0** 1.18" Dia. Female Pilot **1** 1.25" Dia. Male Pilot **2** 1.25" Dia. Male Pilot with Shaft Seal **3** 0.69" Dia. Male Pilot **4** 0.69" Dia. Male Pilot with Shaft Seal	**0** 5-26V in, 5-26V Open Collector out **1** 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups **2** 5-26V in, 5-26V Push-Pull out **A** Same as "**0**" with extend. temp range **B** Same as "**1**" with extend. temp range **C** Same as "**2**" with extend. temp range available when: Code 1 is 1 or 2 and Code 8 is 2 through M, Q or R; or Code 1 is 3 and Code 8 is 4 thru M, Q or R: **3** 5-26V in, 5-26V Differential Line Driver out (7272) **4** 5-26V in, 5V Differential Line Driver out (7272) **5** 5-26V in, 5 V Differential Line Driver out (4469) **6** 5-15V in, 5-15V Differential Line Driver out (4469) **D** Same as "**3**" with extend. temp range **E** Same as "**4**" with extend. temp range	**0** 6 Pin Conn, End Mount **1** 6 Pin Conn, Side Mount **2** 7 Pin Conn, End Mount **3** 7 Pin Conn, Side Mount **4** 10 Pin Conn, End Mount **5** 10 Pin Conn, Side Mount **6** 18" Cable, End Exit **7** 18" Cable, Side Exit **8** 36" Cable, End Exit **9** 36" Cable, Side Exit **A** 10' Cable, End Exit **B** 10' Cable, Side Exit **J** 25' Cable, End Exit **K** 25' Cable, Side Exit **N** 5 Pin M12 Connector, End Mount **P** 5 Pin M12 Connector, Side Mount **Q** 8 Pin M12 Connector, End Mount **R** 8 Pin M12 Connector, Side Mount available when Code 6 is 2 or 4: **C** 18" Sealed Cbl, End Exit **D** 18" Sealed Cbl, Side Exit **E** 36" Sealed Cbl, End Exit **F** 36" Sealed Cbl, Side Exit **G** 10' Sealed Cbl, End Exit **H** 10' Sealed Cbl, Side Exit **L** 25' Sealed Cbl, End Exit **M** 25' Sealed Cbl, Side Exit	available when Code 8 is 0 to 5: **PS** LED Output Indicator

Cable Assemblies with MS Connector*

108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

SERIES H20

Dynapar™ brand

CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - Code 8= 0 to 9, A to M

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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		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	ORN	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	GRN
N/C	F	—	E	—	—	—	E	—	—
Sig. $\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	BRN/WHT
Sig. $\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	ORG/WHT
Sig. $\bar{Z}$*	—	—	—	—	—	—	J	YEL/WHT	YEL/WHT

5 & 8 Pin M12 Accessory Cables when Code 8= N to R

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

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\bar{A}$	—	—	—	—	3	BRN/WHT
Sig. $\bar{B}$	—	—	—	—	5	ORG/WHT
Sig. $\bar{Z}$*	—	—	—	—	8	YEL/WHT

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

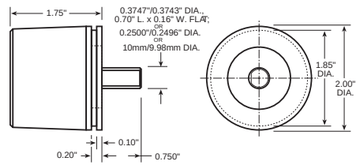
by DYNAPAR™

SERIES H20

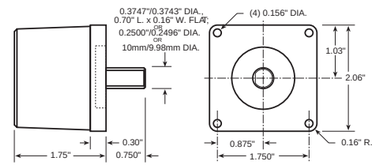
DIMENSIONS

Code 3: Housings

0 Servo Mount

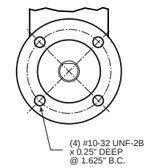


1 Flange Mount

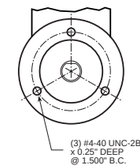


Code 5: Face Mounts

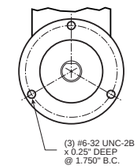
1



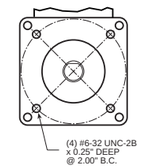
2



3

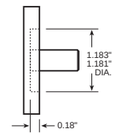


4

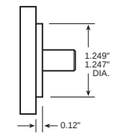


Code 6: Pilots

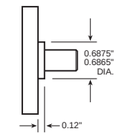
0 Female



1, 2 Male

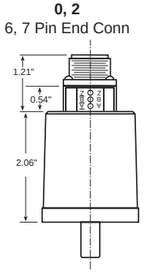


3, 4 Male

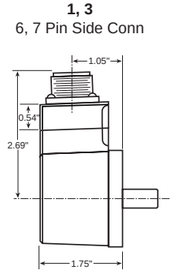


Code 8: Terminations

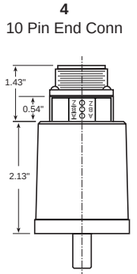
0, 2
6, 7 Pin End Conn



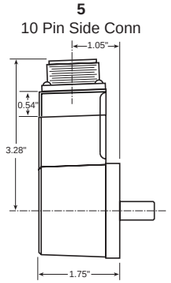
1, 3
6, 7 Pin Side Conn



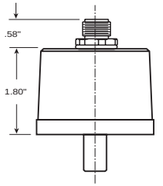
4
10 Pin End Conn



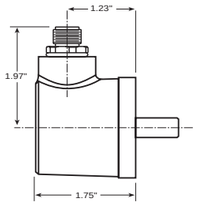
5
10 Pin Side Conn



N, Q
M12 End Conn

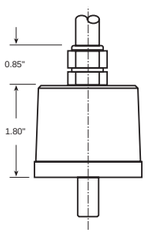


P, R
M12 Side Conn

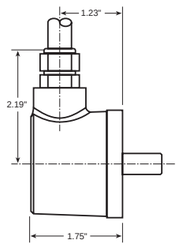


Code 8: 0-5 dimensions shown with LED Output Indicator Option (Code 9: **PS**)

6, 8, A, C, E, G, L
End Exit Cable



7, 9, B, D, F, H, M
Side Exit Cable



SERIES HD20

NorthStar™ brand

Harsh Duty Optical Encoder

HD Heavy Duty

Key Features

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

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 625 PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 330° A leads B, CCW (From Shaft End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC; 80 mA max., not including output loads.
Outputs:
2N2222 Open Collector: 250mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 6, 7, or 10 pin MS 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, NEMA4 style (MCN-N6N4)

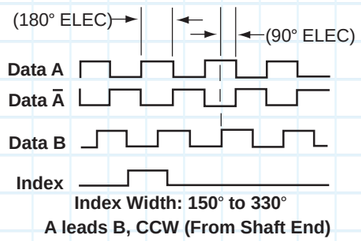
MECHANICAL

Shaft Size: 10mm, 3/8”
Shaft Speed: 6000 RPM, maximum
Shaft Loading: Up to 100 lbs axial and radial
Starting Torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10^8 revs at rated shaft Loading, 5 x 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.
Shaft Material: 303 stainless steel (passivated)
Disc Material: Plastic
Weight: 14 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: Up to 98% (non-condensing)
Enclosure Rating: IP67

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



Index Width: 150° to 330°
A leads B, CCW (From Shaft End)

by DYNAPAR™

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					
Size 20 Heavy Duty Encoder **1** Unidirectional **2** Bidirectional **3** Bidirectional with Index	**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** 3/8” Dia. Shaft with flat **4** 10mm Dia. Shaft, no flat	**0** 5-26V in, 5-26V Open Collector out (7273) **2** 5-26V in, 5-26V Push-Pull out (7272) **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 through H, or Code 1 is 3 and Code 5 is 5 through H: **3** 5-26V in, 5-26V Differential Line Driver out (7272) **4** 5-26V in, 5V Differential Line Driver out (7272)	**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	**0** No Options **1** Nickel Finish Housing **2** Stainless Steel Housing Available when: Code 4 is 0, 2 **3** Redundant Outputs (Dual Connector Housing). **4** Nickel Finish Housing with Redundant Outputs. **5** Stainless Steel Housing with Redundant Outputs.

Cable Assemblies with MS Connector

108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES HD20

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables

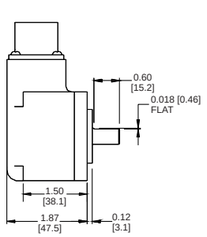
Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference.
Models with direct cable exit carry the color coding as shown in the right hand column.

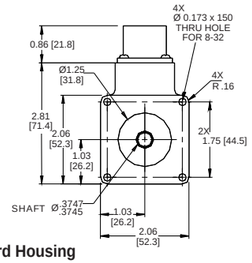
Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver without Index		** Cable # 109209-XXXX or Cable # 1400635XXXX 10 Pin Dif Line Driver with Index		Cable Exit with Seal
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Wire Color Code
Signal A	E	BRN	A	BRN	A	BRN	A	BRN	GRN
Signal B	D	ORN	B	ORG	B	ORG	B	ORG	BLU
Signal Z*	C	YEL	C	YEL	—	—	C	YEL	ORG
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	WHT
N/C	F	—	E	—	—	—	E	—	—
Signal $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	VIO
Signal $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	BRN
Signal $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	YEL

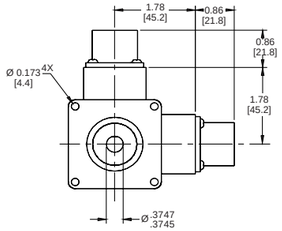
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
3) *Index not provided on all models. See ordering information.
4) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
5) “MS” Type mating connectors and pre-build cables are rated NEMA 12

DIMENSIONS

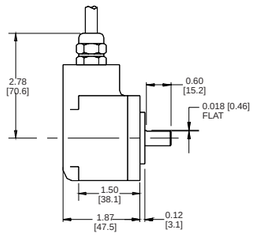




Standard Housing



Dual Redundant Outputs



Cable Exit

INCREMENTAL ENCODERS

DYNAPAR™

Notes

NexGen SERIES 22

Dynapar™ brand

"QUBE" Encoder

IND Industrial Duty

Key Features

- New Phased-Array ASIC Sensor
- Double the Shaft Loading of Previous Qube
- Expanded Resolution Up to 3600 PPR
- New IP67 Sealing Option
- Unbreakable Code Disc

CE EN 61326-1

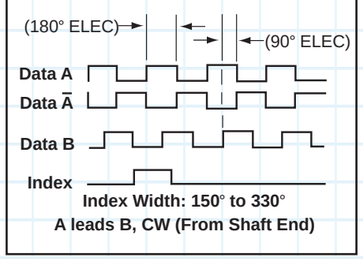
RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 CW shaft rotation when viewing the shaft farthest from connector or cable
Quadrature Phasing:
For resolutions to 625 PPR: 90° ± 15° electrical;
For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 625 PPR: 180° ±18° electrical
For resolutions over 625 PPR: 180° ±25° electrical
Index: 150° to 330° A Leads B, CW (From Shaft End)
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
$\bar{A}$ shown for reference



Index Width: 150° to 330°
A leads B, CW (From Shaft End)

ELECTRICAL

Input Power: 5-26VDC; 75 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected

Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

Termination: MS Connector, M12 Connector or Cable Exit

MECHANICAL

Shaft Sizes: 6mm, 1/4" or 3/8"
Shaft Loading: 80 lbs. radial, 80 lbs. axial
Shaft Speed: 6,000 RPM max.
Shaft Tolerance: Nominal –.0003"/-.0006"
Starting Torque: 2.5 oz-in max.; w/shaft seals: 4.0 oz-in max.; w/double shaft seal: 6.0 oz-in max.
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar
Weight: 14 oz. max.

ENVIRONMENTAL

Operating Temperature: –40 to +100 °C
Storage Temperature: –40 to +100 °C
Shock: 100Gs for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 20Gs
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67 with shaft seals

by DYNAPAR™ NexGen SERIES 22

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	Code 6: Termination
□□□	□□□□	□	□	□	□
Ordering Information					
22 Qube Encoder, Bidirectional **22M** Metric Qube Encoder, Bidirectional	**0001** **0360** **0010** **0500** **0012** **0512** **0024** **0600** **0025** **0625** **0035** **0720** **0040** **0800** **0050** **1000** **0060** **1024** **0100** **1200** **0120** **1250** **0125** **1270** **0150** **1440** **0192** **2000** **0200** **2048** **0240** **2500** **0250** **2540** **0256** **2600** **0300** **3600**	Available only when Code 1 is 22 **0** 3/8" Double ended shaft **1** 3/8" Single ended shaft **2** 1/4" Double ended shaft **3** 1/4" Single ended shaft **A** Same as "0" with shaft seal **B** Same as "1" with shaft seal **C** Same as "2" with shaft seal **D** Same as "3" with shaft seal Available only when Code 1 is 22M **4** 6mm Double ended shaft **5** 6mm Single ended shaft **E** Same as "4" with shaft seal **F** Same as "5" with shaft seal	**0** Single Ended, Table 1 **1** Single Ended, with Index, Table 3 **2** Differential, Table 2 available only when Code 6 is 1 to 5 or A to E: **3** Differential, with Index, Table 5 available only when code 6 is 0: **4** Differential, Table 4 available only when Code 6 is 6: **5** 5 pin M12 connector, single ended, no index, Table 6 **6** 5 pin M12 connector, single ended, with index, Table 6 **7** 8 pin M12 connector, single ended, no index, Table 7 **8** 8 pin M12 connector, single ended, with index, Table 7 **9** 8 pin M12 connector, differential, no index, Table 8 **A** 8 pin M12 connector, differential, with index, Table 8	Available when Code 4 = 0, 1, 5, 6, 7 or 8: **0** 5-26 VDC in, 5-26 VDC Open Collector w/2.2k pull-ups out **1** 5-26 VDC in, 5-26 VDC Open Collector w/o pull-up out **2** 5-26 VDC in, 5V Totem Pole out Available when Code 4 = 2, 3, 4, 9 or A: **3** 5-26 VDC in, 5V Line Driver out **4** 5-26 VDC in, 5-26 VDC CMOS Line Driver	**0** MS Connector Available when Code 3 is 0, 1, 2, 3, 4 or 5 **1** 18" Cable **2** 3' Cable **3** 6' Cable **4** 10' Cable **5** 15' Cable Available when Code 4 is 5, 6, 7, 8, 9 or A **6** M12 Connector Available when Code 3 is A,B,C,D,E or F **A** 18" Sealed Cable **B** 3' Sealed Cable **C** 6' Sealed Cable **D** 10' Sealed Cable **E** 15' Sealed Cable

Cable Assemblies with MS Connector*

1400607XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108241-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
1400664XXXX 6 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S

NexGen SERIES 22

Dynapar™ brand

ELECTRICAL CONNECTIONS

******MS Connector Accessory Cables - when Code 4= 0 to 4**

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference.

Table 1 - Current Sink Output

Encoder Function	Cable # 1400607XXXX 6 Pin Single Ended	
	Pin	Wire Color Code
Common	A	BLK
Power Source	B	RED
Case	C	GRN
Signal A	D	BRN
Signal B	E	ORG
Common	F	BLK

Table 2 - 7 Pin Line Driver Output

Encoder Function	Cable # 108596-XXXX 7 Pin Differential Line Driver	
	Pin	Wire Color Code
Signal A	A	RED
Signal B	B	BLU
Signal $\overline{A}$	C	YEL
Power Source	D	WHT
Signal $\overline{B}$	E	GRN
Common	F	BLK
Case	G	—

Table 3 - Current Sink Output w/ Marker

Encoder Function	Cable # 108241-XXXX 6 Pin Single Ended w/ Index Outputs	
	Pin	Wire Color Code
Common	A	BLK
Power Source	B	RED
Signal $\overline{Z}$*	C	GRN
Signal A	D	BRN
Signal B	E	ORG
Common	F	BLK

Table 4 - 6 Pin Line Driver

Encoder Function	Cable # 1400664XXXX 6 Pin Single Ended	
	Pin	Wire Color Code
Common	A	BLK
Power Source	B	RED
Signal A	C	BRN
Signal $\overline{A}$	D	BRN/WHT
Signal B	E	ORG
Signal $\overline{B}$	F	ORG/WHT

Table 5 - Cable Termination Line Driver Output with Marker

Encoder Function	Wire Color Code
Signal A	BRN
Signal B	ORG
Signal Z*	YEL
Power Source	RED
Com	BLK
Case	GRN
Signal $\overline{A}$	BRN/WHT
Signal $\overline{B}$	ORG/WHT
Signal $\overline{Z}$*	YEL/WHT

******5 & 8 Pin M12 Accessory Cables - when Code 4= 5 to 9 and A**

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

Encoder Function	Table 6 Cable # 112859-XXXX 5 Pin Single Ended		Table 7 Cable # 112860-XXXX 8 Pin Single Ended		Table 8 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

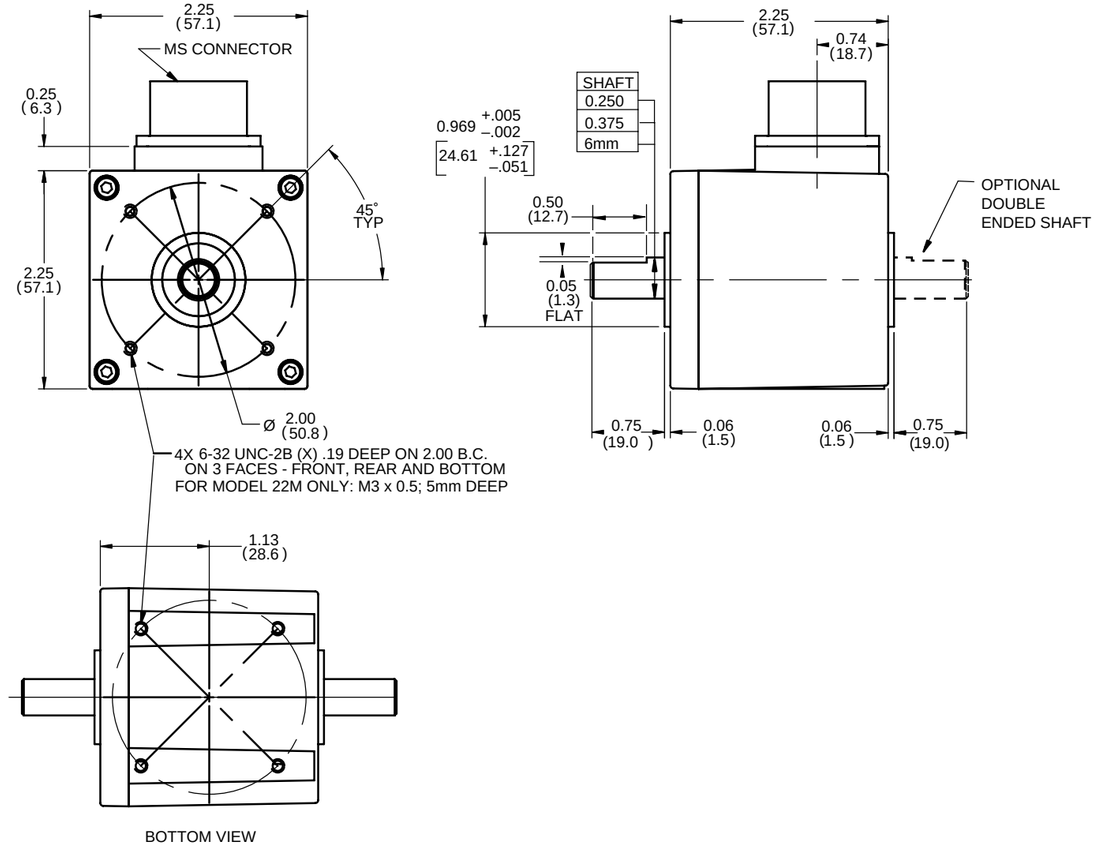
NOTES:

1) Cable Configuration (**Tables 1 and 3 - 5**): PVC jacket, 105° C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 22 AWG conductors, minimum
3) Cable Configuration (**Tables 6 - 8**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

by DYNAPAR™

NexGen SERIES 22

DIMENSIONS inches [mm]



SERIES H58

Dynapar™ brand

Shafted Encoder

Key Features

- **Industry Standard 58mm Mounting**
- **Multiple Connection Options**
- **Rugged Design with Long-Life Bearings**

IND Industrial Duty

EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 2540 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° ± 22.5° electrical

Symmetry: 180° ± 18° electrical

Index: 180° ± 18° electrical (gated with B low)

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

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

4469 Differential Line Driver: 100mA, sink or source

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, M23 Connector, Cable Exit

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5)

10 pin, style MS3106A-18-1S (MCN-N6)

10 pin, NEMA4 style (MCN-N6N4)

12 pin style M23, CW (MCN-C1)

12 pin style M23, CCW (MCN-C2)

Cable w/ 5 pin M12 Connector (112859-XXXX)

Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shaft Sizes: 6 mm, 10 mm

Shaft Loading: (at 6 mm from encoder face)
Resolutions ≤1024 PPR: 356 N radial, axial
Resolutions >1024 PPR: 178 N radial, axial

Shaft Speed:
Resolutions ≤1024 PPR: 10,000 RPM max.
Resolutions >1024 PPR: 5,000 RPM max.

Starting Torque: (max at 25 °C)
without shaft seal: 0.007 N-m;
with shaft seal: 0.014 N-m

Moment of Inertia: 21.2 g-cm²

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 283 g. (10 oz.) max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G's for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G's

Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, wash-down) when ordered with shaft seal and either M12 connector or watertight cable exit

by DYNAPAR™

SERIES H58

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Pilot, Face	Code 4: Shaft	Code 5: Shaft Seal	Code 6: Electrical	Code 7: Termination	Code 8: Connector
H58 □□□	□	□	□	□	□	□	□
Ordering Information							
H58 Bidirectional with Index (Channels A, B and Z)	**0001** **0600** **0010** **0800** **0012** **1000** **0050** **1024** **0060** **1200** **0086** **1250** **0100** **1270** **0120** **1500** **0125** **1600** **0200** **1800** **0240** **1968** **0250** **2000** **0300** **2048** **0360** **2400** **0400** **2500** **0500** **2540** **0512**	**0** (3) M4 @ 42mm BC, no Pilot **1** (3) M3 @ 48mm BC, 36mm Dia. Pilot	**0** 6mm Dia. Shaft **1** 10mm Dia. Shaft	**0** no Shaft Seal **1** Shaft Seal	**0** 5-26V in, 5-26V Push-Pull out **A** Same as "**0**" with extend. temp range available when Code 7 is 2 thru B, E or F: **1** 5-26V in, 5-26V Differential Line Driver out (7272) **2** 5-26V in, 5V Differential Line Driver out (7272) **3** 5-26V in, 5V Differential Line Driver out (4469) **4** 5-15V in, 5-15V Differential Line Driver out (4469) **B** Same as "**1**" with extend. temp range **C** Same as "**2**" with extend. temp range	**0** 7 Pin Conn, End Mount **1** 7 Pin Conn, Side Mount **2** 10 Pin Conn, End Mount **3** 10 Pin Conn, Side Mount **4** 12 Pin CCW Conn, End Mount **5** 12 Pin CCW Conn, Side Mount **6** 12 Pin CW Conn, End Mount **7** 12 Pin CW Conn, Side Mount **C** 5 pin M12 Conn, End Mount **D** 5 pin M12 Conn, Side Mount **E** 8 pin M12 Conn, End Mount **F** 8 pin M12 Conn, Side Mount available when Code 5 is 1: **8** 1m Sealed Cbl, End Exit **9** 1m Sealed Cbl, Side Exit **A** 3m Sealed Cbl, End Exit **B** 3m Sealed Cbl, Side Exit	**0** No Mating Connector **1** 7 Pin Mating Connector **2** 10 Pin Mating Connector **3** 12 Pin CCW Mating Connector **4** 12 Pin CW Mating Connector

Cable Assemblies with MS Connector*

108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
108615-XXXX 12 Pin CCW (if used) MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
108616-XXXX 12 Pin CW (if used) MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-C1 12 pin style M23, CW
MCN-C2 12 pin style M23, CCW

SERIES H58

Dynapar™ brand

ELECTRICAL CONNECTIONS

7, 10 & 12 Pin M23 Connectors and Cables - Code 7 =0 to 7

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.

Table 1

Encoder Function	Cable # 108595-XXXX 7 Pin Single Ended		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		Cable # 108615-XXXX 12 Pin CCW		Cable # 108616-XXXX 12 Pin CW	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	A	BRN	A	BRN	5	BRN	3	BRN
Signal B	B	ORG	B	ORG	8	ORG	4	ORG
Signal Z	C	YEL	C	YEL	3	YEL	7	YEL
Power +V	D	RED	D	RED	12	RED	2	RED
N/C	E	—	E	—	7	—	—	—
Com	F	BLK	F	BLK	10	BLK	1	BLK
Case	G	GRN	G	GRN	9	—	—	—
Signal $\overline{A}$	—	—	H	BRN/WHT	6	BRN/WHT	5	BRN/WHT
Signal $\overline{B}$	—	—	I	ORG/WHT	1	ORG/WHT	6	ORG/WHT
Signal $\overline{Z}$	—	—	J	YEL/WHT	4	YEL/WHT	8	YEL/WHT
5V Sense	—	—	—	—	2	GRN	—	—
0V Sense	—	—	—	—	11	BLK/WHT	—	—

5 & 8 Pin M12 Accessory Cables when Code 7 = C to F

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

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
5) “MS” Type mating connectors and pre-build cables are rated NEMA 12
6) “M12” Cable assemblies are rated IP67

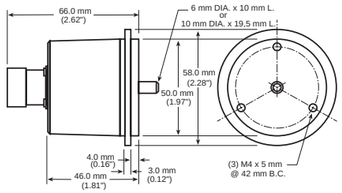
by DYNAPAR™

SERIES H58

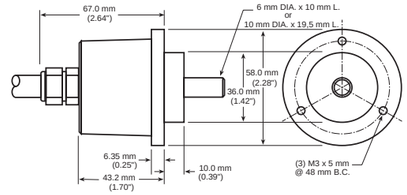
DIMENSIONS

Code 3: Pilot, Face Mounts

0 no Pilot, 42mm B.C.

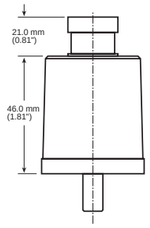


1 36mm Pilot, 48mm B.C.

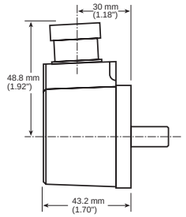


Code 7: Terminations

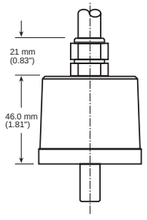
4, 6 12 Pin End Conn



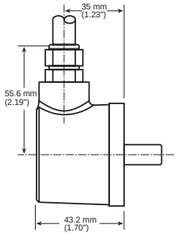
5, 7 12 Pin Side Conn



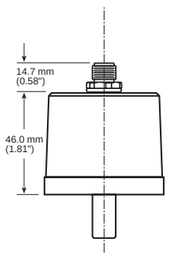
8, A End Exit Cable



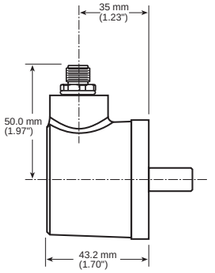
9, B Side Exit Cable



C, E M12 End Conn

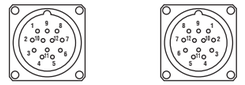


D, F M12 Side Conn



Code 7: Terminations

4, 5 CCW **6, 7** CW
(when looking at encoder)



SERIES E23

Dynapar™ brand

Miniature Encoder

GP
General Purpose

Key Features

- **Up to 2540 PPR with Optional Index**
- **Optional Screw Terminal Connections**
- **Standard Size 23 (2.3” diameter)**

CE
EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 2540 PPR (pulses/revolution)

Accuracy: (Worst case any edge to any other edge) ±2.5 arc-min.

Format: Two channel quadrature (AB) with optional Index (Z) outputs

Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder, see Ordering Information

Quadrature Phasing: 90° ± 18° electrical

Symmetry: 180° ± 9° electrical

Index: 180° ± 9° electrical, gated with B

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

ELECTRICAL CONNECTIONS

Note: Wire color codes are referenced here for models that are specified with pre-wired cable.

Single Ended		
Term.	Function (If Used)	Wire Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal Z	YEL
D	Power Source	RED
E	No Connection	—
F	Common	BLK
G	Case	GRN

ELECTRICAL

Input Power:
Open Collector or Totem Pole outputs: 5 to 26 VDC. at 200 mA max.;
Line Driver: 5 to 26 VDC at 80 mA max.

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: Cable, Screw Terminals

Cable: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)

Differential		
Term.	Function (If Used)	Wire Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal Z	YEL
D	Power Source	RED
E	No Connection	—
F	Common	BLK
G	Case	GRN
H	Signal $\bar{A}$	BRN/WH
I	Signal $\bar{B}$	ORN/WH
J	Signal $\bar{Z}$	YEL/WH

MECHANICAL

Shaft Size: 1/4”

Shaft Loading: 5 lbs. max. radial and axial

Shaft Speed: 5,000 RPM max.

Starting Torque: 0.2 oz-in max. at 25 °C

Moment of Inertia: 3.7 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 13 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70° C

Storage Temperature: –40 to +80 °C

Shock: 50 G’s for 11 msec duration

Vibration: 5 to 2000 Hz at 2 G’s

Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

SERIES E23

Ordering Information

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

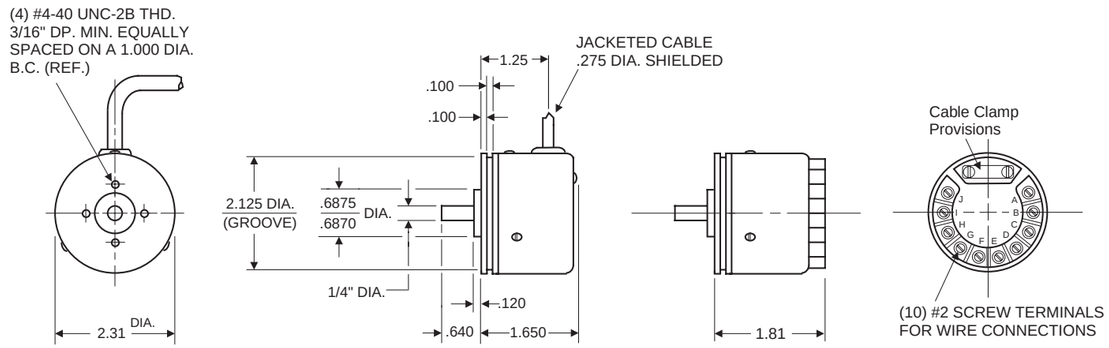
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination
E23	□□□□	□	□	□	□
E23 Size 23 Enclosed	**0001** **0005** **0010** **0012** **0050** **0060** **0100** **0120** **0150** **0180** **0200** **0240** **0250** **0256** **0300** **0344** **0360** **0400** **0500** **0512** **0600** **0625** **0635** **0720** **0800** **0900** **1000** **1024** **1200** **1250** **1270** **1500** **1600** **1800** **1968** **2000** **2048** **2400** **2500** **2540** For Resolutions above 2540, see Series EC23	**0** 1/4” Shaft, Shielded Bearings **1** 1/4” Shaft, Sealed Bearings	**4** Single Ended, with Index, Format C **5** Differential, with Index, Format C **6** Single Ended, with Index, Format D **7** Differential, with Index, Format D **8** Single Ended, no Index, Format C **9** Differential, no Index, Format C	**0** 5-26V in; 5-26V Open Collector w/2.2kΩ Pullup out **1** 5-26V in; 5-26V Open Collector out **2** 5-26V in; 5V TTL Totem Pole out **3** 5-26V in; 5V Line Driver out (7272) **4** 5-26V in; 5-26V Line Driver out (7272) **5** 5-26V in, 5V Differential Line Driver out (4469) **6** 5-15V in, 5-15V Differential Line Driver out (4469)	**0** 18” Cable **1** 3’ Cable **2** 6’ Cable **3** 10’ Cable **4** 15’ Cable **8** Screw Terminals

Dimensions (inches)

Code 6: Termination

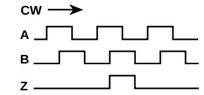
0 - 4: Cable

8: Terminals

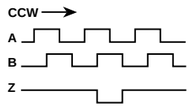


Code 4: Output

4,5,8,9: Format C



6,7: Format D



SERIES EC23

Dynapar™ brand

Miniature Encoder

GP
General Purpose

Key Features

- High 5000 PPR Capability
- Optional Screw Terminal Connections
- Standard Size 23 (2.3” diameter)

CE
EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 3000 to 5000 PPR (pulses/revolution)

Accuracy: (Worst case any edge to any other edge) ±10.8°/PPR

Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs

Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information

Quadrature Phasing: 90° ± 25° electrical

Symmetry: 180° ± 25° electrical

Index: 90° ± 25° electrical, gated with B

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

ELECTRICAL

Input Power:
5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

Frequency Response: 250 kHz min.

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

Termination: Cable, Screw Terminals

Cable: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)

MECHANICAL

Shaft Size: 1/4”

Shaft Loading: 5 lbs. max radial and axial

Shaft Runout: 0.001” max. TIR

Shaft Speed: 10,000 RPM max. mechanical

Shaft Tolerance: Nominal -0.0004”/-0.0007”

Starting Torque:
Shielded bearings: 0.1 oz-in max.;
Sealed bearings: 0.2 oz.-in max.

Moment of Inertia: 2.83 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 13 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

ELECTRICAL CONNECTIONS

Note: Wire color codes are referenced here for models that are specified with pre-wired cable.

Single Ended		
Term.	Function (If Used)	Wire Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal Z	YEL
D	Power Source	RED
E	No Connection	—
F	Common	BLK
G	Case	GRN

Differential		
Term.	Function (If Used)	Wire Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal Z	YEL
D	Power Source	RED
E	No Connection	—
F	Common	BLK
G	Case	GRN
H	Signal $\bar{A}$	BRN/WH
I	Signal $\bar{B}$	ORN/WH
J	Signal $\bar{Z}$	YEL/WH

by DYNAPAR™

SERIES EC23

Ordering Information

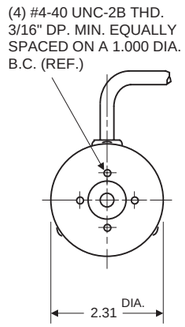
To order, complete the model number with code numbers from the table below:

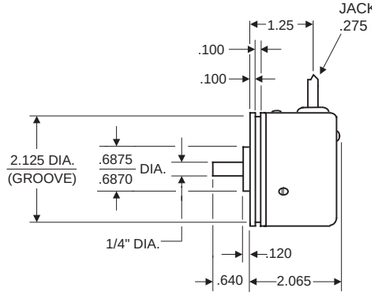
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination
EC23	□□□□	□	□	□	□
Ordering Information					
EC23 Size 23 Enclosed	**3000** **3600** **4096** **5000**	**0** 1/4” Shaft, Shielded Bearings, 2.31” Dia. Servo Mount w/ 4-Hole Face Mount **1** 1/4” Shaft, Sealed Bearings, 2.31” Dia. Servo Mount w/ 4-Hole Face Mount	**4** Single Ended, with Index, Format C **5** Differential, with Index, Format C **6** Single Ended, with Index, Format D **7** Differential, with Index, Format D **8** Single Ended, No Index, Format C **9** Differential, No Index, Format C	**0** 5-26V in, 5-26V Open Collector w/2.2kΩ Pullups out **1** 5-26V in, 5-26V Open Collector out **2** 5-26V in; 5V out, Push-Pull out **3** 5-26V in; 5V Line Driver out **4** 5-26V in, 5-26V Line Driver out	**0** 18” Cable, Side Exit **1** 3’ Cable, Side Exit **2** 6’ Cable, Side Exit **3** 10’ Cable, Side Exit **4** 15’ Cable, Side Exit **8** Screw Terminals

Dimensions (inches/mm)

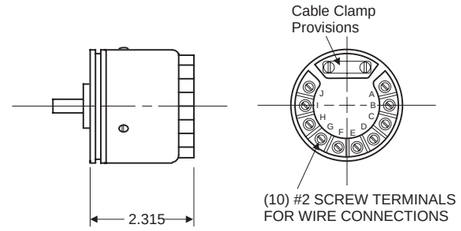
Code 6: Termination

0 - 4: Cable



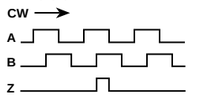


8: Terminals

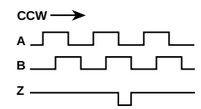


Code 4: Output

4,5,8,9: Format C



6,7: Format D



SERIES HD25

NorthStar™ brand

Harsh Duty Optical Encoder

HD Heavy Duty

Key Features

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

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 625 PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 330° A Leads B, CCW (From Shaft End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

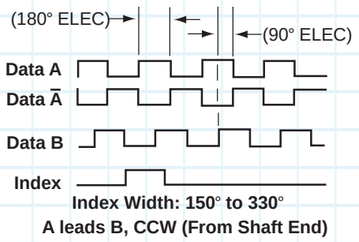
ELECTRICAL

Input Power: 5-26VDC, 5-15VDC dependant on output type. 80 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
2N2222 Open Collector: 250mA, sink max
4469 Differential Line Driver: 100mA, sink or source
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 6, 7, or 10 pin MS Connector, 5, 8 pin M12 Connector; Cable exit w/seal

ELECTRICAL (Cont.)

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, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

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



Index Width: 150° to 330°
A leads B, CCW (From Shaft End)

MECHANICAL

Shaft Sizes: 10mm, 12mm, 3/8"
Shaft Speed: 6,000 RPM, maximum
Shaft Loading: Up to 100 lbs axial and radial
Starting Torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10^8 revs at rated shaft Loading,
5 x 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.
Shaft Material: 303 stainless steel (passivated)
Disc Material: Plastic
Weight: 14 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: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

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 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** 3/8" Dia Shaft w/ Flat, 4 Hole 2.00" BC	**0** 5-26V in, 5-26V Open Collector out (7273) **2** 5-26V in, 5-26V Push-Pull out (7272) **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: Code1 is 1, 2 and Code 5 is 3,5 or A through P, or Code 1 is 3 and code 5 is 5 or A 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 **A** 8 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	**0** No Options **1** Nickel Finish Housing **2** Stainless Steel Housing **3** Redundant Outputs (Dual Connector Housing). **4** Nickel Finish Housing with Redundant Outputs. **5** Stainless Steel Housing with Redundant Outputs.

Cable Assemblies with MS Connector

108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

Cable Assemblies with M12 Connector

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES HD25

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - When Code 5 = 1, 3, 5, or D-P

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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver without Index		** Cable # 109209-XXXX or Cable # 1400635XXXX 10 Pin Dif Line Driver with Index		Cable Exit with Seal
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Wire Color Code
Signal A	E	BRN	A	BRN	A	BRN	A	BRN	GRN
Signal B	D	ORN	B	ORG	B	ORG	B	ORG	BLU
Signal Z*	C	YEL	C	YEL	—	—	C	YEL	ORG
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	WHT
N/C	F	—	E	—	—	—	E	—	—
Signal $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	VIO
Signal $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	BRN
Signal $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	YEL

5 & 8 Pin M12 Accessory Cables when - When Code 5 = 9 or A

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

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

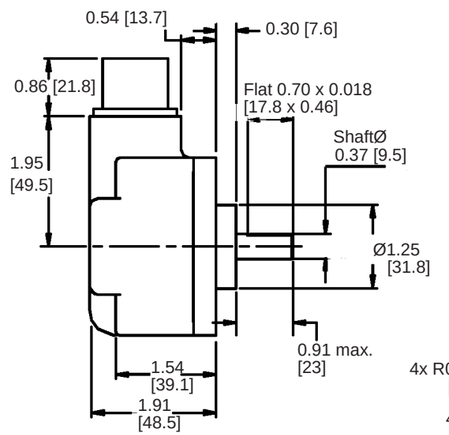
NOTES:

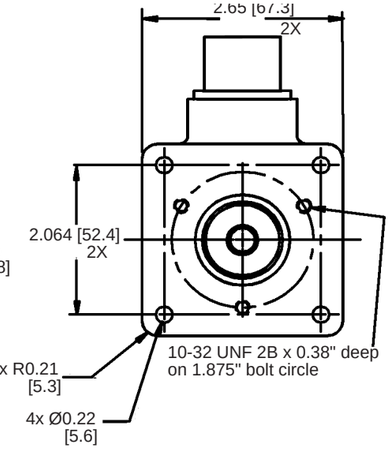
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) “MS” Type mating connectors and pre-build cables are rated NEMA 12
7) “M12” Cable assemblies are rated IP67

by DYNAPAR™

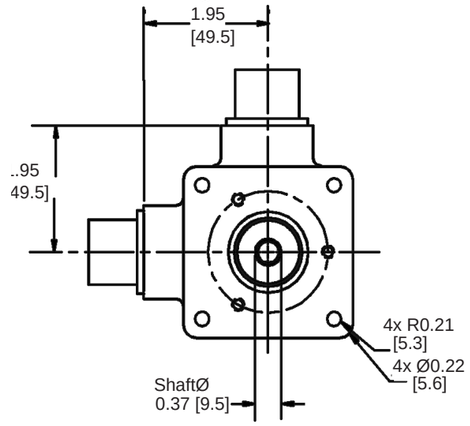
SERIES HD25

DIMENSIONS inches [mm]

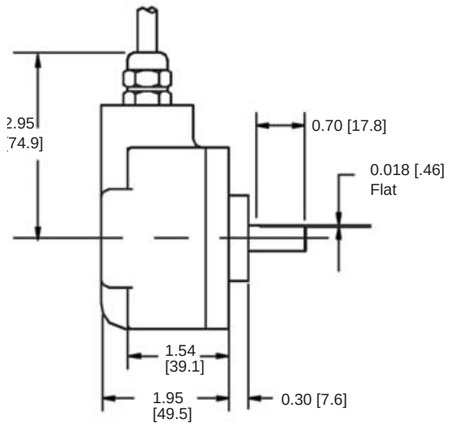




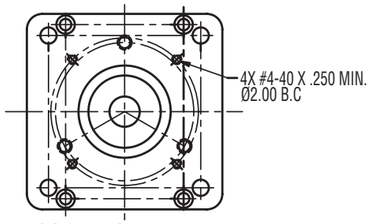
Standard Housing



Dual Redundant Outputs



Cable Exit



With 4 Hole 2.00” BC

SERIES HA725

Dynapar™ brand

Shafted Encoder

IND Industrial Duty

Key Features

- **High, direct-read resolutions up to 10,000 PPR**
- **Industry Standard size 25 (2.5”)**
- **IP66 Sealing**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 8192 to 10,000 PPR (pulses/revolution)

Accuracy:
Any edge to any like edge of the same channel: ±10.8°/PPR (±3.9 arc-sec at 10,000 PPR)
Any edge to any edge of the opposite channel: ±40°/PPR (±14 arc-sec at 10,000 PPR)

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° ± 25° electrical

Symmetry: 180° ± 25° electrical

Index: 90° ± 25° electrical (gated with A and B high)

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

ELECTRICAL

Input Power: (not including output loads)
Push-pull: 10 min. to 30 VDC max. at 60 mA max.
Line driver: 5 VDC ±10% at 40 mA max.

Outputs:
Push-pull: ±30 mA, short circuit protected
Line Driver: ±20 mA

Frequency Response:
Push-pull: 200 kHz min
Line Driver: 300 kHz min.

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

Termination: MS Connector

ELECTRICAL (Cont.)

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)

MECHANICAL

Shaft Size: 3/8”

Shaft Loading: 35 lbs. radial, 24 lbs. axial

Shaft Speed: 10,000 RPM max.mechanical

Moment of Inertia: 2.83 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C;
Storage Temperature: –25 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 2 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA4/IP66 (dust proof, washdown)

ELECTRICAL CONNECTIONS

Encoder Function	Cable #108595-XXXX 7 Pin Single Ended		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index	
	Pin	Wire Color	Pin	Wire Color
Sig. A	A	BRN	A	BRN
Sig. B	B	ORG	B	ORG
Sig. Z	C	YEL	C	YEL
Power +V	D	RED	D	RED
Com	E	BLK	F	BLK
Case	F	GRN	G	GRN
N/C - Shield	G	—	E	—
Sig. $\bar{A}$	—	—	H	BRN/WHT
Sig. $\bar{B}$	—	—	I	ORG/WHT
Sig. $\bar{Z}$	—	—	J	YEL/WHT

Notes:

1) Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)

2) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020

3) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX

4) “MS” Type mating connectors and pre-build cables are rated NEMA 12

by DYNAPAR™

SERIES HA725

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination
HA725	□□□□□	□	□	□	□
HA725 Size 25, High Resolution	**08192** **09000** **10000**	**0** Flange Mount, 3/8” Shaft	**0** Single Ended **2** Differential	Available when Code 4 = 0: **0** 10-30V in; 10-30V Push-Pull out Available when Code 4 = 2: **4** 5V in; 5V Line Driver out	**0** Connector, End Mount **1** Connector, Side Mount

Cable Assemblies with MS Connector*

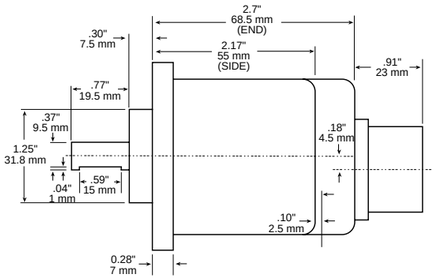
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

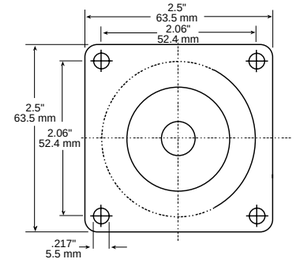
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index

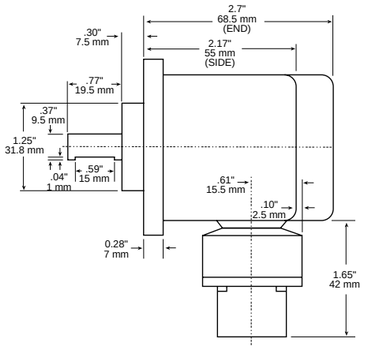
***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increment. For example, for a 20 foot cable, replace XXXX with -0020.

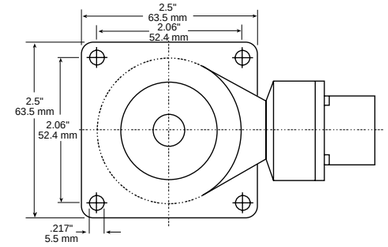
DIMENSIONS





Code 6: Termination: 0





Code 6: Termination: 1

SERIES HA25

Dynapar™ brand

Shafted Encoder

IND Industrial Duty

Key Features

- **Industry Standard Size 25 (2.5”)**
- **Wide Range of Resolutions Available**
- **Optional Extended Temperature Range of –40° to +85°C**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 2540 PPR (pulses/revolution)

Accuracy: (Worst case any edge to any other edge) ±2.5 arc-min.

Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs

Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information

Quadrature Phasing: 90° ± 22.5° electrical

Symmetry: 180° ± 18° electrical

Index: 180° ± 18° electrical (gated with B low)

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

ELECTRICAL

Input Power:
5 to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

Termination: MS Connector, M12 Connector, Cable Exit

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shaft Sizes: 1/4”, 3/8”

Shaft Loading: (at 0.25” from encoder face) 35 lbs. radial, 40 lbs. axial

Shaft Speed: 5,000 RPM max.

Starting Torque: (max at 25 °C)
HA525: 1.0 oz-in;
HA625: 2.5 oz.-in

Moment of Inertia: 3.0 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminium

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating:
HA525: NEMA12/IP54 (dirt tight, splashproof);
HA625: NEMA4/IP66 (dust proof, washdown)

by DYNAPAR™

SERIES HA25

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HA □25	□□□□	□	□	□	□	□□
Ordering Information						
HA525 Size 25 Enclosed, Shielded Bearings, Glass Disk **HA625** Size 25 Enclosed, with Shaft Seal, Glass Disk	**0001 0600** **0005 0625** **0010 0635** **0012 0720** **0050 0800** **0060 0900** **0100 1000** **0120 1024** **0150 1200** **0180 1250** **0200 1270** **0240 1500** **0250 1600** **0256 1800** **0300 1968** **0360 2000** **0400 2048** **0500 2400** **0512 2500** **2540**	**0** Flange Mount, 3/8” Shaft **1** 2.50” Servo Mount/ 4 Hole, 2.00” BC Face Mount, 3/8” Shaft **2** Flange Mount, 1/4” Shaft **3** 2.50” Servo Mount/ 4 Hole 2.00” BC Face Mount, 1/4” Shaft **4** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 3/8” Shaft **5** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 1/4” Shaft **6** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 3/8” Shaft **7** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft **8** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 3/8” Shaft **9** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft	**7 Pin MS Connector or Cable** **0** Single Ended, no Index, Format A, Table 2 **1** Single Ended, with Index, Format A, Table 2 **4** Single Ended, with Index, Format B, Table 2 **6** Differential, no Index, Format C, Table 3 **A** Single Ended, with Index, Format C, Table 2 **C** Single Ended, no Index, Format C, Table 2 **G** Single Ended, with Index, Format D, Table 2 **10 Pin MS Connector or Cable** **2** Differential, no Index, Format A, Table 1 **3** Differential, with Index, Format A, Table 1 **5** Differential, with Index, Format B, Table 1 **B** Differential, with Index Format C, Table 1 **D** Differential, no Index, Format C, Table 1 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6 See page 3 for electrical tables and page 4 for formats.	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ 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 (7272) **4** 5-26V in; 5-26V Line Driver out (7272) **5** 5-26V in, 5V Differential Line Driver out (4469) **6** 5-15V in, 5-15V Differential Line Driver out (4469) **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** End Mount Connector **1** Side Mount Connector Available when Code 1 is HA525: **2** 18” Cable, Side **3** 3’ Cable, Side **4** 6’ Cable, Side **5** 10’ Cable, Side **6** 15’ Cable, Side **J** 18” Cable, End **K** 3’ Cable, End **L** 6’ Cable, End **M** 10’ Cable, End **N** 15’ Cable, End Available when Code 1 is HA625: **A** 18” Watertight, Side **B** 3’ Watertight, Side **C** 6’ Watertight, Side **D** 10’ Watertight, Side **F** 15’ Watertight, Side **P** 18” Watertight, End **Q** 3’ Watertight, End **R** 6’ Watertight, End **S** 10’ Watertight, End **T** 15’ Watertight, End	available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector*

1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES HA25

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 6, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Differential			
Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
N/C	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

Table 2 – Single Ended			
Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 3 – Differential		
Encoder Function	Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index	
	Pin	Cable Accessory Color Code
Signal A	A	RED
Signal B	B	BLUE
Signal $\overline{A}$	C	YEL
Power Source	D	WHT
Signal $\overline{B}$	E	GRN
Common	F	BLK
Case	G	SHIELD

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Tables 1 and 3**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

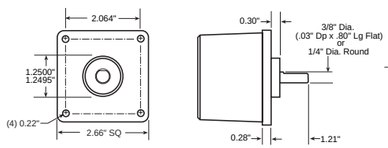
by DYNAPAR™

SERIES HA25

DIMENSIONS

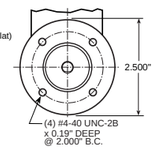
Code 3: Mechanical

0,2: Flange

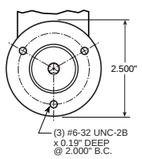


Note: Flat provided on 3/8" shaft

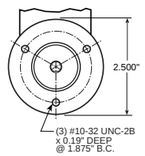
1,3: 2.5" Servo



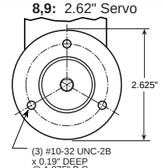
4,5: 2.5" Servo

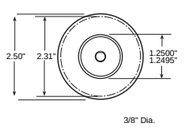


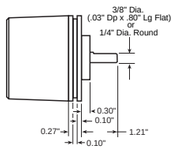
6,7: 2.5" Servo

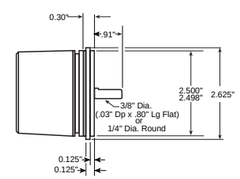


8,9: 2.62" Servo





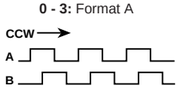




Note: Flat provided on 3/8" shaft

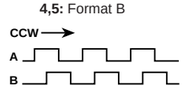
Code 4: Output

0 - 3: Format A



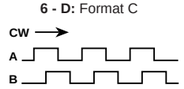
A Leads B CCW
Index Width (180°) Gated to $\overline{B}$

4,5: Format B



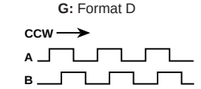
A Leads B CCW
Index Width (180°) Gated to B

6 - D: Format C



$\overline{A}$ Leads B CW
Index Width (180°) Gated to B

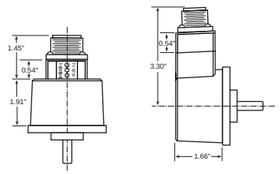
G: Format D



A Leads B CCW
Inverted Index (180°) Gated to B

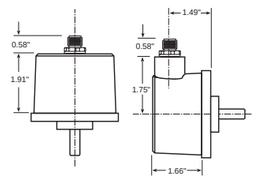
Code 6: Termination

0: End MS Connector **1:** Side MS Connector
When Code 5 is 0 to 6 or A to G

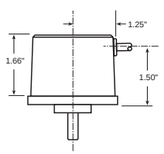


Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

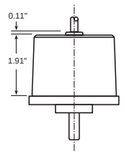
0: End M12 Connector **1:** Side M12 Connector
When Code 5 is H to Z



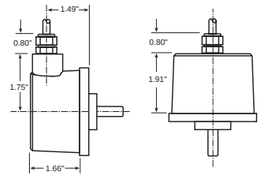
2 - 6: Side Cable



J - N: End Cable



A - F: Side W.T. Cable **P -T:** End W.T. Cable



SERIES HC25

Dynapar™ brand

Shafted Encoder

IND Industrial Duty

Key Features

- **Optional Extended Temperature Range of –40° to +85°C**
- **High 5000 PPR Resolution Available**
- **Industry Standard Size 25 (2.5”)**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 3000 to 5000 PPR (pulses/revolution)

Accuracy: (Worst case any edge to any other edge) ±10.8°/PPR

Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs

Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information

Quadrature Phasing: 90° ± 25° electrical

Symmetry: 180° ± 25° electrical

Index: 90° ± 25° 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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

Frequency Response: 250 kHz

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

Termination: MS Connector, M12 Connector, Cable Exit

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shaft Sizes: 1/4” or 3/8”

Shaft Loading: 40 lbs. radial, 30 lbs. axial

Shaft Speed: 10,000 RPM max. (See Frequency Response)

Starting Torque: (max at 25 °C)
HC525: 1.0 oz-in;
HC625: 2.5 oz.-in

Moment of Inertia: 2.83 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: –40 to +85 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating:
HC525: NEMA12/IP54 (dirt tight, splashproof);
HC625: NEMA4/IP66 (dust proof, washdown)

by DYNAPAR™

SERIES HC25

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HC□25	□□□□	□	□	□	□	□□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HC525 Size 25 Enclosed, Shielded Bearings **HC625** Size 25 Enclosed, with Shaft Seal	**3000** 3,000 **3600** 3,600 **4096** 4,096 **5000** 5,000	**0** Flange Mount, 3/8” Shaft **1** 2.50” Servo Mount/ 4 Hole, 2.00” BC Face Mount, 3/8” Shaft **2** Flange Mount, 1/4” Shaft **3** 2.50” Servo Mount/ 4 Hole 2.00” BC Face Mount, 1/4” Shaft **4** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 3/8” Shaft **5** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 1/4” Shaft **6** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 3/8” Shaft **7** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft **8** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 3/8” Shaft **9** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft	**7 Pin Connector or Cable** **0** Single Ended, no Index, Format A, Table 2 **1** Single Ended, with Index, Format A, Table 2 **4** Single Ended, with Index, Format B, Table 2 **6** Differential, no Index, Format C, Table 3 **A** Single Ended, with Index, Format C, Table 2 **C** Single Ended, no Index, Format C, Table 2 **G** Single Ended, with Index, Format D, Table 2 **10 Pin Connector or Cable** **2** Differential, no Index, Format A, Table 1 **3** Differential, with Index, Format A, Table 1 **5** Differential, with Index, Format B, Table 1 **B** Differential, with Index Format C, Table 1 **D** Differential, no Index, Format C, Table 1 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6 See page 3 for electrical tables and page 4 for formats.	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ 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 **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** End Mount Connector **1** Side Mount Connector Available when Code 1is HC525: **2** 18” Cable, Side **3** 3’ Cable, Side **4** 6’ Cable, Side **5** 10’ Cable, Side **6** 15’ Cable, Side **J** 18” Cable, End **K** 3’ Cable, End **L** 6’ Cable, End **M** 10’ Cable, End **N** 15’ Cable, End Available when Code 1is HC625: **A** 18” Watertight, Side **B** 3’ Watertight, Side **C** 6’ Watertight, Side **D** 10’ Watertight, Side **F** 15’ Watertight, Side **P** 18” Watertight, End **Q** 3’ Watertight, End **R** 6’ Watertight, End **S** 10’ Watertight, End **T** 15’ Watertight, End	**Blank** None Available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector*

1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Cable Assemblies with MS Connector*

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

SERIES HC25

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 6, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Differential

Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
N/C	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

Table 2 – Single Ended

Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 3 – Differential

Encoder Function	Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index	
	Pin	Cable Accessory Color Code
Signal A	A	RED
Signal B	B	BLUE
Signal $\overline{A}$	C	YEL
Power Source	D	WHT
Signal $\overline{B}$	E	GRN
Common	F	BLK
Case	G	SHIELD

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Tables 1 and 3**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

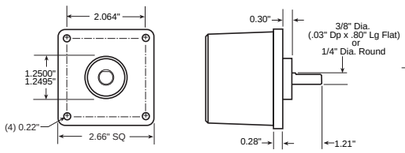
by DYNAPAR™

SERIES HC25

DIMENSIONS

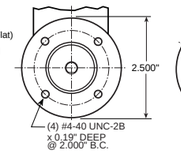
Code 3: Mechanical

0,2: Flange

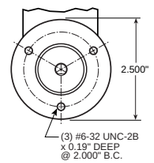


Note: Flat provided on 3/8" shaft

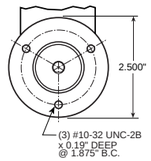
1,3: 2.5" Servo



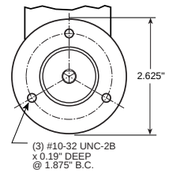
4,5: 2.5" Servo

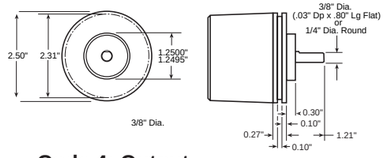


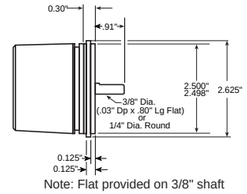
6,7: 2.5" Servo



8,9: 2.62" Servo



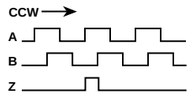




Note: Flat provided on 3/8" shaft

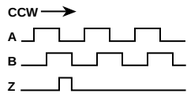
Code 4: Output

0 - 3: Format A



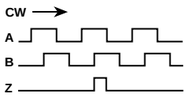
A Leads B CCW
Index Width (90°) Gated to $\overline{B}$

4,5: Format B



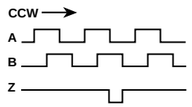
A Leads B CCW
Index Width (90°) Gated to B

6 - D: Format C



A Leads B CW
Index Width (90°) Gated to B

G: Format D

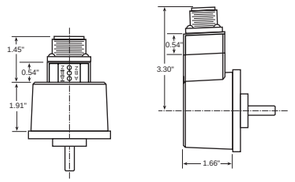


A Leads B CCW
Inverted Index (90°) Gated to B

Code 6: Termination

0: End MS Connector **1:** Side MS Connector

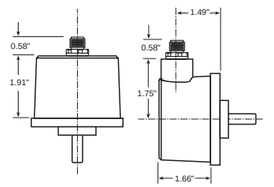
When Code 5 is 0 to 6 or A to G



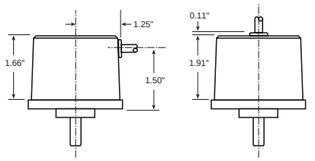
Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

0: End M12 Connector **1:** Side M12 Connector

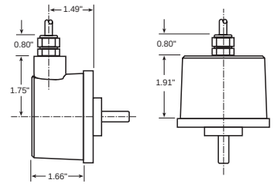
When Code 5 is H to Z



2 - 6: Side Cable **J - N:** End Cable



A - F: Side W.T. Cable **P -T:** End W.T. Cable



SERIES HR25

Dynapar™ brand

Shafted Encoder

IND Industrial Duty

Key Features

- Reliable Dual Row Bearing Design
- Unbreakable Code Disc
- Industry Standard Size 25 (2.5”)

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 1024 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 or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information

Quadrature Phasing: 90° ± 22.5° electrical

Symmetry: 180° ± 18° electrical

Index: 180° ± 18° electrical (gated with B low)

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

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads

Outputs:
4469 Differential Line Driver: 100mA, sink or source

7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exits
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shaft Sizes: 1/4” or 3/8”

Shaft Loading: (at 0.25” from encoder face) 80 lbs. radial, 80 lbs. axial

Shaft Speed: 10,000 RPM max.

Shaft Runout: 0.001” max. TIR

Moment of Inertia: 3.0 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Shaft Material: Stainless Steel

Disc Material: Mylar

Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C (consult factory for low temperature operation to –40 °C)

Storage Temperature: –40 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating:
HR525: NEMA12/IP54 (dirt tight, splashproof);
HR625: NEMA4/IP66 (dust proof, washdown)

by DYNAPAR™

SERIES HR25

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HR□25	□□□□	□	□	□	□	□□
Ordering Information						
HR525 Size 25 Enclosed, Shielded Bearings **HR625** Size 25 Enclosed, with Shaft Seal	**0001** **0250** **0010** **0300** **0012** **0360** **0050** **0400** **0060** **0500** **0086** **0600** **0100** **0800** **0120** **1000** **0200** **1024** **0240**	**0** Flange Mount, 3/8” Shaft **1** 2.50” Servo Mount/ 4 Hole, 2.00” BC Face Mount, 3/8” Shaft **2** Flange Mount, 1/4” Shaft **3** 2.50” Servo Mount/ 4 Hole 2.00” BC Face Mount, 1/4” Shaft **4** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 3/8” Shaft **5** 2.50” Servo Mount/ 3 Hole, 2.00” BC Face Mount, 1/4” Shaft **6** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 3/8” Shaft **7** 2.50” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft **8** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft **9** 2.62” Servo Mount/ 3 Hole, 1.88” BC Face Mount, 1/4” Shaft	**7 Pin Connector or Cable** **0** Single Ended, no Index, Format A, Table 2 **1** Single Ended, with Index, Format A, Table 2 **4** Single Ended, with Index, Format B, Table 2 **6** Differential, no Index, Format C, Table 3 **A** Single Ended, with Index, Format C, Table 2 **C** Single Ended, no Index, Format C, Table 2 **G** Single Ended, with Index, Format D, Table 2 **10 Pin Connector or Cable** **2** Differential, no Index, Format A, Table 1 **3** Differential, with Index, Format A, Table 1 **5** Differential, with Index, Format B, Table 1 **B** Differential, with Index Format C, Table 1 **D** Differential, no Index, Format C, Table 1 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6 See page 3 for electrical tables and page 4 for formats.	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ 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 (7272) **4** 5-26V in; 5-26V Line Driver out (7272) **5** 5-26V in, 5V Differential Line Driver out (4469) **6** 5-15V in, 5-15V Differential Line Driver out (4469) **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** End Mount Connector **1** Side Mount Connector Available when Code 1 is HR525: **2** 18” Cable, Side **3** 3’ Cable, Side **4** 6’ Cable, Side **5** 10’ Cable, Side **6** 15’ Cable, Side **J** 18” Cable, End **K** 3’ Cable, End **L** 6’ Cable, End **M** 10’ Cable, End **N** 15’ Cable, End Available when Code 1 is HR625: **A** 18” Watertight, Side **B** 3’ Watertight, Side **C** 6’ Watertight, Side **D** 10’ Watertight, Side **F** 15’ Watertight, Side **P** 18” Watertight, End **Q** 3’ Watertight, End **R** 6’ Watertight, End **S** 10’ Watertight, End **T** 15’ Watertight, End	Available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector

1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES HR25

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 6, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Differential			
Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
N/C	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

Table 2 – Single Ended			
Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 3 – Differential		
Encoder Function	Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index	
	Pin	Cable Accessory Color Code
Signal A	A	RED
Signal B	B	BLUE
Signal $\overline{A}$	C	YEL
Power Source	D	WHT
Signal $\overline{B}$	E	GRN
Common	F	BLK
Case	G	SHIELD

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Tables 1 and 3**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

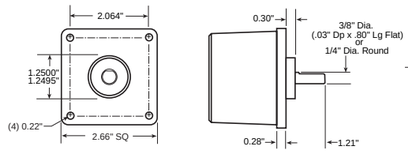
by DYNAPAR™

SERIES HR25

DIMENSIONS

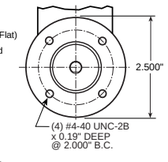
Code 3: Mechanical

0,2: Flange

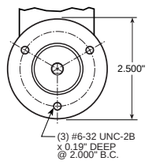


Note: Flat provided on 3/8" shaft

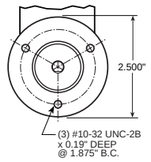
1,3: 2.5" Servo



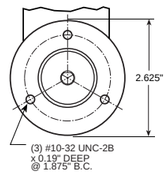
4,5: 2.5" Servo

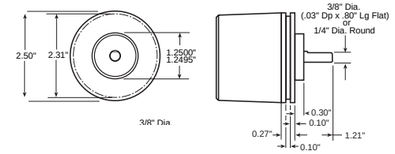


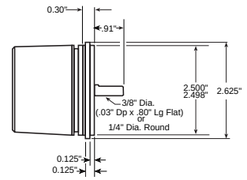
6,7: 2.5" Servo



8,9: 2.62" Servo



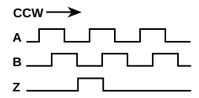




Note: Flat provided on 3/8" shaft

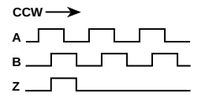
Code 4: Output

0 - 3: Format A



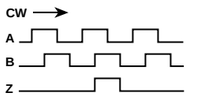
A Leads B CCW
Index Width (180°) Gated to $\overline{B}$

4,5: Format B



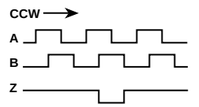
A Leads B CCW
Index Width (180°) Gated to B

6 - D: Format C



A Leads B CW
Index Width (180°) Gated to B

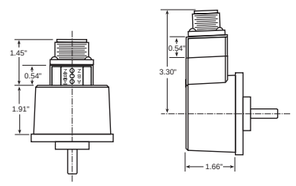
G: Format D



A Leads B CCW
Inverted Index (180°) Gated to B

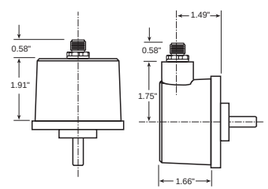
Code 6: Termination

0: End MS Connector **1:** Side MS Connector
When Code 5 is 0 to 6 or A to G

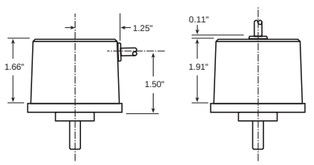


Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

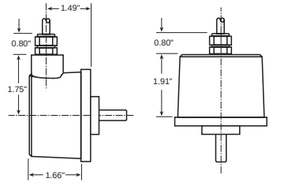
0: End M12 Connector **1:** Side M12 Connector
When Code 5 is H to Z



2 - 6: Side Cable **J - N:** End Cable



A - F: Side W.T. Cable **P -T:** End W.T. Cable



SERIES HA26

Dynapar™ brand

Integral Coupling Encoder

IND Industrial Duty

Key Features

- **Industry Standard 2.5” Rugged Encoder Size**
- **Integral Coupling and Flange Provide Thermal and Electrical Isolation**
- **Field Replaceable Coupling**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 2540 PPR (pulses/revolution)
Accuracy: (worst case any edge to any other edge) ±2.5 arc-min.
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information
Quadrature Phasing: 90° ± 22.5° electrical
Symmetry: 180° ± 18° electrical
Index: 180° ± 18° electrical (gated with B low)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source
Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exit
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-xxxx)
Cable w/ 8 pin M12 Connector (112860-xxxx)

MECHANICAL

Shafts Coupling: accepts 1/4”, 3/8” and 1/2” motor or machinery shafts
Shaft Speed: 5,000 RPM max.
Shafts Alignment: 0.002” max. TIR runout; 0.005” max. radial offset; 3° max. angular
Mating Shaft Lengths: Typically: 0.5” max. available into the coupling as measured from the A/B mounting surface. 1.3” max available into the coupling as measured from the C mounting surface.
Starting Torque: (max at 25 °C) 1.0 oz-in;
Moment of Inertia: 4.3 x 10^{-4} oz–in–sec^2
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C (consult factory for low temperature operation to –40 °C)
Storage Temperature: –40 to +90 °C
Shock: 50 G’s for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 20 G’s
Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

SERIES HA26

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HA526 □□□		□	□	□	□	□□
Ordering Information						
HA526 Size 25 with Integral Coupling and Flange Adapter, Glass Code Disk	**0001 0600** **0005 0625** **0010 0635** **0012 0720** **0050 0800** **0060 0900** **0100 1000** **0120 1024** **0150 1200** **0180 1250** **0200 1270** **0240 1500** **0250 1600** **0256 1800** **0300 1968** **0360 2000** **0400 2048** **0500 2400** **0512 2500** **2540** For Resolutions above 2540, see Series HC526	**A** Flange Adapter with Pilot **B** Flange Adapter without Pilot **C** Flange Adapter for NEMA Size 42 Motors	**7 Pin Connector or Cable** **0** Single Ended, no Index, Format A, Table 1 **1** Single Ended, with Index, Format A, Table 1 **4** Single Ended, with Index, Format B, Table 1 **A** Single Ended, with Index, Format C, Table 1 **C** Single Ended, no Index, Format C, Table 1 **G** Single Ended, with Index, Format D, Table 1 **10 Pin Connector or Cable** **2** Differential, no Index, Format A, Table 2 **3** Differential, with Index, Format A, Table 2 **5** Differential, with Index, Format B, Table 2 **B** Differential, with Index Format C, Table 2 **D** Differential, no Index, Format C, Table 2 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6 See page 3 for electrical tables and page 4 for formats.	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ Pullup out **1** 5-26V in; 5-26V Open Collector out **2** 5-26V in; 5V Totem Pole out **3** 5-26V in; 5V Differential Line Driver out (7272) **4** 5-26V in; 5-26V Differential Line Driver out (7272) **5** 5-26V in, 5 V Differential Line Driver out (4469) **6** 5-15V in, 5-15 V Differential Line Driver out (4469) **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** End Mount Connector **1** Side Mount Connector **2** 18” Cable, Side **3** 3’ Cable, Side **4** 6’ Cable, Side **5** 10’ Cable, Side **6** 15’ Cable, Side	Available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector

1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA 4 style

Flexible Couplings

CPLX1250375 Flexible Coupling 3/8”; 1/4”, 3/8”, 1/2”

SERIES HA26

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 5, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Single Ended

Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 2 – Differential

Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
No Connection	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 22 AWG conductors, minimum
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

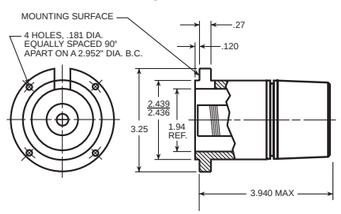
by DYNAPAR™

SERIES HA26

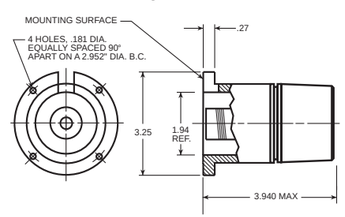
DIMENSIONS

Code 3: Mechanical

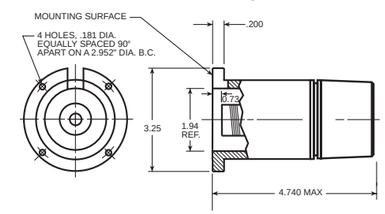
A: Flange with Pilot



B: Flange without Pilot



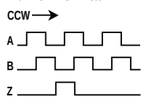
C: NEMA 42 Flange



Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

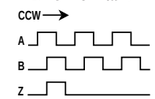
Code 4: Output

0 - 3: Format A



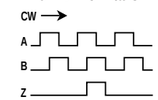
A Leads B CCW
Index Width (180°) Gated to $\overline{B}$

4 - 5: Format B



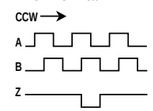
A Leads B CCW
Index Width (180°) Gated to B

6 - D: Format C



A Leads B CW
Index Width (180°) Gated to B

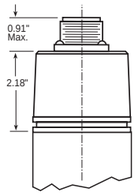
G: Format D



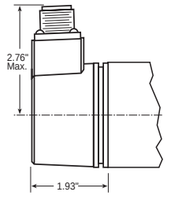
A Leads B CCW
Inverted Index (180°) Gated to B

Code 6: Termination

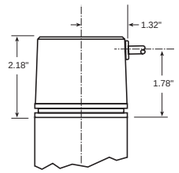
0: End MS Connector
When Code 5 is 0 to 5 or A to G



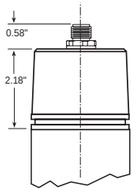
1: Side MS Connector
When Code 5 is 0 to 5 or A to G



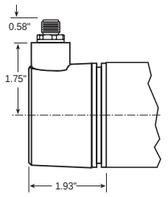
2 - 6: Side Cable



0: End M12 Connector
When Code 5 is H to Z



1: Side M12 Connector
When Code 5 is H to Z



SERIES HC26

Dynapar™ brand

Integral Coupling Encoder

Key Features

- **High 5000 PPR Resolution Available**
- **Integral Coupling and Flange Provide Thermal and Electrical Isolation**
- **Field Replaceable Coupling**

IND Industrial Duty

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 3000 to 5000 PPR (pulses/revolution)
Accuracy: (worst case any edge to any other edge) ±10.8°/PPR
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information
Quadrature Phasing: 90° ± 25° electrical
Symmetry: 180° ± 25° electrical
Index: 90° ± 25° 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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
Frequency Response: 250 kHz min.
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exit
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shafts Coupling: accepts 1/4", 3/8" and 1/2" motor or machinery shafts
Mating Shaft Lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface. 1.3" max available into the coupling as measured from the C mounting surface.
Shafts Alignment: 0.002" max. TIR runout; 0.005" max. radial offset; 3° max. angular
Shaft Speed: 10,000 RPM max.
Starting Torque: (max at 25 °C) 1.0 oz-in
Moment of Inertia: 4.3 x 10^{-4} oz–in–sec^2
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: –40 to +85 °C
Storage Temperature: –40 to +90 °C
Shock: 50 G's for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 20 G's
Humidity: Up to 98% without condensation
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

SERIES HC26

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HC526 □□□□		□	□	□	□	□□
Ordering Information						
HC526 Size 25 Enclosed with Integral Coupling and Flange Adapter	**3000** **3600** **4096** **5000**	**A** Flange Adapter with Pilot **B** Flange Adapter without Pilot **C** Flange Adapter for NEMA Size 42 Motors	**7 Pin Connector or Cable** **0** Single Ended, no Index, Format A, Table 1 **1** Single Ended, with Index, Format A, Table 1 **4** Single Ended, with Index, Format B, Table 1 **A** Single Ended, with Index, Format C, Table 1 **C** Single Ended, no Index, Format C, Table 1 **G** Single Ended, with Index, Format D, Table 1 **10 Pin Connector or Cable** **2** Differential, no Index, Format A, Table 2 **3** Differential, with Index, Format A, Table 2 **5** Differential, with Index, Format B, Table 2 **B** Differential, with Index Format C, Table 2 **D** Differential, no Index, Format C, Table 2 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6 See page 3 for electrical tables and page 4 for formats.	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ Pullup out **1** 5-26V in; 5-26V Open Collector out **2** 5-26V in; 5V Totem Pole out **3** 5-26V in; 5V Differential Line Driver out (7272) **4** 5-26V in; 5-26V Differential Line Driver out (7272) **A** Same as "**0**" with extend. temp range **B** Same as "**1**" with extend. temp range **C** Same as "**2**" with extend. temp range **D** Same as "**3**" with extend. temp range **E** Same as "**4**" with extend. temp range	**0** End Mount Connector **1** Side Mount Connector **2** 18" Cable, Side **3** 3' Cable, Side **4** 6' Cable, Side **5** 10' Cable, Side **6** 15' Cable, Side	Available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector*
1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*
112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

Flexible Couplings
CPLX1250375 Flexible Coupling 3/8"; 1/4", 3/8", 1/2"

SERIES HC26

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 5, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Single Ended

Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 2 – Differential

Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
N/C	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 22 AWG conductors, minimum
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

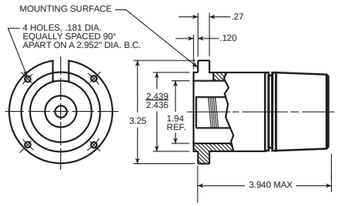
by DYNAPAR™

SERIES HC26

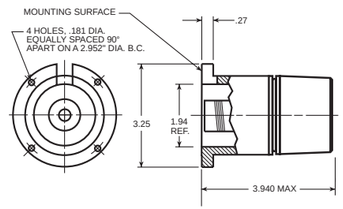
DIMENSIONS

Code 3: Mechanical

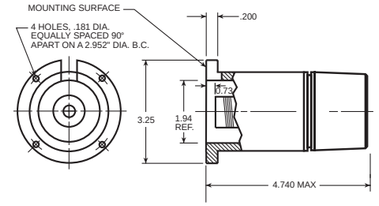
A: Flange with Pilot



B: Flange without Pilot



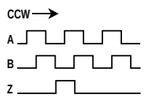
C: NEMA 42 Flange



Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

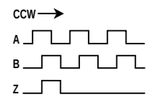
Code 4: Output

0 - 3: Format A



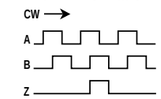
A Leads B CCW
Index Width (180°) Gated to $\overline{B}$

4 - 5: Format B



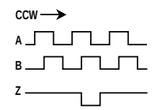
A Leads B CCW
Index Width (180°) Gated to B

6 - D: Format C



A Leads B CW
Index Width (180°) Gated to B

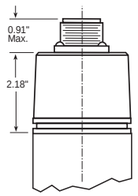
G: Format D



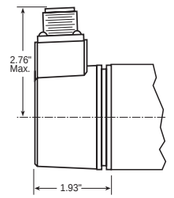
A Leads B CCW
Inverted Index (180°) Gated to B

Code 6: Termination

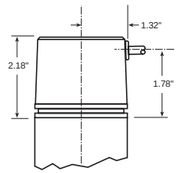
0: End MS Connector
When Code 5 is 0 to 5 or A to G



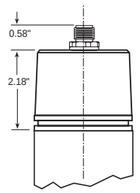
1: Side MS Connector
When Code 5 is 0 to 5 or A to G



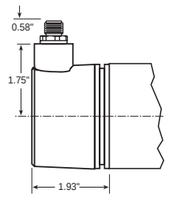
2 - A: Side Cable



0: End M12 Connector
When Code 5 is H to Z



1: Side M12 Connector
When Code 5 is H to Z



SERIES HR26

Dynapar™ brand

Integral Coupling Encoder

IND Industrial Duty

Key Features

- **Unbreakable Code Disc with Rugged Dual Row Bearings**
- **Integral Coupling and Flange Provide Thermal and Electrical Isolation**
- **Field Replaceable Coupling**

EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 1024 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 or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information
Quadrature Phasing: 90° ± 22.5° electrical
Symmetry: 180° ± 18° electrical
Index: 180° ± 18° electrical (gated with B low)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source
Frequency Response: 100 kHz min. (index 75kHz min. for extended temperature range)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exit
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

MECHANICAL

Shaft Coupling: accepts 1/4”, 3/8” and 1/2” motor or machinery shafts
Shafts Alignment: 0.002” max. TIR runout; 0.005” max. radial offset; 3° max. angular
Mating Shaft Lengths: Typically: 0.5” max. available into the coupling as measured from the A/B mounting surface. 1.3” max available into the coupling as measured from the C mounting surface.
Shaft Speed: 10,000 RPM max.
Starting Torque: (max at 25 °C) 1.0 oz-in
Moment of Inertia: 4.3 x 10^{-4} oz–in–sec^2
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar
Weight: 1.5 lbs

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C (consult factory for low temperature operation to –40 °C)
Storage Temperature: –40 to +90 °C
Shock: 50 G’s for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 20 G’s
Humidity: Up to 98% without condensation
Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

SERIES HR26

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HR526	□□□□	□	□	□	□	□□
Ordering Information						
HR526 Size 25 with Integral Coupling and Flange Adapter	**0001** **0250** **0010** **0300** **0012** **0360** **0050** **0400** **0060** **0500** **0086** **0600** **0100** **0800** **0120** **1000** **0200** **1024** **0240**	**A** Flange Adapter with Pilot **B** Flange Adapter without Pilot **C** Flange Adapter for NEMA Size 42 Motors	**7 Pin Connector or Cable** **0** Single Ended, no Index, Format A, Table 1 **1** Single Ended, with Index, Format A, Table 1 **4** Single Ended, with Index, Format B, Table 1 **A** Single Ended, with Index, Format C, Table 1 **C** Single Ended, no Index, Format C, Table 1 **G** Single Ended, with Index, Format D, Table 1 **10 Pin Connector or Cable** **2** Differential, no Index, Format A, Table 2 **3** Differential, with Index, Format A, Table 2 **5** Differential, with Index, Format B, Table 2 **B** Differential, with Index Format C, Table 2 **D** Differential, no Index, Format C, Table 2 **5 Pin M12 Connector** **H** Single ended, no index, Format A, Table 4 **J** Single ended, with index, Format A, Table 4 **K** Single ended, with index, Format B, Table 4 **L** Single ended, with index, Format C, Table 4 **M** Single ended, no index, Format C, Table 4 **N** Single ended, with index, Format D, Table 4 **8 Pin M12 Connector** **P** Single ended, no index, Format A, Table 5 **Q** Single ended, with index, Format A, Table 5 **R** Single ended, with index, Format B, Table 5 **S** Single ended, with index, Format C, Table 5 **T** Single ended, no index, Format C, Table 5 **U** Single ended, with index, Format D, Table 5 **V** Differential, no index, Format A, Table 6 **W** Differential, with index, Format A, Table 6 **X** Differential, with index, Format B, Table 6 **Y** Differential, with index, Format C, Table 6 **Z** Differential, no index, Format C, Table 6	**0** 5-26V in; 5-26V Open Collector with 2.2kΩ Pullup out **1** 5-26V in; 5-26V Open Collector out **2** 5-26V in; 5V Totem Pole out **3** 5-26V in; 5V Differential Line Driver out (7272) **4** 5-26V in; 5-26V Differential Line Driver out (7272) **5** 5-26V in, 5 V Differential Line Driver out (4469) **6** 5-15V in, 5-15 V Differential Line Driver out (4469) **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** End Mount Connector **1** Side Mount Connector **2** 18” Cable, Side **3** 3’ Cable, Side **4** 6’ Cable, Side **5** 10’ Cable, Side **6** 15’ Cable, Side	Available when Code 4 is 0 thru G, and Code 6 is 0 or 1: **PS** LED Output Indicator

Cable Assemblies with MS Connector*

1400431XXXX 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

Flexible Couplings

CPLX1250375 Flexible Coupling 3/8”; 1/4”, 3/8”, 1/2”

SERIES HR26

Dynapar™ brand

ELECTRICAL CONNECTIONS

Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 5, or A, B, C, D or G

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

Table 1 – Single Ended

Encoder Function	Cable # 1400431XXXX 7 Pin Single Ended w/ Index Outputs		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	RED
Signal B	B	ORN	BLUE
Signal Z*	C	YEL	YEL
Power Source	D	RED	WHT
No Connection	E	—	GRN
Common	F	BLK	BLK
Case	G	GRN	SHIELD

Table 2 – Differential

Encoder Function	**Cable # 109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		
	Pin	Wire Color Code	Cable Accessory Color Code
Signal A	A	BRN	BRN
Signal B	B	ORN	ORG
Signal Z*	C	YEL	YEL
Power Source	D	RED	RED
N/C	E	—	—
Common	F	BLK	BLK
Case	G	GRN	GRN
Signal $\overline{A}$	H	BRN/WHT	BRN/WHT
Signal $\overline{B}$	I	ORN/WHT	ORN/WHT
Signal $\overline{Z}$	J	YEL/WHT	YEL/WHT

5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z

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

Encoder Function	Table 4 Cable # 112859-XXXX 5 Pin Single Ended		Table 5 Cable # 112860-XXXX 8 Pin Single Ended		Table 6 Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN BLU	2	RED	2	RED
Com	3	—	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 22 AWG conductors, minimum
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
3) Cable Configuration (**Tables 4, 5 and 6**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
4) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
5) * Index not provided on all models. See ordering information.
6) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
7) "MS" Type mating connectors and pre-build cables are rated NEMA 12
8) "M12" Cable assemblies are rated IP67

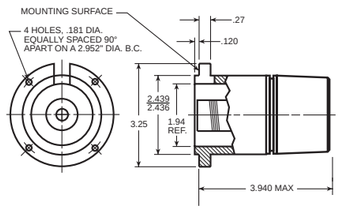
by DYNAPAR™

SERIES HR26

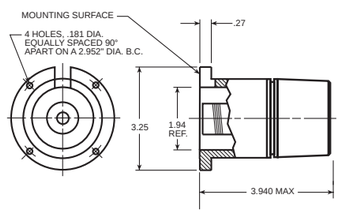
DIMENSIONS

Code 3: Mechanical

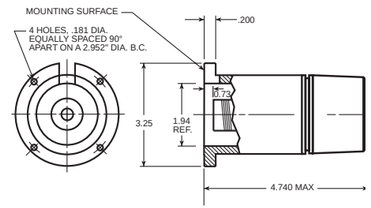
A: Flange with Pilot



B: Flange without Pilot



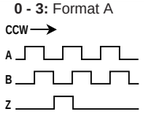
C: NEMA 42 Flange



Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

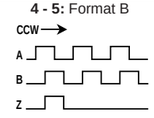
Code 4: Output

0 - 3: Format A



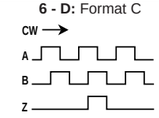
A Leads B CCW
Index Width (180°) Gated to $\overline{B}$

4 - 5: Format B



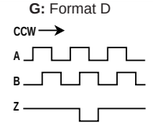
A Leads B CCW
Index Width (180°) Gated to B

6 - D: Format C



A Leads B CW
Index Width (180°) Gated to B

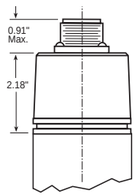
G: Format D



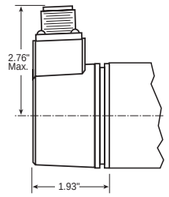
A Leads B CCW
Inverted Index (180°) Gated to B

Code 6: Termination

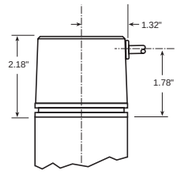
0: End MS Connector
When Code 5 is 0 to 5 or A to G



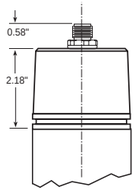
1: Side MS Connector
When Code 5 is 0 to 5 or A to G



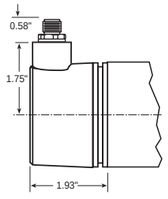
2 - A: Side Cable



0: End M12 Connector
When Code 5 is H to Z



1: Side M12 Connector
When Code 5 is H to Z



SERIES H42

Dynapar™ brand

Shafted Encoder

Key Features

- Simplified Economical Design
- Unbreakable Code Disc
- Rugged Cast Aluminum Housing

IND Industrial Duty

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 600 PPR (pulses/revolution)

Accuracy: (Worst case any edge to any other edge) ±7.5 arc-min.

Format: Two channel quadrature (AB) with complementary outputs

Phase Sense: A leads B for CW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information

Quadrature Phasing: 90° ± 20° 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 Power: 5-26 VDC max. at 90 mA max., not including output loads

Outputs:
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

Frequency Response: 100 kHz min.

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

Termination:
7 pin, style MS3102E-16S-1P MS Connector

Mating Connector: 7 pin, style MS3106A-16S-1S (MCN-N5)

MECHANICAL

Shaft Size: 3/8"

Shaft Loading: (at 0.25" from encoder face) 80 lbs. radial, 80 lbs. axial

Shaft Speed: 7200 RPM max.

Shaft Runout: 0.001" max. TIR

Moment of Inertia: 3.0 x 10^{-4} oz–in–sec^2

Housing & Cover Material: Aluminum

Shaft Material: Stainless Steel

Disc Material: Mylar

Weight: 13 oz.

ELECTRICAL CONNECTIONS

Encoder Function	Cable # 108596-XXXX 7 Pin Dif Line Driver with Index	
	Pin	Wire Color
Signal A	A	RED
Signal B	B	BLUE
Signal Ā	C	YELLOW
Power Source	D	WHITE
Signal B̄	E	GREEN
Common	F	BLACK
Case	G	SHIELD

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

NOTES:
1) Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
3) "MS" Type mating connectors and pre-build cables are rated NEMA 12

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 20 G's

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

by DYNAPAR™

SERIES H42

Ordering Information

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

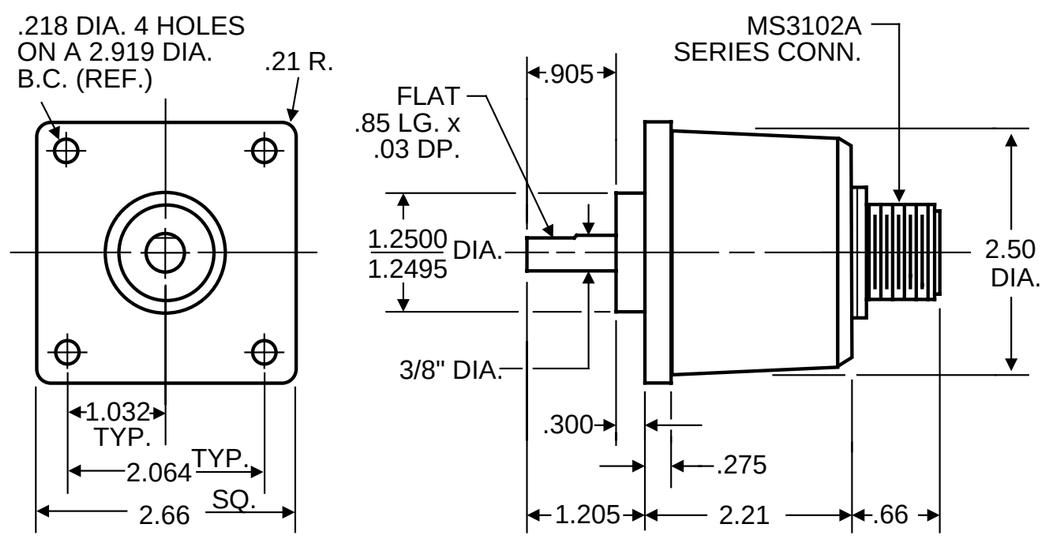
Code 1: Model	Code 2: Pulses/Rev
H42	□□□□
H42 Size 25, Economical	**0001** **0012** **0060** **0100** **0120** **0500** **0600**

Cable Assembly with MS Connector*

108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increment. For example, for a 20 foot cable, replace XXXX with -0020.

DIMENSIONS



SERIES 60

Dynapar™ brand

Heavy Duty Rotopulser©

HD Heavy Duty

Key Features

- **Heavy-duty bearings with 1/2” diameter shaft**
- **Unbreakable disk**
- **Wide selection of resolutions available up to 2500 PPR**
- **Servo ring and face mount options**

SPECIFICATIONS

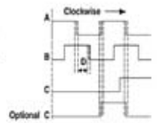
STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 2500 PPR (pulses/revolution) See ordering information
Format: Two channel quadrature (AB) with optional index
Phase Sense: A leads B for CW rotation of the primary shaft
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.

ELECTRICAL

Power Requirements: 5 to 15 VDC max. 115 mA max. plus load requirements
Frequency Response: 50 kHz
Output:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
Mating Connector: 10 Pin: Style MS3106A-18-1S, Dynapar Part No. MCN-N6

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 (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	F	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 $\overline{A}$	G	BLACK
Signal B	D	BLUE
Signal $\overline{B}$	H	BLACK
Signal C (Marker)	A	GREEN
Signal $\overline{C}$	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

Shaft Sizes: 1/4”, 1/8”
Speed Range: Up to 3600 RPM
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)
Housing & Cover Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar
Weight: 26 oz.

ENVIRONMENTAL

Operating Temperature: 0-54°C
Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA 12 / IP54;

by DYNAPAR™

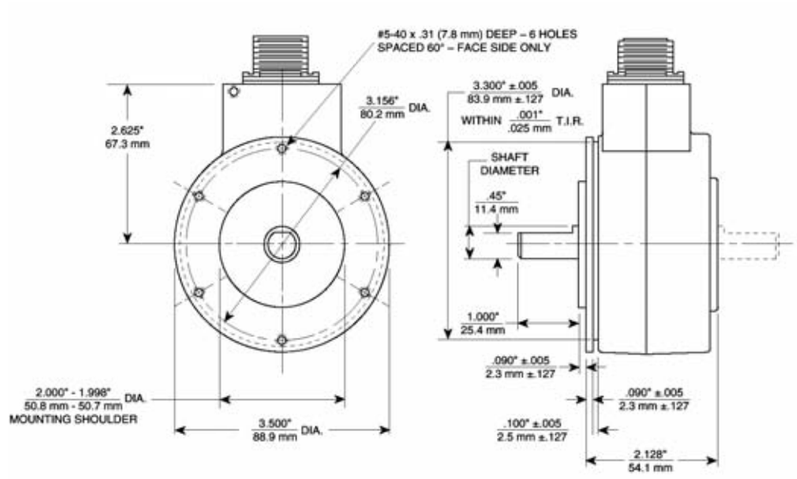
SERIES 60

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	**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]



SERIES 60P

Dynapar™ brand

Heavy Duty Rotopulser©

HD Heavy Duty

Key Features

- Classic Mill-Duty Foot or Face Mount Design
- MS Connector or 1/2" Conduit Entry
- Unbreakable Code Disc
- NEMA 56 C-Face Housing with Feet
- Available with or without Purse Plugs

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

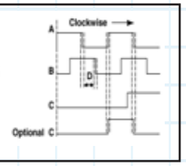
Code: Incremental, Optical
Resolution: 1 to 2500 PPR (pulses/revolution) See ordering information
Format: Two channel quadrature (AB) with optional index
Phase Sense: A leads B for CW rotation of the primary shaft
Minimum Free Path: Between any A and B transition (Distance D) will not be less than 12.5% of one full electrical cycle. This includes effects of jitter, phase and symmetry shifts.

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
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 Single-Ended		Twisted Pairs Cable #14004190010* 10 PIN Differential		Terminal Strip Connector No.
	Pin	Color	Pin	Color	
Signal A	B	RED	B	RED	1
Signal $\overline{A}$	-	-	G	BLK	12
Signal B	D	BLU	D	BLU	3
Signal $\overline{B}$	-	-	H	BLK	11
Signal C (Marker)	A	GRN	A	GRN	4
Signal $\overline{C}$	-	-	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 $\overline{A}$	-	G	C	G	G
Signal B	D	D	B	D	D
Signal $\overline{B}$	-	H	E	H	H
Signal C	A	A	(No Marker)	-	(No Marker)
Signal $\overline{C}$	-	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

Shaft Size: 5/8" nominal
Slew Speed: 3600 RPM
Shaft Diameter: 5/ 8"
Shaft Loading: Radial: 45 lbs. overhung; **Axial:** 15 lbs.
Inertia: 285 gm- cm^2 max.
Typical Starting Torque: 15 oz- in
Bearings: Motor Duty Bearings
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar
Weight: 10 lbs.

