DYNAPAR™

INNOVATION - CUSTOMIZATION - DELIVERY

ENCODERS & RESOLVERS

NorthStar™ ACURO® Dynapar™ HENGSTLER® Harowe™

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INNOVATION - CUSTOMIZATION - DELIVERY

Innovation, Customization, Fast Delivery, and the most comprehensive encoder selection in the industry…Dynapar delivers the rotary feedback solutions customers are demanding.

Dynapar is an ISO 9000 certified facility and has been manufacturing encoders in Gurnee Ilinois since 1955. Today Dynapar offers the widest selection of the industry's most trusted brands in motion feedback control, including NorthStar heavy duty optical and harsh duty magneto resistive encoders, Acuro absolute encoders, Dynapar incremental encoders, Hengstler Euro-spec models, and Harowe resolvers. These brands serve the spectrum of heavy, industrial, servo, and light-duty applications.

Innovation is engrained into the fabric of our company. At Dynapar, we pride ourselves on being at the forefront of feedback technology, making advances to our products through a detailed understanding of the voice of our customers. Dynapar pioneered the first true vector-duty hollow-shaft encoder building on our strong presence in a number of industries including steel, paper, medical, material handling and industrial motor manufacturing.

Customization capability allows customers to meet the varied specifications of feedback application. Shafts, tethers, cables, connectors, and housings can be modified by local engineering teams, and quickly put into production to give our customers the right-fit product.

Fast Delivery is a customer requirement, and at Dynapar we take pride in operational excellence. All Dynapar and NorthStar encoders are built to order utilizing a Just-In-Time (JIT) manufacturing process, allowing for fast Delivery and 3 day lead times on most models.

Depend on Dynapar…..Innovation—Customization—Delivery

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NEW PRODUCTS

DYNAPAR 2010

M53 PAGE 3.26

KEY FEATURES:
- Redesigned circuitry for higher reliability
- Compact size for small motors
- Modular design w/integral gapping

HS35R PAGE 2.44

KEY FEATURES:
- New Phased Array Technology
- High Resolution with unbreakable discs
- Wide sensor gap for high shock loading

HC20 PAGE 3.38

KEY FEATURES:
- Phased array technology
- Wide 0 to 120ºC operating temperature
- Cost-effective high performance

HS60 PAGE 1.60

KEY FEATURES:
- Improved Seals
- Large 2-7/8" bore capability
- Anodized endbells for shaft isolation
- Stainless clamping shaft hub

AD34 PAGE 3.04

KEY FEATURES:
- Up to 17 bit absolute positioning
- 10,000 RPM capability for servo feedback
- Special shaft for easy one-step mounting
- Available with hubshaft (AD35)

AR62 PAGE 1.64

KEY FEATURES:
- Magnetic Technology
- 12 bit true absolute positioning
- Oversized bearings for high shaft loads
- Submersible

HSD44 PAGE 1.26

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

NORTHSTAR HD OPTICAL SECTION 1

KEY FEATURES:
- Unbreakable discs
- High temperature capability
- Phased Array Sensor Technology
- Intrinsic Safety on select models

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by DYNAPAR™

Refer to page number A.12 for Selection Guide providing encoder choice by application and operating characteristics.

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TECHNOLOGY OVERVIEW

DYNAPAR 2010

There are three main types of feedback devices: absolute, incremental, and resolver.

Absolute encoders are typically used in CNC, medical, and robot applications where high resolution is required and absolute feedback reduces power up sequences.

Incremental encoders can be used in positioning and motor speed feedback applications. These would specifically be cut-to-length, crane or hoist, and heavy vehicle applications.

Resolvers are used in applications that are environmentally demanding. This means extreme temperatures, shock, and vibration. These applications can be aerospace, military, heavy vehicle and radio active.

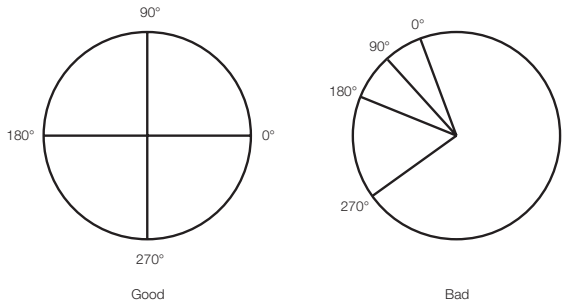

Figure 1: Accuracy

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.

ABSOLUTE ENCODER OVERVIEW

Absolute rotary encoders are devices that transmits a numerical representation of the angular position of a shaft. This number is coded in binary or Gray code. Each digit in binary or Gray code is referred to as a bit. Each digit also represents an exponent of two starting with zero from the left. Therefore, the third digit from the left would be 22. The amount of bits an encoder has is equivalent to the resolution of the encoder. For example, a 22 bit encoder has a resolution of approximately four million counts per revolution or 2^{22} counts. Transmission of high resolution values such as this can take place through several interfaces such as BiSS, SSI, Profibus, DeviceNet, etc.

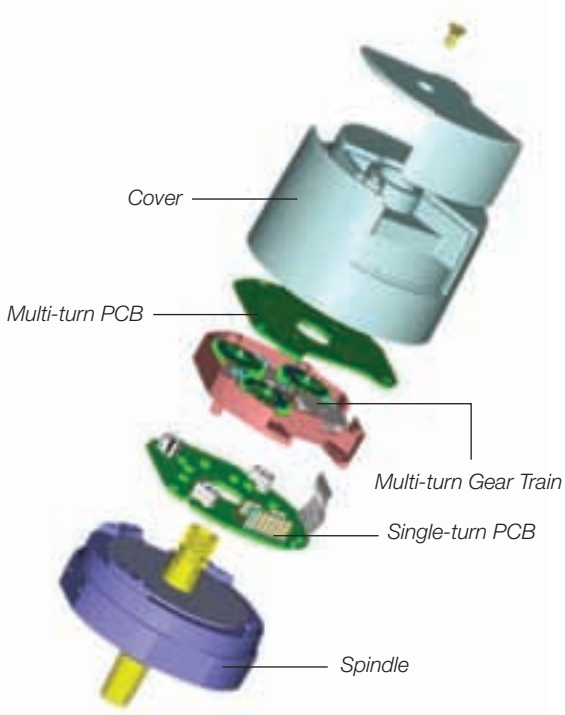

Figure 2: SSI/BiSS Encoder Assembly

Absolute encoders are made of these primary components.

The cover insures that the encoder is protected from the outside elements of the application. This could be washdown for the food industry, stainless for marine applications, or heavy duty for volatile environments.

The Multi turn PCB and gear train keeps an accurate count of the amount times the shaft has made a full rotation. On the PCB, there are three opto asics cascaded and transmitting position down the line using the BiSS protocol. Each opto asic is reading a transparent gear that is coded with an absolute position. The last ASIC transmits a complete 12 bit turn count to the single turn PCB. It is important to note that this is done without the use of a battery, so the count will be valid for the life of the encoder.

The single turn PCB has a single opto asic reading from a disk that is coded similar to the gears above it. The exception is that the disk has more tracks plus an incremental sinusoidal track that is used for a secondary output or for interpolating up to 22 bits.

The spindle primarily contains the bearing, flange, and shaft that meet the mechanical demands of the application. The spindle guarantees that the encoder will stand up to the specified shock and vibration, but proper assembly also insures that the encoder meets the specified accuracy.

Absolute encoders are typically used in CNC, medical, and robot applications where high resolution is required and absolute feedback reduces power up sequences.

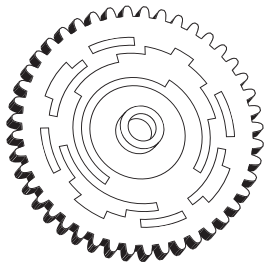

Figure 3: Coded Gear

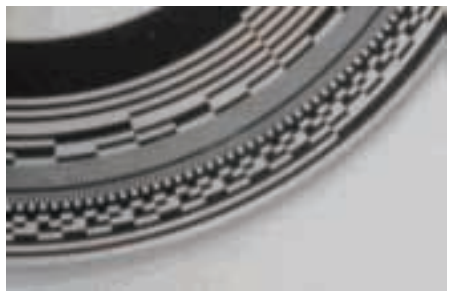

Figure 4: Absolute Disk Section

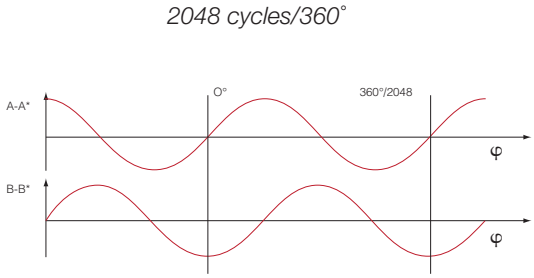

Figure 5: Incremental Sinusoidal Output

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INCREMENTAL ENCODER OVERVIEW

Incremental encoders provide a specified amount of pulses in one rotation of the encoder. The output can be a single line of pulses(an "A" channel) or two lines of pulses(an "A" and "B" channel) that are offset in order to determine rotation. This phasing between the two signals is called quadrature.

The typical assembly of incremental encoders is reduced to a spindle assembly, PCB, and cover. Each component bears a similar purpose as the in the absolute encoders with the exception that the PCB contains a sensor array that creates just two primary signals for the purpose of position and speed.

Optionally, additional signals can be provided:

An index or 'Z' channel can be provided as one pulse per revolution signal for homing and pulse count verification on the A and/or B channels. This index can be gated to either A or B in their various states. It can also be un-gated and vary in width.

Commutation(U,V,W) channels 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.

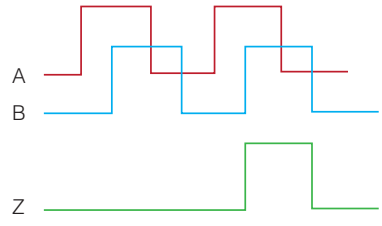

Figure 6: Incremental Encoder Signal

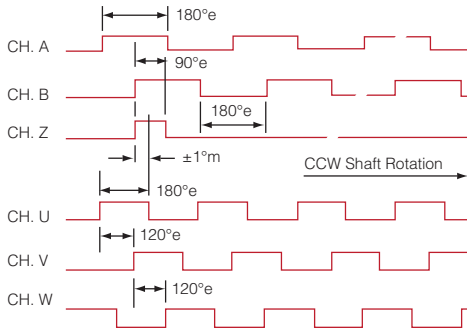

Figure 7: Commutation Channels

RESOLVER OVERVIEW

A resolver functions as an electro-mechanical 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 7.

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.

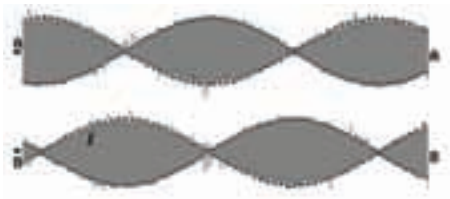

Figure 7: Resolver Signal

ENCODER ENGINES

The engine in encoders is the internal technology used to provide the signal required by the customer. Engine in its more familiar use would be gas, hybrid, or electric. Engines in encoder technology would typically be optical with a mask, optical phased array, and magnetic.

Traditional optical absolute and incremental encoders have four main components: LED, disk, mask, and sensor. 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.

Phased array technology essentially averages several signals to increases signal stability. Users can easily install these modules without the need of precision fixtures and align disks without the use of microscopes. Figure 8 shows the cross sectional side view of the disk, and how the components are used to provide a proper signal.

This technology provides stable output during heavy shock and vibration, and opens up its use to oil rig, heavy vehicle, and military applications.

Magnetic encoders consist of a magnetized wheel, magneto resistive sensors, and a signal conditioning electrical circuit. 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.

In absolute magnetic technology, there is a single pole pair rotating above a sensing element. The resolution is dependant 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.

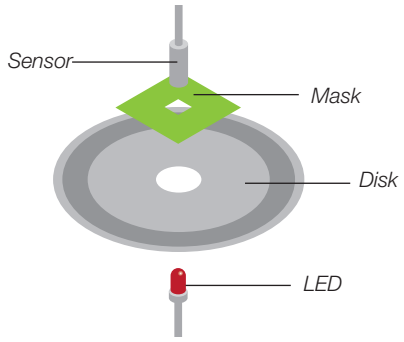

Figure 8: Traditional Optical Encoder Engine

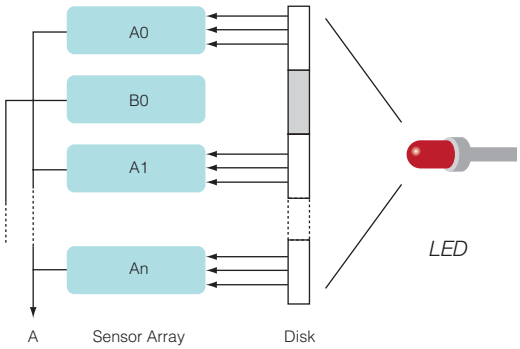

Figure 9: Phased Array Technology

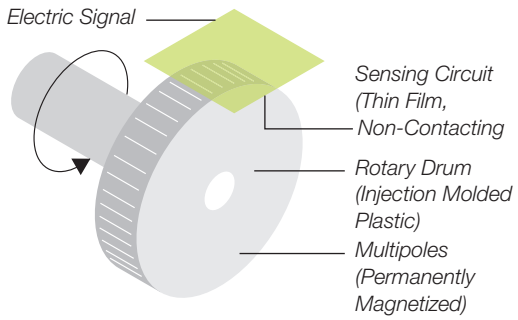

Figure 10: Incremental Magnetic Technology

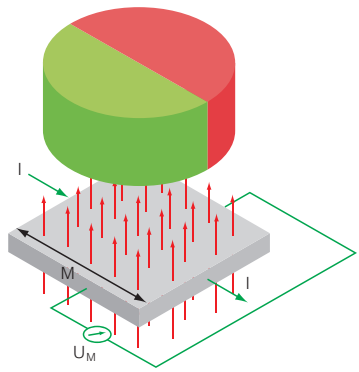

Figure 11: Absolute Magnetic Technology

ENCODER MOUNTING CONFIGURATIONS

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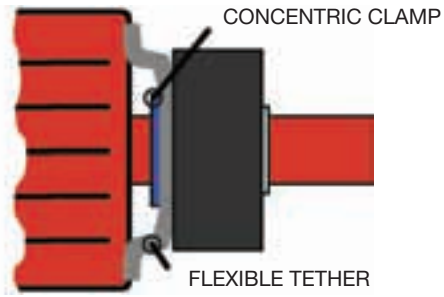
Encoders are applied to measure speed and position in a wide variety of applications and are therefore available with numerous mounting styles. The mounting style should be selected carefully to best fit the application at hand.

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: HS35 (page 2.40), HS20 (page 2.36), AC110 (2.84)

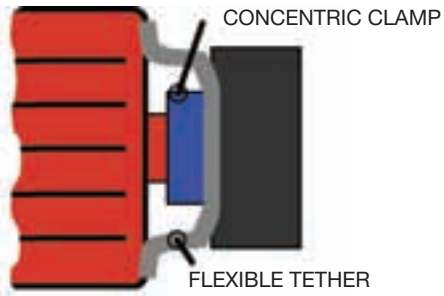


HUB-SHAFT

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 (2.64 - 2.80), HSD25 (page 1.08), E14 (page 4.04)

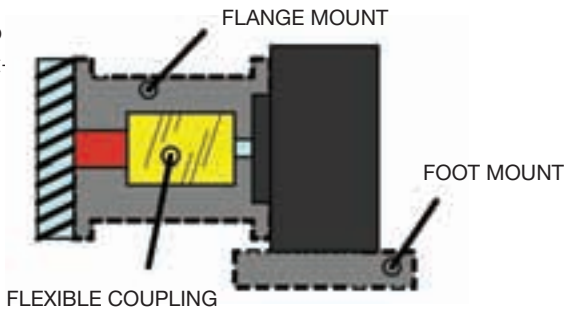


SHAFTED WITH COUPLING

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 4.12), HR26 (page 2.54)

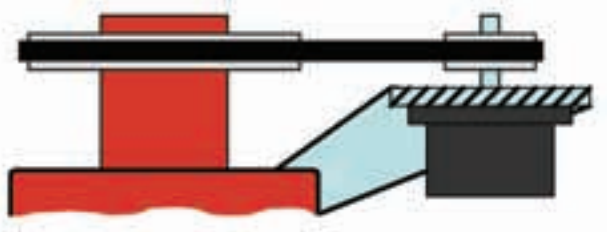


SHAFTED WITH BELT

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 1.32), RIM6200 (page 1.56)



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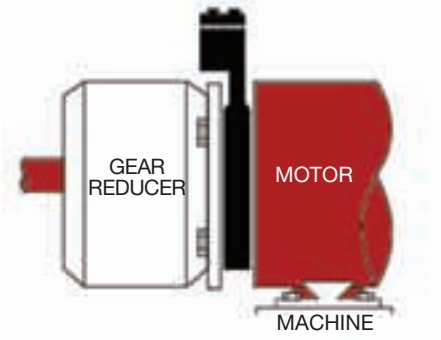
C-FACE

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: SL56 (page 1.42), SL85 (page 1.46)

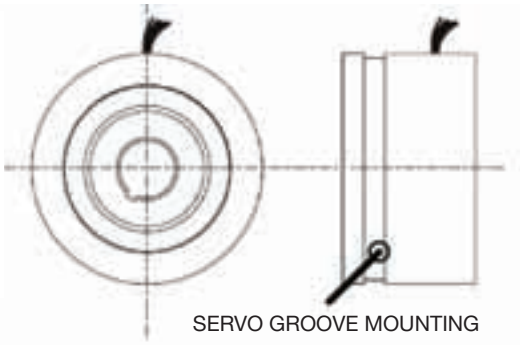


FRAMELESS RESOLVER

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 housin 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 3.42), HAROMAX 21 (page 3.43

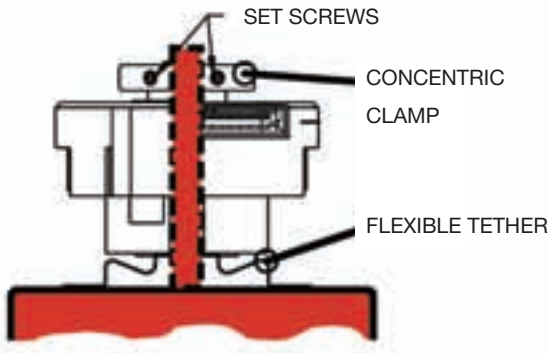


SERVO FLEX-MOUNT

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 3.30), F18 (page 3.34)

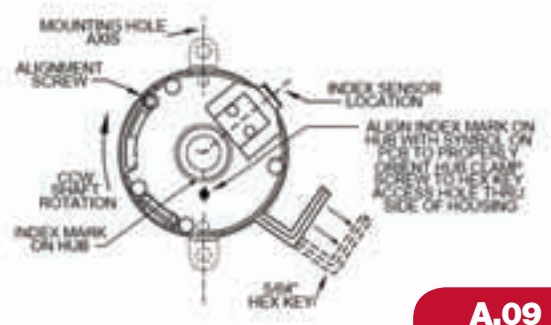


SERVO KIT

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 3.26), M15 (page 3.24), ET Module (page 3.12)



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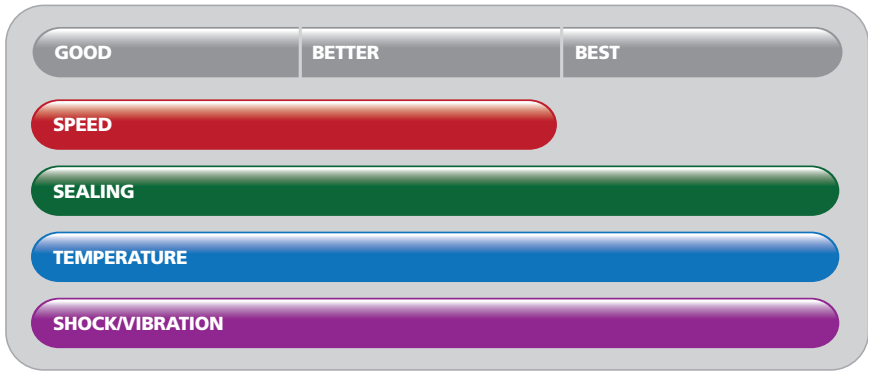
ENCODER/RESOLVER DUTY CLASSIFICATION

HEAVY DUTY

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

RIMTach 8500 Pictured.

HEAVY DUTY GENERAL PERFORMANCE DATA

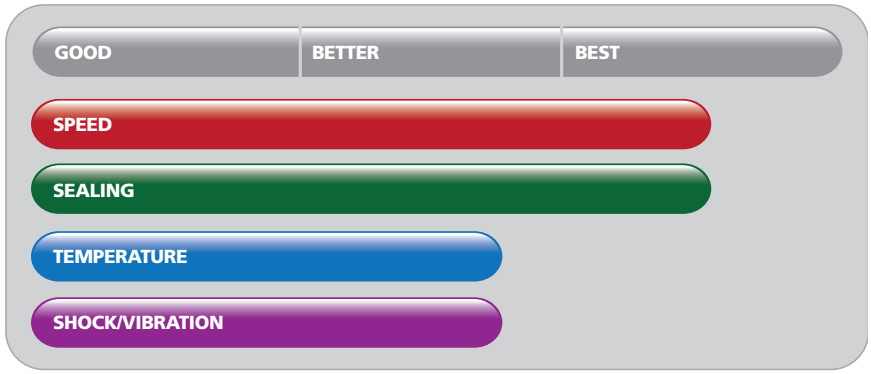


INDUSTRIAL DUTY

Often considered the “workhorse” of the encoder world, industrial duty encoders achieve a good compromise between ruggedness and performance. These encoders are typically used in factory environments where contaminants like dust and moisture are common. The hollow-shaft variety of industrial duty encoders is often the preferred choice of vector motor OEM’s for speed feedback.

HA25 Pictured.

INDUSTRIAL DUTY GENERAL PERFORMANCE DATA



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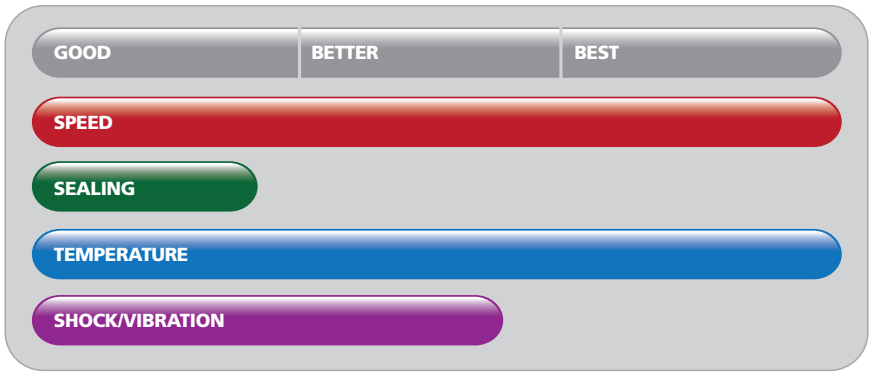
SERVO DUTY

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.

SERVO DUTY GENERAL PERFORMANCE DATA

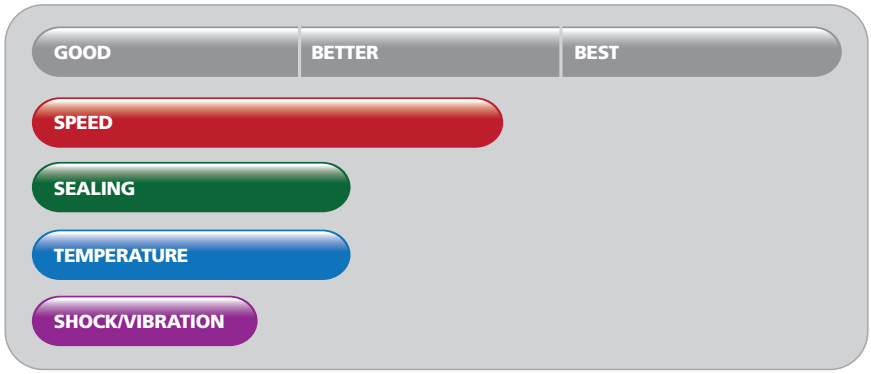


AD35 Pictured.

LIGHT DUTY

Light duty encoders are commonly referred to as “commercial duty” due to their frequent use in commercial or office automation products. Copiers, fax machines, lab equipment, and medical equipment are common applications for light duty encoders. Typically these devices reside in fairly benign environments with little temperature variation, are fairly clean, and not generally subjected to high shock loading or moisture.

LIGHT DUTY GENERAL PERFORMANCE DATA



E14 Pictured.

DYNAPAR™ SELECTION GUIDE

Incremental

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		HSD38	Finned 3.8" housing - Phased Array Sensor - Up to 5000 PPR - Ideal for vector motor duty	1.20
		DWD38	3.75" housing - draw works threaded shaft - ATEX certification available - NAMUR output available	1.24
		SLIMTach HS56	Magneto-resistive sensor - Up to 1-1/8" hollowshaft - Up to 2048 PPR - Field serviceable connector	1.58
		SLIMTach HS60	NEW PRODUCT - Up to 2-7/8" stainless hollowshaft - Magneto-reisistive sensor - Field serviceable connector	1.60
		RIMTach HS85	Removeable Magneto-resistive sensors - Up to 4.5" hollowshaft - Dual isolated output option	1.62
	Servo Duty	F10	Compact 1.25" diameter - direct-fit for Size 10 resolver - 5VDC - Up to 2048 PPR & commutation channels	3.28
		F14	1.55" Diameter - Flex tether mounting - 5VDC - Up to 5000 PPR & commutation channels	3.30
		F15	1.45" Diameter - direct-fit for size 15 resolver - 5VDC - Up to 2048 PPR & commutation channels	3.32
		F18	1.96" Diameter - Flex tether mounting - 5VDC - Up to 10,000 PPR & Commutation channels	3.34
		F21	2.06" Diameter - direct-fit for size 21 resolver - 5VDC - Up to 2048 PPR & commutation channels	3.36
		HC20	NEW PRODUCT - 1.97" diameter - multiple shaft mounting options - Up to 2500 PPR - 5VDC or 5-26VDC	3.38
Bearingless	Heavy Duty	SLIMTach SL56	56C-face mounting. 5-15VDC or 5-26VDC. Magneto-resistive technology. Up to 2048 PPR.	1.42
		SLIMTach RL67	56C-face mounting or Reliance RPM™ rabbet mounting. Magneto-resistive technology.	1.44
		SLIMTach SL85	180C-face mounting. 5-15VDC or 5-26VDC. Magneto-resistive technology. Up to 2048 PPR.	1.46
		SLIMTach SL1250	250C-face mounting. 5-15VDC or 5-26VDC. Magneto-resistive technology. Up to 2048 PPR.	1.50
		RIMTach 8500	180C-face mounting. Removeable sensor modules. Magneto-resistive technology. Up to 1200 PPR.	1.52
		RIMTach 1250	250C-face mounting. 5-15VDC or 5-26VDC. Magneto-resistive technology. Up to 2048 PPR.	1.54
Kit/Modular	Servo Duty	M602 & M832	Component-level kit. 5VDC input. Unbreakable discs	3.12
		LM & LAM	Component-Level Linear encoder kit. Digital or Analog output. 5VDC input.	3.15
		M9 & E9	.9" diameter. Up to 512PPR. 5VDC input.	3.18
		M14	1.496" diameter (38mm). Short mounting depth. Up to 1024PPR. 5VDC input.	3.22
		M15	1.5" diameter. Up to 1024PPR with commutation channels. Phased-Array sensor technology.	3.24
		M53	2.0" diameter. Up to 2500PPR with commutation channels. 5VDC or 12VDC input.	3.26

DYNAPAR™

Absolute

Shafted

			Page
Industrial Duty	AI25	2.5" size. Multiple fieldbus options. Up to 22 bit singleturn, 12 bit multiturn resolution.	2.64
Servo Duty	AD34	37.5mm diameter. Unique one-step shaft mounting. Up to 19 bit singleturn resolution.	3.04
	AD25	58mm diameter. Up to 22 bit singleturn resolution. Unique conical shaft for concentric mounting.	3.10
Heavy Duty	AR62/63	58mm size. Oversized bearings. Magnetic sensor. 12 bit singleturn resolution.	1.64
	AX70/71	70mm diameter. ATEX certified explosion-proof. Aluminum or stainless steel housing.	1.66

Hubshaft

Industrial Duty	AI25	2.5" size. Multiple fieldbus options. IP64 protection rating.	2.64
Servo Duty	AD35	37.5mm diameter. Up to 22 bit singleturn resolution. 5VDC or 7-30VDC.	3.06
	AD36	37.5mm diameter. Up to 22 bit singleturn, 12 bit multiturn resolution. 5VDC or 7-30VDC.	3.08

Hollowshaft

Industrial Duty	AC36	37.5mm diameter. Up to 22 bit singleturn, 12 bit multiturn resolution. 5VDC or 7-30VDC.	2.62
	AC110	110mm diameter. Up to 50mm hollowshaft bore. Up to 22 bit singleturn resolution. 10-30VDC.	2.84
Servo Duty	AD36	37.5mm diameter. Up to 22 bit singleturn, 12 bit multiturn resolution. 5VDC or 7-30VDC.	3.08

Resolver

Housed

Servo Duty	R11	Size 11 housing - unique shaft pinion for pulley mounting - Up to 155C temperature rating	3.40
	11	Size 11 housing - Up to 5X multi-speed available - High 3 arc-min accuracy	3.40
Heavy Duty	R25	Industry standard 2.5" housing - Up to 125C temperature rating - Up to 200g shock rating	1.70

Frameless

Servo Duty	10	Size 10 bearingless - Brushless construction - Up to 200C temperature rating	3.41
	15	Size 15 bearingless - Brushless construction - Multi-speed available	3.41
	21	Size 21 bearingless - Brushless construction - Multi-speed available	3.41
	31	Size 31 bearingless - Brushless construction - Up to 8X multi-speed available	3.41
	55	Size 55 bearingless - Up to 3.65" rotor I.D. bore - Up to 32X multi-speed available	3.41
	HaroMax 15	Size 15 bearingless - High-accuracy - Light weight aluminum housing - Brushless construction	3.42
	HaroMax 21	Size 21 bearingless - High-accuracy - Light weight aluminum housing - Brushless construction	3.43

LIGHT DUTY

SERVO DUTY

INDUSTRIAL DUTY

HEAVY DUTY

DYNAPAR™

HEAVY DUTY ENCODERS & RESOLVERS GUIDE

DYNAPAR 2010

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

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

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

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

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

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

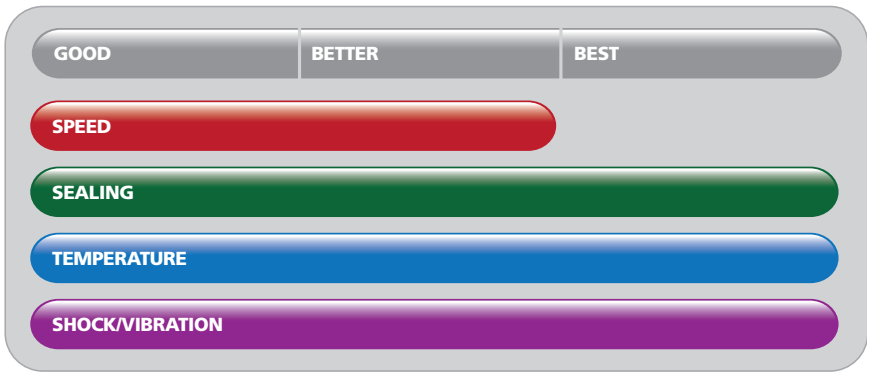
Regardless of the NorthStar encoder used, you can rely on Dynapar for reliable feedback in tough environments. NorthStar encoders are made right here in the USA using the advanced cellular manufacturing concept, ensuring Just-In-Time delivery to meet your needs.