ENVIRONMENTAL

Operating Temperature: 0 to 54 °C
Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA 12 / IP54; NEMA 4 / IP66 with optional shaft seals

by DYNAPAR™

SERIES 60P

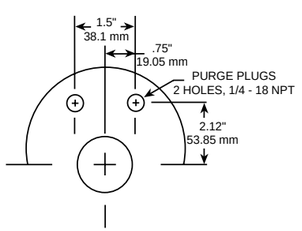
Ordering Information

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

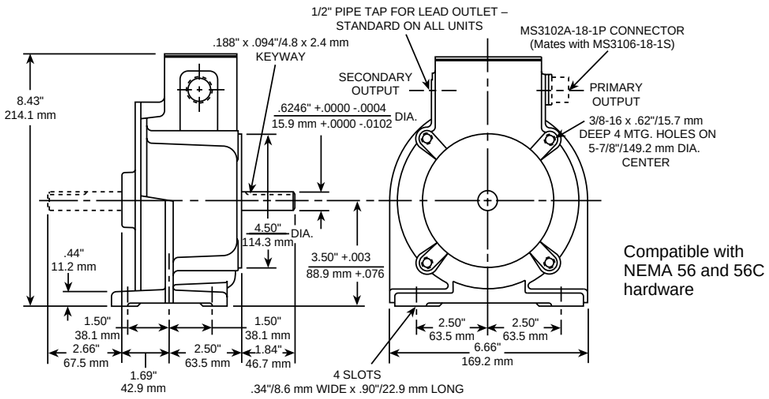
Code 1: Model	Code2: Housing	Code 3: Shaft	Code 4: Output	Code 5: Voltage	Code 6: Pulses/Rev	Code 7: Wiring	Code8: Misc
6 □	P	□	□	F	□ □ □ □	□	□
2 Bidirectional, Heavy Duty **3** Bidirectional with Marker, Heavy Duty	**P** Mill Duty	**M** 5/8" Dia, Single Shaft with Keyway **N** 5/8" Dia, Double Shaft 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	**0** 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 H56

NorthStar™ brand

Heavy Duty Encoder

HD Heavy Duty

Key Features

- **Encoder-Within-Encoder Design with Phased Array Sensor for Reliable Signal Output**
- **Large Outer Bearings Isolate Shaft Loads**
- **Foot Mount or 56 C-Face Mount Easily Replaces BC42 and 46 Tachs**
- **Rugged Enclosure Rating: IP66**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 5000 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° ± 22.5° electrical
Symmetry: 180° ± 25° electrical
Index: 180° ± 25° 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)
5-26 VDC at 100 mA max., not including output loads
Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source
Frequency Response: 100 kHz min.
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
10 pin, style MS3106A-18-1S (MCN-N6)
Pluggable Screw-Terminal (110532-0001)

MECHANICAL

Shaft Size: 5/8" nominal
Shaft Loading: 100 lbs. radial, 50 lbs. axial
Shaft Speed: 3600 RPM max.
Starting Torque: 16 oz-in max.;
Moment of Inertia: 7.9 x 10^{-4} oz–in–sec^2
Bearing Life: See table, below
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar (unbreakable)
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: Up to 98% (non-condensing)
Enclosure Rating: NEMA4/IP66 (dust proof, washdown)

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.

Encoder Function	Cable # 1400209XXXX 6 Pin Single Ended		Cable #1400419XXXX 10 Pin Differential Twisted Pairs		Pluggable Screw Terminal Pin Number
	Pin	Wire Color	Pin	Wire Color	
Sig. A	B	RED	B	RED	3
Sig. $\overline{A}$	—	—	G	BLK	8
Sig. B	D	BLU	D	BLU	7
Sig. $\overline{B}$	—	—	H	BLK	2
Sig. Z*	A	GRN	A	GRN	4
Sig. $\overline{Z}$*	—	—	I	BLK	9
+V	E	WHT	E	WHT	6
Common	C	BLK	C	BLK	1
Shield	F	SHIELD	F	SHIELD	10

Bearing Life versus Load

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

NOTES:
1) Cable Configuration: PVC jacket, 80°C rated, spiral wrapped copper shield; 22 AWG conductors
2) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
3) *Index not provided on all models. See ordering information.
4) "MS" Type mating connectors and pre-build cables are rated NEMA 12

by DYNAPAR™

SERIES H56

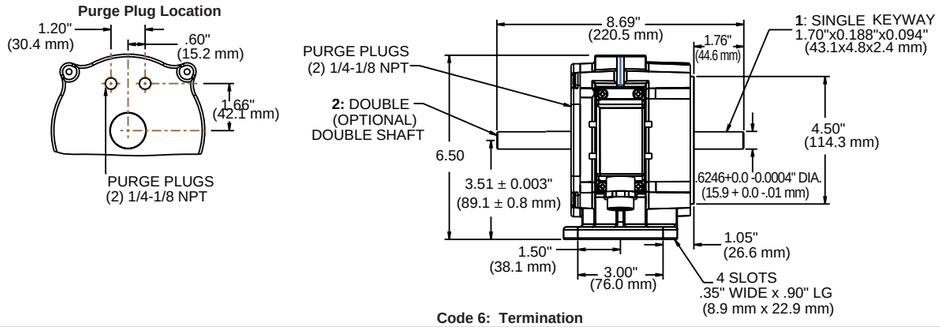
Ordering Information

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** **0500** **0003** **0512** **0010** **0600** **0012** **0900** **0015** **1000** **0032** **1024** **0050** **1200** **0060** **1500** **0100** **2000** **0120** **2048** **0200** **2400** **0240** **2500** **0250** **3072** **0300** **4000** **0360** **4096** **5000**	**1** Single, 5/8" **2** Double, 5/8"	Compliments available when Code 5 is 3 or 4 **2** Single, bidirectional quadrature (AB) **3** Single, bidirectional quadrature with index (ABZ) **4** Dual, isolated bidirectional quadrature (dual AB) **6** Dual, isolated bidirectional quadrature with index (dual ABZ)	**0** 5-26V in, 5-26V Open Collector Out **1** 5-26V in, 5-26V Open Collector Out w/ 2.2kΩ Pullups **2** 5-26V in, 5-26V Single Ended Push-Pull Out **3** 5-26V in, 5V Differential Line Driver Out (7272) **4** 5-26V in, 5-26V Differential Line Driver Out (7272) **5** 5-26V in, 5V Differential Line Driver Out (4469) **6** 5-15V in, 5-15V Differential Line Driver Out (4469)	**0** MS Connector(s) **1** MS Connector(s), plus mating connector(s) **2** Pluggable Screw Terminal Connector(s) **3** Pluggable Screw Terminal(s), plus Mating Connector(s)	Available when Code 6 is 0 or 1: **PS** LED Output Indicator

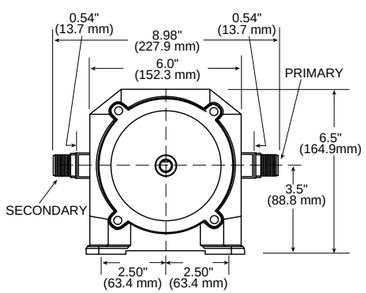
DIMENSIONS inches [mm]

Code 3: Shaft



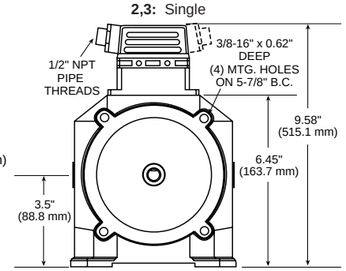
Code 6: Termination

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

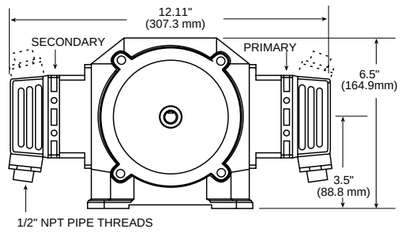


2,3: Pluggable Screw Terminals
Code 4: Format

2,3: Single



4,6: Dual, Isolated



SERIES HD35R

NorthStar™ brand

Heavy Duty Encoder

Key Features

- **Phased Array Sensor for Reliable Signal Output**
- **Rugged Design with Wide-Spaced Oversized Bearings**
- **Unbreakable Code Disc up to 5000 PPR**
- **Improved Seal Design for Increased Moisture Resistance**
- **400G Shock and 20G Vibration Independently Validated**

HD Heavy Duty

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 300°, A leads B CW (from shaft end)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

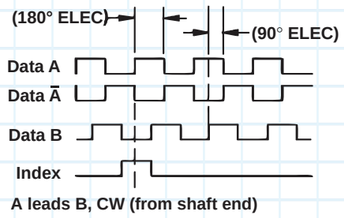
WIRE COLORS

WIRE	PRIMARY FUNCTION	ALTERNATE FUNCTION
Black paired w/ Green	VCC	+UB
Green paired w/ Black	COM	COM
Black paired w/ Blue	A	K1
Blue paired w/ Black	$\overline{A}$	$\overline{K1}$
Black paired w/ Red	B	K2
Red paired w/ Black	$\overline{B}$	$\overline{K2}$
Black paired w/ White	Z	K0
White paired w/ Black	$\overline{Z}$	$\overline{K0}$

ELECTRICAL

Input Power: 5-26VDC, 5-15VDC. 50 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 open collector: 40 mA sink max
4469 differential line driver: 100 mA sink or source
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN613261
Electrical Immunity: Reverse polarity and short circuit protected
Termination: Pluggable screw terminals inside terminal box with M20 cable gland exit

DATA AND INDEX
Not all complements shown
$\overline{A}$ shown for reference



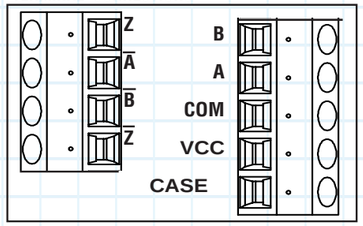
MECHANICAL

Shaft Diameter: 11mm with 4mm key
Mounting Configuration: 100mm IEC "Euro" Flange with 6 Hole Face
Shaft Speed: 6000 RPM, Maximum
Starting Torque: 12.0 in-oz. maximum (at 25°C)
Running Torque: 5.0 in-oz. maximum (at ambient)
Bearings: Deep groove, Dual arrangement
Housing and Cover: Hard Anodized Aluminum
Shaft Material: Stainless Steel
Disc Material: Mylar (unbreakable)
Weight: 4lb

ENVIRONMENTAL

Standard Operating Temperature: -40 to +85°C. At shaft speed above 3000 RPM, derate 10°C per 1000 RPM
Extended Temperature Range: -40 to +100°C (See ordering information)
Storage temperature: -40 to +100°C
Shock: 400g, 6mSec
Vibration: 5 to 3000 Hz, 20g
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67; Custom Seal Option available for environments with pressurized carbon dust

TERMINAL CONNECTIONS



by DYNAPAR™

SERIES HD35R

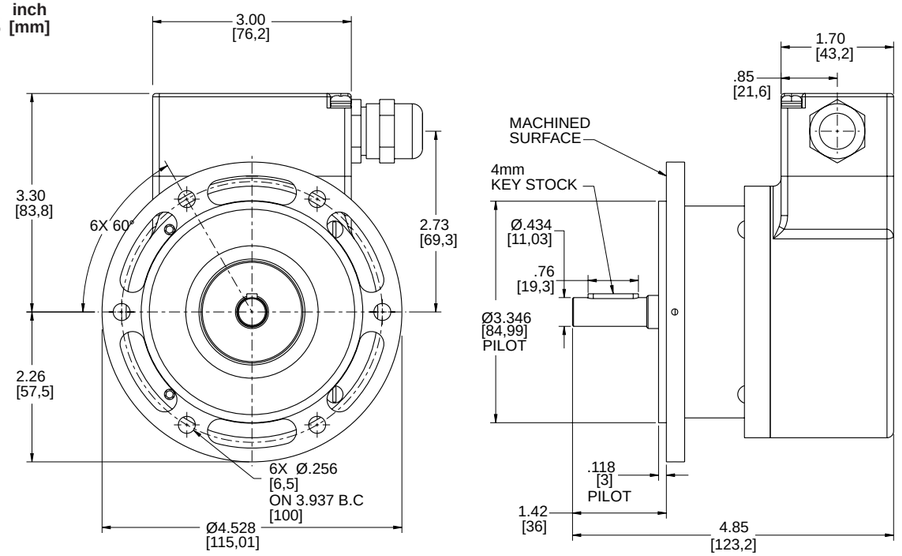
Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Mounting	Code 4: Output Format	Code 5: Termination	Code 6: Housing	Code 7: Options
HD35R □□□□		□	□	□	□	□□
Ordering Information						
HD35R Heavy Duty IEC Flange Encoder	**0001** **0500** **0003** **0512** **0010** **0600** **0012** **0900** **0015** **1000** **0032** **1024** **0050** **1200** **0060** **1500** **0100** **2000** **0120** **2048** **0200** **2400** **0240** **2500** **0250** **3072** **0300** **4000** **0360** **4096** **5000**	**0** 100mm IEC "Euro" flange, 11mm shaft w/ 4mm key	**0** Single Ended ABZ, 5-26VDC push-pull (7272) **1** Single Ended ABZ, 5-26VDC O/C (7273) **2** Single Ended ABZ, 5-26VDC O/C w2.2kOhm (7273) **H** Same as "0" with Extended temp range **J** Same as "1" with Extended temp range **K** Same as "2" with Extended temp range **4** Differential AB only, 5-26VDC, 5-26VDC out *(7272) **5** Differential AB only, 5-26VDC in, 5VDC out *(7272) **A** Differential AB only, 5-15VDC in, 5VDC out *(4469) **C** Differential AB only, 5-15VDC in, 5-15VDC out *(4469) **L** Same as "4" with Extended temp range **M** Same as "5" with Extended temp range **6** Differential ABZ, 5-26VDC in, 5VDC out *(7272) **7** Differential ABZ, 5-26VDC in, 5-26VDC out *(7272) **8** Differential ABZ, 5-15VDC in, 5VDC out *(4469) **9** Differential ABZ, 5-15VDC in, 5-15VDC out *(4469) **N** Same as "6" with Extended temp range **P** Same as "7" with Extended temp range **W** ABZ, 10-24VDC Line Driver for cable runs up to 500ft/120m * **Note**: Line Driver Type, High Powered Mosfet	**0** Terminal Box, M20 gland	**0** Anodized Aluminum	**Blank** None **01** Wind Generator Application with Custom Sealing

Accessories:
114917-0001 Isolated Coupling, 11 mm Bore, 50 mm Length
114917-0002 Isolated Coupling, 11 mm Bore, 68 mm Length

DIMENSIONS inch [mm]



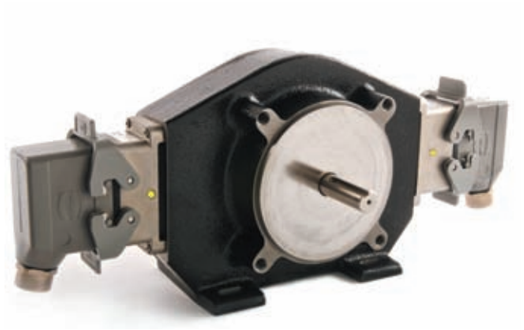
NexGen RIM Tach 6200 *NorthStar™ brand*

Mill-Duty Encoder

HD Heavy Duty

Key Features

- **Stainless Steel and Ductile Cast iron Construction for a Rugged Heavy Duty Encoder**
- **New Sensor Technology provides Extra Wide Gap for even Higher Reliability**
- **Extra Heavy Duty Bearings for Long Life**
- **Redesigned Circuitry for On-Board Diagnostics with LED and Alarm Output**
- **Foot-Mount or 56-C Face Mount Ideal for "Flower Pot" or Belt Drive Applications**



CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 45°
Symmetry: 50% ± 15%
Number of Output Modules: Single or Dual

ELECTRICAL

Input Voltage Requirement: 5-26 Volts DC
Current Requirement: 95 mA typical per sensor module plus line driver load
Output Signals: IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

MECHANICAL

Shaft Size: 0.625" (16mm) diameter with standard key, single or double ended
Shaft Speed: 7,000 RPM
Shaft Axial/Radial Loading:
High Strength Steel: 50 lb axial, 50 lb radial
Stainless Steel: 35 lb axial, 35 lb radial
Mounting Configuration: 4.5" [115mm] diameter, 56 C-Face Mount or accessory flange to meet NEMA MG1-4 standards; foot mount with 4 slotted bolt holes
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron/Stainless Steel
Shaft Material Options: High Strength Carbon Steel or Stainless Steel
Weight: 27.6 lbs

ENVIRONMENTAL

Operating Temperature Range: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™ NexGen RIM Tach 6200

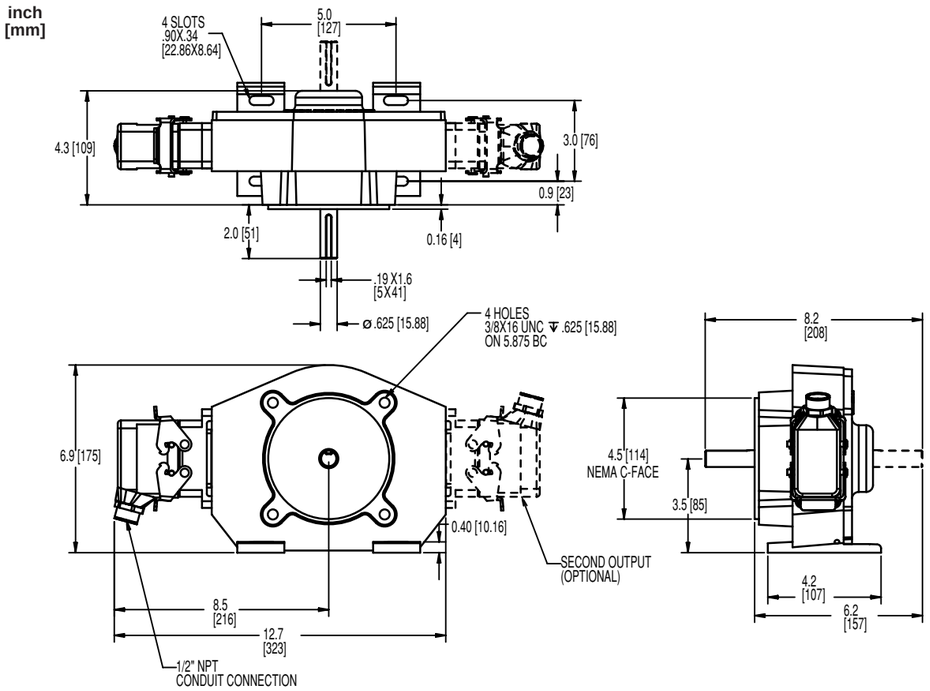
Ordering Information

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: Electrical	Code 6: Termination	Code 7: Options
RT6	□□□□	□	□□□	□	□	□
Ordering Information						
RT6 Foot Mount and Close Coupled Housing	**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	**A** Single Shaft Stainless Steel 5/8" **B** Dual Shaft Stainless Steel 5/8" **S** Single Shaft Hi-strength Steel 5/8" **D** Dual Shaft Hi-Strength Steel 5/8"	**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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18" Long Pigtail Cable **Q** Latching Industrial Connector On 18" Cable **R** Latching Industrial Connector On 18" Cable without Mating Connector	**Blank** No Option **GB** Shaft Grounding Brush (Code **4** must be **S**)

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

DIMENSIONS inch [mm]



SERIES RIM Tach 6200 *NorthStar™ brand*

Severe Duty Encoder

HD Heavy Duty

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 1200 PPR**
- **New Model Available with Larger Air Gap and Diagnostic LED. See NexGen RT6**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-1200 PPR
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

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:
4428 Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

MECHANICAL

Shaft Size: 0.625" (16mm) diameter with standard key, single or double ended
Shaft Speed: 7,000 RPM
Shaft Axial/Radial Loading:
Hot Rolled Steel: 50 lb axial, 50 lb radial
Stainless Steel: 35 lb axial, 35 lb radial
Mounting Configuration: 4.5" [115mm] diameter, 56 C-Face Mount or accessory flange to meet NEMA MG1-4 standards; foot mount with 4 slotted bolt holes
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron/Stainless Steel
Shaft Material Options: Hot Rolled Carbon Steel or Stainless steel
Weight: 27.6 lbs

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™ SERIES RIM Tach 6200

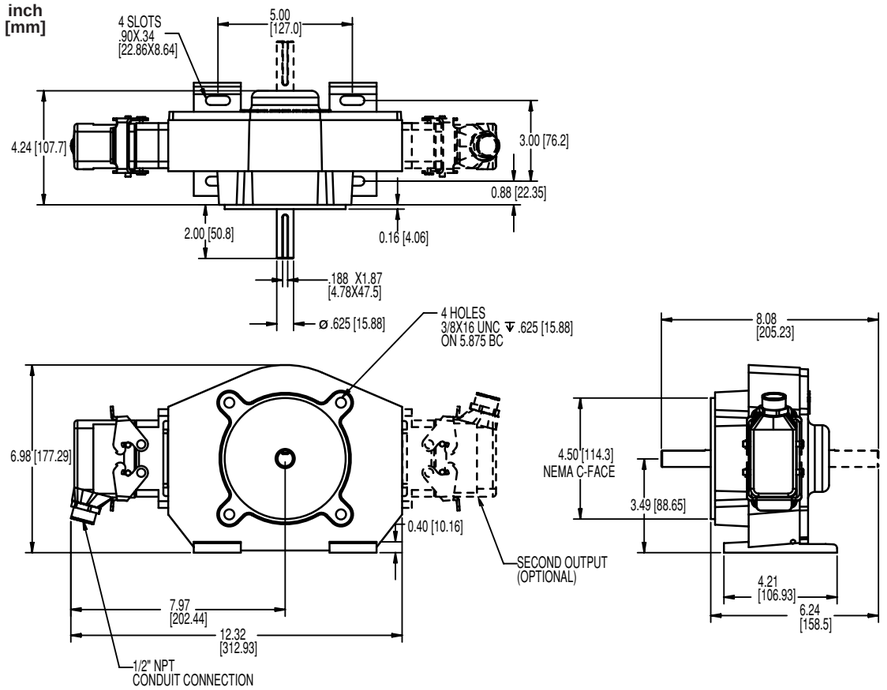
Ordering Information

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 and Close Coupled Housing	**0060** **0300** **0064** **0480** **0075** **0512** **0120** **0600** **0128** **0960** **0150** **1024** **0240** **1200** **0256**	**L** No Index Available when Code 2 is 0480, 0512, 0600, 0960 1024 or 1200 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**A** Single Shaft Stainless Steel 5/8" **B** Dual Shaft Stainless Steel 5/8" **S** Single Shaft Hi-strength Steel 5/8" **D** Dual Shaft Hi-Strength Steel 5/8"	**1** Single Output **2** Dual Output, Isolated Differential, bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)	**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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18" Pigtail

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

DIMENSIONS inch [mm]



SERIES E14H

Dynapar™ brand

Miniature Encoder

Key Features

- **Hubshaft with flex tether for simplified installation**
- **Up to 2540 PPR with optional index**
- **Rugged metal housing**

GP
General Purpose

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 100 to 2540 PPR (pulses/revolution)

Format: Two channel quadrature (AB) with optional Index (Z) outputs

Phase Sense: A leads B for CW shaft rotation as viewed from the shaft end of the encoder

Accuracy: ±3 x (360° ÷ PPR) or ± 2.5 arc-min worst case pulse to any other pulse, whichever is less

Quadrature Phasing: 90° ± 36° electrical

Symmetry: 180° ± 18° electrical

Index: 90° ± 25° (gated with A and B high)

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

ELECTRICAL

Input Power:
5 VDC ± 5% at 80 mA max.;
12 or 15 VDC ± 10% at 80 mA max.; not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source

Frequency Response: 100 kHz min.

Termination: Cable

MECHANICAL

Bore Diameter: 1/4" - 5/8", 6mm - 12mm

Hub Dia. Tolerance: nominal -0/+0.0005" (0.013mm)

Shaft Speed: 5,000 RPM max.

Mating Shaft Length: 0.25" (6 mm) min.; 0.50" (12 mm) max.

Mating Shaft Runout: 0.008" (0.2 mm) max. TIR

Mating Shaft Endplay: ±0.010" (0.25 mm) max.

Starting Torque: 0.9 oz-in max.at 25 °C

Running Torque: 0.8 oz-in max.at 25 °C

Moment of Inertia:
6 to 10 mm hub: 6.03 x 10^{-5} oz–in–sec^2
12 mm to 5/8" hub: 2.4 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Disc Material: Glass

Weight:
6 to 10 mm hub: 3.5 oz. max.
12 mm to 5/8" hub: 4.5 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof)

Electrical Connections

Wire Color Code	Function		
	Single-Ended Outputs	Differential Outputs	
		Unidirectional	Bidirectional
Red	Power Source	Power Source	Power Source
Black	Common	Common	Common
White	Signal A	Signal A	Signal A
Green	Signal B (if used)	Signal $\overline{A}$	Signal B
Orange	Signal Z (if used)	No Connection	Signal $\overline{B}$
Blue	No Connection	No Connection	Signal $\overline{A}$
Shield	Floating	Floating	Floating
White/Black	——	——	Signal Z (if used)
Red/Black	——	——	Signal $\overline{Z}$ (if used)

by DYNAPAR™

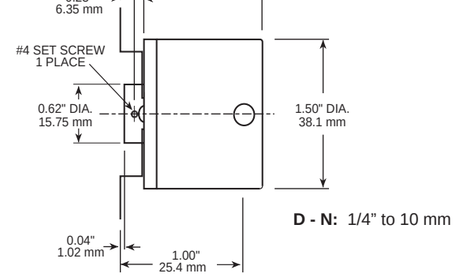
SERIES E14H

Ordering Information

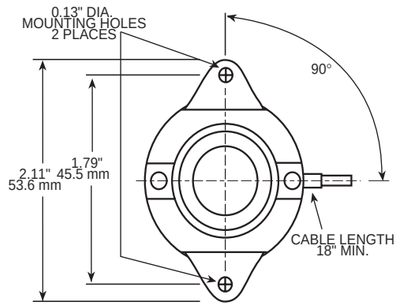
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Pulses/Rev	Code 3: Mounting	Code 4: Hub Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
E14	□□□□	□	□	□	□	□
E14 Size 14, Hub Shaft	**0100** **0750** **0200** **0900** **0250** **1000** **0256** **1024** **0300** **1250** **0400** **1500** **0500** **2000** **0600** **2048** **0720** **2500** **2540**	**0** Size E14	**D** 6 mm **E** 1/4" **F** 5/16" **G** 3/8" **H** 10 mm **J** 12 mm **K** 1/2" **L** 14 mm **M** 5/8" **N** 8 mm	**0** Single Ended, Unidirectional **2** Single Ended, Bidirectional, no Index **3** Single Ended, Bidirectional, with Index **4** Differential, Unidirectional **6** Differential, Bidirectional, no Index **7** Differential, Bidirectional, with Index	**0** 5 VDC **1** 12 VDC **2** 15 VDC	**0** 18" Cable **1** 3' Cable **2** 6' Cable **3** 10' Cable **4** 15' Cable

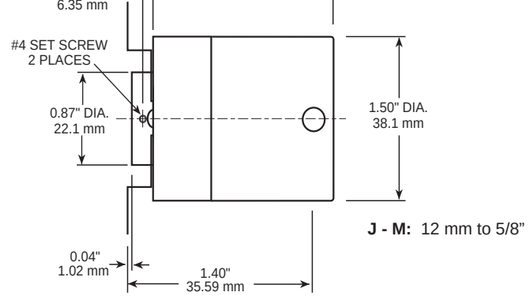
Dimensions (inches/mm)



D - N: 1/4" to 10 mm



Code 4: Mechanical



J - M: 12 mm to 5/8"

SERIES H20 Hubshaft

Dynapar™ brand

Optical Hubshaft Encoder

IND Industrial Duty

Key Features

- **Hubshaft with Spring Tether for Simplified Installation**
- **Industry Standard 2.0” Size**
- **IP66 Sealing Option**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 1 to 2540 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° ± 22.5° electrical

Symmetry: 180° ± 18° electrical

Index: 180° ± 18° electrical (gated with B low)

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

ELECTRICAL

Input Power:
5 to 26 VDC at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 40mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
4469 Differential Line Driver: 100mA, sink or source

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Termination: MS Connector, M12 Connector, Cable Exit

Noise Immunity: Tested to EN61326-1

Electrical Immunity: Reverse polarity and short circuit protected

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, NEMA4 style (MCN-N6N4)
Cable w/ 5 pin M12 Connector (112859-xxxx)
Cable w/ 8 pin M12 Connector (112860-xxxx)

MECHANICAL

Bore Diameter: 1/4”, 3/8”, 1/2”, 5/8”

Mating Shaft Requirements:
Length: 0.38” min., 0.50” max.
Runout: 0.010” max. TIR
Endplay: ±0.025” max.

Shaft Speed:
Resolutions ≤1024 PPR: 10,000 RPM max.
Resolutions >1024 PPR: 5,000 RPM max.

Starting Torque: (max at 25 °C)
without shaft seal: 1.0 oz-in;
with shaft seal: 3.0 oz.-in

Moment of Inertia: 3.0 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Disc Material: Glass or Mylar (PPR Dependant)

Weight: 10 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70 °C;
Extended: 0 to +85 °C

Storage Temperature: –40 to +90 °C

Shock: 50 G’s for 11 milliseconds duration

Vibration: 5 to 2000 Hz at 20 G’s

Humidity: Up to 98% (non-condensing)

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, wash-down) when ordered with shaft seal and either M12 connector or watertight cable exit

by DYNAPAR™ SERIES H20 Hubshaft

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Housing	Code 4: Bore	Code5: FaceMount	Code 6: Shaft Seal	Code 7: Electrical	Code 8: Termination	Code 9: Options
H2□	□□□□	**0**	□	**2**	□	□	□	□
Ordering Information								
1 Unidirectional (Channel A only) **2** Bidirectional (Channels A and B) **3** Bidirectional with Index (Channels A, B and Z)	**0001** **0600** **0005** **0800** **0010** **0900** **0012** **1000** **0050** **1024** **0060** **1200** **0100** **1250** **0120** **1270** **0200** **1500** **0240** **1600** **0250** **1800** **0256** **1968** **0300** **2000** **0360** **2048** **0400** **2400** **0500** **2500** **0512** **2540**	**0** Servo Mount **C** Same as “0” above includes protective cover kit for mounting on 4 1/2” C-face **F** Same as “0” above includes protective cover kit for mounting on fan cover	**2** 5/8” Dia. Hub Shaft and flex coupling **3** 3/8” Dia. Hub Shaft and flex coupling **5** 1/2” Dia. Hub Shaft and flex coupling **6** 1/4” Dia. Hub Shaft and flex coupling	**2** (3) #4-40 @ 1.50” BC	**0** no Shaft Seal **5** Shaft Seal	**0** 5-26V in, 5-26V Open Collector out **1** 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups **2** 5-26V in, 5-26V Push-Pull out **A** Same as “**0**” with extend. temp range **B** Same as “**1**” with extend. temp range **C** Same as “**2**” with extend. temp range available when: Code 1 is 1 or 2 and Code 8 is 2 through M, Q or R; or Code 1 is 3 and Code 8 is 4 thru M, Q or R: **3** 5-26V in, 5-26V Differential Line Driver out (7272) **4** 5-26V in, 5V Differential Line Driver out (7272) **5** 5-26V in, 5 V Differential Line Driver out (4469) **6** 5-15V in, 5-15 V Differential Line Driver out (4469) **D** Same as “**3**” with extend. temp range **E** Same as “**4**” with extend. temp range	**0** 6 Pin Conn, End Mount **1** 6 Pin Conn, Side Mount **2** 7 Pin Conn, End Mount **3** 7 Pin Conn, Side Mount **4** 10 Pin Conn, End Mount **5** 10 Pin Conn, Side Mount **7** 18” Cable, Side Exit **9** 36” Cable, Side Exit **B** 10’ Cable, Side Exit **K** 25’ Cable, Side Exit **N** 5 Pin M12 Connector, End Mount **P** 5 Pin M12 Connector, Side Mount **Q** 8 Pin M12 Connector, End Mount **R** 8 Pin M12 Connector, Side Mount available when Code 6 is 5: **D** 18” Sealed Cbl, Side Exit **F** 36” Sealed Cbl, Side Exit **H** 10’ Sealed Cbl, Side Exit **M** 25’ Sealed Cbl., Side Exit	available when Code 8 is 0 to 5: **PS** LED Output Indicator Option

109296-0001 Replacement flexible mount for Series H20 Hub Shaft

Cable Assemblies with MS Connector*

108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES H20 Hubshaft

Dynapar™ brand

CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - Code 8= 0 to 9, B to M

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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		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	ORN	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	GRN
N/C	F	—	E	—	—	—	E	—	—
Sig. $\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	BRN/WHT
Sig. $\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	ORG/WHT
Sig. $\bar{Z}$*	—	—	—	—	—	—	J	YEL/WHT	YEL/WHT

5 & 8 Pin M12 Accessory Cables when Code 8= N to R

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

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\bar{A}$	—	—	—	—	3	BRN/WHT
Sig. $\bar{B}$	—	—	—	—	5	ORG/WHT
Sig. $\bar{Z}$*	—	—	—	—	8	YEL/WHT

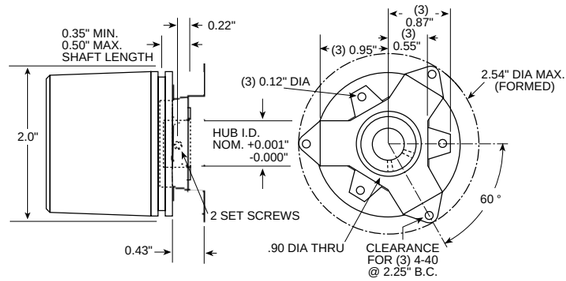
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

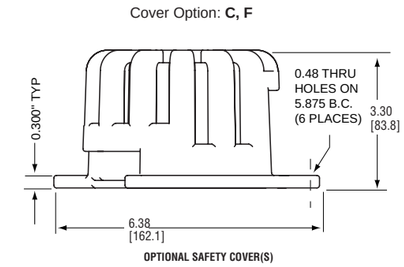
by DYNAPAR™

SERIES H20 Hubshaft

DIMENSIONS

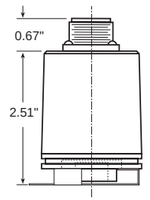
Codes 3-5: Housing, Shafts, Face Mount



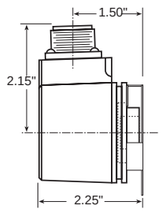


Code 8: Terminations

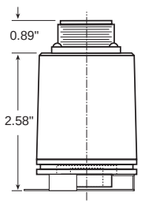
0, 2
6, 7 Pin End MS Conn



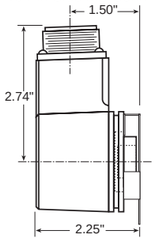
1, 3
6, 7 Pin Side MS Conn



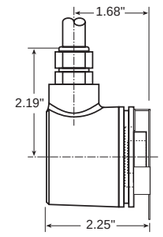
4
10 Pin End MS Conn



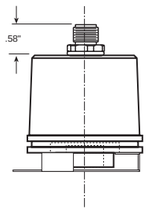
5
10 Pin Side MS Conn



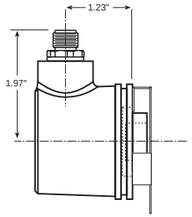
7, 9, B, D, F, H, K, M
Side Exit Cable



N, Q
End M12 Conn



P, R
Side M12 Conn



SERIES HSD25

NorthStar™ brand

Harsh Duty Optical Encoder

HD Heavy Duty

Key Features

- **Compact Hubshaft Design with Field Replaceable Shaft Isolators**
- **Unbreakable Code Disc up to 3600 PPR**
- **IP67 Sealing**
- **Anodized Aluminum, Stainless Steel, or Nickel Plated Housing**
- **Hub-Shaft Mounting Style**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 625 PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 330°, A leads B, CCW (From Clamp End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

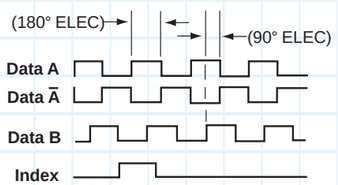
ELECTRICAL

Input Power: 5-26VDC. 80 mA max., not including output loads.
Outputs:
2N2222 Open Collector: 250mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected for 7272 and 7273 line drivers only
Termination: 6, 7, or 10 pin MS Connector; 5 or 8 Pin M12 Connector; 12 Pin M23 Connector; Cable exit w/seal

ELECTRICAL (CONT.)

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, NEMA4 style (MCN-N6N4)
10 pin, Bayonet, style MS3116-F12-10S (MCN-B1)
12 Pin CW M23 Connector (MCN-C1)

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



Index Width: 150° to 330°
A leads B, CCW (From Clamp End)

MECHANICAL

Bore Diameter: 1/4" to 3/4", 6 mm to 19 mm
Mounting Configuration: Hub Shaft Mounting. Note: tether may be required for proper operation. Options available are a slotted or single point tether.
Mating Shaft Length: 1.0" to 1.3"
Shaft Speed: 6000 RPM max.
Starting Torque: 6.5 in-oz. maximum (at 25°C)
Bearings: 61805-2RZ
Housing and Cover: Hard Anodized Aluminum. Also available in Electroless Nickel Finish and Stainless Steel.
Shaft Material: 303 Stainless Steel (passivated)
Disc Material: Mylar
Weight: 20 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: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

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
HSD 25 □□□□		□	□	□	□	□□
Ordering Information						
HSD25 Heavy Duty 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(7272) **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 *Options 4 & 5 not available when Code 5 is H; and Code 6 is 3, 4, 5* **4** Differential AB only, 5-26 in, 5-26 out (7272) **5** Differential AB only, 5-26 in, 5V out (7272) *Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H; and Code 6 is 3, 4, 5* **6** Differential ABZ, 5-26 in, 5V out (7272) **7** Differential ABZ, 5-26 in, 5-26 out (7272)	**0** 6 Pin Connector **1** 7 Pin Connector **2** 10 Pin Connector **3** 12 Pin Connector **4** 10 Pin Bayonet Connector **5** 6 Pin+Mating Connector **6** 7 Pin+Mating Connector **7** 10 Pin+Mating Connector **8** 12 Pin+Mating Connector **9** 10 Pin Bayonet Mating Connector **A** .5m (20") cable **C** 1m (39") cable **D** 2m (79") cable **E** 3m (118") cable **L** 4m (157") cable **H** 5 pin M12 **J** 8 pin M12 **K** 1.5 ft (18") cable w/ in line 10 Pin Connector **M** 5 ft (60") cable **N** 10 ft (120") cable **P** 1.5 ft (18") Cable with 10-pin Bulkhead Connector	**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

Cable Assemblies with MS Connector*
108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs
114448-XXXX 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*
115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*
112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)
MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 pin, Bayonet, style MS3116-F12-10S
MCN-C1 12 Pin CW M23 Connector

Tether Kits**
113764-0001 Single Point Tether Kit
113766-0001 Slotted Tether Kit

****Note:** Tether may be required for proper encoder operation and may be supplied by the customer or ordered below

SERIES HSD25

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS and M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

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-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

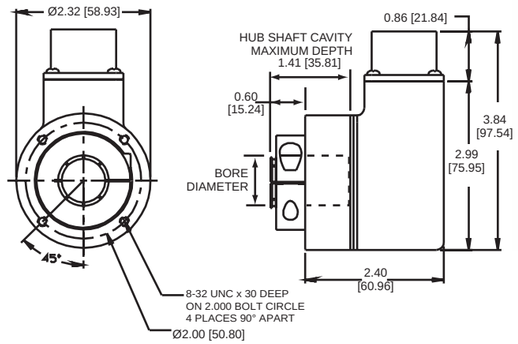
NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

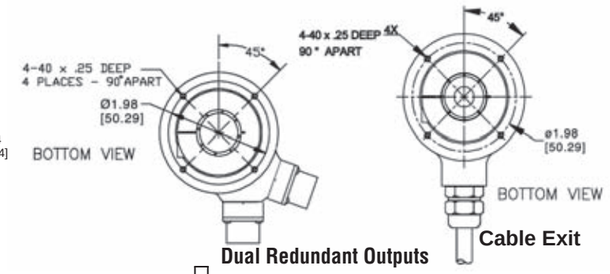
by DYNAPAR™

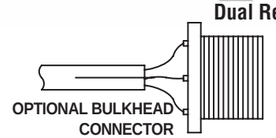
SERIES HSD25

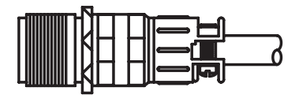
DIMENSIONS inches [mm]

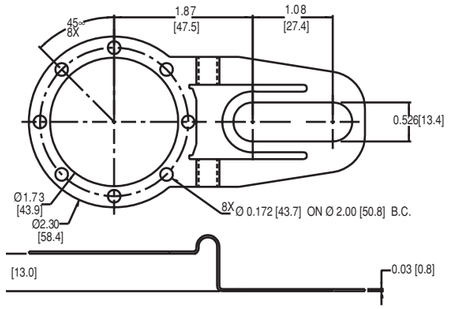


Standard Housing

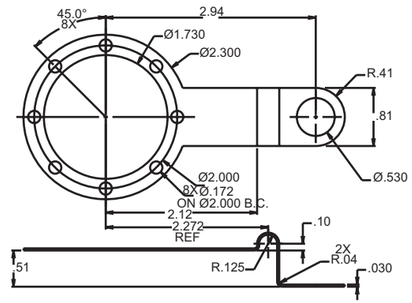








113766-0001 Slotted Tether Kit



113764-0001 Single Point Tether Kit

SERIES RR25

Dynapar™ brand

Heavy Duty Rate Indicator

HD Heavy Duty

Key Features

- **Ball Bearing-less, Hub-Shaft Design with Clamping Collar and Tether**
- **Encapsulated Electronics Ideal For Wet and Dirty Conditions**
- **Corrosion Resistant Construction Resists NPK, Diesel Fuel, Gasoline Acetone and Toluene**
- **Magnetic Sensor Uses Proven Hall-IC Technology**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 180, 360 or 512 PPR
Format: Single Channel
Symmetry: 180° ± 90°

ELECTRICAL

Input Voltage: 5-28VDC (up to 32VDC overvoltage protection)
Current Draw: 50mA Maximum (not including output load)
Output:
HD7 Push-Pull Differential Line Driver: 100mA sink or source
7273 Open Collector: 40mA
Frequency Response: 5kHz Maximum
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: Cable, Radial Exit with Connector

MECHANICAL

Hub Shaft Bore Diameter: 1" or 1-1/8"
Hub Shaft Bore Tolerance: Nominal +.0005"/+.0015"
Starting Torque: 7 oz-in Maximum
Shaft Fixing: Stainless Steel Split Clamp
Shaft Speed: 500 RPM Maximum
Mating Shaft Length: 1" Minimum
Mating Shaft Runout: .005" TIR Maximum
Mating Shaft Endplay: ±.025" Maximum
Housing Material: PBT Thermoplastic Resin
Hub Shaft Material: Stainless Steel
Weight: 1.6 lbs

ENVIRONMENTAL

Operating Temperature: -20°C to +85°C
Storage Temperature: -40°C to +85°C
Vibration: 10G, 5-2000 Hz
Shock: 50G, 6ms duration
Humidity: Up to 98% (non-condensing)
Enclosure Rating (electronic components): IP66/IP67

ELECTRICAL CONNECTIONS

Encoder Function	Pin	Wire Color
VCC	A	RED
COM	B	BLK
SIC	C	WHT

by DYNAPAR™

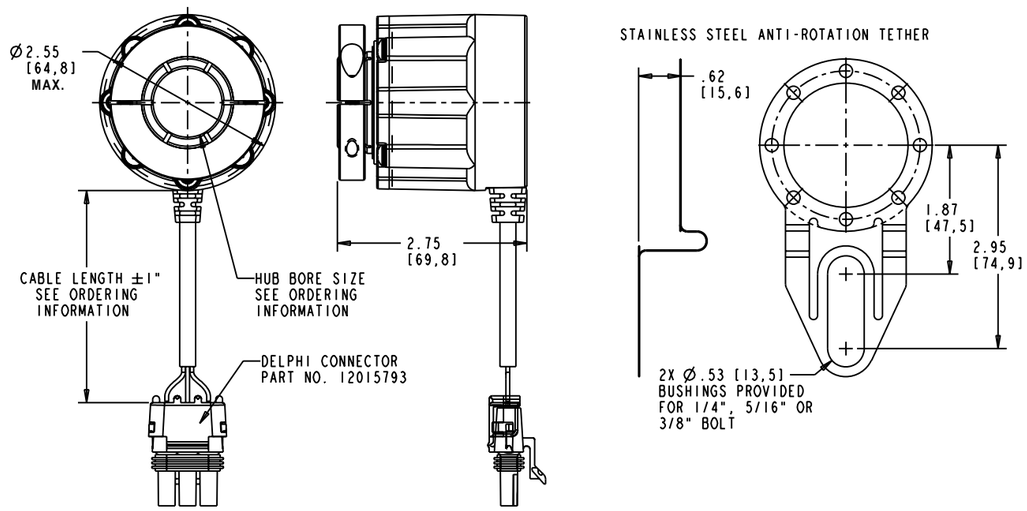
SERIES RR25

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Hub Bore	Code 4: Output	Code 5: Termination
RR25	□□□	□	□	□
Ordering Information				
RR25 2.5" Rate Indicator	**0180** **0360** **0512**	**H** 1" **J** 1-1/8" **K** 3/8" x 0.9"L male shaft extension	**0** HD7 type Push-Pull **1** 7273 Open Collector	**A** 18" Radial Cable w/ 3-pin Delphi connector **C** 36" Radial Cable w/ 3-pin Delphi connector **D** 60" Radial Cable w/ 3-pin Delphi connector

DIMENSIONS inch [mm]
TOLERANCES: ± .02 [0,5]



SERIES HSD44

NorthStar™ brand

Extreme Heavy Duty Encoder

HD Heavy Duty

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**
- **400G Shock and 20G Vibration Independently Validated**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1024 & 2048 PPR (pulses/revolution),
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
Index: 150° to 300° A leads B, CCW (From Clamp End)
Symmetry: 180° ± 18° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

MECHANICAL

Mechanical Interface: Electrically isolated stainless steel shaft flex coupling
Coupling: 16mm, flexible
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Housing Material: Aluminum Alloy
Disc Material: PET
Weight: 4 lbs.

ENVIRONMENTAL

Operating Temperature: -30 to 100°C
Storage temperature: -40 to 100°C
Shock: 400g, 6mSec
Vibration: 5-3000 Hz, 20g
Humidity: Up to 98% (non-condensing)
Enclosure Rating: NEMA 6 / IP67

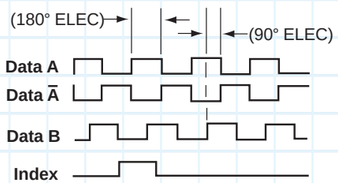
ELECTRICAL

Input Power: 5-30VDC. 80 mA max., not including output loads.
Outputs: 7272 Differential Line Driver: 40 mA, sink or source
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 18" pigtail or 18" pigtail with MS Connector. See Ordering Information
Mating Connector:
10 pin MS, style MS3106A-18-1S (MCN-N6)
10 Pin, NEMA4 Style (MCN-N6N4)

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

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



Index Width: 150° to 300°
A leads B, CCW (From Clamp End)

by DYNAPAR™

SERIES HSD44

Ordering Information

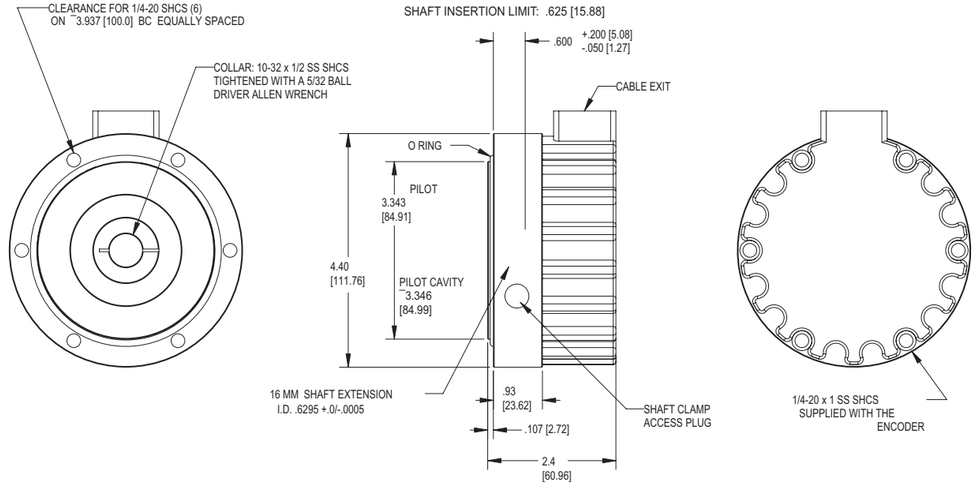
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR	Code 3: Bore	Code 4: Output Format	Code 5: Termination	Code 6: Options	Code 7: Special Option
HSD44	□□□□	□	□	□	□	□□
Ordering Information						
HSD44 Heavy Duty Hub Shaft Encoder	**1024** **2048**	**A** 16mm	**3** Differential ABZ, 5-30 in, 5-30 out (7272)	**A** 18" Cable **K** 1.5 ft (18") cable w/ in line 10 pin connector	**0** No Options **1** Slotted Tether **2** Single Point 4.5" C-face Tether **3** Single Point 8.5" C-face Tether	**Blank** None **01** Extended Pilot (.156")

ACCESSORIES

HSD44ADAPTER45 4-1/2" NEMA Motor Adapter Plate

DIMENSIONS (in. [mm])



SERIES HSD44M

NorthStar™ brand

Extreme Heavy Duty Magnetic Encoder

HD Heavy Duty

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**
- **400G Shock and 20G Vibration Independently Validated**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Resolution: 256, 512, 1024 and 2048 PPR (pulses/ revolution)
Format: Two channel quadrature (AB) with Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: 90° ± 45° electrical
Index: 22.5° to 90° A leads B, CW (from clamp end)
Symmetry: 50% ± 15% 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:
7272 Push-Pull Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 180 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
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
Coupling: 16mm, flexible
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Shaft Speed: 6000 RPM, max.
Housing Material: Aluminum Alloy
Weight: 4 lbs.

ENVIRONMENTAL

Operating Temperature: -40 to 100°C
Storage temperature: -40 to 100°C
Shock: 400g, 6mSec
Vibration: 5-3000 Hz, 20g
Humidity: Up to 98%, (non-condensing)
Enclosure Rating: NEMA 6 / IP67

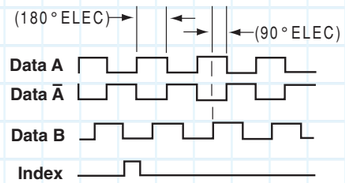
NOTE: For rail or heavier duty applications, please consult factory for custom requirements.

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

DATA AND INDEX

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



Index Width: 22.5° to 90°
A leads B, CW (From Clamp End)

by DYNAPAR™

SERIES HSD44M

Ordering Information

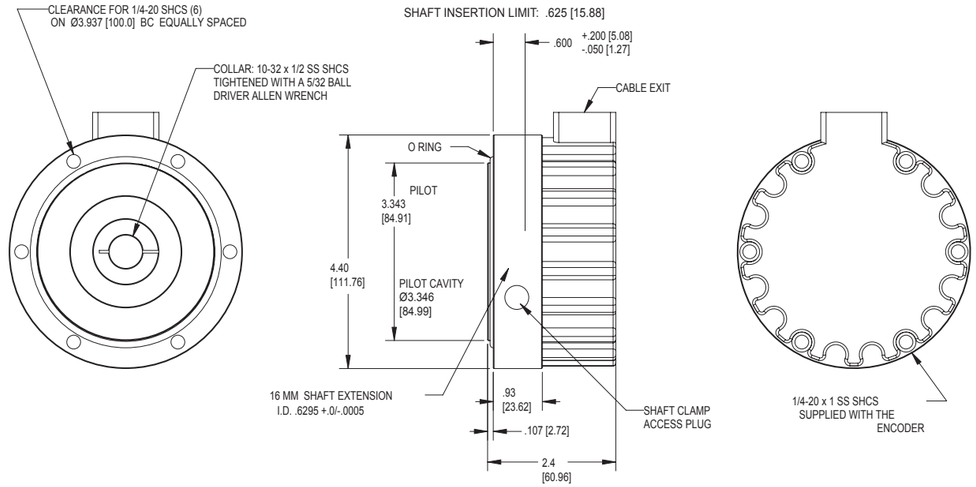
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR	Code 3: Bore	Code 4: Output Format	Code 5: Termination	Code 6: Options	Code 7: Special Option
HSD44	□□□□	□	□	□	□	□□
Ordering Information						
HSD44M Heavy Duty Magnetic Hub Shaft Encoder	**0256** **0512** **1024** **2048**	**A** 16mm	**0** 5-26V in, 5-26V Open Collector out **1** 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups **3** Differential ABZ, 5-26 in, 5-26 out (7272) **4** 5-26V in, 5V Differential Line Driver out (7272)	**A** 18" Cable **K** 1.5 ft (18") cable w/ in line 10 pin 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** Extended Pilot (.156")

ACCESSORIES

HSD44ADAPTER45 4-1/2" NEMA Motor Adapter Plate

DIMENSIONS (in. [mm])



SERIES F10

Dynapar™ brand

For Stepper & Small Servo Motors

SSM Servo Small Motor

Key Features

- **Digital Encoder Replaces size 10 Pancake Resolver**
- **Up to 2048 PPR with Commutation Tracks**
- **Up to 120°C Temperature Range Doesn't Limit Motor Performance**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical
Resolution: 1024 or 2048 PPR incremental with 6 pole commutation channels
Accuracy: Incremental: ±2.5 arc-mins. max. edge to any edge; Commutation: ±6 arc-mins. max.
Phasing for CCW rotation of motor shaft : A leads B by 90° and U leads V leads W by 120 °.
Minimum edge separation A to B is 45°.
Index to U channel: +/- 1 °mech. index pulse center to U channel edge.
Index Pulse Width: 90° gated A and B high

ELECTRICAL

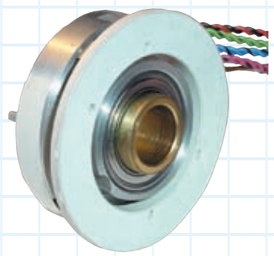
Input Power Requirements: 5±10% VDC at 100 mA max (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LC31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector w/2.0 kΩ pull-ups, 8 mA sink max.; or 26LC31 Differential Line Driver, sink / source 40 mA max.
Frequency Response: 300 kHz, max.
Termination: Flying leads, stranded 26 AWG, twisted pair, PVC insulation, 6.5" length ±0.5"

MECHANICAL

Bore Diameter: 6mm
Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/-0.000 mm)
Dimensions: Outside Diameter : 1.25" (31.7mm), max.; Height: 0.89" (24.1mm), max.
Mating Shaft Runout: 0.002" (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Axial movement: ±0.010" (±0.25 mm)
Mounting: 1.030" (26.16mm) servo ring with integral flexure (size 10 pancake resolver equivalent)
Acceleration: 100,000 rad/sec.^{2} max.
Velocity: 5,000 RPM continuous; 12,000 RPM peak
Moment of Inertia: 2.22X10^{-5} in-oz-sec.^{2} (1.6 gm-cm^2)
Housing & Cover Material: Housing: cast aluminum; Servo Ring: glass reinforced engineering resin; Hub: brass; Disc: 0.030" (0.76mm) thick glass
Weight: 1.6 oz. (45 gm) typ.

ENVIRONMENTAL

Operating Temperature: 0° to +120°C
Storage Temperature: 0° to +120°C
Shock: 50 Gs for 6 msec duration
Vibration: 2.5 Gs at 5 to 2000 Hz
Humidity: 90% (non-condensing)

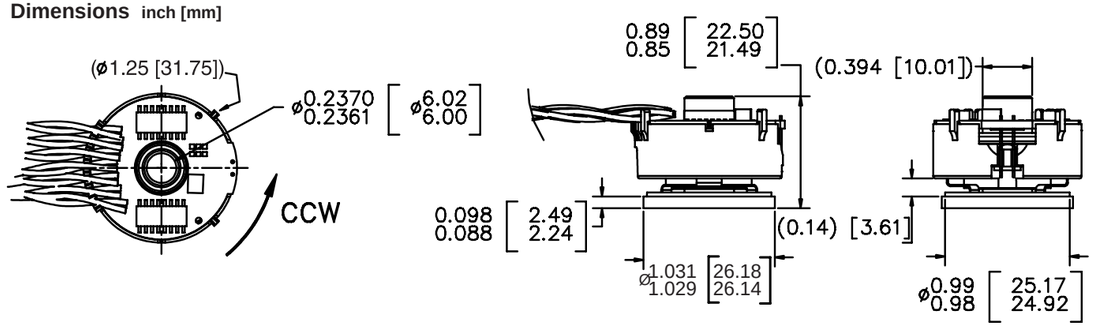


Servo ring mounting with integral flexure is size 10 pancake resolver equivalent

by DYNAPAR™

SERIES F10

Dimensions inch [mm]

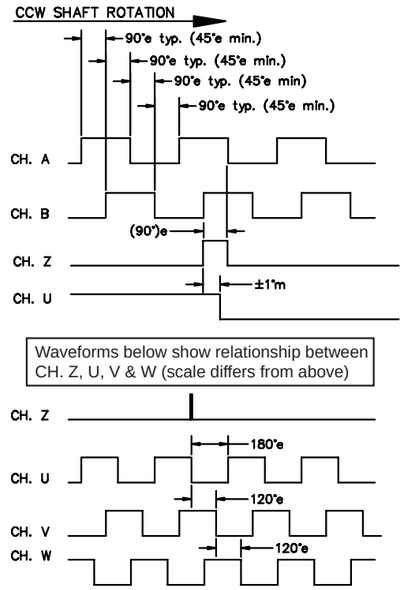


Connections

Function*	Cable Wire Color
VCC	RED
GND	BLACK
$\overline{A}$	BLUE/BLACK
A	BLUE
$\overline{B}$	GREEN/BLACK
B	GREEN
$\overline{Z}$	VIOLET/BLACK
Z	VIOLET
$\overline{U}$	BROWN/BLACK
U	BROWN
$\overline{V}$	GRAY/BLACK
V	GRAY
$\overline{W}$	WHITE/BLACK
W	WHITE

* Function availability dependant on Model

Waveforms



Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Mount	Code 4: Electrical	Code 5: Bore	Code 6: Termination
F10	□□□□/□	**0**	□	**4**	**0**

Ordering Information

F10 Size 10 Commutating Encoder	Incremental channels only **1024/0** **2048/0**	**0** Servo mount 1.030 Diameter x .095 thick	Available when Code 2 is XXXX/0 **3** 5V in, line driver out incremental only	**4** 6mm thru bore	**0** 6.5" ±0.5" Twisted Pair Flying Leads
	Incremental plus Commutation channels **2048/6**		Available when Code 2 is XXXX/6 **6** 5V in, line driver out for incremental; 5V in, open collector out for commutation **9** 5V in, line driver out for incremental; 5V in, line driver out for commutation		

SERIES F15

Dynapar™ brand

For Stepper & Small Servo Motors

SSM Servo Small Motor

Key Features

- **Digital Encoder with Flex Servo Ring Easily Replaces Size 15 Resolver**
- **Short 0.88” Mounting Depth with Jam Nut Shaft Fixing Makes Installation Easy**
- **Superior +/-2.5° Arc-Min Accuracy**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical
Resolution: 1024 or 2048 PPR incremental with 6 or 8 pole commutation channels
Accuracy: Incremental: ±2.5 arc-mins. max.
edge to any edge; Commutation: ±6 arc-mins. max.
Phasing for CCW rotation of motor shaft :
A leads B by 90° and U leads V leads W by 120 °.
Minimum edge separation A to B is 45°.
Index to U channel: +/- 1 °mech. index pulse center to U channel edge.
Index Pulse Width: 90° gated A and B high

ELECTRICAL

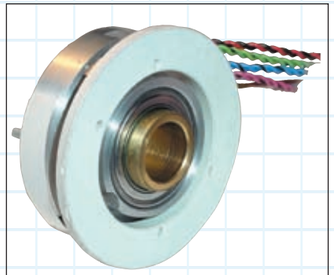
Input Power Requirements: 5±10% VDC at 100 mA max (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LC31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector w/2.0 kΩ pull-ups, 8 mA sink max.; or 26LC31 Differential Line Driver, sink / source 40 mA max.
Frequency Response: 300 kHz, max.
Termination: Flying leads, stranded 26 AWG, twisted pair, PVC insulation, 6.5” length ±0.5”

MECHANICAL

Bore Diameter: 0.375” (9.53mm)
Bore Dia. Tolerance: +0.001”/-0.000” (+0.025 mm/-0.000 mm)
Dimensions: Outside Diameter : 1.45” (36.8mm), max.; Height: 0.87” (22.1mm), max.
Mating Shaft Runout: 0.002” (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Axial movement: ±0.010” (±0.25 mm), max.
Mounting: 1.435” (36.45mm) servo ring with integral flexure (size 15 pancake resolver equivalent)
Acceleration: 100,000 rad/sec.^{2} max.
Velocity: 5,000 RPM continuous; 12,000 RPM peak
Moment of Inertia: 3.59X10^{-5} in-oz-sec.^{2} (2.5 gm-cm^2)
Housing & Cover Material: Housing: cast aluminum; Servo Ring: glass reinforced engineering resin; Hub: brass; Disc: 0.030” (0.76mm) thick glass
Weight: 1.6 oz. (45 gm) typ.

ENVIRONMENTAL

Operating Temperature: 0° to +120°C
Storage Temperature: 0° to +120°C
Shock: 50 Gs for 6 msec duration
Vibration: 2.5 Gs at 5 to 2000 Hz
Humidity: 90% (non-condensing)

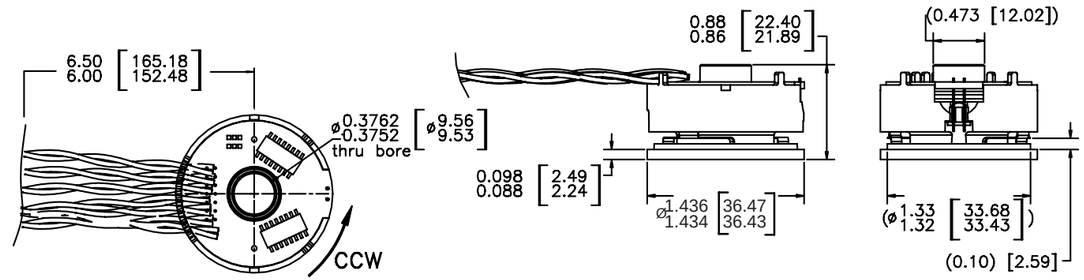


Servo ring mounting with integral flexure is size 15 pancake resolver

by DYNAPAR™

SERIES F15

Dimensions

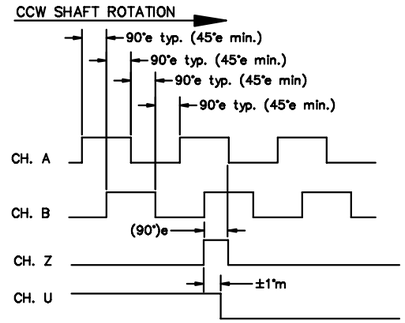


Connections

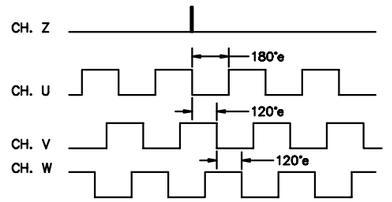
Function*	Cable Wire Color
VCC	RED
GND	BLACK
$\overline{A}$	BLUE/BLACK
A	BLUE
$\overline{B}$	GREEN/BLACK
B	GREEN
$\overline{Z}$	VIOLET/BLACK
Z	VIOLET
$\overline{U}$	BROWN/BLACK
U	BROWN
$\overline{V}$	GRAY/BLACK
V	GRAY
$\overline{W}$	WHITE/BLACK
W	WHITE

* Function availability dependant on Model

Waveforms



Waveforms below show relationship between CH. Z, U, V & W (scale differs from above)



Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Mount	Code 4: Electrical	Code 5: Bore	Code 6: Termination
F15	□□□□/□	**0**	□	**1**	**0**
Ordering Information					
F15 Size 15 Commutating Encoder	Incremental channels only **1024/0** **2048/0** Incremental plus Commutation channels **1024/6** **2048/6** **1024/8** **2048/8** Consult factory for other configurations	**0** Servo mount 1.435 Diameter x .095 thick	Available when Code 2 is XXXX/0 **3** 5V in, line driver out incremental only Available when Code 2 is XXXX/6 or 8 **6** 5V in, line driver out for incremental; 5V in, open collector out for commutation **9** 5V in, line driver out for incremental; 5V in, line driver out for commutation	**1** 3/8 in. thru bore	**0** 6.5” ±0.5” Twisted Pair Flying Leads

SERIES F14

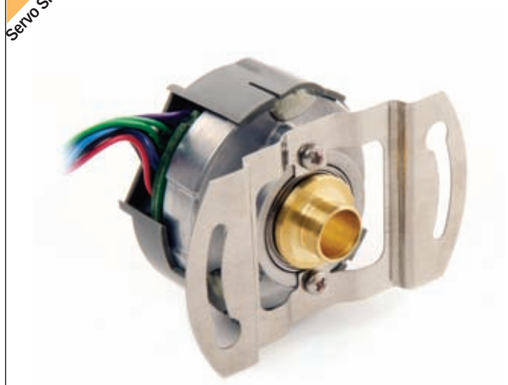
Dynapar™ brand

For Stepper & Small Servo Motors

SSM
Servo Small Motor

Key Features

- **Easy to install non-marring hollowshaft design with flex tether**
- **Up to 5000 PPR for smooth low-speed motor control**
- **Up to 120C temperature range doesn't limit motor performance**



Product shown with optional flex tether

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical
Resolution: 1000 - 5000 PPR incremental with 4, 6 and 8 pole commutation channels
Accuracy: Incremental: ±2.5 arc-mins. max.
edge to any edge; Commutation: ±6 arc-mins. max.
Phasing for CCW rotation of motor shaft (viewing encoder cover): A leads B by 90° and U leads V leads W by 120 °.
Minimum edge separation A to B is 45°.
Index to U channel: +/- 1 °mech. index pulse center to U channel edge.
Index Pulse Width: 90° gated A and B high; (180° gated B high gating options available - consult factory)

ELECTRICAL

Input Power Requirements: 5±10% VDC at 150 mA max (incremental only); 175 mA max. (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LC31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector Commutation 30 mA sink max. (2.0 kΩ pull-ups in encoder)

Frequency Response:
PPR ≤ 1000: 250 kHz; PPR > 1000: 500 kHz
Termination: 16 pin, fully shielded, 2mm pitch, double row header. Accessory mating cable assembly available: 26 AWG twisted pair, jacketed and shielded with copper drain wire

MECHANICAL

Bore Diameters: 1/4", 6mm, 8mm standard
Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/-0.000 mm)
Dimensions: Outside Diameter with cover: 1.55" (39.8mm), without cover 1.45" (36.8mm); Outside collar height 1.36" (34.6mm), inside collar height 1.28" (32.4mm)
Mating Shaft Length: 1.35" (34.3 mm) minimum for outside shaft collar. 0.50 inch minimum for inside shaft collar
Mating Shaft Runout: 0.002" (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Axial movement: ±0.060"
(±1.52 mm)
Mounting Configuration: Two standard configurations are available for tethers. A choice of U.S. or Metric screws are included. Mounting holes should be 0.01" (0.254 mm) true position to shaft for best encoder operation.

Shaft clamp: 2 #6-32 set screws in collar around hub shaft (will not mar shaft)
Electrical/Mechanical Alignment Range:
±15° mechanical typical (see tether options)
Acceleration: 100,000 rad/sec.^{2} max.
Max. Velocity: RPM= (Frequency / PPR)x 60; or 12,000 RPM, whichever is less
Moment of Inertia: 8.2X10^{-5} in-oz sec.^{2} (5.8 gm-cm^2)
Housing & Cover Material: Bearing housing: aluminum; Cover: high temperature, glass filled polymer;
Hub: Brass; Disk: 0.030" thick glass; Cover Finish: RAL 7010 (dark grey)
Weight: 1.6 oz. (45gm) typ.

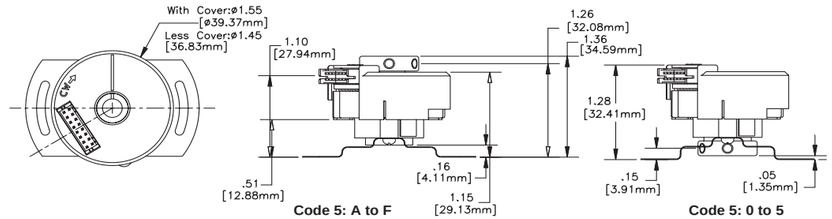
ENVIRONMENTAL

Operating Temperature: 0° to +120°C
Storage Temperature: -40° to +120°C
Shock: 100 Gs for 6 msec duration
Vibration: 2.5 Gs at 5 to 2000 Hz
Humidity: 90% (non-condensing)
Enclosure Rating: NEMA 1 / IP40 (for models with cover)

by DYNAPAR™

SERIES F14

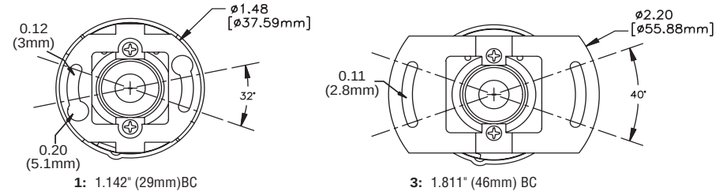
Dimensions



Code 5: A to F
Outside Collar

Code 5: 0 to 5
Inside Collar

Code 3: Tethers



1: 1.142" (29mm)BC

3: 1.811" (46mm) BC

Electrical Connections

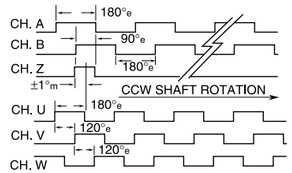
Pin	Function*	Cable Wire Color
1	VCC	RED
2	U	Brown
3	GND	BLACK
4	V	GRAY
5	A	BLUE
6	W	WHITE
7	A	BLUE/BLACK
8	NONE	NONE
9	B	GREEN
10	U	BROWN/BLACK
11	B	GREEN/BLACK
12	V	GRAY/BLACK
13	Z	VIOLET
14	W	WHITE/BLACK
15	Z	VIOLET/BLACK
16	NONE	NONE

* Function availability dependant on Model

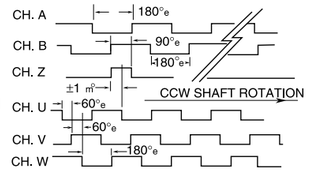
Mating Cable Assembly:
Incremental only, 111752-000x
Incremental + Comm., 111753-000x
x= length in feet

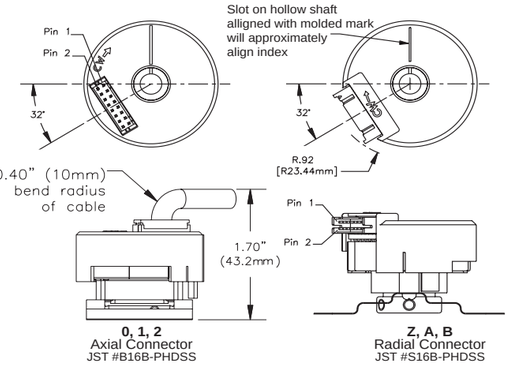
Output Waveforms

Signal Format A



Signal Format B





0, 1, 2
Axial Connector
JST #B16B-PHDSS

Z, A, B
Radial Connector
JST #S16B-PHDSS

Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Tether	Code 4: Electrical	Code 5: Bore	Code 6: Termination
F14	□□□□/□	□	□	□	□

Ordering Information

F14 Size 14 Commutating Encoder

Code 2: PPR, Poles

Incremental channels only

1000/0	**2500/0**
2000/0	**4096/0**
2048/0	**5000/0**

Incremental plus Commutation channels

1000/†	**2500/†**
2000/†	**4096/†**
2048/†	**5000/†**

† Available with 4, 6 or 8 pole.
e.g. 1000/6 is 1000PPR with 6 poles

Code 3: Tether

- **0** No Tether
- **1** 2 #2 on 1.181" Diameter
- **3** 2 #4 on 1.811" Diameter
- **6** 2 M2.5 on 30 mm Diameter
- **8** 2 M3 on 46 mm Diameter

Code 4: Electrical

Available when Code 2 is ≤ 1024/0
- **0** 5V in, open collector out incremental only - Formzat A
- **C** 5V in, open collector out incremental only - Format B

Available when Code 2 is XXXX/0
- **3** 5V in, line driver out incremental only - Format A
- **D** 5V in, line driver out incremental only - Format B

Available when Code 2 is XXXX/4, XXXX/6, or XXXX/8
- **6** 5V in, line driver out incr.; 5V in, open collector out comm. Format A
- **E** 5V in, line driver out incr.; 5V in, open collector out comm. - Format B
- **9** 5V in, line driver out incr.; 5V in, line driver out comm. Format A
- **F** 5V in, line driver out incr.; 5V in, line driver out comm. - Format B

Code 5: Bore

Inside Collar:
- **0** 1/4 in.
- **4** 6 mm
- **5** 8 mm

Outside Collar:
- **A** 1/4 in.
- **E** 6 mm
- **F** 8 mm

Code 6: Termination

Code: Connector/Cable Axial	Code: Connector/Cable Radial	Code: Wire Pigtail	Length
0	**Z**	*N/A*	None
1	**A**	**J**	1 Ft.
2	**B**	**K**	2 Ft.
3	**C**	**L**	3 Ft.
4	**D**	**M**	4 Ft.
5	**E**	**N**	5 Ft.
6	**F**	**P**	6 Ft.
7	**G**	**Q**	7 Ft.
8	**H**	**R**	8 Ft.

CONNECTION OPTIONS
You may choose an integral connector mounted in axial or radial position. Available with or without mating connector/cable.
Alternativly, a direct-solder pigtail cable is offered.

SERIES F18

Dynapar™ brand

For Stepper & Small Servo Motors

Key Features

- **Under 2.0” Diameter Package with High 4,096 PPR Capability**
- **Easy to Install Hollowshaft and Spring Tether Design**
- **Up to 120°C Temperature Range Doesn’t Limit Motor Performance**

SSM Servo Small Motor

Product shown with optional spring tether

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical
Resolution: 500 - 4096 PPR incremental with 4, 6, 8 or 12 pole commutation channels.

Accuracy: Incremental: ±2.5 arc-mins. max.

edge to any edge; Commutation: ±6 arc-mins. max.

Phasing for CCW rotation of motor shaft (viewing encoder cover): A leads B by 90° and U leads V leads W by 120 °.

Minimum edge separation A to B is 45°.

Index to U channel: +/- 1 °mech. index pulse center to U channel edge.

Index Pulse Width: 90° gated A and B high; (180° gated B high gating options available - consult factory)

ELECTRICAL

Input Power Requirements: 5±10% VDC at 150 mA max (incremental only); 175 mA max. (incremental and commutation), excluding output load

Output Signals:
Incremental: 26LC31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector Commutation 30 mA sink max. (2.0 kΩ pull-ups in encoder)

Frequency Response:
PPR ≤ 2048: 250 kHz; PPR > 2048: 500 kHz

Termination: 16 pin, fully shielded, 2mm pitch, double row header. Accessory mating cable assembly available: 26 AWG twisted pair, jacketed and shielded with copper drain wire

MECHANICAL

Bore Diameters: 1/4”, 3/8”, 7/16”, 1/2”, 6mm, 8mm,10mm ,12mm standard

Bore Dia. Tolerance: +0.001”/-0.000” (+0.025 mm/-0.000 mm)

Dimensions: Outside Diameter with cover: 1.96” (49.8mm), without cover 1.85” (47.0mm); Outside collar height 1.71” (43.4mm), inside collar height 1.50” (38.1mm)

Mating Shaft Length: 1.62” (41 mm) minimum for outside shaft collar. 0.50 inch minimum for inside shaft collar

Mating Shaft Runout: 0.002” (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)

Mating Shaft Axial movement: ±0.060” (±1.52 mm)

Mounting Configuration: Four standard configurations are available for tethers. A choice of U.S. and Metric screws are included. Mounting holes should be 0.01” (0.254 mm) true position to shaft for best encoder operation.

Shaft clamp: 2 #6-32 set screws in collar around hub shaft (will not mar shaft)

Electrical/Mechanical Alignment Range:
±15° mechanical typical (see tether options)

Acceleration: 100,000 rad/sec.^{2} max.

Max. Velocity: RPM= (Frequency / PPR)x 60; or 12,000 RPM, whichever is less

Moment of Inertia: 5.3X10^{-4} in-oz sec.^{2} (37.3 gm-cm^2)

Housing & Cover Material: Bearing housing: aluminum; Cover: high temperature, glass filled polymer;

Hub: Brass; Disk: 0.030” thick glass; Cover Finish: RAL 7010 (dark grey)

Weight: 4 oz. (110 gm) typ.

ENVIRONMENTAL

Operating Temperature: 0° to +120°C

Storage Temperature: -40° to +120°C

Shock: 100 Gs for 6 msec duration

Vibration: 2.5 Gs at 5 to 2000 Hz

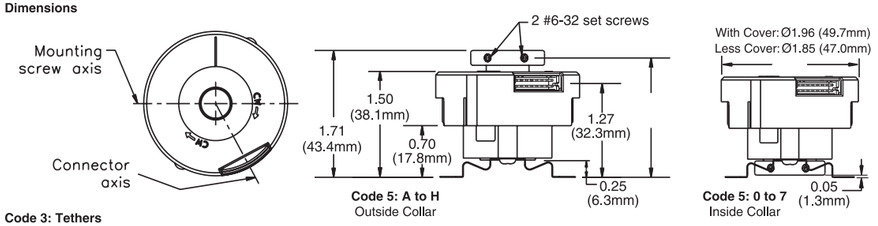
Humidity: 90% (non-condensing)

Enclosure Rating: NEMA 1 / IP40 (for models with cover)

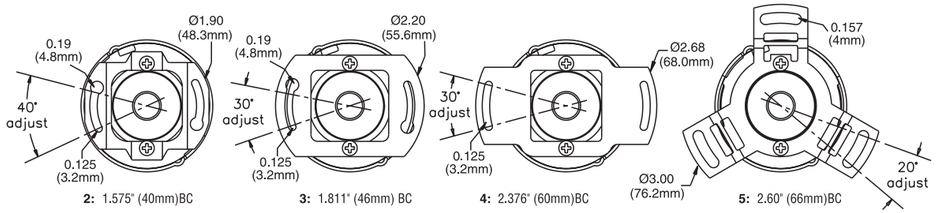
by DYNAPAR™

SERIES F18

Dimensions



Code 3: Tethers



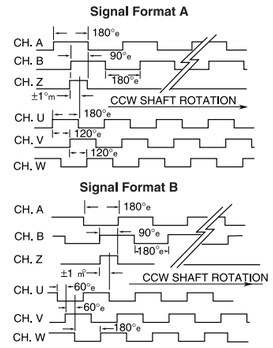
Electrical Connections

Pin	Function*	Cable Wire Color
1	VCC	RED
2	U	Brown
3	GND	BLACK
4	V	GRAY
5	A	BLUE
6	W	WHITE
7	Ā	BLUE/BLACK
8	NONE	NONE
9	B	GREEN
10	Ū	BROWN/BLACK
11	B̄	GREEN/BLACK
12	V̄	GRAY/BLACK
13	Z	VIOLET
14	W̄	WHITE/BLACK
15	Z̄	VIOLET/BLACK
16	NONE	NONE

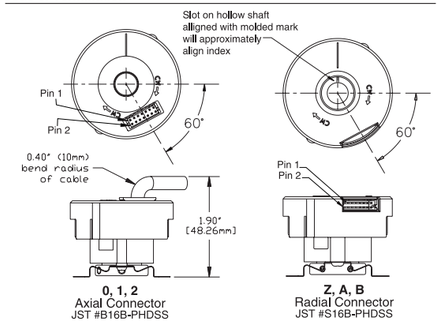
* Function availability dependant on Model

Mating Cable Assembly:
Incremental only, 111752-000x
Incremental + Comm., 111753-000x
x= length in feet

Output Waveforms



Code 6: Termination



Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Tether	Code 4: Electrical	Code 5: Bore	Code 6: Termination
F18	□□□□/□	□	□	□	□

Ordering Information

F18 Size 18 Commutating Encoder

Incremental channels only
0500/0 **2048/0**
1000/0 **2500/0**
1024/0 **4096/0**
2000/0

Incremental plus Commutation channels
0500/† **2048/†**
1000/† **2500/†**
1024/† **4096/†**
2000/†

† Available with 4, 6, 8 or 12 pole. *(12 pole is designated by character “C”)*

Examples: 1024/8 is 1024PPR, 8 pole; 2000/C is 2000PPR, 12 pole

0 No Tether
2 2 #2 on 1.575” Diameter
3 2 #4 on 1.811” Diameter
4 2 #4 on 2.376” Diameter
5 3 #4 on 2.60” Diameter
7 2 M2.5 on 40 mm Diameter
8 2 M3 on 46 mm Diameter
9 2 M3 on 60 mm Diameter
A 3 M3 on 66 mm Diameter

Available when Code 2 is ≤ 2048/0
0 5V in, open collector out incremental only
C 5V in, open collector out incremental only - reverse phase

Available when Code 2 is XXXX/0
3 5V in, line driver out incremental only
D 5V in, line driver out incremental only - reverse phase

Available when Code 2 is XXXX/4, XXXX/6, XXXX/8 or XXXX/C
6 5V in, line driver out for incremental; 5V in, open collector out for commutation
E 5V in, line driver out for incremental; 5V in, open collector out for commutation - reverse phase
9 5V in, line driver out for incremental; 5V in, line driver out for commutation
F 5V in, line driver out for incremental; 5V in, line driver out for commutation - reverse phase

Inside Collar:
0 1/4 in.
1 3/8 in.
2 7/16 in.
3 1/2 in.
4 6 mm
5 8 mm
6 10 mm
7 12 mm

Outside Collar:
A 1/4 in.
B 3/8 in.
C 7/16 in.
D 1/2 in.
E 6 mm
F 8 mm
G 10 mm
H 12 mm

Code: Connector/Cable Axial	Code: Connector/Cable Radial	Code: Wire Pigtail	Length
0	**Z**	*N/A*	None
1	**A**	**J**	1 Ft.
2	**B**	**K**	2 Ft.
3	**C**	**L**	3 Ft.
4	**D**	**M**	4 Ft.
5	**E**	**N**	5 Ft.
6	**F**	**P**	6 Ft.
7	**G**	**Q**	7 Ft.
8	**H**	**R**	8 Ft.

CONNECTION OPTIONS
You may choose an integral connector mounted in axial or radial position. Available with or without mating connector/cable.
Alternativly, a direct-solder pigtail cable is offered.

SERIES HS20

Dynapar™ brand

Sealed Hollowshaft Encoder

IND Industrial Duty

Key Features

- **Hollowshaft Design Eliminates Brackets and Couplings**
- **Electrically Isolated Shaft Design**
- **Compact Size for Tight Mounting Constraints**

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: 50 to 2540 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 viewing the hub clamp end of the encoder

Quadrature Phasing: 90° ± 22.5° electrical

Symmetry: 180° ±18° electrical

Index: 180° +18°/-135° 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:
5 to 26 VDC at 100 mA max., not including output loads

Outputs:
7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

Frequency Response: 100 kHz min. (index 75 kHz min. for extended temperature range)

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector, M12 Connector, Cable Exit

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, NEMA4 style (MCN-N6N4)

Cable w/ 5 pin M12 Connector (112859-xxxx)
Cable w/ 8 pin M12 Connector (112860-xxxx)

MECHANICAL

Bore Diameter: 6mm to 16 mm, 1/4" to 5/8"

Shaft Speed: 6000 RPM max.

Shaft Bore Tolerance: Nominal +0.0002"/+0.0008" (+0.005/+0.020 mm)

Mating Shaft Requirements:
Runout: ±0.005" (±0.13mm) radial, max.
Endplay: ±0.050" (±1.27 mm) axial, max.
Length: 0.80" (20 mm), minimum

Starting Torque: 3.0 oz-in max.

Moment of Inertia: 5.1 x 10^{-4} oz–in–sec^2

Housing and Cover: Aluminum

Disc Material: Glass or Metal (PPR Dependant)

Weight: 10 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70° C
Extended: 0 to +85° C

Storage Temperature: –40 to +85° 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/IP65 (dust proof, washdown)

by DYNAPAR™

SERIES HS20

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: Format	Code 6: Output	Code 7: Termination	Code 8: Options
HS20	□□□□	□	□	□	□	□	□□
Ordering Information							
HS20 Size 20 heavy-duty, sealed hollowshaft encoder	Metal Disk: **0050 0300** **0060 0360** **0100 0400** **0180 0720** **0200 0800** **0250 1000** **0256 1024** Glass Disk: **1200 1968** **1250 2000** **1270 2048** **1500 2400** **1600 2500** **1800 2540**	**0** 6 mm **1** 1/4" **2** 5/16" **3** 8 mm **4** 3/8" **5** 10 mm **6** 12 mm **7** 1/2" **8** 5/8" **9** 15 mm **A** 16 mm **B** 14 mm	**0** None - customer supplied **1** Clearance hole for 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face) **3** Slotted hole for bolt on 1.87" to 2.95" radius **4** Same as '**1**', w/ protective cover kit **5** Same as '**3**', w/ Protective cover kit	**0** single ended, undirectional (A) **1** single ended, bidirectional (AB) **2** single ended, bidirectional with index (ABZ) Available when Code 6 is 3, 4, A or B: **3** differential, bidirectional ($\overline{AA}$ $\overline{BB}$) Available when Code 6 is 3, 4, A or B and code 7 is 2, or 7 thru G or J **4** differential, bidirectional with index ($\overline{AA}$ $\overline{BB}$ $\overline{ZZ}$)	**0** 5-26V in, 5-26V open collector out **1** 5-26V in, 5-26V open collector out w/ 2.2kΩ pullups **2** 5-26V in, 5-26V push-pull out Available when Code 5 is 3 or 4: **3** 5-26V in, 5V line driver out **4** 5-26V in, 5-26V line driver out **A** same as '**3**' with extended temp. **B** same as '**4**' with extended temp.	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **5** 6 pin connector, plus mating connector **6** 7 pin connector, plus mating connector **7** 10 pin connector, plus mating connector **A** 18" cable **B** 36" cable **C** 72" cable **D** 10' cable **F** 13" cable with 10 pin connector plus mating connector **G** 13" cable **J** 8 Pin M12 Connector Available when Code 5 is 0 thru 2 **H** 5 Pin M12 Connector	Available when Code 7 is 0 thru 7: **PS** LED Output Indicator

Cable Assemblies with MS Connector*

112123-XXXX 6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style

Accessory Kits

112096-0001 Tether Kit (clearance hole for 3/8" bolt on 5.88" diameter bolt-circle)
112096-0002 Tether Kit (slotted hole for bolt on 1.87" to 2.75" radius)
112105-0001 Protective Cover Accessory

SERIES HS20

Dynapar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - Code 7 =0 to7, A to G

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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 112123-XXXX 6 Pin Dif Line Driver without Index		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN
Signal B	D	ORN	D	ORG	B	ORG	B	ORG	B	ORG
Signal Z*	C	YEL	—	—	C	YEL	—	—	C	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED
N/C	F	—	—	—	E	—	—	—	E	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN
Signal $\overline{A}$	—	—	C	BRN/WHT	—	—	C	BRN/WHT	H	BRN/WHT
Signal $\overline{B}$	—	—	F	ORG/WHT	—	—	E	ORG/WHT	I	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	—	—	—	—	J	YEL/WHT

5 & 8 Pin M12 Accessory Cables when Code7 = H or J

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

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

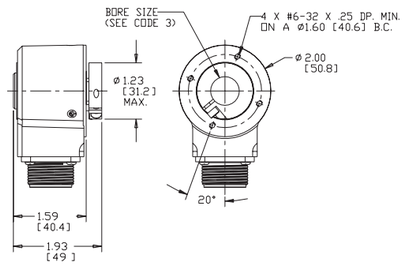
NOTES:
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) “MS” Type mating connectors and pre-build cables are rated NEMA 12
7) “M12” Cable assemblies are rated IP67

by DYNAPAR™

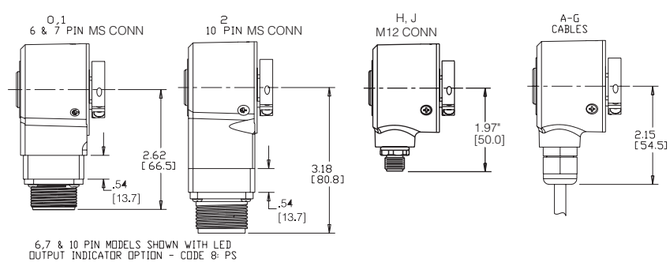
SERIES HS20

DIMENSIONS

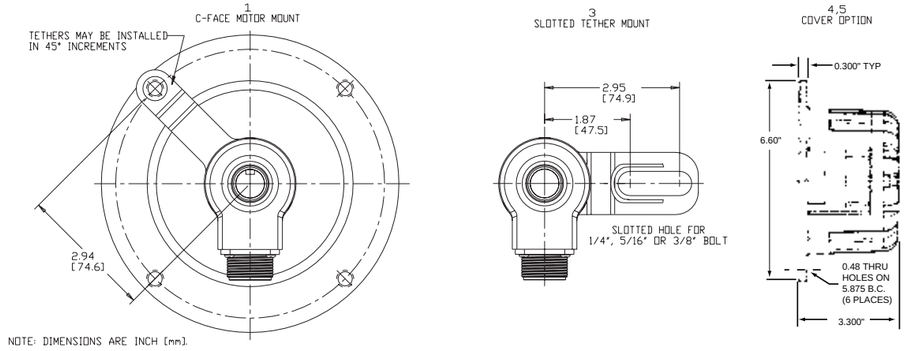
DIMENSIONS



CODE 7: TERMINATION



CODE 4: FIXING



NOTE: DIMENSIONS ARE INCH [mm].

SERIES HC20

Dynapar™ brand

For Stepper & Small Servo Motors

SSM Servo Small Motor

Key Features

- **Economical Servomotor Feedback with New Phased Array ASIC**
- **High 120°C Operating Temperature Won't Limit Motor Performance**
- **Up to 2500 PPR Direct-Read with Commutation Channels**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

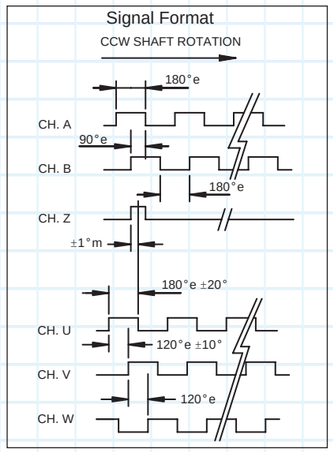
Code: Incremental, Optical
Resolution: 500 to 2500 PPR (Pulses/Revolution)
Commutation: 4/6/8 pole
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: Phasing for CCW rotation of motor shaft (viewing from encoder cover side): A leads B by 90° ± 22.5° electrical, and U leads V leads W by 120°
Accuracy:
Incremental: 40 arc-sec. max. edge to any edge;
Commutation: ±6 arc minutes max.
Index: 90° electrical (gated A and B high)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Supply Voltage: DC 5V ±10% (SELV), 5-26V
Max. Current (w/o load):
Incremental: 150mA
Incremental + Commutation: 175mA
Max. Output Frequency:
250 kHz (up to1024 ppr)
500 kHz (> 1024 ppr)

Signal Level:
NPN: Open Collector
Differential Line Driver: RS 422
Output Current: RS422: ±40 mA (26LS31); NPN O.C.: 16mA (2k. int. pull up)
Connection: Radial cable

Signal Format



MECHANICAL

Dimensions:
Outside Diameter with Cover: 50 mm
Mounting Depth: 36mm
Bore Size:
Blind Hole Shaft: 8.00mm dia; 20mm depth
Hollow Shaft: 6.00 or 8.00mm dia
Taper Shaft: 9.00mm dia. nominal; 2.8624°+0.2289/- 0 Taper
Mating Shaft Runout: ±0.2mm max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Axial Movement: max. ±0.8mm.
Max. Velocity: RPM= (Frequency/PPR) x 60 or 2000 min-1, whichever is less
Material:
Bearing Housing: Aluminium;
Cover: Aluminium;
Shaft: Brass: 699477-0001
Weight: 120g typical

ENVIRONMENTAL

Operating Temperature: 0...+120°C
Storage Temperature: -40...+120°C
Shock Resistance: 100 G for 6 ms
Vibration Resistance: 5 to 2000 Hz at 2.5 G
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP51(cable must be oriented downwards)

by DYNAPAR™

SERIES HC20

Ordering Information

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

Code 1: Model	Code 2: PPR Incremental[2]	Code 3: Poles Commutation[2]	Code 4: Mounting	Code 5: Electrical[1]	Code 6: Shaft	Code 7: Connection
HC20	□□□□	□	□	□	□	□

Ordering Information

HC20
Compact Hollowshaft Encoder

0500 2000
0512 2048
1000 2500
1024

0 None
4 4 Pole
6 6 Pole
8 8 Pole

0 No tether
Tether
1 1.575" (40mm) TK
2 2.166" (55mm) TK

incremental only, <=2048/0 (ppr/poles)
0 U_{inc} = DC 5V; $output_{inc}$ = NPN-O.C.

incremental only without commutation
2 U_{inc} = DC 5-26V; $output_{inc}$ = RS 422
3 U_{inc} = DC 5V; $output_{inc}$ = RS 422

incremental plus commutation signals
6 U_{inc} = DC 5V; $output_{inc}$ = RS 422 U_{com} = DC 5V; $output_{com}$ = NPN-O.C.
9 U_{inc} = DC 5V; $output_{inc}$ = RS 422 U_{com} = DC 5V; $output_{com}$ = RS 422

0 Taper shaft(Ø9,1:10)
1 Blind vertical shaft Ø6
2 Blind vertical shaft Ø8
3 Hollow shaft Ø6
4 Hollow shaft Ø8

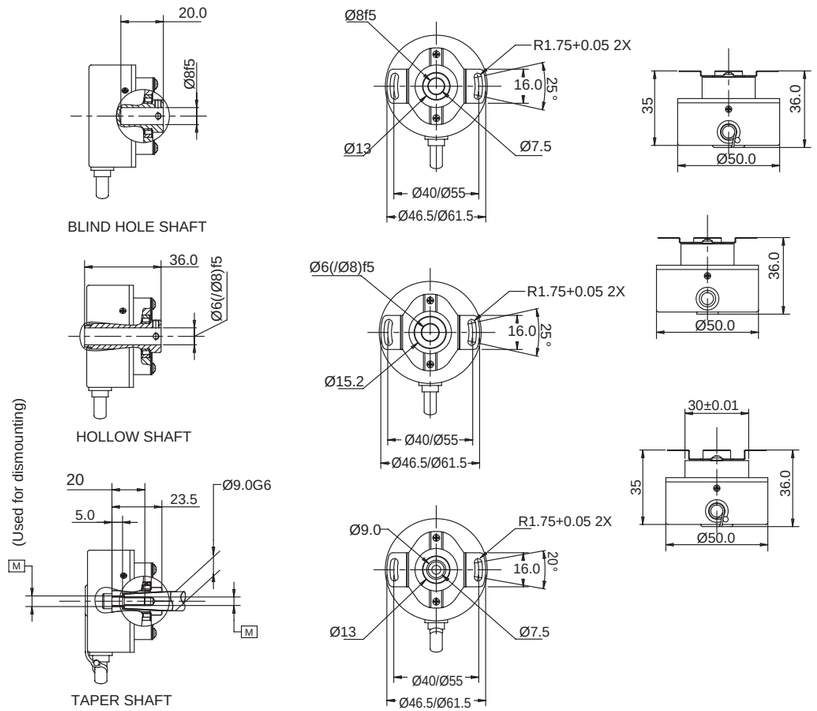
Radial plug
A 1 Ft. cable
B 2 Ft. cable
C 3 Ft. cable
D 4 Ft. cable
E 5 Ft. cable
F 6 Ft. cable
G 7 Ft. cable
H 8 Ft. cable

Available Combinations (PPR/Poles)

	Number of Poles			
Incremental PPR	0	4	6	8
0500	x	x	x	x
0512				x
1000	x	x	x	x
1024	x	x	x	x
2000	x	x	x	x
2048	x	x	x	x
2500	x	x	x	x

1 U_{inc}: Supply voltage incremental, U_{com}: Supply voltage commutation (only if commutation is selected); 2 See available combinations (pulses/poles)

Dimensions (mm)



Connection:

Pin	Signal	Color
1	Vcc	Red
2	U	Brown
3	GND	Black
4	V	Gray
5	A	Blue
6	W	White
7	$\overline{A}$	Blue/Black
8	N.C.	—
9	B	Green
10	$\overline{U}$	Brown/Black
11	$\overline{B}$	Green/Black
12	$\overline{V}$	Gray/Black
13	Z	Violet
14	$\overline{W}$	White/Black
15	$\overline{Z}$	Violet/Black
16	N.C.	—

SERIES HS35R

Dynapar™ brand

Heavy Duty Hollowshaft Encoder

Key Features

- Phased Array Sensor for Reliable Signal Output
- Rugged Design Withstands up to 400G Shock and 20G Vibration
- Unbreakable Code Disc up to 5000 PPR
- Heavy Duty Design Rated for IP67
- Customizable Mounting Options including Torque Arm with Optional Grounding Strap

IND Industrial Duty

CE EN 61326-1

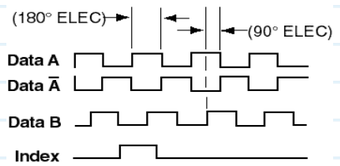
RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing:
For resolutions 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300 PPR and above1024 PPR:180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330° A leads B, CW (from clamp end) (Reverse Phasing, A leads B for CCW also available: See Code 7 in Ordering Information)
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
$\overline{A}$ shown for reference



Index Width: 150° to 330°
A leads B, CW (from clamp end)
(Reverse Phasing, A leads B for CCW also available: See Code 7 in Ordering Information)

ELECTRICAL

Input Power: 5-26VDC, 5-15VDC. 80 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
4469 Differential Line Driver: 100mA, sink or source
High-Power Mosfet Line Driver

Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity, short circuit protected with 7272 or 7273 line drivers only
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, NEMA4 style (MCN-N6N4)
10 pin Bayonet, MS3116-F12-10S (MCN-B1)
12 Pin CCW M23 Connector (MCN-C2)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector(112860-XXXX)

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

MECHANICAL

Bore Diameter: 6mm to 28mm, 1/4" to 1-1/8", 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 1
Housing and Cover: Powder Coated Aluminum
Shaft Material: 6061-T6 Aluminum
Disc Material: Mylar (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: Up to 98% (non-condensing)
Enclosure Rating: IP67 (IP64 at shaft speed above 5000 RPM)

by DYNAPAR™

SERIES HS35R

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: Termination	Code 7: Options
HS35R □□□	□		□	□	□	□□
Ordering Information						
HS35R Heavy-Duty, Hollowshaft Encoder	**0001** **0500** **0003** **0512** **0010** **0600** **0012** **0900** **0015** **1000** **0032** **1024** **0050** **1200** **0060** **1500** **0100** **2000** **0120** **2048** **0200** **2400** **0240** **2500** **0250** **3072** **0300** **4000** **0360** **4096** **5000**	**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" **M** 14mm **N** 18mm **P** 25mm **R** 28mm Not Electrically Isolated **K** 1-1/4"	**0** None **1** 4.5" C-face tether **2** 8.5" C-face tether **3** Slotted tether (to fit standard AC motor fan cover) Not available when Code 5 is D,E,F,G, Q, R **4** Same as 1 w/cover **5** Same as 3 w/cover **C** Same as A with 56C cover (Single Only) Available when Code 5 is D,E,F,G, Q, R **6** Same as 1 w/dual cover **7** Same as 3 w/dual cover **8** Same as 2 w/ 180 C-face cover (single or dual output) **A** Rod tether **B** Rod tether with ground strap. **D** Same as B with 56C cover (Single Output)	**0** ABZ, 5-26VDC push-pull (7272) **1** ABZ, 5-26VDC O/C (7273) **2** ABZ, 5-26VDC O/C w2.2kOhm (7273) **H** Same as "0" with Extended temp range **J** Same as "1" with Extended temp range **K** Same as "2" with Extended temp range Not available when Code 6 is H **4** Differential AB only, 5-26VDC, 5-26VDC out (7272) **5** Differential AB only, 5-26VDC in, 5VDC out (7272) **A** Differential AB only, 5-26VDC in, 5VDC out (4469) **C** Differential AB only, 5-15VDC in, 5-15VDC out (4469) **L** Same as "4" with Extended temp range **M** Same as "5" with Extended temp range Not available when Code 6 is 0, 1, 5, 6, or H **6** Differential ABZ, 5-26VDC in, 5VDC out (7272) **7** Differential ABZ, 5-26VDC in, 5-26VDC out (7272) **8** Differential ABZ, 5-26VDC in, 5VDC out (4469) **9** Differential ABZ, 5-15VDC in, 5-15VDC 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" **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 **W** ABZ, 10-24VDC Line Driver for cable runs up to 500 ft/120m using the Dynapar cable assemblies listed below	**0** 6 Pin Connector **1** 7 Pin Connector **2** 10 Pin Connector **3** 12 Pin Connector **4** 10 Pin Bayonet Connector **5** 6 Pin+Mating Connector **6** 7 Pin+Mating Connector **7** 10 Pin+Mating Connector **8** 12 Pin+Mating Connector **9** 10 Pin Bayonet+Mating Connector **A** 0.5m (18") Cable **C** 1m (36") Cable **D** 2m (72") Cable **E** 3m (120") Cable **F** 0.3m (13") Cable with 10-Pin Bulk-head Connector and Mate **G** 0.3m (13") Cable **H** 5 Pin M12 Connector **J** 8 Pin M12 Connector	**Blank** No Option **01** Reverse Phasing (A leads B, CW) Available when Code 5 is 0-9, A-G and when Code 6 is 0-2 or 5-7 **PS** LED Output

Cable Assemblies with MS Connector*

108594-XXXX	6 Pin MS, Cable Assy. For Use with Single Ended Outputs
112123-XXXX	6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
108595-XXXX	7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX	7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635-XXXX	10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
114448-XXXX	10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX	NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*

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

Cable Assemblies with M12 Connector*

112859-XXXX	5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX	8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX	8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4	6 pin, style MS3106A-14S-6S
MCN-N5	7 pin, style MS3106A-16S-1S
MCN-N6	10 pin, style MS3106A-18-1S
MCN-N6N4	10 pin, NEMA4 style
MCN-B1	10 pin bayonet, style MS3116-F12-10S
MCN-C2	12 Pin CCW M23 Connector

Accessory Kits:

114573-0001	Tether Kit, 4.5" C-Face Single Point with 3/8" Bolt
114574-0001	Tether Kit, Slotted with T-bolts for Standard AC Motor Fan Covers
114575-0001	Tether Kit, 8.5" C-Face Single Point with 1/2" Bolt
114591-0001	Cover Kit, 56 C-Face
114592-0001	Cover Kit, Fan Cover
114593-0001	Dual Cover Kit, 56 C-Face
114928-0001	Dual Cover Kit, 180 C-Face
114594-0001	Dual Cover Kit, Fan Cover
116233-0001	Rod Tether Only
116233-0002	Rod Tether + 56 C-Face Cover (Single)
116233-0004	Rod Tether + Grounding Strap
116233-0005	Rod Tether + Grounding Strap +56 C-Face Cover (Single)

SERIES HS35R

Dynapar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - Code 6 = 0 to 9, A to G

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. Models with direct cable exit carry the same color coding as shown for each output configuration.