DYNAPAR™

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

RIMTach 8500 Pictured

HEAVY DUTY ENCODER GENERAL PERFORMANCE DATA



DYNAPAR™

OPTICAL - INCREMENTAL

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

MAGNETIC - INCREMENTAL

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

DYNAPAR™

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

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

SERIES HD20

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

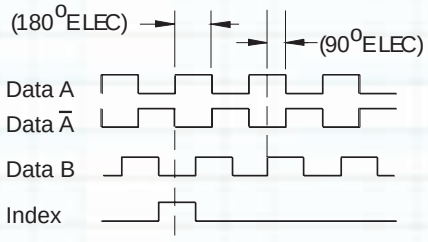
CE RoHS E Ex ia IIB T4

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.
$\overline{A}$ shown for reference



A Leads B CCW

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	—	—
$\overline{\text{Sig. A}}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	VIOLET
$\overline{\text{Sig. B}}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	BROWN
$\overline{\text{Sig. Z}}$	—	—	—	—	—	—	J	YEL/WHT	YELLOW

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

ELECTRICAL

Input Power: 5-26VDC; 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: 2N2222, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/seal
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft speed: 6000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Shaft runout: 0.0005 TIR at midpoint
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 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: Metal or plastic
Weight: 14 ounces, typical

ENVIRONMENTAL

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

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

Code 1: Model

Size 20 Extreme Heavy Duty Encoder

1 Unidirectional
2 Bidirectional
3 Bidirectional with Index

Code 2: PPR

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**

Code 3: Shaft

0 3/8" Dia. Shaft with flat
4 10mm Dia. Shaft, no flat

Code 4: Electrical

0 5-26V in, 5-26V Open Collector out (7273)
2 5-26V in, 5-26V Push-Pull out
F 5-26V in, 5-26V Open Collector out (2222)
G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)

available when: Code 1 is 1,2 and Code 5 is 3 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)

Code 5: Termination

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

Code 6: Options

0 No Options
1 Nickel Finish Housing
2 Stainless Steel Housing
A Same as "0" w/ ATEX Type 1
B Same as "1" w/ ATEX Type 1
C Same as "2" w/ ATEX Type 1

Available when Code 4 is 0, 2, 3, F or G

G Same as "0" w/ ATEX Type 2
H Same as "1" w/ ATEX Type 2
I Same as "2" w/ ATEX Type 2

Available when Code 4 is 4

M Same as "0" w/ ATEX Type 3
N Same as "1" w/ ATEX Type 3
O Same as "2" w/ ATEX Type 3

Available when Code 4 is 0, 2, F or G

3 Redundant Outputs (Dual Connector Housing). See † NOTE
4 Nickel Finish Housing with Redundant Outputs. See † NOTE
5 Stainless Steel Housing with Redundant Outputs. See † NOTE
D Same as "3" " w/ ATEX Type 1. *See †NOTE*
E Same as "4" w/ ATEX Type 1. *See †NOTE*
F Same as "5" w/ ATEX Type 1. *See †NOTE*
J Same as "3" w/ ATEX Type 2. *See †NOTE*
K Same as "4" w/ ATEX Type 2. *See †NOTE*
L Same as "5" w/ ATEX Type 2. *See †NOTE*
P Same as "3" w/ ATEX Type 3. *See †NOTE*
Q Same as "4" w/ ATEX Type 3. *See †NOTE*
R Same as "5" w/ ATEX Type 3. *See †NOTE*

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Notes:

10 foot Cable Assemblies with MS Connector

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

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

*Note: Available ATEX Certified Options

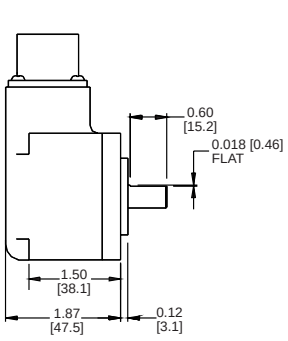
ATEX Type 1: ATEX Certified; 5V in, 5V out only

ATEX Type 2: ATEX Certified; 7-26V in, 7-26V out

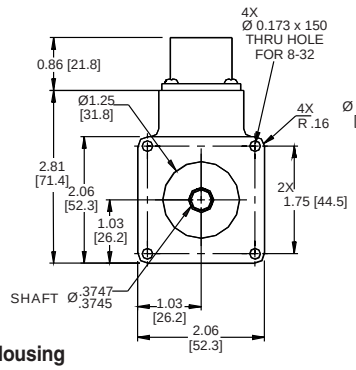
ATEX Type 3: ATEX Certified; 7-26V in, 5V out

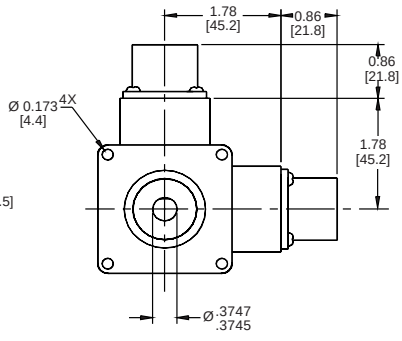
NOTE:ATEX voltages replace those shown in Code 4.

DIMENSIONS inches [mm]

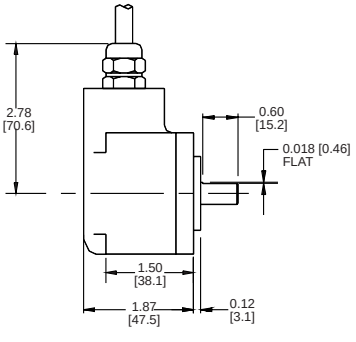


Standard Housing





Dual Redundant Outputs



Cable Exit

SERIES HD25

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

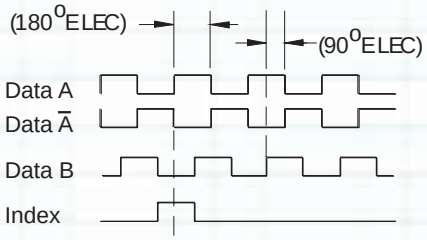
CE RoHS E Ex ia IIB T4

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

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



A Leads B CCW

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS, 5 Pin M12, Connectors and Cables

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

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

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

ELECTRICAL

Input Power: 5-26VDC, 5-15VDC dependant on output type. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: 2N2222, 4469. ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/seal
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Shaft Speed: 6,000 RPM, maximum
Shaft loading: Up to 100 lbs axial and radial
Shaft runout: 0.0005 TIR at midpoint
Starting torque: 2.5 in-oz. maximum (at 25°C)
Bearings: 5200 ZZ double row
Bearing life: 5 x 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: Metal or plastic
Weight: 14 ounces, typical

ENVIRONMENTAL

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

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

Code 1: Model

Size 25 Extreme Heavy Duty Encoder

- **1** Unidirectional
- **2** Bidirectional
- **3** Bidirectional with Index

Code 2: PPR

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**

Code 3: Shaft

- **0** 3/8" Dia. Shaft with flat
- **4** 10mm Dia. Shaft, with flat
- **6** 12mm Dia. Shaft

Code 4: Electrical

- **0** 5-26V in, 5-26V Open Collector out (7273)
- **2** 5-26V in, 5-26V Push-Pull out
- **F** 5-26V in, 5-26V Open Collector out (2222)
- **G** 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)

Available when: Code 1 is 1, 2 and Code 5 is 3,5 or D through P, or Code 1 is 3 and code 5 is 5 or D through P:

- **3** 5-26V in, 5-26V Differential Line Driver out (7272)
- **4** 5-26V in, 5V Differential Line Driver out (7272)
- **6** 5-15V in, 5-15V Differential Line Driver out (4469)

Code 5: Termination

- **1** 6 Pin Connector
- **3** 7 Pin Connector
- **5** 10 Pin Connector
- **9** 5 Pin M12 Connector
- **D** 18" Sealed Cable
- **E** 3' Sealed Cable
- **F** 6' Sealed Cable
- **G** 10' Sealed Cable
- **H** 15' Sealed Cable
- **P** 5m Sealed Cable

*Note: Available ATEX Certified Options

ATEX Type 1: ATEX Certified; 5V in, 5V out only

ATEX Type 2: ATEX Certified; 7-26V in, 7-26V out

ATEX Type 3: ATEX Certified; 7-26V in, 5V out

ATEX Type 4: ATEX Certified; 5-15V in, 5-15V out

NOTE: ATEX voltages replace those shown in Code 4.

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Code 6: Options

- **0** No Options
- **1** Nickel Finish Housing
- **2** Stainless Steel Housing
- **3** Redundant Outputs (Dual Connector Housing). See † NOTE
- **4** Nickel Finish Housing with Redundant Outputs. See † NOTE
- **5** Stainless Steel Housing with Redundant Outputs. See † NOTE

- **A** Same as "0" w/ ATEX Type 1
- **B** Same as "1" w/ ATEX Type 1
- **C** Same as "2" w/ ATEX Type 1
- **D** Same as "3" w/ ATEX Type 1. *See †NOTE*
- **E** Same as "4" w/ ATEX Type 1. *See †NOTE*
- **F** Same as "5" w/ ATEX Type 1. *See †NOTE*

Available when Code 4 is 0-3, F or G

- **G** Same as "0" w/ ATEX Type 2
- **H** Same as "1" w/ ATEX Type 2
- **I** Same as "2" w/ ATEX Type 2
- **J** Same as "3" w/ ATEX Type 2. *See †NOTE*
- **K** Same as "4" w/ ATEX Type 2. *See †NOTE*
- **L** Same as "5" w/ ATEX Type 2. *See †NOTE*

Available when Code 4 is 4

- **M** Same as "0" w/ ATEX Type 3
- **N** Same as "1" w/ ATEX Type 3
- **O** Same as "2" w/ ATEX Type 3
- **P** Same as "3" w/ ATEX Type 3. *See †NOTE*
- **Q** Same as "4" w/ ATEX Type 3. *See †NOTE*
- **R** Same as "5" w/ ATEX Type 3. *See †NOTE*

Available when Code 4 is 6:

- **S** Same as 0, w/ATEX Type 4
- **T** Same as 1, W/ATEX Type 4
- **U** Same as 2, w/ATEX Type 4
- **V** Same as 3, w/ATEX Type 4. *See †NOTE*
- **W** Same as 4, w/ATEX Type 4. *See †NOTE*
- **Y** Same as 5, w/ATEX Type 4. *See †NOTE*

Note:

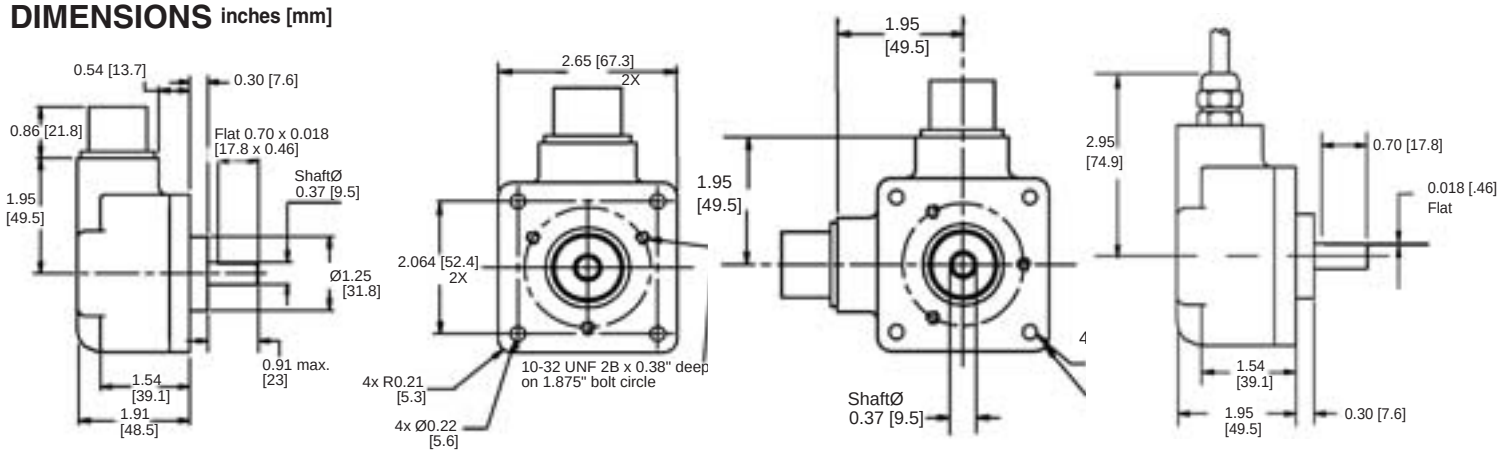
10 foot Cable Assemblies with MS Connector

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

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

DIMENSIONS inches [mm]



Standard Housing | **Dual Redundant Outputs** | **Cable Exit**

SERIES HSD25

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

CE RoHS 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

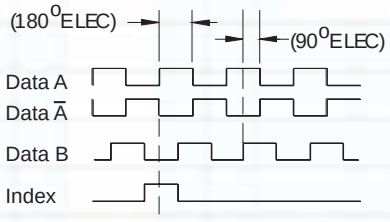
ELECTRICAL

Input Power: 5-26VDC. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: 2N2222. ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 5 or 8 Pin M12 Connector; Cable exit w/seal
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Material: 303 stainless steel (passivated)
Bore Diameter: 3/8", 10mm, 1/2", 5/8", 3/4". Insulated inserts provided
Bore runout: 0.0005 TIR at midpoint
Starting torque: 6.5 in-oz. maximum (at 25°C)

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



A Leads B CCW

Bearings: 61805-2RZ
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. Tether Available
Disc material: Metal or plastic
Weight: 20 ounces, typical

ENVIRONMENTAL

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

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	Code6: Options	Code 7: Special Options
□□□25	□□□□	□	□	□	□	□□

Ordering Information

HSD25 Heavy Duty Hub Shaft Encoder

ISD25 ATEX Intrinsically Safe Hub Shaft Encoder

0001 0500
0010 0512
0024 0600
0025 0625
0035 0720
0040 1000
0060 1024
0100 1200
0120 1250
0192 1440
0200 2000
0240 2048
0250 2500
0256 2540
0300 2600
0360 3600

0 6mm
1 1/4"
2 5/16"
3 8mm
4 3/8"
5 10mm
6 12mm
7 1/2"
8 5/8"
9 15mm
A 16mm
C 19mm
D 3/4"

0 Single Ended ABZ, 5-26VDC push-pull
1 Single Ended ABZ, 5-26VDC Open collector (7273)
2 Single Ended ABZ, 5-26VDC Open collector (2222)
3 Single Ended ABZ, 5-26VDC Open collector (2222) w/2.2kOhm

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)

Following options are only available when Code 1 is ISD25

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 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
1 7 pin
2 10 pin
5 6 pin+mating
6 7 pin+mating
7 10 pin+mating
8 12 CW pin+mating
A .5m (18") cable
C 1m (36") cable
D 2m (72") cable
E 3m (120") cable
L 4m (144") cable
H 5 pin M12
J 8 pin M12
K 1.5 ft (18") cable w/ in line 10pin connector
M 5 ft (60") cable
N 10 ft (120") cable

0 No Options
1 Slotted Tether
2 Single point tether
3 No tether, Dual isolated outputs
4 Slotted Tether, Dual isolated Outputs
5 Single Point Tether, Dual isolated Outputs

Blank None
01 Nickel Plated
02 Stainless Steel

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

113764-0001 Single Point Tether Kit

113766-0001 Slotted Tether Kit

† **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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

SERIES HSD25

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables

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

Encoder Function	Cable # 108594-6 Pin Single Ended		Cable # 108595-7 Pin Single Ended		Cable # 108596-7 Pin Dif Line Drv w/o Idx		Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/Idx		Cable #108615-* 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	BRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	8	ORN	ORG
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	3	YEL	YEL
Power +V	B	RED	D	RED	D	RED	D	RED	12	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	BLACK
Case	—	—	G	GRN	G	GRN	G	GRN	9	—	—
N/C-SLD	F	—	E	—	—	—	E	—	7	—	—
Sig. $\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	6	BRN/WHT	BRN / WHT
Sig. $\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	1	ORN/WHT	ORG /WHT
Sig. $\bar{Z}$	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	YEL / WHT
0 Volt Sense	—	—	—	—	—	—	—	—	2	GRN	—
5 Volt Sense	—	—	—	—	—	—	—	—	11	BLK/WHT	—

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

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

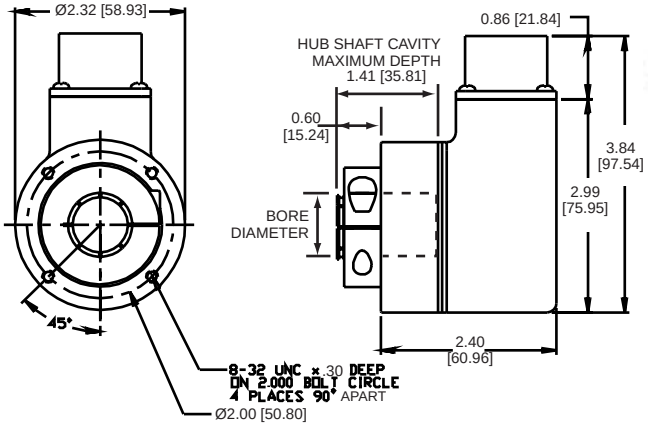
Connector pin numbers and cable assembly wire color information is provided here for reference.