Encoder Function	Cable #108594-XXXX 6 Pin Single Ended		Cable #112123-XXXX 6 Pin Dif Line Drv w/o Index		Cable #108596-XXXX 7 Pin Dif Line Drv w/o Index		Cable #108595-XXXX 7 Pin (If Used)		**Cable #109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		Cable #114448-XXXX 10 Pin Bayonet		Cable #108615-XXXX 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN	A	BRN	5	BRN	BRN
Sig. B	D	ORN	D	ORN	B	ORN	B	ORN	B	ORN	B	ORN	8	ORN	ORN
Sig. Z*	C	YEL	—	—	—	—	C	YEL	C	YEL	C	YEL	3	YEL	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
N/C	F	—	—	—	—	—	E	—	E	—	E	—	7	—	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	GRN
Sig. $\overline{A}$	—	—	C	BRN/WHT	C	BRN/WHT	—	—	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	BRN/WHT
Sig. $\overline{B}$	—	—	F	ORN/WHT	E	ORN/WHT	—	—	I	ORN/WHT	J	ORN/WHT	1	ORN/WHT	ORN/WHT
Sig. $\overline{Z}$*	—	—	—	—	—	—	—	—	J	YEL/WHT	K	YEL/WHT	4	YEL/WHT	YEL/WHT
0V Sense	—	—	—	—	—	—	—	—	—	—	—	—	2	BLK/WHT	—
5V Sense	—	—	—	—	—	—	—	—	—	—	—	—	11	GRN	—

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.

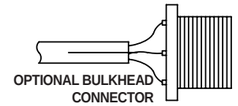
Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	BLK	1	BRN	1	BRN
Sig. B	2	WHT	4	ORG	4	ORG
Sig. Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

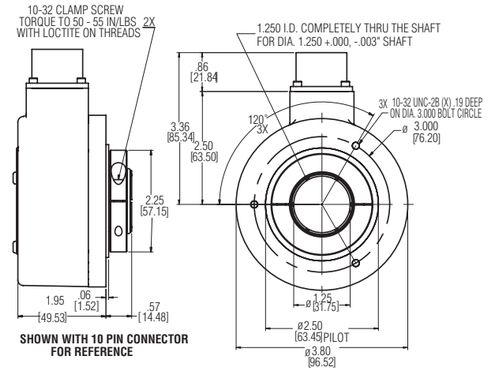
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

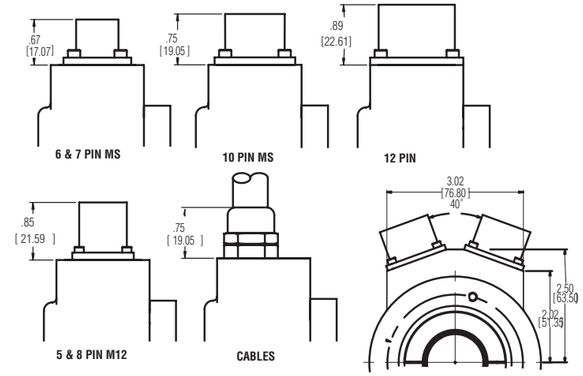
by DYNAPAR™

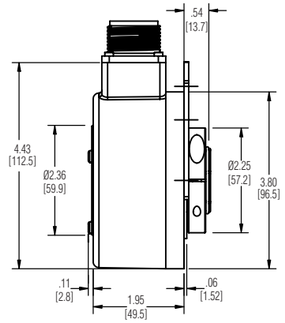
SERIES HS35R

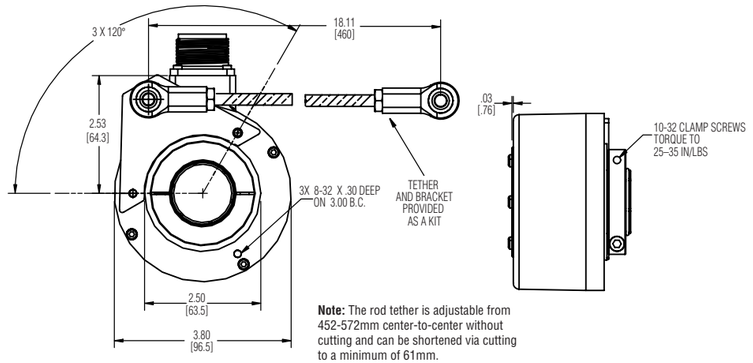
DIMENSIONS inch [mm]









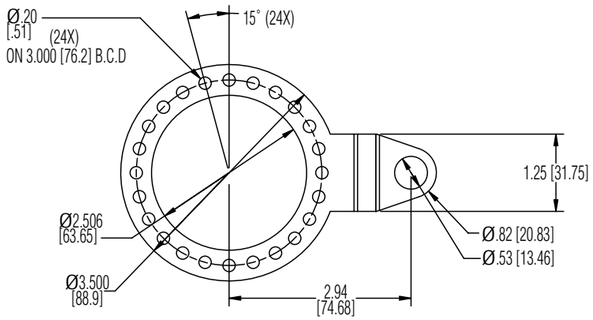


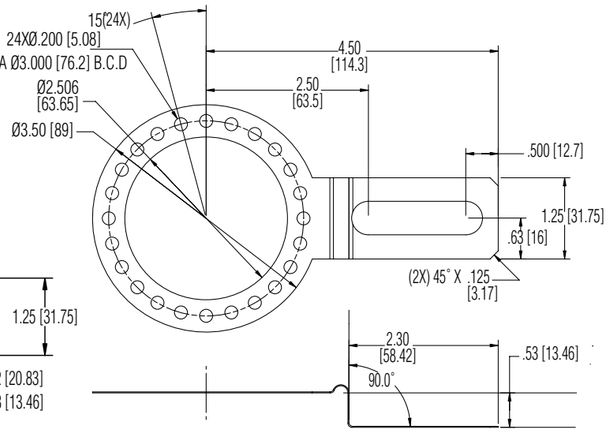
Note: The rod tether is adjustable from 452-572mm center-to-center without cutting and can be shortened via cutting to a minimum of 61mm.

SERIES HS35R

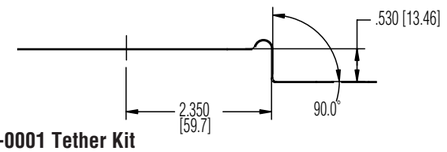
Dynapar™ brand

DIMENSIONS inch [mm]

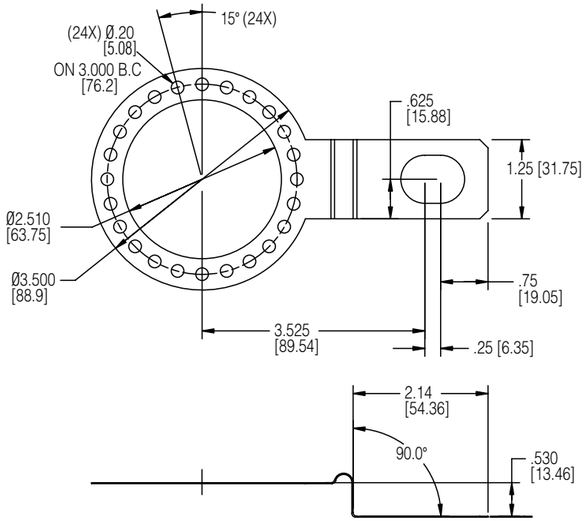




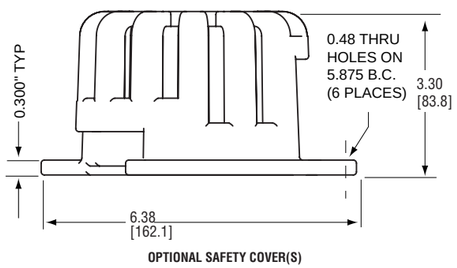
114574-0001 Slotted Tether Kit



114573-0001 Tether Kit



114575-0001 Tether Kit



OPTIONAL SAFETY COVER(S)

INCREMENTAL ENCODERS

DYNAPAR™

Notes

SERIES HS35M

Dynapar™ brand

Heavy Duty Hollowshaft Encoder

IND Industrial Duty

Key Features

- **Rugged Design Withstands up to 400G Shock and 20G Vibration**
- **Heavy Duty Design Rated for IP67**
- **Accommodates Shaft Sizes up to 1.25” (Electrically Isolated up to 1.125”)**

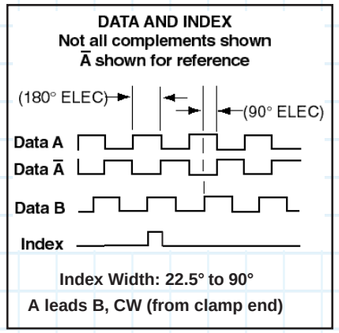
CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Resolution: 256, 512, 1024, 2048 PPR (Pulses per revolution)
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: 90° ±45°
Symmetry: 50% ±15%
Index: 22.5° to 90°
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:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max

Frequency Response: 180 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity, short circuit protected with 7272 or 7273 line drivers only
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, NEMA4 style (MCN-N6N4)
10 pin Bayonet, MS3116-F12-10S (MCN-B1)
12 Pin CCW M23 Connector (MCN-C2)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector(112860-XXXX)

Note: “MS” type mating connectors and pre-built cables are rated NEMA 12. “M12” Cable assemblies are rated IP67

MECHANICAL

Bore Diameter: 6mm to 28mm, 1/4” to 1-1/8”, 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 1
Housing and Cover: Powder Coated Aluminum
Shaft Material: 6061-T6 Aluminum
Weight: 1.76lb (28 Oz) Typical

ENVIRONMENTAL

Standard Operating Temperature: -40 to +120°C
Storage temperature: -40 to +120°C
Shock: 400G, 6mSec
Vibration: 5 to 3000 Hz, 20G
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67 (IP64 at shaft speed above 5000 RPM)

by DYNAPAR™

SERIES HS35M

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: Termination	Code 7: Options
HS35M □□□□		□	□	□	□	□□
Ordering Information						
HS35M Heavy-Duty, Hollowshaft Encoder	**0256** **0512** **1024** **2048**	**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” **M** 14mm **N** 18mm **P** 25mm **R** 28mm Not Electrically Isolated **K** 1-1/4”	**0** None **1** 4.5” C-face tether **2** 8.5” C-face tether **3** Slotted tether (to fit standard AC motor fan cover) Not available when Code 5 is D,E,F,G, Q, R **4** Same as 1 w/cover **5** Same as 3 w/cover **C** Same as A with 56C cover (Single Only) Available when Code 5 is D,E,F,G, Q, R **6** Same as 1 w/dual cover **7** Same as 3 w/dual cover **8** Same as 2 w/ 180 C-face cover (single or dual output) **A** Rod tether	**0** ABZ, 5-26VDC push-pull (7272) **1** ABZ, 5-26VDC O/C (7273) **2** ABZ, 5-26VDC O/C w2.2kOhm (7273) Not available when Code 6 is H **4** Differential AB only, 5-26VDC, 5-26VDC out (7272) **5** Differential AB only, 5-26VDC in, 5VDC out (7272) Not available when Code 6 is 0, 1, 5, 6, or H **6** Differential ABZ, 5-26VDC in, 5VDC out (7272) **7** Differential ABZ, 5-26VDC in, 5-26VDC out (7272) **D** Dual isolated outputs, same as “6” **E** Dual isolated outputs, same as “7”	**0** 6 Pin Connector **1** 7 Pin Connector **2** 10 Pin Connector **3** 12 Pin Connector **4** 10 Pin Bayonet Connector **5** 6 Pin+Mating Connector **6** 7 Pin+Mating Connector **7** 10 Pin+Mating Connector **8** 12 Pin+Mating Connector **9** 10 Pin Bayonet+Mating Connector **A** 0.5m (18”) Cable **C** 1m (36”) Cable **D** 2m (72”) Cable **E** 3m (120”) Cable **F** 0.3m (13”) Cable with 10-Pin Bulk-head Connector and Mate **G** 0.3m (13”) Cable **H** 5 Pin M12 Connector **J** 8 Pin M12 Connector	**Blank** No Option

Cable Assemblies with MS Connector*
108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
112123-XXXX 6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635-XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
114448-XXXX 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*
108615-XXXX 12 M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CCW

Cable Assemblies with M12 Connector*
112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)
MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 pin bayonet, style MS3116-F12-10S
MCN-C2 12 Pin CCW M23 Connector

Accessory Kits:
114573-0001 Tether Kit, 4.5” C-Face Single Point with 3/8” Bolt
114574-0001 Tether Kit, Slotted with T-bolts for Standard AC Motor Fan Covers
114575-0001 Tether Kit, 8.5” C-Face Single Point with 1/2” Bolt
114591-0001 Cover Kit, 56 C-Face
114592-0001 Cover Kit, Fan Cover
114593-0001 Dual Cover Kit, 56 C-Face
114928-0001 Dual Cover Kit, 180 C-Face
114594-0001 Dual Cover Kit, Fan Cover
116233-0001 Rod Tether Only
116233-0002 Rod Tether + 56 C-Face Cover (Single)
116233-0004 Rod Tether + Grounding Strap
116233-0005 Rod Tether + Grounding Strap +56 C-Face Cover (Single)

SERIES HS35M

Dynapar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables - Code 6 = 0 to 9, A to G

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. Models with direct cable exit carry the same color coding as shown for each output configuration.

Encoder Function	Cable #108594-XXXX 6 Pin Single Ended		Cable #112123-XXXX 6 Pin Dif Line Drv w/o Index		Cable #108596-XXXX 7 Pin Dif Line Drv w/o Index		Cable #108595-XXXX 7 Pin (If Used)		**Cable #109209-XXXX or 1400635XXXX 10 Pin Differential Line Driver w/ Index		Cable #114448-XXXX 10 Pin Bayonet		Cable #108615-XXXX 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN	A	BRN	5	BRN	BRN
Sig. B	D	ORN	D	ORN	B	ORN	B	ORN	B	ORN	B	ORN	8	ORN	ORN
Sig. Z*	C	YEL	—	—	—	—	C	YEL	C	YEL	C	YEL	3	YEL	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
N/C	F	—	—	—	—	—	E	—	E	—	E	—	7	—	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	GRN
Sig. $\overline{A}$	—	—	C	BRN/WHT	C	BRN/WHT	—	—	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	BRN/WHT
Sig. $\overline{B}$	—	—	F	ORN/WHT	E	ORN/WHT	—	—	I	ORN/WHT	J	ORN/WHT	1	ORN/WHT	ORN/WHT
Sig. $\overline{Z}$*	—	—	—	—	—	—	—	—	J	YEL/WHT	K	YEL/WHT	4	YEL/WHT	YEL/WHT
0V Sense	—	—	—	—	—	—	—	—	—	—	—	—	2	BLK/WHT	—
5V Sense	—	—	—	—	—	—	—	—	—	—	—	—	11	GRN	—

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.

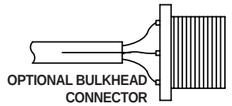
Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig.A	4	BLK	1	BRN	1	BRN
Sig.B	2	WHT	4	ORG	4	ORG
Sig. Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

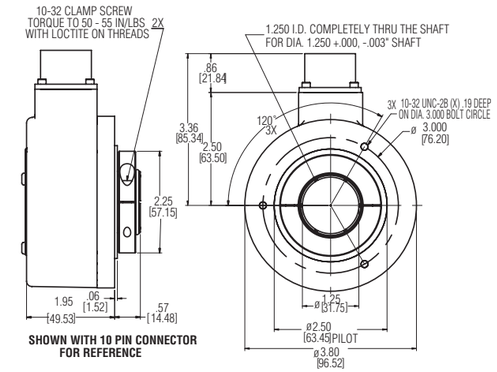
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

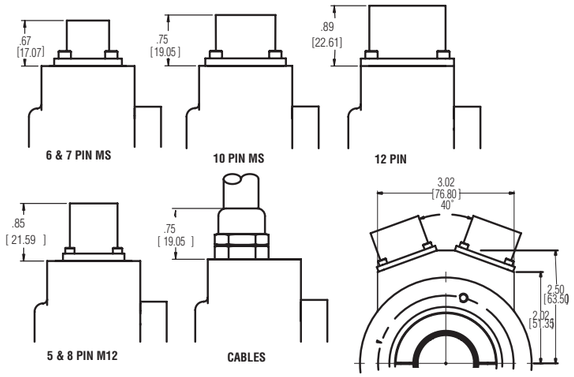
by DYNAPAR™

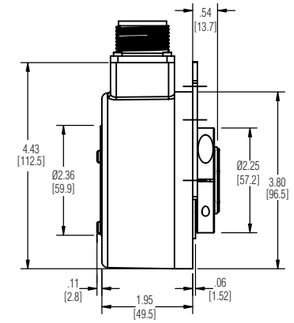
SERIES HS35M

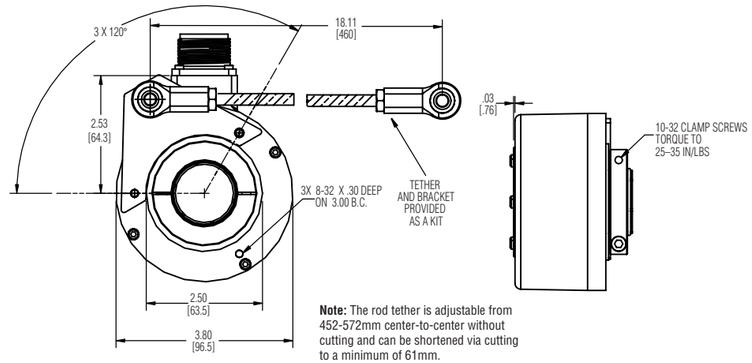
DIMENSIONS inch [mm]







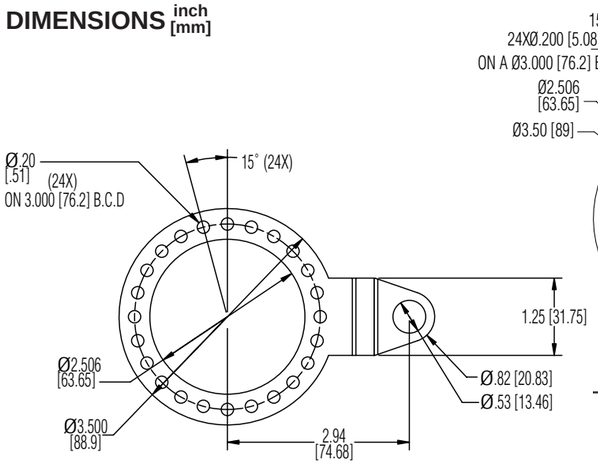


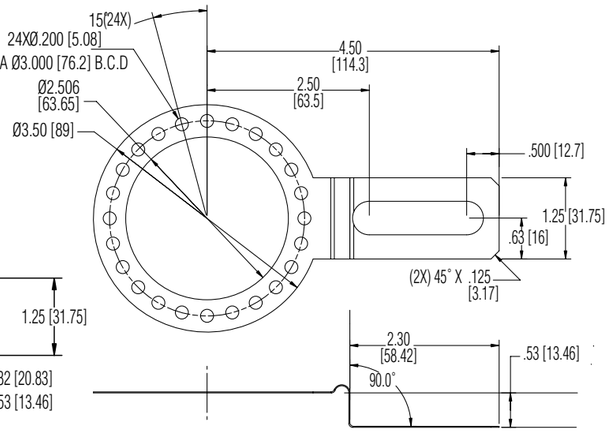


Note: The rod tether is adjustable from 452-572mm center-to-center without cutting and can be shortened via cutting to a minimum of 61mm.

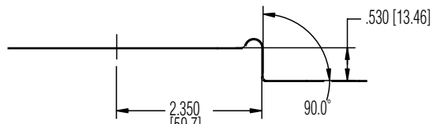
SERIES HS35M

DIMENSIONS inch [mm]

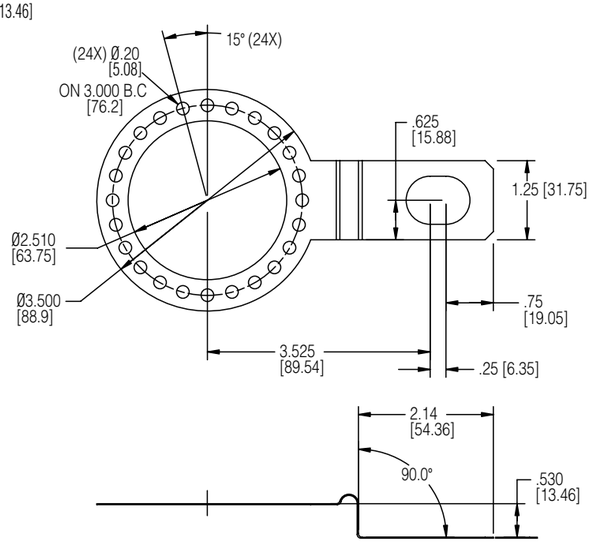




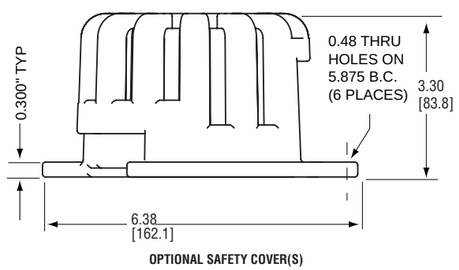
114574-0001 Slotted Tether Kit



114573-0001 Tether Kit



114575-0001 Tether Kit



OPTIONAL SAFETY COVER(S)

INCREMENTAL ENCODERS

DYNAPAR™

Notes

SERIES HSD37

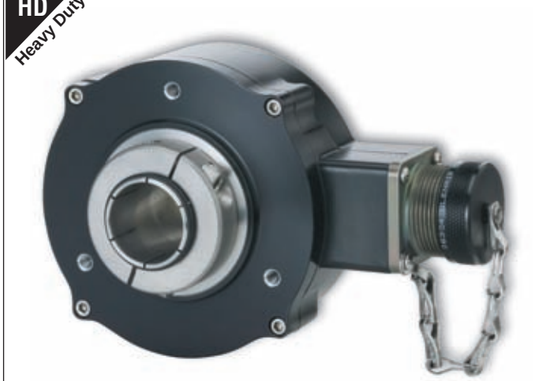
NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

- **Unbreakable Code Disc up to 5000 PPR**
- **Dual Isolated Outputs Available for Redundancy**
- **Anodized Aluminum, Stainless Steel, or Nickel Plated Housing**
- **IP67 Sealing**
- **400G Shock and 20G Vibration vIndependently Validated**

HD Heavy Duty



CE EN 61326-1

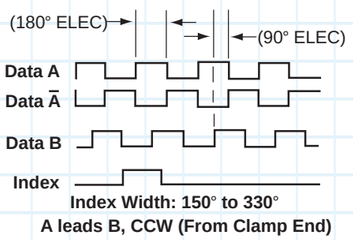
RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 15 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 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330°, A leads B, CCW (From Clamp End)
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
$\bar{A}$ shown for reference



Index Width: 150° to 330°
A leads B, CCW (From Clamp End)

ELECTRICAL

Input Power: 5-26VDC. 80 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
2N2222 Open Collector: 250mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected with 7272 or 7273 line drivers only
Termination: MS Connector; M12 Connector; M23 Connector; Cable Exit w/Seal.

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 (MCN-B1)
10 Pin, NEMA4 Style (MCN-N6N4)
12 Pin CW M23 Connector (MCN-C1)
Cable w/ 5 pin M12 Connector, (112859-XXXX)
Cable w/ 8 pin M12 Connector, (112860-XXXX)

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

MECHANICAL

Bore Diameter: 6-24mm, 1/4" - 1". Insulated inserts provided for bores under 1 inch (1" bore not electrically isolated for stainless shaft option)
Mounting Configuration: Hollow Bore, direct mount over shaft with multiple tether options
Bore Runout: ±0.0005 TIR at midpoint
Min. Shaft Engagement: 1.60" (Recommended)
Shaft Speed: 6000 RPM max
Starting Torque: 4.5 in-oz. maximum (at 25°C)
Running Torque: 4.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Housing and Cover: Hard Anodized Aluminum. Also available in Stainless Steel.
Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)
Disc Material: Mylar
Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 100°C
Storage temperature: -40 to 100°C
Shock: 400G for 6msec duration
Vibration: 5 to 3000Hz @ 20G
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

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
HSD37	□□□□	□	□	□	□	□□

Ordering Information

HSD37
Heavy Duty Hollowshaft Encoder

PPR:
0015
0032
0050
0060
0100
0200
0240
0250
0500
0512
0600
1000
1024
1200
2000
2048
3072
4000
4096
5000

Shaft:
Electrically isolated:
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
R 1"

Not electrically isolated:
H 1"
P 25mm

Output Format:
0 Single Ended ABZ, 5-26VDC push-pull (7272)
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)

Options 4 & 5 not available when Code 5 is H
4 Differential AB only, 5-26VDC in, 5-26V out (7272)
5 Differential AB only, 5-26VDC in, 5V out (7272)

Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H
6 Differential ABZ, 5-26VDC in, 5V out (7272)
7 Differential ABZ, 5-26VDC in, 5-26 out (7272)

Termination:
0 6 pin connector
1 7 pin connector
2 10 pin connector
3 12 pin connector
4 10 pin Bayonet connector
5 6 pin+mating connector
6 7 pin+mating connector
7 10 pin+mating connector
8 12 pin+mating connector
9 10 pin Bayonet+mating connector
A .5m (20") cable
C 1m (39") cable
D 2m (79") 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
P 1.5 ft (18") Cable with 10-pin Bulkhead Connector

Available when Code 6 is 0, 1, 2, 3, A, C
T Terminal box w/conduit entry

Options:
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

Special Option:
Blank None
01 Nickel Plated
02 Stainless Steel

Cable Assemblies with MS Connector*
108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs
114448-XXXX 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*
115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*
112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)
MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 Pin Bayonet, style MS3116-F12-10S
MCN-C1 12 Pin CW M23 Connector

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, 56 C-Face
114592-0001 Cover Kit, Fan Cover
114593-0001 Dual Cover Kit, 56 C-Face
114594-0001 Dual Cover Kit, Fan Cover

SERIES HSD37

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS and M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

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-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

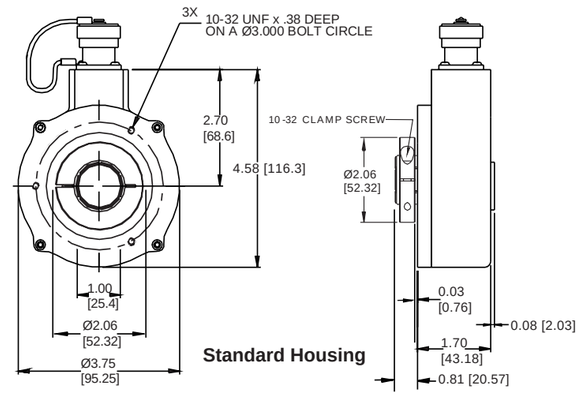
NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

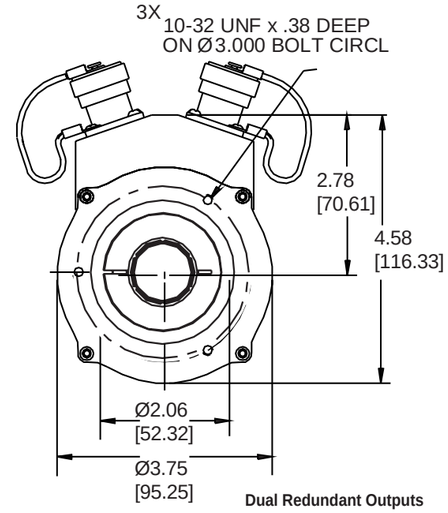
by DYNAPAR™

SERIES HSD37

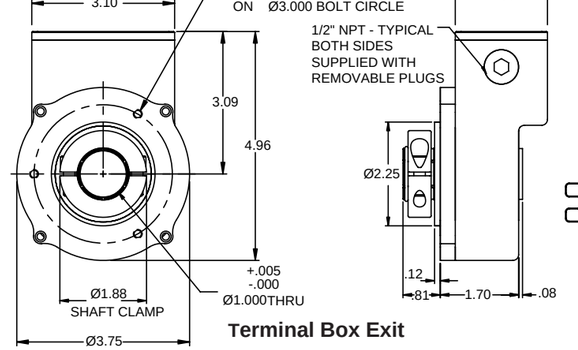
DIMENSIONS (inches [mm])



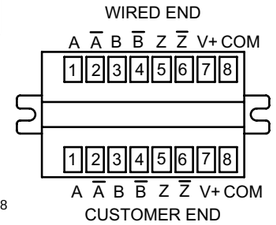
Standard Housing



Dual Redundant Outputs



Terminal Box Exit

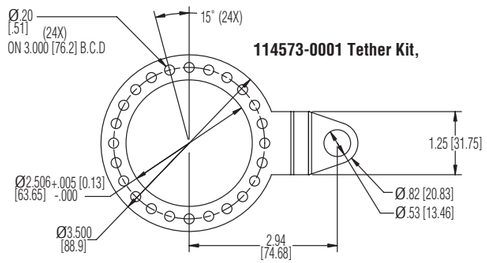


A - GREEN
Ā - VIOLET
B - BLUE
B̄ - BROWN
Z - ORANGE
Z̄ - YELLOW
V+ - RED
COM - BLACK

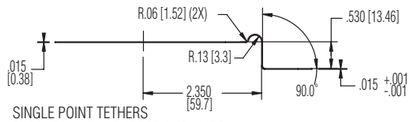
SERIES HSD37

NorthStar™ brand

DIMENSIONS (inches [mm])

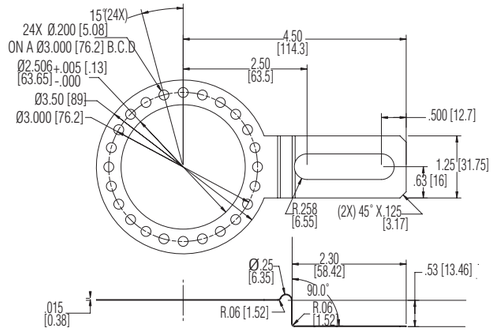


114573-0001 Tether Kit,

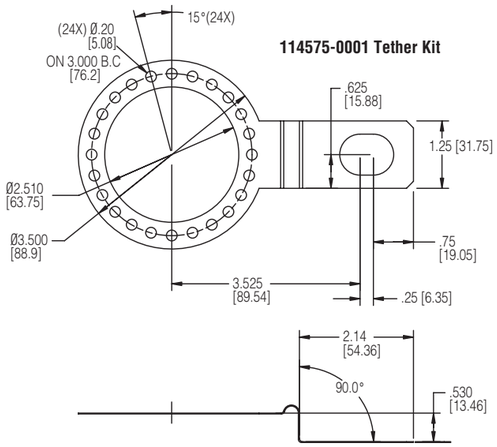


SINGLE POINT TETHERS
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375

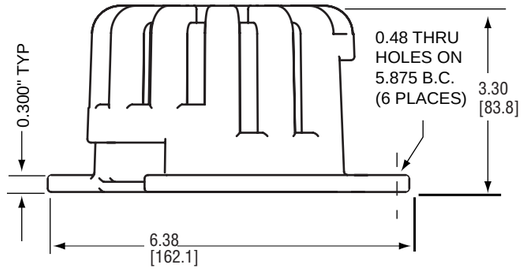
114574-0001 Tether Kit



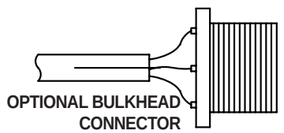
SLOTTED TETHER
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375



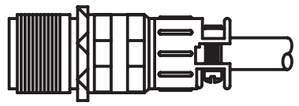
114575-0001 Tether Kit



OPTIONAL SAFETY COVER(S)



OPTIONAL BULKHEAD CONNECTOR (OPTION P)



PIGTAIL WITH MS CONNECTOR (OPTION K)

INCREMENTAL ENCODERS

DYNAPAR™

Notes

SERIES HSD35

NorthStar™ brand

Heavy Duty Optical Encoder

Key Features

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

HD Heavy Duty

CE EN 61326-1

RoHS

PRELIMINARY SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1 to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing:
For resolutions 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300 PPR and above 1024 PPR:180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330°, A leads B, CW (from clamp end)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

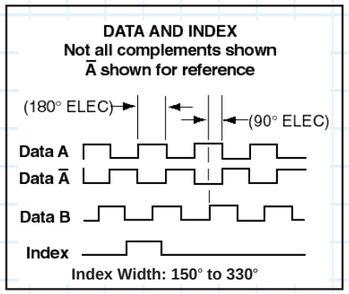
ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

ELECTRICAL

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



A leads B, CW (from clamp end)

MECHANICAL

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

ENVIRONMENTAL

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

by DYNAPAR™

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 □□□□		□	□	□	
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/ 56 C-Face Cover **5** Same as 3 w/ Cover **6** Same as 2 w/ 180 C-Face 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 (7272) **1** Single Ended ABZ, 5-26VDC O/C (7273) **2** Single Ended ABZ, 5-26VDC O/C w2.2kOhm (7273) **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 **W** Differential ABZ, 10-24V in, 10-24V out (Mosfet)	**Blank** None

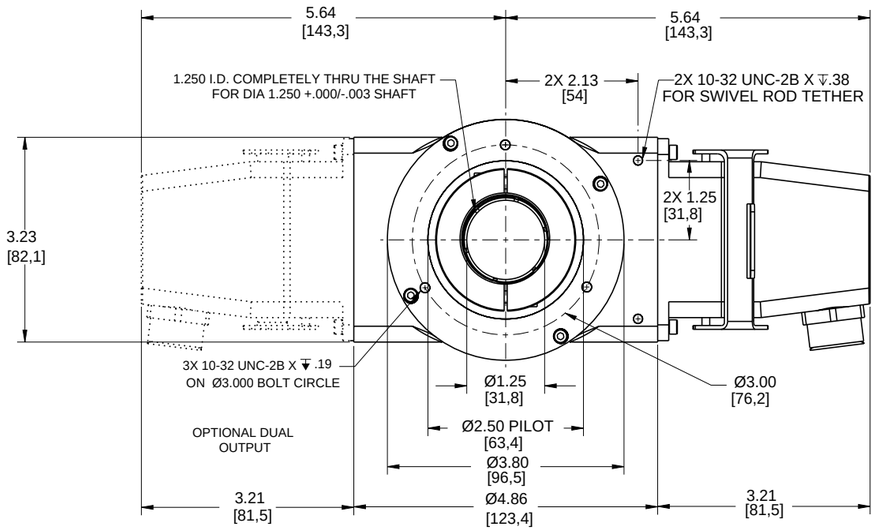
Accessory Kits:

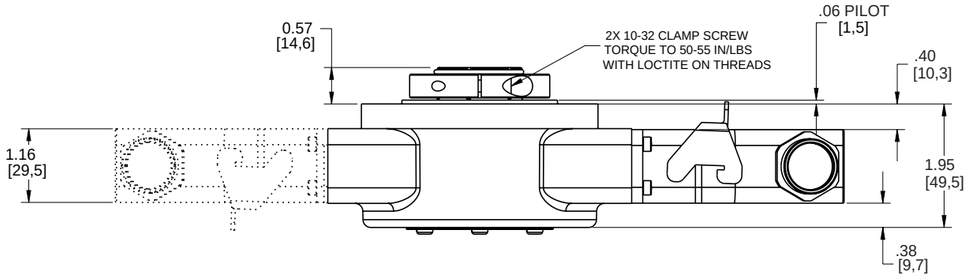
114573-0001	Tether Kit, 4.5” C-Face Single Point with 3/8” bolt
114574-0001	Tether Kit for Standard AC Motor Fan Covers with T-bolt
114575-0001	Tether Kit, 8.5” C-Face Single Point with 1/2” bolt
756-042-01	Rod Tether, AC Motor Fan Cover with T-bolts
756-043-01	Rod Tether Kit, 4.5” C-Face with 3/8” bolt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

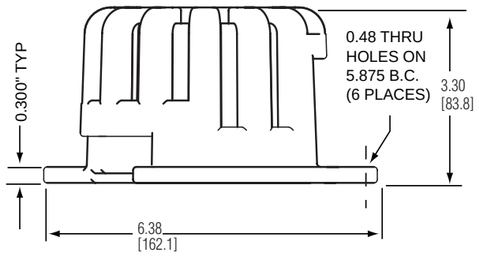
SERIES HSD35

NorthStar™ brand

DIMENSIONS inch [mm]







OPTIONAL SAFETY COVER(S)

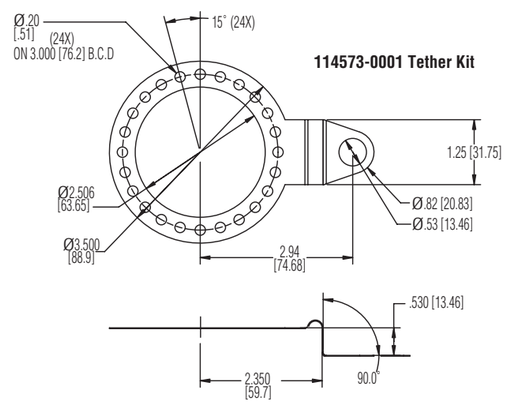
SWIVEL ROD TETHER

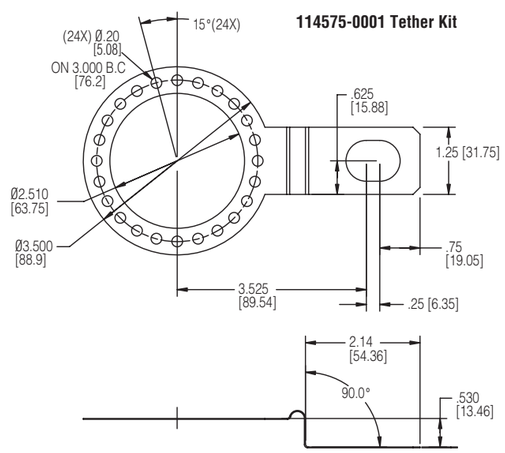
Note* See accessories section on page two for Swivel Rod Part Numbers

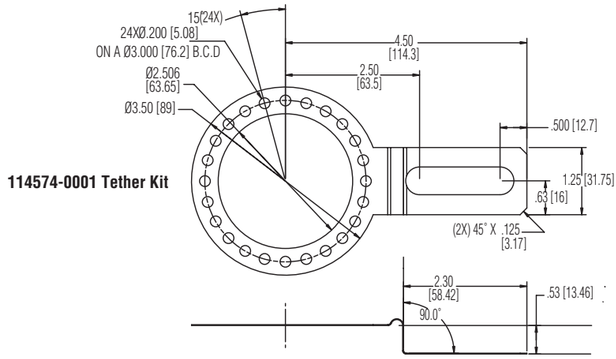
by DYNAPAR™

SERIES HSD35

DIMENSIONS inch [mm]







SERIES HSD35M

NorthStar™ brand

Heavy Duty Magnetic Encoder

HD Heavy Duty

EN 61326-1

RoHS

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**

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Resolution: 256, 512, 1024 and 2048 PPR (pulses/revolution)
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: 90° ±45°
Symmetry: 50% ±15%
Index: 22.5° to 90°, A leads B, CW (from clamp end)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC, 50 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 180 kHz (data & index)
Noise Immunity: Tested to EN61326-1”
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 10 Pin Latching Industrial Connector

MECHANICAL

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: 11.0 in-oz. maximum (at 25°C)
Running Torque: 5.0 in-oz. maximum (at ambient)
Bearings: ABEC 3
Housing and Cover: Powder Coated Aluminum
Shaft Material: Stainless Steel
Weight: 1.76 lbs (28 Oz) Typical

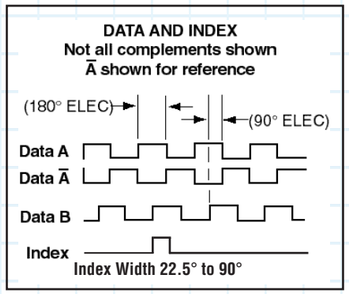
ENVIRONMENTAL

Operating Temperature: -40 to +120°C
Storage temperature: -40 to +125°C
Shock: 400G, 6mSec
Vibration: 5 to 3000 Hz, 20G
Humidity: Up to 98%, (non-condensing)
Enclosure Rating: IP67 (IP64 at shaft speeds above 5000 RPM)
Connector Rating: IP65

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information



A leads B, CW (from clamp end)

by DYNAPAR™

SERIES HSD35M

Ordering Information

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

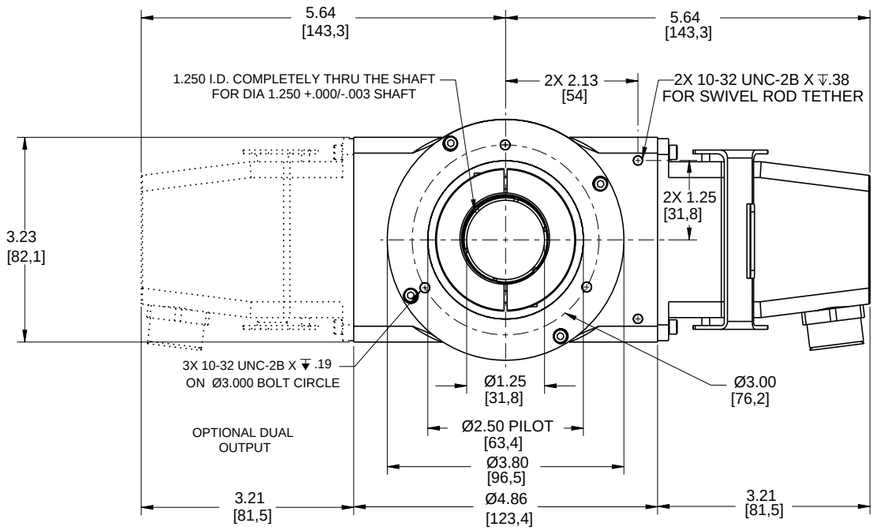
Code 1: Model	Code 2: PPR	Code 3: Bore Size	Code 4: Fixing	Code 5: Output Format	Code 6: Options
HSD35M □□□□	□		□	□	
Ordering Information					
HSD35M Heavy-Duty Hollowshaft Encoder	**0256** **0512** **1024** **2048**	**0** 6mm **1** 1/4” **2** 5/16” **3** 8mm **4** 3/8” **5** 10mm **6** 12mm **7** 1/2” **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” **M** 14mm **N** 18mm **P** 25mm **R** 28mm Not Electrically Isolated **K** 1-1/4”	**Stamped Metal** **0** None **1** 4.5” C-Face Tether **2** 8.5” C-Face Tether **3** Slotted Tether **4** Same as 1 w/56C-Face Cover **5** Same as 3 w/Cover **6** Same as 2 w/180C-Face 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 (7272) **1** Single Ended ABZ, 5-26VDC O/C (7273) **2** Single Ended ABZ, 5-26VDC O/C w2.2kOhm (7273) **4** Differential AB only, 5-26, 5-26 out (7272) **5** Differential AB only, 5-26 in, 5V out (7272 **6** Differential ABZ, 5-26 in, 5V out (7272) **7** Differential ABZ, 5-26 in, 5-26 out (7272) **D** Dual Isolated Outputs, same as “6” **E** Dual Isolated Outputs, same as “7”	**Blank** None

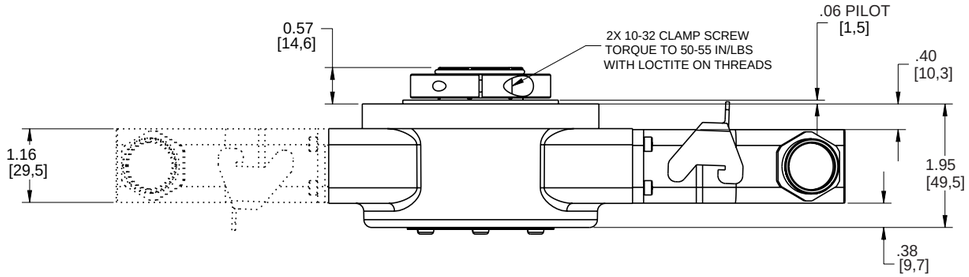
Accessory Kits:

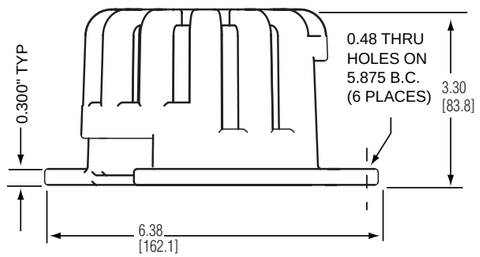
114573-0001 Tether Kit, 4.5” C-Face Single Point with 3/8” bolt
114574-0001 Tether Kit for Standard AC Motor Fan Covers with T-bolt
114575-0001 Tether Kit, 8.5” C-Face Single Point with 1/2” bolt
756-042-01 Rod Tether, AC Motor Fan Cover with T-bolts
756-043-01 Rod Tether Kit, 4.5” C-Face with 3/8” bolt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

SERIES HSD35M

DIMENSIONS inch [mm]





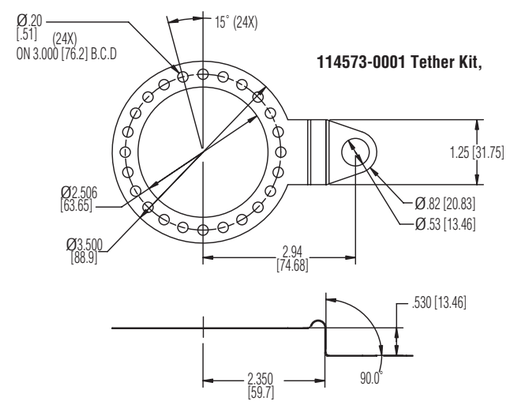


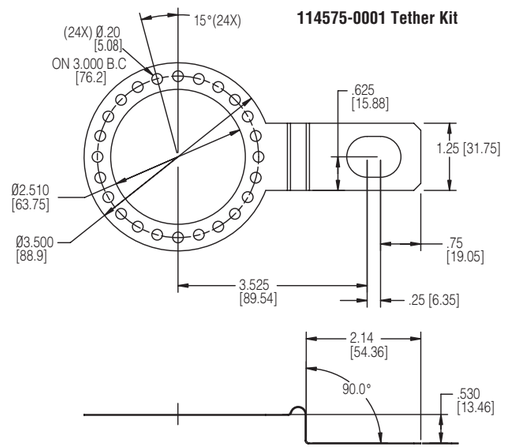
OPTIONAL SAFETY COVER(S)

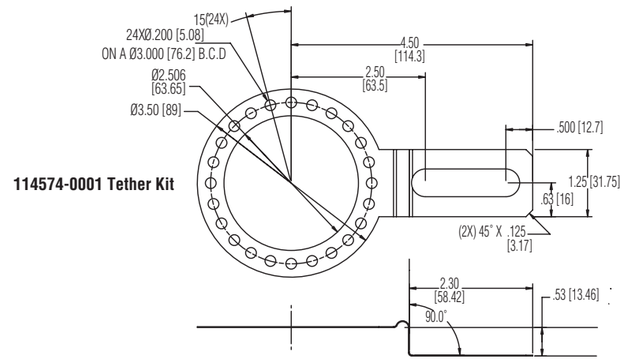
by DYNAPAR™

SERIES HSD35M

DIMENSIONS inch [mm]







SERIES HSD38

NorthStar™ brand

Harsh Duty Optical Encoder

HD Heavy Duty

Key Features

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

EN 61326-1

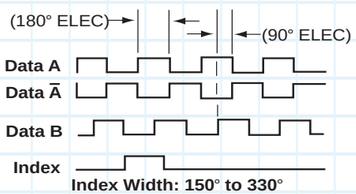
RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 15 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° ± 15° electrical; For resolutions over 1250 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 330°, Reverse Phasing, A leads B for CW also available: See Code 7 in Ordering Information
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
$\bar{A}$ shown for reference



Index Width: 150° to 330°

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

ELECTRICAL

Input Power: 5-26VDC. 80 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector; M12 Connector; M23 Connector; cable exit w/seal.

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, NEMA4 Style (MCN-N6N4)
10 Pin Bayonet, Style MS3116-F12-10S (MCN-B1)
12 Pin CW M23 Connector (MCN-C1)
Cable w/ 5 Pin M12 Connector (112859-XXXX)
Cable w/ 8 Pin M12 Connector (112860-XXXX)

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

MECHANICAL

Bore Diameter: 12mm - 20mm, 1/2" - 1". Insulated inserts provided for bores under 1 inch
Mounting Configuration: Hollow Bore, direct mount over shaft with multiple tether options
Bore Tolerance:
1" bore: 1.0005" -0.0000" / +0.0010"
< 1" bore: Nominal -0.000" / +0.002"
Shaft Speed: 6000 RPM Maximum
Mating Shaft Requirments:
Configuration: Keyway alowed, Flat not allowed
Runout: ±0.025" (0.635mm) radial, typical
Endplay: ±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 25°C)
Bearings: 61806-ZZ
Housing and Cover: Aluminum
Shaft Material: 6061-T6 Aluminum
Disc Material: Mylar
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: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

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

Code 2: PPR
0015
0032
0050
0060
0100
0200
0240
0250
0500
0512
0600
1000
1024
1200
2000
2048
3072
4000
4096
5000

Code 3: Bore Size
Electrically isolated:
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

Code 4: Format
0 Single Ended, Undirectional (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, 3, 4, 6, 7, 8, 9, A, B, C, D, G, J, K, P
3 Differential, Bidirectional ($A\bar{A}$ $B\bar{B}$)

Available when Code 5 is 3 or 4 and Code 6 is 2, 3, 4, 7, 8, 9, A, B, C, D, G, J, K, P
4 Differential, Bidirectional with Index ($A\bar{A}$ $B\bar{B}$ $Z\bar{Z}$)

Code 5: Output
0 5-26V in, 5-26V Open Collector out (7273)
2 5-26V in, 5-26V Push-Pull out (7272)

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)

Code 6: Termination
0 6 pin connector
1 7 pin connector
2 10 pin connector
3 12 pin connector
4 10 pin Bayonet connector
5 6 pin + mating connector
6 7 pin + mating connector
7 10 pin + mating connector
8 10 pin Bayonet + mating connector
9 12 pin + 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
P 1.5 ft (18") Cable with 10-pin Bulkhead Connector

Available when:
Code 5 is 0 or 2
H 5 pin M12 connector
L 5 pin M12 connector w/special pinout

Code 7: Options
0 No Option
1 Internally Isolated 1" Bore
2 Reverse Phasing, No Bore Isolation
3 Internally Isolated 1" Bore, and Reverse Phasing

Code 8: Housing
0 Cast Aluminum Housing, Slotted Tether Included
6 Cast Aluminum Housing, No Tether
C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4-1/2" 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)
M Swivel-Rod Tether with Metric Hardware
N Same as "K" with Cover Kit

Cable Assemblies with MS Connector*
108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
114448-XXXX 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*
115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*
112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)
MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 Pin Bayonet, style MS3116-F12-10S
MCN-C1 12 Pin CW M23 Connector

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, 56 C-Face
114592-0001 Cover Kit, Fan Cover
114593-0001 Dual Cover Kit, 56 C-Face
114594-0001 Dual Cover Kit, Fan Cover

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES HSD38

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS and M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

5 & 8 Pin M12 Accessory Cables when Code 6 = H or J

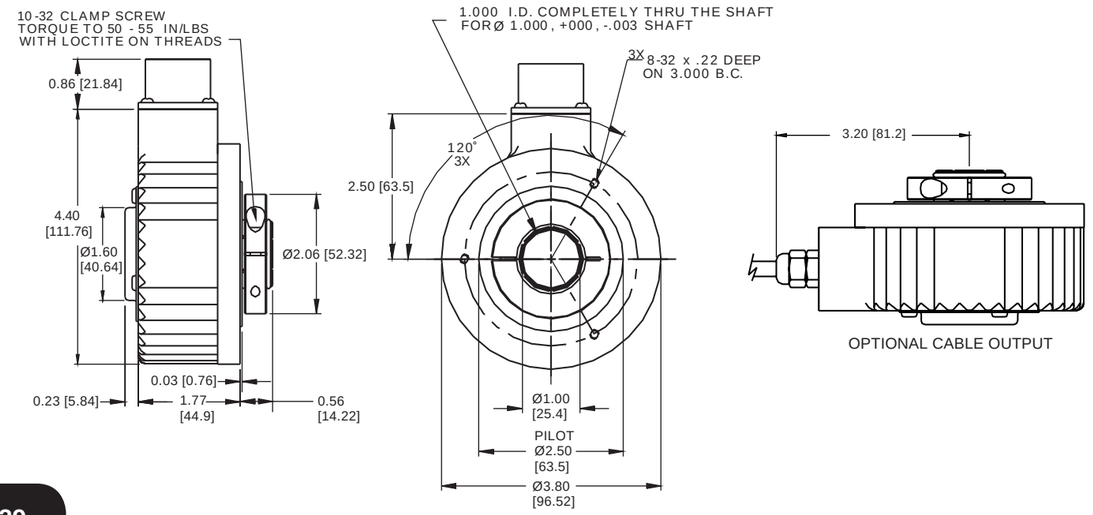
Connector pin numbers and cable assembly wire color information is provided here for reference.

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

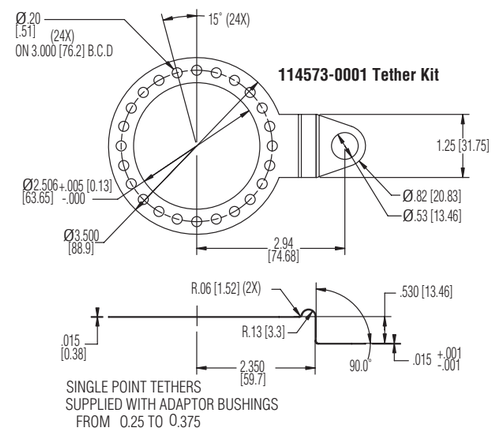
DIMENSIONS inch [mm]

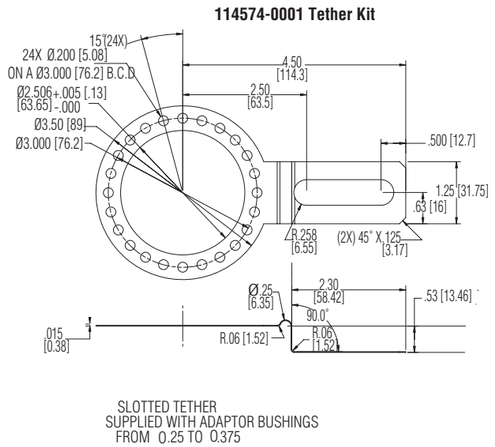


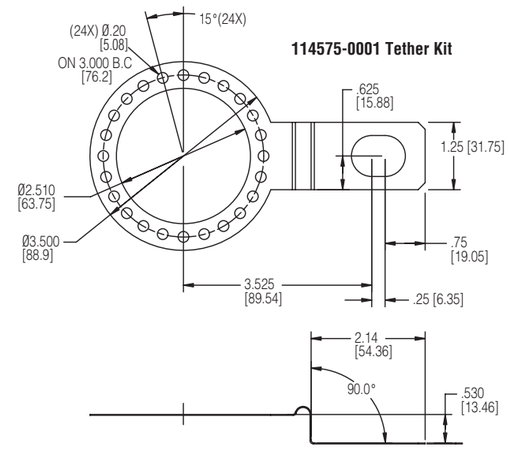
by DYNAPAR™

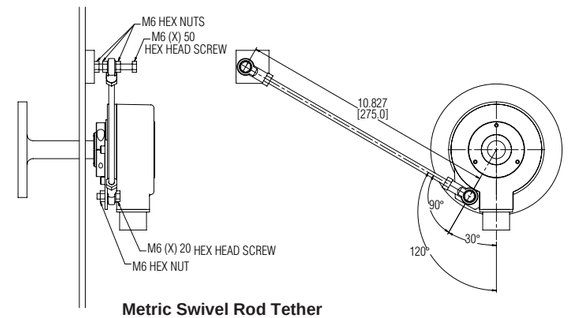
SERIES HSD38

DIMENSIONS inch [mm]

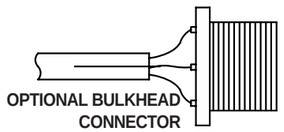




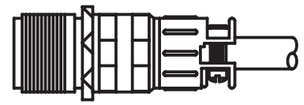




Metric Swivel Rod Tether



OPTIONAL BULKHEAD CONNECTOR (OPTION P)



PIGTAIL WITH MS CONNECTOR (OPTION K)

SERIES HS56

NorthStar™ brand

Hollow Shaft Encoder

HD Heavy Duty

Key Features

- Hollowshaft Design with Heavy-Duty Bearings Ideal for TEFC AC 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

CE
EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-2048 PPR
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

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:
4428 Differential Line Driver: 150mA, sink or source
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Diameter: 5/8” to 1-1/8”
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Shaft Speed: 3,600 RPM
Shaft Length Required: 2.0” min
Allowable Shaft End-Play: ± 0.150” (tether limit)
Allowable Shaft Runout: 0.015” TIR typical (rpm dependent)
Starting Torque: 7 in-oz
Acceleration Rate: 3,600 rpm/sec max
Housing Material: Hard Anodized Aluminum W/Stainless Steel Hub
Weight: 9.3 lbs

ENVIRONMENTAL

Operating Temperature Range: -20°C to +80°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SERIES HS56

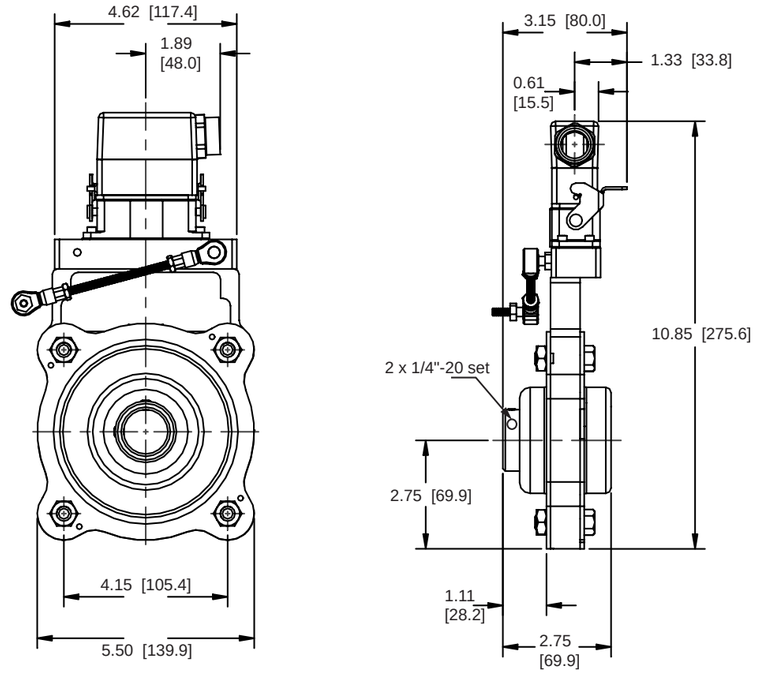
Ordering Information

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 **HD** Hollow Shaft Mount Dual Output	**0064** **0128** **0256** **0512** **1024** **2048**	**L** No Index Available when Code 2 is 0512, 1024 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8” **J05** 7/8” **J06** 1.00” **J07** 1-1/8” **J55** 20 mm For additional bore sizes, please consult factory.	**C** Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18” Pigtail Cable **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**L** 5-15V in, 5-15V Line Driver (4428) out **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)

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

DIMENSIONS inch [mm]



SERIES HS60

NorthStar™ brand

Hollowshaft Encoder

HD Heavy Duty

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

CE
EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-2048 PPR
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
Number of Output Modules: Single or Dual

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:
4428 Differential Line Driver: 150mA, sink or source
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Diameter: 1-1/8” to 2-7/8”
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Shaft Speed: Labyrinth Shaft Seal: 3,600 RPM; V-Ring Shaft Seal: 1,000 RPM
Shaft Length Required: 2.36” min
Acceleration Rate: 3,600 rpm/sec max
Allowable Shaft End-Play: ± 0.150” (tether limit)
Allowable Shaft Runout: 0.015” TIR typical (rpm dependent)
Housing Material: Hard Anodized Aluminum W/Stainless Steel Hub
Weight: 14.7 lbs

ENVIRONMENTAL

Operating Temperature Range: -20°C to +80°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#
Common	1	Black	F
B	2	Green	B
A	3	Blue	A
Z *	4	Violet	C
No Connection	5	—	E
Vcc +	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

by DYNAPAR™

SERIES HS60

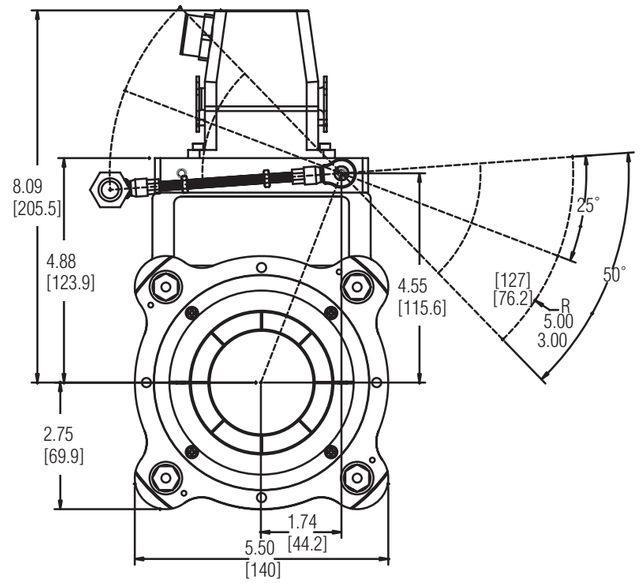
Ordering Information

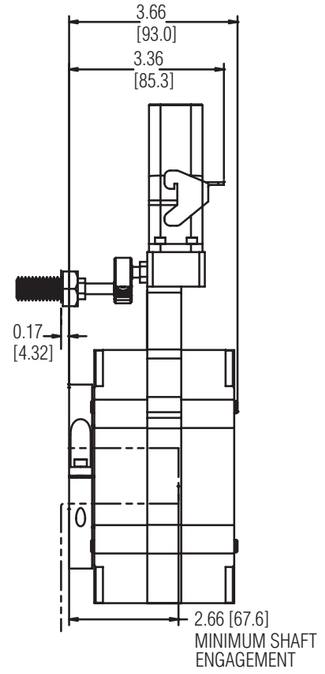
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Seal
□6	□□□□	□	□□□	□	□	□
Ordering Information						
H6 HS60 Hollowshaft, Single Output **D6** Hollowshaft, Dual Output	**0064** **0128** **0256** **0512** **1024** available when code 1 is H6 **2048**	**L** No index Available When Code 2 is 0512, 1024, or 2048 **G** With Gated, Differential Index **Z** With Differential Index	**T01** 1-1/8” **M45** 45 mm **T02** 1-3/8” **M50** 50 mm **T03** 1-5/8” **M55** 55 mm **T04** 1-7/8” **T05** 2.00” **T06** 2-1/8” **T07** 2-1/4” **T08** 2-3/8” **T09** 2-1/2” **T10** 2-7/8” Additional Bore Sizes Available, Please Consult Factory	**C** Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **P** 18” Pigtail Cable **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**L** 5-15VDC In, 5-15V Line Driver (4428) Out **V** 5-26VDC In, 5-26V Line Driver (IC-WE) Out **5** 5-15VDC In, 5V Line Driver (4428) Out	**L** Labyrinth seal **V** V-ring seal

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

DIMENSIONS inch [mm]





SERIES HS85

NorthStar™ brand

Hollow Shaft Encoder

HD Heavy Duty

Key Features

- **Hollowshaft Design Mounts Easily to Large Motor Shafts, up to 4.5” 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**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-2048 PPR
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

ELECTRICAL

Input Voltage Requirement: 5-15 VDC, 15-26 VDC
Current Requirement:
With Electrical Option L: 45mA typical per sensor module plus line driver load
With Electrical Option R and 5: 65mA typical per sensor module plus line driver load
Output Signals:
4428 Differential Line Driver: 150mA, sink or source
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Diameter: 1-1/8” to 4-1/2”, straight or tapered bore
Mounting Configuration: Hollow Shaft mount with Anti-Rotation Tether
Shaft Speed: 3,600 RPM
Shaft Length Required: 2.5” min
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)
Housing Material: Cast Iron/Stainless Steel
Weight: 30 lbs

ENVIRONMENTAL

Operating Temperature Range: -20°C to +70°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SERIES HS85

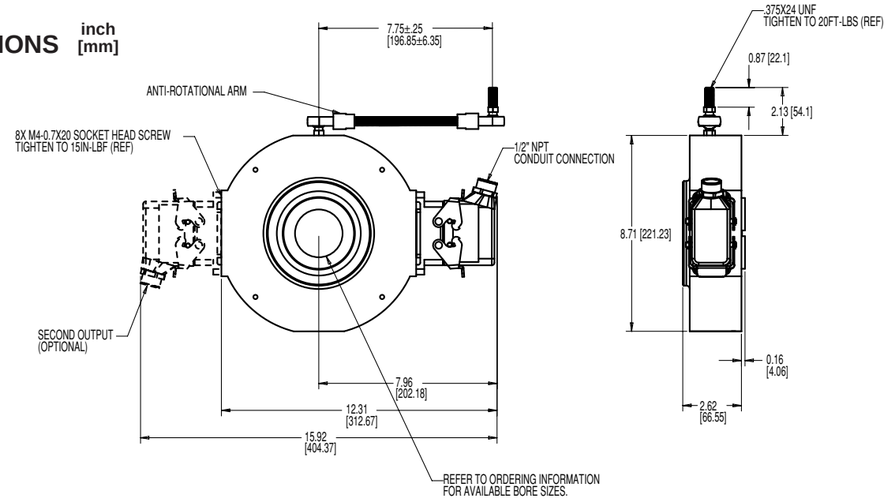
Ordering Information

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** **0064** **0480** **0075** **0512** **0120** **0600** **0128** **0960** **0150** **1024** **0240** **1200** **0256** **2048**	**L** No Index Available when Code 2 is 0480, 0512, 0600, 0960, 1024, 1200 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**Thru-bores** **T01** 1-1/8” **M25** 25 mm **T02** 1-3/8” **M40** 40 mm **T03** 1-5/8” **M48** 48 mm **T04** 1-7/8” **M55** 55 mm **T05** 2.00” **M65** 65 mm **T06** 2-1/8” **M70** 70 mm **T07** 2-1/4” **T08** 2-3/8” **T09** 2-1/2” **T10** 2-7/8” **Bores with 1.25” per foot taper** **P01** 1-1/8” **P02** 1-3/8” **P03** 1-5/8” **P04** 1-7/8” **P05** 2.00” **P06** 2-1/8” **P07** 2-1/4” **P08** 2-3/8” **P09** 2-1/2” **P10** 2-7/8” For Additional Bore Sizes Up to 4.50” Maximum, Please Consult Factory.	**1** Single **2** Dual (Isolated) Differential, bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)	**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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18” Pigtail

Note: See ACCESSORIES Section for Connectors and Spare Parts

DIMENSIONS inch [mm]



SERIES DWD38

NorthStar™ brand

Harsh Duty Optical Encoder

HD Heavy Duty

Key Features

- Draw Works Threaded Shaft with Field Replaceable Adapters for Reduced Downtime
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum or Stainless Steel Housing
- NAMUR Sensor Output Available
- 400G Shock and 20G Vibration Independently Validated

CE EN 61326-1 RoHS

SPECIFICATIONS

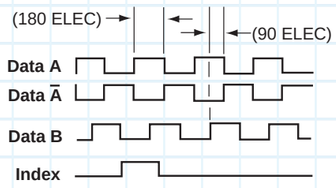
STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 200 to 300 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330° A leads B, CCW (From Shaft End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5-26VDC; 80 mA max., not including output loads.
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
2N2222 Open Collector: 250mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 6, 7, or 10 pin MS Connector; 12 pin CW M23 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, NEMA4 style (MCN-N6N4)
12 Pin CW M23 Connector (MCN-C1)

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



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 Sizes: 6,000 RPM max.
Starting Torque: 4.5 in-oz max (at 25°C)
Running Torque: 4.0 in-oz max (at 25°C)
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
Housing and Cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel
Disc Material: Mylar
Shaft Material: 300 series stainless steel
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: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

SERIES DWD38

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
DWD38	□□□□	□	□	□	□
Ordering Information					
DWD38 Draw Works Encoder	**0015** **1000** **0032** **1024** **0050** **1200** **0060** **2000** **0100** **2048** **0200** **4000** **0240** **4096** **0250** **5000** **0500** **0512** **0600**	**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) **Options 4 & 5 not available when Code 5 is H** **4** Differential AB only, 5-26, 5-26 out (7272) **5** Differential AB only, 5-26 in, 5V out (7272) **Options 6 & 7 not available when Code 5 is 0, 1, 5, 6, H** **6** Differential ABZ, 5-26 in, 5V out (7272) **7** Differential ABZ, 5-26 in, 5-26 out (7272)	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **3** 12 pin CW connector **5** 6 pin+mating connector **6** 7 pin+mating connector **7** 10 pin+mating connector **8** 12 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

Accessories:

Cable Assemblies with MS Connector*

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

Cable Assemblies with M23 Connector*

115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-C1 12 Pin CW M23 Connector

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES DWD38

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables when Code 5 = 0 to 8, A-D or K-N

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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		** Cable # 109209-XXXX or Cable # 1400635XXXX 10 Pin Dif Line Driver with Index		Cable # 115901-XXXX 12 Pin Differential Line Driver with Index		Cable Exit with Seal
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Wire Color Code
Signal A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	GRN
Signal B	D	ORN	B	ORG	B	ORG	B	ORG	8	ORG	BLU
Signal Z*	C	YEL	C	YEL	—	—	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-Shield	F	—	E	—	—	—	E	—	7	—	—
Signal $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Signal $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORG/WHT	BRN
Signal $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	YEL

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.

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

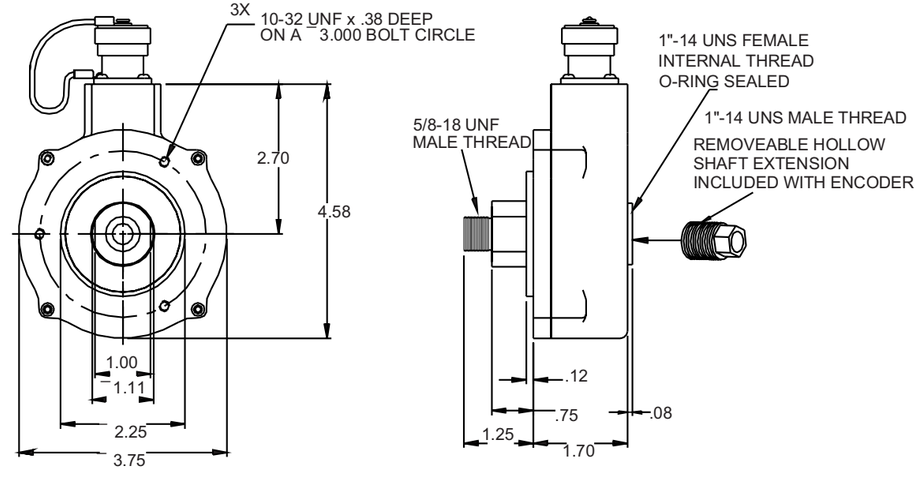
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) “MS” Type mating connectors and pre-build cables are rated NEMA 12
7) “M12” Cable assemblies are rated IP67

by DYNAPAR™

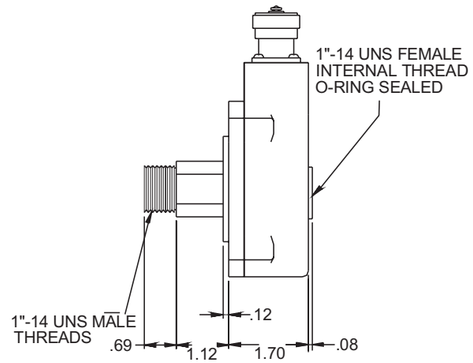
SERIES DWD38

DIMENSIONS inches [mm]

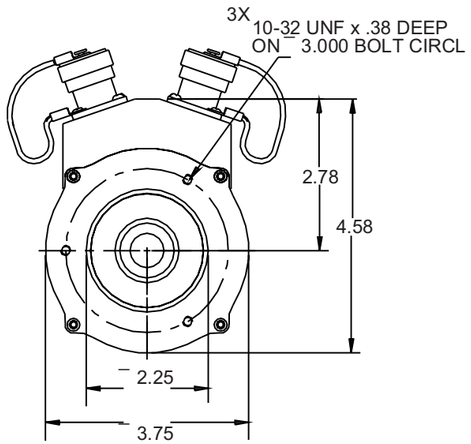
With Convertable Shaft



With Non-Convertable Shaft



Redundant Version



SERIES E9

Dynapar™ brand

Miniature Encoder

SSM Servo Small Motor

Key Features

- **Super-Compact Modular Encoder for Small Servo and Stepper Motor Feedback**
- **Integrated ASIC for Enhanced Reliability and Accuracy**
- **Up to 512 PPR Resolution**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 100 to 512 PPR (pulses/revolution)
Symmetry: 180° ±18° electrical
Index: 90° ±36° electrical
Quadrature Phasing: 90° ±18° electrical
Phase Sense: A leads B for CW shaft rotation
Format: See chart below (output waveform & connections)

ELECTRICAL

Input Power: 5 VDC ±10%, 10mA, typ.
Output Signals: 2.5 V min. high (V_{OH}); 0.5 V max. low (V_{OL}). 6 mA sink/source (25°C), 4 mA (100°C)
Frequency Response: 200 kHz
Termination: 5 pin header (accessory 12" wires w/connector, part no. CA0050012) or flying leads
Recommended Mating Connector: AMP part number 103675-4

MECHANICAL

Hub Diameter: 1/8", 5/32", 1.5mm ~ 4.0 mm
Hub Dia. Tolerance: +0.0004"/-0.0000" (+0.010 mm/-0.000 mm)
Mating Shaft Length: See table
Mating Shaft Runout: 0.001 TIR
Mating Shaft Endplay: >256 ppr: ±0.003" (±0.076mm); 250, 256 ppr: +0.005/-0.003" (+0.127/-0.076mm); <250 ppr: +0.007/-0.003" (+0.178/-0.076mm)
Moment of Inertia: 0.15 x 10^{-5} oz-in-sec^2 (0.11 gm-cm^2)
Housing and Cover: Plastic
Weight: 0.15 oz (4.14 g)

ENVIRONMENTAL

Operating Temperature: -20° to 100°C
Storage Temperature: -50° to 125°C
Humidity: Up to 90% (non-condensing)

OUTPUT WAVEFORMS & CONNECTIONS

Code 4= 00

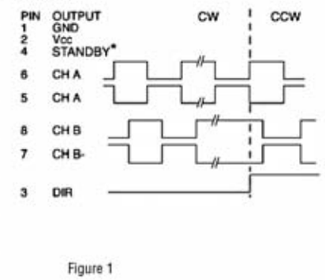


Figure 1

Code 4= 01

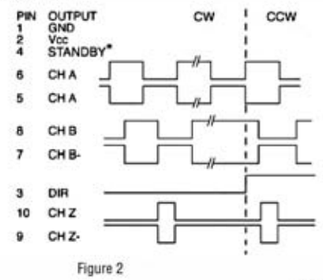


Figure 2

Code 4= 02

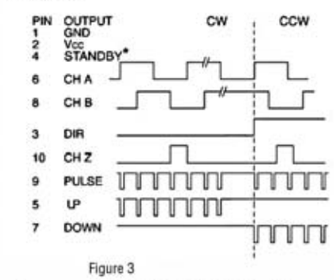


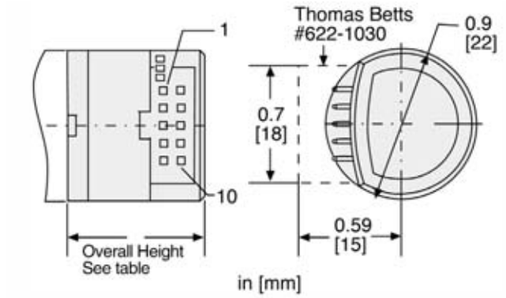
Figure 3

* For operation, connect **STANDBY (4)** to **Vcc (2)**

by DYNAPAR™

SERIES E9

DIMENSIONS/INSTALLATION



IMPORTANT: To properly install Series E9, a specialized mounting kit must be purchased. Only one kit is required to install any number of encoders with the same hub bore size.

Kit Part Number:

MK E9 ☐☐☐ — *Code 3 (from Models Table, above) designating Hub Bore requirement.*

Example: Kit for installing encoders with 3.0 mm hub Bore= ***MK E9 3.0***

Base (Code 3)	Overall Height inch (MM)	Motor Shaft Length inch (MM) Max.	Min
A	0.795 (20.20)	0.479 (12.16)	0.467 (11.86)
C, D, E	0.929 (23.60)	0.613 (15.56)	0.581 (14.76)

Bases C and D provide clearance for motor-bosses with maximum dimensions of 0.5 in, Dia. x 0.15 in. high. Base E provides clearance for motor-bosses with maximum dimensions of 1.0 in. x 0.15 in. high

ORDERING INFORMATION

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

Code 1: Model	Code 2: PPR	Code 3: Hub Bore Description	Code 4: Output Description	Code 5: Mounting Description
E9	☐☐☐☐	☐☐☐	☐☐	☐
Ordering Information				
E9 0.9" Diameter Incremental Modular Encoder	**0100** **0144** **0200** **0500** **0512**	**2.0** 2.0 mm **2.5** 2.5 mm **3.0** 3.0 mm **4.0** 4.0 mm **125** 0.125 in **156** 0.156 in	**00** See Figure 1 **01** See Figure 2 **02** See Figure 3	**0** No mounting base **A** 4x M1.6 on 0.728" BC **C** 2x #2-56 on 0.75" BC **D** 3x #0-80 on 0.823" BC **E** 2x #2-56 0n 1.812" BC
	Special Order Consult Factory for Lead Time & Price	Special Order Consult Factory for Lead Time & Price		
	0256 **0300** **0360**	**1.5** 1.5 mm		

SERIES M9

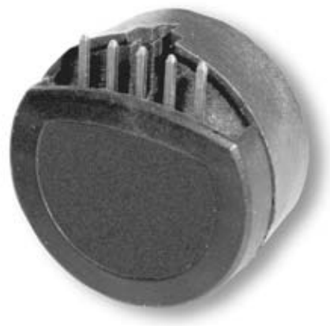
Dynapar™ brand

Miniature Encoder

SSM Servo Small Motor

Key Features

- **Super-Compact Modular Encoder for Small Servo and Stepper Motor Feedback**
- **Integrated ASIC for Enhanced Reliability and Accuracy**
- **Up to 512 PPR Resolution**
- **Ideal for Pick and Place Type Machines**



RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 100 to 512 PPR (Pulses/Revolution)
Phasing: 90° ±18° electrical
Symmetry: 180° ±18° electrical
Index Pulse Width: 90° ±36° electrical

ELECTRICAL

Supply Voltage: 5 VDC ±10%
Supply Current: 10 mA, typ.
Output Signals: 2.5 V min. high (V_{OH}); 0.5 V max. low (V_{OL}). 6 mA sink/source (25°C), 4 mA (100°C)
Frequency Response: 200 kHz
Termination: 5 pin header (accessory 12" wires w/connector, part no. CA0050012) or flying leads
Recommended Mating Connector: AMP part number 103675-4

MECHANICAL

Hub Diameter: 1.5, 2.0, 2.5, 3.0, 4.0 mm; 0.125, 0.156 inch
Mounting Configuration: Modular Hollow Bore Mount
Hub Dia. Tolerance: +0.0004"/-0.0000" (+0.010 mm/-0.000 mm)
Mating Shaft Length: See table (page 2)
Mating Shaft Runout: 0.001 TIR
Mating Shaft Endplay: >256 ppr: ±0.003" (±0.076mm); 250, 256 ppr: +0.005/-0.003" (+0.127/-0.076mm); <250 ppr: +0.007/-0.003" (+0.178/-0.076mm)
Moment of Inertia: 0.15 x 10^{-5} oz-in-sec^2 (0.11 gm-cm^2)
Housing and Cover: Plastic
Weight: 0.15 oz (4.14 g)

ENVIRONMENTAL

Operating Temperature: -20° to 100°C
Storage Temperature: -50° to 125°C
Humidity: Up to 90% (non-condensing)

OUTPUT WAVEFORMS & CONNECTIONS

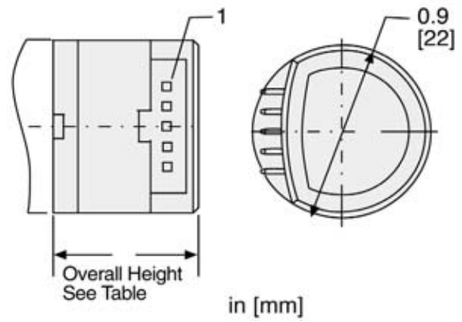
PIN	FUNCTION	CABLE WIRE
1	GND	BLACK
2	CH Z	BLUE
3	CH A	WHITE
4	Vcc	RED
5	CH B	BROWN

(Direction CCW viewing encoder cover)

by DYNAPAR™

SERIES M9

DIMENSIONS/INSTALLATION



in [mm]

IMPORTANT: To properly install Series M9, a specialized mounting kit must be purchased. Only one kit is required to install any number of encoders with the same hub bore size.

Kit Part Number:

MK M9 □ □ □ — *Code 4 (from Models Table, above) designating Hub Bore requirement.*

Example: Kit for installing encoders with 3.0 mm hub Bore= ***MK M9 3.0***

Base (Code 3)	Overall Height inch (MM)	Motor Shaft Length inch (MM) Max.	Motor Shaft Length inch (MM) Min
A	0.583 (14.80)	0.437 (11.10)	0.377 (9.57)
C, D, E	0.717 (18.20)	0.571 (14.50)	0.511 (12.97)

Bases C and D provide clearance for motor-bosses with maximum dimensions of 0.5 in, Dia. x 0.15 in. high. Base E provides clearance for motor-bosses with maximum dimensions of 1.0 in. x 0.15 in. high

ORDERING INFORMATION

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

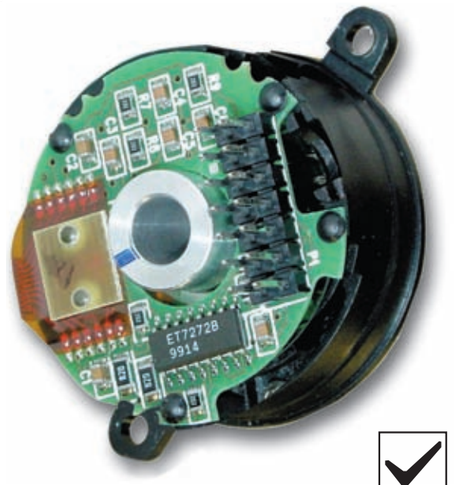
Code 1: Model	Code 2: PPR	Code 3: Mounting Description	Code 4: Hub Bore Description	Code 5: Termination Description
M9 □□□□/0 □			□□□	□
Ordering Information				
M9 0.9" Diameter Incremental Modular Encoder	**0100/0** **0200/0** **0256/0** **0500/0** **0512/0** Special Order Consult Factory for Lead Time & Price **0300/0** **0360/0**	**0** No mounting base **A** 4x M1.6 on 0.728" BC, **C** 2x #2-56 on 0.75" BC **D** 3x #0-80 on 0.823" BC **E** 2x #2-56 0n 1.812" BC	**2.0** 2.0 mm **2.5** 2.5 mm **3.0** 3.0 mm **4.0** 4.0 mm **125** 0.125 in **156** 0.156 in Special Order Consult Factory for Lead Time & Price **1.5** 1.5 mm	**1** 5 pin header **2** flying leads

SERIES M15

Dynapar™ brand

For Stepper & Small Servo Motors

SSM Servo Small Motor



RoHS

Key Features

- **Modular Encoder with Easy Installation Requiring No Special Gapping Tools or Parts**
- **Phased Array Sensor Technology Allowing .030” Axial Shaft Play**
- **Wide -20 to 120C Operating Temperature Range**

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: (pulses/revolution)
Incremental: 200 to 1024 PPR;
Commutation: 4, 6, or 8 pole
Accuracy:
Incremental: ±5 arc-mins. max. edge to edge;
Commutation: ±6 arc-mins. max.
Sense: (viewing encoder mounting surface)
Incremental: A leads B by 90° for CCW rotation of motor shaft;
Commutation: U leads V, V leads W by 120° for CW rotation of motor shaft
Phasing:
Incremental: 90° ±18° electrical
Commutation: 8 Pole: 30°; 6 Pole: 40°; 4 Pole: 60° mechanical
Index to U Channel: ±1° mechanical - Index center to U channel edge
Symmetry:
Incremental: 180° ±18° electrical
Commutation: 8 Pole: 45°; 6 Pole: 60°; 4 Pole: 90° mechanical
Index Pulse Width: 180° ±36° electrical (Gated with B low) standard

ELECTRICAL

Input Power Requirements:
Incremental: 5 or 12 VDC ±10% at 100 mA max. (excluding output load);
Incremental w/Commutation: 5 or 12 VDC ±10% at 120 mA max. (excluding output load)
Output Signals:
7272 Line Driver: 40 mA sink/source max.;
Open Collector w/2.0 kΩ pull-ups: 16 mA sink max.
Frequency Response: 200 kHz min.
Termination:
Connector: PCB mounted dual row head with 0.1” x 0.1” pin spacing, 10 pins (incremental only), 14 pins (w/commutation);
Cable: conductors - 28 AWG, stranded (7/36), insulation - black, PVC; Shield: aluminum/polyester foil plus tinned, copper drain wire (28 AWG, 7/36)
Noise Immunity: Conforms to EN50082-1 Light Industrial for Electro-Static Discharge, Radio Frequency Interference, Electrical Fast Transients, and Magnetic Fields (for models or applications with shielded cable)

MECHANICAL

Weight:
Connector: 0.8 oz. (23 gm) typ.
Connector w/cover: 1.0 oz. (28 gm) typ.
Cable: 1.3 oz (37 gm) typ.
Cable w/cover: 1.5 oz. (43 gm) typ.
Dimensions:
Outside Diameter: 1.60” (40.7 mm) max. w/cover, 1.50” (38.2 mm) max. without cover;
Height: 1.27” (32.3 mm) max. (w/cover, excluding connector);
Emitter to Detector Gap: 0.070” (1.8 mm) min.
Material:
Base, Housing, & Cover: high temperature, glass filled polymer;
Hub: Aluminum; Disk: 0.030” thick glass
Finish:
Base & Housing: black;
Cover: RAL 7010 (dark grey)
Moment of Inertia: 3.40 x 10^{-5} in-oz sec.^{2} (2.4 gm-cm^2)
Hub Diameters: 1/8”, 1/4”, 3/8”, 3/16”, 6 mm, 8 mm, 10 mm nominal
Hub Dia. Tolerance: +0.001”/-0.000” (+0.026 mm/-0.000 mm)
Mating Shaft Length: 0.45” (12 mm) min.; 0.85” (22 mm) max. inside cover
Mating Shaft Runout: 0.002” (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Endplay: +0.015”/-0.015” (+0.38 mm/-0.38 mm) nominal (“+” indicates away from mounting face)
Mounting:
Base: (2) #4-40 (M2.5) #1 Phillips fillister head cap screw on 1.812” (46 mm) B.C., or (2) #2-56 (M2.0) hex socket cap screw on 1.28” (32.5 mm) B.C.; 0.01” (0.254 mm) true position to shaft.
Shaft: split hub w/collar clamp, #2-56 hex socket cap screw (5/64” hex wrench included)
Electrical/Mechanical Alignment Range: ±15° mechanical
Acceleration: 100,000 rad/sec.^{2} max.
Velocity: 12,000 RPM max.

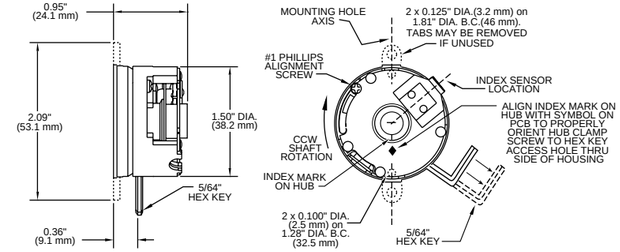
ENVIRONMENTAL

Operating Temperature: 0° to 120°C
Storage Temperature: -40° to 85°C
Shock: 50 G’s for 11 msec duration
Vibration: 2.5 G’s at 5 to 2000 Hz
Relative Humidity: 90% non-condensing
Enclosure Rating: NEMA 1 / IP40 dirt-tight (for models with cover)

by DYNAPAR™

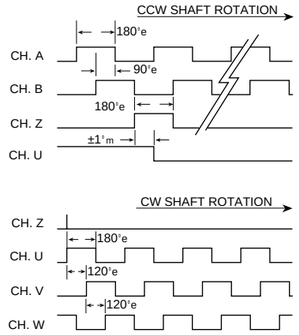
SERIES M15

Dimensions/Installation



Installation Instructions:
Incremental only models: Drawing #200638-0001
Commutation models: Drawing #200638-0002

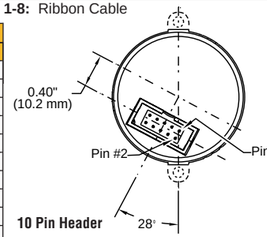
Output Waveforms (For clarity, compliments are not shown.)

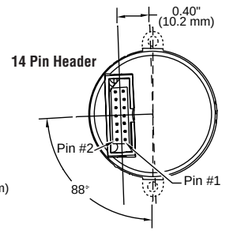


Code 6: Terminations (Not all signals present on all models)

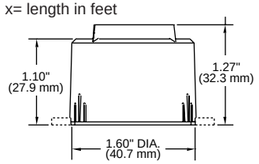
0: Pin Header **1-8:** Ribbon Cable **A-H:** Shielded Cable

Pin	10 Pin O.C.	10 Pin L.D.	14 Pin
1	A	—	Vcc
2	Vcc	Vcc	U
3	GND	GND	U’
4	—	—	V
5	—	A’	V’
6	—	A	W
7	—	B’	W’
8	B	B	A’
9	—	Z’	A
10	Z	Z	B
11	—	—	B’
12	—	—	Z
13	—	—	GND
14	—	—	Z’

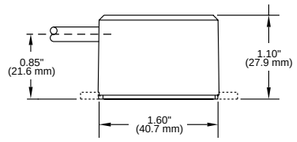


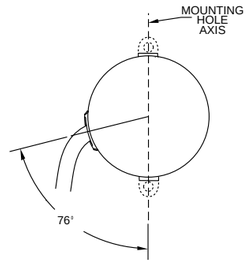


Mating Cable Assembly:
10 pin, 109524-000x
14 pin, 110527-000x
x= length in feet



Function	Wire Color Incr. Only	Wire Color Incr. & Comm.
Vcc com	—	RED/WHT
Vcc Inc	RED	RED
GND Inc	BLK	BLK
GND com	—	BLK/WHT
A’	RED/BLK	BLU/BLK
A	GRN	BLU
B’	WHT/BLK	GRN/BLK
B	ORN	GRN
Z’	BLU	VIO/BLK
Z	WHT	VIO
U’	—	BRN/BLK
U	—	BRN
V’	—	GRY/BLK
V	—	GRY
W’	—	WHT/BLK
W	—	WHT





Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Cover	Code 4: Electrical	Code 5: Hub	Code 6: Termination
M15	□□□□/□	□	□	□	□

Ordering Information

M15 Size 15 Commutating Modular

Code 2:
Incremental channels only
0200/0 **1000/0**
0400/0 **1024/0**
0500/0
Incremental plus Commutation channels
0500/6 **1024/4**
1000/4 **1024/6**
1000/6 **1024/8**
1000/8

Code 3:
0 No cover
1 Enclosed, end-of-shaft mount
2 Through shaft

Code 4:
0 5V in, open collector out incremental only
1 12V in, open collector out incremental only
3 5V in, line driver out incremental only
Available when Code 2 is XXXX/4, XXXX/6, or XXXX/8
6 5V in, line driver out incr.; 5V in, open collector out comm.
7 5V in, line driver out incr.; 12V in, open collector out comm.
9 5V in, line driver out incr.; 5V in, line driver out comm.