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

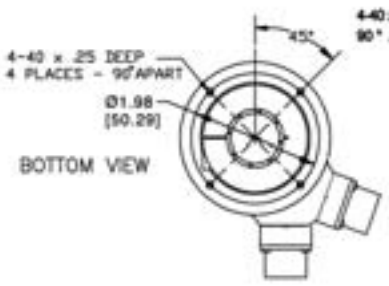
* Index not provided on all models. See ordering information

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

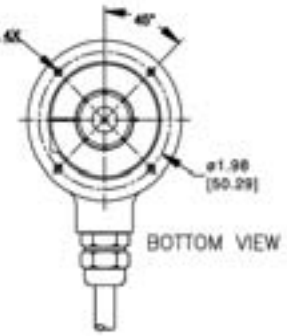
DIMENSIONS inches [mm]



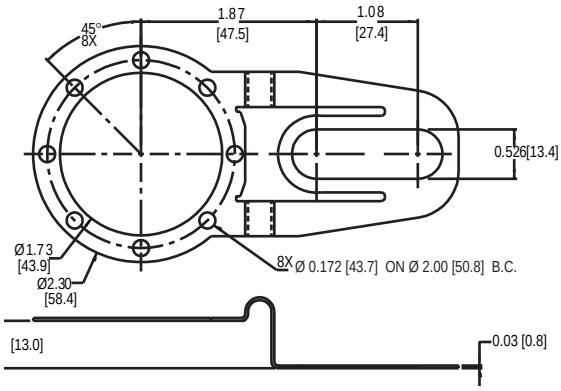
Standard Housing



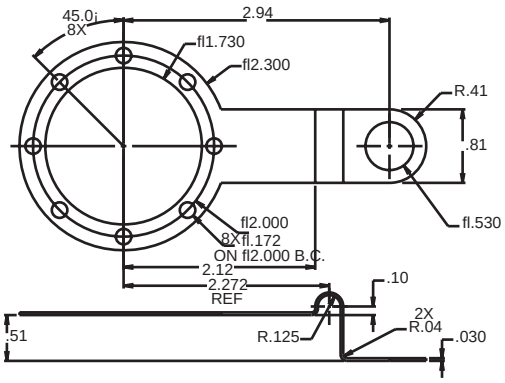
Dual Redundant Outputs



Cable Exit



Slotted Tether



Single Point Tether

by DYNAPAR™

NEW for 2010!

SERIES HSD35

NorthStar™ brand

Heavy Duty Optical Encoder

Key Features

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

CE RoHS

PRELIMINARY SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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 CONNECTIONS

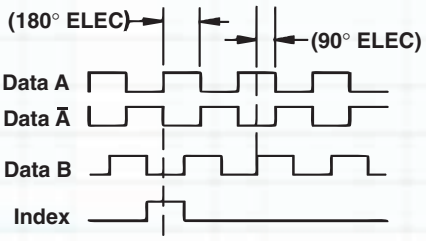
Signal	Connector Pin
Common	1
B	2
A	3
Z *	4
Case (optional)	5
Vcc 5-26 VDC	6
$\overline{B}$	7
$\overline{A}$	8
$\overline{Z}$ *	9
No Connection	10

* Index (Z) optional. See Ordering Information

ELECTRICAL

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

DATA AND INDEX
Not all complements shown
$\overline{A}$ 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: 8.0 in-oz. maximum (at 25°C)
Running torque: 5.0 in-oz. maximum (at ambient)
Bearings: ABEC 3
Housing and cover: Hard Anodized and Powder Coated Aluminum
Disc material: Plastic or metal (unbreakable)
Weight: 1.76lb (28 Oz) Typical

ENVIRONMENTAL

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

Replaces the Magcoder HS35M (shown below)

Contact Customer Service for appropriate replacement model. **+1.800.873.8731**

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

Accessory Kits:

114573-0001 Tether Kit, 4.5" C-face single point with 3/8" bolt

114574-0001 Tether Kit for Standard AC motor fan covers with T-bolt

114575-0001 Tether Kit, 8.5" C-face single point with 1/2" bolt

756-042-01 Rod Tether, AC motor fan cover with T-bolts

756-043-01 Rod Tether Kit, 4.5" C Face with 3/8" bolt

756-044-01 Rod Tether Kit, 8.5" C Face with 1/2" bolt

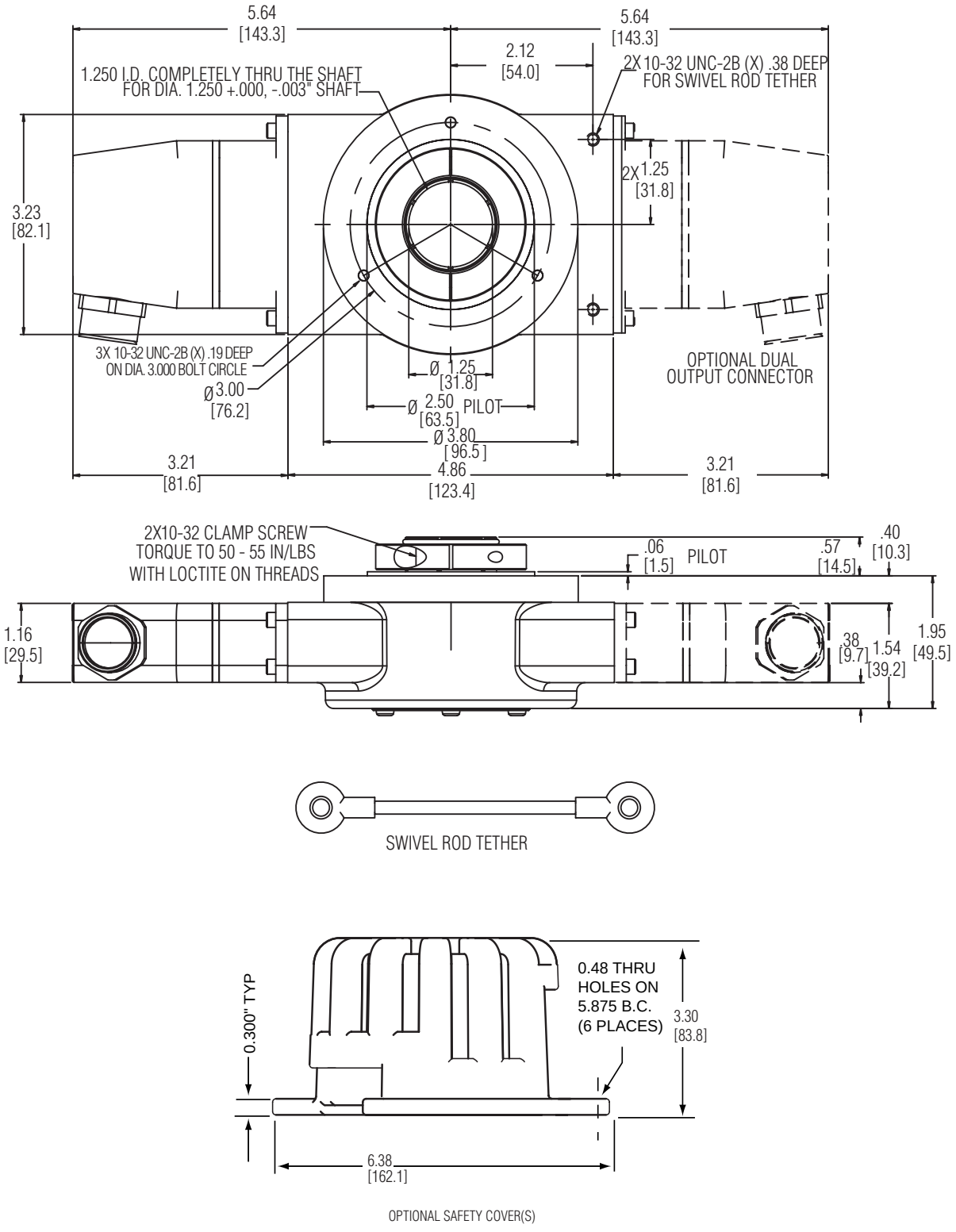
114622-0001 Cover Kit, 56C face (single or dual output)

114623-0001 Cover Kit, Fan cover (single or dual output)

SERIES HSD35

NorthStar™ brand

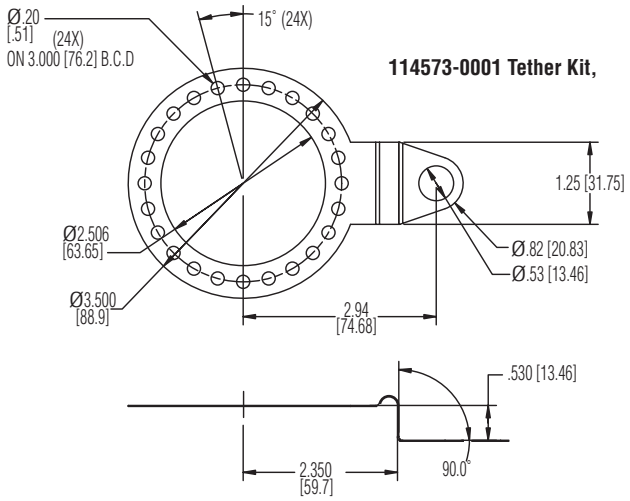
DIMENSIONS inch [mm]



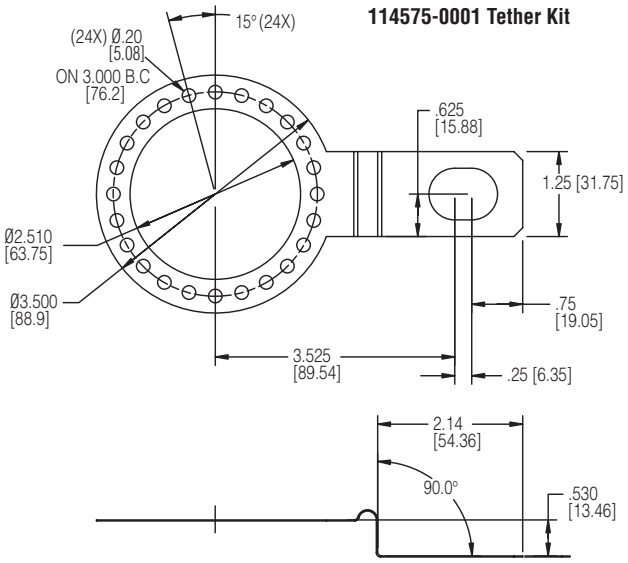
by DYNAPAR™

SERIES HSD35

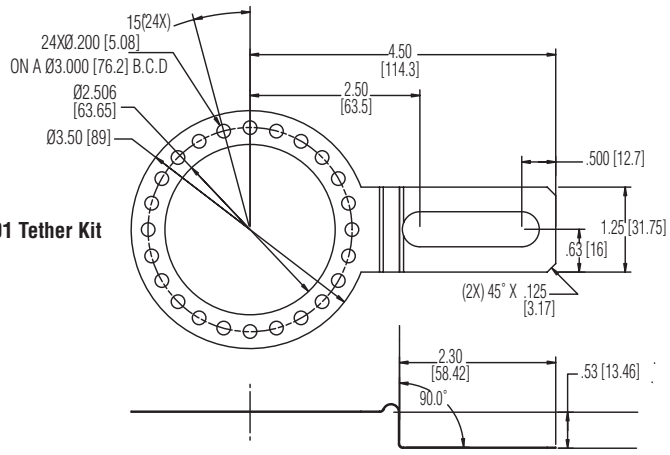
DIMENSIONS inch [mm]



114573-0001 Tether Kit,



114575-0001 Tether Kit



114574-0001 Tether Kit

SERIES HSD37

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

CE RoHS Ex E Ex ia IIB T4

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

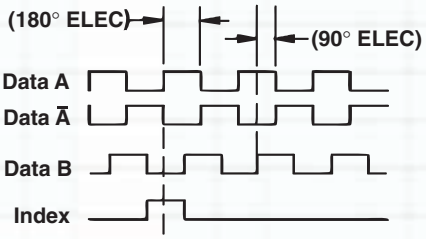
Code: Incremental
Resolution: to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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: 5-26VDC. 50 mA max., not including output loads. ATEX: 5VDC, 7-26VDC
Outputs: ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information

Mating Connector:
6 pin MS, style MS3106A-14S-6S (MCN-N4);
7 pin MS, style MS3106A-16S-1S (MCN-N5);
10 pin MS, style MS3106A-18-1S (MCN-N6);
10 pin Bayonet, MS3116-F12-10S (607545-0001)
10 pin, NEMA 4 style (604505 & 604506)
Cable w/ 5 pin M12 connector, p/n 112859-xxx
Cable w/ 8 pin M12 connector, p/n 112860-xxx

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



A leads B, CCW (From Clamp End)

MECHANICAL

Shaft Material: Stainless Steel (Anodized 6061 aluminum for 1" isolated bore option)
Bore Diameter: 1.00", 0.875, 0.750", 0.625", 0.500", 16mm, 15mm, 12mm. Insulated inserts provided for bores under 1 inch (1" bore not electrically isolated for stainless shaft option)
Bore runout: ±0.0005 TIR at midpoint
Min. Shaft Engagement: 1.60" (Recommended)
Starting torque: 4.5 in-oz. maximum (at 25°C)
Running torque: 4.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Bearing life: 5 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 Stainless Steel.
Disc material: Metal or plastic
Weight: 35 ounces, typical

ENVIRONMENTAL

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

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

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
□SD37	□□□□	□	□	□	□	□□

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
HSD37 Heavy Duty Hollowshaft Encoder **ISD37** ATEX Intrinsically Safe	**0015** **0032** **0050** **0060** **0100** **0200** **0240** **0250** **0500** **0512** **0600** **1000** **1024** **1200** **2000** **2048** **3072** **4000** **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" Non Isolated **P** 25mm Non Isolated **R** 1" Isolated	**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) **Following options are only available when Code 1 is ISD37** **A** Single Ended ABZ, 7-26V in, 7-26V out push-pull (7272) **C** Single Ended ABZ, 5V in, 5V out push-pull (7272) **D** Single Ended ABZ, 7-26V in, 7-26 out push-pull (7272) **E** Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222) **F** Single Ended ABZ, 7-26V in, 7-26V out Open Collector with 1kOhm (2222) *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 **4** 10 pin Bayonet connector **5** 6 pin+mating connector **6** 7 pin+mating connector **7** 10 pin+mating connector **8** 12 CW pin+mating connector **9** 10 pin Bayonet+mating connector **A** .5m (18") cable **C** 1m (36") cable **D** 2m (72") cable **H** 5 pin M12 connector **J** 8 pin M12 connector **K** 1.5 ft (18") cable w/ in line 10pin connector **M** 5 ft (60") cable **N** 10 ft (120") cable **T** Terminal box w/conduit entry	**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

Accessories

114573-0001 Tether Kit, 4.5" C-face single point with 3/8" bolt
114574-0001 Tether Kit for Standard AC motor fan covers with T-bolt
114575-0001 Tether Kit, 8.5" C-face single point with 1/2" bolt

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

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

10 foot Cable Assemblies with MS Connector

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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)

10 pin bayonet, style MS3116-F12-10S (607545-0001)
10 pin, NEMA 4 style (604505 & 604506)

SERIES HSD37

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HSD37 models with direct cable exit carry the color coding as shown in the right hand column.

Encoder Function	Cable # 108594-6 Pin Single Ended		Cable # 108595-7 Pin Single Ended		Cable # 108596-7 Pin Dif Line Driver with Index		Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/Idx		Cable # 114448-* 10 Pin Bayonet		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	A	BRN	BRN
Sig. B	D	ORN	B	ORG	B	ORG	B	ORG	B	ORG	ORN
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	C	YEL	YEL
Power +V	B	RED	D	RED	D	RED	D	RED	D	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	E	—	BLACK
Case	—	—	G	GRN	G	GRN	G	GRN	F	BLK	—
N/C-Shield	F	—	E	—	—	—	E	—	G	GRN	—
Sig.$\bar{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	H	BRN/WHT	BRN / WHT
Sig.$\bar{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	J	ORG/WHT	ORG / WHT
Sig.$\bar{Z}$	—	—	—	—	—	—	J	YEL/WHT	K	YEL/WHT	YEL / WHT

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

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

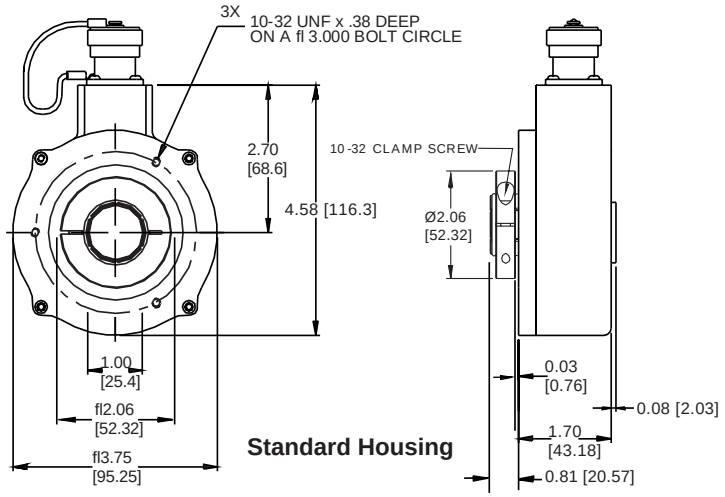
Connector pin numbers and cable assembly wire color information is provided here for reference.

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

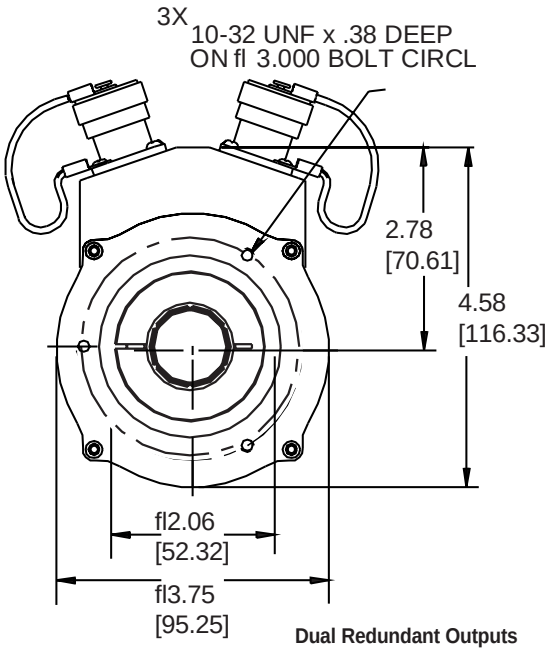
* Index not provided on all models. See ordering information

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

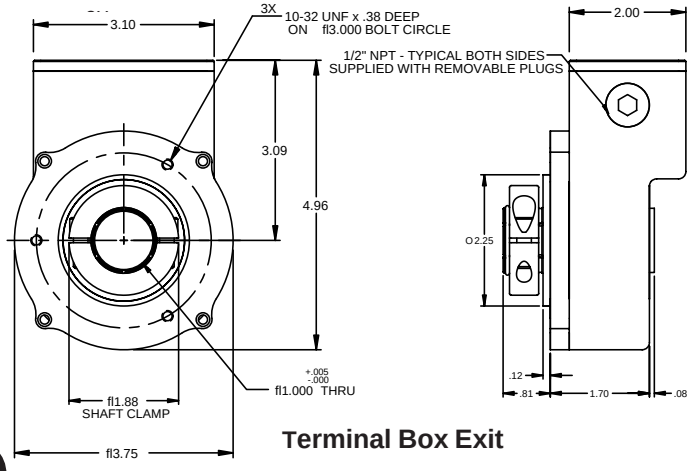
DIMENSIONS (inches [mm])



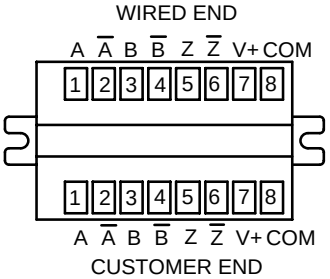
Standard Housing



Dual Redundant Outputs



Terminal Box Exit

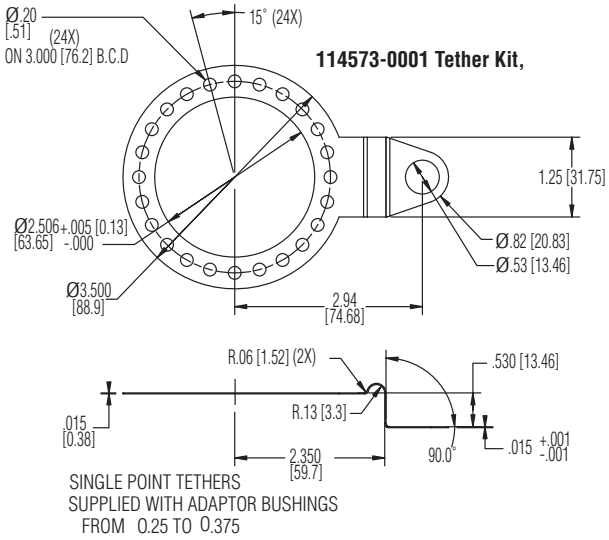


A - GREEN
Ā - VIOLET
B - BLUE
B̄ - BROWN
Z - ORANGE
Z̄ - YELLOW
V+ - RED
COM - BLACK

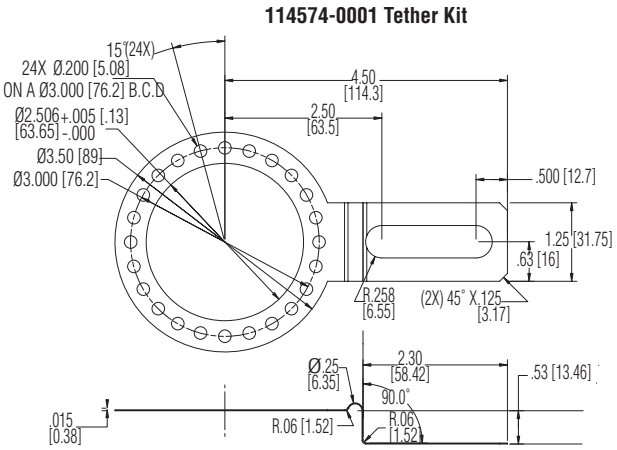
by DYNAPAR™

SERIES HSD37

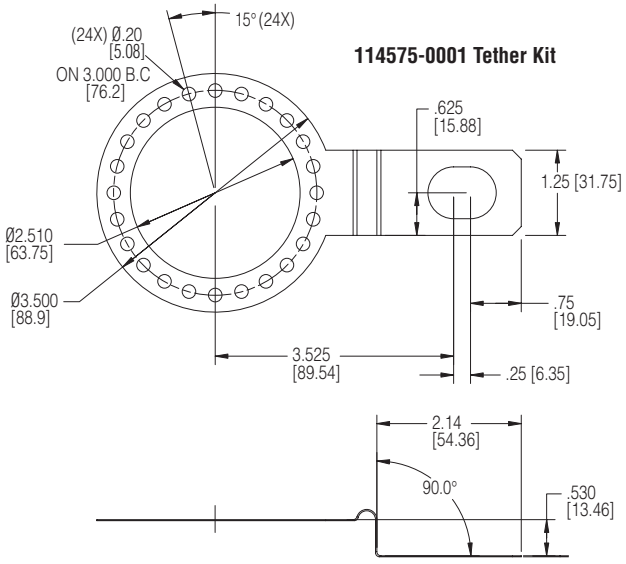
DIMENSIONS (inches [mm])

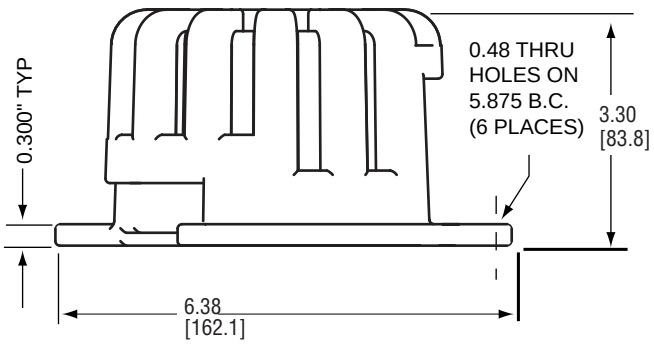


SINGLE POINT TETHERS
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375

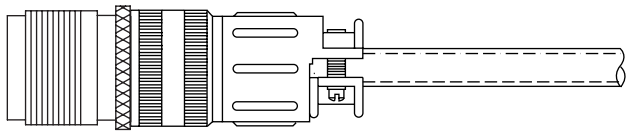


SLOTTED TETHER
SUPPLIED WITH ADAPTOR BUSHINGS
FROM 0.25 TO 0.375





OPTIONAL SAFETY COVER(S)



Pigtail with MS Connector
(Code: 5 = K Option)

SERIES HSD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

CE RoHS

SPECIFICATIONS

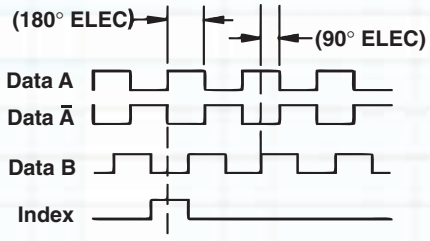
STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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: 5-26VDC. 50 mA max., not including output loads.
Outputs: ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information
Mating Connector:
6 pin MS, style MS3106A-14S-6S (MCN-N4);
7 pin MS, style MS3106A-16S-1S (MCN-N5);
10 pin MS, style MS3106A-18-1S (MCN-N6);
10 pin Bayonet, MS3116-F12-10S (607545-0001)
10 pin, NEMA 4 style (604505 & 604506)
Cable w/ 5 pin M12 connector, p/n 112859-xxx
Cable w/ 8 pin M12 connector, p/n 112860-xxx

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



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

MECHANICAL

Shaft Material: 6061-T6 Aluminum
Bore Diameter: 1.00", 0.875, 0.750", 0.625", 0.500", 16mm, 15mm, 12mm. Insulated inserts provided for bores under 1 inch
Bore Tolerance:
1" bore: 1.0005" -0.0000" / +0.0010"
< 1" bore: Nominal -0.000" / +0.002"
Mating Shaft 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 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 (unbreakable)
Weight: 26 ounces, typical

ENVIRONMENTAL

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

Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated 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	**0015** **0032** **0050** **0060** **0100** **0200** **0240** **0250** **0500** **0512** **0600** **1000** **1024** **1200** **2000** **2048** **3072** **4000** **4096** **5000**	**6** 12mm **9** 15 mm **7** 1/2" **8** 5/8" **A** 16mm **C** 3/4" **D** 20mm **E** 7/8" **T** 5/8" Stainless Steel Collar not electrically isolated: **G** 1" **H** 1" Stainless Steel Collar	**0** single ended, 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, 4, 6, 7, 8, A, G, J or K: **3** differential, bidirectional ($A\bar{A}$ $B\bar{B}$) available when Code 5 is 3 or 4 and Code 6 is 2, 4, 8, 7, A, G, J or K **4** differential, bidirectional with index ($A\bar{A}$ $B\bar{B}$ $Z\bar{Z}$)	**0** 5-26V in, 5-26V Open Collector out (7273) **2** 5-26V in, 5-26V Push-Pull out available when: Code 4 is 3 or 4 **3** 5-26V in, 5-26V Differential Line Driver out (7272) **4** 5-26V in, 5V Differential Line Driver out (7272)	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **4** 10 pin Bayonet connector **5** 6 pin connector, plus mating connector **6** 7 pin connector, plus mating connector **7** 10 pin connector, plus mating connector **8** 10 pin Bayonet connector plus mating connector **A** 18" (.5m) cable **B** 36" (1m) cable **C** 72" (2m) cable **D** 144" (4m) cable **G** 13" (.3m) cable **J** 8 pin M12 connector **K** 18" (.5m) cable with 10 pin in-line connector available when: Code 5 is 0 or 2 **H** 5 pin M12 connector	**0** No Option **1** Internally Isolated 1" bore **2** Reverse Phasing (A leads B, CW)	**0** Cast Aluminum Housing, Slotted Tether Included **6** Cast Aluminum Housing, No Tether **C** Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" C-face) **D** Same as "0" with Cover Kit **E** Same as "C" with Cover Kit **K** Cast Aluminum Housing, Single-Point Tether Included (NEMA 8-1/2" C-face) **N** Same as "K" with Cover Kit

Accessory Kits:

114619-0001 Tether Kit, 4.5" C-face single point with 3/8" bolt
114620-0001 Tether Kit, Slotted with t-bolts for standard AC motor fan covers
114621-0001 Tether Kit, 8.5" C-face single point with 1/2" bolt
114591-0001 Cover Kit, 56C face
114592-0001 Cover Kit, fan cover
114593-0001 Dual Cover Kit, 56C face
114594-0001 Dual Cover Kit, fan cover

10 foot Cable Assemblies with MS Connector

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

10 foot Cable Assemblies with M23 Connector

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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin bayonet, style MS3116-F12-10S (607545-0001)
10 pin, NEMA 4 style (604505 & 604506)

SERIES HSD38

NorthStar™ brand

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HSD37 models with direct cable exit carry the color coding as shown in the right hand column.

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

5 & 8 Pin M12 Accessory Cables when Code 6= H or J

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

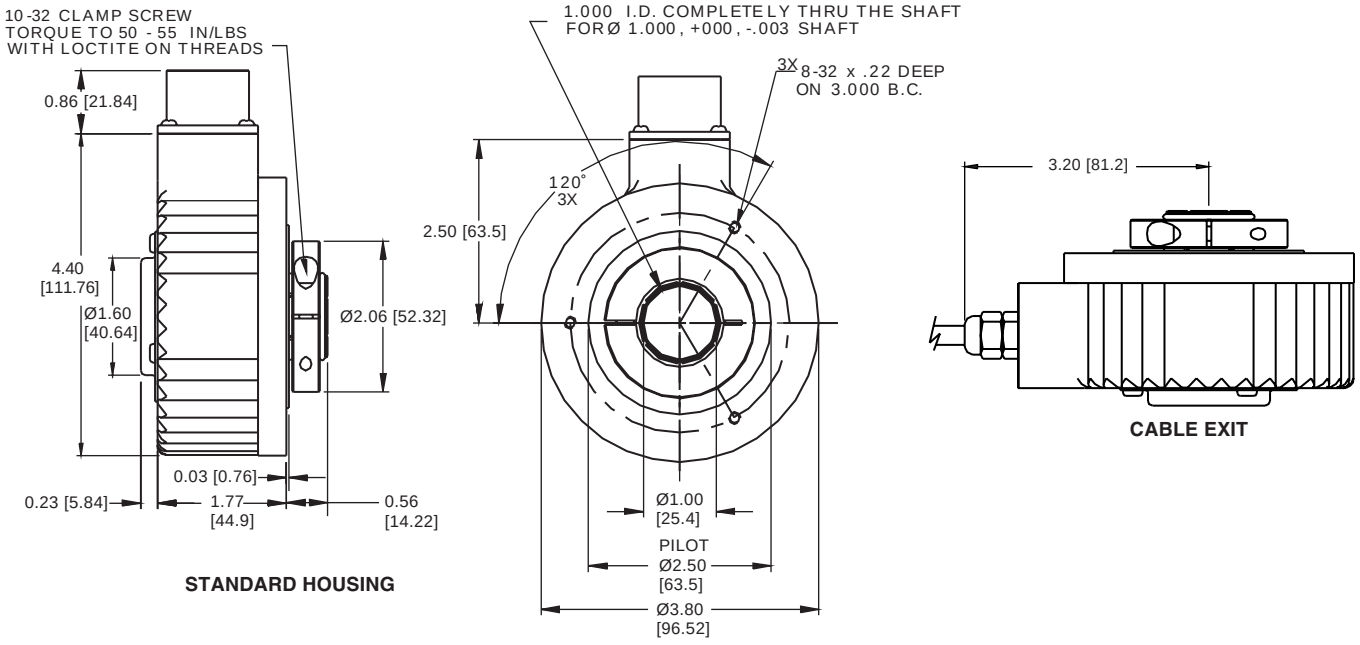
Encoder Function	Cable # 112859- 5 Pin Single Ended		Cable # 112860- 8 Pin Single Ended		Cable # 112860- 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	BLK	1	BRN	1	BRN
Sig. B	2	WHT	4	ORG	4	ORG
*Sig. Z	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig.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

* Index not provided on all models. See ordering information

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

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

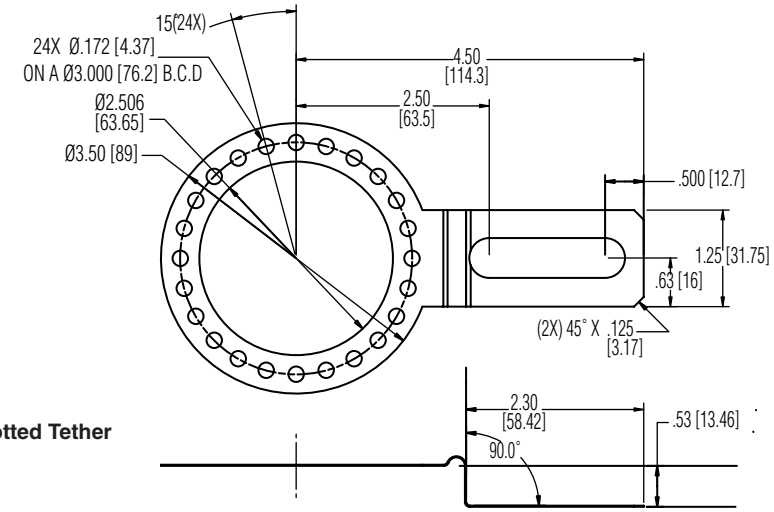
DIMENSIONS inch [mm]



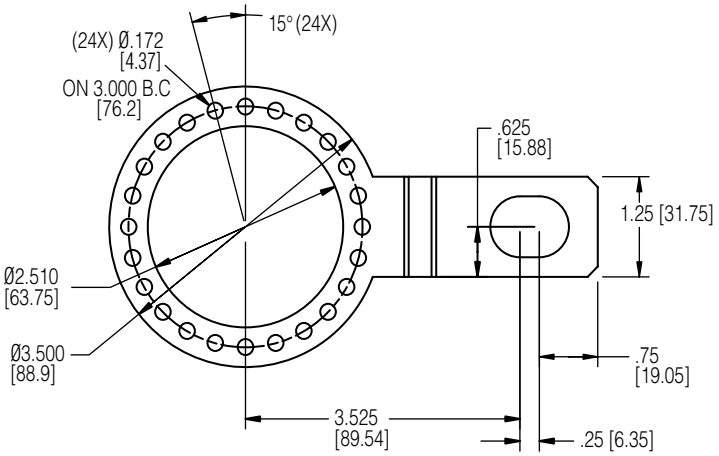
by DYNAPAR™

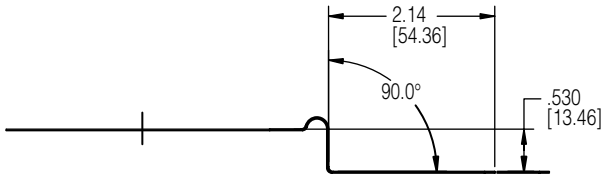
SERIES HSD38

DIMENSIONS inch [mm]