Code 5:
0 1/4 in.
1 3/8 in.
4 6 mm
5 8 mm
6 10 mm
8 3/16 in.
9 1/8 in.

Code 6:
Available when Code 4= 0,1,3,6 or 9
0 Pin Header
1-8 Mating ribbon cable included; 1=1 ft., 2=2 ft., etc.
Available when Code 4= 0 – 9
A-H Shielded cable; A=1 ft., B=2 ft., etc.

SERIES M53

Dynapar™ brand

For Stepper & Small Servo Motors

SSM Servo Small Motor

Key Features

- 2.0” Diameter Modular Encoder with Easy Installation Requiring No Special Gapping Tools or Parts
- Phased Array Sensor Technology Allowing .020” Axial Shaft Play
- Up to 2048 PPR with Commutation Tracks

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: (pulses/revolution)
Incremental: 500 to 2048 PPR
Commutation: 4, 6 or 8 pole
Accuracy:
Incremental: ±5 arc-mins. max. edge to edge;
Sense: (viewing encoder mounting surface)
Incremental: A leads B by 90° for CCW rotation of motor shaft;
Commutation: U leads V, V leads W by 120° for CW rotation of motor shaft
Phasing:
Incremental: 90° ±18° electrical
Commutation: 8 Pole: 30°; 6 Pole: 40°; 4 Pole: 60° mechanical
Index to U Channel: ±1° mechanical - Index center to U channel edge
Symmetry:
Incremental: 180° ±18° electrical
Commutation: 8 Pole: 45°;
6 Pole: 60°; 4 Pole: 90° mechanical
Index Pulse Width: 90° ±36° electrical (Gated with A high and B low)

ELECTRICAL

Input Power Requirements:
Incremental: 5 VDC or 12 VDC ±10% at 100 mA max. (excluding output load);
Commutation: 5 VDC or 12 VDC ±10% at 75 mA max. (excluding output load)

ELECTRICAL (CONT.)

Output Signals:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
Frequency Response: 200 kHz min.
Termination:
Connector: PCB mounted dual row head with 0.1” x 0.1” pin spacing, 10 pins (incremental only), 16 pins (w/commutation);
Cable: conductors - 28 AWG, stranded (7/36), insulation - black, PVC; Shield: aluminum/polyester foil plus tinned, copper drain wire (28 AWG, 7/36)

MECHANICAL

Dimensions:
Outside Diameter: 2.1” (53 mm) max. w/cover, 2.0” (51 mm) max. without cover; Height: 0.8” (20.3 mm) (w/cover, excluding connector);
Emitter to Detector Gap: 0.070” (1.8 mm) min.
Hub Diameters: 1/4”, 3/8”, 7/16”, 1/2”, 6 mm, 8 mm, 10 mm, 12 mm nominal
Mounting Configuration:
Base: (2) #4-40 (M2.5) #1 Phillips fillister head cap screw on 1.812” (46 mm) B.C., 0.01” (0.254 mm) true position to shaft; Shaft: split hub w/collar clamp, #2-56 hex socket cap screw (5/64” hex wrench included)
Hub Dia. Tolerance: +0.001”/-0.000” (+0.026 mm/-0.000 mm)
Mating Shaft Length: 0.45” (12 mm) min. blind hub clamp screw, 0.65” (16.5 mm) exposed hub clamp screw; 0.75” (19 mm) max. inside cover

Mating Shaft Runout: 0.002” (0.05 mm) max. (Includes shaft perpendicularity to mounting surface)
Mating Shaft Endplay: +0.011”/-0.008” (+0.30 mm/-0.21 mm) nominal (“+” indicates away from mounting face)
Electrical/Mechanical Alignment Range: ±15° mechanical
Acceleration: 100,000 rad/sec.^{2} max.
Velocity: 12,000 RPM max.
Moment of Inertia: 6.64 x 10^{-5} in-oz sec.^{2} (4.7 gm-cm^2)
Material:
Base, Housing, & Cover: high temperature, glass filled polymer;
Hub: Aluminum; Disk: 0.030” thick glass
Finish:
Base & Housing: black;
Cover: RAL 7010 (dark grey)
Weight:
Connector: 1 oz. (28 gm) typ.
Connector w/cover: 1.5 oz. (43 gm) typ.
Cable: 2.5 oz (71 gm) typ.
Cable w/cover: 3 oz. (85 gm) typ.

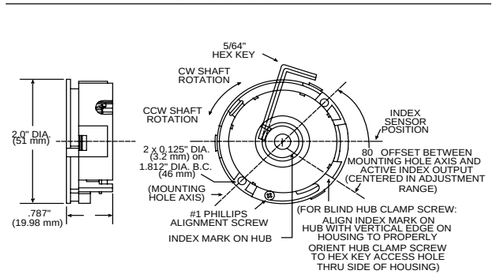
ENVIRONMENTAL

Operating Temperature: 0° to 120°C
Storage Temperature: -40° to 85°C
Shock: 50 G’s for 11 msec duration
Vibration: 2.5 G’s at 5 to 2000 Hz
Relative Humidity: Up to 90% (non-condensing)
Enclosure Rating: NEMA 1 / IP50 dirt-tight (for models with cover)

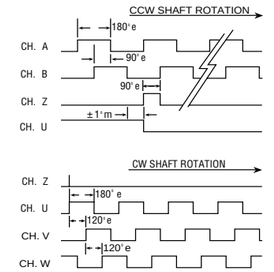
by DYNAPAR™

SERIES M53

Dimensions/Installation



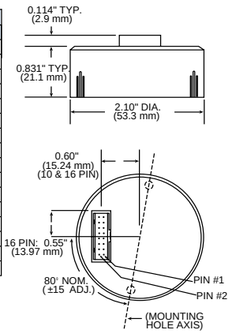
Output Waveforms (For clarity, compliments are not shown.)



Code 6: Terminations (Not all signals present on all models)

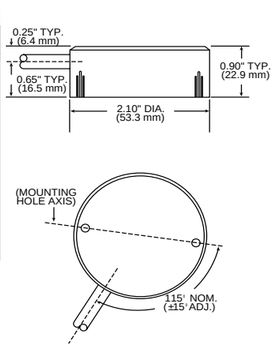
0: 16 Pin JST connector 1-8: Shielded Cable with JST connector

Pin	16 Pin
1	Vcc
2	U
3	GND
4	V
5	A
6	W
7	A'
8	NC
9	B
10	U'
11	B'
12	V'
13	Z
14	W'
15	Z'
16	NC



A-H: Shielded Cable

Function	Wire Color: Incr. Only	Wire Color: Incr. & Comm.
Vcc	RED	RED
GND	BLK	BLK
A	GRN	BLU
A'	RED/BLK	BLU/BLK
B	ORN	GRN
B'	WHT/BLK	GRN/BLK
Z	WHT	VIO
Z'	BLU	VIO/BLK
U	–	BRN
U'	–	BRN/BLK
V	–	GRY
V'	–	GRY/BLK
W	–	WHT
W'	–	WHT/BLK



Ordering Information

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

Code 1: Model	Code 2: PPR, Poles	Code 3: Cover	Code 4: Electrical	Code 5: Hub Bore	Code 6: Termination
M53	□□□□/□	□	□	□	□
Ordering Information					
M53 Size 20 Commutating Modular	Incremental channels only **0500/0** **1024/0** **1000/0** **2000/0** **2048/0** Incremental plus Commutation channels **0500/4** **1024/4** **0500/6** **1024/6** **0500/8** **1024/8** **1000/4** **2000/4** **1000/6** **2000/6** **1000/8** **2000/8** **2048/4** **2048/6** **2048/8**	**0** No Cover **1** Radial Exit Cover (for Shielded Cable) **2** Axial Exit (for Shielded Cable with JST Connector)	**0** 5V in, open collector out incremental only **1** 12V in, open collector out incremental only **3** 5V in, line driver out incremental only **A** 12V in, 5V line driver out incremental only **B** 12V in,12V line driver out incremental only Available when Code 2 is XXXX/4, XXXX/6, or XXXX/8 **6** 5V in,line driver out incremental open collector out Comm **9** 5V in,line driver out incremental line driver out Comm **C** 12V in,5Vline driver out incremental,open collector **D** 12V in,12Vline driver out incremental,open collector **E** 12V in,5V line driver out incremental,5Vline driver out Comm out Comm out Comm **F** 12V in,12Vline driver out incremental,12Vline driver out Comm	Exposed hub clamp screw: **A** 1/4 in. **B** 3/8 in. **C** 7/16 in. **D** 1/2 in. **E** 6 mm **F** 8 mm **G** 10 mm **H** 12 mm	Available when Code 3 is 0 or 2: **0** JST connector **1-8** Shielded cable with connector; 1=1 ft., 2=2 ft., etc. Available when Code 3 is 0 or 1: **A-H** Shielded cable; A=1 ft., B=2 ft., etc.

SERIES M602 & M832

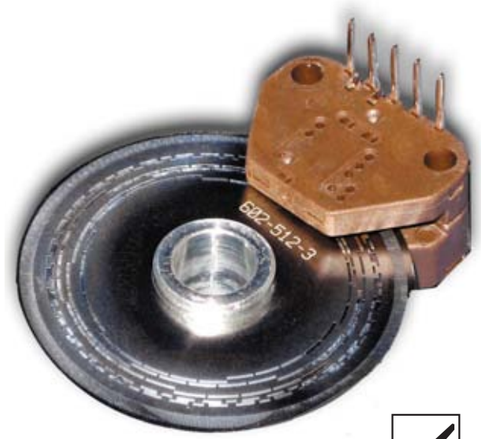
Dynapar™ brand

Kit Encoder

SSM
Servo Small Motor

Key Features

- Compact Size for Easy Integration
- Advanced Phased-Array Sensor Technology with Digital Output
- Available with Unbreakable Plastic or Stainless Code Discs



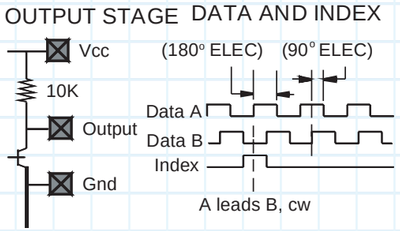
RoHS

SPECIFICATIONS

ELECTRICAL

Code: Incremental
Resolution: See ordering information for standard resolutions
Supply Voltage: 5Vdc + 10% at 60mA maximum
Output Format: Dual channel quadrature with index
Output Type: Square wave, TTL and CMOS compatible, 10mA sink
Frequency Response: 125 kHz (data and index)
Connector:
Molex Connector: P/N 50-57-9005
Molex Socket: P/N 16-02-0069
AMP Connector: P/N 87499-9
AMP Socket: P/N 87667-3

DIGITAL OUTPUT FORMAT



Reading from top as shown in picture.

MECHANICAL

Dimensions: See module outline dimensions
Bore Diameter: 1/4", 3/8", 6mm, 8mm, 10mm
Disc Interface
Runout: 0.005 inches TIR
Endplay: + 0.010 inches
Termination: .025 sqr. discrete pins
Optical Radius (data): 0.602 or 0.832 inches
Motor Interface
Mounting Holes: See recommended mounting
Materials
Module: Molded PPS 40% glass (R-4)
Pins: Gold Plated
Disc: Mylar or Etched Metal
Hub: Aluminum
Weight: <0.25 ounces

ENVIRONMENTAL CONDITIONS

Operating Temperature: -40° to 100°C (non-condensing)
Storage Temperature: -40° to 100°C
Enclosure: Unsealed housing

by DYNAPAR™ SERIES M602 & M832

ORDERING INFORMATION

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

Encoder Module (Rotary)

Digital
M 602 – 1000 – 3T – See Note *
1. 2. 3.

Code Disc and Hub

DH 602 – 1000 – 0 – 25
1. 2. 3. 4.

Code Disc Only (no Hub)

D 602 – 1000 – 0
1. 2. 3.

1. Optical Radius
   0.602 inches 602
   0.832 inches 832

2. Standard Resolutions
   Digital 602 Module
   Resolutions from 35 to 3600.
   See "Current Resolutions" list.
   Digital 832 Module
   Resolutions from 360 to 5000
   See "Current Resolutions" list.

3. Lead Positions
   Digital

Side Exit	Top Exit
ABZ 3S	ABZ 3T

1. Disc Outside Diameter
   1.30 inches 602
   1.75 832

2. Standard Resolutions
   See "Current Resolutions" list.

3. Commutation Tracks (Not Available)
   Default Option 0

4. Hub Bore Size*

1/4 inch	25	6mm	6M
3/8 inch	38	8mm	8M
		10mm	10M

*Consult factory for other sizes

Current Resolutions

M602 Digital Modules
1, 24, 25, 35, 40, 60, 100, 120, 192, 200, 240, 250, 256, 300, 360, 500, 512, 600, 625, 720, 1000*, 1024*
* Available as direct read or doubler
Doubler: 1000, 1024, 1200, 1250, 1440, 2500, 2540, 2600 3600

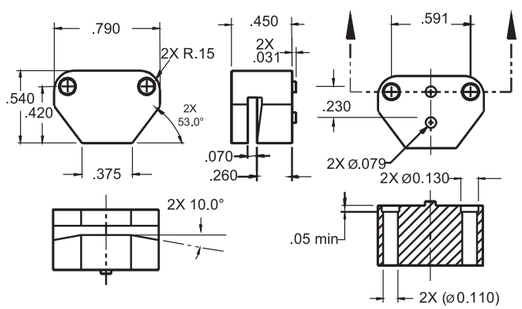
M832 Digital Modules
Direct Read: 360, 1000, 1024
Doubler: 2000, 2048, 3600, 4096, 5000

***NOTE: When ordering Modules with Index add a "G" to the end of the part number for GATED INDEX or "U" for UNGATED INDEX.**
***Note:* Gated Index only available on Doubler Modules.**
When ordering Modules in 1000 or 1024PPR to specify DOUBLER CIRCUIT add a "D" to the last digit.
Example: M602-1000-3T-UD

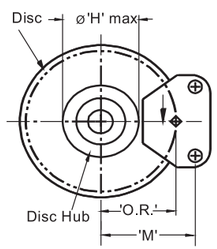
SERIES M602 & M832

Dynapar™ brand

Module Outline Dimensions



Module Interface



Module 602

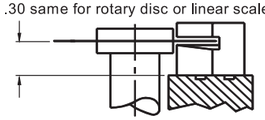
'O.R.' – Optical Radius .....0.602 in.
'M' – Mounting dimension ..0.756 in.
∅ 'H' – Hub Maximum O.D. ..061 in.

Module 832

'O.R. – Optical Radius .....0.832. in.
'M' – Mounting dimension...0.986 in.
∅ 'H' – Hub maximum O.D...1.07 in.

DISC MOUNTING

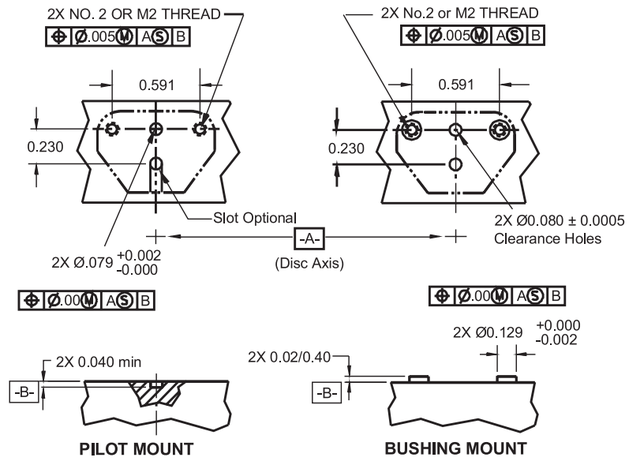
.30 same for rotary disc or linear scale



Pin Layouts

The Optical Encoder Modules come standard in either top mount or s mount with A,B, and Index Channels.

Recommended Mounting Configurations



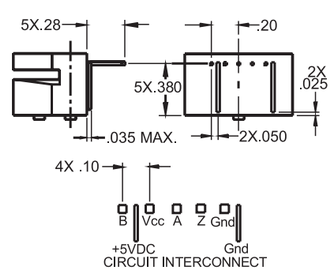
by DYNAPAR™ SERIES M602 & M832

Pin Layouts

The Optical Encoder Modules come standard in either top mount or s mount with A,B, and Index Channels.

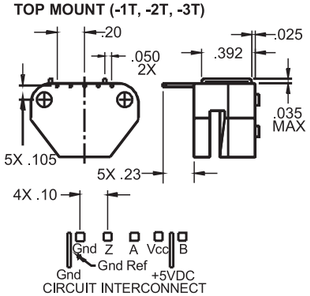
ABZ CONFIGURATION
5X .025 square pins

SIDE MOUNT (-1S,-2S,-3S)



CIRCUIT INTERCONNECT

TOP MOUNT (-1T, -2T, -3T)



CIRCUIT INTERCONNECT

Disc and Hub Dimensions

Module 602 Disc and Hub

∅'D' – Disc O.D. .....1.30 in.
∅ 'H' – Hub O.D. .....0.61 in.

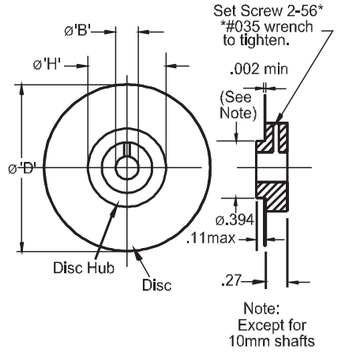
Module 832 Disc and Hub

∅'D' – Disc O.D. .....1.75 in.
∅ 'H' – Hub O.D. .....1.00 in.

Shaft Size	Hub Bore Sizes ∅'B' in. +.0005 +.0000	∅'B' mm +.013 -.000
1/4 in.	.2500	6.350
3/8 in.	.3750	9.525
6 mm	.2362	6.000
8 mm	.3150	8.000
10 mm	.3937	10.000

Disc only

.3942 I.D. x .002 min. thick



SERIES HDP18

NorthStar™ brand

Shaft-Less Encoder

HD Heavy Duty

Key Features

- No Shaft, Bearings, or Seals to Wear Out
- Eliminates Shaft Coupling Issues
- Completely Sealed & Encapsulated Electronics
- Wide Sensing Envelope is Tolerant to Misalignment
- Incremental or Absolute Output
- Incredibly Small Package
- LED Indicators Make Installation and Troubleshooting a Breeze

SPECIFICATIONS

MECHANICAL

Enclosure Diameter: 18mm

Enclosure Height: 47mm

Mounting: 18mm thread (standard prox thread)

Weight: 3.0 oz with mounting nuts and 6" flying lead cable

Speed: 3000 RPM max

ELECTRICAL

Input Power: 6vdc min to 30vdc max at 60mA max, not including output loads

Outputs: 7272 Push-Pull : 40mA sink or source

Electrical Protection: Overvoltage, Reverse Voltage, Output short Circuit protected

PWM Output: 10 bit Pulse Width Modulation output signal proportional to absolute position. 0 degrees =1 usec of 1025 usec period, 359.65 degrees = 1024 usec of 1025 usec period.

LED Indicators: Power, A, B, Z

ENVIRONMENTAL

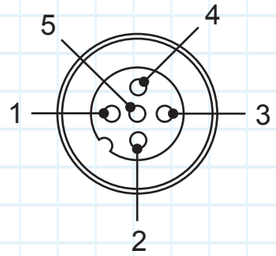
Operating Temperature: -25 to +80 degrees C (-13 to 176 degrees F)

Storage Temperature: -40 to +90 degrees C

Enclosure Rating: Connector dependent
– M12 on pigtail – IP68
– Cable with flying leads – IP68

CONNECTIONS

Function	5 Pin M12 On Cable	5 Conductor Cable	5 Conductor Cable
	Pin	Wire Color	Wire Color
+Vdc	1	BRN	BRN
Common	3	BLU	BLU
Data A	4	BLK	BLK
Data B	2	WHT	WHT
Data Z	5	GRY	GRY
PWM Absolute Posirion			PNK

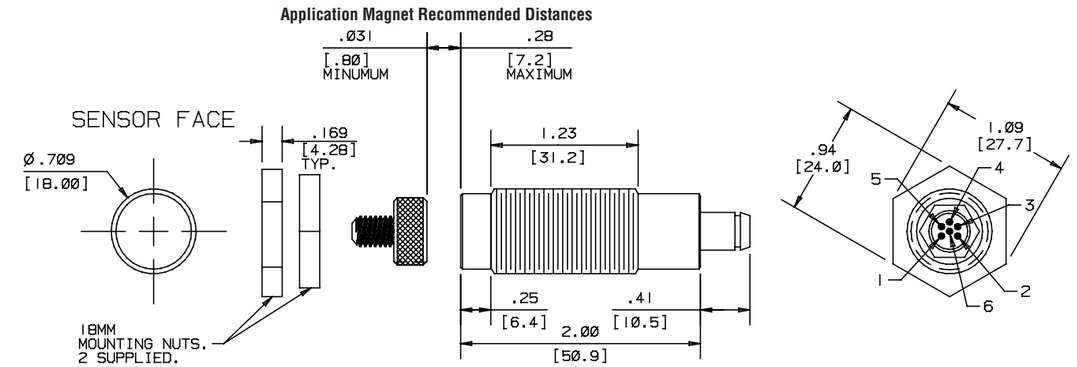


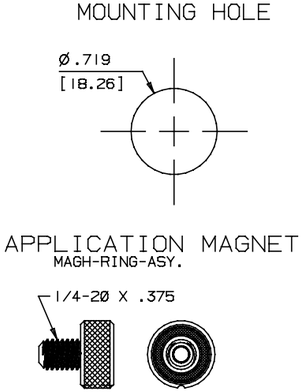
Male 5-pin M12

by DYNAPAR™

SERIES HDP18

DIMENSIONS inch [mm]





HDP18 TARGET MAGNETS

- Neodymium
- Distance from user magnet to face of encoder: 0.01 to 0.5 inches
- Center alignment: 0 to 0.10 inches
- Planar tilt: 30 degrees

Dual magnet, Nylon collar

1/4 Bolt Magnet with Knurl

NorthStar™ brand

SERIES HDP18

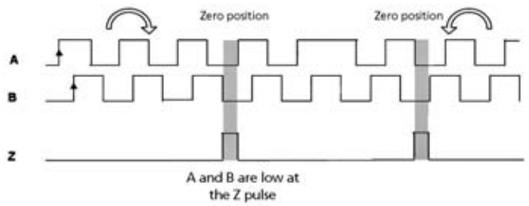
Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Connections	Code 5: Target Magnet
HDP18T	□□□□	□	□	□
Ordering Information				
HDP18T	**0256**	**0** Single Ended A,B,Z Push-pull (7272) Code 4 must = 7 **P** PWM 10-bit absolute output w/ Single ended A,B,Z Push-pull (7272)	**1** 5 pin M12 on pigtail **2** 5 conductor cable **7** 6 conductor cable	**0** No magnet, customer supplied **3** Dual magnet nylon collar, 1/2" bore **4** Dual magnet nylon collar, 3/4" bore **5** Dual magnet nylon collar, 1" bore **6** Dual magnet nylon collar, 1-1/2" bore **8** Dual magnet nylon collar, 5/8" bore **R** Ring magnet w/knurled alumnum bolt, 1/4-20

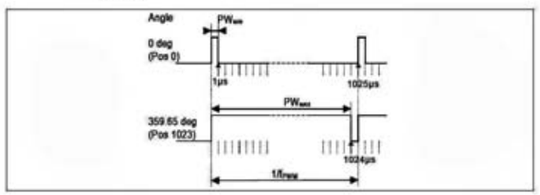
HDP18 OUTPUT FORMAT

18MM: QUADRATURE INCREMENTAL OUTPUT



PULSE WIDTH MODULATION (PWM) OUTPUT

$$Position = \frac{t_{on} \cdot 1025}{(t_{on} + t_{off})} - 1$$



INCREMENTAL ENCODERS

DYNAPAR™

Notes

SERIES HDP30

NorthStar™ brand

Shaft-Less Encoder

HD Heavy Duty

Key Features

- No Shaft, Bearings, or Seals to Wear Out
- Eliminates Shaft Coupling Issues
- Completely Sealed & Encapsulated Electronics
- Wide Sensing Envelope is Tolerant to Misalignment
- Incredibly Small Package
- Standard Proximity Sensor Form Factor
- LED Indicators make Installation and Troubleshooting a Breeze
- CAN SAE J1939 Communication Protocol

CE RoHS

SPECIFICATIONS

MECHANICAL

Enclosure Diameter: 30mm

Enclosure Height: 31mm, 50mm with M12 connector

Mounting: 30mm thread (standard prox thread)

Weight: 1.0 oz without mounting nuts, 2.2 oz with typical mounting nuts

Speed: 3000 RPM max

ELECTRICAL

Input Power: 6vdc min to 30vdc max at 60mA max, not including output loads

Outputs: 7272 Push-Pull : 40mA sink or source

Electrical Protection: Overvoltage, Reverse Voltage, Output short Circuit protected

LED Indicators: Power, A, B, Z

ENVIRONMENTAL

Operating Temperature: -25 to +80 degrees C (-13 to 176 degrees F)

Storage Temperature: -40 to +90 degrees C

Enclosure Rating: Connector dependent
– M12 on pigtail – IP68
– Cable with flying leads – IP68

CONNECTIONS, Quadrature Output

Pin Designation	5-Pin M12	5 Conductor Cable	8-Pin M12	8 Conductor Cable
	Pin	Wire Color	Pin	Wire Color
+Vdc	1	BRN	2	BRN
Common	3	BLU	7	BLU
Data A	4	BLK	1	WHT
Data B	2	WHT	4	GRN
Data Z	5	GRY	6	GRY
Data A'			3	YLW
Data B'			5	RED
Data Z'			8	PNK

Proportional Analog Output

Pin Designation	Pin	Wire Color
+Vdc (VIN)	1	BRN
Dig. Limit Out *	2	WHT
Common/ Ground	3	BLU
Prop. VDC Output	4	BLK
Not Used	5	GRY

*Option, Consult Factory

J1939 Encoder

Pin Designation	Pin	Wire Color
+Vdc (VIN)	1	BRN
CAN High	2	WHT
Common/Ground	3	BLU
CAN Low	4	BLK
Optional Address Program Resistor	5	GRY

by DYNAPAR™

SERIES HDP30

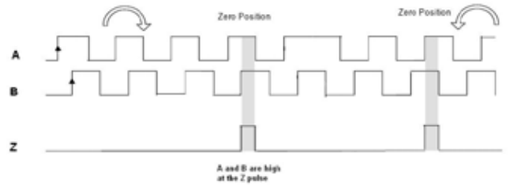
Ordering Information

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

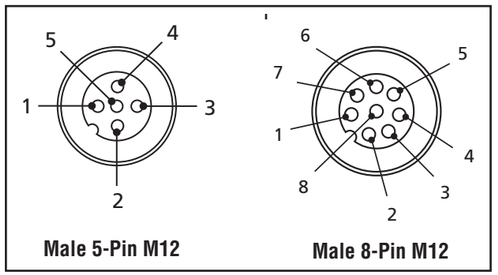
Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Connections	Code 5: Target Magnet
HDP30T	□□□□	□	□	□
Ordering Information				
HDP30T	0008 0010 0016 0020 0025 0032 0040 0050 0064 0080 0100 0125 0128 0200 0250 0256 0400 0500 0512 Code 3 Must be J or P ABSO Other resolutions available. Contact factory for details.	0 Single Ended A,B,Z Push-pull (7272) (Code 4 must = 0,1, or 2) 1 Differential line Driver A,B,Z (7272) (Code 4 must = 4, 5, or 6) Code 2 Must be ABSO and Code 4 must be 0 to 2 J CAN SAE J1939 P PWM 10-bit absolute output w/Single Ended A,B,Z Push-Pull (7272)	0 5 pin M12 1 5 pin M12 on pigtail 2 5 conductor cable 4 8 pin M12 5 8 pin M12 on pigtail 6 8 conductor cable	0 No magnet, customer supplied 3 Dual magnet nylon collar, 1/2" bore 4 Dual magnet nylon collar, 3/4" bore 5 Dual magnet nylon collar, 1" bore 6 Dual magnet nylon collar, 1-1/2" bore 8 Dual magnet nylon collar, 5/8" bore R Ring magnet w/knurled alumnum bolt, 1/4-20

HDP30 OUTPUT FORMAT

30MM: QUADRATURE INCREMENTAL OUTPUT



CONNECTOR DETAIL



HDP30 TARGET MAGNETS

- Neodymium
- Distance from user magnet to face of encoder: 0.01 to 0.5 inches
- Center alignment: 0 to 0.10 inches
- Planar tilt: 30 degrees

Dual magnet, Nylon collar

1/4 Bolt Magnet with Knurl

SERIES HDN58

NorthStar™ brand

Shaft-Less Encoder

HD Heavy Duty

Key Features

- No Shaft, Bearings, or Seals to Wear Out
- Eliminates Shaft Coupling Issues
- Completely Sealed & Encapsulated Electronics
- Wide Sensing Envelope is Tolerant to Misalignment
- Incremental or Absolute Output

SPECIFICATIONS

MECHANICAL

Enclosure Diameter: 58mm

Max. Speed: 3000 RPM

ELECTRICAL

Input Power: 6vdc min to 30vdc max at 60mA max, not including output loads

Outputs: 7272 Push-Pull : 40mA sink or source

Output Resolution: 8 to 2048 quadrature pulses per revolution (13 bit)

Electrical Protection: Reverse polarity, Spike, Noise, Open circuit, Short circuit

Electrical Connections: 5-pin terminal strip, 5-pin M12, 8-pin M12, cable (see Connections)

LED Indicators: Power, Channel and Index

ENVIRONMENTAL

Operating Temperature: -25 to +70 degrees C (-13 to 158 degrees F)

Humidity: 100% relative humidity

Potting Compound: Non-porous, water and chemical resistant, RoHS compliant

Shock & Vibration: Meets MIL-STD-202

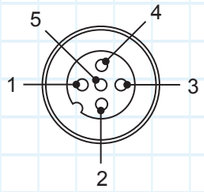
Shock— half sine, 50g, 11ms Thermal Shock— -40 to +125 degrees, one hour dwell

Vibration— 10 to 500hz at 10g

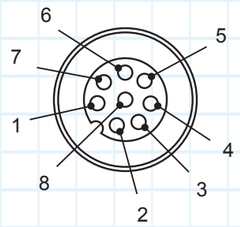
Enclosure Rating: Connector dependent IP65, IP67 or IP68

CONNECTIONS

Function	5 Pin Terminal Strip	5 Pin M12	5 Conductor Cable	8 Pin M12	8 Conductor Cable
	Pin	Pin	Wire Color	Pin	Wire Color
+Vdc	1	1	BRN	2	BRN
Common	2	3	BLU	7	BLU
Data A	3	4	BLK	1	WHT
Data B	4	2	WHT	4	GRN
Data Z	5	5	GRY	6	GRY
Data $\overline{A}$				3	YLW
Data $\overline{B}$				5	RED
Data $\overline{Z}$				8	PNK



Male 5-Pin M12



Male 8-Pin M12

by DYNAPAR™

SERIES HDN58

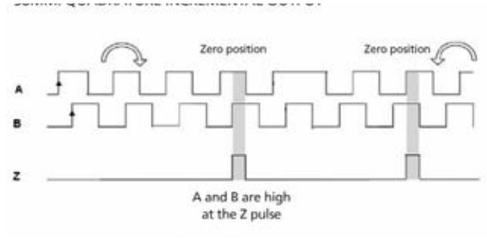
Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Connections	Code 5: Target Magnet
HDN58	□□□□	□	□	□
Ordering Information				
HDN58	0008 0050 0250 0010 0064 0256 0016 0080 0400 0020 0100 0500 0025 0125 0512 0032 0128 0040 0200 Code 3 Must be J ABSO Other resolutions available. Contact factory for details.	0 Single Ended A,B,Z Push-pull (7272) (Code 4 must = 0,1, or 2) 1 Differential line Driver A,B,Z (7272) (Code 4 must = 4, 5, or 6) Code 2 must =ABSO and code 4 must =3 2 13 bit-Absolute 0-5VDC Code 4 must = 0 and Code 2 must = ABSO J CANbus J1939 Protocol	0 5 pin M12 1 5 pin M12 on pigtail 2 5 conductor cable 4 8 pin M12 5 8 pin M12 on pigtail 6 8 conductor cable	0 No magnet, customer supplied 3 Dual magnet nylon collar, 1/2" bore 4 Dual magnet nylon collar, 3/4" bore 5 Dual magnet nylon collar, 1" bore 6 Dual magnet nylon collar, 1-1/2" bore 8 Dual magnet nylon collar, 5/8" bore R Ring magnet w/knurled alumnum bolt, 1/4-20

HDN58 OUTPUT FORMAT

18MM: QUADRATURE INCREMENTAL OUTPUT



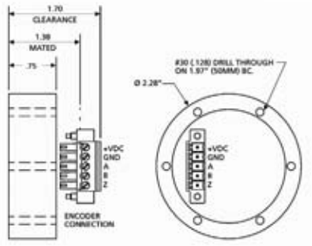
HDN58 TARGET MAGNETS

- Neodymium
- Distance from user magnet to face of encoder: 0.01 to 0.5 inches
- Center alignment: 0 to 0.10 inches
- Planar tilt: 30 degrees

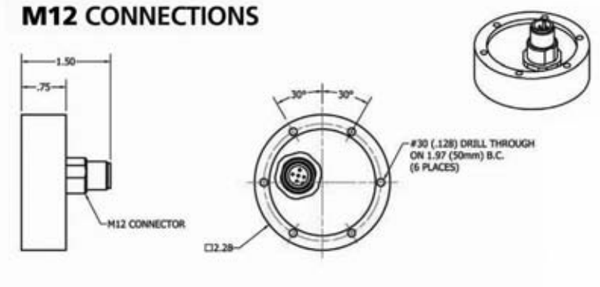
Dual magnet, Nylon collar

1/4 Bolt Magnet with Knurl

HDN58 DIMENSIONS



M12 CONNECTIONS



SERIES R45

Dynapar™ brand

Bearingless Ring Kit

HD Heavy Duty

Key Features

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

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Resolution: 60 PPR (pulses/revolution), optional 120 PPR with X2 output
Format: Single channel unidirectional (A), or two channel quadrature (AB) outputs
Phase Sense: A leads B for CW rotation of motor shaft
Quadrature Phasing: 90° ± 45° electrical
Symmetry: 180° ± 36° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

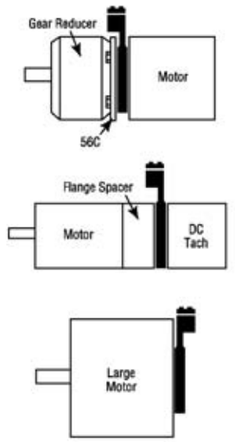
Input Power: (not including output loads)
Single ended 4.5 min. to 16.5 VDC max. at 50 mA max.;
Open collector and differential line driver: 4.5 min. to 26 VDC max. at 75 mA max.
Outputs:
Single ended with 2 kΩ pullup: 16.5 VDC max., 20 mA sink at 0.5 V max.;
Open Collector: 30 VDC max., 40 mA sink max.;
7272 Differential Line Driver: 40 mA sink or source
Frequency Response: 10 kHz min.
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Terminations:
Wire leads: 7” long min., 18 AWG;
Screw terminals: accept 22 to 14 AWG solid or stranded wires

MECHANICAL

Mounting Configuration: 4.5” C-Face Mount
Motor Frame Sizes: 56C, 143TC, 145TC, 182C and 184C
Bore Diameter: 5/8”, 7/8” nominal
Mating Shaft Length: 5/8” min.
Shaft Speed: 5,000 RPM max.
Allowable Endplay: ±0.060
Readhead to Gear Gap: 0.020” nominal, 0.030 max.
Gear: 1010 Steel
Moment of Inertia: 0.0035 in-lb-sec^2
Housing: Cast Aluminum, Anodized finish
Weight: 4.7 lbs

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: Up to 98% (non-condensing)



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 $\overline{A}$	WHT	6
Signal $\overline{B}$	GRN	7
Signal $\overline{X2}$	BLU	8

by DYNAPAR™

SERIES R45

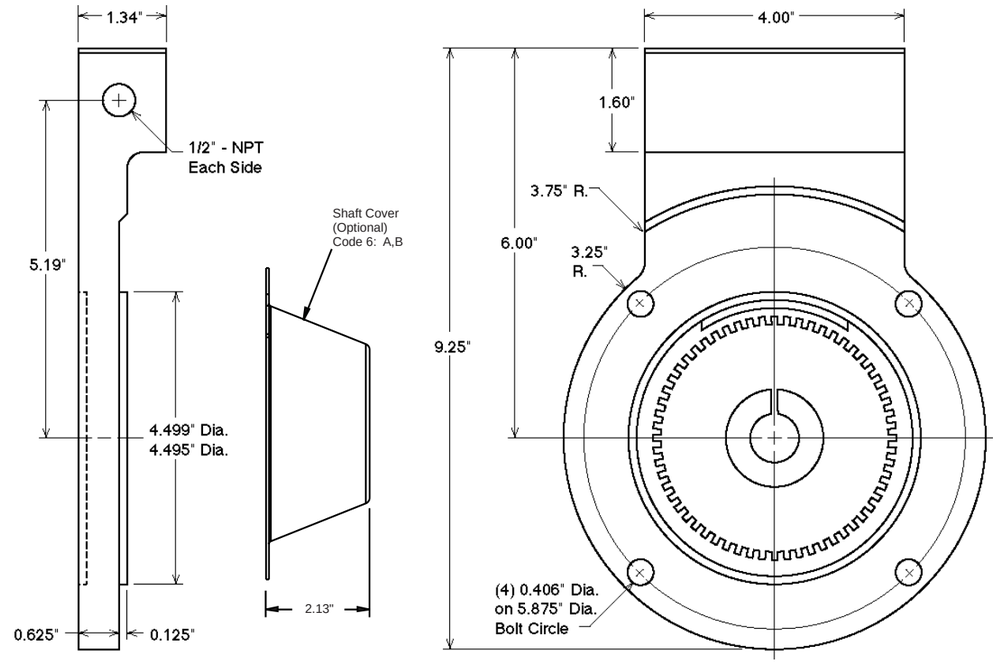
Ordering Information

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	□□□□	□	□	□	□
Ordering Information					
R45 Motor Mount Ring, for NEMA 4-1/2” C-Face Motors **R00** No Ring (gear or readhead only)	**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, wtih protective cover
112122-0001 R45 protective shaft cover accessory					

Example Model number: 5/8” bore, gear only = R00 0060 1000

DIMENSIONS



SLIM Tach ST56

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- Redesigned Using Our Revolutionary Sensor Technology to Provide a Large Air Gap of 0.060”
- Redesigned Circuitry for On-Board Diagnositcs with LED and Alarm Output
- Bearingless Design Mounts to 56 and 140 C-Face Motors
- Thin 3/4” Profile Saves Space and Can be “Sandwiched” Between Motor & Reducer
- Compact Height of 9.8” Designed with Options to Extend
- Anodized Aluminum Housing with Field-Serviceable Connector
- Single or Dual Isolated Outputs Available

CE
EN 61326-1
RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-2048 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 45°
Symmetry: 180° ± 54°
Index: Less than phase A/B pulse width
Number of Output Modules: Single or Dual

ELECTRICAL

Input Voltage Requirement: 5-26 Volts DC
Current Requirement: 95 mA typical per sensor module plus line driver load
Output Signals:
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Size: 5/8” to 2-7/8”
Mounting Configuration: 4.5” 56 C-Face Mount or 140 C-Face Mount for NEMA MG1 Standards
Max. Shaft Speed: 7,000 RPM
Shaft Length Required: 0.7” min
Allowable Shaft End-Play: +0.050”/-0.125”
Allowable Shaft Runout: 0.005” TIR
Acceleration Rate: 3,600 rpm/sec max
Housing Material: Aluminum
Weight: 3.6 lbs.

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +100°C
Extended: -40°C to +120°C
Storage Temperature Range: -40°C to +120°C
Shock: 300 G’s Min.
Vibration: 20 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#	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 (5-26 VDC)	6	Red	D	2
$\overline{B}$	7	Yellow	I	6
$\overline{A}$	8	Gray	H	4
$\overline{Z}$ *	9	Orange	J	8
Shield	10	Braid	G	—

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SLIM Tach ST56

Ordering Information

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

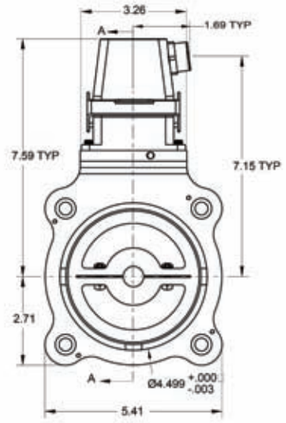
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Cover/Adapter
□□□	□□□□	□	□□□	□	□	□
Ordering Information						
ST5 Direct Motor Mounting on NEMA 56 flange (4.5”), Single Output **DT5** Direct Motor Mounting on NEMA 56 flange (4.5”), Dual Output	**0064** **0128** **0256** **0512** **1024** **2048**	**L** No Index **Z** Index	**C04** 0.625” **CB4** 16 mm **C05** 0.875” **C36** 24 mm **C06** 1.000” **C29** 25 mm **C07** 1.125” **C31** 30 mm **C08** 1.250” **CA4** 45 mm **C09** 1.375” **C58** 60 mm **C10** 1.500’ **C40** 80 mm **C11** 1.625” **C12** 1.750” **C13** 1.875” **C14** 2.000” **C15** 2.125” **C16** 2.250” **C17** 2.375” **C18** 2.500” **C20** 2.625” **C19** 2.875”	**B** Conduit Box **C** Latching Industrial Connector with 1/2” NPT **D** 1” Extended Height Latching Industrial Connector with 1/2” NPT **E** 3” Extended Height Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **G** 1” Extended Height Latching Industrial Connector **H** 3” Extended Height Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **N** 10 Pin MS 3112 Connector **P** 18” Pigtail Cable (25” when Code 6 = H) **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-26V in, 5V out Line Driver (IC-WE) **H** Same as V but with High Temperature, Extended Operating Range to 120°C	**CC** Plastic Cover **EE** Extra Heavy Duty Steel Cover **FF** Flat Thru-Hole Cover **TT** Flat No Hole Cover

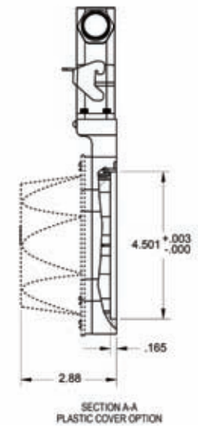
NOTES:
1) For additional bore sizes up to 3.75” maximum, please consult the factory.
2) Please consult factory for more information on Split Unit Designs.
3) See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels.

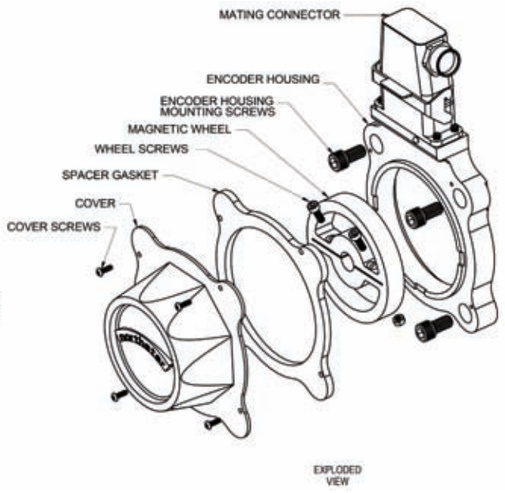
SL56 LEGACY MODELS

Dynapar’s legacy SL56 product line is still available for configurations not currently available in the ST56 product line.

DIMENSIONS inches







Slim Tach SL56

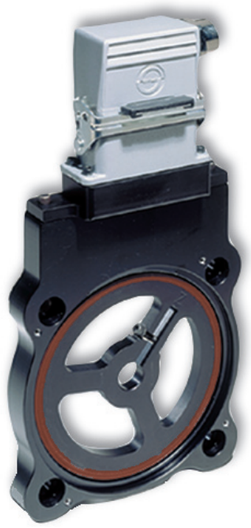
NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

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**
- **New Model Available with Larger Air Gap and Diagnostic LED. See ST56**



CE
EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-1024 PPR
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

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:
IC-WE Differential Line Driver: 150mA, sink or source
4428 Differential Line Driver: 150mA, sink or source

ELECTRICAL (CONT.)

Frequency Response: 0 - 120kHz Data & Index. Please refer to our performance curve diagram for frequency and temperature details**
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

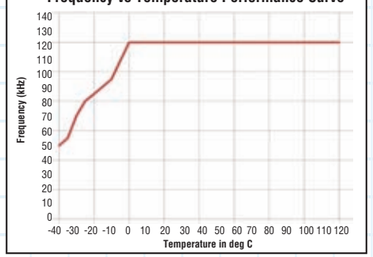
MECHANICAL

Bore Size: 5/8" to 3.75"
Mounting Configuration: 4.5" 56C-Face or 140 C-Face Mount for NEMA MG1 Standards
Max. Shaft Speed: 5,000 RPM
Shaft Length Required: 0.7" min
Allowable Shaft End-Play: ± 0.045"
Allowable Shaft Runout: 0.002" TIR
Acceleration Rate: 12,000 rpm/sec max
Housing Material: Cast Aluminum
Weight: 7 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +90°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

**Frequency vs Temperature Performance Curve



ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#	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 (5-15 VDC)	6	Red	D	2
$\overline{B}$	7	Yellow	I	6
$\overline{A}$	8	Gray	H	4
$\overline{Z}$ *	9	Orange	J	8
Shield	10	Braid	G	—

* Index (Z) optional. See Ordering Information

by DYNAPAR™

Slim Tach SL56

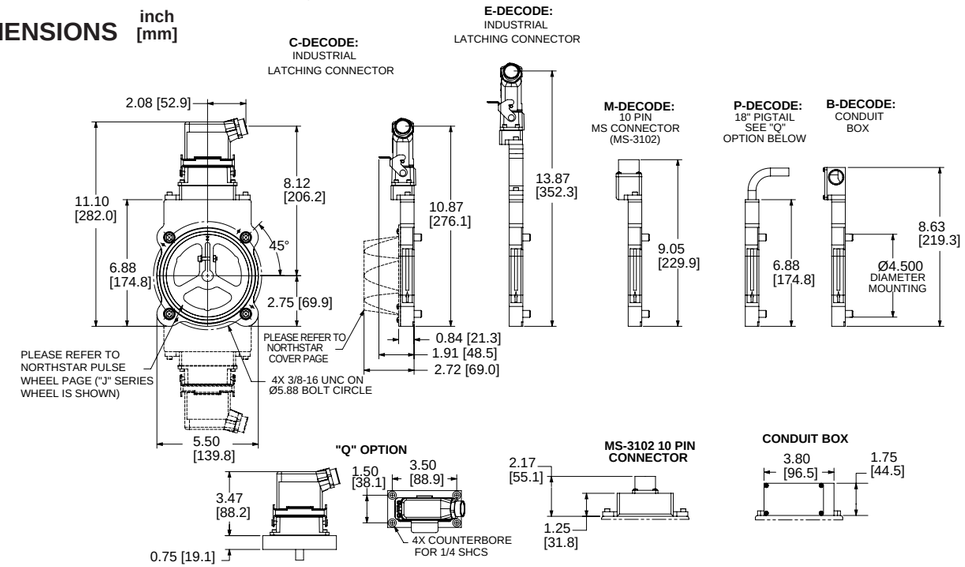
Ordering Information

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
□5	□□□□	□	□□□	□	□	□
Ordering Information						
S5 Motor Mount Ring, for 4 1/2" C-Face Motors (56C) Single Output **D5** Motor Mount Ring, for 4 1/2" C-Face Motors (56C) Dual Output	**0064** **0128** **0256** **0512** **1024**	**L** No Index Available when Code 2 is 0512, 1024 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8" **J05** 7/8" **J06** 1.00" **J07** 1-1/8" **K09** 1-3/8" **K10** 1-1/2" **K11** 1-5/8" **K12** 1-3/4" **K13** 1-7/8" **K14** 2.00" **K15** 2-1/8" **K16** 2-1/4" **K17** 2-3/8" **K18** 2-1/2" **K19** 2-7/8" For additional bore sizes up to 3.75" maximum, please consult factory.	**B** Conduit Box **C** Latching Industrial Connector with 1/2" NPT **E** 3" Extended Height Latching Industrial Connector with 1/2" NPT **F** Latching Industrial Connector without Mating Connector **H** 3" Extended Height Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **P** 18" Pigtail Cable **Q** Latching Industrial Connector on 18" Pigtail Cable **R** Latching Industrial Connector on 18" Pigtail Cable without Mating Connector	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 100°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, $\overline{A}$, B, $\overline{B}$)	**C** Standard Cover **E** Extra heavy duty steel cover **F** Flat Thru-hole cover **S** Double 56 C-Face Sandwich Adapter **T** Flat No Hole Cover

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

DIMENSIONS inch [mm]



SLIM Tach ST67

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- Redesigned using our Revolutionary Sensor Technology to provide a Large Air Gap of 0.060”
- Redesigned Circuitry for On-Board Diagnostics with LED and Alarm Output
- Bearingless Design Mounts to Reliance 6.75” Recess, 56 and 140 C-Face Motors
- Anodized Aluminum Housing with Field-Serviceable Connector

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-2048 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 45°
Symmetry: 180° ± 54°
Index: Less than phase A/B pulse width
Number of Output Modules: Single or Dual

ELECTRICAL

Input Voltage Requirement: 5-26 Volts DC
Current Requirement: 95 mA typical per sensor module plus line driver load
Output Signals:
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Sizes: 5/8” to 2-7/8”
Mounting Configuration: 4.5” 56 C-Face or 140 C-Face Mount for NEMA MG1 Standards
Max. Shaft Speed: 7,000 RPM
Shaft Length Required: 0.7” min
Allowable Shaft End-Play: ± 0.1”
Allowable Shaft Runout: 0.005” TIR
Acceleration Rate: 3,600 rpm/sec max
Housing Material: Aluminum
Weight: 4 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +100°C
Extended: -40°C to +120°C
Storage Temperature Range: -40°C to +120°C
Shock: 300 G’s Min.
Vibration: 20 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

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 (5-26 VDC)	6	Red	D	2
$\overline{B}$	7	Yellow	I	6
$\overline{A}$	8	Gray	H	4
$\overline{Z}$ *	9	Orange	J	8
Shield	10	Braid	G	—

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SLIM Tach ST67

Ordering Information

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

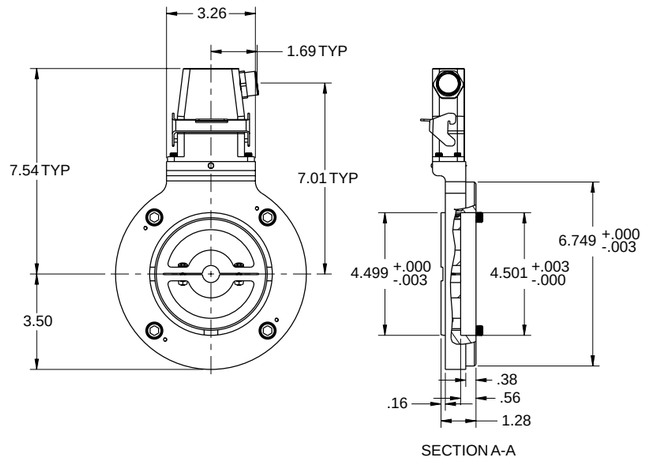
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Cover/Adapter
□□□	□□□□	□	□□□	□	□	□
Ordering Information						
ST6 Direct Motor Mounting on NEMA 56 flange (4.5”), or 6.75” pocket. Single output **DT6** Direct Motor Mounting on NEMA 56 flange (4.5”), or 6.75” pocket. Dual Output	**0064** **0128** **0256** **0512** **1024** **2048**	**L** No Index **Z** Index Signal	**C04** 0.625” **CB4** 16 mm **C05** 0.875” **C36** 24 mm **C06** 1.000” **C29** 25 mm **C07** 1.125” **C31** 30 mm **C08** 1.250” **CA4** 45 mm **C09** 1.375” **C58** 60 mm **C10** 1.500’ **C40** 80 mm **C11** 1.625” **C12** 1.750” **C13** 1.875” **C14** 2.000” **C15** 2.125” **C16** 2.250” **C17** 2.375” **C18** 2.500” **C20** 2.625” **C19** 2.875”	**B** Conduit Box **C** Latching Industrial Connector with 1/2” NPT **D** 1” Extended Height Latching Industrial Connector with 1/2” NPT **E** 3” Extended Height Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **G** 1” Extended Height Latching Industrial Connector without Mating Connector **H** 3” Extended Height Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **N** 10 Pin MS 3112 Connector **P** 18” Pigtail Cable (25” when Code 6 = H) **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-26V in, 5V out Line Driver (IC-WE) **H** Same as V but with High Temperature, Extended Operating Range to 120°C	**CC** Flat No-Hole Cover **EE** Extra Heavy Duty Steel Cover **FF** Flat Thru-Hole Cover

NOTES:
1) For additional bore sizes up to 3.75” maximum, please consult the factory.
2) Please consult factory for more information on Split Unit Designs.
3) See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels.

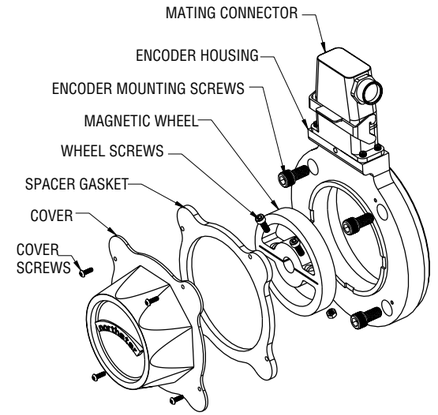
RL67 LEGACY MODELS

Dynapar’s legacy RL67 product line is still available for configurations not currently available in the ST67 product line.

DIMENSIONS inch



SECTION A-A



EXPLODED VIEW

SERIES RL67

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- **Designed for Reliance Motors (6.75” fit and 56 and 140 C-Face)**
- **Magneto-Resistive Technology Resists Dust, Dirt, Oil, Water and Other Contaminants**
- **Anodized Aluminum Housing With Field-Serviceable Connector**
- **New Model Available with Larger Air Gap and Diagnostic LED. See ST67**

CE EN 61326-1

RoHS

SPECIFICATIONS

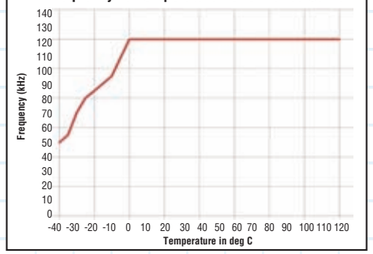
STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-1024 PPR
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

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:
4428 Differential Line Driver: 150mA, sink or source
IC-WE Differential Line Driver: 150mA, sink or source

**Frequency vs Temperature Performance Curve



ELECTRICAL (CONT.)

Frequency Response: 0 - 120kHz Data & Index. Please refer to our performance curve diagram for frequency and temperature details**
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

MECHANICAL

Bore Size: 5/8” to 3.75”
Mounting Configuration: 4.5” diameter, 56 C-Face, 140 C-Face Mount 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
Shaft Speed: 5,000 RPM
Shaft Length Required: 0.7” min
Allowable Shaft End-Play: ± 0.045”
Allowable Shaft Runout: 0.003” TIR
Acceleration Rate: 12,000 rpm/sec max
Housing Material: Cast Aluminum
Weight: 4 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +90°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

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
$\overline{B}$	7	Yellow	I
$\overline{A}$	8	Gray	H
$\overline{Z}$ *	9	Orange	J
Shield	10	Braid	G

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SERIES RL67

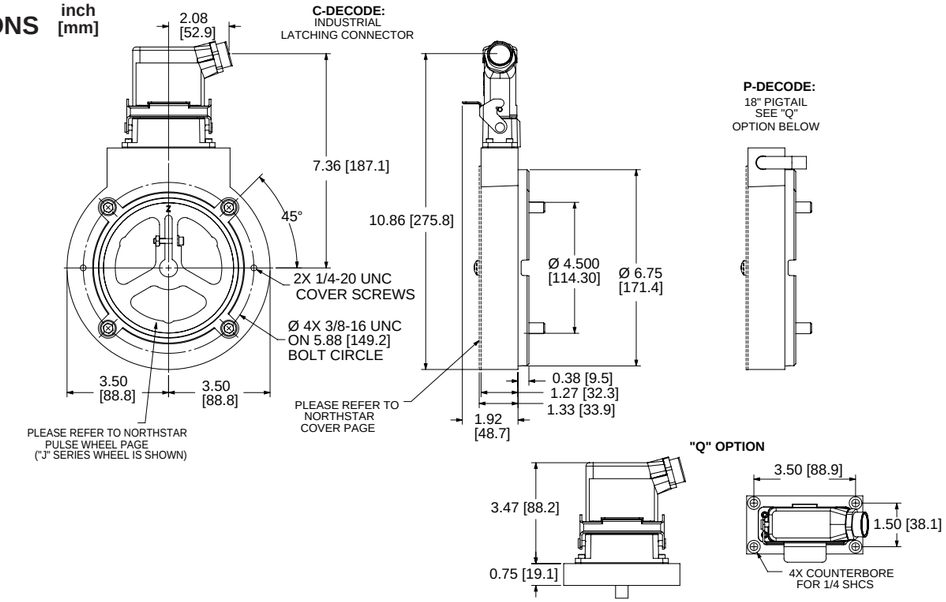
Ordering Information

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-Face Motors or Reliance Electric Style 6.75” Recess	**0064** **0128** **0256** **0512** **1024**	**L** No Index Available when Code 2 is 0512 or 1024 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8” **J05** 7/8” **J06** 1.00” **J07** 1-1/8” **K09** 1-3/8” **K10** 1-1/2” **K11** 1-5/8” **K12** 1-3/4” **K13** 1-7/8” **K14** 2.00” **K15** 2-1/8” **K16** 2-1/4” **K17** 2-3/8” **K18** 2-1/2” **K19** 2-7/8” For additional bore sizes up to 3.75” maximum, please consult factory.	**C** Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **P** 18” Pigtail Cable **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 100°C **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals ($\overline{A}$, $\overline{A}$, $\overline{B}$, $\overline{B}$)	**C** Standard cover **F** Flat Thru-hole cover

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

DIMENSIONS inch [mm]



SLIM Tach ST85

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- Redesigned using our Revolutionary Sensor Technology to provide a Large Air Gap of 0.060”
- Redesigned Circuitry for On-Board Diagnositcs with LED and Alarm Output
- Bearingless Design Mounts to 180 C-Face Motors
- Dual C-Face Versions Available for “Sandwich” Mounting
- Anodized Aluminum Housing with Field-Serviceable Connector
- Single or Dual Isolated Outputs Available

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-2048 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 45°
Symmetry: 180° ± 54°
Index: Less than phase A/B pulse width
Number of Output Modules: Single or Dual

ELECTRICAL

Input Voltage Requirement: 5-26 Volts DC
Current Requirement: 95 mA typical per sensor module plus line driver load
Output Signals:
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Size: 5/8” to 2-7/8”
Mounting Configuration: 8.5” 180 C-Face Mount for NEMA MG1 Standards
Max. Shaft Speed: 7,000 RPM
Shaft Length Required: 0.7” min
Allowable Shaft End-Play: ± 0.1”
Allowable Shaft Runout: 0.005” TIR
Acceleration Rate: 3,600 rpm/sec max
Housing Material: Aluminum
Weight: 9.2 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +100°C
Extended: -40°C to +120°C
Storage Temperature Range: -40°C to +120°C
Shock: 300 G’s Min.
Vibration: 20 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#	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 (5-26 VDC)	6	Red	D	2
$\overline{B}$	7	Yellow	I	6
$\overline{A}$	8	Gray	H	4
$\overline{Z}$ *	9	Orange	J	8
Shield	10	Braid	G	—

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SLIM Tach ST85

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
□□□	□□□□	□	□□□	□	□	□

Ordering Information

ST8 Direct Motor Mounting on NEMA 180 flange (8.5”), Single Output

DT8 Direct Motor Mounting on NEMA 180 flange (8.5”), Dual Output

0064
0128
0256
0512
1024
2048

L No Index
Z Index

C04 0.625” **CB4** 16 mm
C05 0.875” **C36** 24 mm
C06 1.000” **C29** 25 mm
C07 1.125” **C31** 30 mm
C08 1.250” **CA4** 45 mm
C09 1.375” **C58** 60 mm
C10 1.500’ **C40** 80 mm
C11 1.625”
C12 1.750”
C13 1.875”
C14 2.000”
C15 2.125”
C16 2.250”
C17 2.375”
C18 2.500”
C20 2.625”
C19 2.875”

End of Shaft Mounting
G01 1.125” EOS
G06 2.125” EOS
G08 2.375” EOS
G10 2.875” EOS

B Conduit Box
C Latching Industrial Connector with 1/2” NPT
D 1” Extended Height Latching Industrial Connector with 1/2” NPT
E 3” Extended Height Latching Industrial Connector with 1/2” NPT
F Latching Industrial Connector without Mating Connector
G 1” Extended Height Latching Industrial Connector without Mating Connector
H 3” Extended Height Latching Industrial Connector without Mating Connector
M 10 Pin MS Connector
N 10 Pin MS 3112 Connector
P 18” Pigtail Cable (25” when Code 6 = H)
Q Latching Industrial Connector on 18” Pigtail Cable
R Latching Industrial Connector on 18” Pigtail Cable without Mating Connector

V 5-26V in, 5-26V Line Driver (IC-WE) out
5 5-26V in, 5V out Line Driver (IC-WE)
H Same as V but with High Temperature, Extended Operating Range to 120°C

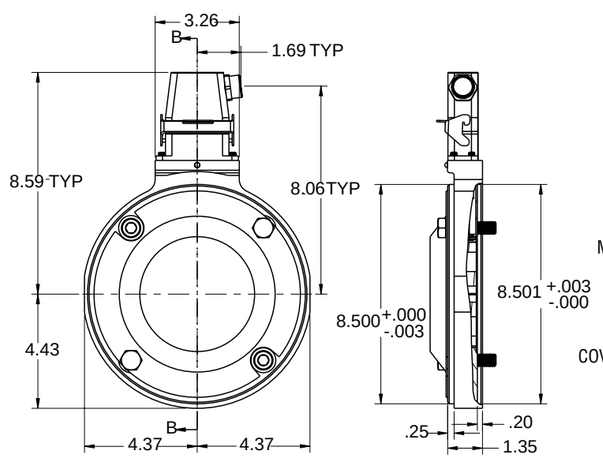
CC Flat No-Hole Cover
EE Extra Heavy Duty Steel Cover
FF Flat Thru-Hole Cover
PP Extra Heavy Duty Steel Pie-Pan Cover

NOTES:
1) For additional bore sizes up to 3.75” maximum, please consult the factory.
2) Please consult factory for more information on Split Unit Designs.
3) See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels.

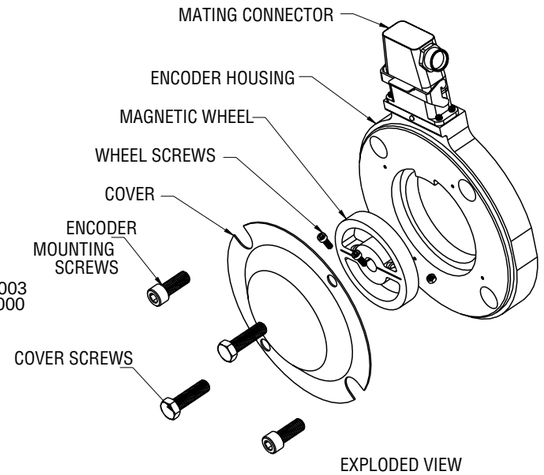
SL85 LEGACY MODELS

Dynapar’s legacy SL85 product line is still available for configurations not currently available in the ST85 product line.

DIMENSIONS inch



SECTION B-B
PIE PAN COVER OPTION



EXPLODED VIEW

SERIES SL85

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

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**
- **New Model Available with Larger Air Gap and Diagnostic LED. See ST85.**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-1024 PPR
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

ELECTRICAL

Input Power Requirements: 5-15 Volts DC, 45 mA typical per sensor module plus line driver load
Output Signals:
4428 Differential Line Driver: 150mA, sink or source
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index. Please refer to our performance curve diagram for frequency and temperature details**

ELECTRICAL (CONT.)

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

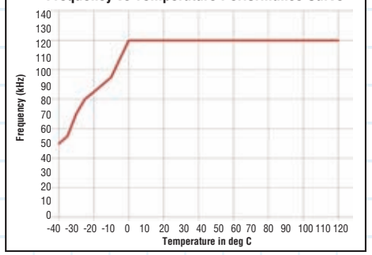
MECHANICAL

Bore Size: 5/8" to 3.75"
Mounting Configuration: 8.5" 180 C-Face Mount for NEMA MG1 standards
Max: Shaft Speed: 5,000 RPM
Shaft Length Required: 1.0" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Aluminum
Weight: 9.2 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +90°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

**Frequency vs Temperature Performance Curve



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 (5-15 VDC)	6	Red	D
$\overline{B}$	7	Yellow	I
$\overline{A}$	8	Gray	H
$\overline{Z}$ *	9	Orange	J
Shield	10	Braid	G

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SERIES SL85

Ordering Information

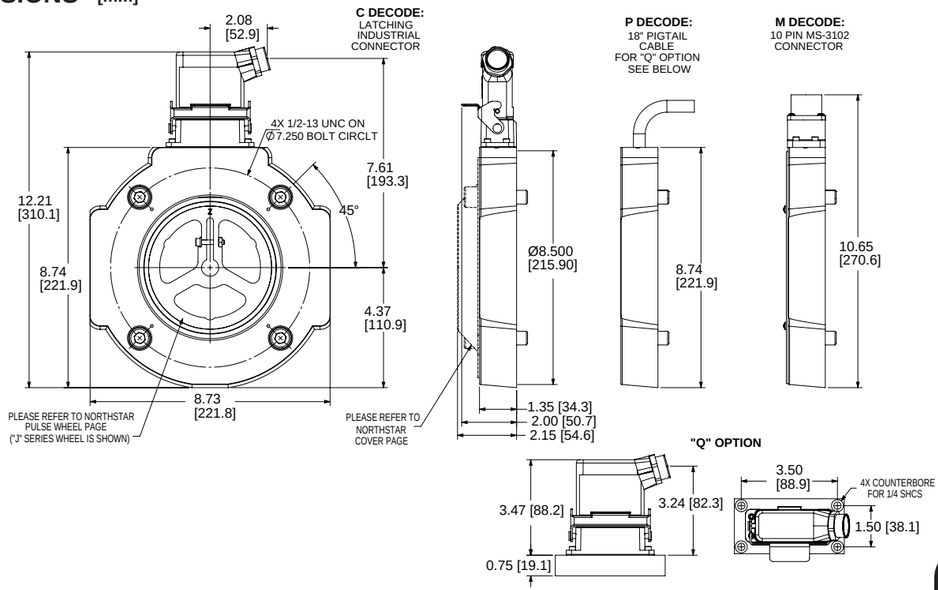
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Cover/Adapter
□ 8	□□□□	□	□□□	□	□	□
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**	**L** No Index Available when Code 2 is 0512, or 1024 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8" **J05** 7/8" **J06** 1.00" **J07** 1-1/8" **K09** 1-3/8" **K10** 1-1/2" **K11** 1-5/8" **K12** 1-3/4" **K13** 1-7/8" **K14** 2.00" **K15** 2-1/8" **K16** 2-1/4" **K17** 2-3/8" **K18** 2-1/2" **K19** 2-7/8" For additional bore sizes up to 3.75" maximum, please consult factory. **End of Shaft Mounting for GE & Emerson Motors** N01 1.125" EOS N06 2.125" EOS N08 2.375" 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 **F** Latching Industrial Connector without Mating Connector **G** 1" Extended Height Latching Industrial Connector without Mating Connector **H** 3" Extended Height Latching Industrial Connector without Mating Connector **P** 18" Pigtail Cable **Q** Latching Industrial Connector on 18" Pigtail Cable **R** Latching Industrial Connector on 18" Pigtail Cable without Mating Connector	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 100°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, $\overline{A}$, B, $\overline{B}$)	**C** Standard Flat Cover **E** Extra heavy duty steel pie pan cover **F** Flat Thru-hole cover Grounding brush kits available for End of Shaft Mounting, Consult Factory for ordering

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

DIMENSIONS inch [mm]

STANDARD HOUSING – SINGLE C-FACE



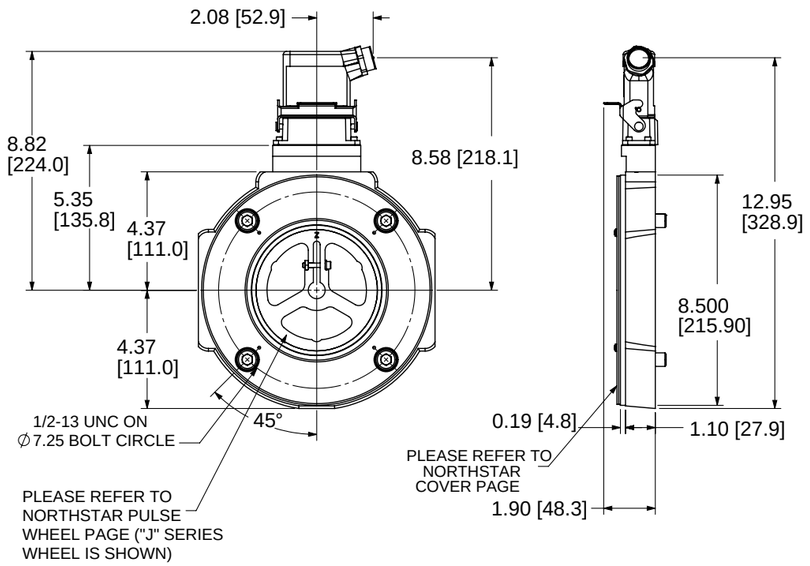
SERIES SL85

NorthStar™ brand

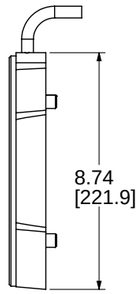
DIMENSIONS inch [mm]

DOUBLE C-FACE HOUSING

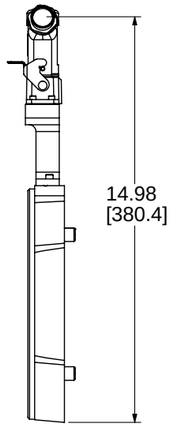
D-DECODE:
DOUBLE C-FACE
INDUSTRIAL
1" EXTENDED HEIGHT
LATCHING CONNECTOR



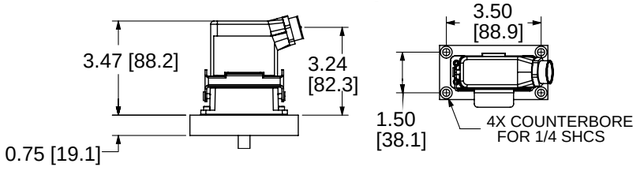
P-DECODE:
DOUBLE C-FACE
18" PIGTAIL
SEE "Q"
OPTION BELOW



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



"Q" OPTION

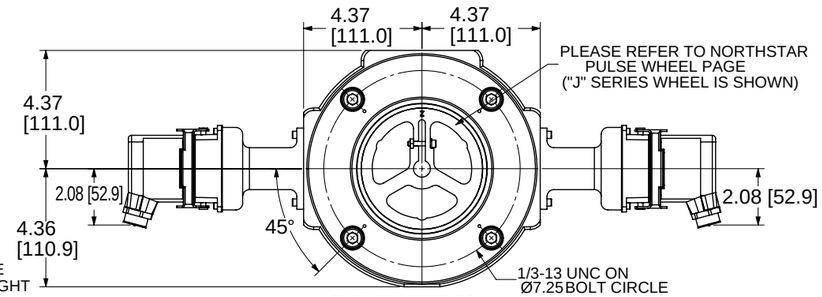


by DYNAPAR™

SERIES SL85

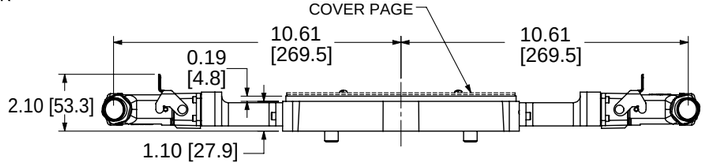
DIMENSIONS inch [mm]

DUAL OUTPUT HOUSING



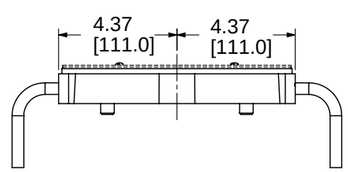
E DECODE:
DOUBLE C-FACE
3" EXTENDED HEIGHT
INDUSTRIAL
LATCHING CONNECTOR

PLEASE REFER TO
NORTHSTAR
COVER PAGE

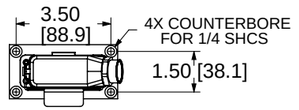


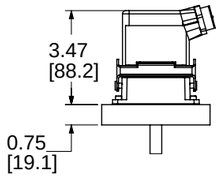
D DECODE:
DOUBLE C-FACE
1" EXTENDED HEIGHT
INDUSTRIAL
LATCHING CONNECTOR

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



"Q" OPTION





NexGen RIM Tach 8500 NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

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

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing male C-face end
Quadrature Phasing: 90° ± 45°
Symmetry: 50% ±15%
Number of Output Modules: Single or Dual

ELECTRICAL

Input Power Requirements: 5-26VDC, 95mA typical per sensor module, plus line driver load
Output Signals: IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65. Optional MS3102 10 pin, Pigtail Cable, or Latching connector on cable extension

MECHANICAL

Bore Sizes: 5/8” to 2-7/8”
Mounting Configuration: 8.5” 180 C-Face Mount for NEMA MG1 Standards
Shaft Speed: 7,000 RPM, max.
Shaft Length Required: 2.5” min
Radial Air Gap:
1200 PPR or lower:
0.075”, +0.015” / -0.070”
Above 1200 PPR:
0.050”, +0.015” / -0.040”
Allowable Shaft End-Play: ±0.150”
Allowable Shaft Runout: 0.005” TIR
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron
Sensor Module Material: Stainless Steel
Weight: 26.5 lbs

ENVIRONMENTAL

Operating Temperature Range: -40°C to +100°C
Storage Temperature Range: -40°C to +125°C
Shock: 200 G’s Min.
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z*	4	Violet	C
Alarm †	5	n/a	F
Vcc (5-24 VDC)	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
† Alarm not available with Pigtail cable. See Ordering Information

by DYNAPAR™ NexGen RIM Tach 8500

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	Code 6: Termination
RT8	□□□□	□	□□□	□	□

Ordering Information

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”
V20 2-5/8”
V19 2-7/8”

CB4 16 mm
C36 24 mm
C29 25 mm
C31 30 mm
CA4 45 mm
C58 60 mm
C40 80 mm

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 680 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

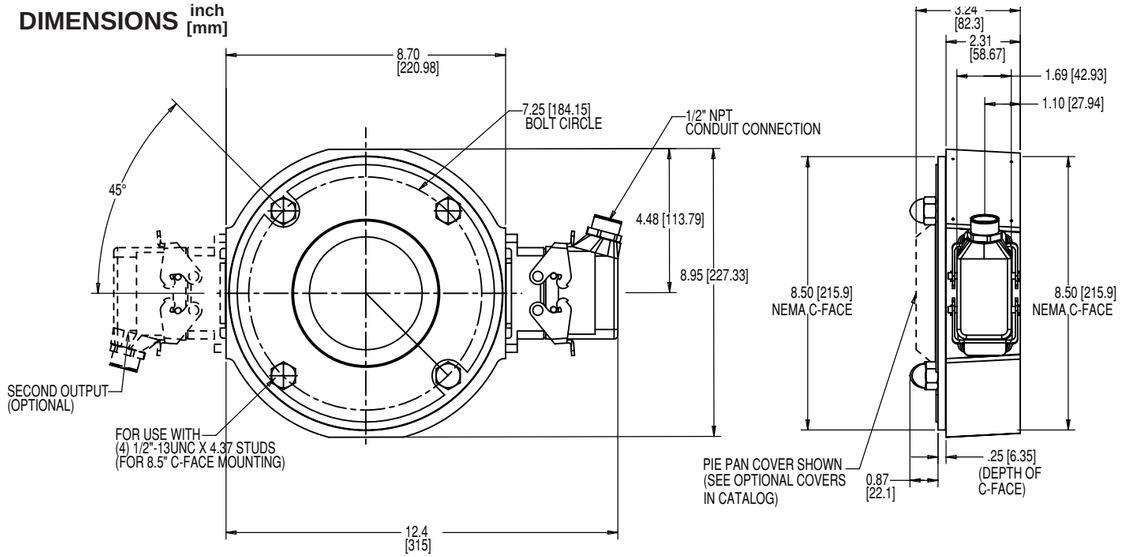
C Latching Industrial Connector with 1/2” NPT
F Latching Industrial Connector without Mating Connector
M 10 pin MS Connector
P 18” Pigtail (Not available with Alarm output)
Q Latching industrial connector on 18” cable
R Latching Industrial Connector on 18” Pigtail Cable without Mating Connector

NOTES:
1) For additional bore sizes up to 3.75” maximum, please consult the factory.
2) Please consult factory for more information on Split Unit Designs.
3) See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels.

RIM TACH 8500 LEGACY MODELS

Dynapar’s legacy RIM Tach8500 product line is still available for configurations not currently available in the RT8 product line.

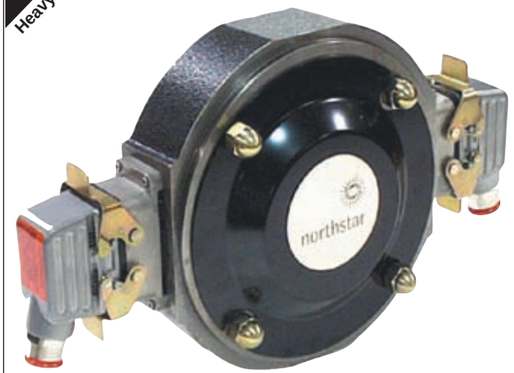
DIMENSIONS inch [mm]



SERIES RIM Tach 8500 NorthStar™ brand

Bearingless Encoder

HD Heavy Duty



Key Features

- **Compact, Bearingless Design Mounts to 180-C 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**
- **New Model Available with Larger Air Gap and Diagnostic LED. See NexGen RT8**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-1200 PPR
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

MECHANICAL

Bore Sizes: 5/8" to 3.75"
Mounting Configuration: 8.5" 180 C-Face Mount for NEMA MG1 Standards
Shaft Speed: 7,000 RPM
Shaft Length Required: 2.5" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron/Stainless Steel
Weight: 26.5 lbs

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +90°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL

Input Power Requirements: 5-15 VDC, 15-26 VDC, 45 mA typical per sensor module plus line driver load
Output Signals:
4428 Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™ SERIES RIM Tach 8500

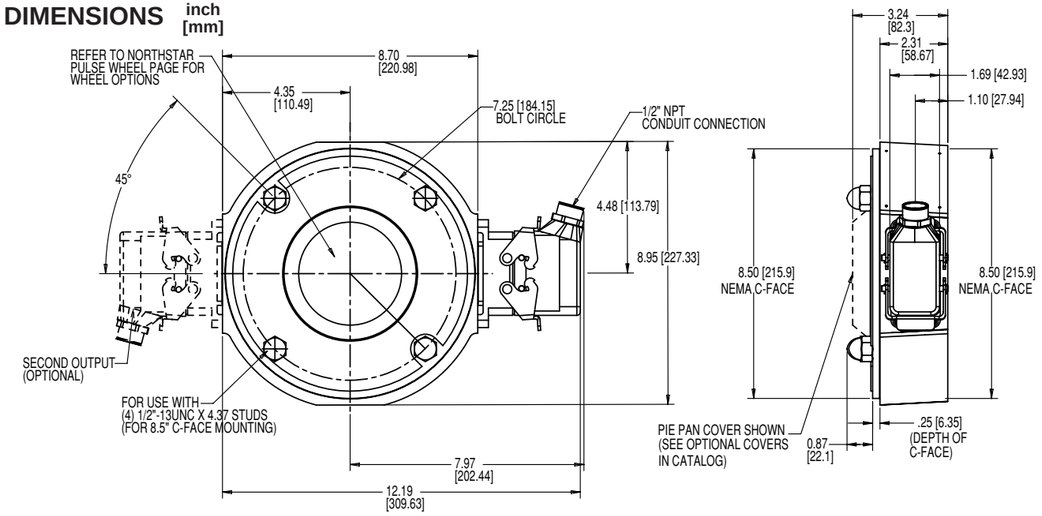
Ordering Information

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** **0064** **0480** **0075** **0512** **0120** **0600** **0128** **0960** **0150** **1024** **0240** **1200** **0256**	**L** No Index Available when Code 2 is 0480, 0512, 0600, 0960 1024 or 1200 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8" **J05** 7/8" **J06** 1.00" **J07** 1-1/8" **K09** 1-3/8" **K10** 1-1/2" **K11** 1-5/8" **K12** 1-3/4" **K13** 1-7/8" **K14** 2" **K15** 2-1/8" **K16** 2-1/4" **K17** 2-3/8" **K18** 2-1/2" **K19** 2-7/8" For additional bore sizes up to 3.75" maximum, please consult factory. **End of shaft mounting for GE & Emerson Motors** E01 1.125" EOS E06 2.125" EOS E08 2.375" EOS E10 2.875" EOS	**1** Single Output **2** Dual Output, (Isolated) Differential, Bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 100°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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18" Pigtail **Q** Latching Industrial Connector on 18" Cable **R** Latching Industrial Connector on 18" Pigtail Cable without Mating Connector

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

DIMENSIONS inch [mm]



NexGen RIM Tach 1250

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- New Sensor Provides up to 0.075” of Air Gap, Over 50% More Than Competitive Models
- Expanded Resolution up to 2400 PPR
- 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
- Available Shaft Sizes From 0.625” to 2.875”

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing male C-face end
Quadrature Phasing: 90° ± 45°
Symmetry: 50% ±15%
Number of Output Modules: Single or Dual

ELECTRICAL

Input Power Requirements: 5-26VDC, 95mA typical per sensor module, plus line driver load
Output Signals: IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65. Optional MS3102 10 pin, Pigtail Cable, or Latching connector on cable extension

MECHANICAL

Bore Size: 0.625” to 2.875”
Mounting Configuration: 12.5” C-Face Mount for NEMA MG1 Standards
Shaft Speed: 7,000 RPM, max.
Shaft Length Required: 2.88” min
Allowable Shaft Runout: 0.005” TIR
Radial Air Gap:
1200 PPR or lower:
0.075”, +0.015” / -0.070”
Above 1200 PPR:
0.050”, +0.015” / -0.040”
Allowable Shaft End-Play: ±0.150”
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron
Sensor Module Material: Stainless Steel
Weight: 38.5 lbs

ENVIRONMENTAL

Operating Temperature Range: -40°C to +100°C
Storage Temperature Range: -40°C to +125°C
Shock: 200 G’s Min.
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z*	4	Violet	C
Alarm †	5	n/a	F
Vcc (5-26 VDC)	6	Red	B
$\overline{B}$	7	Yellow	H
$\overline{A}$	8	Gray	G
$\overline{Z}$*	9	Orange	I
Shield	10	Braid	J

* Index (Z) Optional. See Ordering Information
† Alarm not available with Pigtail cable. See Ordering Information

by DYNAPAR™ NexGen RIM Tach 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: Electrical	Code 6: Termination
RT1	□□□□	□	□□□	□	□

Ordering Information

RT1 RIMTach 1250 Direct Motor Mounting on NEMA 12.5” Flange	**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** 0.625” **V05** 0.875” **V06** 1.000” **V07** 1.125” **V08** 1.250” **V09** 1.375” **V10** 1.500’ **V11** 1.625” **V12** 1.750” **V13** 1.875” **V14** 2.000” **V15** 2.125” **V16** 2.250” **V17** 2.375” **V18** 2.500” **V20** 2.625” **V19** 2.875” **CB4** 16 mm **C36** 24 mm **C29** 25 mm **C31** 30 mm **CA4** 45 mm **C58** 60 mm **C40** 80 mm	**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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18” Pigtail Cable **Q** Latching Industrial Connector on 18” Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector

NOTES:
1) For additional bore sizes up to 3.75” maximum, please consult the factory.
2) Please consult factory for more information on Split Unit Designs.
3) See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels.

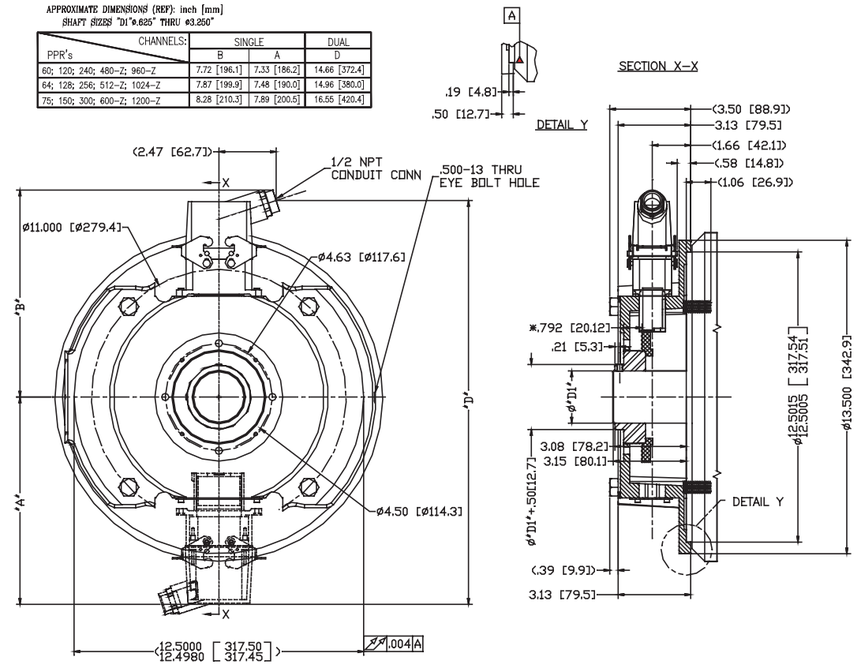
RIM Tach 1250 LEGACY MODELS

Dynapar’s legacy RIM Tach 1250 product line is still available for configurations not currently available in the NexGen RIM Tach 1250 (RT1) product line.

DIMENSIONS inch [mm]

APPROXIMATE DIMENSIONS (REF): inch [mm]
SHAFT SIZES "D1"≥0.625" THRU ø3.250"

PPR's	CHANNELS: SINGLE B	SINGLE A	DUAL 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 Tach 1250 NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- **Bearingless Design Mounts to 250-C 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**
- **New Model Available with Larger Air Gap and Diagnostic LED. See NexGen RT1**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-1200 PPR
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

ELECTRICAL

Input Power Requirements: 5-15 VDC, 15-26 VDC, 45 mA typical per sensor module plus line driver load
Output Signals: 4428 Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

MECHANICAL

Bore Sizes: 5/8” to 8” Available
Mounting Configuration: 12.5” C-Face Mount for NEMA MG1 Standards
Shaft Speed: 7,000 RPM (J or K wheels); 3600 RPM (TL wheels)
Shaft Length Required: 3.0” min
Allowable Shaft End-Play: ± 0.050”
Allowable Shaft Runout: 0.003” TIR
Acceleration Rate: 3600 rpm/sec max
Housing Material: Cast Iron/Stainless Steel
Weight: 38.5 lbs

ENVIRONMENTAL

Operating Temperature Range: -40°C to +80°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

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

* Index (Z) optional. See Ordering Information

by DYNAPAR™ SERIES RIM Tach 1250

Ordering Information

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

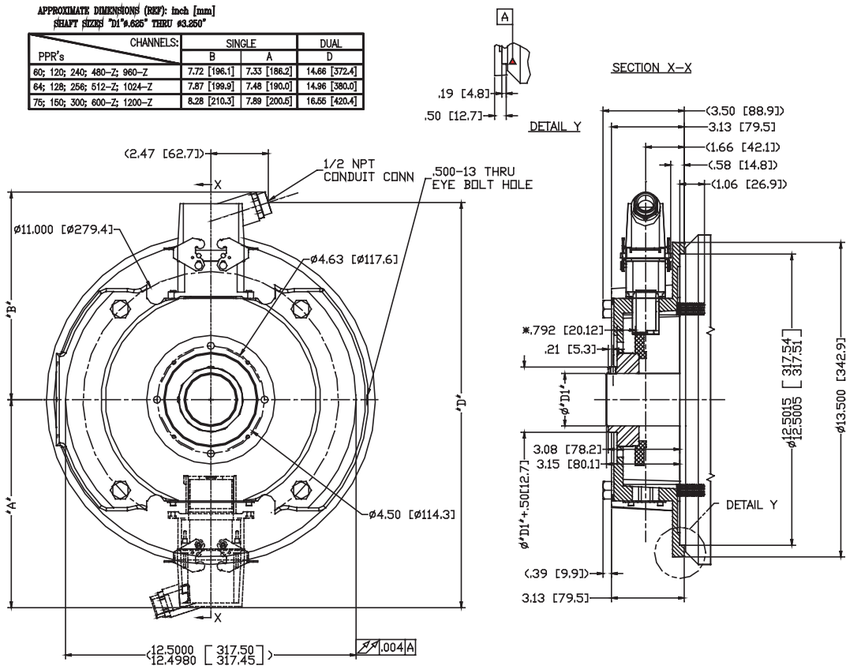
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
R1	□□□□	□	□□□	□	□	□
Ordering Information						
R1 Motor Mount Ring, for 12-1/2” C-Face Motors	**0060** **0300** **0064** **0480** **0075** **0512** **0120** **0600** **0128** **0960** **0150** **1024** **0240** **1200** **0256**	**L** No Index Available when Code 2 is 0480, 0512, 0600, 0960, 1024, 1200 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8” **J05** 7/8” **J06** 1.00” **J07** 1-1/8” **K09** 1-3/8” **K10** 1-1/2” **K11** 1-5/8” **K12** 1-3/4” **K13** 1-7/8” **K14** 2” **K15** 2-1/8” **K16** 2-1/4” **K17** 2-3/8” **K18** 2-1/2” **K19** 2-7/8” For additional bore sizes up to 8.0” maximum, please consult factory.	**1** Single **2** Dual (Isolated) Differential, bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)	**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 **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18” Pigtail

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

DIMENSIONS inch [mm]

APPROXIMATE DIMENSIONS (REF): inch [mm]
SHAFT SIZES: “D1”=.625” THRU ø3.250”

PPR’s \ CHANNELS:	SINGLE B	SINGLE A	DUAL 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 SL1250

NorthStar™ brand

Bearingless Encoder

HD Heavy Duty

Key Features

- **Bearingless Design Mounts to 250-C 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**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-1024 PPR
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

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:
4428 Differential Line Driver: 150mA, sink or source
IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65; MS connector or pig-tail

MECHANICAL

Bore Sizes: 5/8” to 3.75”
Mounting Configuration: 12.5” C-Face Mount for NEMA MG1-4 standards (excluding C-Face runout)
Shaft Speed: 5,000 RPM
Shaft Length Required: 1.1” min
Allowable Shaft End-Play: ± 0.045”
Allowable Shaft Runout: 0.003” TIR
Acceleration Rate: 12,000 rpm/sec max
Housing Material: Cast Aluminum
Weight: 11 lbs.

ENVIRONMENTAL

Operating Temperature Range:
Standard: -40°C to +90°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G’s Min
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

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 (5-15 VDC)	6	Red	D
$\overline{B}$	7	Yellow	I
$\overline{A}$	8	Gray	H
$\overline{Z}$ *	9	Orange	J
Shield	10	Braid	G

* Index (Z) optional. See Ordering Information

by DYNAPAR™

SERIES SL1250

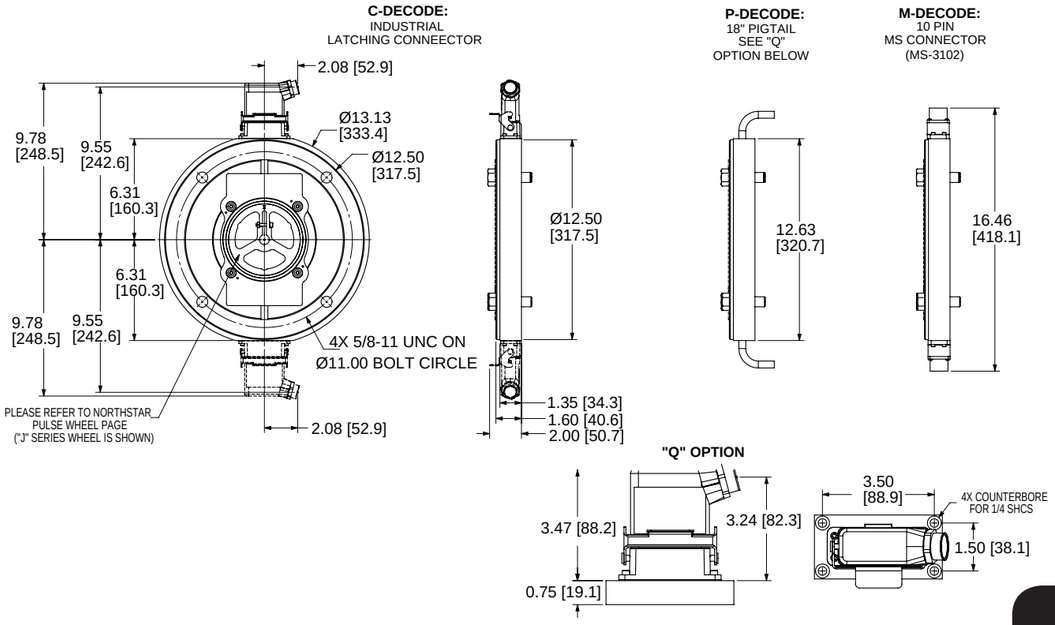
Ordering Information

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 Available when Code 2 is 0512 or 1024 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8” **CB4** 16 mm **J05** 7/8” **C36** 24 mm **J06** 1.00” **C29** 25 mm **J07** 1-1/8” **C31** 30 mm **K09** 1-3/8” **CA4** 45 mm **K10** 1-1/2” **C58** 60 mm **K11** 1-5/8” **C40** 80 mm **K12** 1-3/4” **K13** 1-7/8” **K14** 2.00” **K15** 2-1/8” **K16** 2-1/4” **K17** 2-3/8” **K18** 2-1/2” **K19** 2-7/8” For additional bore sizes up to 3.75” maximum, please consult factory.	**C** Latching Industrial Connector with 1/2” NPT **D** 1” Extended Height Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **G** 1” Extended Height Latching Industrial Connector without Mating Connector **M** 10 Pin MS Connector **P** 18” Pigtail Cable **Q** Latching Industrial Connector on 18” Pigtail Cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 100°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, $\overline{A}$, B, $\overline{B}$)	**C** No Cover **F** Flat Thru-hole cover

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

DIMENSIONS inch [mm]



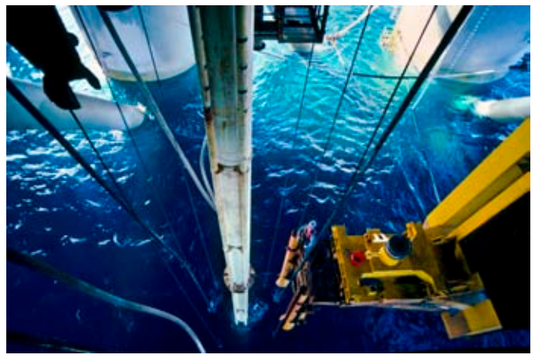
DYNAPAR™

Absolute Encoders

Every absolute rotary encoder is used to determine the speed or position of something – the difference is in how that encoder determines that movement. The “how” defines what type of encoder works in your application.

Absolute encoders work in situations where accuracy for both speed and position, fail tolerance, and interoperability matters more than system simplicity.

Absolute rotary encoders measure actual position by generating a stream of unique digital codes (instead of pulses) that represent the encoder’s actual position. Single turn absolute encoders output codes that are repeated every full revolution and do not output data to indicate how many revolutions have been made. Multi-turn absolute encoders output a unique code for each shaft position through every rotation, up to 4,096 revolutions. Unlike incremental encoders, absolute encoders will retain correct position even if power fails without homing at startup. Absolute encoders are typically used in CNC, medical and robot applications where high resolution is required and absolute feedback reduces power up sequences.



DYNAPAR™

Absolute Encoder Highlights

AD37S — PAGE 2.49

KEY FEATURES:
- Single Cable Solution for 2 and 4 Wire Applications
- Meets SIL 2 PLd, SIL3 PLe and Category 3 Functional Safety Requirements
- High Resolution up 20 Bit Single-turn and 12 Bit Multi-turn
- Motor Winding Temperature Sensor Input
- Stores Motor and Drive Data on "Electronic Data Sheets"

AD36 — PAGE 2.45

KEY FEATURES:
- Compact Dimensions Compatible with Size 15 Resolvers
- Up to 22 Bit Singleturn and 12 Bit True Multiturn Absolute Positioning
- Optional Sinewave 1Vpp Output for Easy Integration Into Older Controls
- Available in Hollow Shaft and Hub-Shaft Mounting Styles
- Single and Multi-Turn Options Available

AI25 ETHERCAT — PAGE 2.17

KEY FEATURES:
- Extremely Fast Cycle Times (62.5 µs)
- Best In Class Shock and Vibration Resistance (400G, 30G)
- Up to 22 Bit Single-Turn Resolution and ± 35” / (±0.009º) Absolute Accuracy
- Programmable Device Configurations To Meet Custom Application Requirements
- Device Data: Position, Speed, Temperature, Diagnostic Data, Alarms

AD34 — PAGE 2.01

KEY FEATURES:
- Special Notched Shaft Installs Easily in One Step and Eliminates Coupling Issues
- Up to 22 bits of Single turn Absolute Positioning
- Wide -15° to +120°C Operating Temperature Covers Majority of Servomotor Applications
- Available in BiSS and SSI Interfaces

AR62/63 — PAGE 2.37

KEY FEATURES:
- 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

AC36 — PAGE 2.33

KEY FEATURES:
- Up to 22 bit singleturn and 12 bit multiturn true absolute positioning
- Available Interfaces include BiSS or SSI Interface
- Small 38mm diameter housing
- Solid or Hubshaft version available
- Wide -40 to +100C temperature range

SERIES AD34 HENGSTLER™ brand

Single Turn Absolute Encoder

Key Features

- **Special Notched Shaft Installs Easily in One Step and Eliminates Coupling Issues**
- **Up to 22 bits of Singleturn Absolute Positioning**
- **Wide -15° to +120°C Operating Temperature Covers Majority of Servomotor Applications**

CE EN61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute
Resolution Single-turn: 12-22 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ±35”
Repeatability: ±7”

ELECTRICAL:

Interface: BiSS & SSI
Input Power: DC 5V -5 %/+10 % or DC 7 - 30V
Current w/o Load typ.: 5V: 100 mA (ST), 150 mA (MT); 7-30V: 100 mA (ST), 150 mA (MT)
Permissible load: Max. 30 mA
Output Code: Gray
Drives: Clock and Data / RS422
Incremental Signals: Sine-Cosine 1 Vpp
Number of Pulses: 2048
3dB Limiting Frequency: 500 kHz
Alarm Output: Alarm bit (SSI Option), warning bit and alarm bit (BiSS)

ELECTRICAL (Cont.):

Frequency Response (Baud Rate):
SSI: 100kHz ... 1,5MHz
BiSS-B/ BiSS-C: 100kHz ... 10 MHz
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse Polarity and Short Circuit Protected for the 7-30 VDC Only
Termination: Cable, radial; PCB connector, 12 pole

MECHANICAL:

Housing Diameter: 38.1 mm
Shaft Diameter: 6mm (Notched Shaft)
Shaft Material: Stainless Steel
Axial Endplay of Mounting Shaft: (Hub shaft) ± 0.5 mm
Radial Runout of Mating Shaft: (Hub shaft) ± 0.05 mm
Maximum Speed: max. 10,000 rpm (continuous), max. 12 000 rpm (short term)
Starting torque typ.: ≤ 1 Nm
Moment of inertia: ca. 2.5 x 10^{-6} kgm²
Mounting: Spring Tether
Housing Material: Plastic
Disc Material: Glass
Weight: approx. 80g (2.8 oz), (ST)

ENVIRONMENTAL:

Standard Operating Temperature: -15 °C ...+120 °C
Storage Temperature: -15 °C ...+85 °C
Shock: (DIN EN 60068-2-27) 1000 m/s² (6 ms)
Vibration: (DIN EN 60068-2-6) 100 m/s² (10 ... 2000 Hz)
Humidity: 75% rel. Humidity (no condensation allowed)
Enclosure Rating: (EN 60529/A1:2000-02) IP40 Housing & Shaft

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Function	DC 5V / 7-30V (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	White	Yellow	Gray/Pink	Brown	Brown/Green	Pink
PIN	1a	2a	3a	4a	5a	6a
Function	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	5V Sensor
Color	Gray	White/Green	Black	Red/Blue	Green	Violet

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

Analog signals (1Vpp) only available with interface SC (SSI Gray +1Vpp), BC (BiSS-B +1Vpp) and BV (BiSS-C +1Vpp)

by DYNAPAR™ SERIES AD34

Ordering Information

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

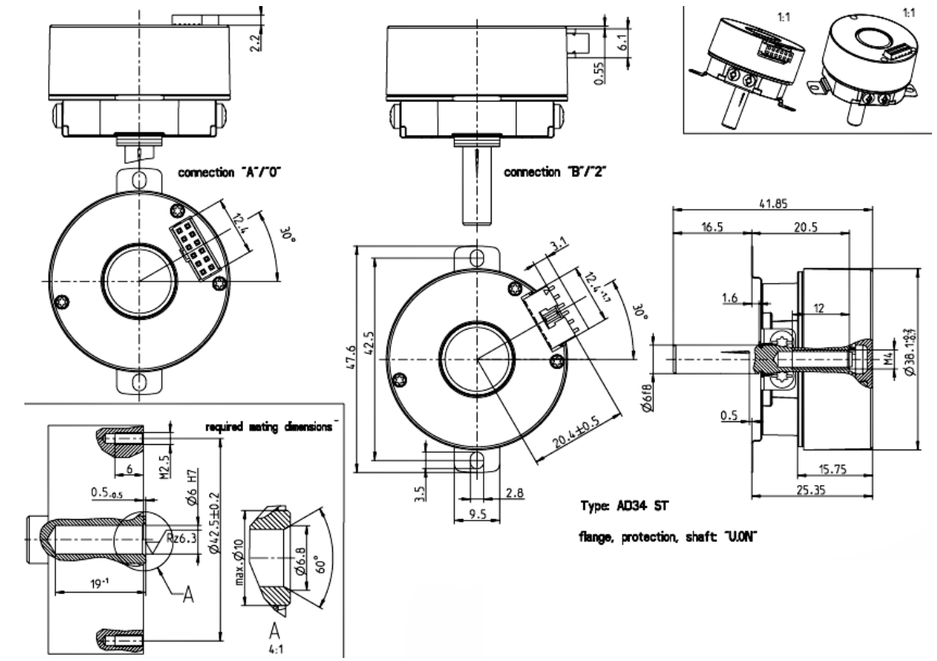
Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Flange/Protection/Shaft	Code 5: Interface	Code 6: Connection
AD34	□□□□	□	□.□□	□□	□
Series AD34 Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT, 12 Bit ST **1213** 12 Bit MT, 13 Bit ST **1214** 12 Bit MT, 14 Bit ST **1217** 12 Bit MT, 17 Bit ST **1219** 12 Bit MT, 19 Bit ST **1222** 12 Bit MT, 22 Bit ST	**A** 5 VDC* **E** 7-30VDC	**F.ON** Spring tether F, IP40, 6 mm notched shaft **U.ON** Spring tether U, IP40, 6 mm notched shaft	**BC** BiSS-B (+SinCos 1Vpp) **SC** SSI Gray (+SinCos 1Vpp) **BV** BiSS- C (+SinCos 1Vpp) **SD** SSI-Binary (+SinCos 1Vpp) BI, SG, BE, SB available ONLY when Code 6: is A or B **BI** BiSS-B **BE** BiSS- C **SB** SSI-Binary **SG** SSI-Gray	**0** PCB Connector, axial, 12 pole **2** PCB Connector, radial, 12 pole **A** PCB Connector, axial, 12 pole, with mating connector and 0.5 m cable **B** PCB Connector, radial, 12 pole, with mating connector and 0.5 m cable

*No inverse-polarity protection for 5V power supply.

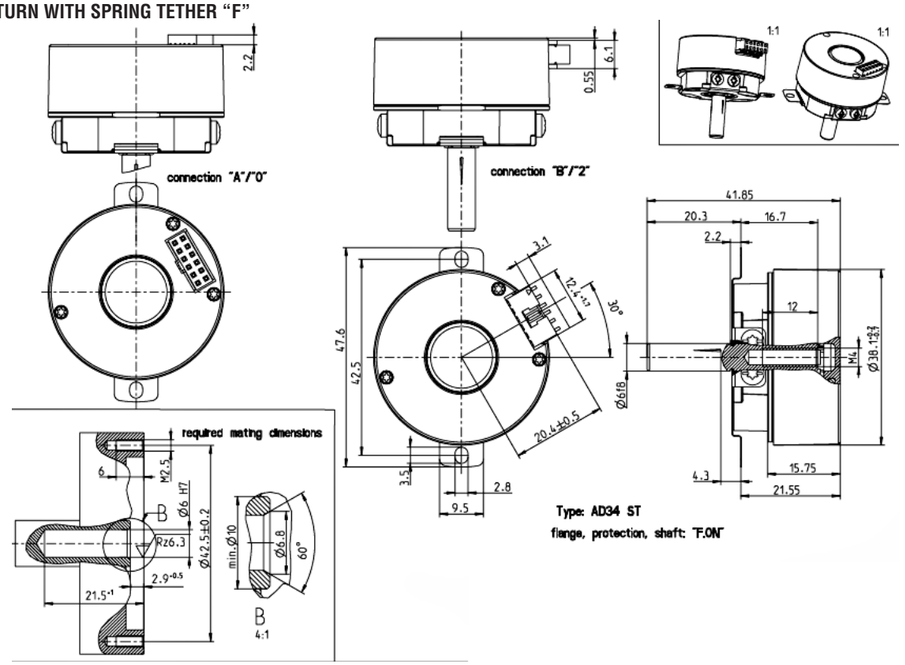
SERIES AD34 HENGSTLER™ brand

DIMENSIONS mm

SINGLE TURN WITH SPRING TETHER "U"



SINGLE TURN WITH SPRING TETHER "F"

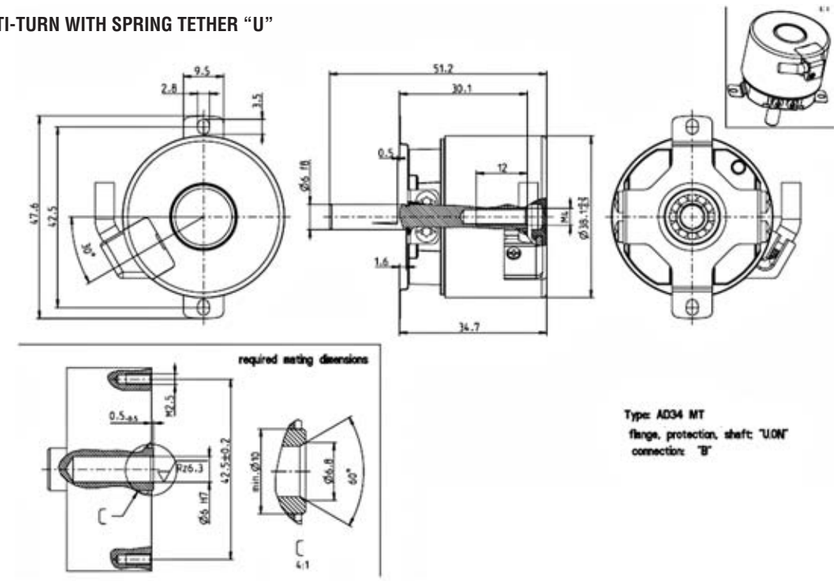


by DYNAPAR™

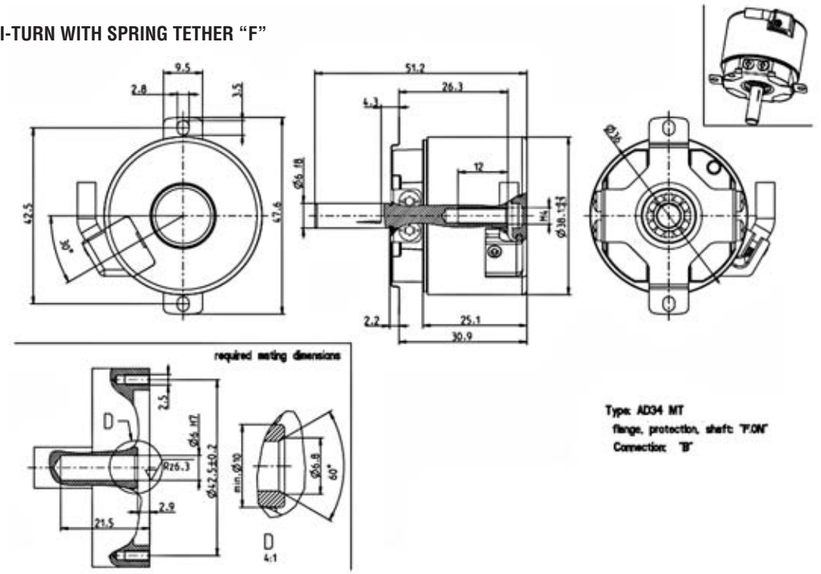
SERIES AD34

DIMENSIONS mm

MULTI-TURN WITH SPRING TETHER "U"



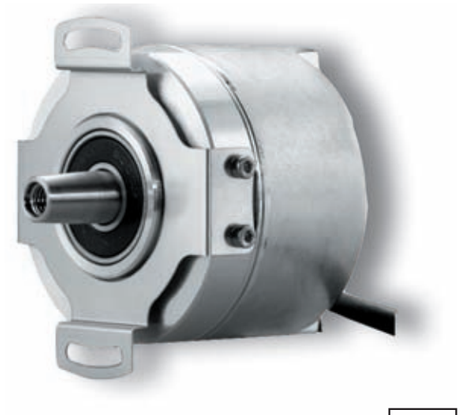
MULTI-TURN WITH SPRING TETHER "F"



SERIES AD25 HENGSTLER™ brand

Single- / Multi- Turn Absolute Encoder

SSM Servo Small Motor



Key Features

- **Special Conical Shaft for Concentric Motor Mounting**
- **Up to 22 Bits of Singleturn Absolute Positioning for Smooth Low Speed Motor Performance**
- **Integrated On-Board Diagnostics to Monitor Encoder Health**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Optical
Resolution Single-turn: 13 and 22 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:
Interface: BiSS, SSI
Input Power: 5 VDC, +10% / –5%
Current Consumption w/o Load: 100 mA (ST), 150 mA (MT)
Output Code: Gray, Binary

SSI Interface:
Resolution: 2048
Format: A, B Quadrature, 1 Vpp Sine wave
Number of lines: 4 unidirectional (2 for clock; 2 for data)
Electrical Interface: RS 422
Transmission Speed: 70 kHz to 2 MHz per SSI definition

ELECTRICAL (Cont.):
BiSS Interface:
Signals: Clock unidirectional (from master to encoder); Data unidirectional (from encoder to master)
Electrical Interface: RS 422
Number of lines: 4 unidirectional (2 for clock and 2 for data)
Transmission Speed: 70 kHz – 10 MHz
Transmission Security: 1 start bit, 1 stop bit, 6 Bit CRC
Diagnostic Functions: possible failure modes are constantly checked with the following functions:
LED Current Sensing: Pollution, condensation, over temperature
Single-Step Check: Disk pollution or damage, condensation, mechanical overload
Temperature Monitoring: Warning message if the user defined limits have been reached/ exceeded
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1

MECHANICAL:
Diameter: 2.28", Length: 1.85"
Shaft Size:
Tapered Solid Shaft: 10 mm diameter; Cone 1:10
Tapered Hub Shaft: 10 mm diameter; Cone 1:10
Shaft Loading: 5 lb. axial, 20 lb. radial
Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak-ST only)
Starting Torque: < 1.4 in-oz.
Housing Material: Stainless Steel
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: 6.2 oz.

ENVIRONMENTAL:
Operating Temperature: -15 °C ...+120°C
Storage Temperature: -25 °C ...+85 °C
Shock: 100 G for 6 msec duration
Vibration: 10 G (10 to 2000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP40

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Name	Power Supply (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	Gray/Pink	White	Red	White/Green	Yellow	Black
PIN	1a	2a	3a	4a	5a	6a
Name	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	U_p Sensor
Color	Violet	Green	Brown/Green	Blue	Brown	Blue/Red

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

by DYNAPAR™ SERIES AD25

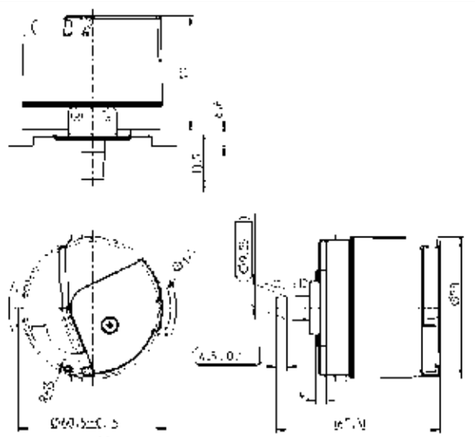
Ordering Information

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

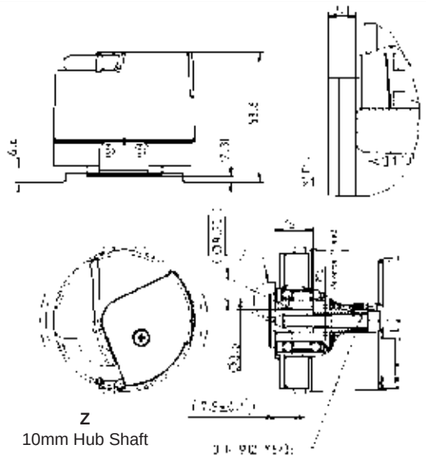
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AD25	☐☐☐☐	☐	☐	☐	☐	☐
AD25 Size25 Acuro Absolute Encoder	**Single-Turn** **0013** 13 Bit **0022** 22 Bit **Multi-Turn** **1213** 12 Bit Multi-Turn, 13 Bit Single-Turn **1222** 12 Bit Multi-Turn, 22 Bit Single-Turn	**4** Spring Tether	**Y** 10mm Shaft (10:1 Taper) **Z** 10mm Hub Shaft (10:1 Taper)	Available when Code 2 is 0022 or 1222 **A** BiSS-B **(BI)** **L** BiSS-B (+SinCos 1Vpp) **(BC)** **M** BiSS-C **(BE)** **N** BiSS-C (+SinCos 1Vpp) **(BV)** Available when Code 2 is 0013 or 1213 **F** SSI Gray (+SinCos 1Vpp) **(SC)**	**0** 5 VDC	**M** Drive cable, 1 foot (30 cm)

Dimensions (mm)

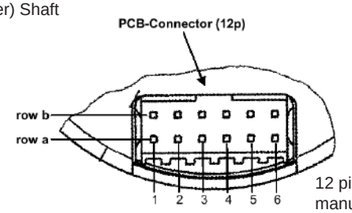
Code 4: Shaft Size



Y
10mm (10:1 taper) Shaft



Z
10mm Hub Shaft



12 pin PCB connector
manufacture Berg, type Minitek

SERIES AI25 BiSS HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- Up to 22 Bit True Singleturn Positioning
- Onboard Diagnostics
- BiSS-B and BiSS-C Interface
- Available with Multiple Shaft Configurations
- Enclosure ratings of IP64 or IP67

E321846

EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 12-22 Bit
Resolution Multi-turn: 12 Bit
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: BiSS
Output Code: Binary, Gray, Gray Excess, parameterization through AcuroSoft
Parameterization: Resolution code type, sense of rotation, warning, alarm
Input Power: 5 VDC +/-10% or 10-30 VDC
Intrinsic current consumption: 5V: 100 mA (ST), 150 mA (MT); 10-30V: 100 mA (ST), 150 mA (MT)
Output Current: 60 mA per bit, short circuit protected
Frequency Response (Baud Rate): 500 kHz
Maximum cable length: 400 m
Control Inputs: Direction
Alarm Output: Warning and Alarm bits
Status LED: Green = OK, Red = Alarm (IP64 only)
Preset Switch: Sets encoder to zero output at present mechanical position (IP64 only)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1
Termination: Cable, axial or radial;
M23 connector (Conin), 12 pole, axial or radial;
M12 connector, 8 pole, axial or radial

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft Tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Shaft Load (hub shaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 9.2 oz (260 g)
Multi-Turn: approx. 11 oz. (310 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+100 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 100G, 1,000 m/s² for 6 msec
Vibration: 10G, 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™

SERIES AI25 BiSS

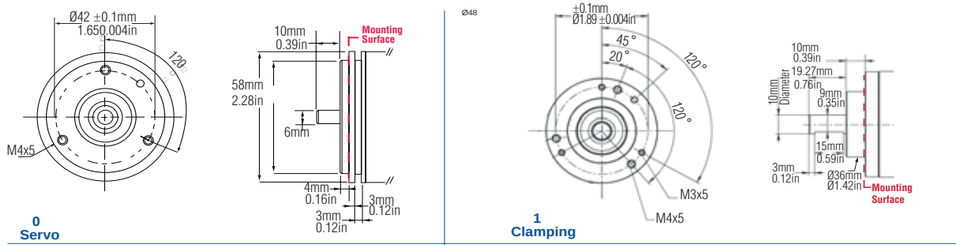
Ordering Information

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

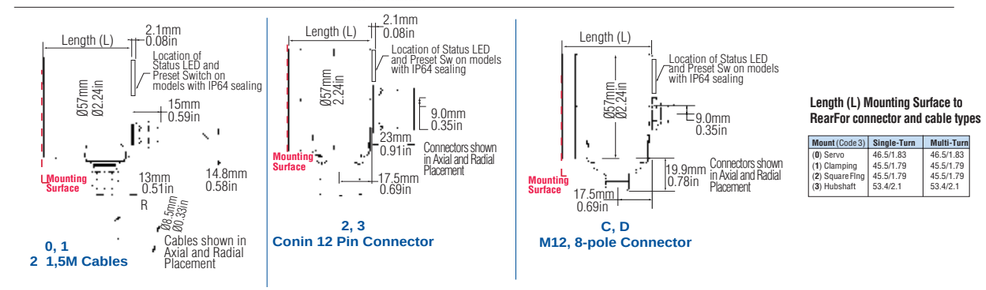
Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Output	Code 7: Termination
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Absolute Encoder	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT 12 Bit ST **1213** 12 Bit MT 13 Bit ST **1214** 12 Bit MT 14 Bit ST **1217** 12 Bit MT 17 Bit ST **1219** 12 Bit MT 19 Bit ST **1222** 12 Bit MT 22 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm Available only when Code 2 is ST (Single Turn) **K** 1/4" Hubshaft	**A** BiSS-B **(BI)** **L** BiSS-B (+Sin-Cos 1Vpp) **(BC)** **M** BiSS-C **(BE)** **N** BiSS-C (+Sin-Cos 1Vpp) **(BV)**	**0** 5 VDC **2** 10-30 VDC	**0** Cable, axial **1** Cable, radial **2** M23 Conin 12 pin axial, CW **3** M23 Conin 12 pin radial, CW **4** M23 12 pin axial, CCW **5** M23 12 pin radial, CCW **C** M12 , 8-pole connector axial **D** M12 , 8-pole connector radial

DIMENSIONS

Code 3: Mounting



Code 7: Connector



Length (L) Mounting Surface to RearFor connector and cable types

Mount (Code 3)	Single-Turn	Multi-Turn
(0) Servo	46.5/1.83	46.5/1.83
(1) Clamping	45.5/1.79	45.5/1.79
(2) Square Flng	45.5/1.79	45.5/1.79
(3) Hubshaft	53.4/2.1	53.4/2.1

SERIES AI25 BiSS HENGSTLER™ brand

ELECTRICAL CONNECTIONS

M23 connector (Conin), 12 pole / cable
Interface BE and BI

Cable	M23 (Conin)	Signal
brown [3]	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	$\overline{\text{Direction}}$ [1]
red	6	N.C.
violet	7	N.C.
white [3]	8	DC 5/ 10 - 30 V
	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output [2]

[1] $\overline{\text{Direction}}$: UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw
[2] Connected with 0 V in the encoder.
Use this output to lay Direction on “0V” if required.
[3] use only thin wires ∅ = 0.14 mm)

M23 connector (Conin), 12 pole / cable
Interface BC, BV

Cable	M23 (Conin)	Signal
brown [2]	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
white/green	4	A+
blue	5	$\overline{\text{Direction}}$ [1]
red/blue	6	B+
brawn/green	7	A-
white [2]	8	DC 5/10 - 30 V
grey/pink	9	B-
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	Sense

[1] $\overline{\text{Direction}}$: +UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw
[2] use only thin wires (∅ = 0.14 mm)

8 pole M12

Colour	Pin	Signal
white	1	DC 10 - 30 V
brown	2	0 V
	3	N.C.
green	4	$\overline{\text{Clock}}$
pink	5	Data
yellow	6	Clock
blue	7	$\overline{\text{Direction}}$ [1]
grey	8	$\overline{\text{Data}}$

View on connector

[1] $\overline{\text{Direction}}$: + UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

12 pin CONIN Connector	**Part Number: G3 539 202**
Bulk Cable (sold by the meter)	**Part Number: 113101-0001**
Cable Assembly (with Connector)	
3 meters	**Part Number: G1 542 003**
5 meters	**Part Number G1 542 004**
10 meters	**Part Number: G1 542 005**
8 pin M12 Connector	**Part Number: G3 539 597**
Bulk Cable (sold by the meter)	**Part Number: G3 280 220**
Cable Assembly (with Connector)	
3 meters	**Part Number: G1 565 329**
5 meters	**Part Number G1 565 330**
10 meters	**Part Number: G1 565 331**

ABSOLUTE ENCODERS

DYNAPAR™

Notes

SERIES AI25 CANopen HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- **Up to 16 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **CAN Open Interface**
- **Available with multiple shaft configurations**
- **Enclosure ratings of IP64 or IP67**

E321846 c UL us LISTED

CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical

Resolution Single-turn: 10-16 Bit

Resolution Multi-turn: 12 Bit

Linearity: +/- 1/2 LSB

Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)

Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: CAN High-Speed according to ISO/ DIS 11898

Protocol: CANopen according to DS 301 with profile DSP 406, programmable encoder according to C2

Transfer mode:

Poll mode

Bit strobe (time-synchronous for all devices)

Change of State (automatic after change of values) Cyclic, with adjustable cycle timer

Output Code: Binary

Input Power: 10-30 VDC

Intrinsic Current Consumption: 200 mA (ST), 220 mA (MT)

Frequency Response (Baud Rate): 10, 20, 50, 125, 250, 500, 800, 1000 kBaud

Noise Immunity: Tested to EN 61326-1

Electrical Immunity: Tested to EN 61326-1

Termination: Bus Cover with spring terminal clamps; 12 pin Conin CW; Cable with Pigtail

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount)

Hubshaft Size: 10mm, 12 mm, 3/8", 1/2"

Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)

Shaft Tolerance (hubshaft only): ± 1.5 mm axial, ± 0.2 mm radial

Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)

Starting Torque: < 1.4 in-oz

Housing Material: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight:
Single-Turn: approx. 12.3 oz (350 g)
Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+85 °C

Storage Temperature: -40 °C ...+100 °C

Shock: 100G, 1,000 m/s² for 6 msec

Vibration: 10G, 100 m/s² (10 to 2,000 Hz)

Humidity: Up to 75%, (no condensation allowed)

Enclosure Rating: IP64 or IP67

by DYNAPAR™

SERIES AI25 CANopen

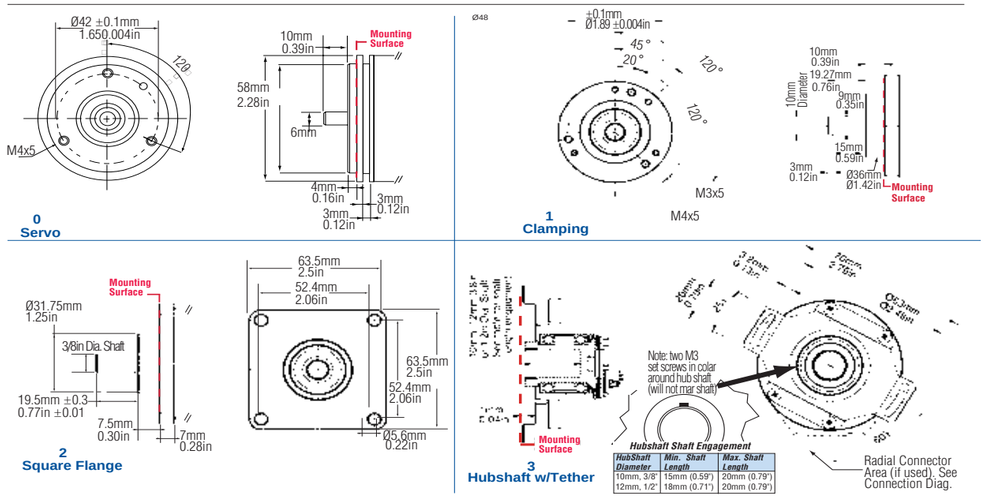
Ordering Information

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

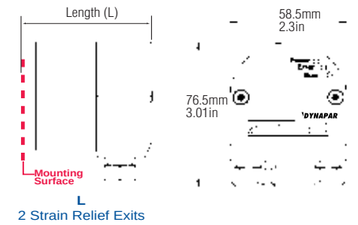
Code 1: Model	Code 2: Bits	Code 3: Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
Ordering Information						
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **0016** 16 Bit **Multi-Turn** **1212** 12 Bit MT 12 Bit ST **1213** 12 Bit MT, 13 Bit ST **1214** 12 Bit MT, 14 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**8** CANopen **(OL)** **S** CANopen **(OC)**	**2** 10-30 VDC	**0** Cable, axial **1** Cable, radial **2** M23 Conin 12 pin axial, CW **3** M23 Conin 12 pin radial, CW **4** M23 Connector (Conin), 12 pole, axial, CCW **5** M23 Connector (Conin), 12 pole, radial, CCW **E** Bus Cover with 3 sealed cable exits **F** Bus Cover 1 M12, 5-Pole Connector **H** Bus Cover with 2x M23 Connector (Conin), 9 pole, radial, CW **L** Bus Cover 2 Strain Relief Exits. Internal T-coupler included

DIMENSIONS

Code 3: Mounting



Code 7: Connector



Length (L) Mounting Surface to Rear
For connector types L, and F

Mount (Code 3)	**Single-Turn**	**Multi-Turn**
(**0**) Servo	63.3/2.49	72.3/2.85
(**1**) Clamping	62.3/2.45	71.3/2.81
(**2**) Square Flng	64.8/2.55	73.8/2.91
(**3**) Hubshaft	72.2/2.84	81.2/3.2

SERIES AI25 CANLayer 2 HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **CANbus CAN Layer 2 Interface**
- **Available with multiple shaft configurations**
- **Enclosure ratings of IP64 or IP67**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 10-14 Bit
Resolution Multi-turn: 12 Bit
Linearity: ± 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: CAN High-Speed according to ISO/ DIS 11898
Protocol: CAN 2.0A
Output Code: Binary
Input Power: 10-30 VDC
Intrinsic Current Consumption: 220 mA (ST), 250 mA (MT)
Frequency Response (Baud Rate): Range of 10 through 1000 Kbits/s
Noise Immunity: Tested to EN 61326-1
Electrical Immunity: Tested to EN 61326-1
Termination: Bus Cover with spring terminal clamps; 12 pin Conin CW; Cable with Pigtail

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft Tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 12.3 oz (350 g)
Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+85 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 1,000 m/s² for 6 msec
Vibration: 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™ SERIES AI25 CANLayer 2

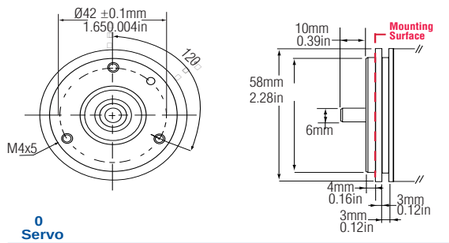
Ordering Information

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

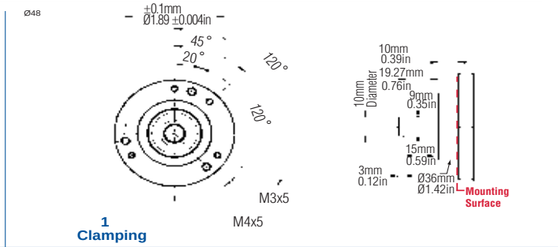
Code 1: Model	Code 2: Bits	Code 3: Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
Ordering Information						
AI25	□□□□	□	□	□	□	□
AI25 Size25 Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **Multi-Turn** **1212** 12 Bit MT 12 Bit ST **1213** 12 Bit MT, 13 Bit ST **1214** 12 Bit MT, 14 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**7** CAN Layer2	**2** 10-30 VDC	**0** Cable, axial **1** Cable, radial **2** M23 Conin 12 pin axial, CW **3** M23 Conin 12 pin radial, CW **4** M23 connector (Conin), 12 pole, axial, CCW **5** M23 connector (Conin), 12 pole, radial, CCW **F** Bus Cover 1 M12, 5-Pole Connector **H** Bus Cover with 2x M23 connector (Conin), 9 pole, radial, CW **L** Bus Cover 2 Strain Relief Exits. Internal T-coupler included

DIMENSIONS

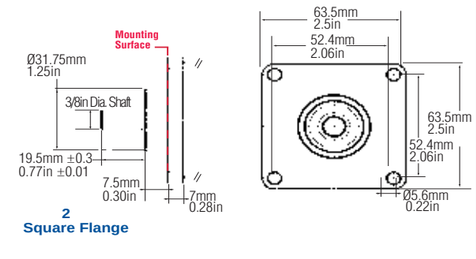
Code 3: Mounting



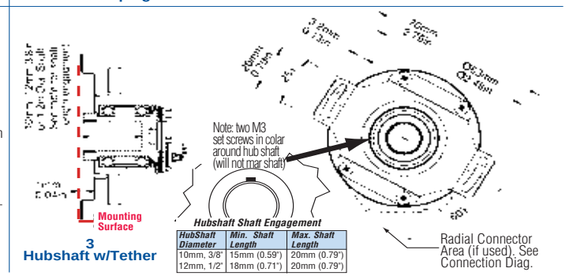
0 Servo



1 Clamping

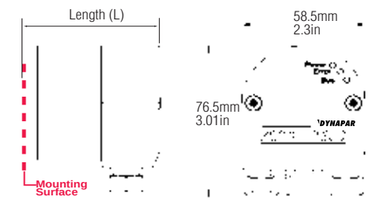


2 Square Flange



3 Hubshaft w/Tether

Code 7: Connector



L
2 Strain Relief Exits

Length (L) Mounting Surface to Rear For connector types L, and F

Mount (Code 3)	Single-Turn	Multi-Turn
(**0**) Servo	63.3/2.49	72.3/2.85
(**1**) Clamping	62.3/2.45	71.3/2.81
(**2**) Square Flng	64.8/2.55	73.8/2.91
(**3**) Hubshaft	72.2/2.84	81.2/3.2

SERIES AI25 DeviceNet HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning
- Onboard Diagnostics
- DeviceNet Interface
- Available with Multiple Shaft Configurations
- Enclosure ratings of IP64 or IP67

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CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 10-14 Bit
Resolution Multi-turn: 12 Bit
Linearity: ± 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Protocol: According to DeviceNet V2.0
Interface: CAN Highspeed according to ISO/ DIS 11898,CAN Specification 2.0 B (11 and 29 bit identifier)
Output Code: Binary
Input Power: 10-30 VDC
Intrinsic Current Consumption: 220 mA (ST), 250 mA (MT)
Transfer Mode:
Poll mode
Bit strobe (time-synchronous for all devices)
Change of State (automatic after change of values)
Cyclic, with adjustable cycle timer
Frequency Response (Baud Rate): 125, 250, 500 kBaud
Noise Immunity: Tested to EN 61326-1
Electrical Immunity: Tested to EN 61326-1
Termination: Bus Cover with spring terminal clamps

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft Tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Weight (approx.): 350 g ST, 400 g MT
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 12.3 oz (350 g)
Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+85 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 1,000 m/s² for 6 msec
Vibration: 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™

SERIES AI25 DeviceNet

Ordering Information

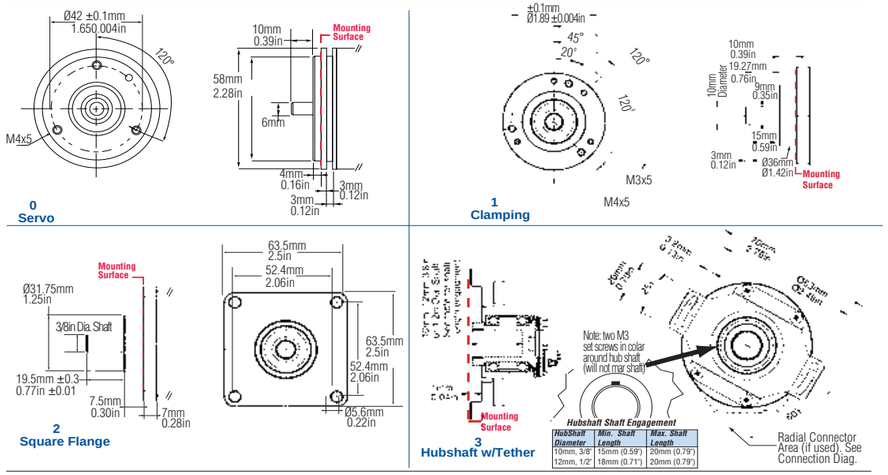
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Output	Code 7: Termination
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Absolute Encoder	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **1212** 12 Bit MT 12 Bit ST **1213** 12 Bit MT 13 Bit ST **1214** 12 Bit MT 14 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**9** Devicenet	**2** 10-30 VDC	**F** Bus Cover 1 M12, 5-Pole Connector **G** Bus Cover 2 Strain Relief Exits and 1 M12, 5-Pole Connector (for Tico display). Internal T-coupler included **L** Bus Cover 2 Strain Relief Exits. Internal T-coupler included

ACCESSORY
Part Number: 3 280 220 + length: TPE cable, 12-core + screen Price: CF

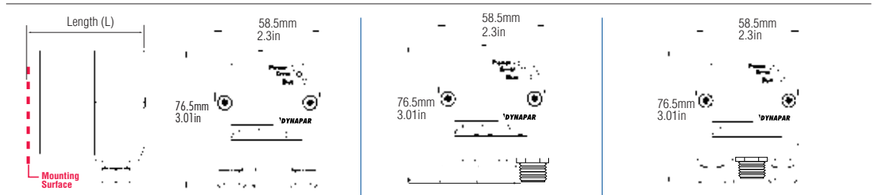
DIMENSIONS

Code 3: Mounting



Hubshaft Diameter	Min. Shaft Length	Max. Shaft Length
10mm, 3/8"	15mm (0.59")	20mm (0.79")
12mm, 1/2"	18mm (0.71")	20mm (0.79")

Code 7: Connector



Length (L) Mounting Surface to Rear
For connector types L, F and G

Mount (Code 3)	Single-Turn	Multi-Turn
(0) Servo	63.3/2.49	72.3/2.85
(1) Clamping	62.3/2.45	71.3/2.81
(2) Square Flng	64.8/2.55	73.8/2.91
(3) Hubshaft	72.2/2.84	81.2/3.2

*M12, 5-Pole Connector used to interface Hengstler Tico 731 LCD display

SERIES AI25 EtherCAT® HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- **Best Shock and Vibration Resistance In Its Class (400G shock, 30G vibration)**
- **High Speed 10,000 RPM Continuous Operation (12,000 RPM Short Term)**
- **Extremely Fast Cycle Times (62.5 µs)**
- **Extended Temperature Range (-40°C... +85°C)**
- **Customizable Resolution and Mounting Style**
- **Device Data: Position, Speed, Temperature, Diagnostic Data, Alarms**
- **Device Configuration: Resolution, Total Measuring Range, Preset, Offset, Direction, Position, Limits, Scaling, Residual Value Function, Speed Limits, Temperature Limits**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 10 - 22 Bit
Resolution Multi-turn: 12 Bit
Linearity:±½ LSB up to 14 Bit
Absolute Accuracy (typ.): ±35”
Repeatability (typ.): ±10”

ELECTRICAL:

Interface: EtherCAT CoE, FoE
Output Code: Binary
Input Power: 7 - 30 VDC
Current w/o load: (typ.) 24V: 85 mA (ST) max; 200 mA (MT)
Device Data: position, speed, temperature, diagnostic data, alarms
Device Configuration: resolution, total measuring range, preset, offset, direction, position limits, scaling, residual value function, speed limits, temperature limits
Updating of values / Cycle Time: 62,5µs min.
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1
Termination: Bus cover with 3x M12 connectors

MECHANICAL

Shaft Diameter: 6-12mm (solid shafts), 9.52mm – 14mm (hub shafts)
Mounting Flanges: Synchro Flange, Clamping Flange, Tether Flange, Square Flange
Shaft Load (axial / radial): 40 N / 80 N
Axial/Radial Endplay of Mating Shaft (Hub Shaft only): ±1.5 mm, ±0.2 mm
Maximum Speed: 10.000 U/min (continuous duty), max. 12.000 U/min (short term)
Starting Torque (at 20 °C): typ. ≤ 0,05 Nm (lower values available upon request)
Moment of Inertia: ca. 3.8 x 10^{-6} kgm^2
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: 4.8 oz. (420 g) ST/ 15.9 oz. (450 g) MT

ENVIRONMENTAL

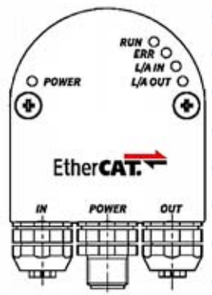
Operating Temperature: -40 °C ... +85 °C
Storage Temperature: -40 °C ... +85 °C
Shock: 400g, 4000 m/s² (2 ms) (half-sine)
Vibration: 30g, 300 m/s² (5 - 500 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating:
Housing: IP65 and IP67
Shaft: IP64 or IP67
General Design: As per DIN EN 61010-1, protection class III, contamination level 2, overvoltage class II

ELECTRICAL CONNECTIONS

Bus cover with 3x M12 connectors

Pin	BusPort IN	Supply voltage	Bus Port OUT
1	TxD+	UB in	TxD+
2	RxD+	N.C.	RxD+
3	TxD-	0 V in	TxD-
4	RxD-	N.C.	RxD
Shield	Shield[1]	Shield[1]	Shield[1]

[1]Shield connected to encoder housing



by DYNAPAR™

SERIES AI25 EtherCAT®

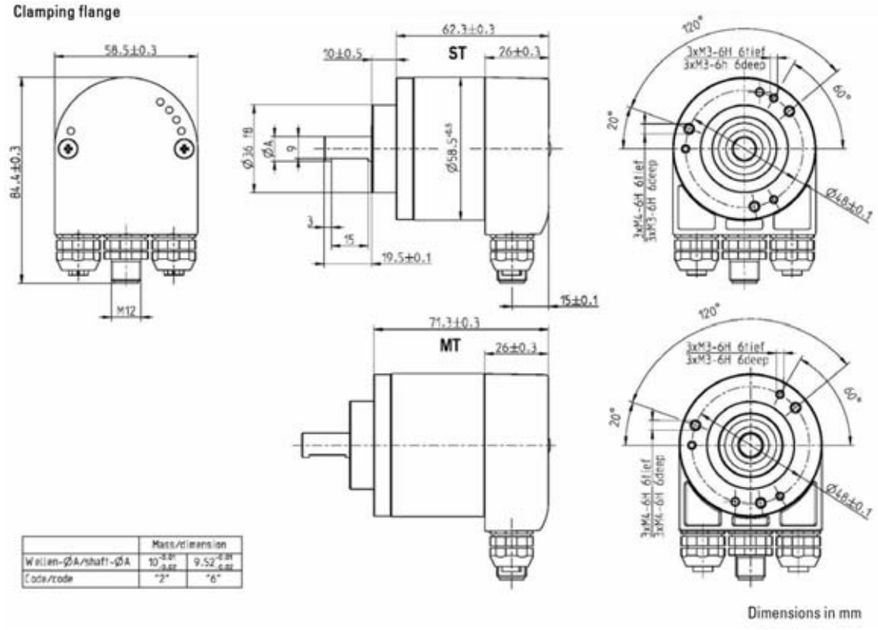
Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	T	2	R
AI25 Size25 Absolute Encoder	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0016** 16 Bit ST **0017** 17 Bit ST **0018** 18 Bit ST **0019** 19 Bit ST **0020** 20 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT, 12 Bit ST **1213** 12 Bit MT, 13 Bit ST **1214** 12 Bit MT, 14 Bit ST **1216** 12 Bit MT, 16 Bit ST **1217** 12 Bit MT, 17 Bit ST **1218** 12 Bit MT, 18 Bit ST **1219** 12 Bit MT, 19 Bit ST **1220** 12 Bit MT 20 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2, 8, 9 or B, C, H and J **1** Clamping* Available when Code 4 is 1,2 or B, C **2** Square Flange** Available when Code 4 is 3, 4, 5, 6, 7 or E **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o Shaft Seal (IP64)** **0** 6 mm **1** 3/8” **2** 10 mm **3** 3/8” Hubshaft **4** 12 mm Hubshaft **5** 1/2” Hubshaft **6** 10 mm Hubshaft **7** 14 mm Hubshaft **8** 12 mm **9** 8 mm **w/ Shaft Seal (IP67)** **A** 6 mm **B** 3/8” **C** 10 mm **E** 12 mm Hubshaft **H** 12 mm **J** 8 mm	**T** EtherCAT **(EC)**	**2** 7-30 VDC	**R** Bus Cover with 3 M12 Connectors

DIMENSIONS

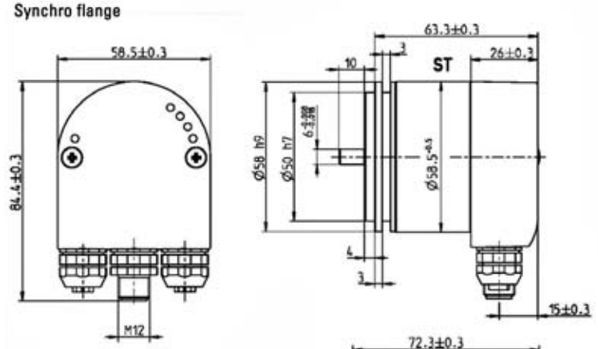
Clamping flange



SERIES AI25 EtherCAT® HENGSTLER™ brand

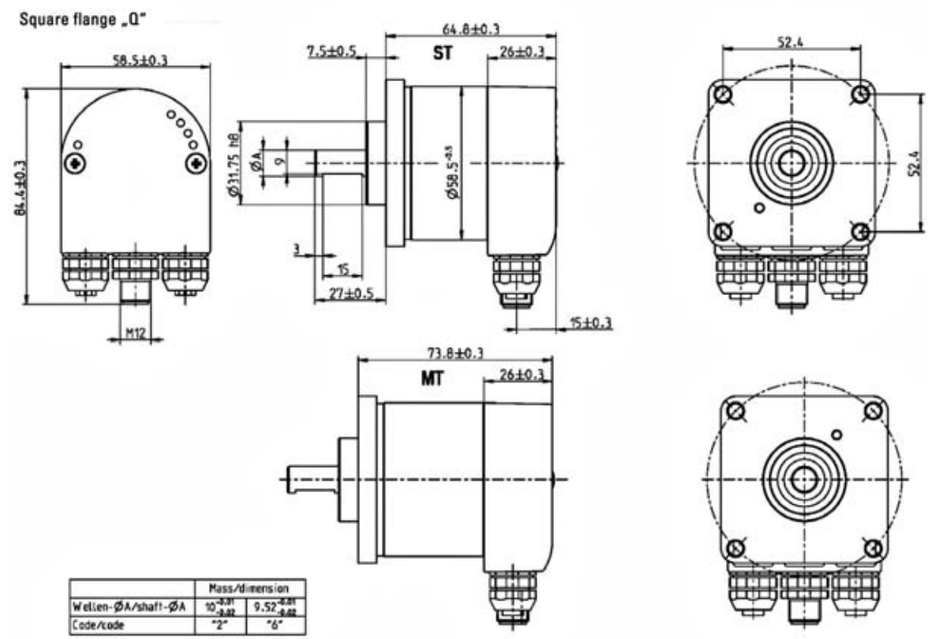
DIMENSIONS

Synchro flange



Dimensions in mm

Square flange „Q"



	Mass/dimension	
Wellen-ØA/shaft-ØA	$10^{-0.01}_{-0.02}$	$9.52^{-0.01}_{-0.02}$
Code/code	"2"	"6"

Dimensions in mm

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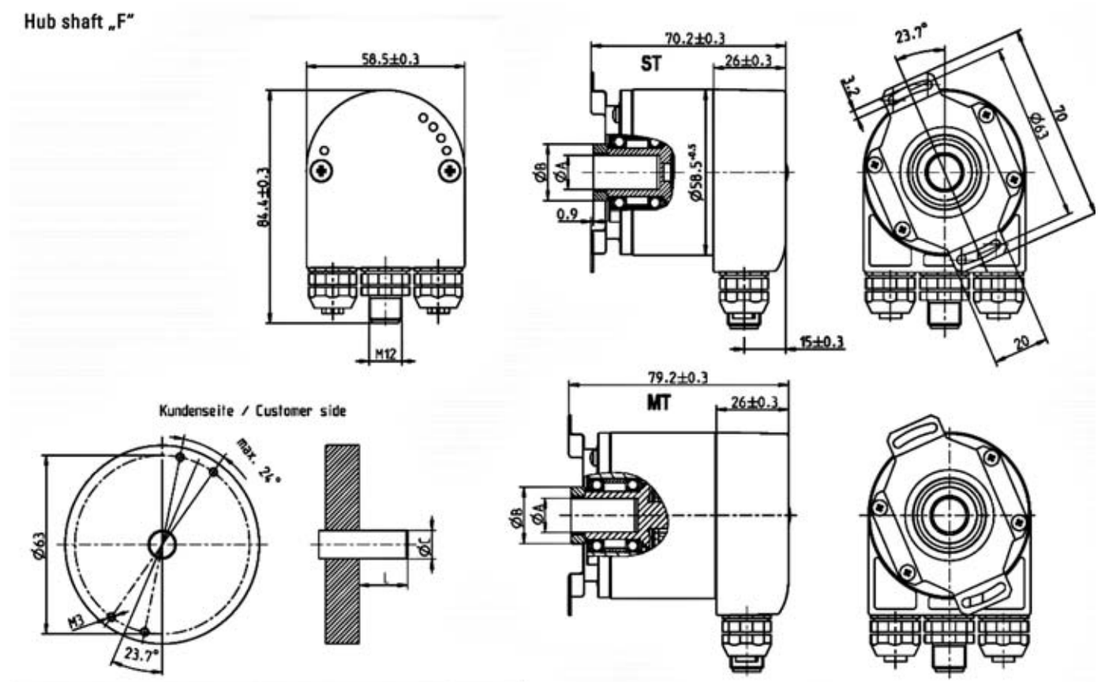
SERIES AI25 EtherCAT®

DIMENSIONS

Hub shaft „F"



	Mass/dimension				Einheit/unit
Hohlwellen-ØA/hollow shaft-ØA	$10^{+0.012}$	$12^{+0.018}$	$9.52^{+0.018}$	$12.7^{+0.018}$	mm
Anschlusswellen-ØC/connecting shaft-ØC	10_{g6}	12_{g6}	9.52_{g6}	12.7_{g6}	mm
Klemmring-ØB/clamping ring-ØB	18	20	18	22	mm
L min.	15	18	15	18	mm
L max.	20	20	20	20	mm
Wellen-Code / shaft code	"2"	"7"	"6"	"E"	

L = Eintauchtiefe der Anschlusswelle in den Geber
L = Length of customers shaft inside of encoder

Dimensions in mm

SERIES AI25 Interbus

HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- **Up to 12 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **Interbus Interface**
- **Available with multiple shaft configurations**
- **Enclosure ratings of IP64 or IP67**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical

Resolution Single-turn: 10 and 12 Bit

Resolution Multi-turn: 12 bit (only available with 12 bit ST resolution)

Linearity: +/- 1/2 LSB

Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)

Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: Interbus, ENCOM Profile K3 (parameterizable)

Output Code: 32 Bit Binary

Input Power: 10-30 VDC

Intrinsic Current Consumption: 220 mA (ST), 250 mA (MT)

Programmable: Direction, scaling factor, preset, Offset

Frequency Response (Baud Rate): 500 kBaud according to ENCOM

Noise Immunity: Tested to EN 61326-1

Electrical Immunity: Tested to EN 61326-1

Termination: Bus Cover with spring terminal clamps; cable with connector

MECHANICAL:

Shaft Size: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount)

Hubshaft Size: 10mm, 12 mm, 3/8", 1/2"

Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)

Shaft Tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial

Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)

Starting Torque: < 1.4 in-oz

Housing Material: Aluminum

Shaft Material: Stainless Steel

Disc Material: Glass

Weight:

Single-Turn: approx. 12.3 oz (350 g)

Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+70 °C

Storage Temperature: -40 °C ...+100 °C

Shock: 100G, 1,000 m/s² for 6 msec

Vibration: 10G, 100 m/s² (10 to 2,000 Hz)

Humidity: Up to 75%, (no condensation allowed)

Enclosure Rating: IP64 or IP67

by DYNAPAR™

SERIES AI25 Interbus

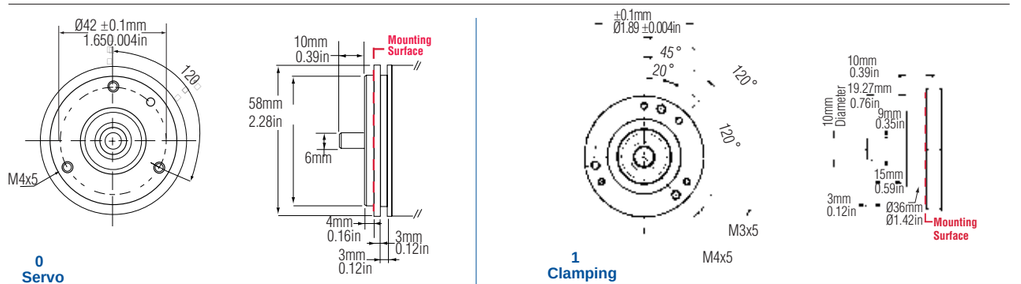
Ordering Information

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

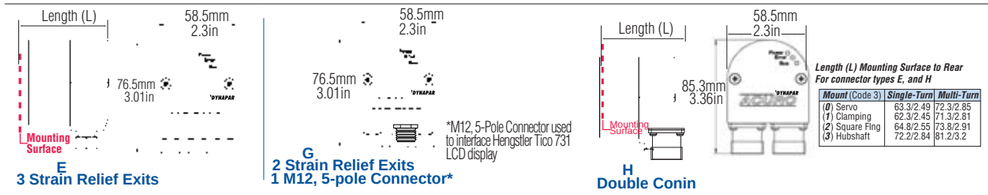
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **Multi-Turn** **1212** 12 Bit MT, 12 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**5** Interbus K3 **U** Interbus K2	**2** 10-30 VDC	**E** Bus Cover 3 Strain Relief Exits. Internal T-coupler included **G** Bus Cover 2 Strain Relief Exits and 1 M12, 5-Pole Connector (for Tico display). Internal T-coupler included **H** Double Conin. Internal T-coupler included

DIMENSIONS

Code 3: Mounting



Code 7: Connector



SERIES AI25 Parallel HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning
- Onboard Diagnostics
- Parallel Interface
- Available with multiple shaft configurations
- Enclosure ratings of IP64 or IP67

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CE EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 12-22 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: Parallel
Output Code: Binary, Gray, Gray Excess
Input Power: 5 VDC -5%/+10% or 10-30 VDC
Intrinsic Current Consumption: 5V: 150 mA (ST), 300 mA (MT); 10-30V:200 mA (ST), 300 mA (MT)
Output Current: 60 mA per bit, short circuit protected on single-turn, 1.5m cable.
Frequency Response (Baud Rate): 500 kHz on single-turn, 1.5m cable.**Update Rate:** 1mHz for Single-turn; 100kHz for Multi-turn
Latch Delay: 20µSec.
Alarm Output: NPN open collector max 5 mA
Maximum Cable Length: 100 m
Status LED: Green = OK, Red = Alarm (IP64 only, not available on connector type J)
Preset Switch: Sets encoder to zero output at present mechanical position (Multi-turn IP64 only, not available on connector type J)

ELECTRICAL (Cont.)

Control Inputs: Latch, Direction, Tri-state (see table below)
Noise Immunity: Tested to EN 61326-1
Electrical Immunity: Tested to EN 61326-1
Termination: Cable, Conin Connector, MS Connector, Cable with Sub-D Connector (MT only)

Control Inputs		
Input	**Logic Level**	**Function**
Direction	1	Ascending code values when turning clockwise
	0	Descending code values when turning clockwise
Latch	1	Encoder data continuously changing at output
	0	Encoder data stored and constant at output
Tristate (ST)	1	Outputs active
	0	Outputs at high impedance (Tristate mode)
Tristate (MT)	1	Outputs at high impedance (Tristate mode)
	0	Outputs active

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Weight (approx.): 350 g ST, 400 g MT
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 12.3 oz (350 g)
Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+100 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 1,000 m/s² for 6 msec
Vibration: 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™

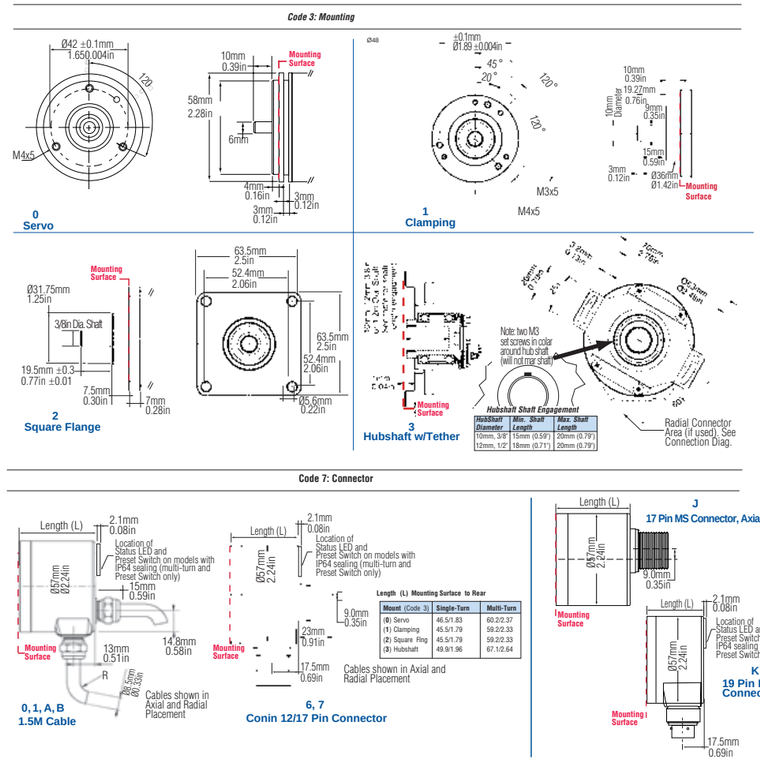
SERIES AI25 Parallel

Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Electrical	Code 7: Termination
AI25	□□□□	□	□	□	□	□
AI25 Size25 Absolute Encoder	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0360** 360 PPR (Gray excess) **0720** 720 PPR (Gray excess) Available when Code 6 is 2 **0412** 4 Bit MT 12 Bit ST **0812** 8 Bit MT 12 Bit ST **1212** 12 Bit MT 12 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**0** Parallel Binary **1** Parallel Gray	**0** 5 VDC **2** 10-30 VDC	**0** Cable, axial **1** Cable, radial Available when Code 2 is 00XX, 0360 or 0720 **6** M23 Conin 17 pin axial, CW **7** M23 Conin 17 pin radial, CW **8** 17 pin Conin axial, CCW **9** 17 pin Conin radial, CCW Available when Code 2 is 1212 **A** Cable 1.5m radial w/37 pin sub-D **B** Cable 1.5m axial w/37 pin sub-D Available when Code 2 is 00XX. Status LED and Preset Switch features not available with "**J**" **J** 17 pin MS axial Available when Code 2 is 00XX or 0720 **K** 19 pin Bayonet radial

DIMENSIONS



SERIES AI25 Parallel HENGSTLER™ brand

Explanation of Terms		
Tristate	+UB = 0 V[2] =	Outputs at high impedance (Tristate mode) Outputs active
$\overline{\text{Tristate}}$	+UB[2] = 0 V =	Outputs active Outputs at high impedance (Tristate-Mode)
$\overline{\text{Latch}}$	+UB[2] = 0 V =	Encoder data continuously changing at output Encoder data stored and constant at output
$\overline{\text{Direction}}$	+UB[2] = 0 V =	Ascending code value when turning cw Descending code value when turning cw
N.C.	=	Not Connected
LSB	=	Least Significant Bit
MSB	=	Most Significant Bit
S0, S1, ...	=	Data bits for resolution per turn
M0, M1, ... (Multiturn)	=	Data bits for number of turns

2) Or unattached (floating)

PVC-cable (Singleturn) 9-12 Bit			
Color	**9 Bit / 360 [3]**	**10 Bit/720 [3]**	**12 Bit**
brn/gry	N.C.	N.C.	S0 (LSB)
red/blu	N.C.	N.C.	S1
vio	N.C.	S0 (LSB)	S2
wht/brn	S0 (LSB)	S1	S3
wht/grn	S1	S2	S4
wht/yel	S2	S3	S5
wht/gry	S3	S4	S6
wht/pnk	S4	S5	S7
wht/blu	S5	S6	S8
wht/red	S6	S7	S9
wht/blk	S7	S8	S10
brn/grn	S8 (MSB)	S9 (MSB)	S11 (MSB)
yel	$\overline{\text{Tristate D0...D8}}$	$\overline{\text{Tristate D0...D9}}$	$\overline{\text{Tristate D0.. D11}}$
pnk	$\overline{\text{Latch}}$ [4]	$\overline{\text{Latch}}$ [4]	$\overline{\text{Latch}}$ [4]
grn	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$
blk	0 V	0 V	0 V
red	5/10...30VDC	5/10...30VDC	5/10...30VDC
brn	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$

3) Increments 4) Binary Only

Connector 17pol. (CONIN) 9-12 Bit			
Pin	**9 Bit / 360 [3]**	**10 Bit / 720 [3]**	**12 Bit**
1	S0 (LSB)	S0 (LSB)	S0 (LSB)
2	S1	S1	S1
3	S2	S2	S2
4	S3	S3	S3
5	S4	S4	S4
6	S5	S5	S5
7	S6	S6	S6
8	S7	S7	S7
9	S8 (MSB)	S8	S8
10	N.C.	S9 (MSB)	S9
11	N.C.	N.C.	S10
12	$\overline{\text{Tristate S0...S8}}$	$\overline{\text{Tristate S0...S9}}$	S11 (MSB)
13	$\overline{\text{Latch}}$ [4]	$\overline{\text{Latch}}$ [4]	$\overline{\text{Latch}}$ [4]
14	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$
15	0 V	0 V	0 V
16	5/10...30VDC	5/10...30VDC	5/10...30VDC
17	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$

3) Increments 4) Binary Only

CONNECTOR WIRING

Connector 17pol. (CONIN) 13-14 Bit		
Pin	**13 Bit**	**14 Bit**
1	S12 (MSB)	S13 (MSB)
2	S11	S12
3	S10	S11
4	S9	S10
5	S8	S9
6	S7	S8
7	S6	S7
8	S5	S6
9	S4	S5
10	S3	S4
11	S2	S3
12	S1	S2
13	S0 (LSB)	S1
14	$\overline{\text{Direction}}$	S0 (LSB)
15	0 V	0 V
16	5/10...30VDC	5/10...30VDC
17	$\overline{\text{Latch}}$ (Binarycode) $\overline{\text{Alarm}}$ (Graycode)	$\overline{\text{Latch}}$ (Binarycode) $\overline{\text{Alarm}}$ (Graycode)

TPE-cable (Multiturn 13-14 Bit) 37 pol. Sub-D		
Color	**Pin**	
brn	2	S0
grn	21	S1
yel	3	S2
gry	22	S3
pnk	4	S4
vio	23	S5
gry/pnk	5	S6
red/blu	24	S7
wht/grn	6	S8
brn/grn	25	S9
wht/yel	7	S10
yel/brn	26	S11
wht/gry	8	M0
gry/brn	27	M1
wht/pnk	9	M2
pnk/brn	28	M3
wht/blu	14	M4
brn/blu	33	M5
wht/red	15	M6
brn/red	34	M7
wht/blk	16	M8
brn/blk	35	M9
gry/grn	17	M10
yel/gry	36	M11
pnk/grn	18	$\overline{\text{Alarm}}$
yel/pnk	10	$\overline{\text{Direction}}$
grn/blu	30	$\overline{\text{Latch}}$
yel/blu	12	Tristate
red	13	10...30 VDC
wht	31	10...30 VDC
blu	1	0 V
blk	20	0 V

by DYNAPAR™

SERIES AI25 Parallel

CONNECTOR WIRING

MS style 17 pin connectors					
	Function		**107865 Cable Accessory***		
	12 Bit	**10 Bit**			
Pin	**4096 CPR**	**1024 CPR**	**Color Code**	**14 BIT**	**13 BIT**
A	Vin		Red	D13 (MSB)	D12 (MSB)
B	N.C.		Violet	D12	D11
C	Latch (binary only)		Green	D11	D10
D	Direction		Orange	D10	D9
E	S1	N.C.	White	D9	D8
F	S3	S1	White/Brown	D8	D7
G	S5	S3	White/Orange	D7	D6
H	S7	S5	White/Green	D6	D5
J	S8	S6	White/Blue	D5	D4
K	S9	S7	White/Violet	D4	D3
L	S11 (MSB)	S9 (MSB)	White/Black/Brown	D3	D2
M	GND		Black	D2	D1
N	S4	S2	White/Red	D1	D0 (LSB)
P	S0 (LSB)	N.C.	Gray	D0 (LSB)	Direction
R	S2	S0 (LSB)	White/Black	GND	GND
S	S6	S4	White/Yellow	Latch	Latch
T	S10	S8	White/Grey	Vin	Vin
	10ft Cable # 107865-0010			NA	
Mating Connector: MS 17 pin style MS3106A-20-29S part # MCN-N8					
*This is a mating connector/cable assembly. Color coding information is provides here for reference					

PVC-cable (Singleturn 13-14 Bit)		
Color	**13 Bit**	**14 Bit**
gry/pnk	N.C	S0 (LSB)
brn/yel	S0 (LSB)	S1
brn/gry	S1	S2
red/blu	S2	S3
vio	S3	S4
wht/brn	S4	S5
wht/grn	S5	S6
wht/yel	S6	S7
wht/gry	S7	S8
wht/pnk	S8	S9
wht/blu	S9	S10
wht/red	S10	S11
wht/blk	S11	S12
brn/grn	S12 (MSB)	S13 (MSB)
yel	$\overline{\text{Tristate S0...S12}}$	$\overline{\text{Tristate S0...S13}}$
pnk	$\overline{\text{Latch}}$ [4]	$\overline{\text{Latch}}$ [4]
grn	$\overline{\text{Direction}}$	$\overline{\text{Direction}}$
blk	0 V	0 V
red	5/10...30VDC	5/10...30VDC
brn	$\overline{\text{Alarm}}$	$\overline{\text{Alarm}}$

4) Binary Only

Bayonet style 19 pin connectors							
					Function		
Pin	**Function 14 Bit**	**112077 Cable Accessory***	**Function 13 it**	**112076 Cable Accessory***	**12 Bit**	**10 Bit**	**110158 Cable Accessory***
	16384 CPR	**Color Code**	**8192 CPR**	**Color Code**	**4096 CPR**	**1024 CPR**	**Color Code**
A	S13 (MSB)	White/Black/Brown	S12	White/Black/Brown	S11 (MSB)	S9 (MSB	White/Black/Brown
B	S12	White/Grey	S11	White/Grey	S10	S8	White/Grey
C	S11	White/Violet	S10	White/Violet	S9	S7	White/Violet
D	S10	White/Blue	S9	White/Blue	S8	S6	White/Blue
E	S9	White/Green	S8	White/Green	S7	S5	White/Green
F	S8	White/Orange	S7	White/Orange	S6	S4	White/Orange
G	S7	White/Yellow	S6	White/Yellow	S5	S3	White/Yellow
H	S6	White/Red	S5	White/Red	S4	S2	White/Red
J	S5	White/Brown	S4	White/Brown	S3	S1	White/Brown
K	S4	White/Black	S3	White/Black	S2	S0 (LSB)	White/Black
L	S3	Brown	S2	Blue	S1	N.C.	White
M	S2	Blue	S1	White	S0 (LSB)	N.C.	Grey
N	S1	White	S0 (LSB)	Grey	N.C	N.C.	
P	S0 (LSB)	Grey	GND	Black	GND		Black
R	Direction	Orange	Direction	Orange	Direction		Orange
S	Case	Violet	Case	Violet	Case		Violet
T	GND	Black	GND	Yellow	GND		Yellow
U	Latch	Green	Latch	Green	Latch (binary only)		Green
V	Vin	Red	Vin	Red	Vin		Red
10ft Cable # 112077-0010			**10ft Cable #** 112076-0010		**10ft Cable #** 110158-0010		
Mating Connector: 19 pin Bayonet style PT06E-14-19S part # 606219-0001							

*This is a mating connector/cable assembly. Color coding information is provided here for reference

SERIES AI25 Profibus HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning
- Onboard Diagnostics
- Profibus Interface
- Available with Multiple Shaft Configurations
- Enclosure ratings of IP64 or IP67

E321846 cULus LISTED CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Optical
Resolution Single-turn: 10-14 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:
Interface: Profibus-DP, Encoder Profile
Output Code: Binary
Input Power: 10-30 VDC
Intrinsic current Consumption: 220 mA (ST), 250 mA (MT)
Programmable: Resolution, Preset, Direction
Special Functions: Speed, Acceleration, Operating time
Frequency Response (Baud Rate): is automatically set within a range of 9.6 KBaud through 12 MBaud
Noise Immunity: Tested to EN 61326-1
Electrical Immunity: Tested to EN 61326-1
Termination: Bus Cover with spring terminal clamps

MECHANICAL:
Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Maximum Shaft Load:
6 mm shaft: 13 lb axial, 24 lb radial
10 mm shaft: 9 lb axial, 13 lb radial
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Weight (approx.): 350 g ST, 400 g MT
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 12.3 oz (350 g)
Multi-Turn: approx. 14.1 oz. (400 g)

ENVIRONMENTAL:
Operating Temperature: -40 °C ...+85 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 1,000 m/s² for 6 msec
Vibration: 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™

SERIES AI25 Profibus

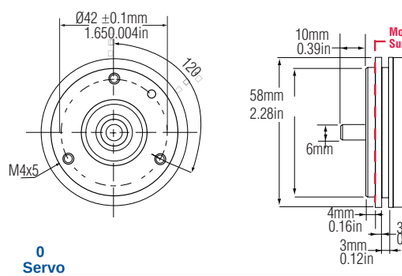
Ordering Information

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

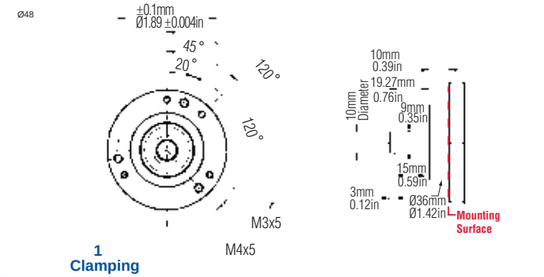
Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Output	Code 7: Termination
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit Single-Turn **1213** 12 Bit Multi-Turn, 13 Bit Single-Turn **1214** 12 Bit Multi-Turn, 14 Bit Single-Turn	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**6** Profibus	**2** 10-30 VDC	**E** Bus Cover 3 Strain Relief Exits. Internal T-coupler included **G** Bus Cover 2 Strain Relief Exits and 1 M12, 5-Pole Connector (for Tico display). Internal T-coupler included **H** Bus Cover Double Conin. Internal T-coupler included **R** Bus Cover with 3x M12

DIMENSIONS

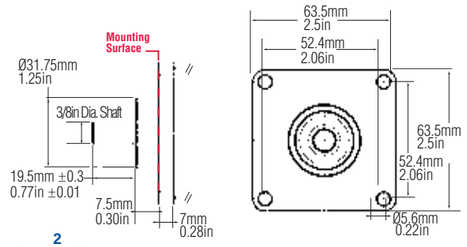
Code 3: Mounting



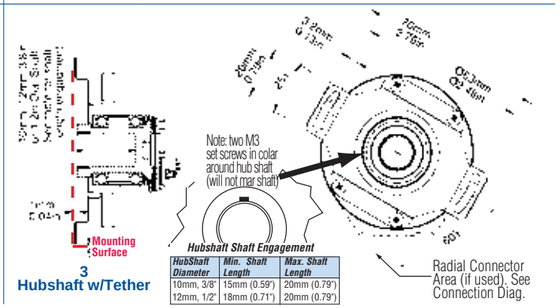
0
Servo



1
Clamping

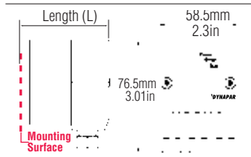


2
Square Flange

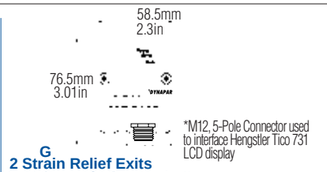


3
Hubshaft w/Tether

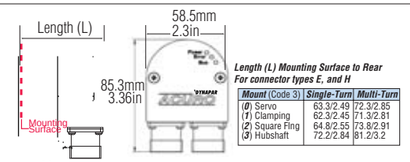
Code 7: Connector



E
3 Strain Relief Exits



G
2 Strain Relief Exits
1 M12, 5-pole Connector*



H
Double Conin

SERIES AI25 SSI HENGSTLER™ brand

Absolute Encoder

IND Industrial Duty

Key Features

- Up to 22 Bit True Singleturn Positioning
- Onboard Diagnostics
- SSI Interface
- Available with multiple shaft configurations
- Enclosure ratings of IP64 or IP67

E321846

EN 61326-1

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 12-22 Bit
Resolution Multi-turn: 12 Bit
Linearity: ± ½ LSB (± 1 LSB for resolution > 13 Bit
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: SSI
Output Code: Binary, Gray, Gray Excess, parameterization through AcuroSoft
Parameterization: Resolution code type, sense of rotation, warning, alarm
Input Power: ±10% 5 VDC or 10-30 VDC
Intrinsic Current Consumption:
5V: 100 mA (ST), 150 mA (MT);
10-30V: 100 mA (ST), 150 mA (MT)
Permissible Load: max 30mA
Output Current: 60 mA per bit, short circuit protected
Frequency Response (Baud Rate): 500 kHz
Maximum Cable Length: 400 m
Control Inputs: Direction
Alarm Output: Alarm bit
Status LED: Green = OK, Red = Alarm (IP64 only)
Preset Switch: Sets encoder to zero output at present mechanical position (IP64 only)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1
Termination: Cable, axial or radial;
M23 connector (Conin), 12 pole, axial or radial;
M12 connector, 8 pole, axial or radial

MECHANICAL:

Shaft Diameter: 6 mm (Servo Mount), 10 mm (Clamping Mount), 3/8" (Square Flange Mount),
Hubshaft: 10mm, 12 mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft Tolerance (hubshaft only): ± 1.5 mm axial, ± 0.2 mm radial
Shaft Load (hub shaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 9.2 oz (260 g)
Multi-Turn: approx. 11 oz. (310 g)

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+100 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 100G, 1,000 m/s² for 6 msec
Vibration: 10G, 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67

by DYNAPAR™ SERIES AI25 SSI

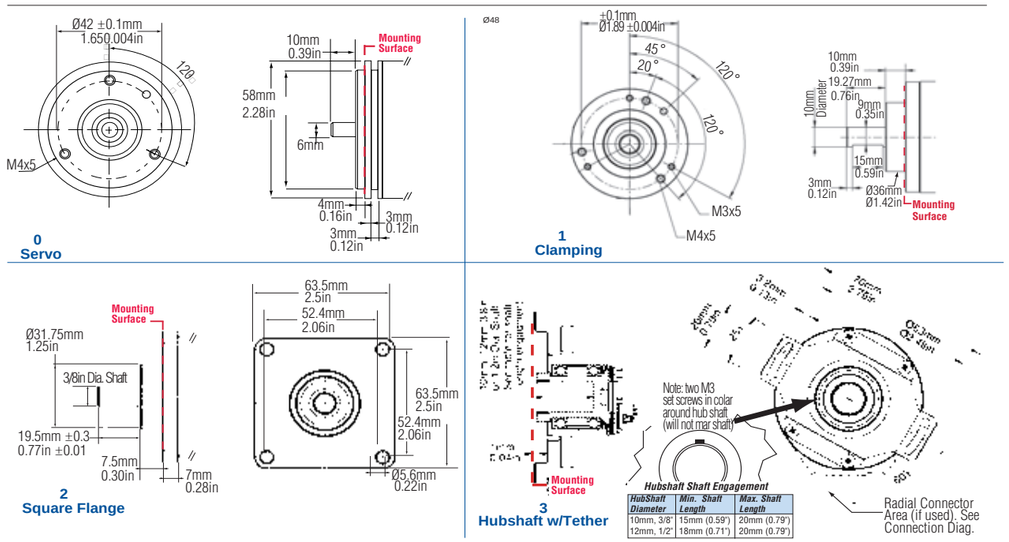
Ordering Information

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

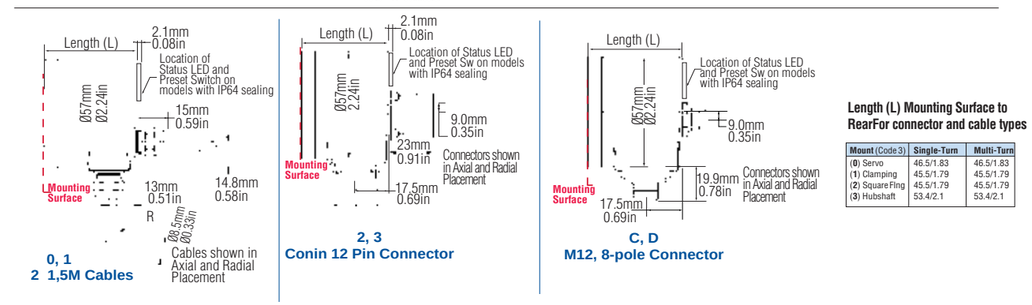
Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Output	Code 7: Termination
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Absolute Encoder	**0010** 10 Bit ST **0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT 12 Bit ST **1213** 12 Bit MT 13 Bit ST **1214** 12 Bit MT 14 Bit ST **1217** 12 Bit MT 17 Bit ST **1219** 12 Bit MT 19 Bit ST **1222** 12 Bit MT 22 Bit ST	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 1, 2 or B, C **1** Clamping* **2** Square Flange** Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/ Tether† * 58mm Dia. ** 2.5" Square † 63mm BC	**w/o shaft seal (IP64)** **0** 6 mm **1** 3/8" **2** 10 mm **3** 3/8" Hubshaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10mm Hubshaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm Available only when Code 2 is ST (Single Turn) **K** 1/4" Hubshaft	**2** SSI Gray **(SG)** **3** SSI Binary **(SB)** **F** SSI Gray (+Sin-Cos 1Vpp) **(SC)** **Q** SSI Binary + high active Preset **(SR)** **P** SSI Gray + high active Preset **(SH)** **E** SSI Binary (+ sin/cos 1Vpp **(SD)** **R** SSI Binary Extended **(SE)**	**0** 5 VDC **2** 10-30 VDC	**0** Cable, axial **1** Cable, radial **2** M23 Conin 12 pin axial, CW **3** M23 Conin 12 pin radial, CW **4** M23 12 pin axial, CCW **5** M23 12 pin radial, CCW **C** M12 , 8-pole connector axial **D** M12 , 8-pole connector radial

DIMENSIONS

Code 3: Mounting



Code 7: Connector



Length (L) Mounting Surface to RearFor connector and cable types

Mount (Code 3)	Single-Turn	Multi-Turn
(0) Servo	46.5/1.83	46.5/1.83
(1) Clamping	45.5/1.79	45.5/1.79
(2) Square Fling	45.5/1.79	45.5/1.79
(3) Hubshaft	53.4/2.1	53.4/2.1

SERIES AI25 SSI HENGSTLER™ brand

SSI Data Format

Bits	T1 - T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
10	S9 - S0	0	0	0	0	S9	S8	S7	S6	S5
12	S11 - S2	S1	S0	0	0	S11	S10	S9	S8	S7
13	S12 - S3	S2	S1	S0	0	S12	S11	S10	S9	S8
14	S13 - S4	S3	S2	S1	S0	0	S13	S12	S11	S10
17	S16 - S7	S6	S5	S4	S3	S2	S1	S0	0	S16

Bits	T1 - T12	T13 - T21	T22	T23	T24	T25	T26	T27	T28	T29
1212	M11 - M0	S11 - S3	S2	S1	S0	0	0	M11	M10	M9
1213	M11 - M0	S12 - S4	S3	S2	S1	S0	0	M11	M10	M9

S9, S8 Data Bits for resolution per turn.
M11, M10 Data Bits for number of turns.
T1, T2 SSI Clock number

S9 - S0 Data Bits S9, S8, S7, S6, S5, S4, S3 Etc.
M11- M0 Turn Data Bits M11, M10, M9, M8, Etc.

ELECTRICAL CONNECTIONS

M23 connector (Conin), 12 pole / cable
Interface SB and SG

Cable	M23 (Conin)	Signal
brown [3]	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	$\overline{\text{Direction}}$ [1]
red	6	N.C.
violet	7	N.C.
white [3]	8	DC 5/ 10 - 30 V
	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output [2]

[1] $\overline{\text{Direction}}$: UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw
[2] Connected with 0 V in the encoder.
Use this output to lay Direction on "0V" if required.
[3] use only thin wires ∅ = 0.14 mm)

M23 connector (Conin), 12 pole / cable
Interface SC

Cable	M23 (Conin)	Signal
brown [2]	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
white/green	4	A+
blue	5	$\overline{\text{Direction}}$ [1]
red/blue	6	B+
brawn/green	7	A-
white [2]	8	DC 5/10 - 30 V
grey/pink	9	B-
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	Sense

[1] $\overline{\text{Direction}}$: +UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw
[2] use only thin wires (∅ = 0.14 mm)

8 pole M12

Colour	Pin	Signal
white	1	DC 10 - 30 V
brown	2	0 V
	3	N.C.
green	4	$\overline{\text{Clock}}$
pink	5	Data
yellow	6	Clock
blue	7	$\overline{\text{Direction}}$ [1]
grey	8	$\overline{\text{Data}}$

View on connector

[1] $\overline{\text{Direction}}$: + UB or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

12 pin M23 CONIN Connector CW	**Part Number: G3 539 202**
12 pin M23 CONIN Connector CCW	**Part Number: G3 539 229**
Bulk Cable (sold by the meter)	**Part Number: 113101-0001**
Cable Assembly (with CW Connector)	
3M	**Part Number: G1 542 003**
5M	**Part Number G1 542 004**
10M	**Part Number: G1 542 005**
Cable Assembly (with CCW Connector)	
3M	**Part Number: G1 542 010**
5M	**Part Number G1 542 011**
10M	**Part Number: G1 542 012**
8 pin M12 Connector	**Part Number: G3 539 597**
Bulk Cable (sold by the meter)	**Part Number: G3 280 220**
Cable Assembly (with Connector)	
3 meters	**Part Number: G1 565 329**
5 meters	**Part Number G1 565 330**
10 meters	**Part Number: G1 565 331**

ABSOLUTE ENCODERS

DYNAPAR™

Notes

SERIES AC36

HENGSTLER™ brand

Absolute Encoder

SSM Servo Small Motor

Key Features

- Up to 22 bit singleturn and 12 bit multiturn true absolute positioning
- Available Interfaces include BiSS or SSI Interface
- Small 38mm diameter housing
- Solid or Hubshaft version available
- Wide -40 to +100C temperature range

E321846 c UL us LISTED · CE EN 61326-1 · RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Optical
Resolution Single-turn: 12 - 22 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ±35”
Repeatability: ±7”

ELECTRICAL:
Interface: BiSS, SSI
Input Power: 5 VDC -5 %/+10 %, 7 - 30 VDC
Current w/o Load: 100 mA (ST), 150 mA (MT)
Permissible Load: Max. 30 mA
Output Code: Gray, Binary
Drives: Clock and Data / RS422
Incremental signals: Sine-Cosine 1 Vpp
Number of pulses: 2048
3dB limiting frequency: 500 kHz
Alarm output: Alarm bit (SSI Option), warning and alarm bit (BiSS)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1
Termination: Cable, Axial or Radial

MECHANICAL
Housing Diameter: 38.1 mm
Shaft Size: 6 mm (Solid shaft), 8 mm (Hubshaft)
Axial Endplay of Mounting Shaft: (Hubshaft) ± 0.5 mm
Radial Runout of Mating Shaft: (Hubshaft) ± 0.05 mm
Maximum Speed: max. 10 000 rpm (continuous), max. 12 000 rpm (short term)
Starting Torque typ.: ≤ 1 Ncm (at 20°C)
Moment of Inertia: ca. 2,5 x 10-6 kgm²
Housing Material: Stainless Steel
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
Single-Turn: approx. 2.8 oz (80 g)
Multi-Turn: approx. 4.6 oz. (130 g)

ENVIRONMENTAL
Operating Temperature: -40 °C ...+100°C
Storage Temperature: -25 °C ...+85 °C
Shock: 100G, 1000 m/s² (6 ms)
Vibration: 10G, 100 m/s² (10 ... 2000 Hz)
Humidity: 75% without condensation
Enclosure Rating: IP64 (housing), IP50, IP64 (shaft)

ELECTRICAL CONNECTIONS

SIGNAL	CABLE COLOR
5 / 7-30 V (U_B)	White
0 V (U_N)	Brown
Clock	Yellow
$\overline{\text{Clock}}$	Green
Data	Pink
$\overline{\text{Data}}$	Grey
A	White/Green [1]
$\overline{\text{A}}$	Brown/Green [1]
B	Red/Blue [1]
$\overline{\text{B}}$	Grey/Pink [1]
5V Sensor	Violet [1]
0V Sensor	Black [1]

[1]only with “SC”

by DYNAPAR™

SERIES AC36

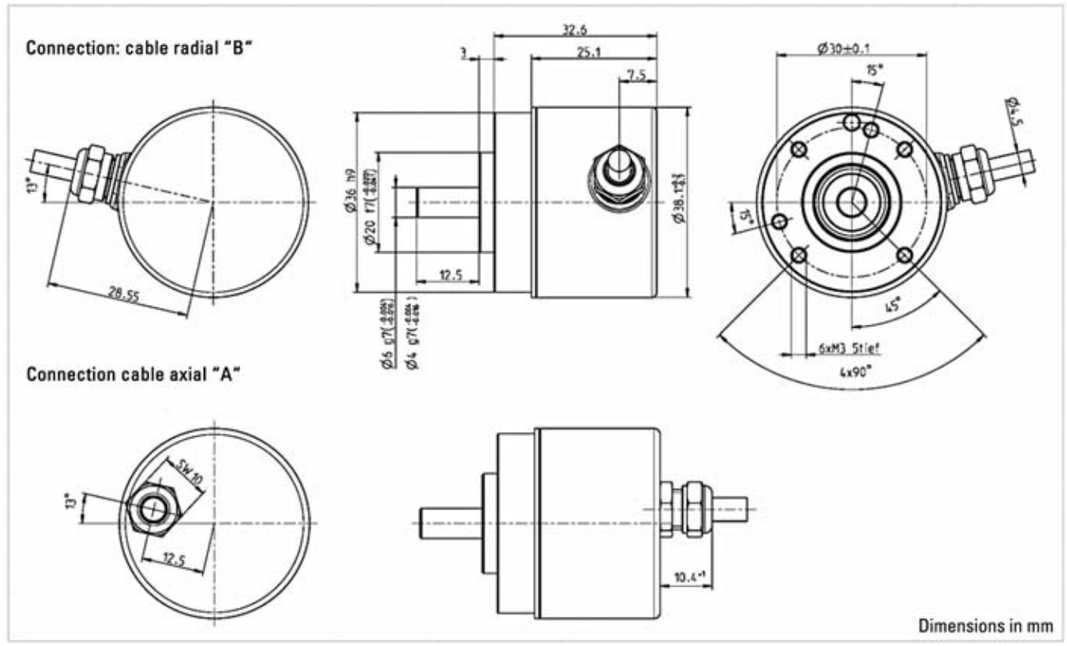
Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Flange/Protection/Shaft	Code 5: Interface	Code 6: Termination	Code 7: Cable
AC36 □□□□		□	**R.41**	□□	□	□
Ordering Information						
Series AC36 Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT, 12 Bit ST **1213** 12 Bit MT, 13 Bit ST **1214** 12 Bit MT, 14 Bit ST **1217** 12 Bit MT, 17 Bit ST **1219** 12 Bit MT, 19 Bit ST **1222** 12 Bit MT, 22 Bit ST	**A** 5 VDC **E** 7-30 VDC	R.41 Pilot Flange, IP64, 6 mm F.1R Spring Tether, IP50, 8mm Hubshaft U.1R Spring Tether, IP50, 8mm Hubshaft	**BI** BISS-B **BC** BiSS-B (+SinCos 1Vpp) **BE** BiSS-C **BV** BiSS-C (+SinCos 1Vpp) **SB** SSI Binary **SD** SSI Binary (+SinCos 1Vpp) **SG** SSI Gray **SC** SSI Gray (+Sin/Cos 1Vpp)	**A** Cable, axial, 12 pole **B** Cable, radial, 12 pole	**Blank** 1.5 M cable **DO** 3 M cable **FO** 5 M cable **KO** 10 M cable **PO** 15 M cable **UO** 20 M cable **VO** 25 M cable

DIMENSIONS

Pilot Flange “R”

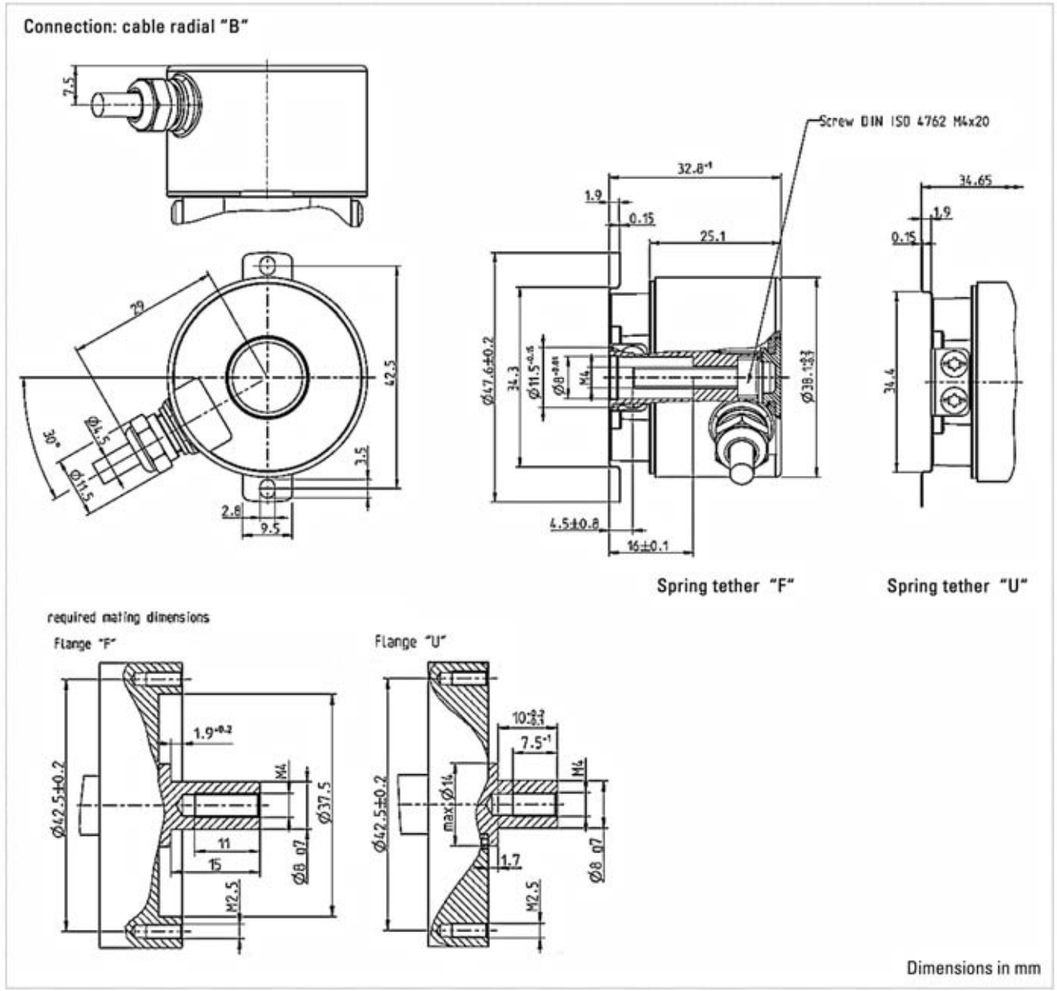


SERIES AC36

HENGSTLER™ brand

DIMENSIONS (Cont.)