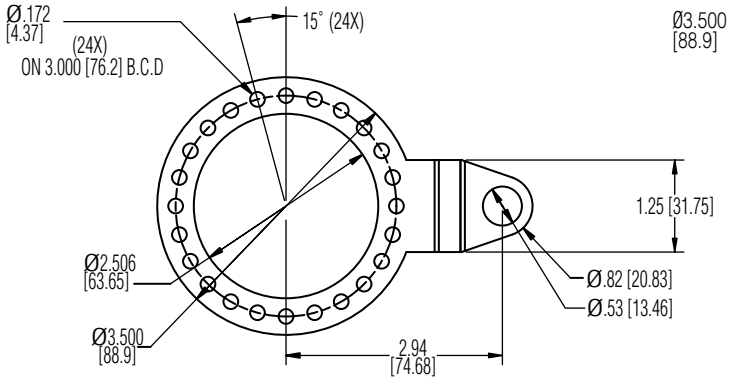


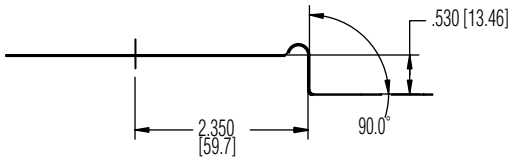
Slotted Tether



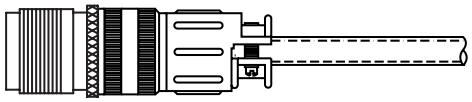


Single Point Tether for 8-1/2" C-Face





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



Pigtail with MS Connector
(Code: 5 = K Option)

SERIES DWD38

NorthStar™ brand

Harsh Duty Optical Encoder

Key Features

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

CE RoHS Ex

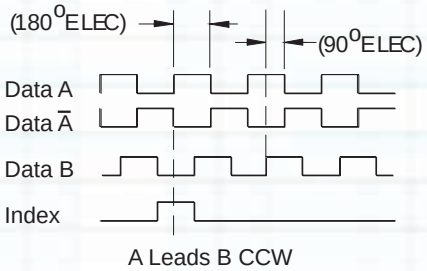
E Ex ia IIB T4

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 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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.
$\overline{A}$ shown for reference



A Leads B CCW

ELECTRICAL CONNECTIONS

6, 7 & 10 Pin MS Connectors and Cables

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

Encoder Function	Cable #108594- 6 Pin Single Ended		Cable # 108595- 7 Pin Single Ended		Cable #108596- 7 Pin Dif Line Drv w/o Idx		Cable # 1400635- or 109209- (NEMA4) 10 Pin Dif Line Drv w/Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN	BRN
Sig. B	D	ORG	B	ORG	B	ORG	B	ORG	ORG
Sig. Z	C	YEL	C	YEL	—	—	C	YEL	YEL
Power +V	B	RED	D	RED	D	RED	D	RED	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK	BLK
Case	—	—	G	GRN	G	GRN	G	GRN	—
N/C	F	—	E	—	—	—	E	—	—
$\overline{\text{Sig. A}}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT	BRN/WHT
$\overline{\text{Sig. B}}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT	ORG/WHT
$\overline{\text{Sig. Z}}$	—	—	—	—	—	—	J	YEL/WHT	YEL/WHT

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

ELECTRICAL

Input Power: 5-26VDC; 50 mA max., not including output loads. ATEX: 5VDC, 5-26VDC
Outputs: 2N2222, ET7272, ET7273
Frequency Response: 125 kHz (data & index)
Termination: 6, 7, or 10 pin MS Connector; 18" cable exit w/seal
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6);
10 pin, NEMA 4 style (604505 & 604506)

MECHANICAL

Shaft Sizes:
1"-14 UNS x 5/8" - 18 UNF Threaded Shaft;
1"-14 UNS Threaded Shaft;
1"-14 UNS x 5/8" - 18 UNF Field Replaceable Threaded Shaft
Shaft Material: 300 series stainless steel
Bore loading: Up to 20 lbs axial and radial
Bore runout: 0.0005 TIR at midpoint
Starting/Running torque: 4.5/4.0 in-oz. maximum (at 25°C)
Bearings: 61806-ZZ
Bearing life: 5 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: Metal or plastic
Weight: 35 ounces, typical

ENVIRONMENTAL

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

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
□□□38	□□□□	□	□	□	□

Ordering Information

Code 1: Model

DWD38
Draw Works Encoder

ISW38
ATEX Intrinsically Safe

Code 2: PPR

0015
0032
0050
0060
0100
0200
0240
0250
0500
0512
0600
1000
1024
1200
2000
2048
4000
4096
5000

Code 3: Shaft

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

Code 4: Output Format

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)

Following options are only available when Code 1 is ISW38

A Single Ended ABZ, 7-26V in, 7-26V out push-pull (7272)
C Single Ended ABZ, 5V in, 5V out push-pull (7272)
D Single Ended ABZ, 7-26V in, 5V out push-pull (7272)
E Single Ended ABZ, 7-26V in, 7-26V out Open Collector (7273)
F Single Ended ABZ, 7-26V in, 7-26V out Open Collector (2222)
G Single Ended ABZ, 7-26V in, 7-26V out Open Collector w/ 1kOhm (2222)

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)
N Namur output, 15mA max

† NOTE: Simultaneous use of redundant outputs may void ATEX certification. Consult factory for details.

Code 5: Termination

0 6 pin connector
1 7 pin connector
2 10 pin connector
5 6 pin+mating connector
6 7 pin+mating connector
7 10 pin+mating connector
8 12 CW pin+mating connector
A .5m (18") cable
C 1m (36") cable
D 2m (72") cable
H 5 pin M12 connector
J 8 pin M12 connector
K 1.5 ft (18") cable w/ in line 10pin connector
M 5 ft (60") cable
N 10 ft (120") cable

Code 6: Options

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:

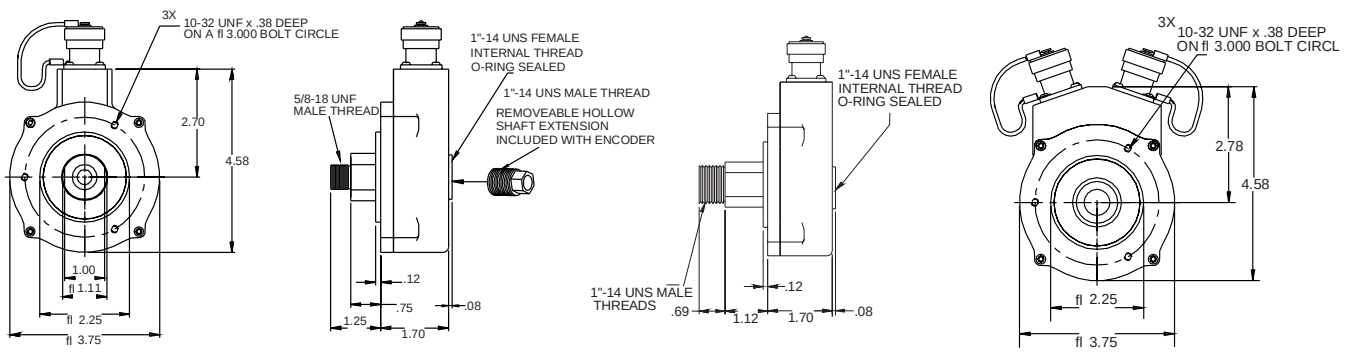
10 foot Cable Assemblies with MS Connector

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

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin, NEMA 4 style (604505 & 604506)

DIMENSIONS inches [mm]



With Convertable Shaft | **With Non-Convertable Shaft** | **Redundant Version**

SERIES HSD44

NorthStar™ brand

Extreme Heavy Duty Encoder

Key Features

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

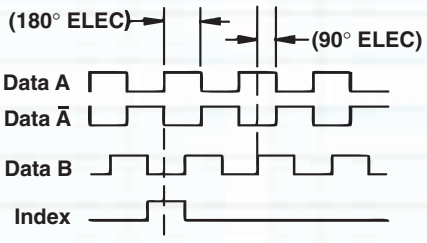
CE RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1024 PPR (pulses/revolution), Others at special order
Format: Two channel quadrature (AB) with Index (Z), and complementary outputs
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: 90° ± 15° electrical
Symmetry: 180° ± 18° electrical
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf
Electrical Immunity: 50 Meg ohm minimum encoder shaft/frame to all connector pins

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



A leads B, CCW (From Clamp End)

ELECTRICAL

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

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

MECHANICAL

Mechanical Interface: Electrically isolated stainless steel shaft flex coupling
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Coupling: 16mm or 5/8", flexible
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Bearing life: 5 x 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: Stainless steel
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: 98%, non-condensing
Enclosure Rating: NEMA 6

by DYNAPAR™

SERIES HSD44

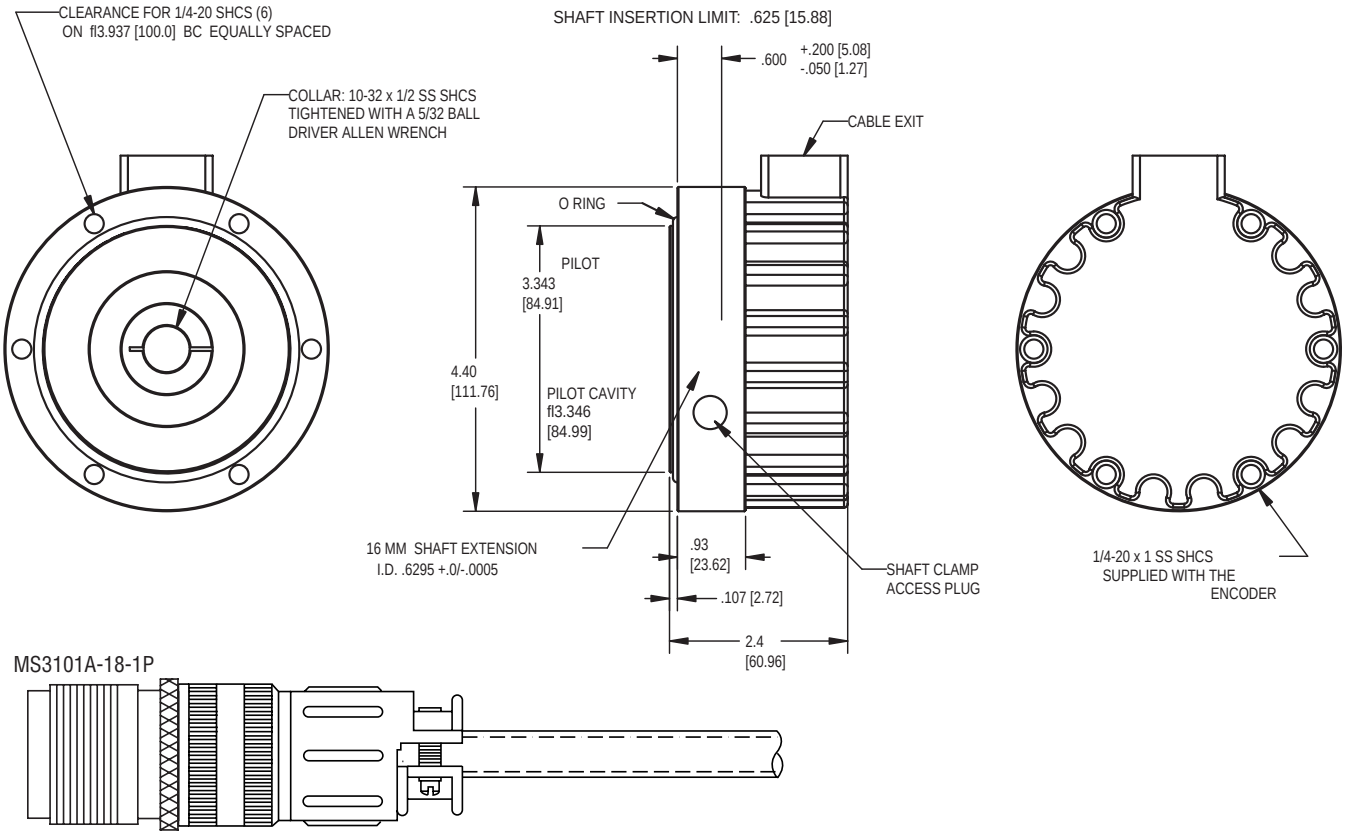
Ordering Information

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

Accessories

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

DIMENSIONS (in. [mm])



Pigtail with MS Connector (K Option)

SERIES EN42

NorthStar™ brand

Zone 1 Heavy Duty Encoder

Key Features

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

RoHS CE Ex ia mb e IIC T4 Gb

SPECIFICATIONS

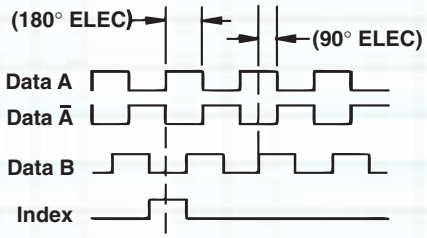
STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

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



A leads B, CCW (From Clamp End)

ELECTRICAL CONNECTIONS

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

MECHANICAL

Shaft Material: Stainless steel or anodized aluminum (See ordering information)
Bore Diameter: 1.00", 0.875, 0.750", 0.625", 16mm, 15mm. Insulated inserts provided for bores under 1 inch
Mating Shaft length: 2.0", Minimum; 2.5", Recommended
Shaft Speed: 3600RPM Maximum continuous; 6000RPM Peak
Starting torque: 8.0 in-oz. maximum (at 25°C)
Running Torque: 5.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Bearing Life: 5 x 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
Weight: 6.5 lb, typical

ENVIRONMENTAL

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

by DYNAPAR™

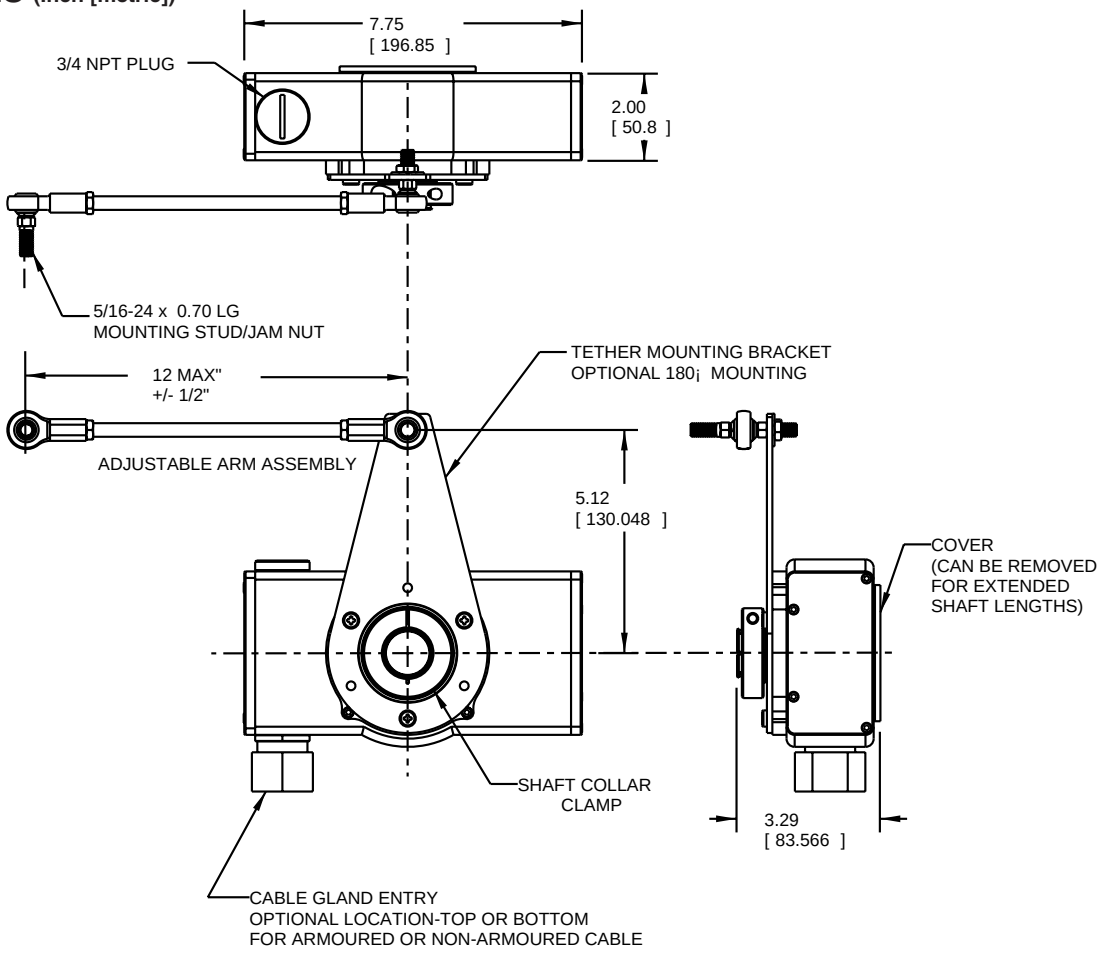
SERIES EN42

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

DIMENSIONS (Inch [metric])



SERIES EN44

NorthStar™ brand

Extreme Heavy Duty Encoder

Key Features

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

RoHS CE Ex

Ex ia mb e IIC T4 Gb

SPECIFICATIONS

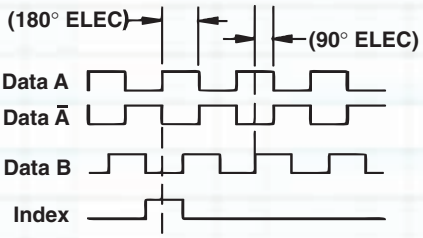
STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

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



A leads B, CCW (From Clamp End)

ELECTRICAL CONNECTIONS

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

MECHANICAL

Mechanical Interface: Stainless steel shaft clamp
Mating Shaft Length: 0.47" to 0.625" (11.9mm to 15.9mm)
Coupling: 16mm or 5/8", flexible
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Bearing life: 5 x 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: Stainless steel
Weight: 6 lb. 6 oz, typical

ENVIRONMENTAL

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

* Specifications are for base models with standard features only unless otherwise noted. Specifications subject to change without notice in accordance with our DBS policy of continuous improvement. All product and brand names are trademarks of their respective owners. All rights reserved.