Hubshaft



ABSOLUTE ENCODERS

DYNAPAR™

Notes

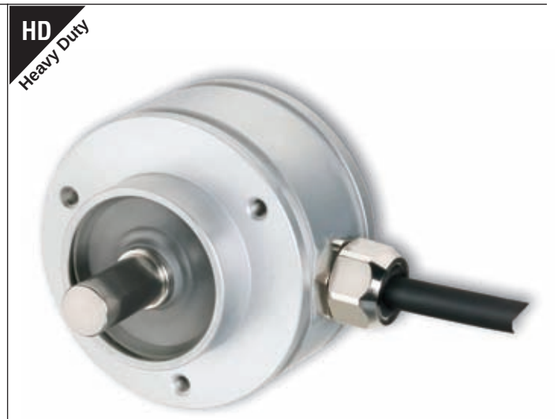
SERIES AR62/AR63 HENGSTLER™ brand

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

HD Heavy Duty



10R-036823 LISTED EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Magnetic
Absolute Accuracy: ±1°
Repeatability: ±0.2°

ELECTRICAL:

Noise Immunity: Tested to EN61326-1
Parametrization: Preset
Termination: Cable radial, PVC; M12 connector, radial; Cable radial for maritime approval

Interface: CANopen & SSI
Input Power: 10-30VDC (+10%)
Resolution: Single-turn: 12 Bit
Resolution: Multi-turn: 12, 16 Bit

Interface: Analog
Input Power: 17-30VDC (+10%)
Resolution Analog:
AV: 0…10V (Voltage)
A4: 4…20mA (Current)
Measuring Range in Degrees: 90°, 180°, 360°, others on request
Measuring Range in Resolutions: 4, 8, 16 revolutions, others on request
Control Inputs: Preset, Direction

MECHANICAL:

Shaft Diameter: 3/8”, 10 mm
Shaft Speed (maximum): 5000 rpm
Shaft Load (axial/radial): 300 N max.
Mounting Depth: 32 mm
Maximum Speed: max. 5,000 rpm;
Maximum Speed Analog: max. 1,500 ron (continuous), Max 5,000 rpm (short term)
Starting Torque typ.: ≤ 4.5 Nm

MECHANICAL (Cont.):

Moment of inertia: 25 gcm²
Housing Material: Stainless Steel
Shaft Material: Stainless Steel
Weight:
AR62 w/ 1.5m cable: approx. 480g
AR62 w/ connector M12: approx. 250g
AR63 w/ 1.5m cable: approx. 700g
AR63 w/ connector M12: approx. 470g

ENVIRONMENTAL:

Standard Operating Temperature:
SSI: -40 °C ...+100 °C
With Maritime Approval (DNV GL): -40 °C ...+85 °C
Canopen, Analog: -40 °C ...+85 °C
Storage Temperature: -15 °C ...+85 °C
Shock: 1000 m/s² (6 ms)
Vibration: 100 m/s² (10 ... 2000 Hz)
Humidity: 75%, without condensation
Enclosure Rating: IP67 or IP69K

ELECTRICAL CONNECTIONS – SSI

Cable Color	PIN	Signal
Yellow	6	Clock
Pink	5	Data
Green	4	$\overline{\text{Clock}}$
Grey	8	$\overline{\text{Data}}$
Blue	7	Signal Direction [1]
White	1	UB
Brown	2	0V
Red	3	Preset (set to 0) [1]
Screen	Screen	Screen

Note:
[1] Preset and Direction high active :
Signal level high: ≥ 66% Ub; low: ≤ 15% Ub or unconnected
Bounce time preset: >2s
Bounce time direction: < 1 ms (dynamic)

ELECTRICAL CONNECTIONS – CANopen

Color Cable	Signal	M12, 5 Pole	M12, 8 Pole
Yellow	CAN in+	4	6
Green	CAN in-	5	4
Pink	CAN out+	-	5
Grey	CAN out-	-	8
Blue	CAN GND in	1	7
Black*	CAN GND out	-	3
White	UB	2	1
Brown	0 V	3	2
Screen	Screen	Screen	Screen

* Cable color is Red for extension cable

ELECTRICAL CONNECTIONS – Analog

Cable Color	PIN	Signal
Pink	5	0 ... 10 V (Voltage), or 4 ... 20 mA (Current)
Blue[2]	7	Direction (change value counting)
Grey	8	AGND (Analog ground)
Red[2]	3	Preset (set to 0)
White	1	UB
Brown	2	0 V (connected with AGND)
Yellow[1]	6	Diagnostic 1
Green[1]	4	Diagnostic 2
Screen	Screen	Screen

[1] Diagnostic signals only for service purposes.
The cable wires have to be isolated.
[2] Preset and Direction low active: Signal level high ≤ DC 2 V

by DYNAPAR™ SERIES AR62/AR63

Ordering Information

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

SSI, CANopen

Code 1: Model	Code 2: Resolution [1]	Code 3: Output	Code 4: Flange [2]/Protection/Shaft	Code 5: Interface [3, 4]	Code 6: Termination [5, 6, 7, 8]	Code 7: Cable Length
AR62/63	□□□□	□	□.□□	□	□	□
Ordering Information						
AR62 Aluminum **AR63** Stainless Steel	**0012** 12 Bit ST **1212** 12 Bit MT + 12 Bit ST **1312** 13 Bit MT + 12 Bit ST **1612** 16 Bit MT + 12 Bit ST	**E** DC 10-30 V	**L.72** Synchro-Clamping, IP67 10 mm **L.92** Synchro-Clamping, IP69K, 10 mm **Q.76** Square flange, IP67, 9.52 mm **Q.96** Square flange, IP69K, 9.52 mm	**OL** CAN Open [9] **SB** SSI-Binary **SG** SSI-Gray	**B** Radial Cable **F** Radial Cable for Maritime (DNV GL) **8** M12 radial connector, 8-pin **5** M12 radial connector, 5-pin	Available only when Code 6 is B or F **Blank** 1.5m **D0** 3m **F0** 5m **K0** 10m **P0** 15m **U0** 20m **V0** 25m **W0** 30m **X0** 40m **Y0** 50m

[1] Other resolution on request
[2] Square flange with stainless housing (AR63) on request
[3] Standard setting CANopen: Bus termination not activated. External bus terminal resistor required.
[4] E1 approval only with interface “OL” CANopen available.
[5] M12 Connector not available in stainless steel. IP67 and IP69k only guaranteed if mating plug connected correctly.
[6] DNV GL approval only with connection “5”, “8” or “F” available.
[7] Maximum operating temperature with connection “F”: -40°C ... +85°C.
[8] Connection “5” M12-connector 5-pole only available with interface “OL” CANopen.
[9] E1 approval (only available with interface “OL” CANopen)

ANALOG

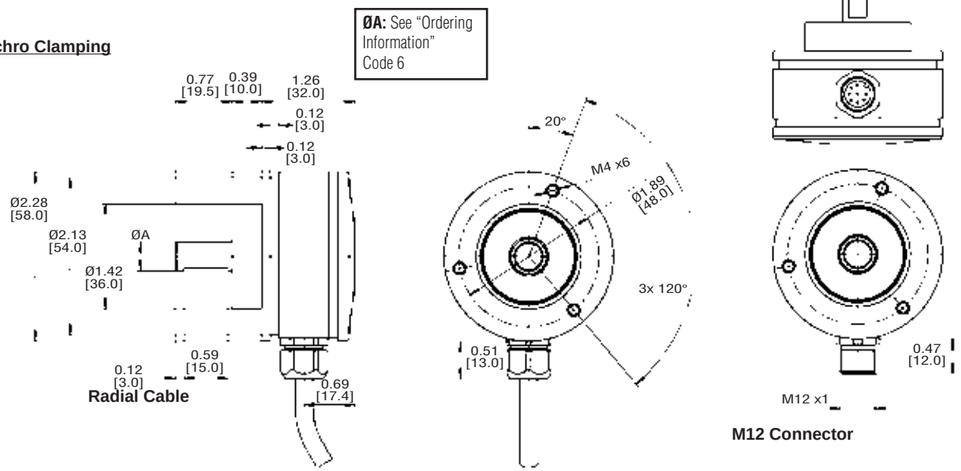
Code 1: Model	Code 2: Resolution [1,2]	Code 3: Output	Code 4: Flange [3]/Protection/Shaft	Code 5: Interface [3, 4]	Code 6: Termination [4, 5]	Code 7: Cable Length
AR62/63	□□□□	□	□.□□	□	□	□
Ordering Information						
AR62 Aluminum **AR63** Stainless Steel	Measuring range in degrees: **G090** 90° **G180** 180° **G360** 360° Other on request Measuring range in revolutions: **U004** 4 revolutions **U008** 8 revolutions **U016** 16 revolutions Other on request	**F** DC 17-30 V	**L.72** Synchro-Clamping, IP67 10 mm **L.92** Synchro-Clamping, IP69K, 10 mm **Q.76** Square flange, IP67, 9.52 mm **Q.96** Square flange, IP69K, 9.52 mm	**AV** Analog 0 … 10V **A4** Analog 4 … 20mA	**B** Radial Cable **F** Radial Cable for Maritime (DNV GL) **8** M12 radial connector, 8-pin	Available only when Code 6 is B or F **Blank** 1.5m **D0** 3m **F0** 5m **K0** 10m **P0** 15m **U0** 20m **V0** 25m **W0** 30m **X0** 40m **Y0** 50m

[1] Coding of the measuring range in degree or revolutions.
[2] Measuring Range G360 = 360° similar to former definition 0012 = 12 Bit ST.
[3] Square flange with stainless housing (AR63) on request.
[4] M12 Connector not available in stainless steel. IP67 and IP69k only guaranteed if mating plug connected correctly.
[5] DNV GL approval only with connection “5”, “8” or “F” available.
[6] Maximum operating temperature with connection “F”: -40°C ... +85°C.

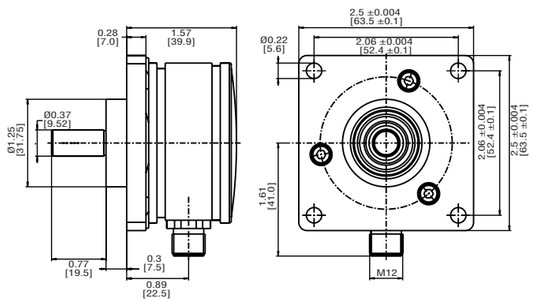
SERIES AR62/AR63 HENGSTLER™ brand

DIMENSIONS inch [mm]

Synchro Clamping



Square Flange



ABSOLUTE ENCODERS

DYNAPAR™

Notes

SERIES AD35 HENGSTLER™ brand

Single Turn Absolute Encoder

SSM Servo Small Motor

Key Features

- **Short Mounting Depth Allows Installation in Tight Motor Endbells**
- **Up to 10,000 RPM Speed Capability for Majority of Servomotor Applications**
- **8mm Hubshaft Mount for Easy Installation**

CE EN61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute
Resolution Single-turn: 12-22 Bit
Absolute Accuracy: ±35”
Repeatability: ±10”

ELECTRICAL:

Interface: BiSS & SSI
Input Power: DC 5 V -5 %/+10 % or DC 7 - 30 V
Current w/o load typ.: 100 mA
Permissible load: Max. 30 mA
Output Code: Gray
Drives: Clock and Data / RS422
Incremental Signals: Sine-Cosine 1 Vpp
Number of Pulses: 2048
3dB Limiting Frequency: 500 kHz
Alarm Output: Alarm bit (SSI Option), Warning bit and alarm bit (BiSS)
Frequency Response (Baud Rate):
SSI: 100kHz ... 1,5MHz
BiSS-B/ BiSS-C: 100kHz ... 10 MHz

ELECTRICAL (Cont.):

Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse Polarity and Short Circuit Protected for the 7-30 VDC Only
Termination: Cable, PCB connector, 12 pole

MECHANICAL:

Housing Diameter: 38.1 mm
Shaft Diameter: 8mm (Hub Shaft)
Shaft Material: Stainless Steel
Shaft Load (solid-shaft): Axial ≤5 N; Radial ≤10 N
Shaft Load (hubshaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Maximum Speed: max. 10,000 rpm (continuous), max. 12,000 rpm (short term)
Starting torque typ.: ≤ 1 Nm
Moment of inertia: Approx. 2.5 gcm²
Mounting: Spring Tether (Hub Shaft)
Housing Material: Plastic
Disc Material: Glass
Weight: 80g (2.8 oz), (ST)

ENVIRONMENTAL:

Standard Operating Temperature: -15 °C ...+100 °C
Storage Temperature: -15 °C ...+85 °C
Shock (DIN EN 60068-2-27): 1,000 m/s² for 6 msec duration (IEC 68-2-27)
Vibration (DIN EN 60068-2-6): 100 m/s² (10 to 2000 Hz) (IEC 68-2-6)
Humidity: 75%, non-condensing
Enclosure Rating: (EN 60529/A1:2000-02): IP40 Housing & Shaft

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Function	DC 5V / 7-30V (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	White	Yellow	Gray/Pink	Brown	Brown/Green	Pink
PIN	1a	2a	3a	4a	5a	6a
Function	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	5V Sensor
Color	Gray	White/Green	Black	Red/Blue	Green	Violet

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

Analog signals (1Vpp) only available with interface SC (SSI Gray +1Vpp), BC (BiSS-B +1Vpp) and BV (BiSS-C +1Vpp)

by DYNAPAR™ SERIES AD35

Ordering Information

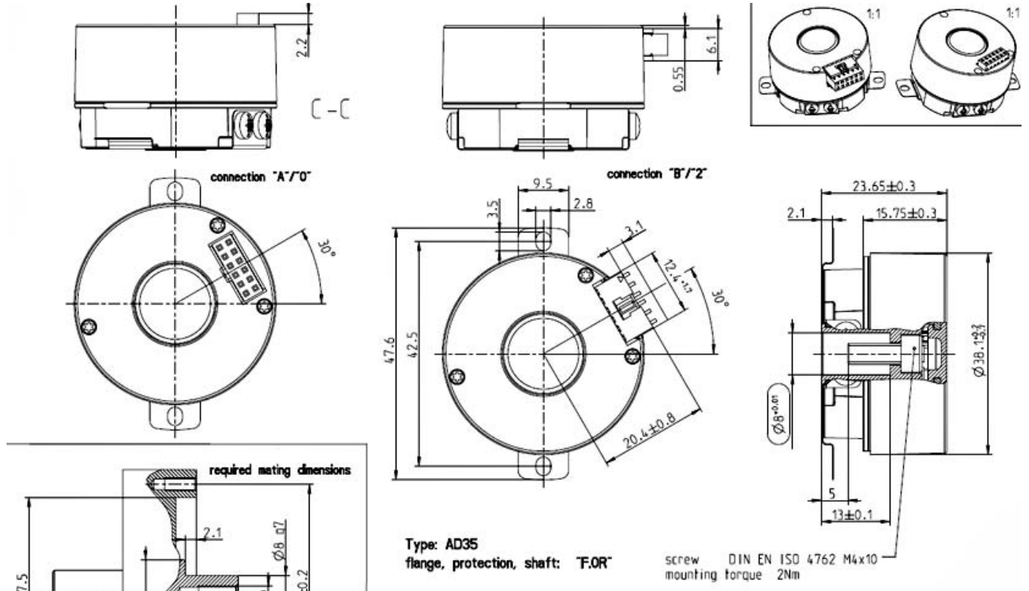
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Output	Code 4: Flange/Protection/Shaft	Code 5: Interface	Code 6: Termination
AD35	□□□□	□	□.□□	□□	□
AD35 Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST	**A** 5 VDC* **E** 7-30 VDC	**F.0R** Spring Tether F, IP40, 8mm Hub Shaft **U.0R** Spring Tether U, IP40, 8 mm Hub Shaft	**BC** BiSS-B (+SinCos 1Vpp) **SC** SSI Gray (+SinCos 1Vpp) **BV** BiSS- C (+SinCos 1Vpp) **SD** SSI-Binary (+SinCos 1Vpp) BI, SG, BE, SB available ONLY when Code 6: is A or B **BI** BiSS-B **BE** BiSS- C **SB** SSI-Binary **SG** SSI-Gray	**0** PCB Connector, Axial,12 pole **2** PCB Connector, Radial,12 pole **A** PCB Connector, Axial,12 pole with Mating Connector and 0.5 m Cable **B** PCB Connector, Radial,12 pole with Mating Connector and 0.5 m Cable

*No inverse-polarity protection for 5V power supply.

DIMENSIONS mm

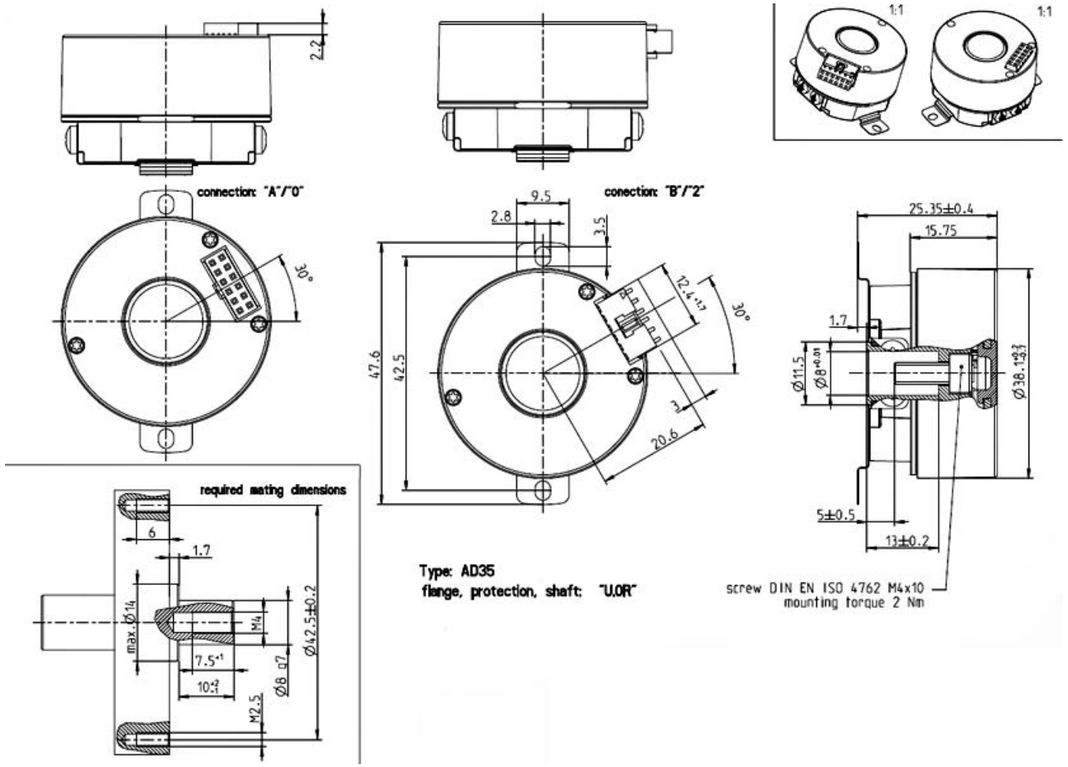
WITH SPRING TETHER “F”



SERIES AD35 HENGSTLER™ brand

DIMENSIONS mm

WITH SPRING TETHER "U"



DYNAPAR™

Notes

SERIES AD36 HENGSTLER™ brand

Single- / Multi- Turn Absolute Encoder

SSM Servo Small Motor

Key Features

- **Compact Dimensions Compatible with Size 15 Resolvers**
- **Up to 22 Bit Singleturn and 12 Bit True Multiturn Absolute Positioning**
- **Optional Sinewave 1Vpp Output for Easy Integration Into Older Controls**

CE EN61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute
Resolution Single-turn: 12-22 Bit
Resolution Multi-turn: 12 Bit
Absolute Accuracy: ±35"
Repeatability: ±7"

ELECTRICAL:

Interface: BiSS & SSI
Input Power: DC 5 V -5 %/+10 % or DC 7 - 30 V
Current w/o load typ.: 5V: 100 mA (ST), 150 mA (MT), 10-30V: 100 mA (ST), 150 mA (MT)
Permissible load: Max. 30 mA
Output Code: Gray
Drives: Clock and Data / RS422
Incremental Signals: Sine-Cosine 1 Vpp
Number of Pulses: 2048
3dB Limiting Frequency: 500 kHz
Alarm Output: Alarm bit (SSI Option), Warning bit and alarm bit (BiSS)

ELECTRICAL (Cont.):

Frequency Response (Baud Rate):
SSI: 100kHz ... 1,5MHz
BiSS-B/BiSS-C: 100kHz ... 10 MHz
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse Polarity and Short Circuit Protected for the 7-30 VDC Only
Termination: Cable, PCB connector, 12 pole

MECHANICAL:

Housing Diameter: 38.1 mm
Shaft Diameter: 8mm (Hollow Shaft)
Shaft Material: Stainless Steel
Shaft Load (solid-shaft): Axial ≤5 N; Radial ≤10 N
Shaft Load (hub shaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Maximum Speed: max. 10 000 rpm (continuous), max. 12 000 rpm (short term)
Starting torque typ.: 1 Ncm
Moment of inertia: Approx. 2.5 gcm²
Mounting: Spring Tether (Hollow Shaft)
Housing Material: Plastic
Disc Material: Glass
Weight: 80g (2.8 oz.) (ST) / 130g (4.6 oz.)(MT)

ENVIRONMENTAL:

Standard Operating Temperature:
-40 °C ...+120 °C
Storage Temperature: -15 °C ...+85 °C
Shock (DIN EN 60068-2-27):
1,000 m/s² for 6 msec duration (IEC 68-2-27)
Vibration (DIN EN 60068-2-6):100 m/s² (10 to 500 Hz) (IEC 68-2-6)
Humidity: 75%, non-condensing
Enclosure Rating: (EN 60529/A1:2000-02): IP40 Housing & Shaft

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Function	DC 5V / 7-30V (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	White	Yellow	Gray/Pink	Brown	Brown/Green	Pink
PIN	1a	2a	3a	4a	5a	6a
Function	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	5V Sensor
Color	Gray	White/Green	Black	Red/Blue	Green	Violet

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

Analog signals (1Vpp) only available with interface SC (SSI Gray +1Vpp), BC (BiSS-B +1Vpp) and BV (BiSS-C +1Vpp)

by DYNAPAR™ SERIES AD36

Ordering Information

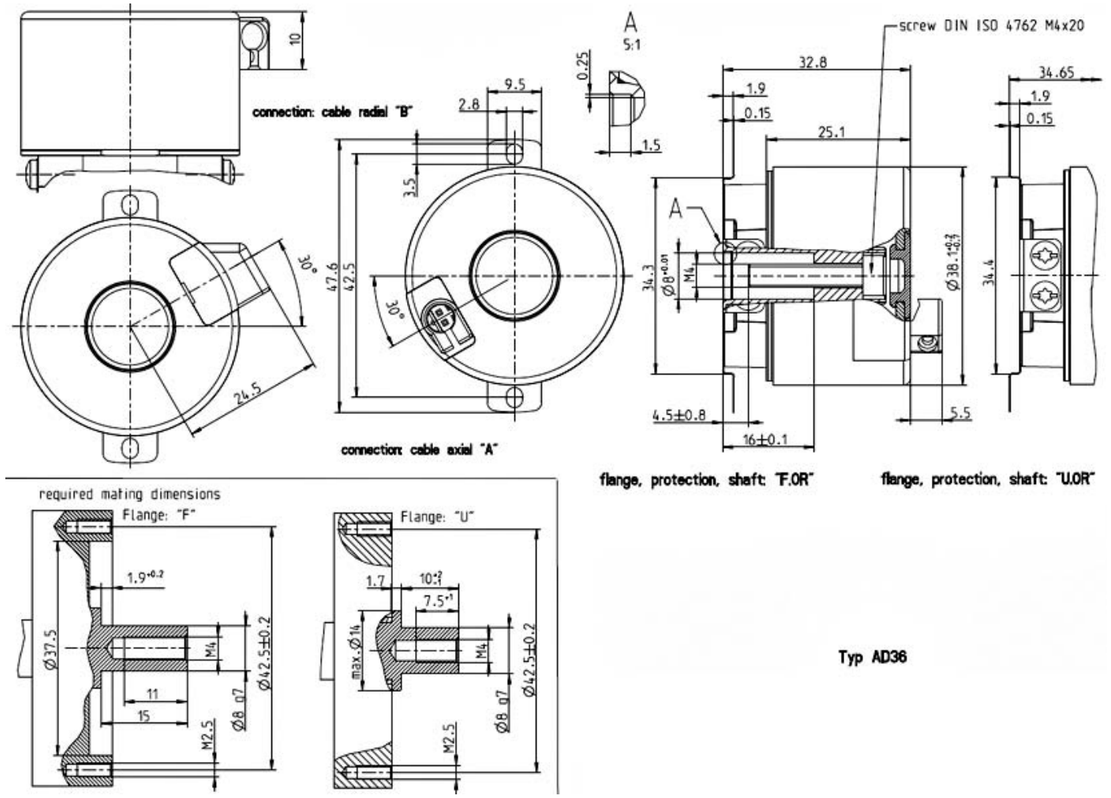
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Flange/Protection/Shaft	Code 5: Output	Code 6: Termination
AD36	□□□□	□	□.□□	□□	□
AD36 Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST **0022** 22 Bit ST **1212** 12 Bit MT +12 Bit ST **1213** 12 Bit MT +13 Bit ST **1214** 12 Bit MT +14 Bit ST **1217** 12 Bit MT +17 Bit ST **1219** 12 Bit MT +19 Bit ST **1222** 12 Bit MT +22 Bit ST	**A** 5 VDC* **E** 7-30 VDC	**F.0C** Spring Tether F, IP40, 8mm Through Hollow Shaft **F.0R** Spring Tether F, IP40, 8mm Hub Shaft **U.0R** Spring Tether U, IP40, 8 mm Hub Shaft **U.0C** Spring Tether U, IP40, 8 mm Through Hollow Shaft	**BC** BiSS-B (+SinCos 1Vpp) **SC** SSI Gray (+SinCos 1Vpp) **BV** BiSS- C (+SinCos 1Vpp) **SD** SSI-Binary (+SinCos 1Vpp) BI, SG, BE, SB available ONLY when Code 6: is A or B **BI** BiSS-B **BE** BiSS- C **SB** SSI-Binary **SG** SSI-Gray	**0** PCB Connector, Axial,12 pole **2** PCB Connector, Radial,12 pole **A** PCB Connector, Axial,12 pole with Mating Connector and 0.5 m Cable **B** PCB Connector, Radial,12 pole with Mating Connector and 0.5 m Cable

*No inverse-polarity protection for 5V power supply.

DIMENSIONS mm

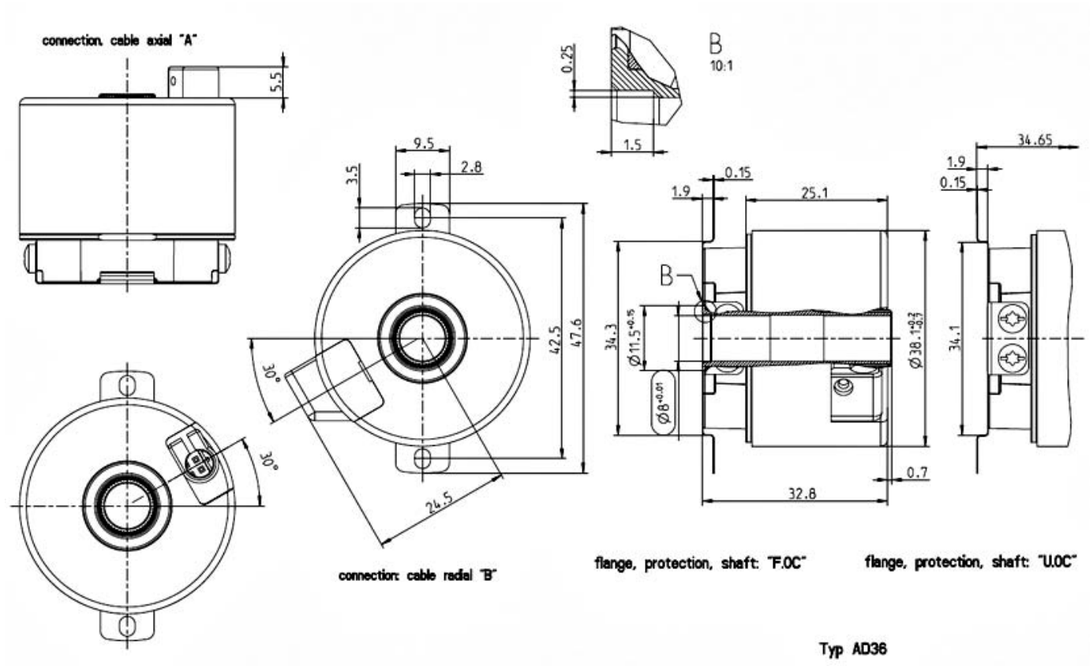
HUB SHAFT WITH SPRING TETHER "F"



SERIES AD36 HENGSTLER™ brand

DIMENSIONS mm

HOLLOW SHAFT WITH SPRING TETHER "F"



DYNAPAR™

Notes

SERIES AD37 HENGSTLER™ brand

Absolute Functional Safety Encoder

HD Heavy Duty

Key Features

- **Single Cable Solution with ACURO® Link Interface for 2 and 4 Wire Applications**
- **Encoder For Functional Safety Applications (SIL2 PLd, SIL3 PLe, category 3)**
- **Single and Multi-Turn Encoder For High Performance Motion Control**
- **Motor Winding Temperature Sensor Input**
- **Wide Operating Temperature Range (-40°C to +115°C)**
- **Up To 12,000 RPM Continuous Operation**
- **Motor and Drive Data Can Be Stored In "Electronic Data Sheet (EDS)" Inside Encoder**

CE EN61326-1 RoHS c UL us LISTED SIL2 PLd SIL3 PLe

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Single-Turn Optical; Multi-Turn Magnetic
Resolution Single-turn: 20 Bit Standard (others available on request)
Resolution Multi-turn: 12 Bit (magnetic)
Absolute Accuracy: ± 36''
Repeatability: ± 10''

ELECTRICAL:
Data Protocol: ACURO® Link for Single Cable Solution
Supply Voltage: 7 - 12 VDC
Current Consumption: Typically 12 VDC: 60 mA (without Load)
Electrical Interface: 4Wire: RS485; 2Wire: Modulated upon supply voltage
Electronic Data Sheet (EDS): 512 bytes of storage for drive data
OEM Memory: 7.5 kbytes of storage for motor and drive data
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse Polarity and Short Circuit Protected
Termination (with strain relief):
ECU Interface - PCB connector (axial)
Motor winding temperature sensor input (axial)
Data Retention in Non-Volatile MT Memory (without power supply): 1 Year at 120°C; 14 years at 35°C

MECHANICAL
Housing Diameter: max. 39.3 mm
Shaft: Shaft with integrated Double-Cardanic coupling hub
Mounting Depth: 28 mm
Mounting Flange: Direct Flange Mount (fixing screws M3)
Shaft Load: Axial: 20 N; Radial: 55 N
Axial Endplay of Mating Shaft: + 1 mm / - 0.5 mm max.
Radial Runout of Mating Shaft: ± 0.1 mm max.
Maximum Speed: 6,000-12,000 rpm (continuous duty)
Starting Torque: typ. ≤ 1 Ncm
Moment of Inertia: 1.05 x 10^{-6} kgm²
Maximum Angular Acceleration: 2.5 x 10^{5} rad/sec²
Housing Material: Aluminum / Plastic
Shaft Material: Stainless Steel
Weight: approx. 70 g (ST or MT)

ENVIRONMENTAL
Operating Temperature: -40°C ... +115°C
Storage Temperature: -30°C ... +80°C
Shock (DIN EN 60068-2-27:2010): 1000 m/s² (6 ms), 100g
Vibration (DIN EN 60068-2-6:2008): 300 m/s² (10 ... 2000 Hz), 20g
Humidity: Up to 75%, (No Condensation Allowed)
Enclosure Rating: IP40 Housing & Shaft
General Design: as per EN IEC 61010-1, protection class III, contamination level 2, over-voltage class II

SAFTEY
Design Functional Safety AD37S:
SIL2 according to EN IEC 61508, 62061, 61800-5-2, PLd according to EN ISO 13849-1
Design Functional Safety AD37E:
SIL3 according to EN IEC 61508, 62061, 61800-5-2, PLe according to EN ISO 13849-1
Resolution for Save Position: 9 Bit Singleturn
PFH-value: 1.22 x 10^{-9} per hour
MTTFd: 482 years
DCavg: 90.93%
Realizable Safety Function According to EN 61800-5-2:
SS1 (Safe Stop 1)[1]
SS2 (Safe Stop 2)[1]
SOS (Safe Operating Stop)
SDI (Safe Direction)
SLS (Safe Limited Speed)
SLI (Safe Limited Increment)
SLA (Safe Limited Acceleration)
SSR (Safe Speed Range)
SAR (Safe Acceleration Range)

[1] Deceleration Controlled (-d) or Ramp Monitored (-r)

by DYNAPAR™

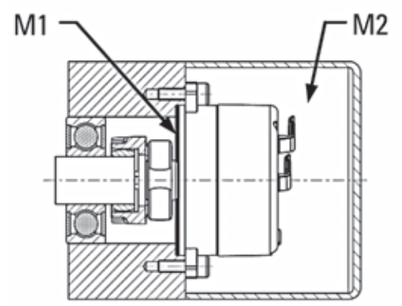
SERIES AD37

SPECIFICATIONS (Cont.)

TEMPERATURE CHARACTERISTICS

Operating Temperature [1]	-40°C ... +115°C
Ambient Temperature [2]	-40°C ... +105°C @6,000 rpm -40°C ... +95°C @9,000 rpm -40°C ... +85°C @12,000 rpm
Storage Temperature [3]	-30°C ... +80°C

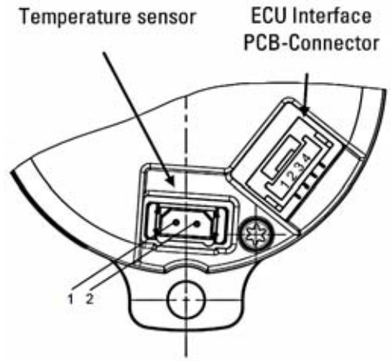
[1] See Measuring Point M1
[2] See Measuring Point M2
[3] Due to Packaging



ELECTRICAL CONNECTIONS

PCB-Connector, 4 Pole with Strain Relief		
PIN	Signal 4 Wire	Signal 2 Wire
1	UB+	UB+ & DATA+
2	DATA+	
3	DATA-	
4	UB-	UB- & DATA-
Motor Winding Temperature Sensor Input, 2 pole, with strain relief [2]		
PIN	Signal	
1	KTY+	
2	KTY-	

[2] Insulation Resistance According to EN IEC 60204- 1 PELV/SELV



SERIES AD37 HENGSTLER™ 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: Flange/Protection/Shaft	Code 5: Interface	Code 6: Connection
AD37□	□□□□	□	□.□□	□□	□
AD37 Absolute Encoder **AD37S** SIL PLd **AD37E** SIL3 PLe	**0017** 17 Bit ST* **0019** 19 Bit ST* **0020** 20 Bit ST¹ **1217** 17 Bit ST* + 12 Bit MT* **1219** 19 Bit ST + 12 Bit MT* **1220** 20 Bit ST¹ + 12 Bit MT * On Request ¹ 9 Bit ST resolution for safe position	**G** 7-12 VDC	**Z.0W** Two-Eared Flange, IP40, Shaft with Integrated Coupling Hub	**4W** ACURO® Link 4 Wire **2W** ACURO® Link 2 Wire* *On Request	**9** Data & Power Supply Connector, Axial, 4 Pole + Motor Temperature Sensor, Axial 2 Pole

ACCESSORIES
Coupling

AD37 Coupling	Part Number
For shaft size 6 mm	G1 572 028
For shaft size 8 mm	G1 572 029
For shaft size 10 mm	G1 572 030
For shaft size 12 mm	G1 572 031

*Other sizes available upon request

ACCESSORIES
Motor Connection Cables

Motor Connection Cable with Connector	Part Number
Encoder power/interface harness assembly, 30 cm, 4-pin AD37-Series connector on one end with cut wires on the opposite end	G1 572 019
Encoder KTY motor winding temperature sensor harness assembly, 30 cm, 2-pin AD37-Series connector on one end and cut wires on the opposite end	G1 572 020

TECHNICAL MANUALS

	Ordering Code
Implementation Guide and User Manual, English	G2 572 032
Protocol description, English	G2 572 040

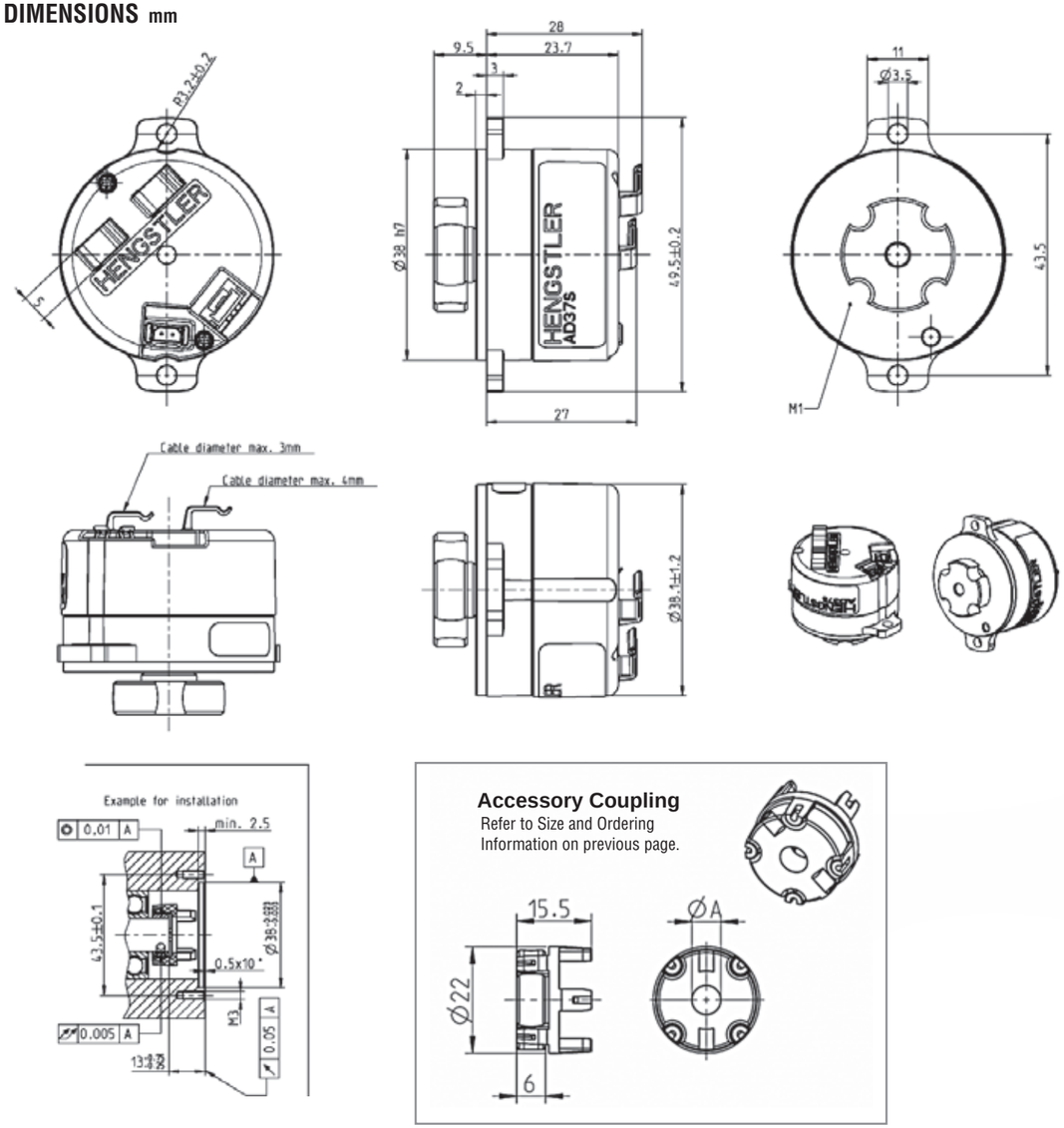
SOFTWARE

	Ordering Code
IP Core code (for incorporation into drive, if needed)	On Request

by DYNAPAR™

SERIES AD37

DIMENSIONS mm



Resolvers

A Resolver is an electromagnetic transducer that can be used in a wide variety of position and velocity feedback applications which includes light duty/servo, light industrial or heavy duty applications. Because the resolver is an analog device and the electrical outputs are continuous through one complete mechanical revolution, the theoretical resolution of a single speed resolver is infinite. Because of its simple transformer design and lack of any on board electronics, the resolver is a much more rugged device than most any other feedback device and is the best choice for those applications where reliable performance is required in those high temperature, high shock and vibration, radiation and contamination environments which makes the resolver the sensible design alternative for shaft angle encoding.

A resolver can be used in a wide range of demanding applications, from wood processing to semiconductor fabrication, from radiation treatment machines to steel mills. They can be frameless or housed and are used in applications that are environmentally demanding. This mean extreme temperatures, shock and vibration. These applications can be aerospace, military, CNC, off highway vehicles and radioactive (for example nuclear reactors and medical).

Resolver Highlights

RH25 — PAGE 3.21

KEY FEATURES:

- Rugged, Housed Resolver now available in a Hub-shaft Design
- Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings
- High Temperature Rating of 125°C Continuous Duty
- Rugged Housing with IP54 Rating
- Various Connector Options

R56 — PAGE 3.25

KEY FEATURES:

- Harowe Resolver in NorthStar Housing
- Large Outer Bearings Isolate Shaft Loads
- Foot Mount or 56 C-Face Mount
- Excellent Zero-Speed Output
- Suitable Replacement for the Reliance Automax Resolvers 800123-R, 800123-S, 800123-1R and 800123-1S*

RF25 — PAGE 3.19

KEY FEATURES:

- Flange Mount Rugged Housing Immune to Oil, Salt, Water & Dust
- Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings
- Withstands 200g Shock and 40g Vibration
- Shaft Seal Standard
- Suitable Replacement for the Reliance Automax Resolvers 800123-2R and 800123-2S* RoHS CERTIFIED

SIZE 15 FRAMELESS — PAGE 3.03

KEY FEATURES:

- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

R25 — PAGE 3.17

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
- High Temperature Rating of 125°C Continuous Duty
- Available in Square and Servo Mount

SERIES 11/R11 — PAGE 3.15

KEY FEATURES:

- Brushless Construction is Ideal for Brushless Servo Motors
- Shortest Mounting Depth in the Industry for Easy Mounting
- Up to 125°C Temperature Range
- Radiation-Hardened Models Available

Size 10 Frameless

Harowe™ brand

Heavy Duty Brushless Resolvers

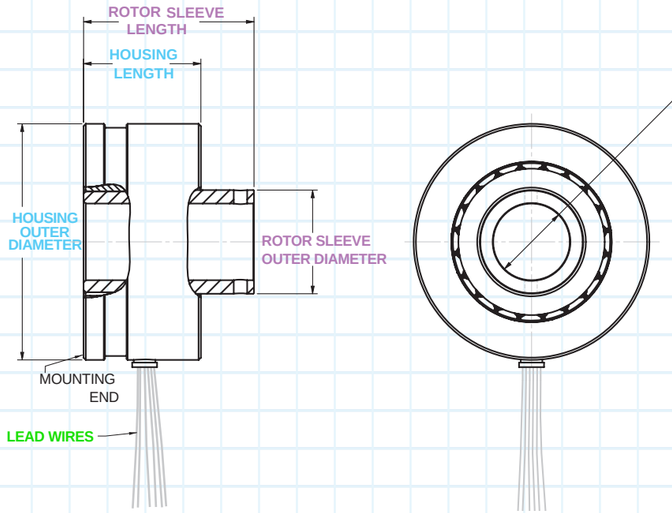
HD Heavy Duty

RoHS
Most Models

Key Features

- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

SPECIFICATIONS



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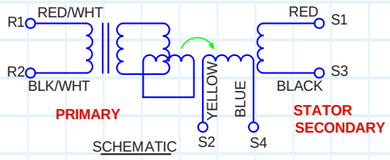


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ. 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 10 Frameless

by DYNAPAR™

10BRCX — 600 — B 12 B A

FAMILY TYPE	
10BRCX	1 inch OD - Rotor Primary

Code	HOUSING MOUNTING -PILOT - LEADS
400	Flange - 0.984 inch pilot - Radial Leads
401	Single Servo groove - 1.04 inch pilot - Radial Leads
403	Single Servo groove - 1.04 inch pilot - Axial Leads
405	Mounting Ears - 0.988 inch pilot - Radial Leads
406	No Servo Groove - .984 inch pilot - Radial leads
411	Single Servo groove - 1.0 inch pilot - Radial Leads

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
A	7	10	50	0.5	1	+/- 20 arcmin
B	4	5	43	0.50	1	+/- 15 arcmin
C	4	5	43	0.50	1	+/- 20 arcmin
D	7	10	50	0.5	1	+/- 15 arcmin
H	7	5	70	0.50	1	+/- 15 arcmin
J	4.25	7	55	0.47	1	+/- 15 arcmin
K	7	10	30	0.50	1	30 arcmin spread
P	3.5	10	65	1.00	1	30 arcmin spread
W	4.7	2.7	55	0.48	1	+/- 15 arcmin

Code	ROTOR BORE
1	6 mm
2	1/4 inch
9	4 mm

Code	LEADS/CABLES/SPECIAL FEATURES
B	28AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
G	28AWG Flying Leads with Tubing & Shielding on Leads
H	High Temp Winding w/28AWG Flying Leads
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
T	Radiation Hardened Windings w/26AWG Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

Size 15 Frameless

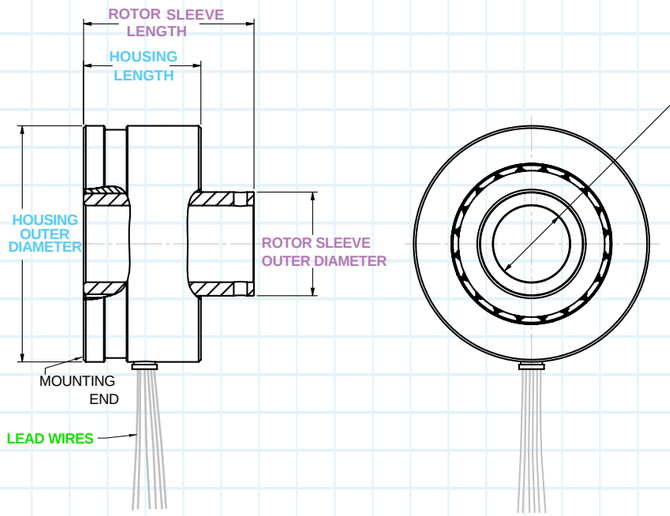
Harowe™ brand

Heavy Duty Brushless Resolvers

Key Features

- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

SPECIFICATIONS



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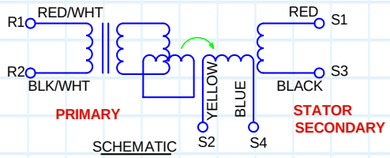


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ. 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 15 Frameless

by DYNAPAR™

15BRCX — 600 — A 04 B A

FAMILY TYPE	
15BRCX	1.5 inch OD - Rotor Primary

Code	HOUSING MOUNTING -PILOT - LEADS
600	Servo Groove - Aluminum - 1.0 inch long with 1.449 inch pilot
602	Servo Groove - Aluminum - 0.635 inch long with 1.449 inch pilot
603	Flange - Aluminum - 0.635 inch long with 1.417 inch pilot
604	Servo Groove - Steel - 16mm long with 36.8mm pilot

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
A	10	4.5	58	0.50	1	+/- 10 arcmin
AL	7	8	50	0.50	1	+/- 10 arcmin
B	7	10	40	0.50	1	20 arcmin spread
BA	7	10	40	0.50	1	20 arcmin spread
D	4	10	16	0.47	2	20 arcmin spread
F	4	5	23	0.50	1	+/- 15 arcmin
G	2	6	45	1.00	1	+/- 7 arcmin
J	4.25	7	55	0.47	1	+/- 7 arcmin
K	7	10	32	0.50	1	16 arcmin spread
L	4.25	10	35	0.47	3	+/- 8 arcmin
P	3.5	10	65	1.00	1	16 arcmin spread
T	7	8	45	0.50	4	8 arcmin spread

Code	ROTOR BORE	LENGTH
04	3/8 inch	1 inch *Note #1
10	3/8 inch	0.635 inch
15	1/4 inch w/key	0.635 inch
17	.437 inch	1.53 inch *Note #1*
21	8 mm	0.635 inch
27	10 mm	0.635 inch
36	3/8 inch w/key	0.635 inch
43	Special-See Print	1 inch *Note #1
46	12 mm	16 mm
47	1/4 inch w/key	0.635 inch

Code	LEADS - CABLES - SPECIAL FEATURES
B	28AWG Flying Leads
E	26 AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
G	24AWG Flying Leads with Tubing & Shielding on Leads *Note #1
H	High Temp Winding w/28AWG Flying Leads
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
L	24 AWG Flying Leads *Note #1
S	29 AWG Siliflex Flying Leads
T	Radiation Hardened Windings w/26AWG Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

***Note #1**: Can only be Configured with the "600" Housing

Please contact Customer Service for any options or features not available in the above Configurator.

Size 15 HaroMax

Harowe™ brand

Heavy Duty Brushless Resolvers

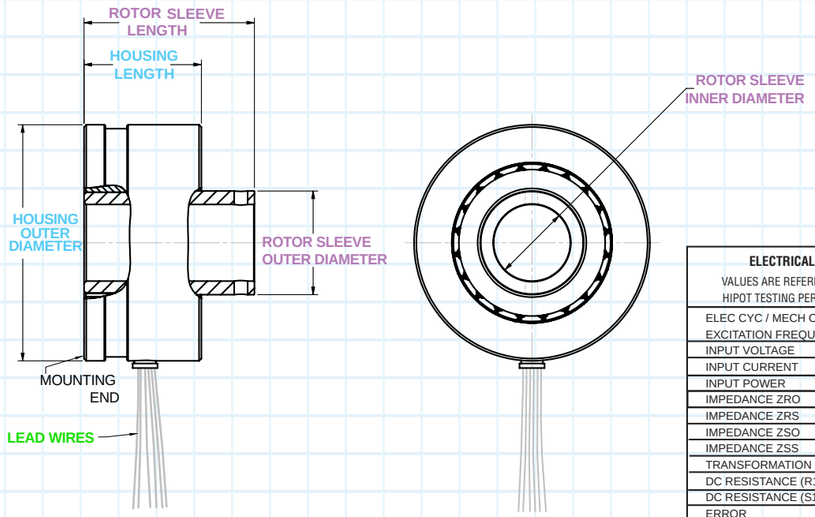
Key Features

- Frameless size 15 Servo Mounting
- Aluminum Housing with Low Mass
- Machine Wound Stator for High Accuracy

HD Heavy Duty

RoHS Most Models

SPECIFICATIONS



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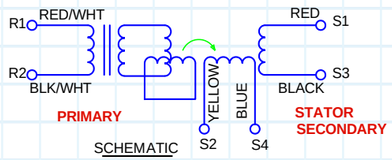


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ, 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size15 HaroMax

by DYNAPAR™

15BRX — 700 — B 10 B A

FAMILY TYPE	
15BRX	1.5 inch OD - Rotor Primary

Code	HOUSING MOUNTING -PILOT - LEADS
700	Servo Groove - Aluminum - 1.0 inch long with 1.449 inch pilot

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
B	2	10	50	0.98	1	20 arcmin spread
D	8	8	50	0.50	1	16 arcmin spread
F	4	5	45	0.50	1	20 arcmin spread

Code	ROTOR BORE	LENGTH
10	3/8 inch	0.635 inch
14	3/8 inch w/flat	0.635 inch
46	12 mm	16 mm

Code	LEADS - CABLES - SPECIAL FEATURES
B	28AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
S	29 AWG Siliflex Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

Size 21 Frameless

Harowe™ brand

Heavy Duty Brushless Resolvers

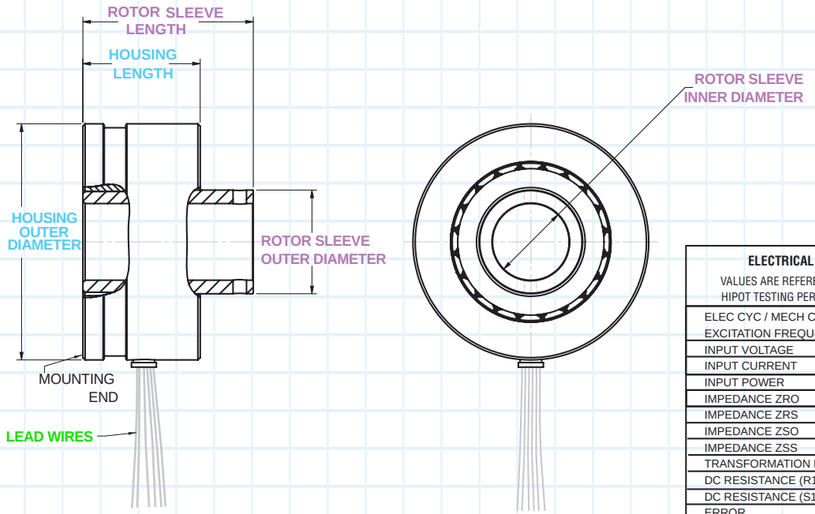
HD Heavy Duty

Key Features

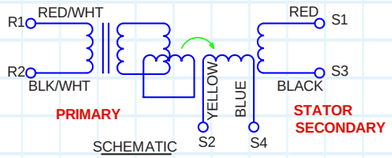
- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

RoHS
Most Models

SPECIFICATIONS



PHASING



ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ, 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 21 Frameless

by DYNAPAR™

21BRCX — 600 — B 12 B A

FAMILY TYPE	
21BRCX	2.1 inch OD - Rotor Primary

Code	HOUSING MOUNT- LENGTH - PILOT
600	Single Servo Groove - 1.06 inch - 2.061 inch
601	Single Servo Groove - 1.06 inch - 1.997 inch
603	Single Servo Groove - 1.03 inch - 2.06 inch
607	Double Servo Groove - 1.06 inch - 1.997 inch
616	Servo Groove/Flange - 1.22 inch - 2.36 inch
621	Single Servo Groove - 1.26 inch - 1.85 inch

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
B	7	10	31	0.50	1	20 arcmin Spread
BA	8	8	52	0.50	1	20 arcmin Spread
D	4	5	27	0.50	2	+/- 5 arcmin
DB	7	4	58	1.00	2	+/-10 arcmin
H	4	5	25	0.50	1	+/-10 arcmin
HA	7	5	77	0.50	1	+/- 7 arcmin
HB	7	10	25	0.47	1	+/-10 arcmin
HG	7	10	30	0.50	1	+/-10 arcmin
HH	2.21	10	12	0.50	1	+/-10 arcmin
J	4.25	7.5	55	0.47	1	+/- 7 arcmin
JA	6	7.5	55	0.28	1	+/- 15 arcmin
L	4.25	7.5	55	0.47	3	+/- 2 arcmin
LE	7	10	13.5	0.50	3	+/- 5 arcmin
M	8	2.6	10	1.00	1	+/-10 arcmin
TA	7.5	4	23	1.00	4	+/-10 arcmin

Code	BORE	LENGTH	
12	0.8	1.5	Only available with the 600 Housing
33	0.5	1.5	Only available with the 600 Housing
39	0.67	1.77	Only available with the 600 Housing
41	.5 w/key	1.06	Only available with the 601, 603 & 607 housing
42	0.5	1.06	Only available with the 601, 603 & 607 housing
43	0.56	1.06	Only available with the 601, 603 & 607 housing
68	0.5	1.22	Only available with the 616 Housing
80	0.8	1.06	Only available with the 601, 603 & 607 housing
84	0.59	1.26	Only available with the 621 Housing
87	0.67	1.26	Only available with the 621 Housing
91	0.75	1.02	Only available with the 601, 603 & 607 housing
93	.65 w/key	1.06	Only available with the 601, 603 & 607 housing
110	0.748	1.06	Only available with the 601, 603 & 607 housing
111	0.5	1.24	Only available with the 601, 603 & 607 housing

Code	LEADS - CABLES - SPECIAL FEATURES
B	28AWG Flying Leads
E	26 AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
G	24AWG Flying Leads with Tubing & Shielding on Leads
H	High Temp Winding w/28AWG Flying Leads
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
L	24 AWG Flying Leads
S	29 AWG Siliflex Flying Leads
T	Radiation Hardened Windings w/26AWG Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

Size 21 HaroMax

Harowe™ brand

Heavy Duty Brushless Resolvers

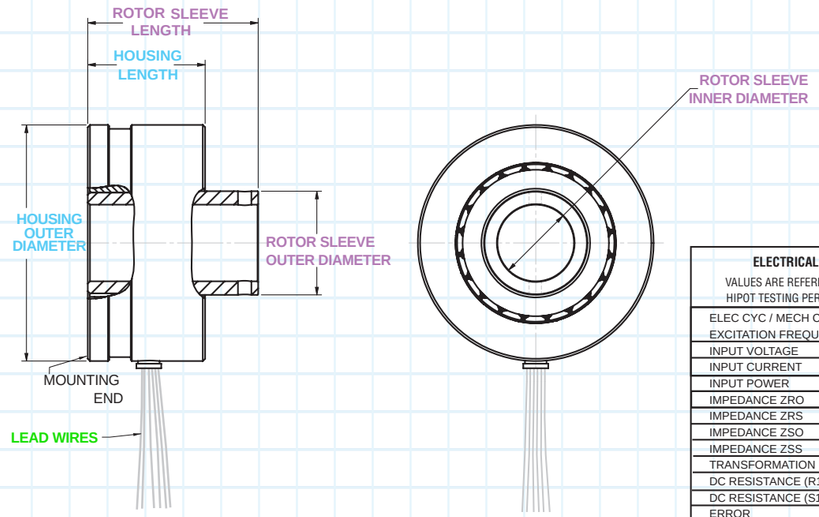
HD Heavy Duty

Key Features

- Frameless size 21 Servo Mounting
- Aluminum Housing with Low Mass
- Machine Wound Stator for High Accuracy

RoHS Most Models

SPECIFICATIONS



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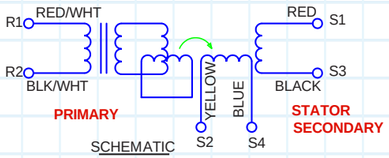


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ, 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 21 HaroMax

by DYNAPAR™

21BRX — 700 — B 42 B A

FAMILY TYPE	
21BRX	1.5 inch OD - Rotor Primary

Code	HOUSING MOUNT - MATERIAL - LENGTH - PILOT
700	Single Servo Groove - Aluminum - 1.02 inch long - 2.06 inch
701	Single Servo Groove - Aluminum - 26.06 mm - 50.77 mm
702	Double Servo Groove - Aluminum - 1.02 inch - 2.06 inch
704	No Servo Grove - Aluminum - 25.8 mm - 52.37 mm
705	Single Servo Groove - Aluminum - 26.46 mm - 50.77 mm
708	Flange - Aluminum - 1.02 inch - 1.968 inch
709	Flange -Aluminum - 26 mm - 55 mm

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
B	2	10	46	1.00	1	18 arcmin Spread
C	6	7.5	25	0.33	1	+/- 12 arcmin
D	8	8	46	0.50	1	18 arcmin Spread
E	6	6	28	0.31	1	24 arcmin Spread
F	4	5	27	0.50	1	20 arcmin Spread
H	4	4	55	0.45	1	20 arcmin Spread
J	7	10	40	0.50	1	20 arcmin Spread

Code	BORE	LENGTH
6	0.63	1.02
11	17.04 mm	1.49
20	20 mm	1.02
42	0.5	1.06
84	0.59	1.26
110	0.748	1.06

Code	LEADS - CABLES - SPECIAL FEATURES
B	28AWG Flying Leads
E	26 AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
S	29 AWG Siliflex Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

Size 31 Frameless

Harowe™ brand

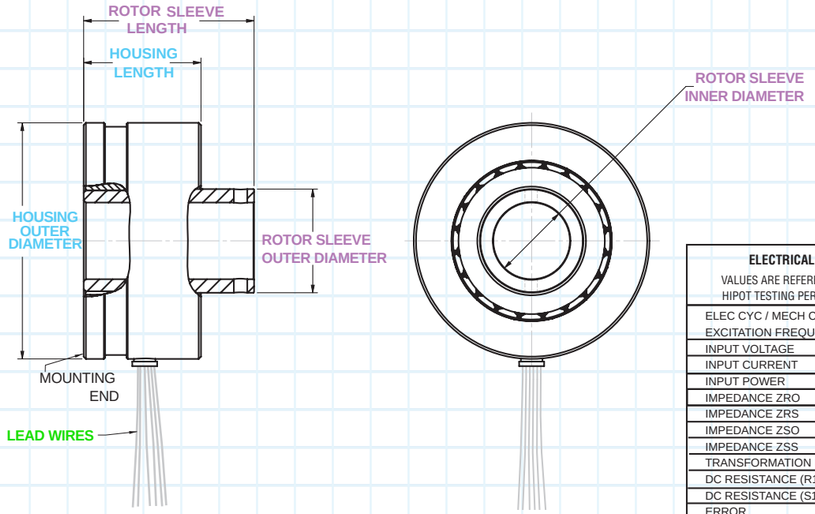
Heavy Duty Brushless Resolvers

Key Features

- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

RoHS
Most Models

SPECIFICATIONS



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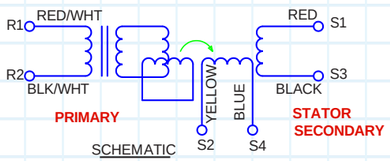


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ, 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 31 Frameless

by DYNAPAR™

31BRCX — 500 — B 1 E B

FAMILY TYPE	
31BRCX	3.1 inch OD - Rotor Primary

Code	HOUSING MOUNTING - LENGTH - PILOT
500	Servo - 1.25 inch long - Steel - 3.05 inch OD
502	Flange - 0.875 inch long - 3.62 inch OD
503	Flange - Steel - 1.181 inch - 3.54 inch

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
B	4	5	30	0.50	1	+/- 10 arcmin
D	7	4	30	0.5	1	+/- 10 arcmin
F	8	6.5	75	0.50	1	+/- 20 arcmin
J	4.25	7	55	0.47	1	+/- 10 arcmin
JD	4.25	7	75	0.47	4	12 arcmin spread

Code	ROTOR BORE	LENGTH	
1	1.5 inch	1.25 inch	
3	1.37 inch w/keyway	1.25 inch	*Note #1
7	1.56 inch	1.25 inch	
15	25 mm	1.25 inch	
16	30 mm	1.25 inch	
21	34 mm	1.50 inch	

***Note #1** - Only available with the “502” Housing

Code	LEADS/CABLES/SPECIAL FEATURES
E	26AWG Flying Leads
F	28AWG Cable - 3 Twisted pairs w/Drain
G	24AWG Flying Leads with Tubing & Shielding on Leads
H	High Temp Winding w/28AWG Flying Leads
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
L	24 AWG Flying Leads
T	Radiation Hardened Windings w/26AWG Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

Size 55 Frameless

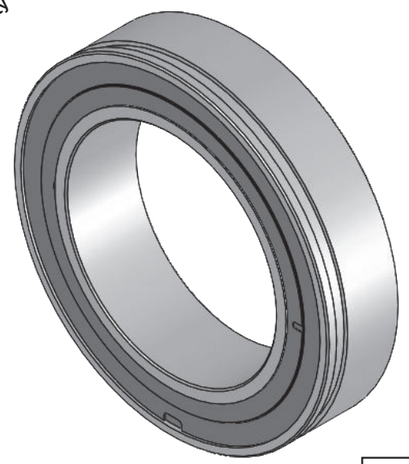
Harowe™ brand

Heavy Duty Brushless Resolvers

Key Features

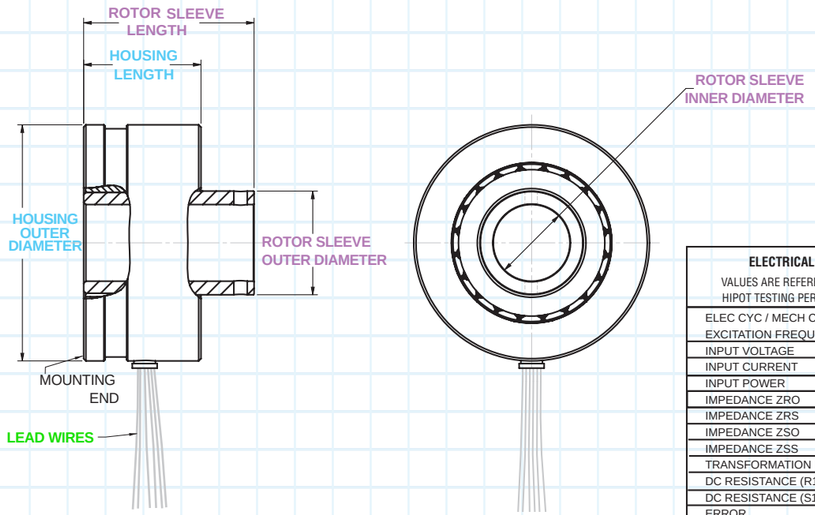
- Options include Multi-Speed, Radiation Hardened, High Temperature and Flux Shielding Technology
- Resistant to noise and impervious to most industrial contaminants
- Up to 200°C Temperature Range
- Stainless Steel or Aluminum Housing

HD Heavy Duty



RoHS
Most Models

SPECIFICATIONS



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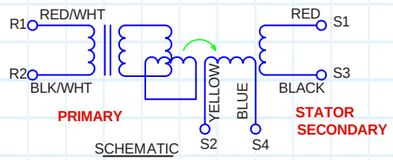


ELECTRICAL & MECHANICAL DATA AT 25°C

VALUES ARE REFERENCE UNLESS OTHERWISE TOLERANCED
HIPOT TESTING PERFORMED AT 60HZ, 4 SECOND DURATION

ELEC CYC / MECH CYC	deg/deg
EXCITATION FREQUENCY	±1% kHz
INPUT VOLTAGE	±5% V rms
INPUT CURRENT	Max. mA rms
INPUT POWER	Watts
IMPEDANCE ZRO	Ohms
IMPEDANCE ZRS	Ohms
IMPEDANCE ZSO	Ohms
IMPEDANCE ZSS	Ohms
TRANSFORMATION RATIO	Min. to Max.
DC RESISTANCE (R1-R2)	Ohms
DC RESISTANCE (S1-S3, S2-S4))	Ohms
ERROR	±Max. arcminutes
PK-PK POSITION ERROR	Max. arcminutes
PK-PK VELOCITY ERROR	Max. %
PHASE SHIFT, OPEN CIRCUIT	degrees
NULL VOLTAGE	Max. mV rms
HIPOT, LEADS TO CASE, 500VAC	Max. mA rms
HIPOT, INTERPHASE, 250AC	Max. mA rms
TEMPERATURE RANGE	°C
WEIGHT	oz
CONTINUOUS SPEED	Max. kRPM

Size 55 Frameless

by DYNAPAR™

55BRCX | 520 | JA | 5 | E | B

FAMILY TYPE	
55BRCX	3.1 inch OD - Rotor Primary

Code	HOUSING MOUNTING - LENGTH - PILOT
520	Servo - 1.25 inch long - 5.5 inch OD

	Input Excitation					
Code	Vrms	KHz	mA	TR	Speed	Accuracy
J	4.25	7	55	0.47	1	+/- 30 arcmin
JA	4.25	7	55	0.47	12	4 arcmin spread
JB	4.25	7	55	0.47	8	8 arcmin spread
JC	4.25	7	55	0.47	16	4 arcmin spread
JD	4.25	7	55	0.47	4	10 arcmin spread

Code	ROTOR BORE	LENGTH
5	1.5 inch	1.25 inch

Code	LEADS - CABLES - SPECIAL FEATURES
E	26 AWG Flying Leads
G	24AWG Flying Leads with Tubing & Shielding on Leads
H	High Temp Winding w/24AWG Flying Leads
J	24AWG Cable - 3 Twisted Pairs
K	22AWG Cable - 4 Twisted & Shielded Pairs
L	24 AWG Flying Leads
T	Radiation Hardened Windings w/26AWG Flying Leads

Code	LEADS/CABLE LENGTH
A	12 inches long
B	16 inches long
C	24 inches long
D	60 inches long
E	80 inches long
F	120 inches long

Please contact Customer Service for any options or features not available in the above Configurator.

SERIES 11/R11

Harowe™ brand

Heavy Duty Brushless Resolvers

SSM
Servo Small Motor

Key Features

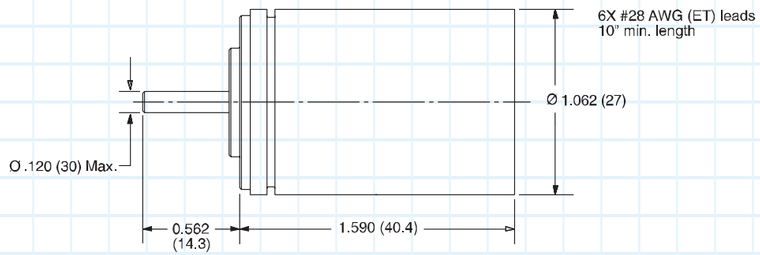
- Brushless Construction is Ideal for Brushless Servo Motors
- Shortest Mounting Depth in the Industry for Easy Mounting
- Up to 125°C Temperature Range
- Radiation-Hardened Models Available

RoHS
Most Models

SPECIFICATIONS

Family Model	Speed*	Primary Winding	Accuracy ± Arc-Min	Input Voltage (Vrms)	Frequency (Hz)	Maximum Input Current (mA)	Transformation Ratio (V out / V in) ± 10%	Phase Shift (degrees)	Total Null Voltage (mV)
11BR W -300-B	1	Stator	10	12.0	400	10.9	1.75	12	30
11BR W -300-F	1	Stator	7	12.0	2,500	3.1	0.50	-2	30
11BR W -300-M	1	Stator	7	10.0	5,000	8.3	0.50	-5	30
11BRCT -300-F	2	Stator	10	12.0	2,500	8.3	0.50	0	15
11BRCT -300-M	2	Stator	10	11.8	2,500	70.0	1.02	-1	30
11BRCT -300-T	4	Stator	5	12.0	2,500	6.0	0.53	-2	15
11BRCT -300-P	5	Stator	4	12.0	2,500	1.4	0.39	-7	15
11BRCX-300-A	1	Rotor	7	7.5	4,000	13.5	0.54	-2	20
11BRCX-300-B	1	Rotor	7	7.5	4,000	40.0	1.07	-2	15
11BRCX-300-C	1	Rotor	7	6.0	1,000	15	0.45	4	15
11BRCX-300-G	1	Rotor	7	26.0	400	40.0	0.45	12	30
11BRCX-300-J	1	Rotor	7	7.0	5,000	10.9	0.95	-6	15
11BRCX-300-N	1	Rotor	7	8.5	1,000	14.0	1.00	3	30
11BRCX-300-M	2	Rotor	7	7.0	5,000	10.9	0.95	-2	30
11BRCX-300-T	4	Rotor	7	7.0	5,000	11.0	0.84	7	20
11BRCX-300-P	5	Rotor	6	10.0	5,000	5.0	0.55	-3	20
R11-S01F-1A	1	Rotor	20	1.88	2,250	21.0	1.40	11	15
R11-S01F-1B	1	Rotor	20	6.00	2,000	12.0	0.454	8.5	15
R11-S01F-1A	1	Rotor	6	1.88	2,250	21.0	1.40	11	15

*Speeds are defined as follows: 1 = single speed; 2 = 2-speed; etc.



RESOLVERS

DYNAPAR™

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**
- **High Temperature Rating of 125°C Continuous Duty**
- **Available in Square and Servo Mount**

HD Heavy Duty

RoHS
Most Models

SPECIFICATIONS

Elecrical 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)	0.50	10	50	4500	-4	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

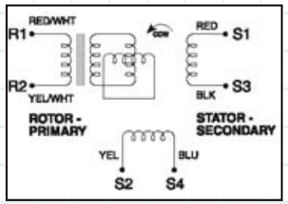
Shaft Size: 3/8"
Mounting Type: Square or Servo Flange
Max Radial Shaft Load: 60 lbs.
Max Axial Shaft Load: 40 lbs.
Max Continuous Speed: 6,000 RPM
Moment of Inertia: .004 oz–in–sec^2
Bearing Life: 2x10^8 Revs at rated shaft load
Housing and Cover: Aluminum
Shaft Material: 416 SS
Weight: 1.6 lbs.

ENVIRONMENTAL

Operating Temperature: –55 to +125°C
Storage Temperature: –55 to +125°C
Shock: 200G at 11 milliseconds time duration. Half sine waveform per Mil-S-81963
Vibration: 40G at .06 inch double amplitude at 10-2000 Hz per Mil-S-81963
Humidity: to 98% without condensation
Enclosure: IP65

ELECTRICAL CONNECTIONS

Connector:	7 pin MS	10 pin MS	6 pin MS Clicklock	19 pin MS Clicklock	
Signal	Pin	Pin	Pin	Pin	Cable Color
R1 (Rotor Hi)	A	A	E	A & B	Red w/ White
R2 (Rotor Lo)	B	H	F	C & D	Yellow w/White
S1 (Cos Hi)	C	B	C	E & F	Red
S3 (Cos Lo)	D	I	D	G & H	Black
S4 (Sin Lo)	F	C	B	L & M	Blue
S2 (Sin Hi)	E	J	A	J & K	Yellow w/Blue
N/C	G	G	-	-	-



SERIES R25

by DYNAPAR™

Ordering Information

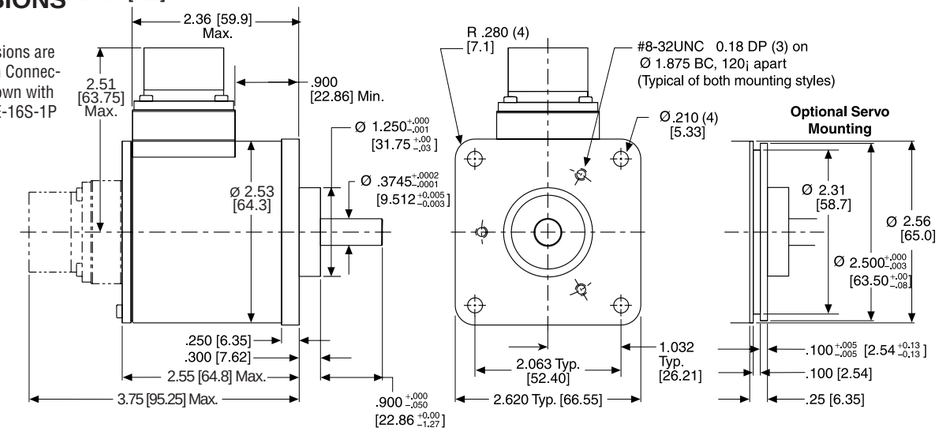
To order, complete the model number with code numbers from the table below:

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
R25	□	□	□	□	□	□□	□□	0 0
Ordering Information								
R25 Heavy-duty, resolver	**F** Flange **S** Servo	**B** MS3102E-16S-1P **C** MS3102E-18-1P **E** TVP02RW-15-35D **F** FLYING LEADS **G** MS3112E-10-6P **N** RC-12P2N8A2200 **P** PT02E-14-19-P	**R** Rear Exit **S** Side Exit	**R** Round **F** Round with flat **W** Round with 2 flats @ 90 degrees	**Y** Shaft Seal **N** No Shaft Seal	Available when Code 8 is 07 to 20 **1A 1E 1J** **1B 1F 1K** **1C 1H 1M** **1D** Available when Code 8 is 04 to 10 **2A** Available when Code 8 is 02 to 10 **3A 3B**	**02** 2 arc min **03** 3 arc min **05** 5 arc min **07** 7 arc min **10** 10 arc min **2S** 20 arc min Spread **15** 15 arc min **20** 20 arc min	**00** Factory Assigned Designator

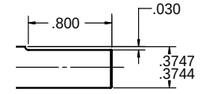
Please contact Customer Service for any options or features not available in the above Configurator.

DIMENSIONS inches [mm]

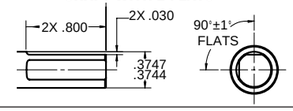
Note: Dimensions are dependent on Connector type - Shown with B = MS3102E-16S-1P

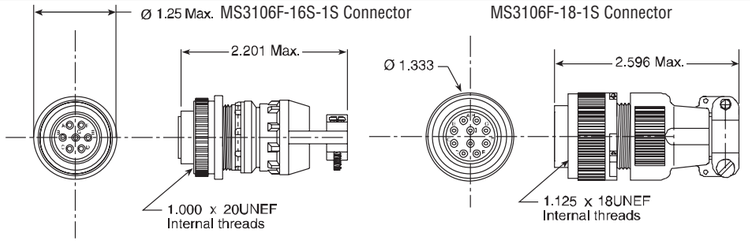


SHAFT WITH FLAT



SHAFT WITH 2 FLATS





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

SERIES RF25

NorthStar™ brand

Heavy Duty Resolver

HD Heavy Duty

RoHS
Most Models

Key Features

- Flange Mount Rugged Housing Immune to Oil, Salt, Water & Dust
- Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings
- Withstands 200g Shock and 40g Vibration
- Shaft Seal Standard
- Suitable Replacement for the Reliance Automax Resolvers 800123-2R and 800123-2S* RoHS CERTIFIED

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

ELECTRICAL	1J Winding	2J Winding
Sensing Method	Sine/Cosine	Sine/Cosine
Electrical Cycles	1	2
Excitation	26 Vrms - 2.4 kHz	26 Vrms - 2.4 kHz
Input Current	22 Max mArms	45 Max mArms
Null Voltage	25 Max mVrms	25 Max mVrms
Electrical Error	10 ArcMin Max	10 ArcMin Max
DC Resistance (R1-R2)	255 Ohms	190 Ohms
DC Resistance (S1-S3 and S2-S4)	176 Ohms	322 Ohms
Transformation Ratio	0.454	0.454
Phase Shift	6 degrees	18 degrees
Dielectric Strength to Case	500 VAC w/2 Max mArms	500 VAC w/2 Max mArms
Dielectric Strength to Phase to Phase	250 VAC w/2 Max mArms	250 VAC w/2 Max mArms

*Reliance and Automax are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement.

MECHANICAL

Shaft Size: 3/8"
Mounting Type: Square Flange
Max Radial Shaft Load: 60 lbs.
Max Axial Shaft Load: 40 lbs.
Max Continuous Speed: 6,000 RPM
Moment of Inertia: .004 oz–in–sec^2
Bearing Life: 2x10^8 Revs at rated shaft load
Housing and Cover: Aluminum
Shaft Material: 416 Stainless Steel
Weight: 1.6 lbs.

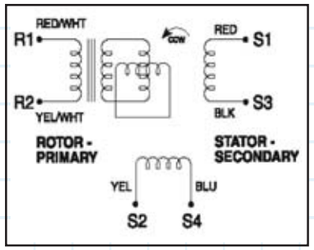
ENVIRONMENTAL

Operating Temperature: –55 to +125°C
Storage Temperature: –55 to +125°C
Shock: 200G at 11 milliseconds time duration. Half sine waveform per Mil-S-81963
Vibration: 40G at .06 inch double amplitude at 10-2000 Hz per Mil-S-81963
Humidity: to 98% without condensation
Enclosure: IP65

ELECTRICAL CONNECTIONS

Connector:	7 pin MS	10 pin MS	6 pin MS Clicklock	19 pin MS Clicklock	
Signal	Pin	Pin	Pin	Pin	Cable Color
R1 (Rotor Hi)	A	A	E	A & B	Red w/ White
R2 (Rotor Lo)	B	H	F	C & D	Yellow w/White
S1 (Cos Hi)	C	B	C	E & F	Red
S3 (Cos Lo)	D	I	D	G & H	Black
S4 (Sin Lo)	F	C	B	L & M	Blue
S2 (Sin Hi)	E	J	A	J & K	Yellow w/Blue
N/C	G	G	-	-	-

SCHEMATIC



SERIES RF25

by DYNAPAR™

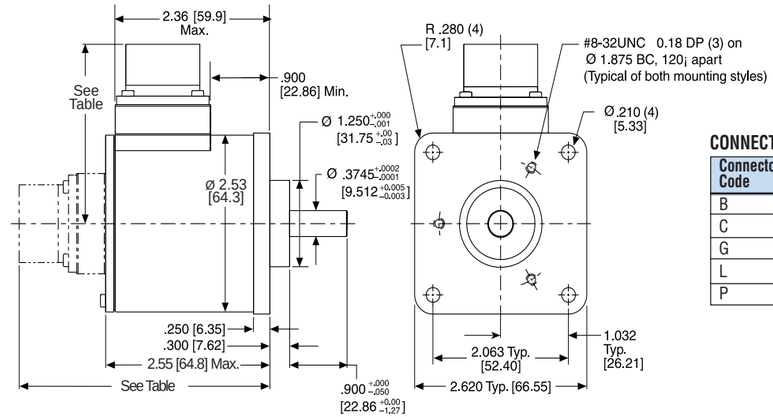
Ordering Information

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

Code 1: Model	Code 2: Resolver Speed	Code 3: Shaft	Code 4: Termination	Code 5: Connector Exit	Code 6: Special Opions
RF25 —	1J	W	L	S	A
Ordering Information					
RF25 Heavy Duty Flange Mount Resolver	**1J** **2J**	**R** Round **F** Round with Flat **W** Round with Two Flats @ 90 Degrees	**B** MS3102E-16S-1P **C** MS3102E-18-1P **F** Flying Leads* **G** MS3112E-10-6P **P** PT02E-14-19P* **L** PT02E-18-11P (025)*	**R** Rear Exit **S** Side Exit	**A** None

*RoHS Certified

DIMENSIONS inches [mm]

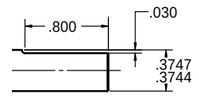


CONNECTOR LOCATION

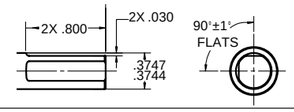
Connector Code	Connector Type	Side Location	Rear Location
B	7 Pin Screw Type	2.51 inch	3.74 inch
C	10 Pin Screw Type	2.90 inch	4.12 inch
G	6 PinTwist & Lock	2.32 inch	3.54 inch
L	11 PinTwist & Lock	2.29 inch	3.55 inch
P	19 PinTwist & Lock	2.40 inch	3.62 inch

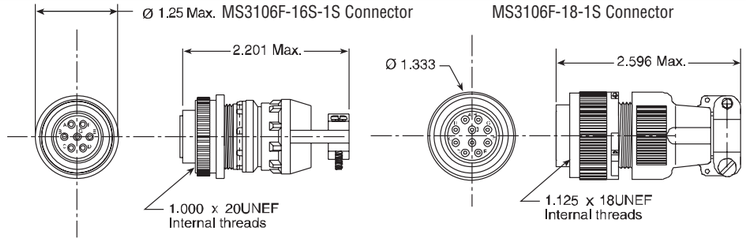
Note: Dimensions are dependent on Connector type - Shown with PT02E-18-11P (025)

SHAFT WITH FLAT



SHAFT WITH 2 FLATS





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

SERIES RH25

Harowe™ brand

Heavy Duty Resolver

Key Features

- **Rugged Housing with IP54 Rating**
- **Spaced Bearings for up to 10x the Life of Traditional Duplex Bearings**
- **High Temperature Rating of 125°C Continuous Duty**
- **Various Connector Options**

HD Heavy Duty

RoHS
Most Models

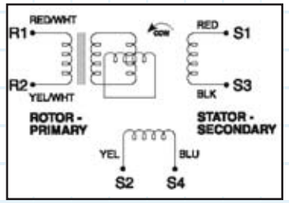
SPECIFICATIONS

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
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

ELECTRICAL CONNECTIONS

Connector:	7 pin MS	10 pin MS	6 pin MS Clicklock	19 pin MS Clicklock	12 pin M23	Flying
Signal	Pin	Pin	Pin	Pin	Pin	Cable Colors
R1 (Rotor Hi)	A	A	E	A & B	1	Red w/ White
R2 (Rotor Lo)	B	H	F	C & D	2	Yellow w/White
S1 (Cos Hi)	C	B	C	E & F	3	Red
S3 (Cos Lo)	D	I	D	G & H	4	Black
S4 (Sin Lo)	F	C	B	L & M	5	Blue
S2 (Sin Hi)	E	J	A	J & K	6	Yellow w/Blue
N/C	G	G	-	-	-	-



MECHANICAL

Bore: 5/8”
Mounting Type: Hub Shaft
Max Continuous Speed: 6,000 RPM
Housing and Cover: Aluminum
Shaft Material: 303 SS
Weight: 1.9 lbs.

ENVIRONMENTAL

Operating Temperature: –55 to +125°C
Storage Temperature: –55 to +125°C
Humidity: to 98% without condensation
Enclosure: IP54

SERIES RH25

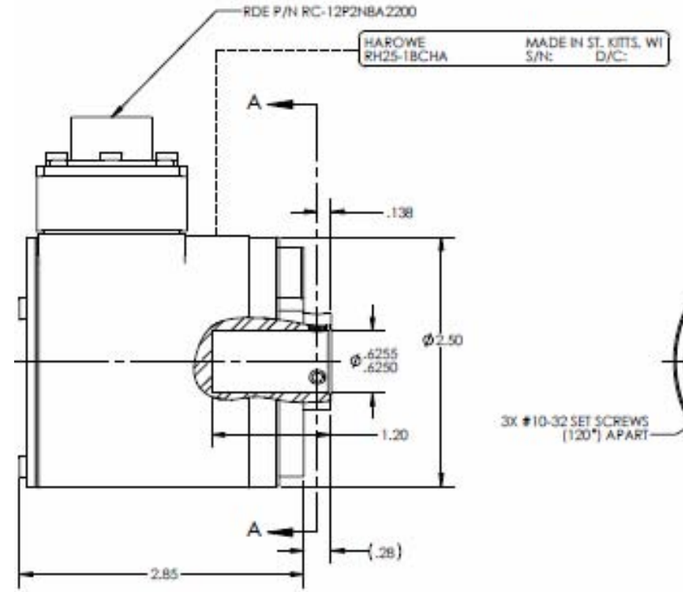
by DYNAPAR™

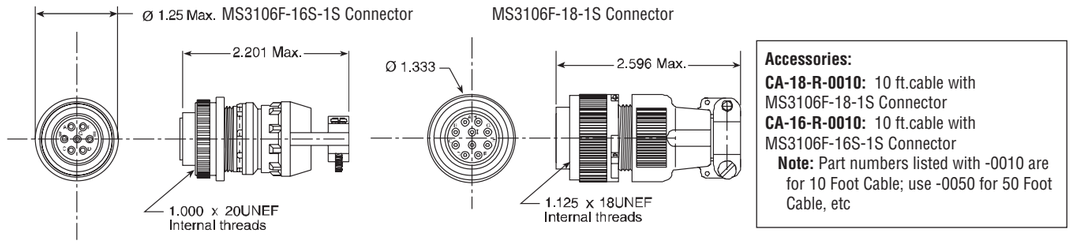
Ordering Information

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

RH25-	1B	C	H	A
Code 1 Family	Code 2 Electrical Winding Kit	Code 3 Bore/Bearings	Code 4 Connector	Code 5 Mounting Hardware
RH25 Heavy Duty	**1A** = 4K-5.3V-.50TR (BRW) +/- 7 arcmin	C = 5/8 in ID & Ceramic Bearings	B = MS3102E-16S-1P (7 Pin MS Screw Type)	A = 8.5 inch C-Face Tether Kit w/Cover
5/8 inch Bore	1B = 5K-4V-.50TR +/- 7 arcmin	E = 5/8 in ID & HD Bearings	C = MS3102E-18-1P (10 Pin MS Screw Type)	B = 8.5 inch C-Face Tether Kit
Hub Shaft Mount	1C = 7K-4.25-.47TR +/- 7 arcmin		F = FLYING CABLE (24 AWG Twisted & Shielded Pairs)	D = 4.5 inch C-Face Tether Kit
Side Exit Connector	1D = 2.5K-7V-.50TR +/- 7 arcmin		G = MS3112E-10-6P (6 Pin Clicklock)	E = Slotted Tether Kit
	1E = 5K-7V-.95TR +/- 7 arcmin		H = RC-12P2N8A2200 (/12 Pin M23 Screw Type)	
	1F = 5K-2V-1.0TR +/- 7 arcmin		P = PT02E-14-19-P (19 Pin Clicklock)	
	1H = 2.6K-8V-1.07TR +/- 7 arcmin			
	2A = 4K-8V-.25TR +/- 5 arcmin			
	3A = 7K-4.25-.47TR +/- 3 arcmin			
	3B = 5K-7V-.95TR +/- 3 arcmin			

DIMENSIONS inches [mm]

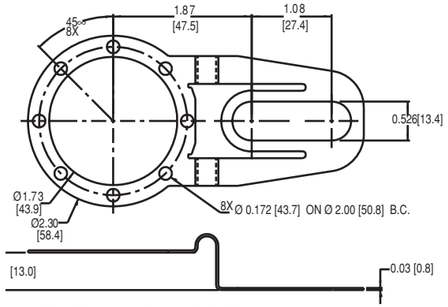




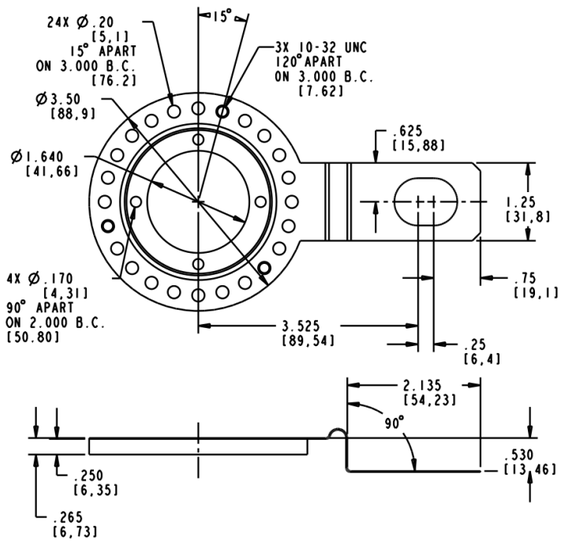
Accessories:
CA-18-R-0010: 10 ft.cable with MS3106F-18-1S Connector
CA-16-R-0010: 10 ft.cable with MS3106F-16S-1S Connector
Note: Part numbers listed with -0010 are for 10 Foot Cable; use -0050 for 50 Foot Cable, etc

SERIES RH25

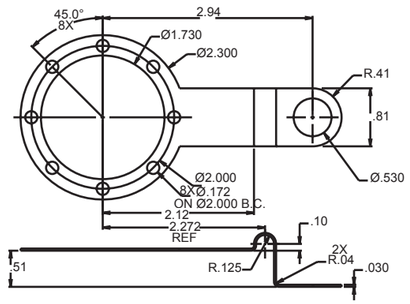
Harowe™ brand



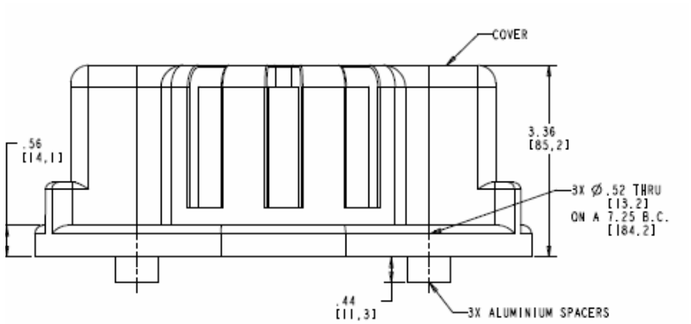
Slotted Tether Kit Code 5 = E



8.5” C-Face Tether Kit With Adapter Plate
Code 5 = A or B



Single Point Tether Kit Code 5 = D



Optional 8.5” C-Face Protecting Cover
Code 5 = A

DYNAPAR™

Notes

SERIES R56

NorthStar™ brand

Heavy Duty Resolver

HD Heavy Duty

Key Features

- Harowe Resolver in NorthStar Housing
- Large Outer Bearings Isolate Shaft Loads
- Foot Mount or 56 C-Face Mount
- Excellent Zero-Speed Output
- Suitable Replacement for the Reliance Automax Resolvers 800123-R, 800123-S, 800123-1R and 800123-1S*

RoHS

SPECIFICATIONS

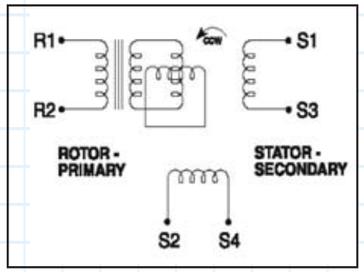
STANDARD OPERATING CHARACTERISTICS

ELECTRICAL	One Speed Winding	Two Speed Winding
Sensing Method	Sine/Cosine	Sine/Cosine
Electrical Cycles	1	2
Excitation	26 ±5% Vrms 2.4 kHz	26 ±5% Vrms 2.4 kHz
Input Current	22 Max mArms	45 Max mArms
Null Voltage	25 Max mVrms	25 Max mVrms
Position Error	±10 ArcMin	10 ArcMin Max
DC Resistance (R1-R2)	255 Ohms ±15%	190 Ohms ±15%
DC Resistance (S1-S3 and S2-S4)	176 Ohms ±15%	322 Ohms ±15%
Transformation Ratio	0.454 ±10%	0.454 ±10%
Phase Shift	6 degrees	18 degrees
Dielectric Strength to Case	500 VAC w/2 Max mArms	500 VAC w/2 Max mArms
Dielectric Strength to Phase to Phase	250 VAC w/2 Max mArms	250 VAC w/2 Max mArms

ELECTRICAL CONNECTIONS

Signal	Pin
R1 – Rotor Hi	1
R2 – Rotor Lo	2
S1 – Cos Hi	3
S3 – Cos Lo	4
S2 – Sin Hi	5
S4 – Sin Lo	6

SCHEMATIC



MECHANICAL

Shaft Size: 5/8" stainless steel, 56 C-Face NEMA style; single or dual shaft
Shaft Loading: 100 lbs. radial, 50 lbs. axial
Shaft Speed: 3600 RPM max.
Mounting: Foot mount; NEMA 56C face mount
Connector: Industrial 10pin latching connector
Housing and Cover: Aluminum
Shaft Material: Stainless Steel
Weight: 11 lbs. max.

ENVIRONMENTAL

Operating Temperature: –40 to +120°C
Storage Temperature: –40 to +130°C
Shock: 50 G's for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 10 G's
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP65 (dust proof, washdown)

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SERIES R56

by DYNAPAR™

Ordering Information

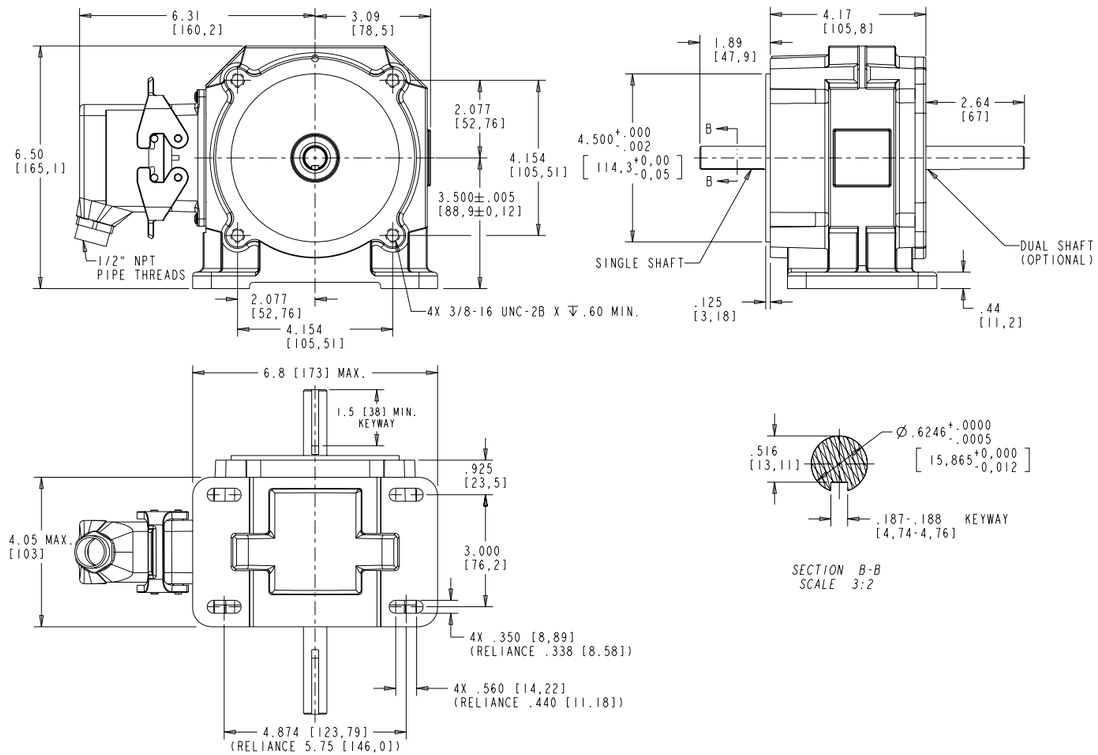
To order, complete the model number with code numbers from the table below:

Code 1: Model		Code 2: Resolver Speed	Code 3: Shaft	Code 4: Termination
R56	–	☐	☐	☐
Ordering Information				
R56 Foot Mount or NEMA 56C Face Mount Resolver		1 2	**S** Single, 5/8" **D** Dual Shaft, 5/8"	**L** Latching Industrial Connector

Please contact Customer Service for any options or features not available in the above Configurator.

DIMENSIONS inches [mm]

Tolerances: XXX ±0.010; XX ±0.02



DYNAPAR™

Hazardous Duty

Hazardous Areas or Hazardous Locations relate to areas where flammable liquids, vapors, gases or combustible dusts are likely to occur in quantities ample to cause a fi re or explosion. If your encoder is going into an environment where explosive gas or dust may be present, determine what level of protection is required and then look for an encoder that carries at the least the minimum requirement.

There are several methods of designing encoders for hazardous environments and all have varying degrees of Zone and Class & Division ratings. There are 4 major types of hazardous location encoders. There are Intrinsically Safe encoders, Flame Proof encoders, Encapsulated Encoders and Non Incendiary Encoders. Typical industries where hazardous location encoders are used are Paper and Steel, Oil and Gas, Mining, Power, Chemical, Aerospace and Food and Beverage.

DYNAPAR™

Hazardous Duty Highlights

ISD37 — PAGE 4.21

KEY FEATURES:

- Triple certified U.S./Canadian, ATEX and IECEx in hazardous locations to create a Class 1 Div. 1, Zone 0 Solution
- Dual Isolated Outputs Available for Redundancy
- Unbreakable Code Disc up to 5000 PPR
- Coupled with the IS Barrier to create a complete Intrinsically Safe Solutions
- 300g Shock and 20g Vibration Resistance and IP67 Sealing

X25 — PAGE 4.07

KEY FEATURES:

- For Hazardous Location Applications
- 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

EN44 — PAGE 4.13

KEY FEATURES:

- Triple Certified Encoder for Hazardous Locations
- Hub-shaft Design with Isolated Coupling to Compensate for Shaft Endplay
- Encapsulated Electronics with Increased Safety Interface for Zone 1 Use Eliminates Need for I.S. Barrier
- Industry Leading -50 to +100°C Temperature Range
- High Current Line Driver for Long Cable Runs

AX65 — PAGE 4.35

KEY FEATURES:

- Explosion Proof Absolute
- 12 bit of Singleturn, 12 or 16 bit of True Multiturn Absolute Positioning
- ATEX and IECEX certification for Mining, Gas and Dust
- Extreme corrosion resistance: high grade stainless steel housing
- Protection class up IP66/ IP67
- CANopen or SSI Communications

ISW38 — PAGE 4.31

KEY FEATURES:

- Draw Works Threaded Shaft with Field Replaceable Adapters for Reduced Downtime
- ATEX and CSA Certified for Hazardous Duty Applications
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum or Stainless Steel Housing
- NAMUR Sensor Output Available

AX73 — PAGE 4.43

KEY FEATURES:

- Brushless Construction is Ideal for Brushless Servo Motors
- Shortest Mounting Depth in the Industry for Easy Mounting
- Up to 125°C Temperature Range
- Radiation-Hardened Models Available

HAZARDOUS SERIES HD20 *NorthStar™ brand*

Hazardous Duty Encoder

Key Features

- **Size 20 Encoder with Single or Dual Isolated Outputs**
- **ATEX and CSA Certified for Hazardous Duty Applications**
- **Unbreakable Code Disc up to 3600PPR**
- **Special Housing and Seals for IP67 Rating**
- **Anodized Aluminum, Stainless Steel, or Nickel Plated Housing**

HAZ Hazardous Duty

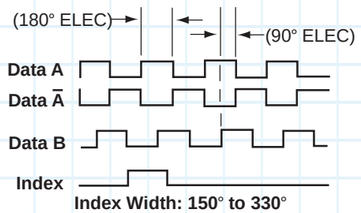
CE RoHS c SA us Class 1, Div 1 Group C&D Ex E Ex ia IIB T4

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
$\bar{A}$ shown for reference



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. $\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	VIOLET
Sig. $\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	BROWN
Sig. $\bar{Z}$	—	—	—	—	—	—	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.

ELECTRICAL

Input Power: 5VDC, 7-26VDC
Outputs: 2N2222, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS 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 (MCN-N6N4)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft speed: 6000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10^8 revs at rated shaft Loading, 5 x 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: Plastic
Weight: 14 ounces, typical

ENVIRONMENTAL

Operating Temperature: -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

by DYNAPAR™ HAZARDOUS 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

Size 20 Hazardous Duty Encoder

1 Unidirectional
2 Bidirectional
3 Bidirectional with Index

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 3/8" Dia. Shaft with flat
4 10mm Dia. Shaft, no flat

0 Open Collector out (7273)
2 Push-Pull out
F Open Collector out (2222)
G Open Collector out with 2.2 kΩ Pullups (2222)

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:
3 Differential Line Driver out (7272)

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

A No Option w/ ATEX Type 1
B Nickel Finish Housing w/ ATEX Type 1
C Stainless Steel Housing w/ ATEX Type 1
G Same as "A" w/ ATEX Type 2
H Same as "B" w/ ATEX Type 2
I Same as "C" w/ ATEX Type 2

Available when Code 4 is 2, 3
M Same as "A" w/ ATEX Type 3
N Same as "B" w/ ATEX Type 3
O Same as "C" w/ ATEX Type 3

Available when Code 4 is 0, 2
D Redundant Outputs (Dual Connector Housing) w/ ATEX Type 1. *See †NOTE*
E Nickel Finish Housing, Redundant Outputs w/ ATEX Type 1. *See †NOTE*
F Stainless Steel Housing, Redundant Outputs w/ ATEX Type 1. *See †NOTE*

Available when Code 4 is 0, 2
J Same as "D" w/ ATEX Type 2. *See †NOTE*
K Same as "E" w/ ATEX Type 2. *See †NOTE*
L Same as "F" w/ ATEX Type 2. *See †NOTE*

Available when Code 4 is 2
P Same as "D" w/ ATEX Type 3. *See †NOTE*
Q Same as "E" w/ ATEX Type 3. *See †NOTE*
R Same as "F" w/ ATEX Type 3. *See †NOTE*

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

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

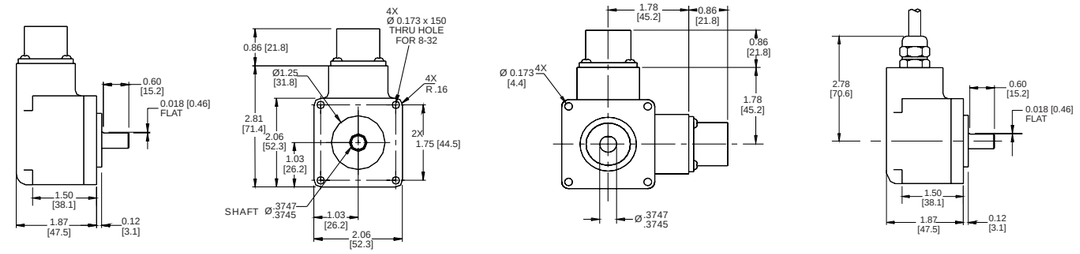
Mating Connectors (no cable)

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 (MCN-N6N4)

*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

DIMENSIONS inches [mm]



HAZARDOUS SERIES HD25

NorthStar™ brand

Hazardous Duty Encoder

Key Features

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

HAZ Hazardous Duty

CE RoHS CSA C US Class 1, Div 1 Group C&D Ex E Ex ia IIB T4

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

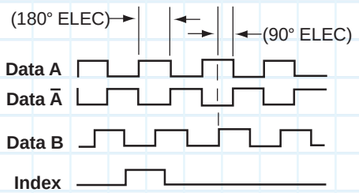
Code: Incremental
Resolution: 1 to 5000 PPR (pulses/revolution)
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 625PPR: 90° ± 15° electrical; 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

ELECTRICAL

Input Power: 5VDC, 5-15VDC, 7-26VDC
Outputs: 2N2222, 4469. ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS 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 (MCN-N6N4)

DATA AND INDEX

Not all complements shown
Ā shown for reference



Index Width: 150° to 330°
A leads B, CCW (From Shaft End)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft Speed: 6,000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 10^8 revs at rated shaft Loading, 5 x 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: Plastic
Weight: 14 ounces, typical

ENVIRONMENTAL

Operating Temperature: -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

by DYNAPAR™ HAZARDOUS SERIES HD25

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS, 5 & 8 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 Idx		Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/ Idx		Cable # 112859- M12, 5 Pin Single Ended		Cable # 112860- M12, 8 Pin Dif		Cable Exit with Seal
	Pin	Wire Color	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	1	BRN	GREEN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	2	WHT	4	ORG	BLUE
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	5	GRY	6	YEL	ORANGE
Power +V	B	RED	D	RED	D	RED	D	RED	1	BRN	2	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	3	BLU	7	BLK	BLACK
Case	—	—	G	GRN	G	GRN	G	GRN	–	–	–	–	WHITE
N/C	F	—	E	—	—	—	E	—	–	–	–	–	—
$\overline{\text{Sig. A}}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	–	–	3	BRN/WHT	VIOLET
$\overline{\text{Sig. B}}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	–	–	5	ORG/WHT	BROWN
$\overline{\text{Sig. Z}}$	—	—	—	—	—	—	J	YEL/WHT	–	–	8	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.

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 Hazardous 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

0 Open Collector out (7273)
2 Push-Pull out
F Open Collector out (2222)
G Open Collector out with 2.2 kΩ Pullups (2222)

Available when:
Code1 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 Differential Line Driver out (7272)
6 Differential Line Driver out (4469)

1 6 Pin Connector
3 7 Pin Connector
5 10 Pin Connector
9 5 Pin M12 Connector
A 8 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

A No Options w/ ATEX Type 1
B Nickel Finish Housing w/ ATEX Type 1
C Stainless Steel Housing w/ ATEX Type 1
G Same as "A" w/ ATEX Type 2
H Same as "B" w/ ATEX Type 2
I Same as "C" w/ ATEX Type 2

Available when Code 4 is 0, 2
D Redundant Outputs (Dual Connector Housing) w/ ATEX Type 1. *See †NOTE*
E Nickel Finish Housing, Redundant Outputs w/ ATEX Type 1. *See †NOTE*
F Stainless Steel Housing, Redundant Outputs w/ ATEX Type 1. *See †NOTE*
J Same as "D" w/ ATEX Type 2. *See †NOTE*
K Same as "E" w/ ATEX Type 2. *See †NOTE*
L Same as "F" w/ ATEX Type 2. *See †NOTE*
M Same as "A" w/ ATEX Type 3
N Same as "B" w/ ATEX Type 3
O Same as "C" w/ ATEX Type 3
P Same as "D" w/ ATEX Type 3. *See †NOTE*
Q Same as "E" w/ ATEX Type 3. *See †NOTE*
R Same as "F" w/ ATEX Type 3. *See †NOTE*

Available when Code 4 is 6:
S Same as "A", w/ATEX Type 4
T Same as "B", W/ATEX Type 4
U Same as "C", w/ATEX Type 4

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Note:
10 foot Cable Assemblies with MS Connector

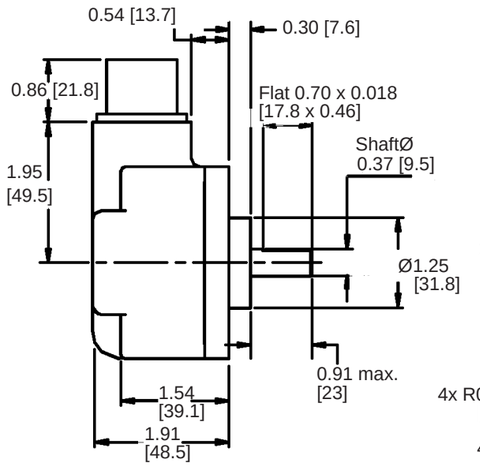
108594-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with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

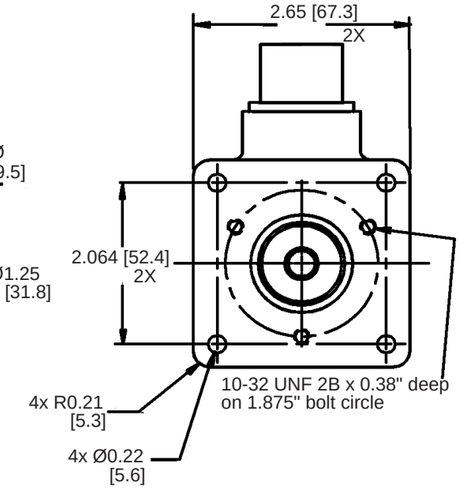
Mating Connectors (no cable)
6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (MCN-N6N4)

*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

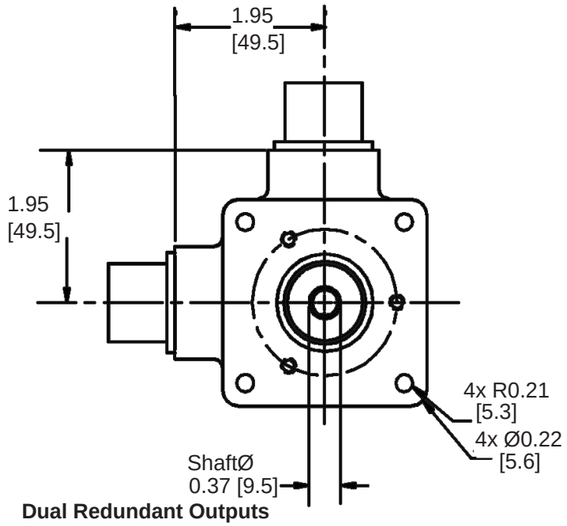
HAZARDOUS SERIES HD25 NorthStar™ brand

DIMENSIONS inches [mm]

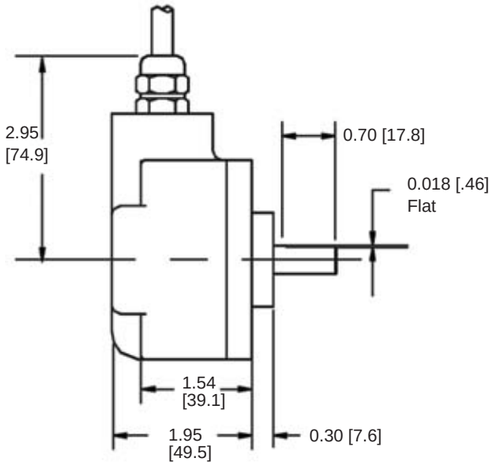




Standard Housing



Dual Redundant Outputs



Cable Exit

DYNAPAR™

Notes

SERIES X25

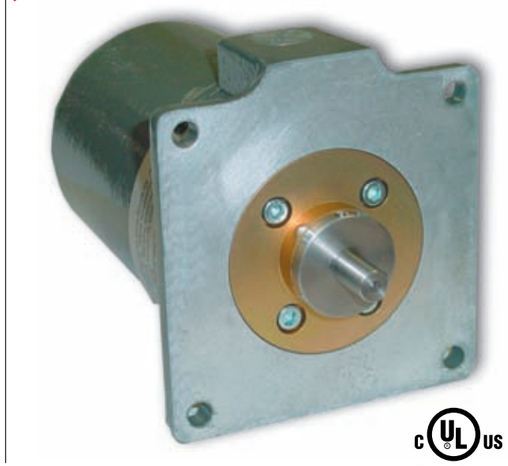
Dynapar™ brand

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**

HAZ Hazardous Duty



c UL us
File No. E116133,
Control No. 11X6

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° ± 25° electrical
Symmetry: 90° ± 25° electrical
Index: 2540 PPR and below: 180° ± 25° electrical; Greater than 2540 PPR: 90° ± 25° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power:
5 to 26 VDC 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. (index 75 kHz min. for extended temperature range)
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

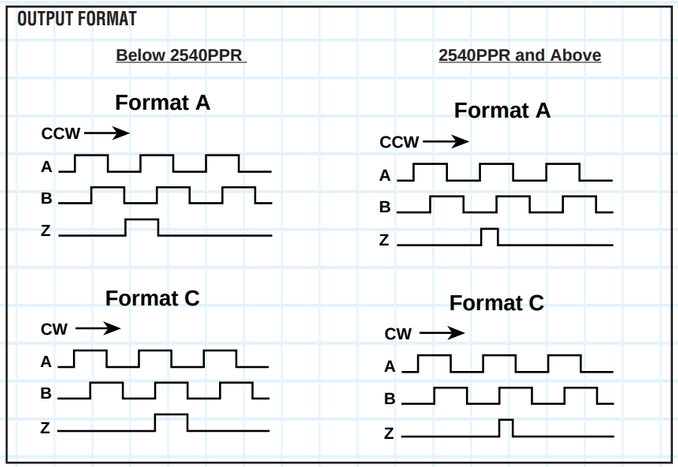
MECHANICAL

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 x 10^{-4} oz–in–sec^2

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



by DYNAPAR™

SERIES X25

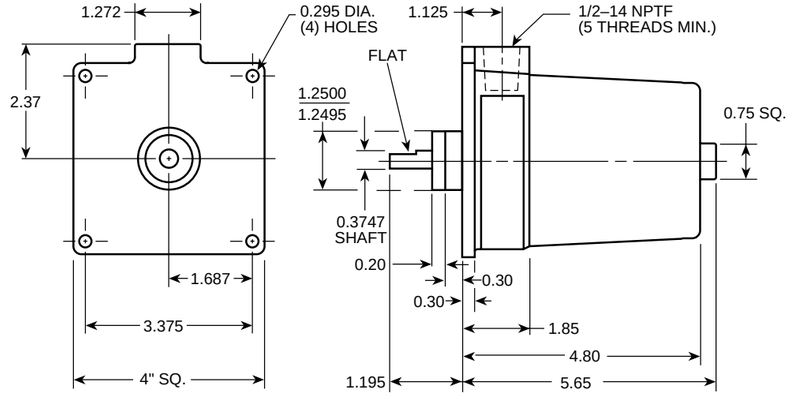
Ordering Information

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

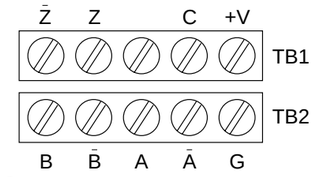
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mechanical	Code 4: Output	Code 5: Electrical
X25	□□□□	□	□	□
X25 Explosion Proof, Shielded Bearings with Shaft Seal	**0001** **0010** **0012** **0050** **0060** **0086** **0100** **0120** **0200** **0240** **0250** **0300** **0360** **0400** **0500** **0600** **0720** **0768** **0800** **1000** **1024** **1200** **1250** **1270** **1500** **1600** **1800** **1968** **2000** **2048** **2400** **2500** **2540** **3000** **3400** **3600** **3750** **4000** **4096** **4800** **5000**	**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 2.2kΩ 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 ISD25

NorthStar™ brand

Hazardous Duty Encoder

Key Features

- **Compact Hubshaft Design with Field Replaceable Shaft Isolators**
- **Unbreakable Code Disc up to 3600 PPR**
- **ATEX and CSA Certified for Hazardous Duty Applications**
- **IP67 Sealing**
- **Anodized Aluminum, Stainless Steel, or Nickel Plated Housing**

HAZ Hazardous Duty

EN 61326-1 RoHS

IEC Ex SIR15.0107X

C SP US Class 1, Div 1 Group C&D

Ex II1G Ex ia IIB T4 Ga

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 625 PPR: 90° ± 15° electrical; For resolutions over 625 PPR: 90° ± 30° electrical
Symmetry:
For resolutions to 1024 PPR: 180° ±18° electrical
For resolutions over 1024 PPR: 180° ±25° electrical
Index: 150° to 330°, A leads B CCW (From Clamp End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

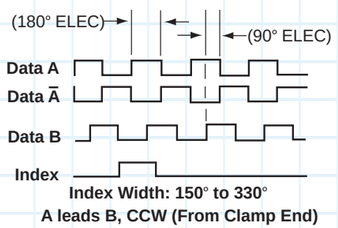
ELECTRICAL

Input Power: 5VDC, 7-26VDC
Outputs:
2N2222 Open Collector: 250mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 6, 7, or 10 pin MS Connector; 5 or 8 Pin M12 Connector; M23 Connector; Cable exit w/seal

ELECTRICAL (CONT.)

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, Style MS3116-F12-10S (MCN-B1)
10 Pin, NEMA4 Style (MCN-N6N4)
12 Pin CW M23 Connector (MCN-C1)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

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



Index Width: 150° to 330°
A leads B, CCW (From Clamp End)

MECHANICAL

Bore Diameter: 3/8", 10mm, 1/2", 5/8", 3/4". Insulated inserts provided
Mounting Configuration: Hubshaft, direct mount over shaft with multiple tether options available
Shaft Speed: 6000 RPM max.
Starting Torque: 6.5 in-oz. maximum (at 25°C)
Bearings: 61805-2RZ
Housing and Cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel. Tether Available
Shaft Material: 303 stainless steel (passivated)
Disc Material: Mylar
Weight: 20 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 80°C
Storage temperature: -40 to 100°C
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

SERIES ISD25

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	Code6: Options	Code 7: Special Options
ISD 25 □□□	□		□	□	□	□□
Ordering Information						
ISD25 Hazardous Duty 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"	**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) *Options G, H & J not available when Code 5 is 0, 5, H and Code 6 is 3, 4, 5* **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) *Options K, L & M not available when Code 5 is 0, 1, 5, 6, H and Code 6 is 3, 4, 5* **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)	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **3** 12 pin connector **4** 10 pin bayonet connector **5** 6 pin+mating connector **6** 7 pin+mating connector **7** 10 pin+mating connector **8** 12 pin+mating connector **9** 10 pin Bayonet mating connector **A** .5m (20") cable **C** 1m (39") cable **D** 2m (79") cable **E** 3m (118") cable **L** 4m (157") 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 **P** 1.5 ft (18") Cable with 10-pin Bulkhead Connector	**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

NOTE: Tether may be required for proper encoder operation and may be supplied by the customer or ordered from below.

† **NOTE**: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Cable Assemblies with MS Connector*

108594-XXXX 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108595-XXXX 7 Pin MS, Cable Assy. For Use with Single Ended Outputs
108596-XXXX 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs
114448-XXXX 10 Pin Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs
1400635XXXX 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs
109209-XXXX NEMA4 10 pin MS, Cable Assy. For use with Differential Line Driver with Index Outputs

Cable Assemblies with M23 Connector*

115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 Pin Bayonet, style MS3116-F12-10S
MCN-C1 12 Pin CW M23 Connector

Tether Kits

113764-0001 Single Point Tether Kit
113766-0001 Slotted Tether Kit

SERIES ISD25

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS & M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

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-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

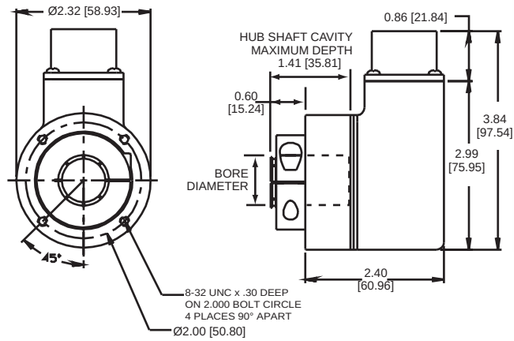
NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

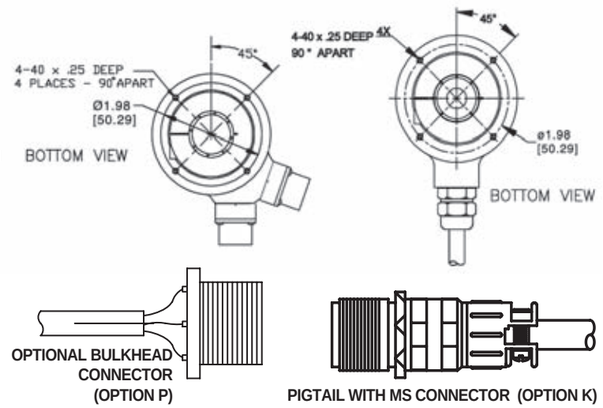
by DYNAPAR™

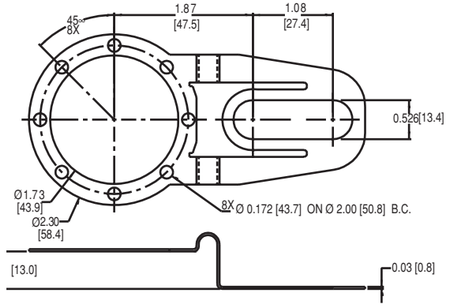
SERIES ISD25

DIMENSIONS inches [mm]

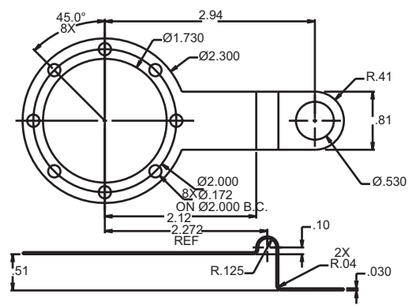


Standard Housing





113766-0001 Slotted Tether Kit



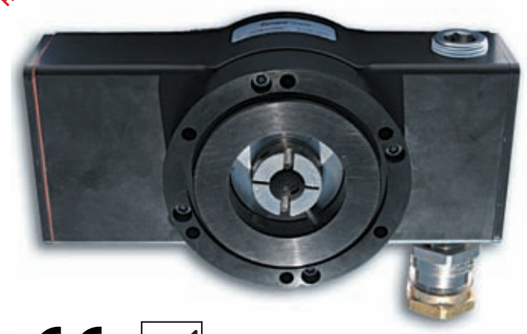
113764-0001 Single Point Tether Kit

SERIES EN44

NorthStar™ brand

Zone 1 Hazardous Area Rated Encoder

HAZ Hazardous Duty



Key Features

- Triple Certified Encoder for Hazardous Locations
- Hubshaft Design with Isolated Coupling to Compensate for Shaft Endplay
- Encapsulated Electronics with Increased Safety Interface for Zone 1 Use Eliminates Need for I.S. Barrier
- Industry Leading -50 to +100°C Temperature Range
- High Current Line Driver for Long Cable Runs
- 50g Shock and 20G Vibration Tolerant
- 2 Year Warranty

CE 0518 RoHS IEC Ex SIR15.0051X

C SA US
Ex e ia mb IIC T4 Gb
Certification No.
CSA 14.2676947X

Ex
II 2 G D
Ex ia mb e IIC T4 Gb
EX tb IIIC T119°C Db
Sira 09ATEX5172X

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: to 2048 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: 1200 PPR: 90° ± 15° electrical; 2048 PPR: 90° ± 30° electrical
Symmetry: 180° ± 25° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Voltage: 7-15VDC, 7-26VDC, 10-30VDC (see ordering information)
Input Current: 65mA max., not including output loads
Outputs: 4428 (7-15VDC), 7272 (7-26VDC) and High Powered Mosfet Line Drivers (10-30VDC)
Output Current: (Refer to Ordering Information Table, Code 4: Output Format)
Code 4, Option 0 or 2: 125mA max. per channel
Code 4, Option 1 or 3: 10mA max. per channel @ 100°C; 15mA max. per channel @ 90°C
Code 4, Option 4: 90mA max per channel @ 60C; 60mA max per channel at 95°C

ELECTRICAL (cont.)

Frequency Response: 125 kHz (data & index)
Termination: Terminal block - Ex screwless w/spring cage-clamp
Interface: HAWKE type "E" increased safety rated gland for armored and non-armored cables.
HAWKE Part Numbers:
Non-Armored Gland: HAWKE 501/421 A 3/4" NPT S (accepts 8.5 - 13mm cable, OD)
Armored Gland: HAWKE 501/453 UNIV A 3/4" NPT (accepts 12.5 - 20.5mm cable, OD)

MECHANICAL

Mechanical Interface: Electrically isolated stainless steel shaft flex coupling
Mounting: 100mm IEC Flange
Mating Shaft Length: 0.47" to 0.83" (11.9mm to 28.1mm)
Coupling: 16mm, flexible
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Bearing life: 5 x 10^8 revs at rated shaft Loading, 5 x 10^{11} revs at 10% of rated shaft loading. (manufacturers' specs)
Housing Material: Aluminum Alloy, Black Anodized
Disc material: Mylar®
Weight: 6 lb. 6 oz, typical

ENVIRONMENTAL

Operating Temperature: Refer to Temperature Range Table (below)
Storage temperature: -50 to 100°C. Armored Gland high-temperature specification limited to +80°C.
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

CERTIFICATIONS

IECEx SIR 15.0051X
Sira 09ATEX5172X
Ex ia mb e IIC T4 Gb
Ex tb IIIC T119°C Db
CSA 14.2676947X
Ex e ia mb IIC T4 Gb
Ex tb IIIC T119°C Db IP64
Ex m IIC T4 Gb and Class III, Div 1; Class II, Div 1, Groups E, F and G
Class I, Zone 1, AEx e ia mb IIC T4 Gb
Zone 21, AEx tb IIIC T119°C Db IP64

by DYNAPAR™

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: Output Format	Code 5: Termination
EN44	□□□□	□	□	□
Ordering Information				
EN44 Triple Certified ATEX Zone 1 Hollowshaft Encoder	**1024** **2048**	**A** 16mm	**0** Differential AB, 7-15V in, 7-15V out* **1** Differential AB, 7-26V in, 5V out* **2** Differential ABZ, 7-15V in, 7-15V out* **3** Differential ABZ, 7-26V in, 5V out* **4** Differential ABZ,10-30V in, 10-30V out* * See Electrical Specifications for Details	**0** No Gland **1** Ex Gland for non-armored cables (8.5 - 13.5mm OD) **2** Ex Gland for armored cables (12.5 - 20.5mm OD) **See †Note**

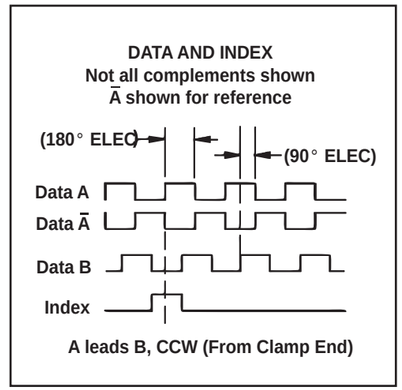
† **Note:** Armored Gland high-temperature specification limited to +80°C.

TEMPERATURE RANGE

Code 4 Option	Output Current	Group II Ambient Temperature Range	Group III Ambient Temperature Range
0 or 2	125mA max per channel	Ta = -50°C to +100°C	Ta = -50°C to +100°C
1 or 3	10mA max per channel	Ta = -50°C to +100°C	Ta = -50°C to +100°C
1 or 3	15mA max per channel	Ta = -50°C to +90°C	Ta = -50°C to +90°C
4	90mA max per channel	Ta = -50°C to +60°C	Ta = -50°C to +60°C
4	60mA max per channel	Ta = -50°C to +95°C	Ta = -50°C to +95°C

ELECTRICAL CONNECTIONS

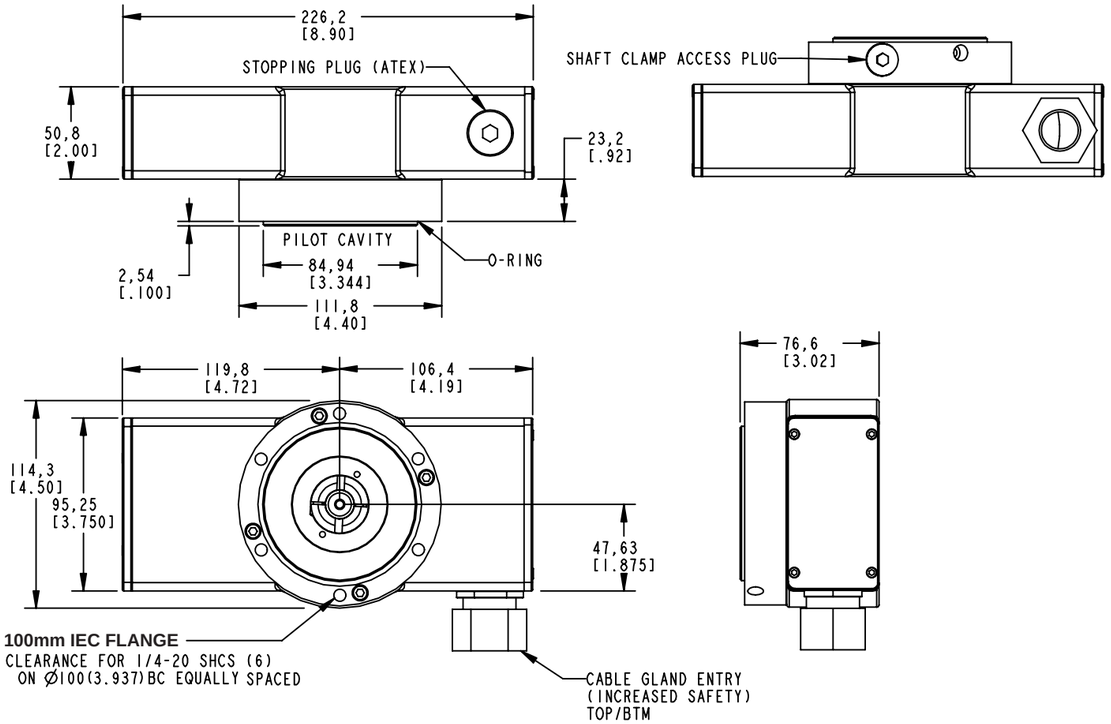
Encoder Function	Terminal Box Connection
Sig. A	1
Sig. $\bar{A}$	2
Sig. B	3
Sig. $\bar{B}$	4
Sig. Z	5
Sig. $\bar{Z}$	6
Power +V	7
Com	8



NorthStar™ brand

SERIES EN44

DIMENSIONS mm [inch]



HAZARDOUS DUTY

DYNAPAR™

Notes

HAZARDOUS SERIES HSD35 NorthStar™ brand

Hazardous Duty Encoder

HAZ Hazardous Duty

Key Features

- UL Certified for Hazardous Applications
- Rugged Design Resists up to 400g Shock and 20g Vibration
- Compact Design with Field Serviceable Connector for Solder-Less Connections
- Dual Isolated Output Option for Redundancy

CE RoHS c UL us

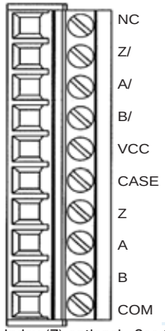
Class 1, Div 2 Group A,B,C&D
Class 2, Div 2 Group F&G

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 200 to 300PPR and 1200PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300PPR and above1024PPR:180° ±25° electrical; all other resolutions: 180° ±18°
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL CONNECTIONS

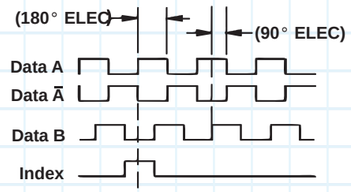


* Index (Z) optional. See Ordering Information

ELECTRICAL

Input Power: 5-26VDC, 5-15VDC. 50 mA max., not including output loads.
Outputs: ET7272, ET7273, 4469, MOSFET
Frequency Response: 125 kHz (data & index)
Termination: Pluggable screw terminals, inside terminal box with 1/2" conduit connector

DATA AND INDEX
Not all complements shown
Ā shown for reference



A leads B, CW (from clamp end)

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: 11.0 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
Weight: 3.2 lb (51.2 Oz) Typical

ENVIRONMENTAL

Operating Temperature: -40 ° to +85 °C with 7272 Line Driver; -40 ° to +70 °C with 4469 line driver; see "Ordering Information "). At shaft speed above 3000 RPM, derate 10 °C per 1000 RPM
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)
Hazardous Location Certification:
Class I, Division 2, Groups A, B, C & D;
Class II, Division 2, Groups F & G

by DYNAPAR™ HAZARDOUS SERIES HSD35

Ordering Information

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

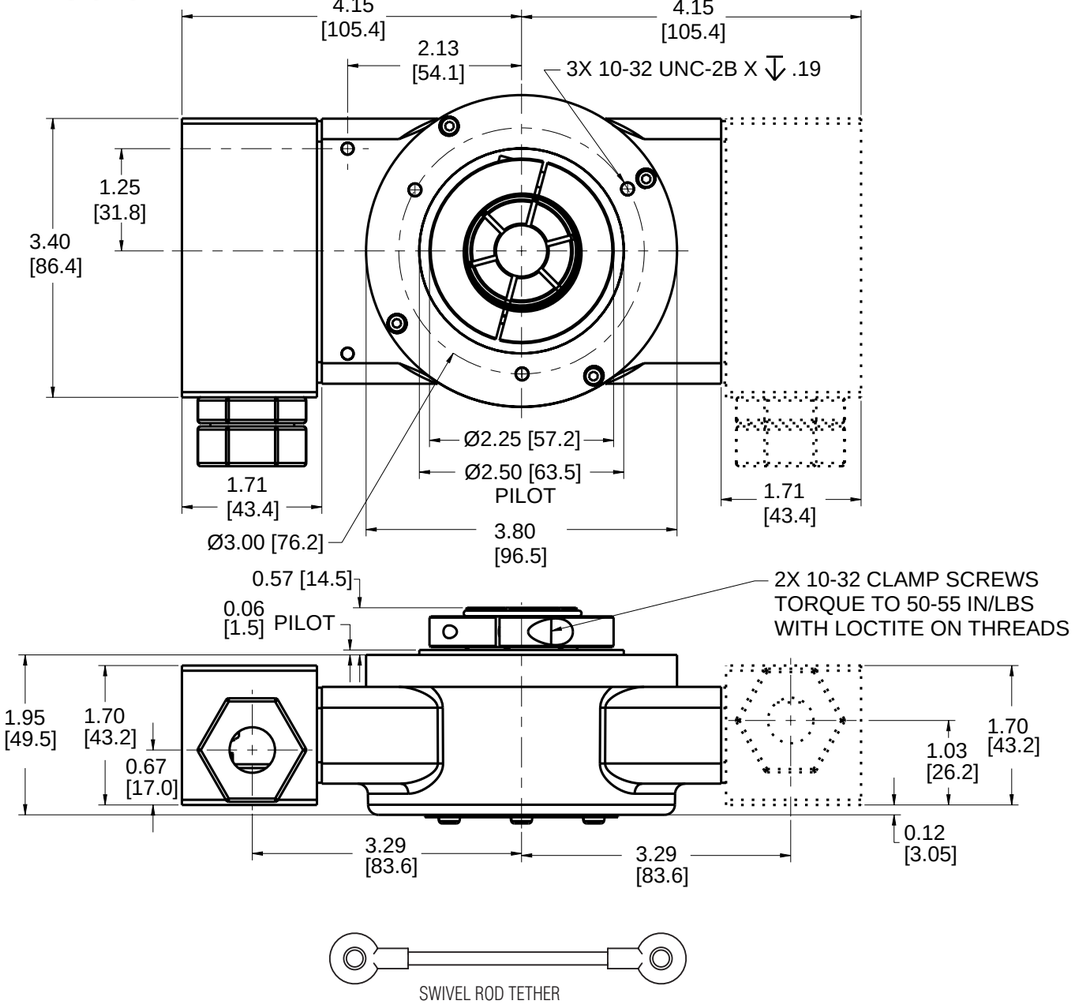
Code 1: Model	Code 2: PPR	Code 3: Bore Size	Code 4: Fixing	Code 5: Output Format	Code 6: Options
HSD35 □□□□		□	□	□	D2
Ordering Information					
HSD35 Hazardous Series, Hollowshaft Encoder	**0001** **0512** **0003** **0600** **0010** **0900** **0012** **1000** **0015** **1024** **0032** **1200** **0050** **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/56C-face cover **5** Same as 3 w/cover **6** Same as 2 w/180C-face 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, 5-26V, 5-26V out (7272) **5** Differential AB only, 5-26V 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, 5-26V in, 5V out (7272) **7** Differential ABZ, 5-26V in, 5-26V out (7272) **8** Differential ABZ, 5-26V in, 5V out (4469) **9** Differential ABZ, 5-15V in, 5-15V 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" **W** Differential ABZ, 10-24V in, 10-24V out (MOSFET)	**D2**

Accessory Kits:

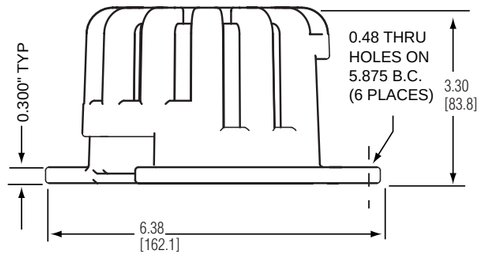
114573-0001 Tether Kit, 4.5" C-face single point with 3/8" bolt
114574-0001 Tether Kit for Standard AC motor fan covers with T-bolt
114575-0001 Tether Kit, 8.5" C-face single point with 1/2" bolt
756-042-01 Rod Tether, AC motor fan cover with T-bolts
756-043-01 Rod Tether Kit, 4.5" C Face with 3/8" bolt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

HAZARDOUS SERIES HSD35 *NorthStar™ brand*

DIMENSIONS inch [mm]



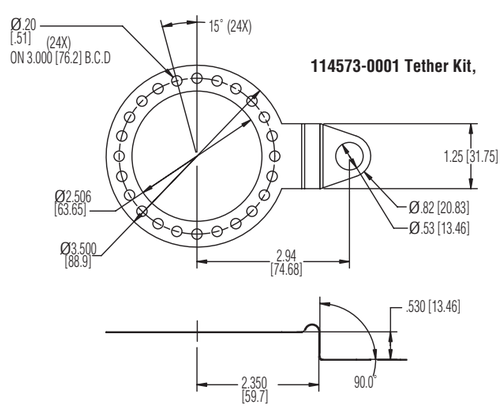
SWIVEL ROD TETHER

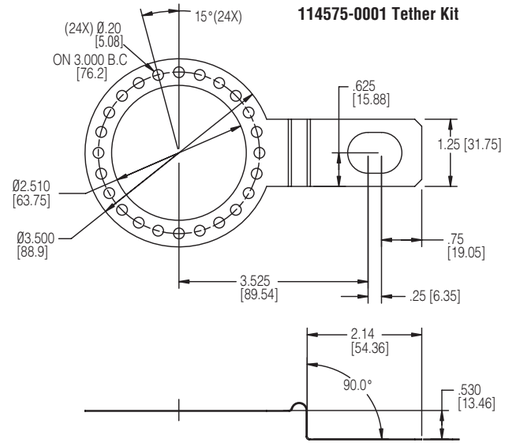


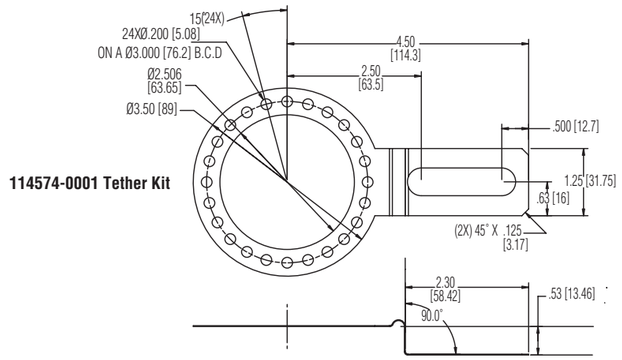
OPTIONAL SAFETY COVER(S)

by DYNAPAR™ HAZARDOUS SERIES HSD35

DIMENSIONS inch [mm]







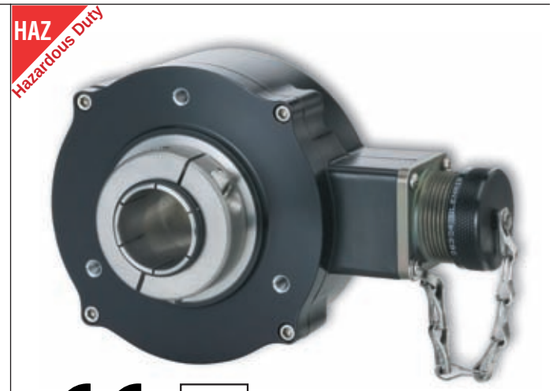
SERIES ISD37

NorthStar™ brand

Hazardous Duty Encoder

Key Features

- **Unbreakable Code Disc up to 5000 PPR**
- **ATEX and CSA Certified for Hazardous Duty Applications**
- **Dual Isolated Outputs Available for Redundancy**
- **Anodized Aluminum, Stainless Steel, or Nickel Plated Housing**
- **IP67 Sealing**



CE EN 61326-1

RoHS

IEC Ex SIR15.0107X

c SA us Class 1, Div 1 Group C&D

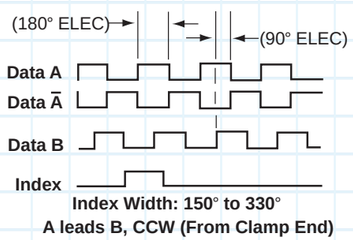
Ex II1G Ex ia IIB T4 Ga

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: Up 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 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330°, A leads B, CCW (From Clamp End)
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
Ā shown for reference



Index Width: 150° to 330°
A leads B, CCW (From Clamp End)

ELECTRICAL

Input Power: 5VDC, 7-26 VDC
Outputs:
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: MS Connector; M12 Connector; M23 Connector; cable exit w/seal.

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, Style MS3116-F12-10S (MCN-B1)
10 Pin, NEMA4 Style (MCN-N6N4)
12 Pin CW M23 Connector (MCN-C1)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

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

MECHANICAL

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)
Mounting Configuration: Hollow Bore, direct mount over shaft with multiple tether options available
Bore Runout: ±0.0005 TIR at midpoint
Shaft Speed: 6000 RPM max.
Min. Shaft Engagement: 1.60" (Recommended)
Starting Torque: 4.5 in-oz. maximum (at ambient)
Running Torque: 4.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Housing and Cover: Hard Anodized Aluminum. Also available in Stainless Steel.
Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)
Disc Material: Mylar
Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 80°C
Storage Temperature: -40 to 100°C
Shock: 400g for 6msec duration
Vibration: 5 to 3000Hz @ 20g
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67

by DYNAPAR™

SERIES ISD37

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
ISD37	□□□□	□	□	□	□	□□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Shaft	Code 4: Output Format	Code 5: Termination	Code 6: Options	Code 7: Special Option
ISD37 Hazardous Duty Encoder	**0015** **0032** **0050** **0060** **0100** **0200** **0240** **0250** **0500** **0512** **0600** **1000** **1024** **1200** **2000** **2048** **3072** **4000** **4096** **5000**	Electrically isolated: **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 **R** 1" Not electrically isolated: **H** 1" Non Isolated **P** 25mm Non Isolated	**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 (2222) **F** Single Ended ABZ, 7-26V in, 7-26V out Open Collector with 1kOhm (2222) *Options G , H & J not available when Code 5 is H* **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) *Options K, L, M not available when Code 5 is 0, 1, 5, 6, H* **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)	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **3** 12 pin connector **4** 10 pin Bayonet connector **5** 6 pin+mating connector **6** 7 pin+mating connector **7** 10 pin+mating connector **8** 12 pin+mating connector **9** 10 pin Bayonet+mating connector **A** .5m (20") cable **C** 1m (39") cable **D** 2m (79") 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 **P** 1.5 ft (18") Cable with 10-pin Bulkhead Connector *Available when Code 6 is 0, 1, 2, 3, A, C* **T** Terminal box w/conduit entry	**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

Cable Assemblies with MS Connector*

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

Cable Assemblies with M23 Connector*

115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-B1 10 Pin Bayonet, style MS3116-F12-10S
MCN-C1 12 Pin CW M23 Connector

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, 56 C-Face
114592-0001 Cover Kit, Fan Cover
114593-0001 Dual Cover Kit, 56 C-Face
114594-0001 Dual Cover Kit, Fan Cover

SERIES ISD37

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS & M23 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-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver With Out Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 114448-XXXX 10 Pin Bayonet		Cable #115901-XXXX 12 Pin (CW)		Cable Exit with Seal
	Pin	Wire Color	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	5	BRN	GRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	B	ORG	8	ORN	BLU
Sig. Z*	C	YEL	C	YEL	—	—	C	YEL	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-SLD	F	—	E	—	—	—	E	—	E	—	7	—	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	I	ORG/WHT	1	ORN/WHT	BRN
Sig. $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	J	YEL/WHT	4	YEL/WHT	YEL

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-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 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. $\overline{A}$	–	–	–	–	3	BRN/WHT
Sig. $\overline{B}$	–	–	–	–	5	ORG/WHT
Sig. $\overline{Z}$*	–	–	–	–	8	YEL/WHT

NOTES:

1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) "MS" Type mating connectors and pre-build cables are rated NEMA 12
7) "M12" Cable assemblies are rated IP67

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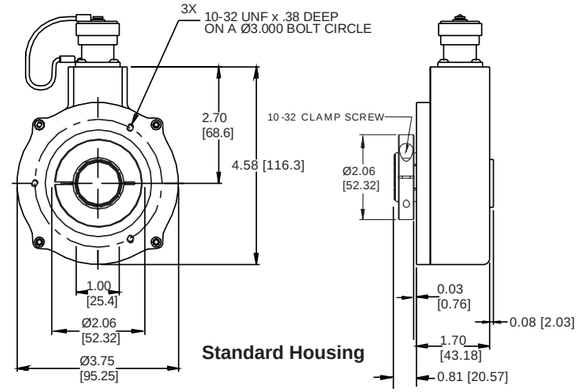
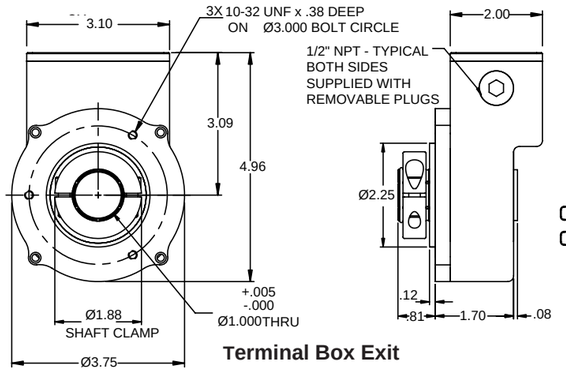
SERIES ISD37

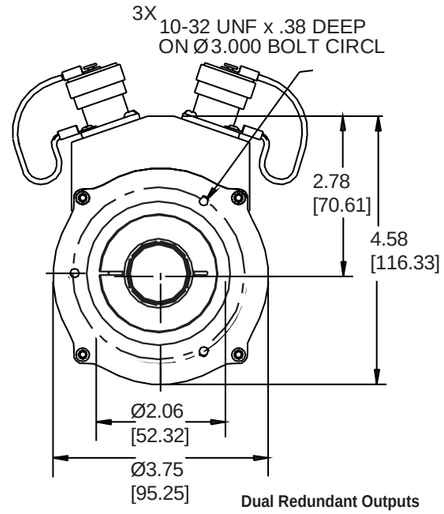
DIMENSIONS (inches [mm])



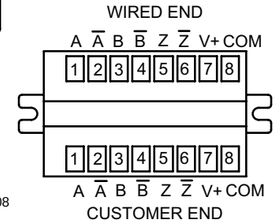
Standard Housing



Terminal Box Exit



Dual Redundant Outputs

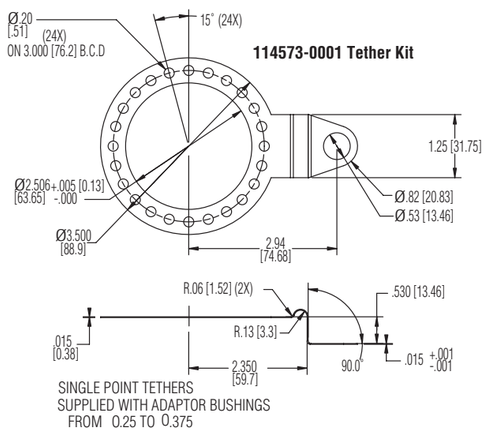


A - GREEN
Ā - VIOLET
B - BLUE
B̄ - BROWN
Z - ORANGE
Z̄ - YELLOW
V+ - RED
COM - BLACK

SERIES ISD37

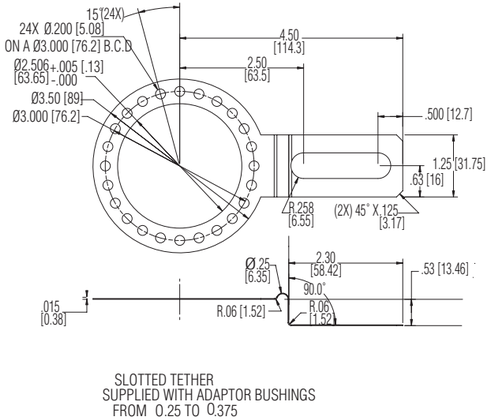
NorthStar™ brand

DIMENSIONS (inches [mm])



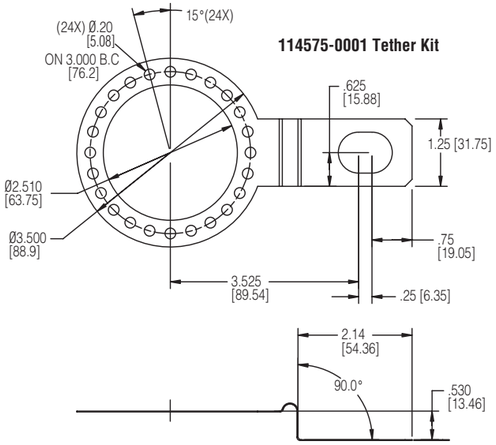
114573-0001 Tether Kit

SINGLE POINT TETHERS
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375

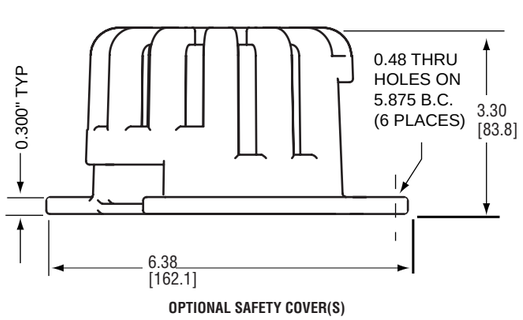


114574-0001 Tether Kit

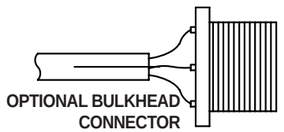
SLOTTED TETHER
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375



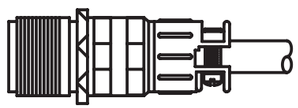
114575-0001 Tether Kit



OPTIONAL SAFETY COVER(S)



OPTIONAL BULKHEAD
CONNECTOR
(OPTION P)



PIGTAIL WITH MS CONNECTOR (OPTION K)

HAZARDOUS DUTY

DYNAPAR™

Notes

SERIES EN42

NorthStar™ brand

Zone 1 Hazardous Area Rated Encoder

Key Features

- Triple Certified Encoder for Hazardous Locations
- Encapsulated Electronics with Increased Safety Interface for Zone 1 Use Eliminates Need for I.S. Barrier
- Industry Leading -50 to +100°C Temperature Range
- High Current Line Driver for Long Cable Runs
- 50g Shock and 20G Vibration Tolerant
- 2 Year Warranty

HAZ Hazardous Duty

RoHS CE 0518 IEC Ex SIR15.0051X

Ex II 2 G D
Ex ia mb e IIC T4 Gb
EX tb IIIC T119°C Db
Sira 09ATEX5172X

CSA US
Ex e ia mb IIC T4 Gb
Certification No.
CSA 14.2676947x

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 ±25 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: 7-15VDC, 7-26VDC, 10-30VDC (see ordering information)
Input Current: 65mA max., not including output loads
Outputs: 4428 (7-15VDC), 7272 (7-26VDC) and High Powered Mosfet Line Drivers (10-30VDC)
Output Current: (Refer to Ordering Information Table, Code 4: Output Format)
Code 4, Option 0 or 2: 125mA max. per channel
Code 4, Option 1 or 3: 10mA max. per channel @ 100°C; 15mA max. per channel @ 90°C
Code 4, Option 4: 90mA max per channel @ 60C; 60mA max per channel at 95°C
Frequency Response: 125 kHz (data & index)
Termination: Terminal block - Ex screwless w/spring cage-clamp
Interface: HAWKE type "E" increased safety rated gland for armored and non-armored cables.
HAWKE Part Numbers:
Non-Armored Gland: HAWKE 501/421 A 3/4" NPT S (accepts 8.5 - 13mm cable, OD)
Armored Gland: HAWKE 501/453 UNIV A 3/4" NPT (accepts 12.5 - 20.5mm cable, OD)

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: 2.00", Minimum; 2.50", 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 10^8 revs at rated shaft Loading, 5 x 10^{11} revs at 10% of rated shaft loading. (manufacturers' specs)
Housing and Cover: Hard Anodized Aluminum.
Disc Material: Metal or Plastic
Accessory Fastners, Provided With:
Tether Bracket: (3) #10-32 x 3/8" SHCS Socket Head Cap Screws
Threaded Rod: (2) 5/16-24 x .70" Mounting Bolts
Rear Cover: (4) #6-32 x 3/8" SHCS Socket Head Cap Screws
Terminal Box: (4) #6-32 x 3/8" SHCS Socket Head Cap Screws
Weight: 6.5 lb, typical

ENVIRONMENTAL

Operating Temperature: Refer to Temperature Range Table (below)
Storage temperature: -50 to 100°C. Armored Gland high-temperature specification limited to +80°C.
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

CERTIFICATIONS

IECEx SIR 15.0051X
Sira 09ATEX5172X
Ex ia mb e IIC T4 Gb
Ex tb IIIC T119°C Db
CSA 14.2676947X
Ex e ia mb IIC T4 Gb
Ex tb IIIC T119°C Db IP64
Ex m IIC T4 Gb and Class III, Div 1; Class II, Div 1, Groups E, F and G
Class I, Zone 1, AEx e ia mb IIC T4 Gb
Zone 21, AEx tb IIIC T119°C Db IP64

by DYNAPAR™

SERIES EN42

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: Tether	Code 7: Cover
EN42	□□□□	□	□	□	□	□
Ordering Information						
EN42 Triple Certified ATEX Zone 1 Hollowshaft Encoder	**0015** **1000** **0032** **1024** **0100** **1200** **0200** **2000** **0240** **2048** **0250** **2500** **0500** **4000** **0512** **5000** **0600**	**Stainless Steel Hub** **8** 5/8" **9** 15 mm **A** 16mm **D** 3/4" **F** 7/8" **H** 1" Non-Isolated **Anodized Aluminum Hub** **R** 1" Isolated	**0** Differential AB, 7-15V in, 7-15V out* **1** Differential AB, 7-26V in, 5V out* **2** Differential ABZ, 7-15V in, 7-15V out* **3** Differential ABZ, 7-26V in, 5V out* **4** Differential ABZ,10-30V in, 10-30V out* * See Electrical Specifications for Details	**0** No Gland **1** Ex Gland for non-armored cables (8.5 - 13.5mm OD) **2** Ex Gland for armored cables (12.5 - 20.5mm OD) **See †Note**	**0** Slotted Tether **1** Heavy Duty Swivel Rod Tether	**0** Covers, Standard Flat and Extended

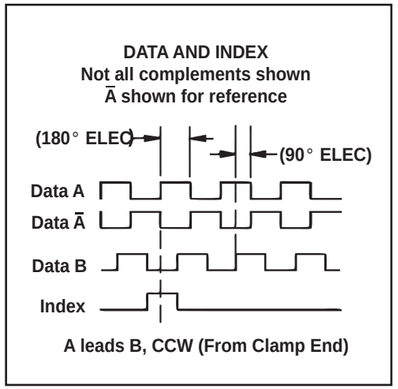
† **Note:** Armored Gland high-temperature specification limited to +80°C.

TEMPERATURE RANGE

Code 4 Option	Output Current	Group II Ambient Temperature Range	Group III Ambient Temperature Range
0 or 2	125mA max per channel	Ta = -50°C to +100°C	Ta = -50°C to +100°C
1 or 3	10mA max per channel	Ta = -50°C to +100°C	Ta = -50°C to +100°C
1 or 3	15mA max per channel	Ta = -50°C to +90°C	Ta = -50°C to +90°C
4	90mA max per channel	Ta = -50°C to +60°C	Ta = -50°C to +60°C
4	60mA max per channel	Ta = -50°C to +95°C	Ta = -50°C to +95°C

ELECTRICAL CONNECTIONS

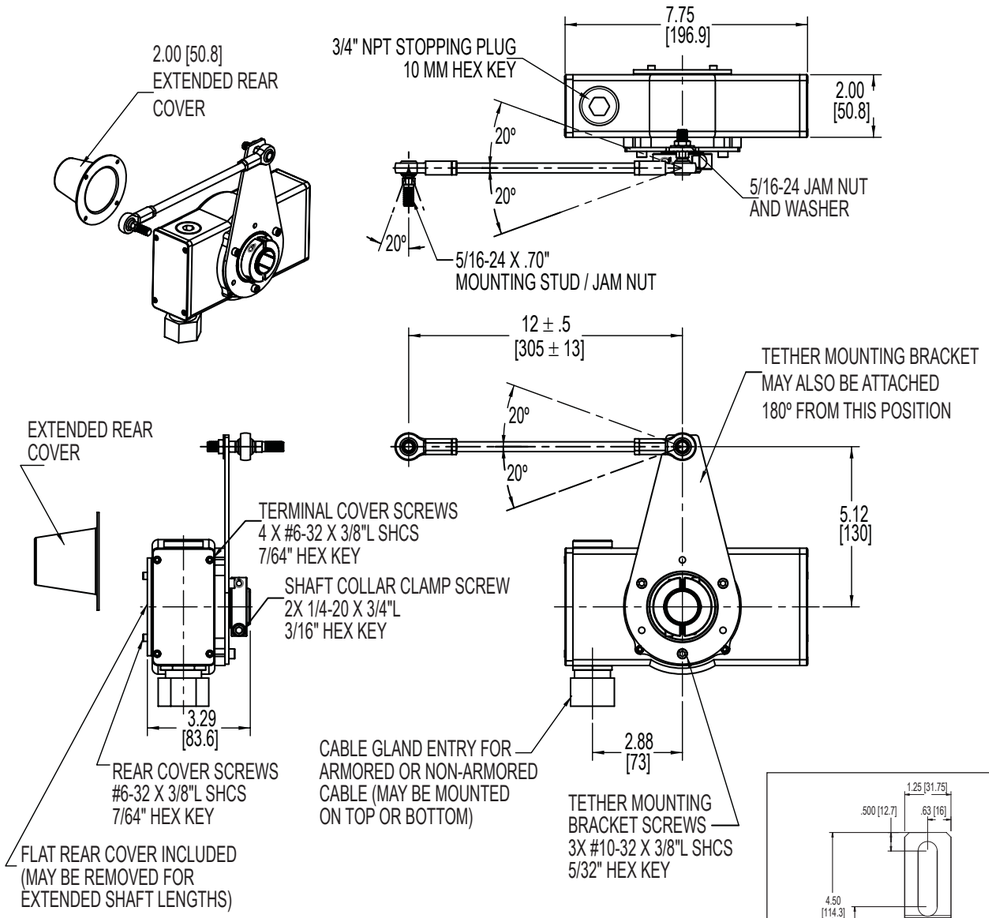
Encoder Function	Terminal Box Connection
Sig. A	1
Sig. $\bar{A}$	2
Sig. B	3
Sig. $\bar{B}$	4
Sig. Z	5
Sig. $\bar{Z}$	6
Power +V	7
Com	8



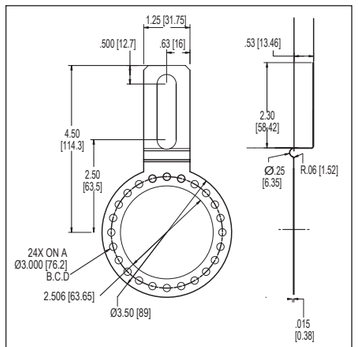
SERIES EN42

NorthStar™ brand

DIMENSIONS (Inch [metric])



SHOWN WITH HEAVY DUTY SWIVEL ROD TETHER ATTACHED



SLOTTED TETHER
SUPPLIED WITH ADAPTOR
BUSHINGS FROM 0.25 TO 0.375

HAZARDOUS DUTY

DYNAPAR™

Notes

SERIES ISW38

NorthStar™ brand

Hazardous Duty Encoder

Key Features

- Draw Works Threaded Shaft with Field Replaceable Adapters for Reduced Downtime
- ATEX and CSA Certified for Hazardous Duty Applications
- Dual Isolated Outputs Available for Redundancy
- Anodized Aluminum or Stainless Steel Housing
- NAMUR Sensor Output Available

EN 61326-1 | RoHS | C SP US Class 1, Div 1 Group C&D | Ex E Ex ia IIB T4

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
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 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
For resolutions 200-300PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°
Index: 150° to 330° A Leads B, CCW (From Shaft End)
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Power: 5VDC, 7-26VDC
Outputs:
2N2222 Open Collector: 250mA, sink max
7272 Push-Pull: 40mA, sink or source
7272 Differential Line Driver: 40 mA, sink or source
7273 Open Collector: 40mA, sink max
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Termination: 6, 7, or 10 pin MS Connector; M23 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, NEMA4 style (MCN-N6N4)
12 pin CW, M23 Connector (MCN-C1)
Cable w/ 5 pin M12 Connector (112859-XXXX)
Cable w/ 8 pin M12 Connector (112860-XXXX)

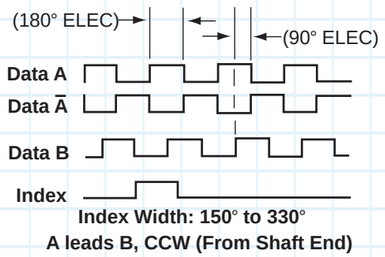
MECHANICAL

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 Speed: 6000 RPM max
Bore Loading: Up to 20 lbs axial and radial
Bore Runout: 0.0005 TIR at midpoint
Starting Torque: 4.5 in-oz. max (at 25°C)
Running Torque: 4.0 in-oz. max (at 25°C)
Bearings: 61806-ZZ
Housing and Cover: Hard Anodized Aluminum. Also available in Electroless Nickel finish and Stainless Steel
Shaft Material: 300 series stainless steel
Disc Material: Mylar
Weight: 35 ounces, typical

ENVIRONMENTAL

Operating Temperature: -40 to 80°C
Storage temperature: -40 to 100°C
Shock: 400g for 6msec duration
Vibration: 5 to 3000Hz @ 20g
Humidity: Up to 98% (non-condensing)
Enclosure Rating: IP67

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



Index Width: 150° to 330°
A leads B, CCW (From Shaft End)

by DYNAPAR™

SERIES ISW38

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
ISW38	□□□□	□	□	□	□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Shaft	Code 4: Output Format	Code 5: Termination	Code 6: Options
ISW38 Hazardous Duty Encoder	**0015** **1000** **0032** **1024** **0050** **1200** **0060** **2000** **0100** **2048** **0200** **4000** **0240** **4096** **0250** **5000** **0500** **0512** **0600**	**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 Replace-able Threaded Shaft	**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) *Options H, J &K not available when Code 5 is H* **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) *Options L, M, P not available when Code 5 is 0, 1, 5, 6, H* **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) *Option N available only when Code 2 is 0015)* **N** Namur output, 15mA max	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **3** 12 pin connector **5** 6 pin+mating connector **6** 7 pin+mating connector **7** 10 pin+mating connector **8** 12 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 † † **NOTE:** Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Accessories:

Cable Assemblies with MS Connector*

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

Cable Assemblies with M23 Connector*

115901-XXXX 12 pin M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CW

Cable Assemblies with M12 Connector*

112859-XXXX 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-XXXX 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

MCN-N4 6 pin, style MS3106A-14S-6S
MCN-N5 7 pin, style MS3106A-16S-1S
MCN-N6 10 pin, style MS3106A-18-1S
MCN-N6N4 10 pin, NEMA4 style
MCN-C1 12 Pin CW M23 Connector

***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

SERIES ISW38

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS & M23 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.

Table 1

Encoder Function	Cable # 108594-XXXX 6 Pin Single Ended		Cable # 108595-XXXX 7 Pin Single Ended		Cable # 108596-XXXX 7 Pin Dif Line Driver w/o Index		**Cable # 109209-XXXX or 1400635XXXX 10 Pin Dif Line Driver w/ Index		Cable # 115901-XXXX 12 Pin Differential Line Driver with Index		Cable Exit with Seal
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code	Wire Color Code
Signal A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	GRN
Signal B	D	ORN	B	ORG	B	ORG	B	ORG	8	ORG	BLU
Signal Z*	C	YEL	C	YEL	—	—	C	YEL	3	YEL	ORG
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLK
Case	—	GRN	G	GRN	G	GRN	G	GRN	9	—	WHT
N/C-Shield	F	—	E	—	—	—	E	—	7	—	—
Signal $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	VIO
Signal $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORG/WHT	BRN
Signal $\overline{Z}$*	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	YEL

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.

Table 2

Encoder Function	Cable # 112859-XXXX 5 Pin Single Ended		Cable # 112860-XXXX 8 Pin Single Ended		Cable # 112860-XXXX 8 Pin Differential	
	Pin	Wire Color Code	Pin	Wire Color Code	Pin	Wire Color Code
Signal A	4	BLK	1	BRN	1	BRN
Signal B	2	WHT	4	ORG	4	ORG
Signal Z*	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Signal $\overline{A}$	—	—	—	—	3	BRN/WHT
Signal $\overline{B}$	—	—	—	—	5	ORG/WHT
Signal $\overline{Z}$*	—	—	—	—	8	YEL/WHT

NOTES:

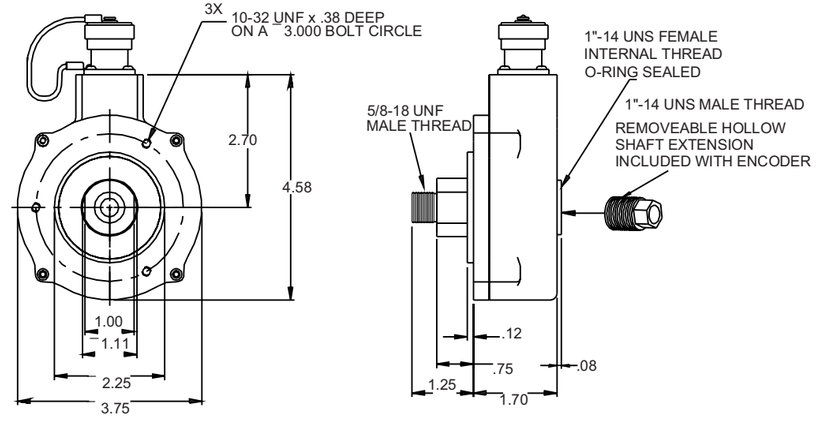
1) Cable Configuration (**Table 1**): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)
2) Cable Configuration (**Table 2**): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum
3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020
4) *Index not provided on all models. See ordering information.
5) **For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.
6) “MS” Type mating connectors and pre-build cables are rated NEMA 12
7) “M12” Cable assemblies are rated IP67

by DYNAPAR™

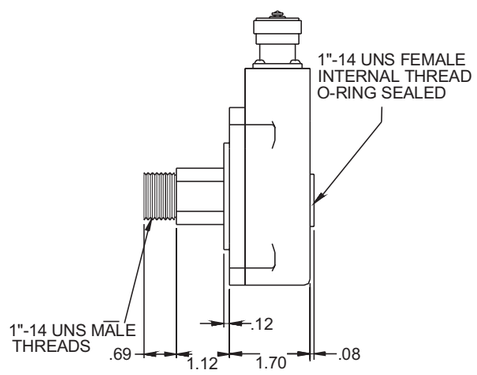
SERIES ISW38

DIMENSIONS inches [mm]

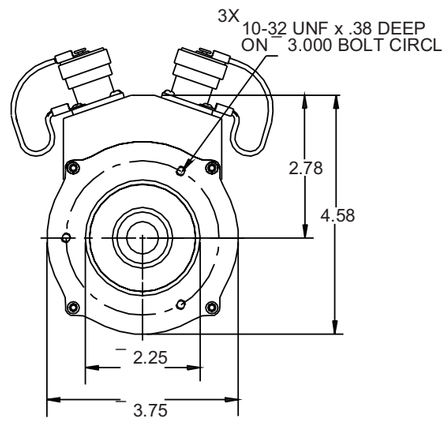
With Convertable Shaft



With Non-Convertable Shaft



Redundant Version



SERIES AX65 HENGSTLER

Explosion Proof Absolute Multi-Turn Encoder

Key Features

- **Explosion Proof Absolute**
- **12 bit of Singleturn, 12 or 16 bit of True Multiturn Absolute Positioning**
- **ATEX and IECEX certification for Mining, Gas and Dust**
- **Extreme corrosion resistance: high grade stainless steel housing**
- **Protection class up IP66/ IP67**
- **CANopen or SSI Communications**

IEC Ex IBE12.0017X CE EN 61326-1 Ex RoHS

Ex II 2G Ex db IIC T4
Ex II 2D Ex tb IIIC T135 °C
Ex I M2 Ex db I

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Magnetic
Resolution Single-turn: 12 Bit
Resolution Multi-turn: 12 Bit, 13Bit (SSI Only), 16 Bit
Absolute Accuracy: ±1 °
Repeatability: ±0.2 °

ELECTRICAL:
Interface: CANopen, SSI
Input Power: DC 10 -30V
Current w/o Load: 200 mA, typ.
Recommended External Fuse: T 0.2 A
Power Consumption: Max.2 W
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1
Termination (without cable gland):
Terminal box with 1 x M20x1, 5 screw thread, axial or radial
Terminal box with 2 x M20x1, 5 screw thread, radial
Mating Connector: Cable Exit

Interface: CANopen
Output Code: Binary
Protocol: CANopen according to DS 301 with profile DSP 406
Programmable: Resolution, Preset, Offset, Direction
Parametrization: Speed, Acceleration, Limit values, Operating time
Bus Termination Resistor: Set via DIP switches

Interface: CANopen (Cont.)
Updating of Values: Every millisecond (adjustable), on request
Basic Identifier (11 Bit): Set via DIP switches or Software
Frequency Response (Baud Rate): Set via DIP switches in the range of 10 to 1.000 Kbit/s (standard setting EX-Works: 250 Kbit/s)
Max. Speed: at +60 °C Ambient temperature: 700 rpm, 6000 rpm (short term <1sec), at +40 °C Ambient temperature: 2200 rpm, 6000 rpm (short term <1sec)

Interface: SSI
Output Code: Gray or Binary
Drives: Clock and Data /RS422
Control Inputs 2: Preset, Direction
Max. Speed: 3000 rpm (6000 rpm short term <1sec)

SSI RECOMMENDED DATA TRANSFER RATE

The max. data transfer rate depends on the cable length. For Clock / $\overline{\text{Clock}}$ and Data / $\overline{\text{Data}}$ please use twisted pairs. Use shielded cable.

Cable Length	Frequency
<25m	< 800 kHz
<50m	< 400 kHz
<100m	< 300 kHz
<200m	< 200 kHz
<400m	< 100 kHz

MECHANICAL
Shaft Diameter: 10 mm (Solid shaft)
Shaft Material: Stainless Steel
Maximum Shaft Load Axial: 300 N axial
Maximum Shaft Load Radial: 300 N radial
Starting Torque: ≤4.5 Ncm typ.
Nominal Speed: 1500 rpm
Moment of inertia: approx.25 gcm^2
Housing Material: Stainless Steel
Weight: 2.86 lbs. (1300g) approx. without cable

ENVIRONMENTAL
Standard Ambient Temperature:
-40 °C ...+60 °C Ex db IIC T4
-40 °C ...+60 °C Ex tb IIIC T135 °C /Ex db I
Storage Temperature: -20 °C ...+85 °C
Shock (DIN EN 60068-2-27:2010):
2000m/s^2 (3ms)
Vibration (DIN EN 60068-2-6:2008): 300m/s^2 (50 … 2000Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP66/67 (housing & Shaft)

by DYNAPAR™ SERIES AX65

WIRING - CANopen

Color / Printed Numbers	Terminal Block	Signal
White / 1	1	U in 10...30V DC
Brown / 2	2	0V(GND Power supply)
Green / 3	3	CAN in -
Yellow / 4	4	CAN in +
Grey / 5	5	CAN out -
Pink / 6	6	CAN out +
Blue / 7	7	GND in
Red / 8	8	GND out
	9	Not connected
	10	PE
Screen		Cable Screen Connected to Housing
Terminal screw		For Additional Connection of an Earth Conductor

WIRING - SSI

Color / Printed Numbers	Terminal Block	Signal
White / 1	1	U in 10...30V DC
Brown / 2	2	0V(GND Power supply)
Green / 3	3	$\overline{\text{Clock}}$
Yellow / 4	4	Clock
Grey / 5	5	$\overline{\text{Data}}$
Pink / 6	6	Data
Blue / 7	7	Direction
Red / 8	8	Preset (set to zero)
	9	Not connected
	10	PE
Screen		Cable Screen Connected to Housing
Terminal screw		For Additional Connection of an Earth Conductor

SERIES AX65 HENGSTLER

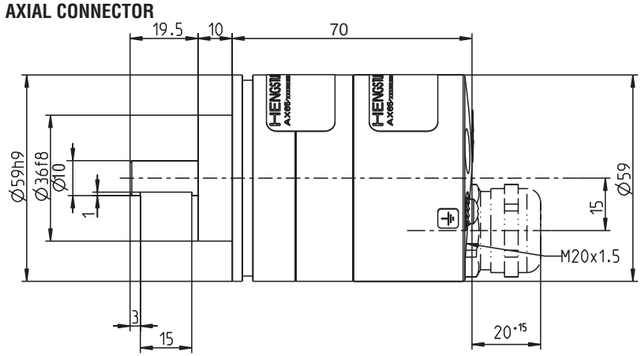
Ordering Information

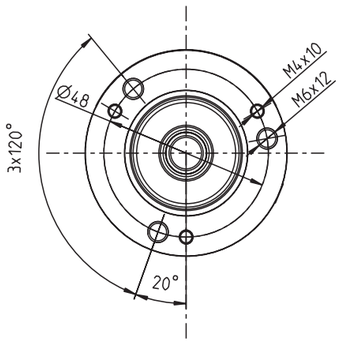
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Supply Voltage	Code 4: Flange, Protection, Shaft	Code 5: Interface	Code 6: Connection
Ordering Information					
AX65	□□□□	□	□□□□	□□	□
Series **AX65** Hazardous Duty Absolute Encoder	**0012** 12 Bit ST **1212** 12 Bit ST +12 Bit MT **1612** 12 Bit ST +16 Bit MT Available when Code 5 is SG or SB **1312** 12 Bit ST +13 Bit MT	**E** 10-30VDC	**L.72** Synchro-Clamping, IP66/ IP67, 10mm	**SB** SSI-Binary **SG** SSI-Gray **OL** CANopen	**0** 1 x M20x1.5 screw thread, axial **1** 1 x M20x1.5 screw; thread, radial **2** 2 x M20x1.5 screw; thread, radial

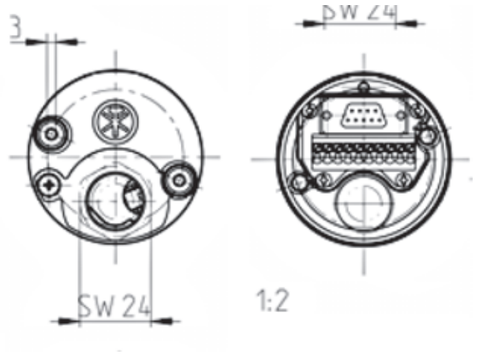
DIMENSIONS mm

AXIAL CONNECTOR





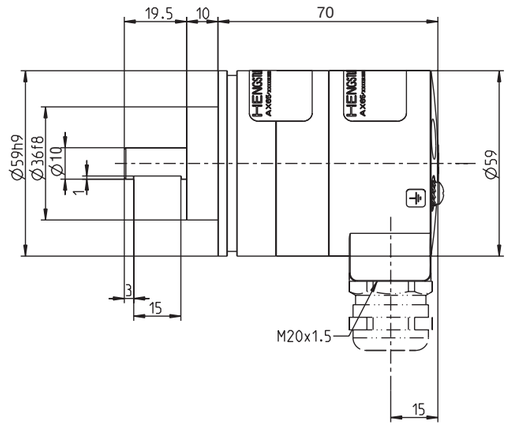
Recommended thread length of cable gland: 14mm

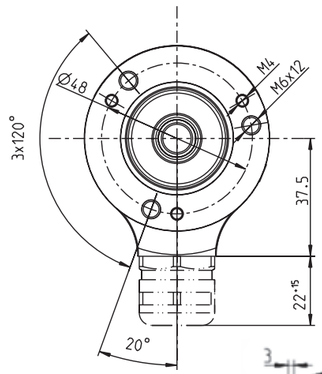


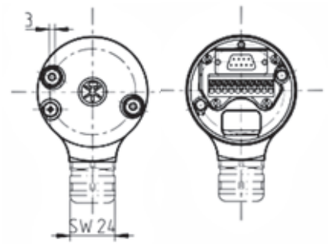
by DYNAPAR™ SERIES AX65

DIMENSIONS mm

SINGLE RADIAL CONNECTOR

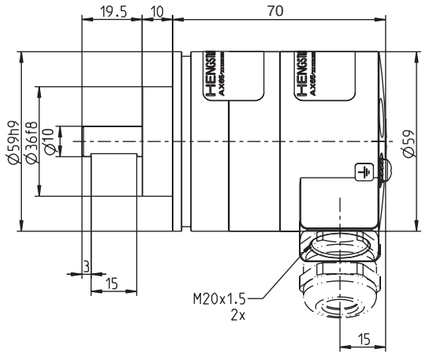


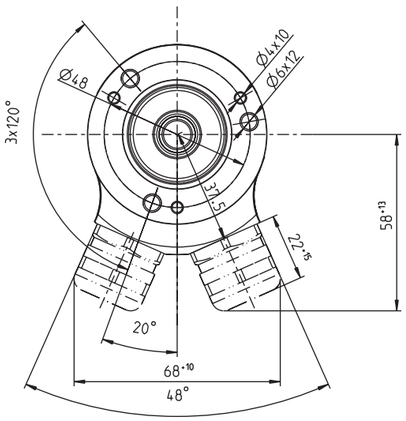


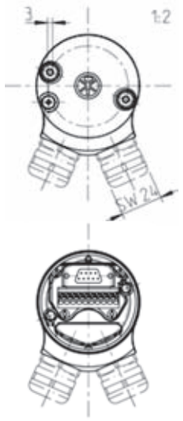


Recommended thread length of cable gland: 14mm

DUAL RADIAL CONNECTOR







Recommended thread length of cable gland: 14mm

SERIES AX70/AX71 HENGSTLER

Optical Absolute Encoder

Key Features

- **Up to 22 bit of Singleturn, 12 bit of True Multiturn Absolute Positioning**
- **ATEX Certification for Explosion Proof Requirements**
- **Ingress Protection up to IP67**
- **Stainless Steel or Aluminum Housing**
- **Multiple Communication Options**

IEC Ex PTB 12.0002X CE EN61326-1 Ex D II C T6/T4

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:
Code: Absolute, Optical
Absolute Accuracy: ±35" (BiSS/SSI)
Linearity:
BiSS/SSI: ± ½LSB (± 1 LSB for resolution > 13 Bit)
CANopen: ± ½LSB (± 1 LSB for resolution 13, 14, 25, 26 Bit)
Profibus: ± ½ LSB (± 1 LSB for resolution 13, 14, 25, 26 Bit)
DeviceNet: ± ½ LSB (± 1 LSB for resolution 13, 14, 25, 26 Bit)

ELECTRICAL:
Connection: Cable, axial and radial
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1

Interface: BiSS/SSI/ SSI Programmable
Input Power: 10-30 VDC
Current Consumption:
BiSS/ SSI: 220 mA (ST) / 250 mA (MT)
SSI Programmable: max. 250 mA (ST / MT)
Line/Drivers: Clock and Data RS422
Output Code: Binary or Gray
Resolution Single-turn:
BiSS/ SSI: 10-22 Bit
SSI Programmable: 10-17 Bit
Resolution Multi-turn: 12 Bit
Programmable (with WIN SSI): Resolution, Code Type, Direction, Output Format, Warning, Alarm, Preset Values
Control Input:
BiSS/ SSI: Direction
SSI Programmable: Direction, Preset 1, Preset 2
Alarm Output: Alarm bit

Interface: Profibus
Input Power: 10-30 VDC
Current Consumption: 220 mA (ST) / 250 mA (MT)
Protocol: Profibus DP with encoder profile CLASS C2 (parameterizable)
Output Code: Binary
Resolution Single-Turn: 10-14 Bit
Resolution Multi-turn: 12 Bit
Frequency Response (Baud Rate): Is automatically set within a range of 9.6 Kbit/s through 12Mbit/s
Bus Terminating Resistor: External Mounting
Device Address: Set via Bus
Integrated Special Functions: Speed, Acceleration, Operating Time
Programmable: Resolution, Preset, Direction

Interface: CANopen
Input Power: 10-30 VDC
Current Consumption: 250 mA (ST, MT)
Protocol: CANopen according DS 301 with encoder profile DSP 406
Output Code: Binary
Resolution Single-Turn: 10-16 Bit
Resolution Multi-turn: 12 Bit
Frequency Response (Baud Rate): set via bus within a range of 10 to 1000 Kbit/s (Standard setting for baud rate is 800 Kbit/s ex works
Bus Terminating Resistor: External Mounting
Node ID: Set via Bus
Integrated Special Functions: Speed, Acceleration, Rotary Axis, Limited Values, Operating Time
Programmable: Resolution, Preset, Direction

Interface: DeviceNet
Input Power: 10-30 VDC
Current Consumption: 220 mA (ST) / 250 mA (MT)
Protocol: DeviceNet according to Rev. 2.0, programmable encoder
Output Code: Binary
Resolution Single-Turn: 10-14 Bit
Resolution Multi-turn: 12 Bit
Frequency Response (Baud Rate): 500KBaud
Bus Terminating Resistor: Activated
Mac-ID: =1
Programmable: Resolution, Preset, Direction

MECHANICAL
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
Starting Torque: ≤1 Ncm
Moment of Inertia: approx. 20 gcm²
Housing Material: AX 70= Aluminum; AX 71= Stainless Steel
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: AX 70= approx. 1.4 kg; AX 71= approx. 4.8 kg

ENVIRONMENTAL
Ambient temperature: T4= -40°C to +60°C; T6= -40°C to +40°C
Operating Temperature:
Operating temperature correlating with Ex-requirements, please see page 2 showing allowed ambient temperature in relation to different conditions
Storage Temperature: -25°C to +85°C
Shock (DIN EN 60068-2-27): 1000 m/s² (6 ms)
Vibration (DIN EN 60068-2-6): 100 m/s² (10 to 500 Hz)
Humidity: Up to 75%, (No Condensation Allowed)
Enclosure Rating:
Housing: (EN 60529/ A1:2000-02): T4: IP65 or IP67; T6: IP65
Shaft: (EN 60529/ A1:2000-02) T4: IP64 or IP67 ; T6: IP64

* No standing water allowed at the shaft entrance or cable entrance or at the ball bearing.

by DYNAPAR™ SERIES AX70/AX71

MAXIMUM SPEED VS TEMPERATURE CLASS

Interface	Protection Class	Max. Speed	Ambient Temperature	Temperature Class
SSI / BiSS	IP64	1000 rpm	-40 °C … +60 °C	T6
		10000 rpm	-40 °C … +40 °C	T6
		10000 rpm	-40 °C … +60 °C	T4
	IP67	1000 rpm	-40 °C … +60 °C	T6
		6000 rpm	-40 °C … +60 °C	T4
		10000 rpm	-40 °C … +55 °C	T4
Profibus CANopen DeviceNet SSI-P	IP64	1000 rpm	-40 °C … +60 °C	T6
		6000 rpm	-40 °C … +50 °C	T6
		10000 rpm	-40 °C … +60 °C	T4
	IP67	1000 rpm	-40 °C … +55 °C	T6
		3000 rpm	-40 °C … +40 °C	T6
		6000 rpm	-40 °C … +60 °C	T4
		10000 rpm	-40 °C … +40 °C	T4

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})

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 CONNECTIONS — SSI/BiSS

Wire Color	Pin No.	SSI Function
White 0.25 mm	12	Vcc 10 to 30VDC
Brown 0.25 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 — 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

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.

ORDERING INFORMATION SSI / BiSS To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution[1]	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	□□□□	□	□ •	□	□	□	□	□
AX70 Heavy Duty Absolute encoder, Aluminum Housing **AX71** Stainless Steel Housing	**0010** 10 ST **0012** 12 ST **0013** 13 ST **0014** 14 ST **0017** 17 ST **0019** 19 ST **0022** 22 ST **1212** 12 MT +12 ST **1213** 12 MT +13 ST **1214** 12 MT +14 ST **1217** 12 MT +17 ST **1219** 12 MT +19 ST **1222** 12 MT +22 ST	**E** 10-30VDC	**K** Clamping Flange	**4** IP64 **7** IP67[2,3]	**2** 10mm	**BI** BiSS-B **BE** BiSS-C **SB** SSI-Binary **SG** SSI-Gray	**A** Axial Cable **B** Radial Cable	**F0** 5 m **K0** 10 m **P0** 15 m **U0** 20 m **V0** 25 m **W0** 30 m **X0** 40 m **Y0** 50 m

Notes:
[1]When resolution > 14 Bit: max. clock frequency 178 kHz
[2]Only with temperature class 4; IP67 is necessary for use in areas with cloud of dust
[3]Dust explosion-proof certification (D) only for IP67

SERIES AX70/AX71 HENGSTLER

ORDERING INFORMATION SSI - PROGRAMMABLE

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	□□□□	□	□•	□	□	□	□	□□
AX70 Heavy Duty Absolute encoder, Aluminum Housing **AX71** Stainless Steel Housing	**0010** 10 ST **0012** 12 ST **0013** 13 ST **0014** 14 ST **0017** 17 ST **1212** 12 MT +12 ST **1213** 12 MT +13 ST **1214** 12 MT +14 ST **1217** 12 MT +17 ST	**E** 10-30VDC	**K** Clamping Flange	**4** IP64 **7** IP67[1,2]	**2** 10mm	**SP** SSI-Programmable	**A** Axial Cable **B** Radial Cable	**F0** 5 m **K0** 10 m **P0** 15 m **U0** 20 m **V0** 25 m **W0** 30 m **X0** 40 m **Y0** 50 m

Notes:

[1] IP67 only with temperature class 4

[2] Dust explosion-proof certification (D) only for IP67

ORDERING INFORMATION Profibus, CANopen, DeviceNet

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	□□□□	□	□•	□	□	□	□	□□
AX70 Heavy Duty Absolute encoder, Aluminum Housing **AX71** Stainless Steel Housing	**0010** 10 ST **0012** 12 ST **0013** 13 ST **0014** 14 ST **1212** 12 MT +12 ST **1213** 12 MT +13 ST **1214** 12 MT +14 ST **Available only for CANopen** **0016** 16 ST	**E** 10-30VDC	**K** Clamping Flange	**4** IP64 **7** IP67[1,2]	**2** 10mm	**DP** Profibus **OL** CANopen **VD** DeviceNet	**A** Axial Cable **B** Radial Cable	**F0** 5 m **K0** 10 m **P0** 15 m **U0** 20 m **V0** 25 m **W0** 30 m **X0** 40 m **Y0** 50 m

Notes:

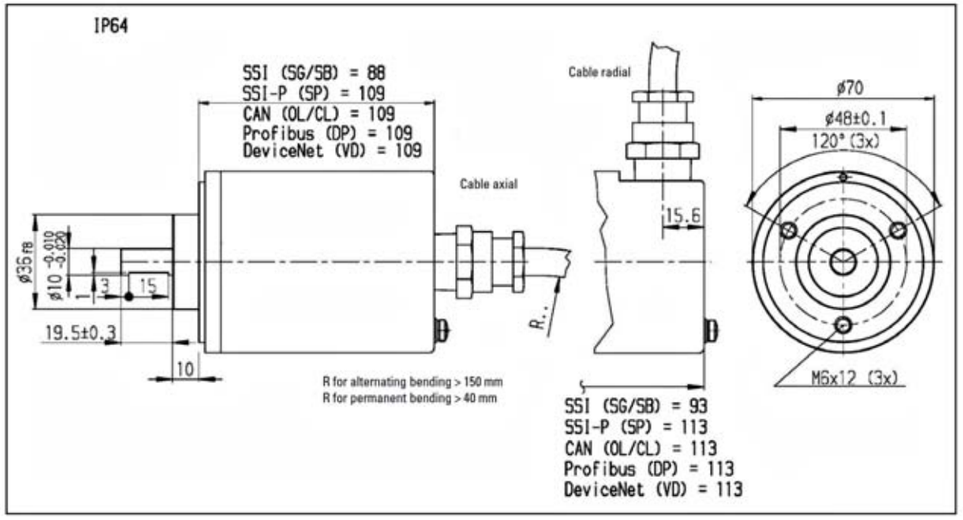
[1] IP67 only with temperature class 4

[2] Dust explosion-proof certification (D) only for IP67

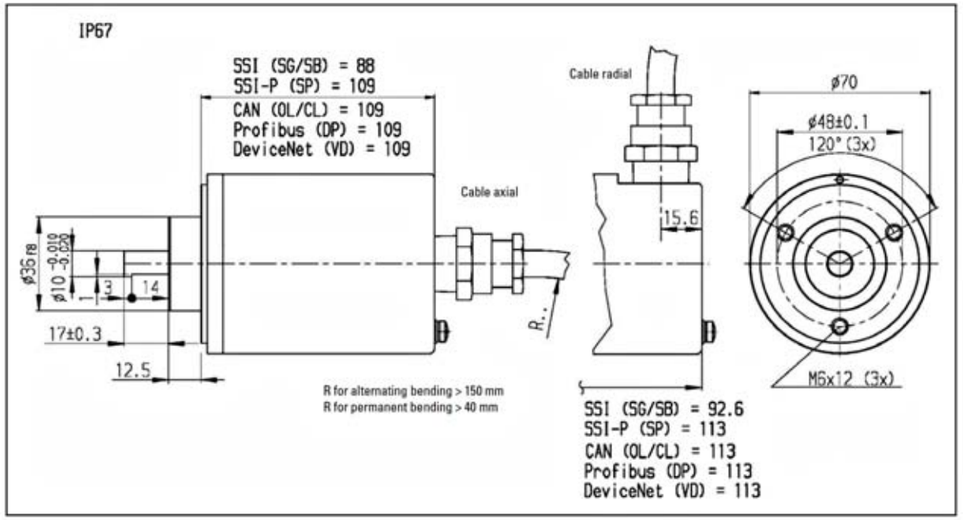
by DYNAPAR™ SERIES AX70/AX71

DIMENSIONS mm

WITH IP64



WITH IP67



SERIES AX73

HENGSTLER

Harsh-Duty Absolute Encoder

HAZ Hazardous Duty

Key Features

- ATEX and IECEx Certification for Gas and Dust Explosion Proof
- Robust Design
- Easy and Fast Field Installation
- Extreme Corrosion Resistance: High Grade Stainless Steel Housing (1.4404 / AISI 316L)
- BiSS, SSI and Profibus Interface
- Resolution up to 22 Bit Singleturn + 12 Bit Multiturn
- Optical Encoder with a True Geared Multiturn
- Protection Class IP66/IP67

Ex II 2 G Ex d IIC T4 Gb
Ex II 2D Ex tb IIIC T130 Db

ITS 14.0062X

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: Profibus: 10-14 bit, BiSS/SSI: 10-22 Bit
Resolution Multi-turn: 12 Bit

ELECTRICAL:

Input Power: DC 10 -30 VDC with pole protection
Recommended External Fuse: T 0.25 A
Power Consumption: approx. 1.5 W to 2W
Noise Emission: per EN 61326-1 Group 1, Class B
Noise Immunity: per EN 61326 - 1 Class A
Termination (without cable gland):
Terminal box with 2 x M20x1.5 screw thread, radial
Mating Connector: Cable Exit

Interface: Profibus
Current w/o Load: 230 mA, typ.
Drives: RS485
Protocol: Profibus - DP with encoder profile class C2 (can be parameterized)
Baud Rate: automatically adjusted in a range from 9.6 KBaud up to 12 MBaud
Device Address: adjustable by DIP switches or bus (optional)
Linearity: ± ½ LSB (±1 LSB with resolution 13, 14, 25, 26 Bit)
Output Code: Binary

Interface: BiSS/ SSI
Current w/o Load max.: 200 mA
Output Code: Gray or Binary
Lines/ Drivers: Clock and Data / RS422
Control Input: Direction

SSI Cable Length Vs Clock Frequency

Cable Length	Clock Frequency
< 25 m	< 1000 kHz
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

The maximum clock frequency depends on cable length and cable quality.

Please use a screened cable with twisted cable pairs for clock and clock\; data and data\ as well as U_b and GND.