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by DYNAPAR™

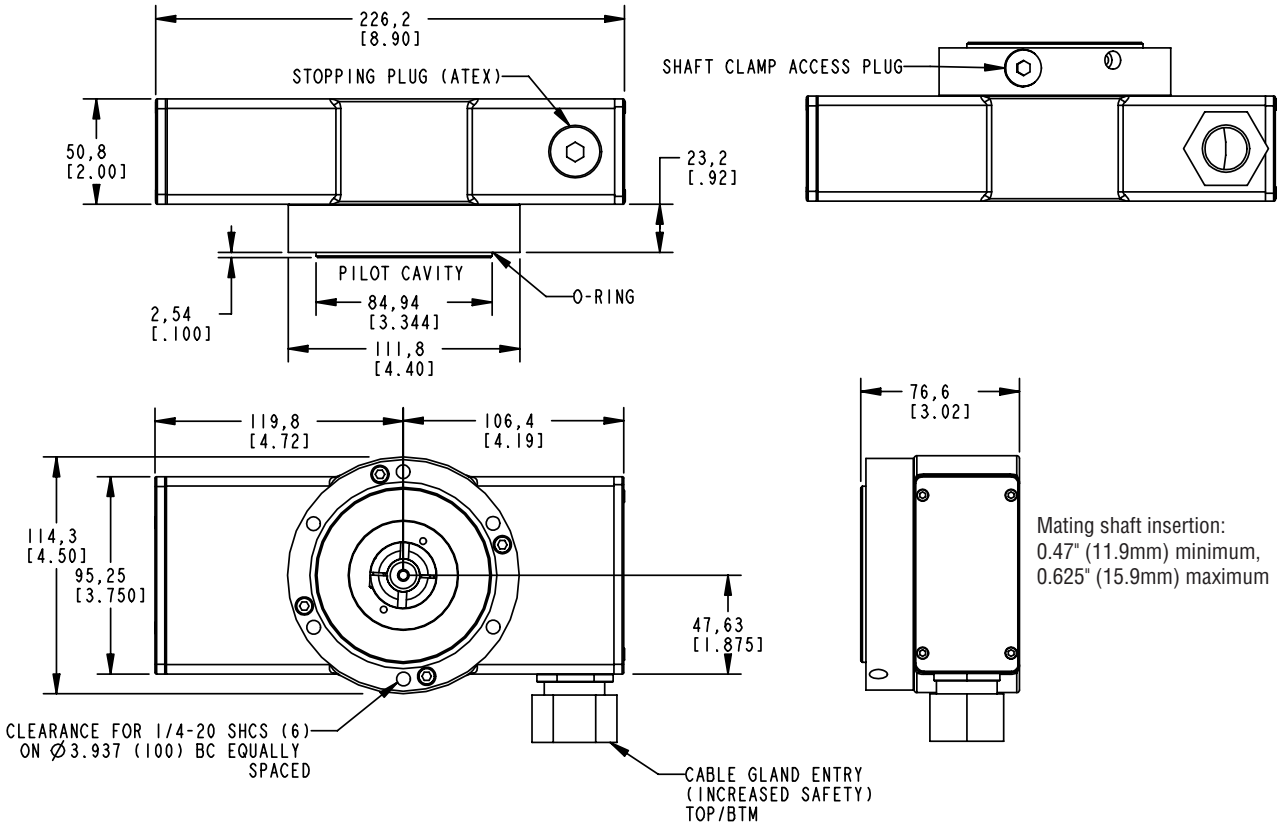
SERIES EN44

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

DIMENSIONS (Inch [metric])



Mating shaft insertion:
0.47" (11.9mm) minimum,
0.625" (15.9mm) maximum

SERIES H56

Dynapar™ brand

Heavy Duty Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 2500 PPR (pulses/revolution)
Accuracy: (Worst case any edge to any other edge) ±7.5 arc-min.
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CW shaft rotation as viewed from the C-face of the encoder
Quadrature Phasing: 90° ± 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: (each output)
4.5 min. to 26 VDC max. at 100 mA max., not including output loads
Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA, sink or source
Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
10 pin, style MS3106A-18-1S (MCN-N6)
Pluggable Screw-Terminal (110532-0001)

ELECTRICAL CONNECTIONS

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

Function (If	Cable #14002090010* 6 Pin Single Ended		Twisted Pairs Cable #14004190010* 10 Pin Differential		Pluggable Screw Terminal Pin Number
	Pin	Wire Color	Pin	Wire Color	
Sig. A	B	RED	B	RED	3
Sig. $\overline{A}$	—	—	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

MECHANICAL

Bearing Life: see table, below
Shaft Loading: 100 lbs. radial, 50 lbs. axial
Shaft Speed: 3600 RPM max.
Starting Torque: 15 oz-in max.;
Moment of Inertia: 7.9 x 10^{-4} oz–in–sec^2
Weight: 144 oz. (9 lbs.)

ENVIRONMENTAL

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

Bearing Life versus Load

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

by DYNAPAR™

SERIES H56

Ordering Information

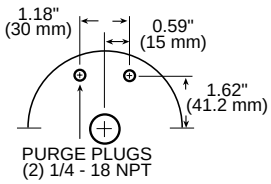
To order, complete the model number with code numbers from the table below:

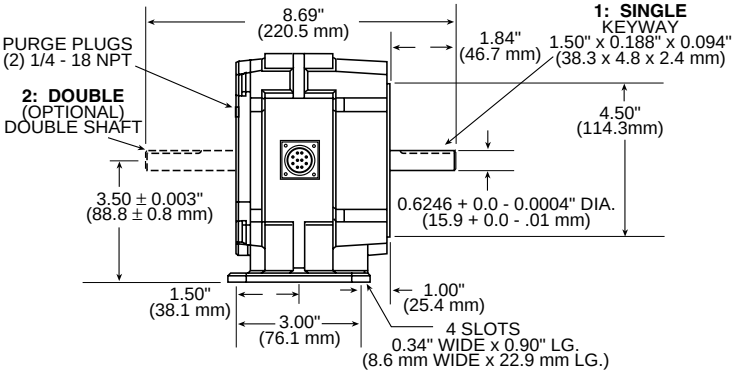
Code 1: Model	Code 2: PPR	Code 3: Shaft	Code 4: Format	Code 5: Electrical	Code 6: Termination	Code 7: Options
H56	□□□□	□	□	□	□	□□
Ordering Information						
H56 Mill Duty, 56C-Face or Foot Mount Rotopulser®	**0001** **0300** **0002** **0360** **0003** **0400** **0005** **0500** **0006** **0512** **0010** **0600** **0012** **0625** **0025** **0720** **0050** **0900** **0060** **1000** **0064** **1024** **0100** **1200** **0120** **1270** **0128** **1500** **0180** **1800** **0200** **2000** **0240** **2048** **0250** **2400** **2500**	**1** Single **2** Double	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

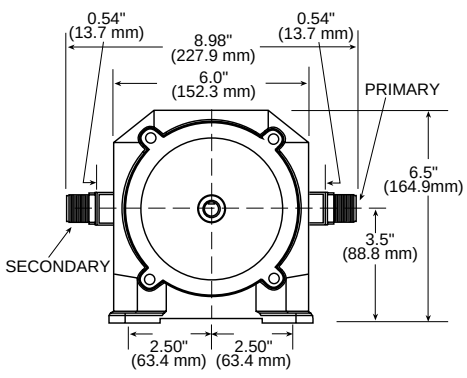
Purge Plug Location





Code 6: Termination

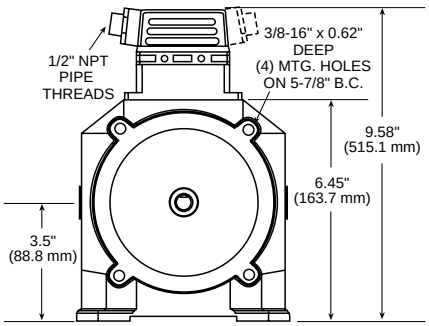
0,1: MS Connectors
Shown with LED Output Indicator Option
Code 9: PS



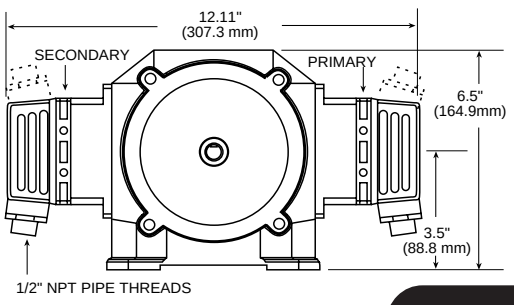
2,3: Pluggable Screw Terminals

Code 4: Format

2,3: Single



4,6: Dual, Isolated



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**

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

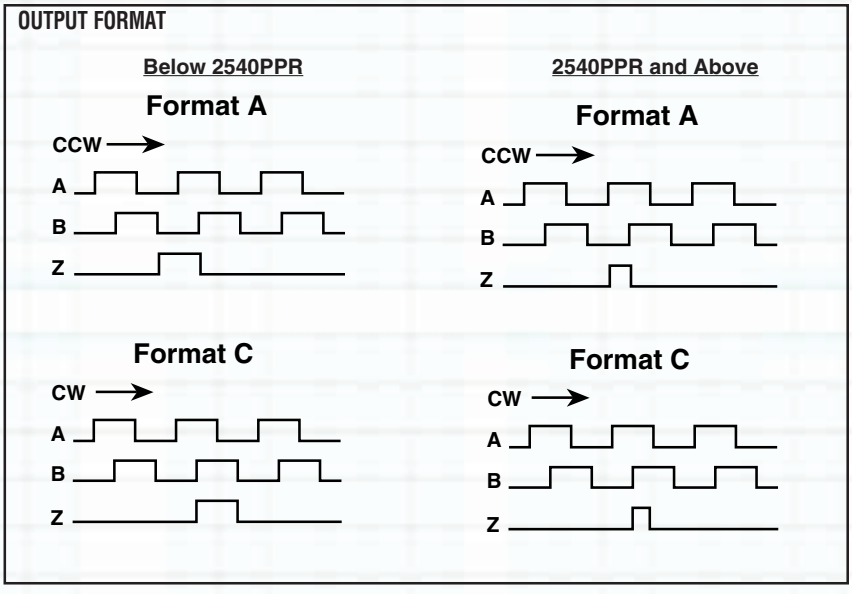
MECHANICAL

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

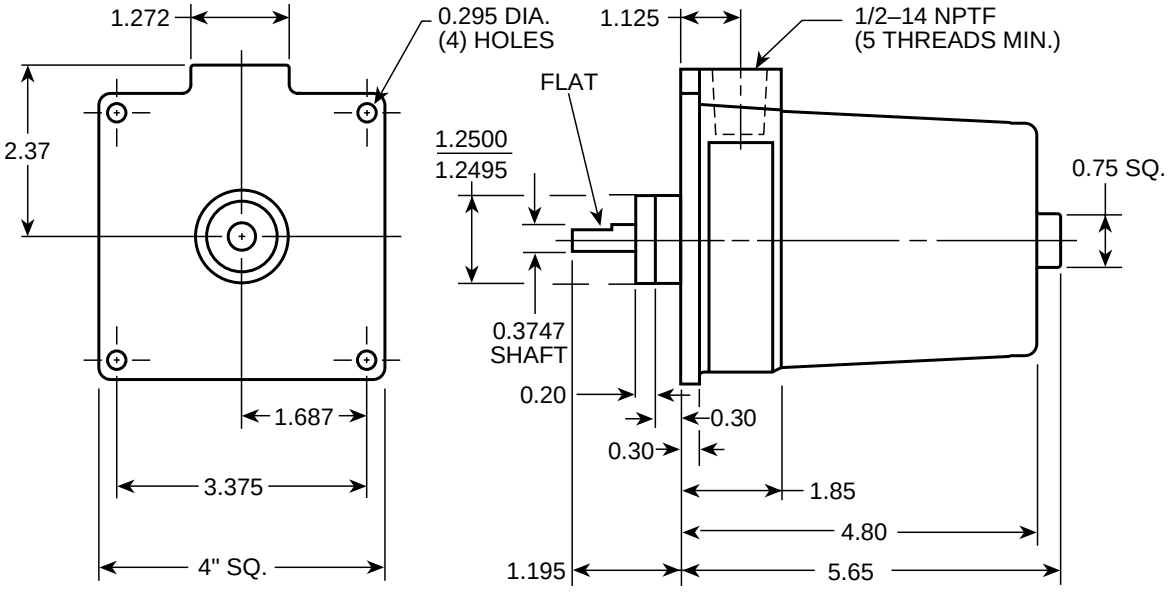
Ordering Information

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

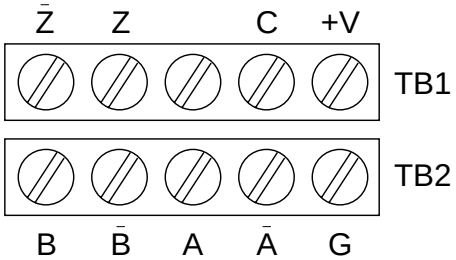
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mechanical	Code 4: Output	Code 5: Electrical
X25	□□□□	□	□	□
X25 Explosion Proof, Shielded Bearings with Shaft Seal	**0001** **0005** **0010** **0012** **0025** **0050** **0060** **0086** **0100** **0120** **0180** **0200** **0240** **0250** **0254** **0256** **0300** **0360** **0400** **0500** **0512** **0600** **0635** **0720** **0768** **0800** **0900** **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 60

Dynapar™ brand

Heavy Duty Rotopulser©

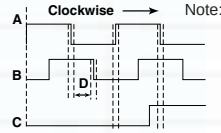
Key Features

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

SPECIFICATIONS

ELECTRICAL

Power Requirements: 5 to 15 VDC max. 115 mA max. plus load requirements
Frequency Response: 50 kHz
Minimum Free Path: Between any A and B transition, will not be less than 12.5% of one full electrical cycle. This includes effects of jitter, phase and symmetry shifts.



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°. Distance D equals the minimum clear path.