MECHANICAL

Shaft Diameter: 10 mm
Maximum Shaft Load Axial / Radial: 100N / 40 N
Starting Torque: ≤ 4 Ncm
Max. Speed: 3000 rpm
Nominal Speed: 1500 rpm
Moment of Inertia: approx. 30 gcm²
Housing Material: Stainless Steel
Shaft Material: Stainless Steel
Disc Material: Glass
Weight: Approx. 4.85 lbs. (2200g)

ENVIRONMENTAL

Operating Temperature: -40 °C ...+70 °C
Storage Temperature: -20 °C ...+80 °C
Shock (DIN EN 60068-2-27:2010):
1000m/s 2 (6ms), 100 G
Vibration (DIN EN 60068-2-6:2008):
100m/s 2 (60 … 2000Hz), 10 G
Humidity: Up to 98%, (no condensation allowed)
Enclosure Rating:
Housing/ Shaft: Housing IP66/IP67, Bearing IP67 (no standing water allowed at the shaft inlet or cable routing or at the bearing)
Certifications:
Gas: Ex II 2 G Ex d IIC T4 Gb
Dust: Ex II 2D Ex tb IIIC T130 Db
General Design: as per EN 61010 - 1, protection class III contamination level 2, overvoltage class II

by DYNAPAR™

SERIES AX73

Electrical Connections Profibus

Terminal block	Signal
1	UB in 10 ... 30V DC
2	0V (GND Power supply)
3	UB out
4	0V out
5	B in
6	A in
7	B out
8	A out
9	not connected
10	PE
Screen	Cable screen connected to housing
Terminal Screw	For additional connection of an earth conductor

Electrical Connections BiSS / SSI

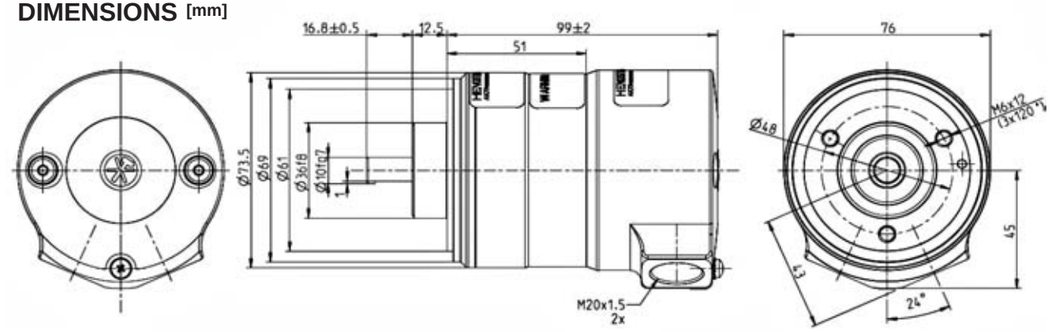
Terminal block	Signal
1	U_b 10 ... 30V DC
2	0V (GND Supply Voltage)
3	$\overline{\text{Clock}}$
4	Clock
5	$\overline{\text{Data}}$
6	Data
7	$\overline{\text{Direction}}$
8	0V [signals]
9	not connected
10	Functional Earth
Grounding-Screw (2x inside, 1x outside)	Functional Earth

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: Termination
Ordering Information							
AX73	□□□□	□	□■	□	□	□	□
Series AX73 (Stainless) Harsh-Duty Absolute Encoder	**0010** 10 BIT ST **0012** 12 BIT ST **0013** 13 BIT ST **0014** 14 BIT ST **0017** 17 BIT ST **0019** 19 BIT ST **0022** 22 BIT ST **1212** 12 BIT MT, 12 BIT ST **1213** 12 BIT MT, 13 BIT ST **1214** 12 BIT MT, 14 BIT ST **1217** 12 BIT MT 17 BIT ST **1219** 12 BIT MT 19 BIT ST **1222** 12 BIT MT 22 BIT ST	**E** 10-30VDC	**K** Clamping Flange	**7** IP67	**2** 10mm	**BI** BiSS-B **BE** BiSS-C **SB** SSI-Binary **SG** SSI-Gray Available only when Code 2 is 14 Bit single-turn or less **DP** Profibus DP	**2** 2 x M20 x 1.5 screw thread, radia

DIMENSIONS [mm]



Notes

ACCESSORIES

Notes

Section 5

CABLES & CONNECTORS

Dynapar™ brand

Mating Connectors and Cables

Key Features

- Shielded Cables for Greater Noise Immunity
- Custom Cable Lengths available
- NEMA4, UL and Watertight Cable and Connector Options available
- RoHS Compliant Mating Connectors
- Wide Variety of Mating Connectors including MS, M12 and M23 Styles

CE RoHS

Mating Connectors

INDUSTRIAL CONNECTORS			
INCREMENTAL CONNECTORS			
Model #	**Description**	**Pins**	**Used with Series**
MCN-N2	Mating connector with cable clamps; use with Series 53Z, 3 pins	3 pin	53Z
MCN-N4	6 pin	6 pin	DWD38, H20, H20 Hubshaft, H56, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, HSD38, IE20, , ISD25, ISD37, ISW38, NexGen Series 22 Qube
MCN-N5	7 pin	7 pin	DWD38, H20, H20 Hubshaft, H42, H58, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, HSD38, IE20, ISD25, ISD37, ISW38, NexGen Series 22 Qube
MCN-N6	10 pin	10 pin	60, 60P, DWD38, H20, H20 Hubshaft, H56, H58, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HD20, Hazardous HD20, HD25, HE20, Hazardous HD25, HS20, HS35R, HSD25, HSD37, HSD38, HSD44, IE20, ISD25, ISD37, ISW38
MCN-B1	10 pin bayonet, style MS3116-F12-10S	10 pin bayonet	HS35R, HSD37, HSD38, ISD37
110532-0001	Pluggable Screw Terminal, 10 pin	10 pin	H56
MCN-C2	H58 CCW 12 p M23 connector assembly - replacement for 605560-0002	12 pin CCW	H58, HS35R
MCN-C1	H58 CW 12 pin M23 connector assembly - replacement for 605560-0001	12 pin CW	DWD38, H58, HSD25, HSD37, HSD38, ISD25, ISD37, ISW38
NEMA4 CONNECTORS			
Model #	**Description**	**Pins**	**Used with Series**
MCN-N5N4	7 pin, NEMA4	NEMA 7 pin	DWD38, H20, H20 Hubshaft, H42, H58, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, HSD38, IE20, ISD25, ISD37, ISW38, NexGen Series 22 Qube
MCN-B1N4	10 pin bayonet, style MS3116-F12-10S, NEMA 4	NEMA 10 pin	Typically a Baldor spec on HS20, HS35R, HSD37, HSD38
MCN-N6N4	10 pin, NEMA4	NEMA 10 pin	DWD38, H20, H20 Hubshaft, H58, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, HSD38, IE20, ISD25, ISD37, ISW38

by DYNAPAR™

Mating Connectors

INDUSTRIAL CONNECTORS			
ABSOLUTE CONNECTORS			
Model #	**Description**	**Pins**	**Used with Series**
G3539749	CONNECTOR SSI M12 8P STRAIGHT	8 pin	AI25 SSI/BISS
G3539293	CONNECTOR,INTERBUS-S,OUT/MALE	9 pin	AI25 INTERBUS
G3539294	CONNECTOR,INTERBUS-S,IN/FEMALE	9 pin	AI25 INTERBUS
606972-0001	CONNECTOR CONIN 12P CLOCKWISE	12 pin	AI25 SSI, BISS, CANOpen, CANLayer, CANLayer2
G3539229	CONNECTOR,12 PIN,CCW	12 pin	AI25 SSI, BISS, CANOpen, CANLayer, CANLayer2
G3539254	CONNECTOR,17P,CLOCKWISE,RA58	17 pin	AI25 PARALLEL
G3539256	CONNECTOR,17P,CCW,RA58	17 pin	AI25 PARALLEL
MCN-N8	CONNECTOR, MS, 17-PIN	17 pin	AI25 PARALLEL
MCN-N9	ASSY,CONN,MS,19P	19 pin	AI25
606219-0001	CONNECTOR, MS BAYONET, 19-PIN	19 pin	AI25 PARALLEL
G1542024	CONNECTOR, SUB-D, 37-PIN	37 pin	AI25 PARALLEL
HEAVY DUTY CONNECTORS			
RIM/SLIM CONNECTORS			
Model #	**Description**	**Pins**	**Used with Series**
NSH5C	SLIM TACH HS56, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	HS56
NSH5M	SLIM TACH HS56, 10 PIN MS MATING CONNECTOR	10 pin	HS56
NSH8C	SLIM TACH HS85, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	HS85
NSH8M	SLIM TACH HS85, 10 PIN MS MATING CONNECTOR	10 pin	HS85
NSR1C	RIM TACH 1250, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Rim Tach 1250, NexGen Rim Tach 1250
NSR6C	RIM TACH 6200, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Rim Tach 6200, NexGen Rim Tach 6200
NSR8C	RIM TACH 8500, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Rim Tach 8500, NexGen Rim Tach 8500
NSS1C	SLIM TACH SL1250, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Slim Tach SL1250
NSS5C	SLIM TACH 56, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Slim Tach SL56, Slim Tach ST56
NSS5M	SLIM TACH 56, 10 PIN MS MATING CONNECTOR	10 pin	Slim Tach SL56, Slim Tach ST56
NSS6C	SLIM TACH RL67, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Slim Tach RL67, Slim Tach ST67
NSS8C	SLIM TACH 85, 10 PIN EPIC LATCHING INDUSTRIAL CONNECTOR	10 pin	Slim Tach SL85, Slim Tach ST85
NSS8M	SLIM TACH 85, 10 PIN MS MATING CONNECTOR	10 pin	Slim Tach SL85, Slim Tach ST85
RIMC02	RIM TACH 8500 TOP ENTRY EPIC CONNECTOR	10 pin	Rim Tach 1250, NexGen Rim Tach 1250, Rim Tach 6200, NexGen Rim Tach 6200, Rim Tach 8500, NexGen Rim Tach 8500
SLQ Connector	SLIM-Q BASE MALE AND FEMALE	10 pin	Slim Tach SL1250, Slim Tach SL56, Slim Tach SL85, Slim Tach RL67, Slim Tach ST56, Slim Tach ST85, Slim Tach ST67
NSRIMQBASE	RIM Q CONNECTOR BASE FIELD KIT	10 pin	Rim Tach 1250, NexGen Rim Tach 1250, Rim Tach 6200, NexGen Rim Tach 6200, Rim Tach 8500, NexGen Rim Tach 8500

CABLES & CONNECTORS

Mating Cables

CABLE ASSEMBLIES FOR INCREMENTAL ENCODERS AND GEAR PICKUPS					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
108241-XXXX	6 Pin Single Ended w/ Index Outputs ASSY, CABLE, 10 FT, 6 PIN W/MKR	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Single Ended, Current Sink, Open Collector	6 Pin	NexGen 22 Qube
108594-XXXX	6 Pin Single Ended ASSY, CABLE, 6P, SE, 5 FT, H20	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Single Ended, Current Sink, Open Collector	6 Pin	DWD38, H20, H20 Hubshaft, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, IE20, ISD25, ISD37, ISW38
108595-XXXX	7 Pin Single Ended ASSY, CABLE, 7P, SE, 5 FT, H20	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Open Collector, Push Pull, Single Ended	7 Pin	DWD38, H20, H20 Hubshaft, H58, HA725, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, IE20, ISD25, ISD37, ISW38
108596-XXXX	7 Pin Dif Line Driver with Index ASSY, CABLE, 7P, DIFF, 5FT, H20	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Differential Line Driver without Index	7 Pin	DWD38, H20, H20 Hubshaft, H42, HA25, HR25, HC25, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, IE20, ISD25, ISD37, ISW38
108615-XXXX	12 Pin CCW ASSY, CABLE, 05', 12 PIN, CCW, H58	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Any Output with 12 Pin CCW Connector	12 Pin	H58, HS35R
108616-XXXX	12 Pin CW ASSY, CABLE, 10', 12 PIN, CW, H58	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Any Output with 12 Pin CW Connector	12 Pin	H58
109065-XXXX	Assembly Cable, 10 PIN w/ MS Connector	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Single Ended or Differential	10 Pin	DWD38, H20, H20 Hubshaft, H58, HD20, Hazardous HD20, HD25, Hazardous HD25, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HS20, HS35R, HSD25, HSD37, HSD44, IE20, ISD25, ISD37, ISW38
109209-XXXX	10 Pin Dif Line Driver with Index ASSY, CABLE, 375', 10 PIN NEMA 4	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	NEMA4 10 Pin MS, Differential Line Driver with Index Outputs	10 Pin	DWD38, H20, H20 Hubshaft, H58, HA25, HC25, HR25, HA26, HC26, HR26, HD20, Hazardous HD20, HD25, Hazardous HD25, HE20, HS20, HS35R, HSD25, HSD37, IE20, ISD25, ISD37, ISW38

by DYNAPAR™

Mating Cables

CABLE ASSEMBLIES FOR INCREMENTAL ENCODERS AND GEAR PICKUPS					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
111752-XXXX	ASSY, CABLE, SHLD, INC, F14/F18	Cable Configuration: PVC jacket, 105 °C rated, foil shield; 4 pair 26 AWG	Differential with Index	16 Pin	F14, F18
111753-XXXX	ASSY, CABLE, 6' SHLD, I/C, F14/F18	Cable Configuration: PVC jacket, 105 °C rated, foil shield; 8 pair 26 AWG	Differential with Commutation Channels	16 Pin	F14, F18
112123-XXXX	6 Pin Dif Line Driver without Index ASSY, CABLE, 6P, DIFF	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Differential Line Driver without Index	6 Pin	HS20, HS35R
112859-XXXX	5 Pin Single Ended ASSY, CABLE, M12, 5P, 5 FT	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum	Single Ended	5 Pin M12	DWD38, H20, H20 Hubshaft, H58, HA25, HC25, HR25, HA26, HC26, HR26, HD25, Hazardous HD25, HS20, HS35R, HSD25, HSD37, ISD25, ISD37, ISW38, NexGen Series 22 Qube
112860-XXXX	8 Pin Single Ended ASSY, CABLE, M12, 8P, 5FT	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum	Single Ended or Differential	8 Pin M12	DWD38, H20, H20 Hubshaft, H58, HA25, HC25, HR25, HA26, HC26, HR26, HD25, Hazardous HD25, HS20, HS35R, HSD25, HSD37, ISD25, ISD37, ISW38, NexGen Series 22 Qube
113047-XXXX	ASSY, CABLE, M12, 8P	Cable Configuration: PVC jacket, 105 °C rated, foil shield; 4 pair 24 AWG	Single Ended or Differential	8 Pin M12	DWD38, H20, H20 Hubshaft, H58, HA25, HC25, HR25, HA26, HC26, HR26, HD25, Hazardous HD25, HS20, HS35R, HSD25, HSD37, ISD25, ISD37, ISW38, NexGen Series 22 Qube
113066-XXXX	ASSY, CABLE, 12P, CW, UL	Cable Configuration: PVC jacket, 80 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Any Output with 12 Pin CW Connector	12 Pin	H58
113215-XXXX	ASSY, CABLE, 12P, CCW, UL	Cable Configuration: PVC jacket, 80 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Any Output with 12 Pin CCW Connector	12 Pin	H58
114448-XXXX	10 Pin Bayonet ASSY, CABLE, BAYONET, 10P	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Differential Line Driver with Index Outputs	10 Pin Bayonet	HS35R, HSD25, HSD37, ISD25, ISD37
115901-XXXX	12 Pin M23 Differential (CW) ASSY, CABLE, 12 PIN, CW, HD	Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Differential w/ Index	12 Pin	DWD38, H58, HS35R, HSD25, HSD37, ISD25, ISD37, ISW38
1400209XXXX	6 Pin Single Ended ASSY, CABLE, 6 PIN	Cable Configuration: PVC jacket, 80°C rated, spiral wrapped copper shield; 22 AWG conductors	Single Ended	6 Pin	60, 60P, H56

CABLES & CONNECTORS

Mating Cables

CABLE ASSEMBLIES					
FOR INCREMENTAL ENCODERS AND GEAR PICKUPS					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
1400334XXXX	ASSY, CABLE, 3 PIN	Cable Configuration: PVC jacket, 75°C rated, foil shield, 3 Wire, 22AWG	Single Ended, Open Collector, A Only	3 Pin	53Z Pickup
1400419XXXX	10 Pin Differential ASSY, CABLE, 10 PIN, 60 DIFF	Cable Configuration: PVC jacket, 80°C rated, spiral wrapped copper shield; 22 AWG conductors	Differential	10 Pin	60, 60P, H56
1400431XXXX	7 Pin Single Ended w/ Index Outputs CABLE	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 22 AWG conductors, minimum	Single Ended w/ Index Outputs	7 Pin	HA25, HR25, HC25, HA26, HC26, HR26, H42
1400607XXXX	6 Pin Single Ended - Current Sink Output ASSY, CABLE, 6 PIN, QUBE	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Single Ended, Current Sink, Open Collector	6 Pin	NexGen Series 22 Qube
1400635XXXX	10 Pin Dif Line Driver with Index ASSY, CABLE, 10 PIN, OPAL	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Differential	10 Pin	DWD38, H20, H20 Hubshaft, H58, HD20, Hazardous HD20, HD25, Hazardous HD25, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HS20, HS35R, HSD25, HSD37, HSD44, IE20, ISD25, ISD37, ISW38
1400663XXXX	7 Pin Single Ended, AB Only CABLE W/LEADS	Cable Configuration: PVC jacket, 80°C rated, spiral-wrapped bare copper shield, 6-conductors 22 AWG	Single Ended, AB Only	7 Pin	DWD38, H20, H20 Hubshaft, H42, H58, HA25, HR25, HC25, HA26, HC26, HR26, HA725, HD20, HD25, HSD25, HS20, HS35R, HSD37, HSD38, ISD25, ISD37, ISW38, Hazardous HD20, Hazardous HD25
1400664XXXX	6 Pin Line Drive Differential ASSY, CABLE, 6 PIN, QUBE DIF	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	6 Pin Line Driver Differential	6 Pin	NexGen Series 22 Qube
CA0040012	E9 accessory mating connector with 12 ribbon cable, 10P API #CA-004-1.0-D	Cable Configuration: PVC jacket, 10 Conductor, 28 AWG, 12" Ribbon Cable	Single or Differential	10 Pin	E9, PC9
CA0050012	M9 accessory mating connector with 12 ribbon cable, 5P API #CA-005-1.0-D	Cable Configuration: PVC jacket, 5 Connductor, 24 AWG, 12" Ribbon Cable	Single Ended	5 Pin	E9, M9, PC9S

by DYNAPAR™

Mating Cables

CABLE ASSEMBLIES					
FOR ABSOLUTE ENCODERS					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
113101-0001	CABLE,12 COND,5 TWST PR,PVC	Cable Configuration: TPE Jacket, 10 Wires	Single or Differential	None	Bulk Cable
107865-XXXX	"17 Pin Parallel Push-Pull Cable Assembly"	Cable Configuration: PVC jacket, 80°C rated, aluminum/polyester overall foil shield, 20-conductors 24 AWG	Parallel Push-Pull	17 Pole	AI25 Parallel
110158-XXXX	ASSY,CABLE, AI25,19P, 12B	Cable Configuration: PVC jacket, 80°C rated, Foil Shield, 20 Conductor, 24AWG	Parallel Push-Pull	19 Pole	AI25 Parallel
112076-XXXX	ASSY,CABLE,19P,AI25 13B	Cable Configuration: PVC jacket, 80°C rated, Foil Shield, 20 Conductor, 24AWG	Parallel Push-Pull	19 Pole	AI25 Parallel
112077-XXXX	ASSY,CABLE, 19P,AI25 14B	Cable Configuration: PVC jacket, 80°C rated, Foil Shield, 20 Conductor, 24AWG	Parallel Push-Pull	19 Pole	AI25 Parallel
113065-XXXX	ASSY,CABLE, 12PIN,CCW,AI25	Cable Configuration: PVC jacket, 75°C rated, Foil Shield, 4 Conductor, 22 AWG	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
113629-XXXX	ASSY,CABLE,SSI,12P,AI25	Cable Configuration: PVC jacket, 105°C rated, Foil Shield, 5 twisted pairs, 26 AWG	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1541030	ASSY,CABLE,5M,SSI-BISS,AD36	Cable Configuration: Cable 12-poles AC36 5,0m TMPU Jacket, -40° +90° rating	SSI/ BiSS	12 Pole	AD36
G1541085	ASSY,CABLE,1M,BISS,AD35	Cable Configuration: Cable 12-poles AC36 5,0m TMPU Jacket, -40° +90° rating	BiSS	12 Pole	AD35
G1542003	ASSY,CABLE,3M,SSI,12P,AI25, CW	Cable Configuration: Cable CW, SSI-E, 3M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542004	ASSY,CABLE, 5M,SSI,12P,AI25, CW	Cable Configuration: Cable CW, SSI-E, 5M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542005	ASSY,CABLE,10M,SSI,12P,AI25, CW	Cable Configuration: Cable CW, SSI-E, 10M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542010	ASSY,CABLE,3M,SSI,12P,AI25, CCW	Cable Configuration: Cable CCW, SSI-E, 3M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542011	ASSY,CABLE, 5M,SSI,12P,AI25, CCW	Cable Configuration: Cable CCW, SSI-E, 5M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542012	ASSY,CABLE,10M,SSI,12P,AI25, CCW	Cable Configuration: Cable CCW, SSI-E, 10M TPE -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1565329	ACURO SSI M12 8P 3M CBL	Cable Configuration: Cable 8 poles, 3M, TPE Jacket, -30° + 90° rating	SSI/ BiSS	8 Pole	AI25 SSI/ BiSS
G1565330	ACURO SSI M12 8P 5M CBL	Cable Configuration: Cable 8 poles, 5M TPE Jacket, -30° +90° rating	SSI/ BiSS	8 Pole	AI25 SSI/ BiSS
G1565331	ACURO SSI M12 8P 10M CBL	Cable Configuration: Cable 8 poles, 10M TPE Jacket, -30° +90° rating	SSI/ BiSS	8 Pole	AI25 SSI/ BiSS
G1542007	ASSY,CABLE,ACURO,12P, 20M,SSI	Cable Configuration: Cable CW, SSI-E, 20M, TPE Jacket, -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542027	ASSY,CABLE,50M,SSI,12P,AI25	Cable Configuration: Cable CW, SSI-E, 50M, TPE Jacket, -40° +105° rating	SSI/ BiSS	12 Pole	AI25

CABLES & CONNECTORS

Mating Cables

CABLE ASSEMBLIES					
FOR ABSOLUTE ENCODERS					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
G1565634	ACURO M12 4P 3M CBL	Cable Configuration: Cable 3.0M, USB 4POL, M12, 80° rating	SSI/ BiSS	4 Pole	AI25 SSI/ BiSS
G1565652	ACURO SSI M12 RP 1.5M	Cable Configuration: Cable 1.5M, USB 4POL, M12, 80° rating	SSI/ BiSS	4 Pole	AI25 SSI/ BiSS
G1565332	ACURO SSI M12 8P 15M CBL	Cable Configuration: Cable 8 poles, 15M, TPE Jacket, -40° +105° rating	SSI/ BiSS	8 Pole	AI25 SSI/ BiSS
G3539789	ACURO SSI M12 4P 3M	Cable Configuration: Cable 4 poles, M12, 3M, -25° +90° rating	SSI/ BiSS	4 Pole	AI25 SSI/ BiSS
G1565328	ACURO SS1 M12 8P 1.5 METER CBL	Cable Configuration: Cable 8 poles, 1.5M, TPE Jacket, -30° + 90° rating	SSI/ BiSS	8 Pole	AI25 SSI/ BiSS
G1565634	ACURO M12 4P 3M CBL	Cable Configuration: Cable 3.0M, USB 4POL, M12, 80° rating	SSI/ BiSS	4 Pole	AI25 SSI/ BiSS
G1565053	ACURO SOFTWARE,CBL,PWR SUPPLY	Cable Configuration: AC-I-Cable C12L, SSI 10-30V 1.5, TPE Jacket, -40° +105° rating	SSI/ BiSS	NA	AI25 SSI/ BiSS
E1541061	PCB, 12-PIN, 0.5M,	Cable Configuration: Cable 12-poles, AC36 3M, TMPU Jacket, -40° +90° rating	SSI/ BiSS	12 Pole	AD34, AD35, AD36
G1542010	M23 12-PIN, CCW, 3M	Cable Configuration: Cable CCW, SSI-E, 3M, TPE Jacket, -40° +105° rating	SSI/ BiSS	12 Pole	AI25 SSI/ BiSS
G1542236	M23, 12-PIN, CW, 3M	Cable Configuration: Cable CW, CAN, 1M, TPE Jacket, -40° +105° rating	CANOpen	12 Pole	AI25 CANOpen
G1542020	SUB-D, 37-PIN, 3M	Cable Configuration: Cable SUB-D, 37P, 3M, TPE Jacket, -25° +105° rating	Parallel Push-Pull	37 Pole	AI25 Parallel
G1540100	M23, 12-PIN, CW, 3M E	Cable Configuration: Cable M.17P CCW, PVC Jacket, 80°C rated	Parallel Push-Pull	12 Pole	AI25 Parallel
G1540097	M23, 12-PIN, CCW, 3M	Cable Configuration: Cable M.17P CCW, PVC Jacket, 80°C rated	Parallel Push-Pull	12 Pole	AI25 Parallel

by DYNAPAR™

Mating Cables

SHIELDED CABLE					
WITHOUT CONNECTOR					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
107312	10 wire cable with full differential options, BULK CABLE, 10 COND, PVC	Cable Configuration: PVC jacket, 105°C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)	Single Ended or Differential	None	All Incremental Series
16002160022	3 wire, 22 gage cable BULK CABLE(QTY=FT) SC16D216-22	Cable Configuration: PVC jacket, 75°C rated, foil shield, 3 Wire, 22AWG	Single Ended	None	53Z Pickup
16002160024	6 wire, 22 gage cable CABLE, 6COND, 22AWG, PVC, SHLD(FT)	Cable Configuration: PVC jacket, 80 °C rated, spiral-wrapped bare copper shield, 6-conductors 22 AWG	Single Ended	None	60 Rotopulser, H56, HA25, HR25, HC25, HA26, HC26, HR26, NexGen Series 22 Qube, X25
16002160029	BULK CABLE (QTY=FT) 8C-4PR24GA	Cable Configuration: PVC jacket, 80°C rated, overall foil shield, 8 Conductor, 4 Pair, 24AWG, UL2464	Differential	None	60, 60P, H56, H42, Full Differential
RIMCABLED-B1XXXX	RIM Interface Cable Bulk Cable, 10-Conductor, No Connector	Cable Configuration: PVC jacket, 105 °C rated, foil shield (individual pairs); 4 twisted pairs 22 AWG	Differential	None	HD35R, HS56, HS60, HS85, HSD35, Rim Tach 1250, Rim Tach 6200, Rim Tach 8500, NexGen Rim Tach 1250, NexGen Rim Tach 6200, NexGen Rim Tach 8500, Slim Tach SL1250, Slim Tach SL56, Slim Tach SL85, Slim Tach RL67, Slim Tach ST56, Slim Tach ST85, Slim Tach ST67, X25
PATCH CORD ASSEMBLIES					
Cable Number	**Description**	**Cable Parameters**	**Output Type**	**Encoder Pins**	**Use with Encoder Series**
114413-0001	10 Pin MS to SLIM / Electrical Connection Patch Cords	Cable Configuration: PVC jacket, 105 °C rated, foil shield (individual pairs); 4 twisted pairs 22 AWG	Differential	10 Pin	Slim Tach SL1250, Slim Tach SL56, Slim Tach SL85, Slim Tach RL67, Slim Tach ST56, Slim Tach ST85, Slim Tach ST67
114414-0001	10 Pin MS to RIM / Electrical Connection Patch Cords	Cable Configuration: PVC jacket, 105 °C rated, foil shield (individual pairs); 4 twisted pairs 22 AWG	Differential	10 Pin	Rim Tach 1250, NexGen Rim Tach 1250, Rim Tach 6200, NexGen Rim Tach 6200, Rim Tach 8500, NexGen Rim Tach 8500

MEASURING WHEELS *Dynapar™ brand*

Measuring Wheels

Key Features

- Encoder measuring wheels allow rotary encoders to measure linear distance.
- Fast, easy attachment to most Dynapar brand encoders.
- Available with high performance phenolic material with high temp range.
- Available with Rubber, Phenolic and O-Ring Surfaces

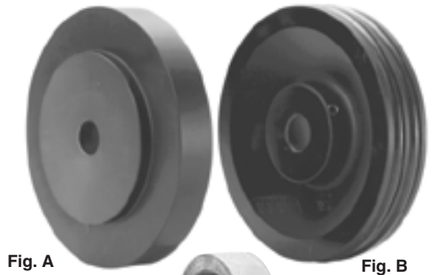


Fig. A

Fig. B

Fig. C

SPECIFICATIONS

For materials with normal slip characteristics, precisely machined phenolic wheels provide maximum accuracy over the widest temperature range — better than aluminum or urethane. Where traction with reasonable accuracy and lower cost is required, the non-marking white rubber wheel is recommended.

Model No.	Fig.	Description/Shaft Bore	Measuring Circum-ference
16002070010	**A**	Phenolic; 1/2" bore Temperature Rating = -30 to +140°C	12"
16002070177	**A**	Phenolic; 3/8" bore Temperature Rating = -30 to +140°C	12"
112919-0001	**C**	White rubber; 3/8" bore Temperature Rating = -30 to +70°C	12"

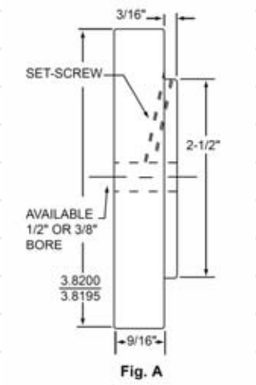


Fig. A

For materials with high slip characteristics. Dual “O” rings prevent slip but must be compressed to allow the phenolic surface to accurately measure. This requires 8 lbs. pressure per wheel and is best suited to the Series 60 encoders.

Model No.	Fig.	Description/Shaft Bore	Measuring Circum-ference
16002070011	**B**	for Series 60 Rotopulsers, 1/2" bore Temperature Rating: -30 to +70°C	12"
16002070284	**B**	for encoders with 3/8" shaft	12"
16002070046	**B**	Replacement O-ring	12"

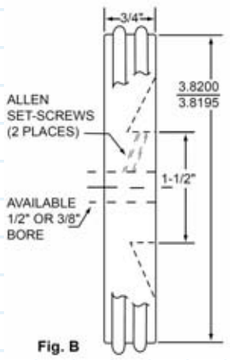


Fig. B

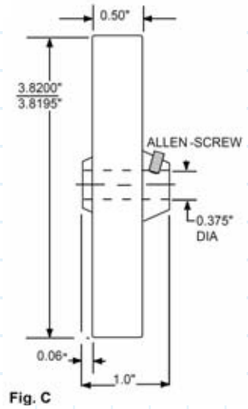


Fig. C

DYNAPAR™

Notes

CPL COUPLINGS

Dynapar™ brand

Flexible Shaft Couplings

Key Features

- **Maximum Mechanical, Thermal, and Electrical Protection for Encoder Shaft Connections**
- **Three-Beam Helical Design Restricts Torque "Windup"**
- **Clamp Attachment. No Setscrews to Score or Pit Shafts**
- **Full Range of Models Designed To Match Specific Encoders are Supplied with Shaft Size Adaptors**

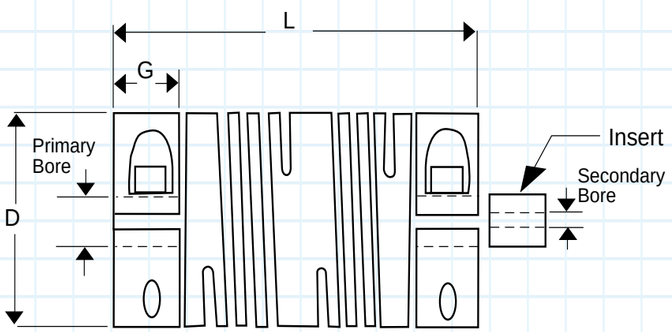
SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Predicted life: Tested in accordance with MIL-HDBK-5A for infinite life.
Material: 2024-T3.5 QQA225/6 aluminum with MIL A8625 Type II black anodize.
Insert/insulator: G10 glass filled phenolic. Sizes provided per *Models table, Secondary Bore.*
Clamps: Integral at each end, with black oxide finish hex socket cap screws. Grip is secure to peak torque rating of the coupling per *Models table, Peak Torque.*
Peak Torque: Per *Models table, Peak Torque.* Safety factor should be determined considering acceleration and deceleration loads, etc.

APPROXIMATE DIMENSIONS

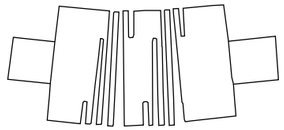
Refer to Models Table for dimensions of specific models.



Shafts may extend beyond the clamp-grip-area to within the flexure area, but must not butt.

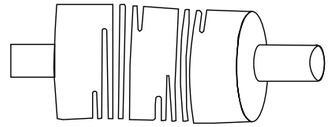
CPL COUPLINGS

by DYNAPAR™

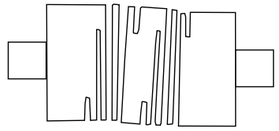


Angular Misalignment
When the center lines of the shafts extend and form an obtuse angle. The intersection of this obtuse angle should be at the center of the flexible beam area.

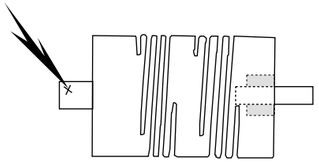
Proper shaft coupling protects precision encoders from all of these common hazards. Use of a well engineered coupling can save many times its cost by eliminating failures due to excessive shaft loading, electrical leakage, and thermal stress.



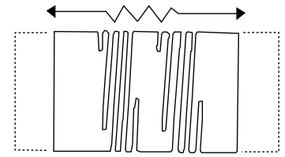
Skewed Misalignment
The shafts are not in the same plane. Center line extension is not parallel or intersecting. There can be two obtuse angles of varying degrees. These angles should be centered within the coupling.



Parallel Misalignment
The shaft's center lines are parallel but offset. When the coupling is installed there should be two equal obtuse angles within the coupling.



Electrical and Thermal Stress
The supplied insulator insert blocks transfer of static charges, leakage currents, and heat to the encoder. These stresses have been proven to be contributory to bearing damage as well as electrical failures.



Axial Motion
Motion in the direction of the center lines of the shafts, such as motor shaft "thrust". Usually created by loose bearings or other elements that do not restrain the motion.

ORDERING INFORMATION

Coupling Model Numbers should be selected first by Encoder Application duty, then by specific encoder shaft size and drive shaft size. Most applications will use the Primary Bore as the encoder end, but it is permissible to reverse the coupling to accommodate specific shaft combinations. Each coupling is supplied with Secondary Bore insulator inserts as listed.

Model Number	Primary Bore	Secondary Bore	Dimensions D= Dia.	L= Len.	G= Grip	Maximum Misalignment Angular	Parallel	Axial	Peak Torque (lb. - in.)	Encoder Application (Series)
CPL00750125	1/8	1/8, 3/16	0.750	0.875	0.230	3°	0.020	0.035	35	Very Light Duty E12, E14,
CPL00750187	3/16	3/16, 1/4								
CPL00750250	1/4	1/8, 1/4								
CPL01000187	3/16	3/16, 1/4	1.000	1.250	0.290	5°	0.025	0.060	45	Light Duty E14, E23, H42, H25, 22 NexGen
CPL01000250	1/4	1/4, 3/8								
CPL01000375	3/8	3/16, 3/8								
CPL01250250	1/4	1/4, 3/8	1.250	1.250	0.348	7°	0.038	0.060	75	Medium Duty H42, H25, 60, 60P 22 NexGen
CPL01250375	3/8	3/8, 1/2								
CPL01250500	1/2	1/4, 1/2								
CPL01500375	3/8	3/8, 1/2	1.500	1.500	0.400	10°	0.035	0.060	100	Heavy Duty 60, 60P H25, X25
CPL01500500	1/2	1/2, 5/8								
CPL01500625	5/8	3/8, 5/8								
CPL02000875	7/8	3/8, 5/8	2.000	2.000	0.450	10°	0.040	0.060	300	Extra Heavy Duty H25, 60P
CPL02001000	1	3/8, 5/8								
CPL02001125	1 1/8	3/8, 5/8								
CPLM1000250	1/4	4, 5, 6 mm	1.000	1.250	0.290	5°	0.025	0.060	45	Light Duty E12, E14, E23, H25, 22 NexGen
CPLM1250375	3/8	6, 8, 10 mm	1.250	1.250	0.348	7°	0.038	0.060	75	Medium Duty H42, H25 22 NexGen
CPLM1500500	1/2	6, 8, 10 mm	1.500	1.500	0.400	10°	0.035	0.060	100	Heavy Duty 60, 60P

Note:
1. For extremely high acceleration rates, consider using the next larger coupling size.
2. When coupling an encoder to a shaft which is stepped down from a larger size, always use a heavy-duty or extra-heavy-duty coupling.
3. For maximum life, encoders must be installed and aligned such that the encoder shaft to driving shaft alignment is within the 0.003" TIR NEMA standard despite the maximum misalignment specified.

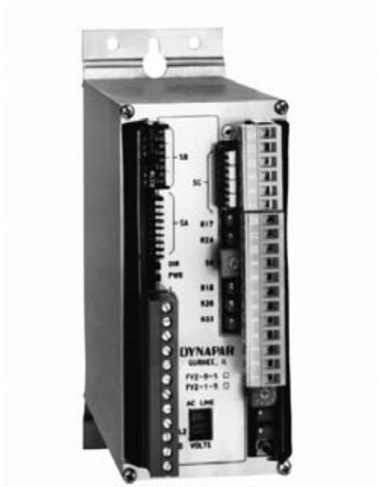
SERIES FV2

Dynapar™ brand

Brushless Digital Feedback

Key Features

- **Bidirectional Frequency/Voltage or Frequency/Current Converter**
- **An FV2 and an Encoder Replace a DC Tachometer when Precision Feedback is Required.**



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Electrical

Input Power Requirements: 115/230 VAC ±10%, 50/60 Hz; 120 mA @ 115 VAC, 60 mA @ 230 VAC
Available Power for the Transducer: 12 VDC ±5%, 200 mA max.
Input Signal: (Field-Selectable) 4 to 15V differential; or 8 to 15V single-ended; or magnetic 1.5 to 15V peak-to-peak
Input Frequency Range: (Field-Selectable)
Bidirectional: 0-500 Hz to 0-100 kHz;
Unidirectional: 0-1 kHz to 0-100 kHz;
Analog Output: ±10V bidirectional; 0-10V unidirectional @ 25 mA
Output Linearity: ±.01% of span
Temperature Stability: ±.02% per °F
Current Range: 4-20 mA
Current Linearity: ±0.2% max.
Compliance: +16V min.
Response Time: <10 msec. switch selectable to <20, <36, or <46 msec.
Output Ripple: Volts RMS is generally less than brush generators and is predictable depending on input frequency from an encoder. For 240 PPR, open loop ripple is 0.080V at 25 RPM, 0.03V at 250 RPM and 0.015V at 2500 RPM
Output Overrange: 10% min. (volt. or current)
Output Offset: Adjustable

Environmental

Operating Temperature: 0 to 60°C
Storage Temperature: -18° to +85°C
Relative Humidity: to 90% non-condensing

OPTIONAL FEATURES

The following features are available with the FV2 option board, which can be factory- or field-installed:

Auxiliary Isolated Digital Outputs
When supplied separately with 12 ±3 VDC, an isolated digital differential line driver output is supplied corresponding to the A and B input phases. By connecting the analog power supply cable to the option board, the analog outputs can also be powered by the separate supply and optically isolated from the digital inputs.

Transducer Phase Reversal Detector
This feature monitors the A and B phases and detects reverse rotation. When reversal is detected, there is a user-selectable delay (2048 pulses max.) before the output relay drops out. The relay will not re-energize until: 1) the reset button is pressed, 2) an external reset signal is applied, or 3) power is removed and restored. An inhibit input is provided to override the reversal detection circuit.

Transducer Phase Failure Detector
This feature monitors the A and B phase inputs and detects a failure (i.e. one phase failed high or low). Its output is a normally-open relay contact which opens upon failure detection. This relay contact is shared with a Phase Loss Detection circuit.

Transducer Phase Loss Detector
This feature monitors current supplied to the encoder and reacts to a decrease in current required. Failure is indicated by opening the relay contact shared with the Phase Failure Detector. Current trip level is field-adjustable. Transducer supply must be provided by FV2.

Zero Speed Detector
This feature monitors transducer speed, and can be set by the user to trip at a specific level corresponding to desired speed. A relay with a single-pole-double-throw contact is used for the output.

SPECIFICATIONS FOR FV2 OPTIONS

Auxiliary Digital Outputs
Power Requirements: 12 ±3 VDC
Current Requirements: 25 mA w/ digital outputs only; 250 mA w/ analog outputs only

Outputs	Voltage Range	Sink (mA)	Source (mA)	Standard IC
Differential Line Driver	12 ±3 VDC	22	40	88C30

Transducer Reversal Detector
Forward Input Phasing: A leads B
Reversal Delay: 16, 32, 64, 128, 256, 512, 1024, or 2048 pulses, selectable.
Output: Relay contacts*, latched upon failure.
Latch Reset & Inhibit Input Requirements: TTL/CMOS, activates on high,10K pull-down, 17V max.

Transducer Phase Failure Detector
Failure Type: A or B phase
Delay: 4 transitions
Output: N.O. contact* shared with Phase Loss Detector

Transducer Phase Loss Detector
Current Level: 30 to 200 mA, adjustable
Output: N.O. contact* shared with Phase Failure Detector

Zero Speed Detector
Adjustable Range: 10 Hz to 300 Hz
Response Time: Less than 0.1 sec.
Output: SPDT relay contact*
*Relay contacts are rated at (1) 1.0 amps, 24 VDC, or (2) 0.3 amps, 115 VDC resistive, or (3) 0.3 amps, 24 VDC, or (4) 0.2 amps, 115 VAC inductive.

ORDERING INFORMATION

Model No.	Description
FV2-0-S	Frequency-to-Voltage Converter
FV2-1-S	Same as FV2-0-S with Factory-Installed Option Board
FV2-N1	Option Board Only (Kit for Field Installation with FV2-0-S)
*	Technical Manual

*A technical manual is included with each FV2 unit shipped. Consult Customer Service for ordering extra copies.

SERIES FV3

by DYNAPAR™

Frequency to Voltage Converter

Key Features

- **Delivers 0 to +10 VDC or 4-20 mA Outputs Proportional to Input Pulse Rate (frequency).**
- **Accepts Variable Pulse Rate Inputs from a Variety of Sensors.**
- **Linearity ±0.2% Maximum.**
- **An FV3 and an Encoder Replace a DC Tachometer when Precision Feedback is Required.**

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Electrical

Input Power Requirements: 115/230 VAC ±10%, 50/60 Hz; 120 mA @ 115 VAC, 60 mA @ 230 VAC;
Externally fuse with Slo-Blo type 1/8 A for 115 VAC or 1/16 A for 230 VAC
Available Power for the Transducer:
12 VDC ±5%, 75 mA max.
Input Signal: (Field-Selectable) 2.5 to 15V single-ended; or magnetic 1.5 to 15V peak-to-peak
Input Frequency Range: (Adjustable)
Unidirectional: 0.03 to 0.1 kHz; 0.1 to 0.3 kHz; 0.3 to 1 kHz; 1-3 kHz; 3-10 kHz; 10-30 kHz; 20-60 kHz
Analog Output: 0 to +10V unidirectional @ 25 mA
Voltage Output Linearity: ±0.1% of full scale
Current Range: 4-20 mA into load resistance range of 0-800 ohms
Current Linearity: ±0.2% max.
Output Overrange: 10% min. (volt. or current)
Output Offset: Adjustable
Speed Detector/Alarm Output (Optional)
This feature monitors transducer speed and can be adjusted—5% to100%—from a front panel potentiometer to trip at a specific speed. The output is a relay contact, field selectable via an internal jumper as N.O. or N.C. Contact rating is 1.25 Amp AC/DC, 125 Volts.

Environmental

Operating Temperature: 0 to 60°C
Storage Temperature: -18° to +85°C
Relative Humidity: to 90% non-condensing

APPLICATION CONSIDERATIONS

Transducer Selection: The FV3 operates on the frequency content of a sinusoidal, triangular, or square waveform. Typical transducers include:
1) A magnetic pick-up detecting a passing keyway, gear teeth, etc.
2) A photo eye which scans alternating opaque and transparent slots.
3) A digital tachometer or encoder.
For fast response of FV3 outputs, it is important that the transducer be located toward the high speed end of the drive train. For slow shaft speeds, the transducer must be capable of delivering a high number of cycles or pulses per revolution. The transducer should also be capable of delivering a usable output for the entire speed range through maximum speed.
The following formula is convenient for relating machine speeds and sensor frequency output:

$$\text{FRQ (CPS or Hz)} = \frac{\text{RPM} \times \text{PPR}}{60}$$

Where:
RPM is the speed of the shaft where the sensor is located in revolutions per minute.
PPR is the number of pulses (or cycles) produced by the sensor for one shaft revolution.

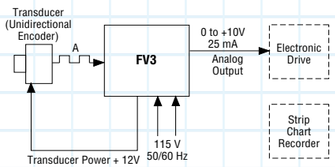
FV3 Performance: The FV3 range adjustment allows the unit to deliver full-scale output for any input frequency within the limits of each range rating. It will provide a better combination of fast response and low ripple when input frequencies for full scale output are at least 3 kHz and above. The FV3 is provided with the capability for field-installed capacitance to optimize response time vs. ripple if required (see the technical manual).

Full-Scale Range Adjustment[1] Min.	Max.	Response Time[2]
30 Hz	100 hZ	5.1 sec.
100 Hz	300 hZ	1.7 sec.
300 Hz	1 kHz	0.52 sec.
1 kHz	3 kHz	13 msec.
3 kHz	10 kHz	10 msec.
10 kHz	30 kHz	6 msec.
20 kHz	60 kHz	6 msec.

[1]Field-selectable range adjustment via jumpers (refer to technical manual).
[2]Response time is time required for the output to reach 99% of final value when the input frequency instantly changes from 0 to full scale.

Typical Application

Unidirectional with 0 to +10V output



Ordering Information

Model No.	Description
FV3-0-S-00	Frequency-to-Voltage Converter
FV3-1-S-00	Frequency-to-Voltage Converter with Speed Detection Option
845-26*	Technical Manual

*A technical manual is automatically shipped with each FV3. Use this publication number to order extra copies.

MOUNTING BRACKET

Dynapar™ brand

"L" Mounting Bracket

Key Features

- Precision Machined Aluminum (6061-T6)
- Drilled and Tapped Where Required
- Mounting Hardware Included
- Encoder can be Mounted from Either Side
- Allows Servo-Ring Mount for Phasing Adjust

Encoder and coupling not included

SPECIFICATIONS

ORDERING INFORMATION

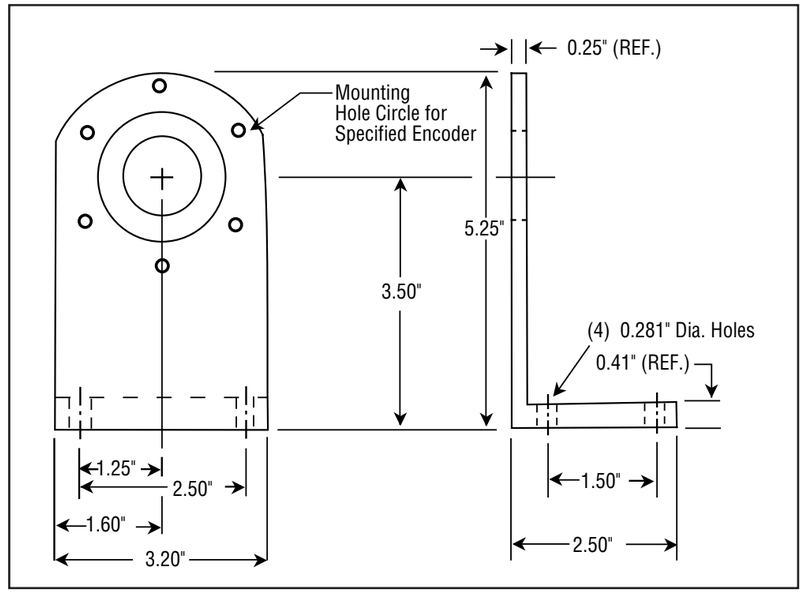
The mounting bracket may be used with the listed series encoders having the specified mounting configurations.

Bracket Model No.	Description	Compatible Encoder Series	Mounting Configuration
14005730000	Mounting Bracket for 60 Rotopulser and 2.5" Square or Servo Encoders	HA25, HC25, HR25, HD25, Hazardous Series HD25, HE25, IE25, HA725, H42, AI25, AR62/63, R25, RF25	2.5" Square Flange
		60 Rotopulser	2.5" Servo Flange (A and C Housings Only)
		HA25, HC25, HR25, HE25, IE25, AI25, R25	2.5" Servo Flange
108680-0001	Mounting Bracket for NEXGEN 22 Qube and 2.0" Square or Servo Encoders	H20, HE20, IE20, HD20, Hazardous Series HD20, NexGen 22 Qube (except metric)	2" Square Flange
		H20, HE20, IE20	Servo with a 1.25" Male Pilot
108680-0002	Mounting Bracket for 58mm Face Mount Encoders	H58, AI25, RI58-O	58mm Face Mount
		H58, AR62/63	36mm Pilot Mount

MOUNTING BRACKET

by DYNAPAR™

DIMENSIONS



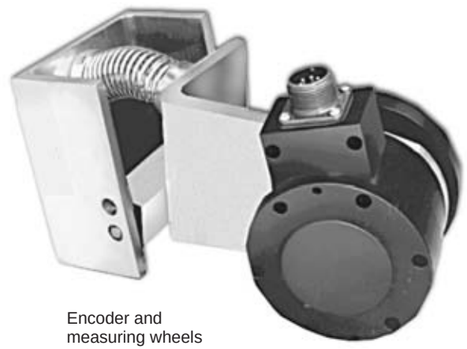
PIVOT MOUNT

Dynapar™ brand

Pivot Mounting Bracket

Key Features

- **Complete Pre-assembled Mounting System with Hardware Included**
- **Single or Dual Wheel uses Same Mount**
- **Easy Machine Attachment**
- **Built-in Spring Tension for Accurate Tracking**



Encoder and measuring wheels not included

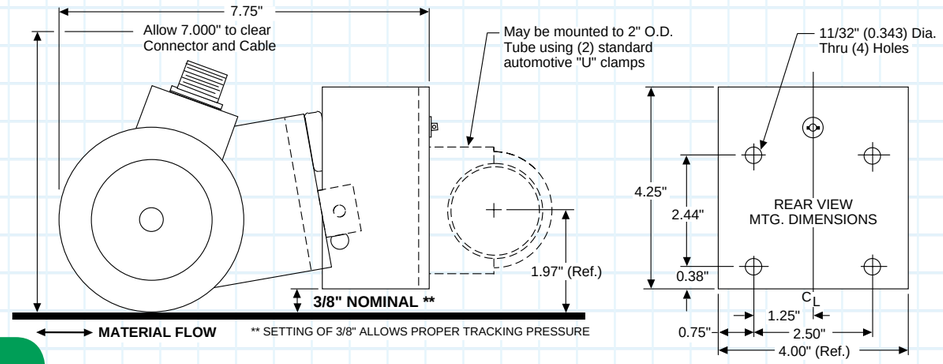
SPECIFICATIONS

ORDERING INFORMATION

The mounting bracket may be used with the listed series encoders having the specified mounting configurations.

Bracket Model No.	Description	Compatible Encoder Series	Mounting Configuration
14005740000	Pivot Mounting Bracket	HA25, HC25, HR25, HD25, Hazardous Series HD25, HE25, IE25, HA725, H42, AI25, AR62/63, R25, RF25	2.5” Square Flange
		60 Rotopulser	2.5” Servo Flange (A and C Housings Only)
		HA25, HC25, HR25, HE25, IE25, AI25, R25	2.5” Servo Flange

DIMENSIONS



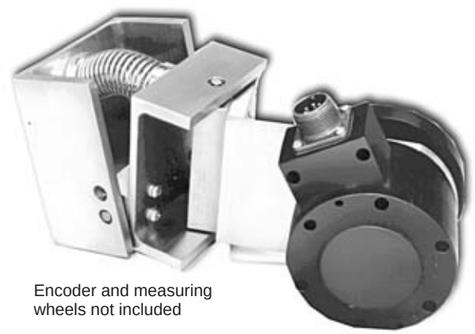
UNIVERSAL MOUNT

by DYNAPAR™

Universal Mounting Bracket

Key Features

- **Complete, Pre-assembled Mounting System with Hardware Included**
- **Single or Dual Wheel uses Same Mount**
- **Easy Machine Attachment**
- **Built-in Spring Tension with Two Degrees of Freedom for Accurate Tracking**



Encoder and measuring wheels not included

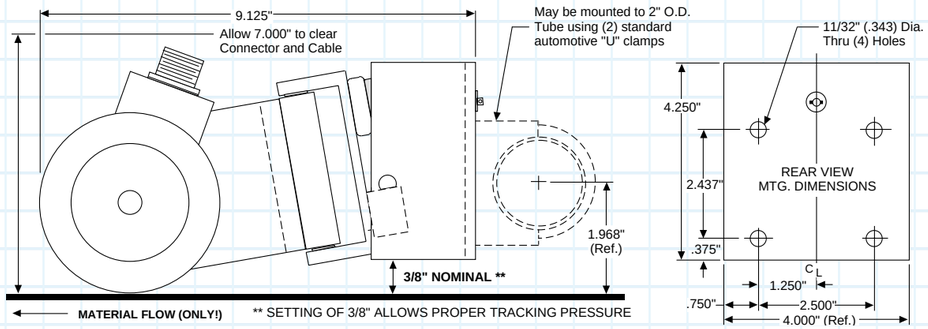
SPECIFICATIONS

ORDERING INFORMATION

The mounting bracket may be used with the listed series encoders having the specified mounting configurations.

Bracket Model No.	Description	Compatible Encoder Series	Mounting Configuration
14005750000	Universal Mounting Bracket	HA25, HC25, HR25, HD25, Hazardous Series HD25, HE25, IE25, HA725, H42, AI25, AR62/63, R25, RF25	2.5” Square Flange
		60 Rotopulser	2.5” Servo Flange (A and C Housings Only)
		HA25, HC25, HR25, HE25, IE25, AI25, R25	2.5” Servo Flange

DIMENSIONS



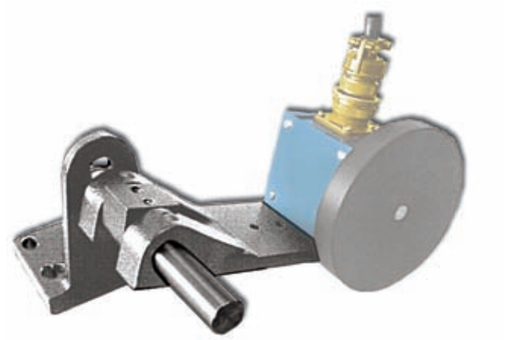
QUBE PIVOT MOUNT

Dynapar™ brand

Qube Pivot Mounting Bracket

Key Features

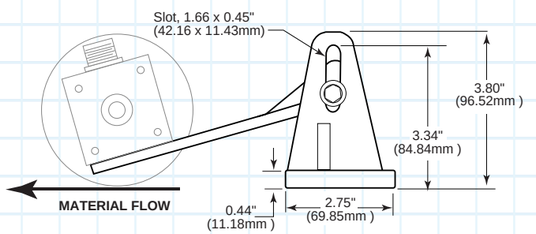
- Complete Mounting System with Hardware Included
- Single or Dual Wheel uses Same Mount
- Easy Machine Attachment
- Accepts NexGen 22 Qube Encoders

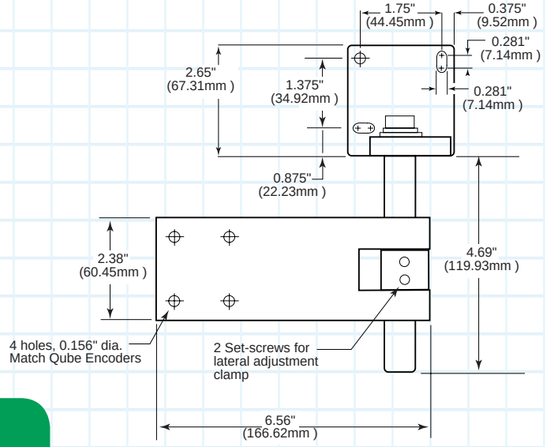


Encoder, cable and measuring wheels not included

SPECIFICATIONS

DIMENSIONS





COMPATIBLE ENCODERS

Compatible with all NexGen 22 Qube Encoder Models

ORDERING INFORMATION

Model No.	Description
111328-0001	Qube Pivot Mounting Base

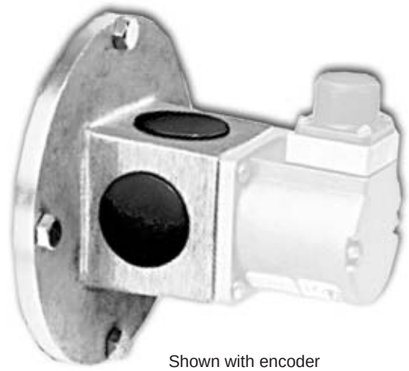
C-FACE ADAPTER

by DYNAPAR™

NEMA C-Face Adapter

Key Features

- "Flower Pot" Style Adapter Kit
- Provides Spacer, Coupling and all Necessary Hardware
- 5/8" I.D. Coupling for 56C Motor Shafts with Extensions from 1.1" to 1.8" Long
- Accepts Any 2.5" Square Flange Encoder



Shown with encoder mounted (not included)

SPECIFICATIONS

COMPATIBLE ENCODERS

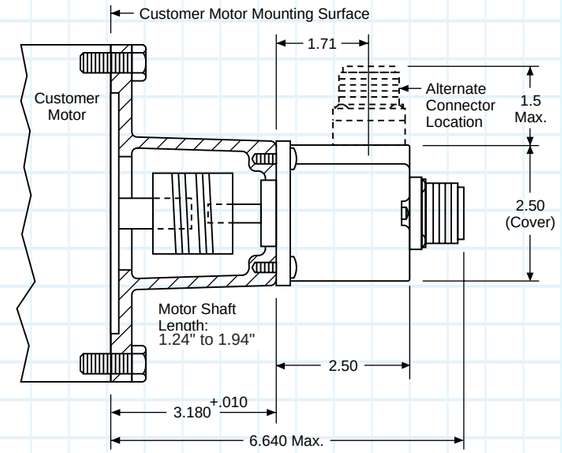
The adapter may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
Incremental Encoders	
HA25	2.5" Flange
HC25	2.5" Flange
HR25	2.5" Flange
HD25	2.5" Flange
Hazardous Series HD25	2.5" Flange
HE25	2.5" Flange
IE25	2.5" Flange
HA725	2.5" Flange
H42	2.5" Flange
Absolute Encoders	
AI25	2.5" Flange
AR62/63	2.5" Flange
Resolvers	
R25	2.5" Flange
RF25	2.5" Flange

ORDERING INFORMATION

Model No.	Description
FPA1	NEMA C Face Adapter, 5/8" Motor Shaft
FPA2	NEMA C Face Adapter, 7/8" Motor Shaft
FPA3	NEMA C Face Adapter, 1" Motor Shaft

DIMENSIONS



5PY ADAPTER

Dynapar™ brand

5PY Adapter for 2-1/2” Encoders

Key Features

- **Kits Include Mounting Plate and Hardware**
- **Makes Servo Mount 2.5” or 60A Encoders Interchangeable with 5PY DC Tach Generators.**

Encoder not included

SPECIFICATIONS

ORDERING INFORMATION

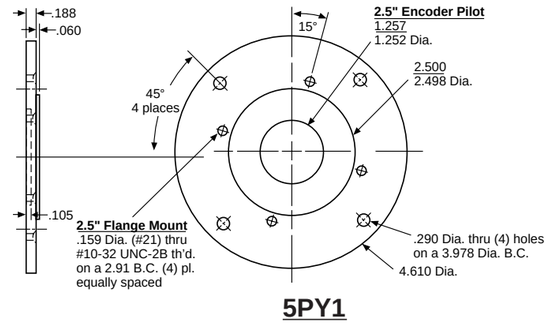
The adapter may be used with the listed series encoders having the specified mounting configurations.

Adapter Model No.	Description	Compatible Encoder Series	Mounting Configuration
5PY1	5PY Adapter Kit for 2.5” Square Flange Encoders	HA25, HC25, HR25, HD25, Hazardous Series HD25, HE25, IE25, HA725, H42, AI25, AR62/63, R25, RF25	2.5” Square Flange
5PY2	5PY Adapter Kit for 60 Rotopulsers	60 Rotopulser	2.5” Servo Flange (A and C Housings Only)
5PY3	5PY Adapter Kit for 2.5” Servo Flange Encoders	HA25, HC25, HR25, HE25, IE25, AI25, R25	2.5” Servo Flange

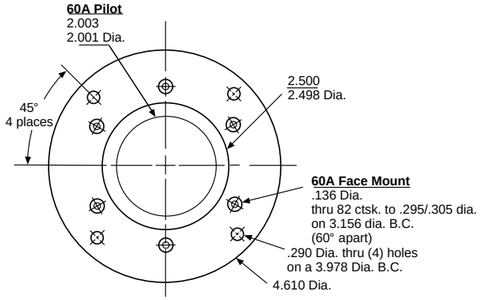
5PY ADAPTER

by DYNAPAR™

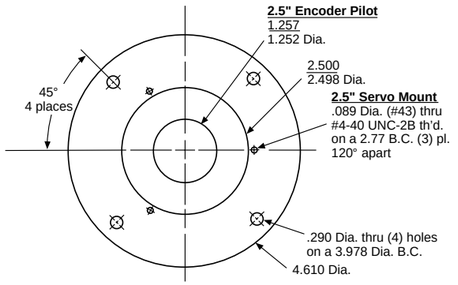
DIMENSIONS



5PY1



5PY2



5PY3

5PY ADAPTER

Dynapar™ brand

5PY Adapter for X25 Encoders

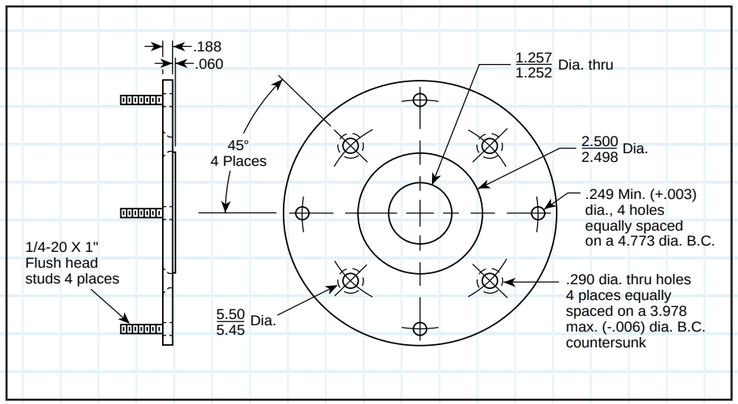
Key Features

- **Kits include Mounting Plate and Hardware**
- **Makes Servo X25 Encoders Interchangeable with 5PY DC Tach Generators.**

Encoder not included. (Hardware to mount encoder to adapter is included.)

SPECIFICATIONS

DIMENSIONS



ORDERING INFORMATION

Model No.	Description
MPAEX5PY	5PY Adapter Kit for X25 encoder

DYNAPAR™

Notes

NEX GEN RIM TACH WHEELS

NorthStar™ brand

Replacement Pulse Wheel For NexGen RIM Tach RT8 and RIM Tach RT1 Models

Key Features

- **NexGen RIM Tach sensor module and wheel are reverse compatible with previous generations RIM Tach series.**
- **“Best in Class” Durable Replacement Wheel Options**
- **Non-marring Clamping System**
- **Eliminates Shaft Damage**
- **Easy Configurations**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing male C-face end

MECHANICAL

Radial Air Gap:
1200 PPR or lower:
0.075”, +0.015” / -0.070”
Above 1200 PPR:
0.050”, +0.015” / -0.040”

NexGen RIM Tach 8500
Bore Sizes: 5/8” to 2-7/8”
Shaft Speed: 7,000 RPM
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 2.5” min
Allowable Shaft End-Play: ± 0.050”
Allowable Shaft Runout: 0.003” TIR

NexGen RIM Tach 1250
Bore Size: 0.625” to 2.875”
Shaft Speed: 7,000 RPM, max.
Acceleration Rate: 3600 rpm/sec max
Shaft Length Required: 2.88” min
Allowable Shaft End-Play: ±0.150”
Allowable Shaft Runout: 0.005” TIR

NORTHSTAR PULSE WHEEL STYLES

Photographs are representative of each wheel style.

F Wheel	V Wheel
	
Inside Diameter: 1.125” - 2.875” Commonly known as “End of Shaft” wheel configuration used on GE design motors.	**Inside Diameter:** 0.625” - 2.875” NEXGEN version of the K wheel formerly known as the “Clamp Wheel”

NEX GEN RIM TACH WHEELS

by DYNAPAR™

Series RT8 & RT1 Pulse Wheels

Code 1: NorthStar	Code 2: PPR	Code 3: Index	Code 4: Bore Size	Code 5: Part Description
NSRT	□□□□	□	□	WHL

Ordering Information

NSRT Northstar NexGen RT8 & RT1 Series Spare Wheel	**Used On Resolutions** **0480** 60, 120, 240, 480, 960, 1920 **0512** 64, 128, 256, 512, 1024, 2048 **0600** 75, 150, 300, 600, 1200, 2400	**L** No Index signal **Z** Index Signal Output	**V04** 0.625" **V05** 0.875" **V06** 1.000" **V07** 1.125" **V08** 1.250" **V09** 1.375" **V10** 1.500' **V11** 1.625" **V12** 1.750" **V13** 1.875" **V14** 2.000" **V15** 2.125" **V16** 2.250" **V17** 2.375" **V18** 2.500" **V19** 2.875" **V20** 2.625" **End of Shaft** **F01** 1.125" EOS **F06** 2.125" EOS **F08** 2.375" EOS **F10** 2.875" EOS **F44** (4400 series motors) **F47** (4700 series motors) **F60** (6000 series motors) **F68** (6800 series motors)	**WHL**

HOW TO CONFIGURE

When configuring a NexGen RIM Tach Series Pulse Wheel (RT8 or RT1), please review the appropriate family data sheet and use the following methodology:
Use “NSRT” followed by Code 2 (PPR) & Code 3 (Index) & Code 4 (Bore Size) & add “WHL” to the end.

CONFIGURATION EXAMPLE 1

NexGen RIM Tach 8500 (RT8) Part Number: RT80512ZV111C

RT8	0512	Z	V11	1	C
	Code 2 PPR ↓	Code 3 Index ↓	Code 4 Bore Size ↓		

Example Spare Wheel: NSRT0512ZV11WHL

NRST	0512	Z	V11	WHL

CONFIGURATION EXAMPLE 2

NexGen RIM Tach 1250 (RT1) Part Number: RT10256LV172R

RT1	0256	L	V17	2	R
	Code 2 PPR ↓	Code 3 Index ↓	Code 4 Bore Size ↓		

Example Spare Wheel: NRST0256LV17WHL

NRST	0256	L	V17	WHL

NorthStar™ brand NEX GEN RIM TACH WHEELS

Series RT8 & RT1 Magnetic Ring

Code 1: Model	Code 2: Resolution	Code 3: Index	Code 4: Part Description
NSRT	□□□□	□	**MAGRING**

Ordering Information

NSRT Northstar NexGen RT8 & Small Bore RT1 Spare Magnetic Ring	**Ordering Code:** / **Used On Resolutions:** **0480** 60, 120, 240, 480, 960, 1920 **0512** 64, 128, 256, 512, 1024, 2048 **0600** 75, 150, 300, 600, 1200, 2400	**L** No Index signal **Z** Index Signal Output	**MagRing**

HOW TO CONFIGURE

Use "NSRT" followed by Code 2 (PPR) & Code 3 (Index) & add "MAGRING" to the end.
NexGen RIM Tach 8500 (RT8) Part Number: RT80512ZV111C
Example Spare Wheel: NSRT0512ZMAGRING

Series RT8 & RT1 Spare Shaft Adapter

Code 1: Model	Code 2: Bore Size	Code 3: Part Description
NSRT	□□□	**HUB**

Ordering Information

NSRT Northstar NexGen RT8 & Small Bore RT1 Spare Shaft Adapter	**V04** 0.625" **V05** 0.875" **V06** 1.000" **V07** 1.125" **V08** 1.250" **V09** 1.375" **V10** 1.500' **V11** 1.625" **V12** 1.750" **V13** 1.875" **V14** 2.000" **V15** 2.125" **V16** 2.250"	**V17** 2.375" **V18** 2.500" **V19** 2.875" **V20** 2.625" **End of Shaft** **F01** 1.125" EOS **F06** 2.125" EOS **F08** 2.375" EOS **F10** 2.875" EOS **F60** (6000 series motors)	**HUB (Shaft Adapter)**

HOW TO CONFIGURE

Use "NSRT" followed by Code 4 (Bore Size) & add "HUB" to the end.
NexGen RIM Tach 8500 (RT8) Part Number: RT80512ZV111C
Example Spare Wheel: NSRTV11HUB

DYNAPAR™

Notes

RIM TACH REPLACEMENT WHEELS NorthStar™ brand

Replacement Wheels for Legacy RIM Tach R8 and R1 Models

Key Features

- **"Best in Class" Durable Replacement Wheel Options**
- **Non-Marring Clamping System**
- **Eliminates Shaft Damage**
- **Easy Configurations**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60-1200 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Index: 270°, ungated (optional gated to falling B edge)

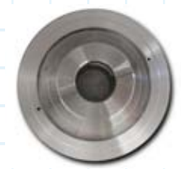
MECHANICAL

RIM Tach 8500
Bore Size: 5/8" to 3-3/4"
Shaft Speed: 7,000 RPM
Acceleration Rate: 3,600 rpm/sec max
Shaft Length Required: 2.5" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR

RIM Tach 1250
Bore Size: 5/8" to 8"
Shaft Speed: 7,000 RPM (J or K Wheels)
3,600 RPM (T Wheel)
Acceleration Rate: 3,600 rpm/sec max
Shaft Length Required: 3.0" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR

NORTHSTAR PULSE WHEEL STYLES

Photographs are representative of each wheel style.

			
J Wheel	**K Wheel**	**E Wheel**	**T Wheel**
Inside Diameter: 0.625" - 1.25" Commonly known as a "Spoke Wheel" configuration.	Inside Diameter: 1.375" - 3.25" Commonly known as a "Clamp Wheel" configuration. This wheel consists of three components and the assembly is different for RIM style and SLIM style.	Inside Diameter: 1.125", 2.125", 2.375", 2.875" Commonly known as "End of Shaft" wheel configuration used on GE design motors.	Inside Diameter: 3.256" - 4.50" Commonly known as a "Set Screw Wheel" configuration. Other than for some larger size motor shafts, the T wheel has been replaced by either J and or K Wheel.

RIM TACH REPLACEMENT WHEELS by DYNAPAR™

Ordering Information

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

Code 1: NorthStar	Code 2: PPR	Code 3: Index	Code 4: Bore Size
NS	□□□□	□	□□□

Ordering Information

NS Northstar RimTach Series Wheels	**0060** **0064** **0075** **0120** **0128** **0150** **0240** **0256** **0300** **0480** **0512** **0600** **0960** **1024** **1200**	**L** No Index Available When Code 2 is 480 or Greater **Z** Index	**J04** 5/8" **J05** 7/8" **J06** 1" **J07** 1-1/8" **K09** 1-3/8" **K10** 1-1/2" **K11** 1-5/8" **K12** 1-3/4" **K13** 1-7/8" **K14** 2" **K15** 1-1/8" **K16** 2-1/4" **K17** 2-3/8" **K18** 2-1/2" **K19** 2-7/8" **K20** 2-5/8" **End of Shaft** **E01** 1.125" EOS **E06** 2.125" EOS **E08** 2.375" EOS **E10** 2.875" EOS **E60** (6000 series motors)

NOTE: For additional bore sizes up to 8.0" maximum, please consult factory.

HOW TO CONFIGURE

When configuring a RIM Tach Series Pulse Wheel (R1 or R8), please review the appropriate family data sheet and use the following methodology:
Use "NS" followed by Code 2 (PPR) & Code 3 (Index) & Code 4 (Bore Size).

CONFIGURATION EXAMPLE 1

RIM Tach 8500 Part Number: R80512ZK111LC

R8	0512	Z	K11	1	L	C
	Code 2 PPR ↓	Code 3 Index ↓	Code 5 Bore Size ↓			

Spare Wheel Part Number: NS0512ZK11

NS	0512	Z	K11

CONFIGURATION EXAMPLE 2

RIM Tach 1250 Part Number: R10256ZJ062RM

R1	0256	Z	J06	2	R	M
	Code 2 PPR ↓	Code 3 Index ↓	Code 5 Bore Size ↓			

Spare Wheel Part Number: NS0256ZJ06

NS	0256	Z	J06

NEX GEN RIM TACH SENSORS

NorthStar™ brand

Replacement Sensor Modules For All NexGen RIM Tach Models

Key Features

- **Replaceable Stainless Steel Sensor Modules**
- **Largest Non-Contact Sensing Gap Available On The Market**
- **Encapsulated Surface Mount Electronics**
- **Patented Magneto-Resistive Technology**
- **Utilizes DC Power From +5 to +26V**
- **Provides Transient and Noise Suppression**
- **Reverse Polarity Protection**
- **Active LED Indicator with Diagnostics**

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing mail C-face end
Quadrature Phasing: 90° ± 45°
Symmetry: 50% ± 15°

ELECTRICAL

Input Power Requirements: 5-26VDC, 95mA typical per sensor module, plus line driver load
Output Signals: IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65. Optional MS3102 10 pin, Pigtail Cable, or Latching connector on cable extension

MECHANICAL

Radial Air Gap (RT8 and RT1 Models Only):
1200 PPR or lower:
0.075", +0.015" / -0.070"
Above 1200 PPR:
0.050", +0.015" / -0.040"
Sensor Module Material: Stainless Steel

ENVIRONMENTAL

RT8 and RT1 Models:
Operating Temperature Range:
Standard: -40°C to +100°C
Storage Temperature Range: -40°C to +125°C
Shock: 200 G's Min.
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

RT6 Models:
Operating Temperature Range:
Standard: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock: 30 G's Min.
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z*	4	Violet	C
No Connection	5	–	–
Vcc	6	Red	B
$\overline{B}$	7	Yellow	H
$\overline{A}$	8	Gray	G
$\overline{Z}$*	9	Orange	I
Shield	10	Braid	J

* Index (Z) optional. See Ordering Information

NEX GEN RIM TACH SENSORS by DYNAPAR™

Ordering Information

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

Code 1: Model	Code 2: PPR Resolution	Code 3: Index	Code 4: Termination	Code 5: Part Description
NSRT	□□□□	□	□	**SEN**
Ordering Information				
NSRT Northstar NexGen Spare Sensor	**0060** **0480** **0064** **0512** **0075** **0600** **0120** **0960** **0128** **1024** **0150** **1200** **0240** **1920** **0256** **2048** **0300** **2400**	**L** No Index signal **Z** Index Signal Output	**C** Latching Industrial Connector **M** 10 pin MS Connector **P** 18" Long Pigtail Cable **Q** Latching Industrial Connector On 18" Cable	**SEN**

HOW TO CONFIGURE

When configuring a RIM Tach Series Sensor (Part numbers starting with RT8, RT6 or RT1), please review the appropriate family data sheet and use the following methodology: Use "NSRT" followed by Code 2 (PPR) & Code 3 (Index) & Code 5 (Electrical) & Code 6 (Termination).

CONFIGURATION EXAMPLE 1

NexGen RIMTach RT8 Part Number: RT80512ZV111C

RT8 0512 Z V11 C
(Code 2 PPR: 0512; Code 3 Index: Z; Code 6 Termination: C)

Replacement Sensor Part Number: NSRT0512ZCSEN

NSRT 0512 Z C SEN

CONFIGURATION EXAMPLE 2

NexGen RIMTach RT6 Part Number: RT60300LA1M

RT6 0300 L A M
(Code 2 PPR: 0300; Code 3 Index: L; Code 6 Termination: M)

Replacement Sensor Part Number: NSRT0300LMSEN

NSRT 0300 L M SEN

RIM TACH SENSOR MODULES

NorthStar™ brand

Wheel and Sensor Upgrade Kit for All Legacy RIM Tach Models

Key Features

- Replaceable Sensor Modules
- Encapsulated Surface Mount Electronics
- Patented Magneto-Resistive Technology
- Utilizes DC Power From +5 to +15V
- Provides Transient and Noise Suppression
- Reverse Polarity Protection

EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 1200 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°

ELECTRICAL

Input Power Requirements: 5-15VDC, 45mA typical per sensor module, plus line driver load
Output Signals: 4428 Differential Line Driver: 150mA, Sink or Source
Frequency Response: 0 - 120kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65.

MECHANICAL

Radial Air Gap (R8 and R1 Models Only):
1200 PPR or lower:
0.075", +0.015" / -0.070"
Above 1200 PPR:
0.050", +0.015" / -0.040"
Sensor Module Material: Stainless Steel

ENVIRONMENTAL

R8 and R1 Models:
Operating Temperature Range:
Standard: -40°C to +80°C
Extended: -40°C to +100°C
Storage Temperature Range: -40°C to +120°C
Shock: 30 G's Min.
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

R6 Modles:
Operating Temperature Range:
Standard: -40°C to +70°C
Storage Temperature Range: -40°C to +120°C
Shock (Sensor Module): 30 G's Min
Vibration: 18 G's @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z*	4	Violet	C
No Connection	5	–	–
Vcc	6	Red	B
$\overline{B}$	7	Yellow	H
$\overline{A}$	8	Gray	G
$\overline{Z}$*	9	Orange	I
Shield	10	Braid	J

* Index (Z) optional. See Ordering Information

RIM TACH SENSOR MODULES

by DYNAPAR™

Ordering Information

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

Code 1: Model	Code 2: Model	Code 3: PPR Resolution	Code 4: Index	Code 5: Electrical	Code 6: Connector
NS	□□	□□□□	□	□	□
Ordering Information					
NS Northstar RimTach Series Sensors	**R6** **R8** **R1** **H8**	**0060** **0064** **0075** **0120** **0128** **0150** **0240** **0256** **0300** **0480** **0512** **0600** **0960** **1024** **1200**	**L** No Index Available When Code 3 is 480 or Greater **G** Gated Index **Z** Index	**L** 5-15V In / Out 4428 Line Driver **H** Same as L with Extended Temp to 120* **R** 15-26V In / 15V Out 4428 Line Driver **5** 5-15V In / 5V Out 4428 Line Driver	**C** Latching Industrial Connector **M** 10-Pin MS Connector **P** 18" Pigtail

HOW TO CONFIGURE

When configuring a RIM Tach Series Sensor (Part numbers starting with R8, R6, R1 or H8), please review the appropriate family data sheet and use the following methodology: Use "NS" followed by Code 1 (Model) & Code 2 (PPR) & Code 3 (Index) & Code 6 (Electrical) & Code 7 (Termination).

CONFIGURATION EXAMPLE 1

RIMTach 8500 Part Number: R80512ZK111LC

		Code 1 Model	Code 2 PPR	Code 3 Index			Code 6 Electrical	Code 7 Termination
		R8	0512	Z	K11	1	L	C
Replacement Sensor Part Number: NSR80512ZLC	NS	R8	0512	Z			L	C

CONFIGURATION EXAMPLE 2

RIMTach 1250 Part Number: R11024GK1425F

		Code 1 Model	Code 2 PPR	Code 3 Index			Code 6 Electrical	Code 7 Termination
		R1	1024	G	K14	2	5	F
Replacement Sensor Part Number: NSR11024G5F	NS	R1	1024	G			5	F

NEX GEN SLIM TACH WHEELS

NorthStar™ brand

Replacement Wheels for SLIM Tach ST56, ST67, ST85 Models

Key Features

- **"Best in Class" Durable Replacement Wheel Options**
- **Non-Marring Clamping System**
- **Eliminates Shaft Damage**
- **Easy Configurations**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

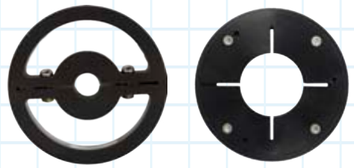
Code: Incremental, Magnetic
Pulses per Revolution: 64 to 2048 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Index: Less than phase A/B pulse width

MECHANICAL

Bore Sizes: 5/8" to 2-7/8"
Max. Shaft Speed: 7,000 RPM
Shaft Length Required: 0.7" min
Allowable Shaft End-Play:
ST56: +0.050"/-0.125"
ST67 and ST85: ± 0.1"
Allowable Shaft Runout: 0.005" TIR
Acceleration Rate: 3,600 rpm/sec max

NORTHSTAR PULSE WHEEL STYLES

Photographs are representative of each wheel style.

C Wheel	G Wheel
	
Inside Diameter: 0.625" - 2.875" NEXGEN version of the J wheel formerly known as the "Spoke Wheel" or "Clamping Wheel"	Inside Diameter: 1.125" - 2.875" NEXGEN version of the E or N wheel formerly known as the "End of Shaft Wheel"

NEX GEN SLIM TACH WHEELS

by DYNAPAR™

Ordering Information

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

Code 1: NorthStar	Code 2: PPR Resolution	Code 3: Index	Code 4: Bore Size	Code 5: Part Description
NSST	□□□□	□	□	WHL
Ordering Information				
NSST Northstar NexGen ST56, ST85, ST67 Wheels	**0064** **0128** **0256** **0512** **1024** **2048**	**L** No Index signal **Z** Index Signal Output	**C04** 0.625" **C05** 0.875" **C06** 1.000" **C07** 1.125" **C08** 1.250" **C09** 1.375" **C10** 1.500" **C11** 1.625" **C12** 1.750" **C13** 1.875" **C14** 2.000" **C15** 2.125" **C16** 2.250" **C17** 2.375" **C18** 2.500" **C19** 2.875" **C20** 2.625" **End of Shaft Mounting** **G01** 1.125" EOS **G06** 2.125" EOS **G08** 2.375" EOS **G10** 2.875" EOS	**WHL**

HOW TO CONFIGURE
When configuring a NexGen SLIM Tach Series Pulse Wheel (ST56, ST67 and ST85), please review the appropriate family data sheet and use the following methodology:
Use "NSST" followed by Code 2 (PPR) & Code 3 (Index) & Code 4 (Bore Size) & add "WHL" to the end.

CONFIGURATION EXAMPLE 1

NexGen SLIM Tach ST56 (ST5) Part Number: ST50512LC11CVCC

ST5 **0512** **L** **C11** C V CC
(Code 2 PPR: 0512; Code 3 Index: L; Code 4 Bore Size: C11)

Example Spare Wheel: NSST0512LC11WHL

NSST 0512 L C11 WHL

CONFIGURATION EXAMPLE 2

NexGen SLIM Tach ST85 (ST8) Part Number: ST80256ZG06FHEE

ST8 **0256** **Z** **G06** F H EE
(Code 2 PPR: 0256; Code 3 Index: Z; Code 4 Bore Size: G06)

Example Spare Wheel: NSST0256ZG06WHL

NSST 0256 Z G06 WHL

SLIM TACH REPLACEMENT WHEELS *NorthStar™ brand*

Replacement Wheels for Legacy SLIM Tach SL56, RL67, SL85, SL1250 Models

Key Features

- **"Best in Class" Durable Replacement Wheel Options**
- **Non-Marring Clamping System**
- **Eliminates Shaft Damage**
- **Easy Configurations**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 64-1024 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Index: 270°, ungated (optional gated to falling B edge)

MECHANICAL

SLIM Tach RL67
Bore Size: 5/8" to 3.75"
Shaft Speed: 5,000 RPM
Shaft Length Required: 0.7" min
Allowable Shaft End-Play: ± 0.045"
Allowable Shaft Runout: 0.003" TIR
Acceleration Rate: 12,000 rpm/sec max

SLIM Tach SL56
Bore Size: 5/8" to 3.75"
Max. Shaft Speed: 5,000 RPM
Shaft Length Required: 0.7" min
Allowable Shaft End-Play: ± 0.045"
Allowable Shaft Runout: 0.002" TIR
Acceleration Rate: 12,000 rpm/sec max

SLIM Tach SL85
Bore Size: 5/8" to 3.75"
Max: Shaft Speed: 5,000 RPM
Shaft Length Required: 1.0" min
Allowable Shaft End-Play: ± 0.050"
Allowable Shaft Runout: 0.003" TIR
Acceleration Rate: 3600 rpm/sec max

SLIM Tach 1250
Bore Sizes: 5/8" to 3.75"
Shaft Speed: 5,000 RPM
Shaft Length Required: 1.1" min
Allowable Shaft End-Play: ± 0.045"
Allowable Shaft Runout: 0.003" TIR
Acceleration Rate: 12,000 rpm/sec max

NORTHSTAR PULSE WHEEL STYLES

Photographs are representative of each wheel style.

		
J Wheel	**K Wheel**	**N Wheel**
Inside Diameter: 0.625" - 1.25" Commonly known as a "Spoke Wheel" configuration.	Inside Diameter: 1.375" - 3.25" Commonly known as a "Clamp Wheel" configuration. This wheel consists of three components and the assembly is different for RIM style and SLIM style.	Inside Diameter: 1.125", 2.125", 2.375", 2.875" Commonly known as "End of Shaft" wheel configuration used on GE design motors.

SLIM TACH REPLACEMENT WHEELS by DYNAPAR™

Ordering Information

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

Code 1: NorthStar	Code 2: PPR	Code 3: Index	Code 4: Bore Size
NS	□□□□	□	□□
Ordering Information			
NS Northstar SlimTach Series Wheels	**0064** **0128** **0256** **0512** **1024**	**L** No Index **G** Gated Index **Z** Differential Index	**J04** 5/8" **J05** 7/8" **J06** 1" **J07** 1-1/8" **K09** 1-3/8" **K10** 1-1/2" **K11** 1-5/8" **K12** 1-3/4" **K13** 1-7/8" **K14** 2" **K15** 1-1/8" **K16** 2-1/4" **K17** 2-3/8" **K18** 2-1/2" **K19** 2-7/8" **K20** 2-5/8" **End of Shaft** **N01** 1.125" EOS **N06** 2.125" EOS **N08** 2.375" EOS **N10** 2.875" EOS

HOW TO CONFIGURE

When configuring a SLIM Tach Series Pulse Wheel (RL67, SL56, SL85 and SL1250), please review the appropriate family data sheet and use the following methodology: Use "NS" followed by Code 2 (PPR) & Code 3 (Index) & Code 4 (Bore Size).

CONFIGURATION EXAMPLE 1

SLIM Tach RL67 Part Number: S60512LK11CVC

S6 **0512** **L** **K11** **C** **V** **C**

Code 2 PPR → Code 3 Index → Code 5 Bore Size

Spare Wheel Part Number: NS0512LK11

NS **0512** **L** **K11**

CONFIGURATION EXAMPLE 2

SLIM Tach SL56 Part Number: S50256ZJ06MLE

S5 **0256** **Z** **J06** **M** **L** **E**

Code 2 PPR → Code 3 Index → Code 5 Bore Size

Spare Wheel Part Number: NS0256ZJ06

NS **0256** **Z** **J06**

NRTK RIM TACH UPGRADE KIT

NorthStar™ brand

Wheel and Sensor NexGen Upgrade Kit for Legacy RIM Tach 8500 and RIM Tach 1250 Models

Key Features

- New Sensor Provides up to 0.075” of Air Gap, Over 50% More Than Competitive Models
- “Best in Class” Durable Replacement Wheel Options
- Protective Magnetic Wheel Edge Guard
- Stainless Steel Sensor Modules
- Higher Resolutions up to 2400 PPR

CE EN 61326-1 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Magnetic
Pulses per Revolution: 60 to 2400 PPR
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing male C-face end
Quadrature Phasing: 90° ± 45°
Symmetry: 50% ±15%
Number of Output Modules: Single or Dual

ELECTRICAL

Input Power Requirements: 5-26VDC, 95mA typical per sensor module, plus line driver load
Output Signals: IC-WE Differential Line Driver: 150mA, sink or source
Frequency Response: 0 - 180kHz Data & Index
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Reverse polarity and short circuit protected
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65. Optional MS3102 10 pin, Pigtail Cable, or Latching connector on cable extension

MECHANICAL

NexGen RIM Tach RT8 (RIM Tach 8500):
Bore Sizes: 5/8” to 2-7/8”
Mounting Configuration: 8.5” 180 C-Face Mount for NEMA MG1 Standards
Shaft Length Required: 2.5” min

NexGen RIM Tach RT1 (RIM Tach 1250):
Bore Sizes: 5/8” to 2-7/8”
Mounting Configuration: 12.5” C-Face Mount for NEMA MG1 Standards
Shaft Length Required: 2.88” min

MECHANICAL (CONT.)

Shaft Speed: 7,000 RPM, max.
Radial Air Gap:
1200 PPR or lower:
0.075”, +0.015” / -0.070”
Above 1200 PPR:
0.050”, +0.015” / -0.040”
Allowable Shaft End-Play: ±0.150”
Allowable Shaft Runout: 0.005” TIR
Acceleration Rate: 3600 rpm/sec max
Sensor Module Material: Stainless Steel

ENVIRONMENTAL

Operating Temperature Range: -40°C to +100°C
Storage Temperature Range: -40°C to +125°C
Shock: 200 G’s Min.
Vibration: 18 G’s @ 5-2000 Hz spectrum
Humidity: Up to 98% (non-condensing)

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z*	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
$\overline{Z}$*	9	Orange	I
Shield	10	Braid	J

* Index (Z) optional. See Ordering Information
† Alarm not available with Pigtail cable. See Ordering Information

NRTK RIM TACH UPGRADE KIT

by DYNAPAR™

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
NRTK□	**□□□□**	**□**	**□□□**	**□**
NRTKS Upgrade Kit for RIM Tach 8500 and 1250 Single Sensor Unit (Includes 1 Sensor & 1 Wheel) **NRTKD** Upgrade Kit for RIM Tach 8500 and 1250 Dual Sensor Unit (Includes 2 Sensors & 1 Wheel)	**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” **V20** 2-5/8” **V19** 2-7/8” **CB4** 16 mm **C36** 24 mm **C29** 25 mm **C31** 30 mm **CA4** 45 mm **C58** 60 mm **C40** 80 mm **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** 680 Series Motors	**C** Latching Industrial Connector with 1/2” NPT **F** Latching Industrial Connector without Mating Connector **M** 10 pin MS Connector **P** 18” Pigtail (Not available with Alarm output) **Q** Latching industrial connector on 18” cable **R** Latching Industrial Connector on 18” Pigtail Cable without Mating Connector

HOW TO CONFIGURE

When configuring an upgrade kit from a RIM Tach Series to the NexGen RIM Tach Series, please review the appropriate family data sheet and use the following methodology: Use “NRTKS” for a single sensor kit or “NRTKD” for a dual sensor kit followed by Code 2 (PPR) & Code 3 (Index) & Code 4 (Bore Size) & Code 7 (Termination). All single sensor upgrade kits (S) come with 1 sensor and 1 wheel. All dual sensor upgrade kits (D) come with 2 sensors and 1 wheel.

CONFIGURATION EXAMPLE 1

RIM Tach R8 Part Number: R80512ZK111LC

R8 **0512** **Z** **K11** **1** **L** **C**
Code 2 PPR · Code 3 Index · Code 5 Bore Size*2 · Code 7 Termination

Upgrade Kit Part Number: NRTKS0512ZV11C

NRTK **S***1 **0512** **Z** **V11** **C**

CONFIGURATION EXAMPLE 2

RIM Tach R1 Part Number: R10256ZJ062RM

R1 **0256** **Z** **J06** **2** **R** **M**
Code 2 PPR · Code 3 Index · Code 5 Bore Size*2 · Code 7 Termination

Upgrade Kit Part Number: NRTKD0256ZV06M

NRTK **D***1 **0256** **Z** **V06** **M**

***1 Note:** For single output, legacy part decode is 1 and NexGen part decode is S.
For dual output, legacy part decode is 2 and NexGen part decode is D.

*2 LEGACY TO NEXGEN BORE SIZE LOOKUP

Legacy Wheel	NexGen Wheel	Bore Size
J04	V04	5/8”
J05	V05	7/8”
J06	V06	1.00”
J07	V07	1-1/8”
K09	V09	1-3/8”
K10	V10	1-1/2”
K11	V11	1-5/8”
K12	V12	1-3/4”
K13	V13	1-7/8”
K14	V14	2.00”
K15	V15	2-1/8”
K16	V16	2-1/4”
K17	V17	2-3/8”
K18	V18	2-1/2”
K20	V20	2-5/8”
K19	V19	2-7/8”

RIM M100

NorthStar™ brand

RIM M100 Encoder Tester

Key Features

- Performs up to 18 Tests of Signal Output Quality; Simple One Keystroke Access to Tests
- Interfaces with Most Major Brands of Digital Tachometers and Encoders
- Fast Encoder Checkout with Numeric Value Display
- Can Be Used With Any 9V Incremental Encoder

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Controller: 68HC11 microcomputer
Frequency Response: 10Hz - 100kHz
Signal Input: 5-15 VDC digital line driver signal
Power: 110 VDC power pack or 9 VDC battery
Keyboard power on/off

MECHANICAL SPECIFICATIONS

Size: 7.50"(191mm) x 4.00"(102mm) x 3.00"(77mm)
Weight: 0.94 lbs. (0.43 kg)
Display: 4 line x 16 character LCD
Keyboard: 24 key membrane sealed, contamination resistant

*Specifications subject to change without notice.

ORDERING INFORMATION

Part Number:	Description
RIMM100RC	M100 system with RIM Tach® connector
RIMM100SC	M100 system with SLIM Tach® connector
RIMM100MS18D	M100 system with standard 10 PIN Differential
RIM M100 RSC	M100 system with RIM & SLIM
RIM TEST KIT	M100 system with 4 Connectors: RIM; SLIM; MS-10 PIN; Avtron 10 PIN
	Options
RIMETEUROCON	Spare Eurostyle connector with strain relief
RIMETCABLE-RIM	Cable harness, RIM Tach® connector
RIMETCABLE-SL	Cable harness, SLIM Tach® connector
RIMETCERT	Recalibration and certification service

TESTS PERFORMED

	Test	Function
Function	Signal Pulse State	Continuous display of high/low signal state (A,B,Z)
	Complementary	Display high/low state of complementary signals
	Pulses Per Second	Count number of pulses detected each sec-ond (100 kHz maximum)
	Pulse Counter	Display a continuous bidirectional count of detected pulses (10 digits)
Phase	Quadrature Phase	Display actual phase angle (±1% accuracy, derated at higher speeds)
	Min & Max Phase	Detects and holds the extreme quadrature phase angles
	Pulse Duty Cycle	Continuous update display (±1% accuracy, derated at higher speeds)
	Min & Max Duty	Detects and holds the extreme duty cycles
RPM	RPM	Calculates RPM (100 kHz maximum)
	Min & Max RPM	Detects and holds the extreme RPM (100 kHz maximum)
	Direction of Rotation	Displays + or - to indicate direction of signal input
Marker	Number of Pulses	Display number of pulses detected between markers (10,000 PPR max)
	Marker Pulse Presence	Display signal when marker is received
	Count Error	Detects and displays the number of pulse counts different from input count
	Revolution Counter	Display a continuous bidirectional count of revolution (10,000 revolutions)

RIM SS2

NorthStar™ brand

RIM SS2 Signal Splitter

Key Features

- Eliminates the Expense and Maintenance of Two Separate Encoders
- Optically Isolated Outputs can be Sent to a Motor Drive and a Display at the Same Time
- Compatible with Virtually Every Incremental Digital Encoder
- Combats Long Distance and Electrical Interference Problems

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Input Signal: 2 or 3 channel quadrature signal, square wave, open collector, differential, or single ended line driver

ELECTRICAL

Input Signal Voltage: 4 - 26 VDC
Input Signal Current: 2.2 mA minimum, 3.5 mA typical
Input Impedance: Optically isolated, 1 kOhm at 4V, 6.8 kOhms at 24V typical. Current limited.
Frequency Range: 0 - 120 kHz
Output Signal: Two independent, isolated line driver output sets (A/A, B/B)
Supply Voltage: 5 - 26 VDC
Output Current: 150 mA (maximum per channel)
Wire Gauge Accepted: 26 -16 AWG
Output Protection: ESD to MIL-STD-883 and short circuit protected

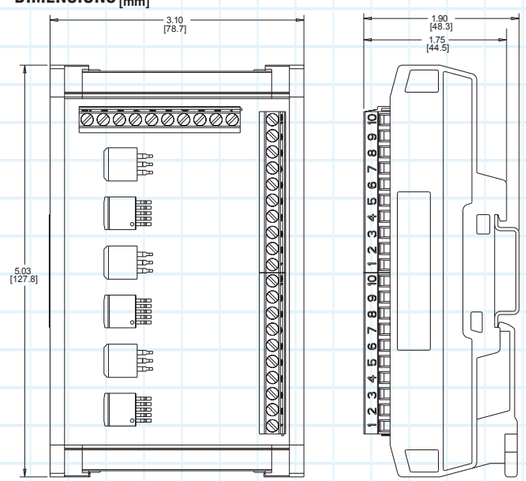
MECHANICAL

Enclosure Material: PVC
Mounting: DIN Rail EN 50022, (35mm x 7.5mm)

ENVIRONMENTAL

Operating Temperature: 0°C to 50°C
Storage Temperature: -20°C to 70°C
Operational Humidity: 98% non-condensing

DIMENSIONS Inch [mm]



ORDERING INFORMATION

Part Number: RIM SS2

RIM SSW

NorthStar™ brand

RIM SSW Signal Switcher

Key Features

- Eliminates Need for Two PLCs or Input Devices
- Accepts A, B, and Z Inputs from Two Separate Encoders
- May Switch Two Encoders of Different Resolutions for Coarse and Fine Position Control
- Can Select Spare Encoder that Acts as Backup of First
- Input Voltage Range from 4 to 26 VDC
- Can Be Used With Any Incremental Encoder

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Input Signal: 2 or 3 channel quadrature signal, square wave (open collector, differential, or single ended line driver)

ELECTRICAL

Input Signal Voltage: 4 - 26 VDC
Input Signal Current: 2.2 mA minimum, 3.5 mA typical
Input Signal Impedance: Optically isolated, 1 k Ohm at 4V, 6.8 k Ohms at 24V typical. Current limited.
Operating Frequency Range: 0 - 100 kHz
Output Signal: Differential driven square wave, signal level approximately equivalent to input supply voltage.
Error Output Signal: Sinking normally open, closes on error. 5V, 20 mA maximum load
Supply Voltage: 5 - 26 VDC
Current Consumption: Less than 150 mA at 100 kHz and 26 VDC typical with no output driver load
Output Current: 150 mA (maximum)
Power Up Time: Less than 10 ms
Encoder Switching Time: Less than 8 µs
Connector Wire Gauge: 26 -16 AWG
Electrical Protection: Reverse polarity protected
Output Protection: Under voltage, short circuit, and thermally protected
Fail Safe Feature: Fail safe mode connects device's ENCODER 1 INPUT directly to device's OUTPUT terminals

MECHANICAL

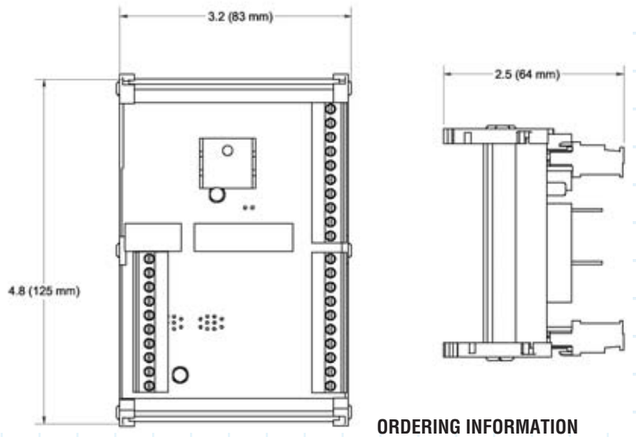
Enclosure Material: PVC
Side Element Material: Polyamide PA non-reinforced
Mounting Options: DIN 35 or 32

ENVIRONMENTAL

Operating Temperature: 0°C to 50°C
Storage Temperature: -20°C to 70°C
Operational Humidity: 98% non-condensing

*Specifications subject to change without notice

DIMENSIONS inches [mm]



ORDERING INFORMATION

Part Number: RIMSSW

DYNAPAR™

Notes

Notes

Dynapar's Global Presence

Dynapar has been manufacturing encoders since 1955, and our breadth of product offering has served us well in many industries. Throughout the years, and with the introduction of Hengstler Absolute Encoders and Harowe Resolvers, Dynapar has expanded its North American presence to become a global platform. With the expansion of our company, Dynapar now maintains manufacturing and engineering capabilities in North America, Europe, China and Brazil serving all of our customers across the globe with customized, innovative motion feedback technology.

Dynapar currently has 8 manufacturing and engineering offices, 14 sales offices, hundreds of distribution partners and a strong, direct sales force around the world providing us a supply chain, engineering footprint and dedicated support team to grow with our customers and their global advancements. As our customers grow and evolve into new markets, we grow with them providing motion feedback solutions at every turn.

◆Manufacturing, Engineering and Sales Offices:

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Hengstler Setra-ICG Tianjin Co., LTD
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DYNAPAR™

INNOVATION - CUSTOMIZATION - DELIVERY

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West Indies: St. Kitts

Europe: United Kingdom, Italy, France, Germany, Spain, Slovakia

South America: Brazil

Asia: China, Japan, Korea, Singapore