Differential Output: 7272, 40 mA sink/source; connections
Mating Connector: Style MS3106A-18-1S; Dynapar Part No. MCN-N6
Single-Ended Output: 7272, 40 mA sink/source; Mating Connector: Style MS3106A-14S-6S; Dynapar Part No. MCN-N4

ELECTRICAL CONNECTIONS

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

Differential Line Driver (10-pin)		
Function (If Used)	MS Pin No.	#14004190010* Cable Accessory Color Code
Signal A	B	RED
Signal $\overline{A}$	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

Weight: 26 oz.
Speed Range: Up to 3600 RPM
Shaft Loading: Radial: 15 lbs. overhung; Axial: 5 lbs.
Inertia: 170 gm-cm^2
Starting Torque: 0.45 oz-in (0.30 oz-in for 1/4 in. dia. shaft)
Running Torque: 0.35 oz-in (0.15 oz-in for 1/4 in. dia. shaft)
Shaft Diameters: 1/4", 1/2" (-0.0003"/-0.0007")

ENVIRONMENTAL

Enclosure Rating: NEMA 12 / IP54;
Temperature Range: 0-54°C

by DYNAPAR™

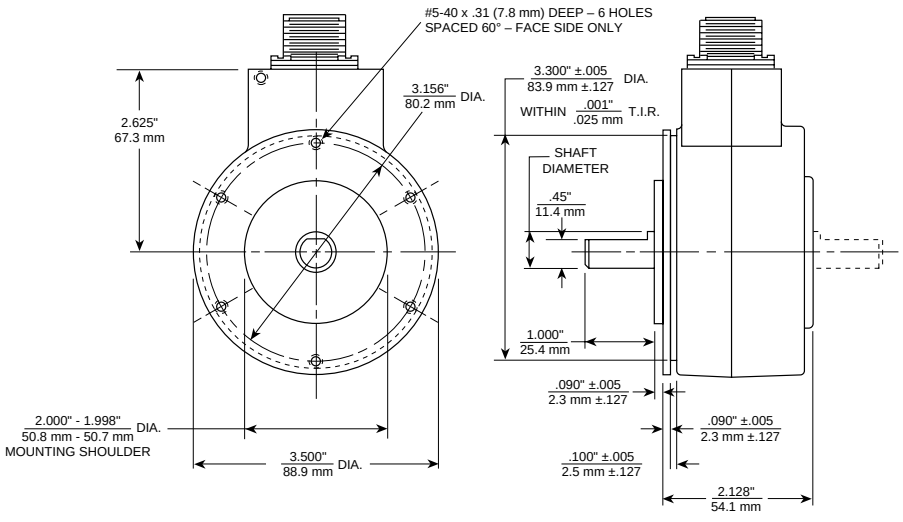
SERIES 60

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

DIMENSIONS inches [mm]



Hand-Held Speed Monitor

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

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

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

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

SERIES 60P

Dynapar™ brand

Heavy Duty Rotopulser©

Key Features

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

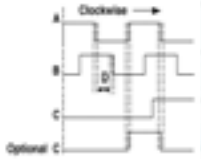
SPECIFICATIONS

ELECTRICAL

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

ELECTRICAL OUTPUT

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



ELECTRICAL CONNECTIONS

Single-Ended Output

Function (If Used)	Cable #14002090010* 6 PIN Single-Ended		TwistedPairs 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

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

ENVIRONMENTAL

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

by DYNAPAR™

SERIES 60P

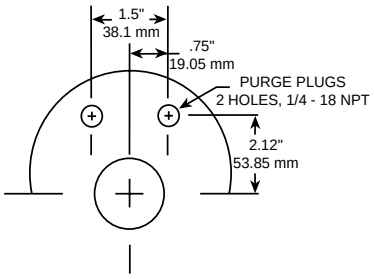
Ordering Information

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

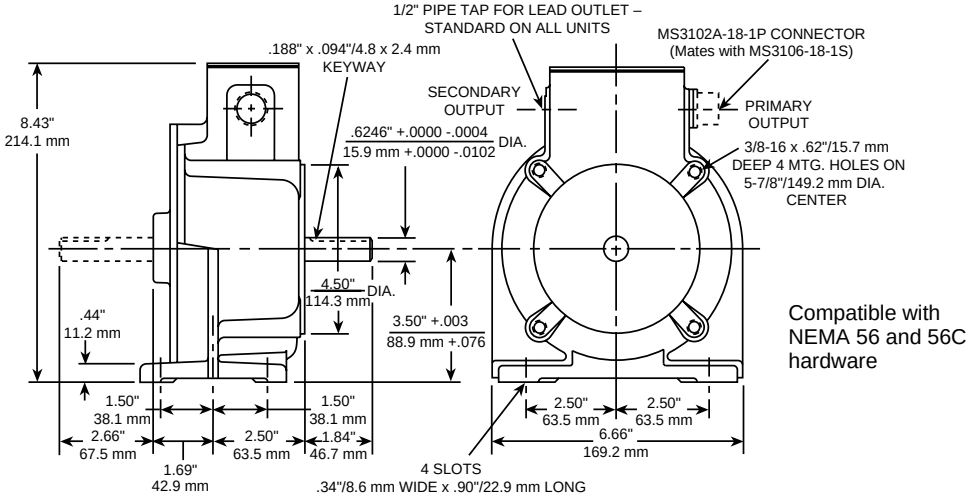
Code 1: Model	Code 2: Housing	Code 3: Shaft	Code 4: Output	Code 5: Voltage	Code 6: Pulses/Rev	Code 7: Wiring	Code 8: Misc
6 ☐	**P**	☐	☐	**F**	☐☐☐☐	☐	☐
2 Bidirectional, Heavy Duty **3** Bidirectional with Marker, Heavy Duty	**P** Mill Duty	**M** 5/8" Dia, Single Shaft with Keyway **N** 5/8" Dia, Double Shaft with Keyway	**D** Differential **E** Single Ended **K** Single Ended, Dual Isolated, 6 and 7 pin connectors **L** Differential, Dual Isolated, 10 and 7 Pin Connectors Available when Code 1 is 62: **M** Differential, Dual Isolated, 10 and 10 Pin Connectors	**F** 5 to 15 VDC	**0001 0096 0360 0750** **0002 0100 0375 0800** **0004 0120 0382 0805** **0005 0125 0384 0833** **0006 0127 0390 0900** **0010 0128 0400 1000** **0012 0150 0402 1024** **0015 0180 0430 1200** **0018 0192 0450 1250** **0020 0200 0500 1270** **0025 0203 0508 1500** **0040 0240 0512 1800** **0045 0250 0530 2000** **0050 0256 0550 2160** **0060 0300 0600 2250** **0064 0306 0625 2400** **0090 0315 0720 2500**	**A** MS Connector Available when Code 4 is D or E: **T** Terminal Strip	**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 R45

Dynapar™ brand

Bearingless Ring Kit

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 60 PPR (pulses/revolution), optional 120 PPR with X2 output
Format: Single channel unidirectional (A), or two channel quadrature (AB) outputs
Quadrature Phasing: 90° ± 45° electrical
Symmetry: 180° ± 36° electrical

ELECTRICAL

Input Power: (not including output loads)
Single ended 4.5 min. to 16.5 VDC max. at 50 mA max.;
Open collector and differential line driver: 4.5 min. to 26 VDC max. at 75 mA max.
Outputs:
Single ended with 2 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.
Electrical Protection: Overvoltage and reverse voltage to 30 VDC; output short circuit protected to Common or other outputs, to +V (differential line driver only)
Noise Immunity: Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
Terminations:
Wire leads: 7" long min., 18 AWG;
Screw terminals: accept 22 to 14 AWG solid or stranded wires

ELECTRICAL CONNECTIONS

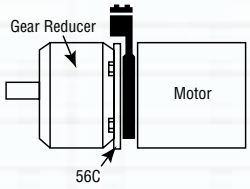
Function (If Used)	Wire Color	Terminal
Signal X2	ORG	1
Signal B	BRN	2
Signal A	YEL	3
+V in	RED	4
Common	BLK	5
Signal $\overline{A}$	WHT	6
Signal $\overline{B}$	GRN	7
Signal $\overline{X2}$	BLU	8

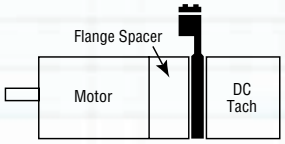
MECHANICAL

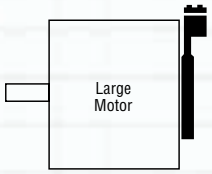
Motor frame sizes: 56C, 143TC, 145TC, 182C and 184C
Motor shaft/hub sizes: 5/8", 7/8" nominal
Housing: Cast Aluminum, chromate finish
Gear: 1010 Steel
Moment of Inertia: 0.0035 in-lb-sec^2
Shaft Speed: 5,000 RPM max.
Readhead to gear gap: 0.020" nominal, 0.030 max.
Allowable Endplay: ±0.060

ENVIRONMENTAL

Operating Temperature: –40 to +85 °C
Storage Temperature: –40 to +90 °C
Shock: 20 G's for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 2.5 G's
Humidity: to 98% without condensation







by DYNAPAR™

SERIES R45

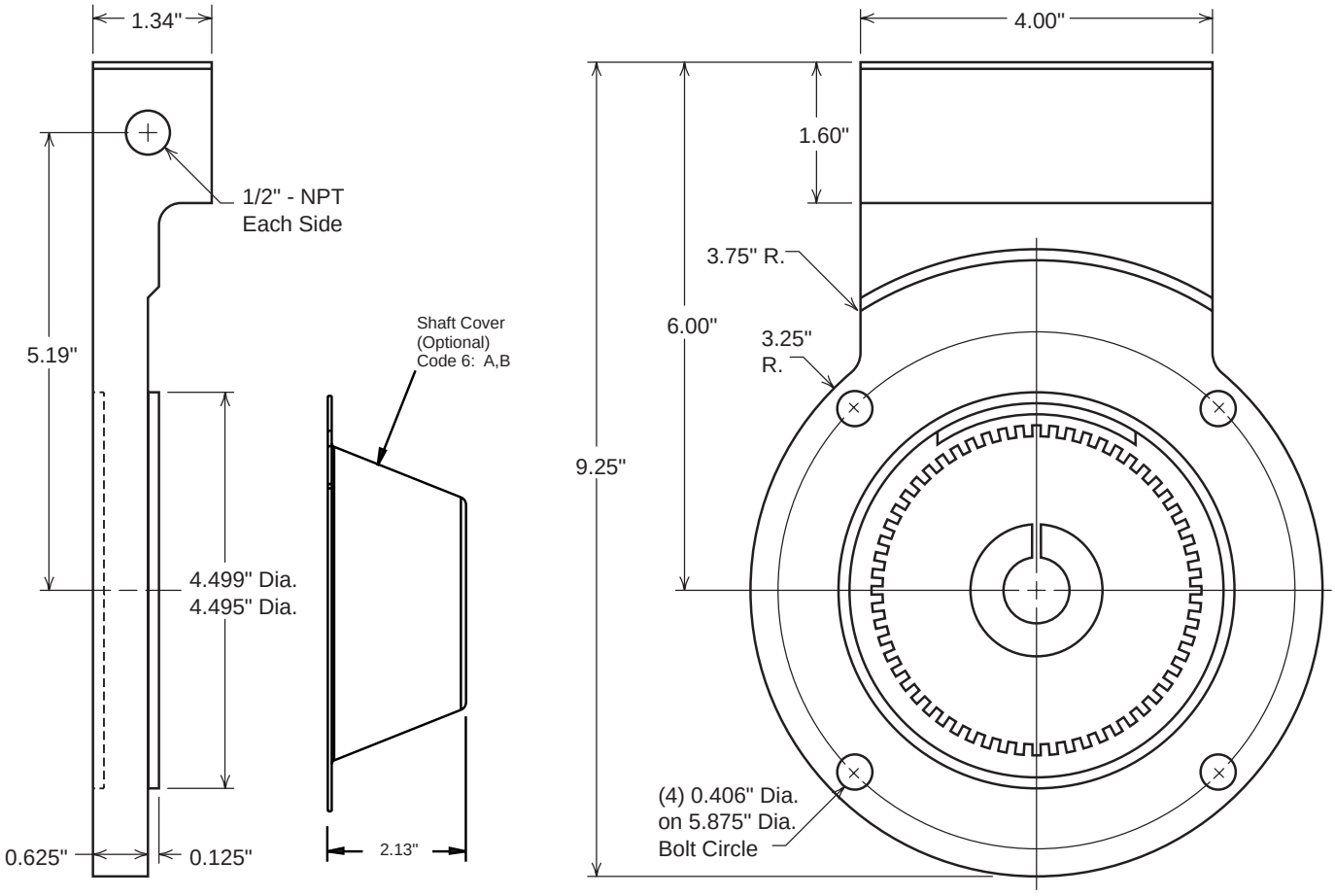
Ordering Information

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



SERIES SL56

NorthStar™ brand

Bearingless Encoder

Key Features

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

CE EN 61326 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-1T#	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™

SERIES SL56

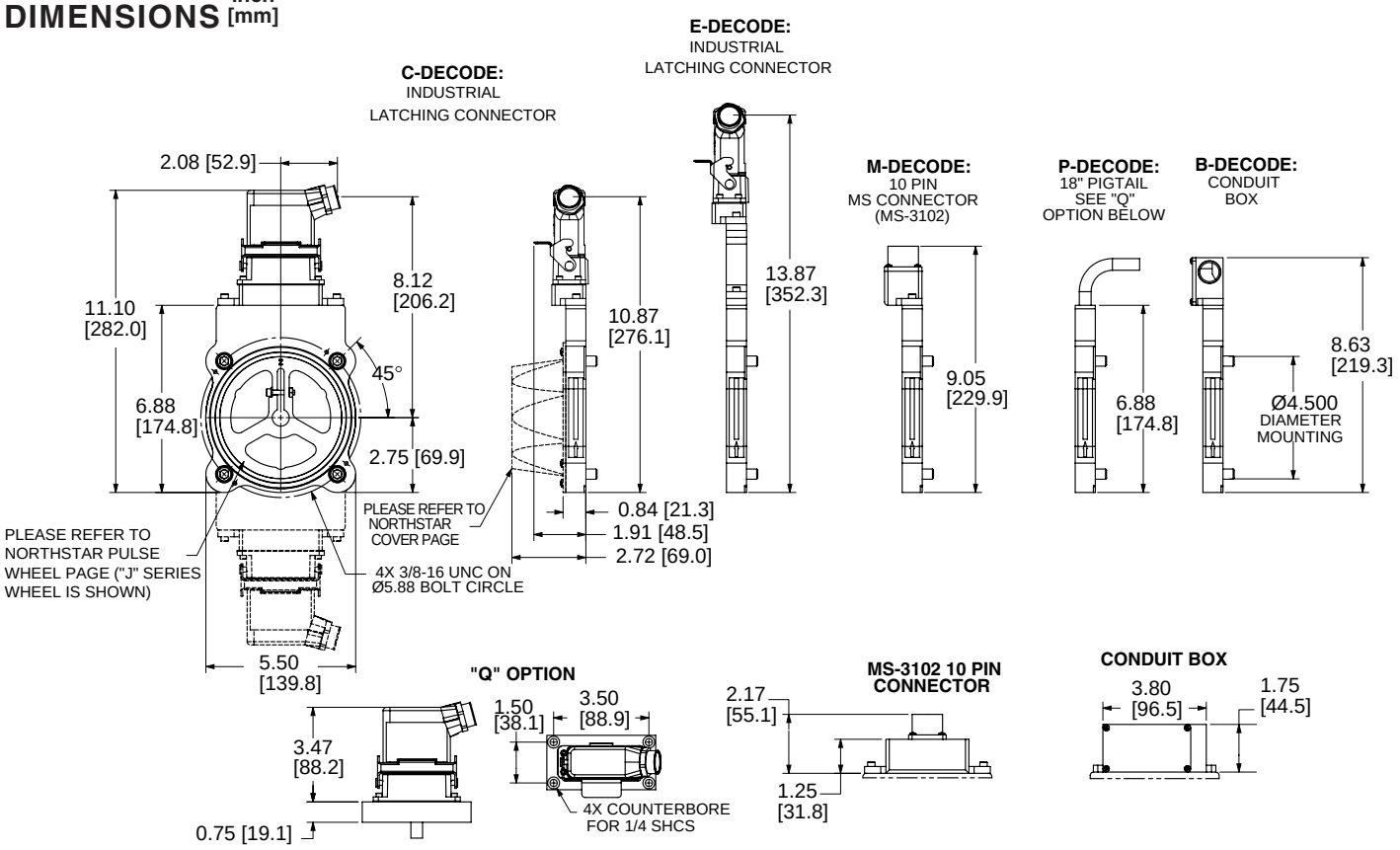
Ordering Information

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** **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" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2.00" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum	**B** Conduit box **C** Latching Industrial Connector with 1/2" NPT **E** 3" extended height Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" pigtail cable **Q** Latching Industrial Connector on 18" pigtail cable Available when Code 1 is S5 and Code 4 is J04 thru J07: **S** 18" pigtail cable with stainless steel housing	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 120°C **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, $\overline{A}$, 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]



SERIES RL67

NorthStar™ brand

Bearingless Encoder

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**

CE EN 61326

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

Shaft Speed: 7,000 RPM
Mounting Configuration: 4.5" diameter, 56 C motor face or accessory flange to meet NEMA MG1-4 standards or mounts directly in the 6.75" machined accessory recess of the 4.5" accessory flange found on Reliance RPM™ motors
Housing Material: Cast Aluminum
Acceleration Rate: 12,000 rpm/sec max
Shaft Length Required: 2.5" min
Allowable Shaft End-Play: ± 0.045"
Allowable Shaft Runout: 0.003" TIR

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
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

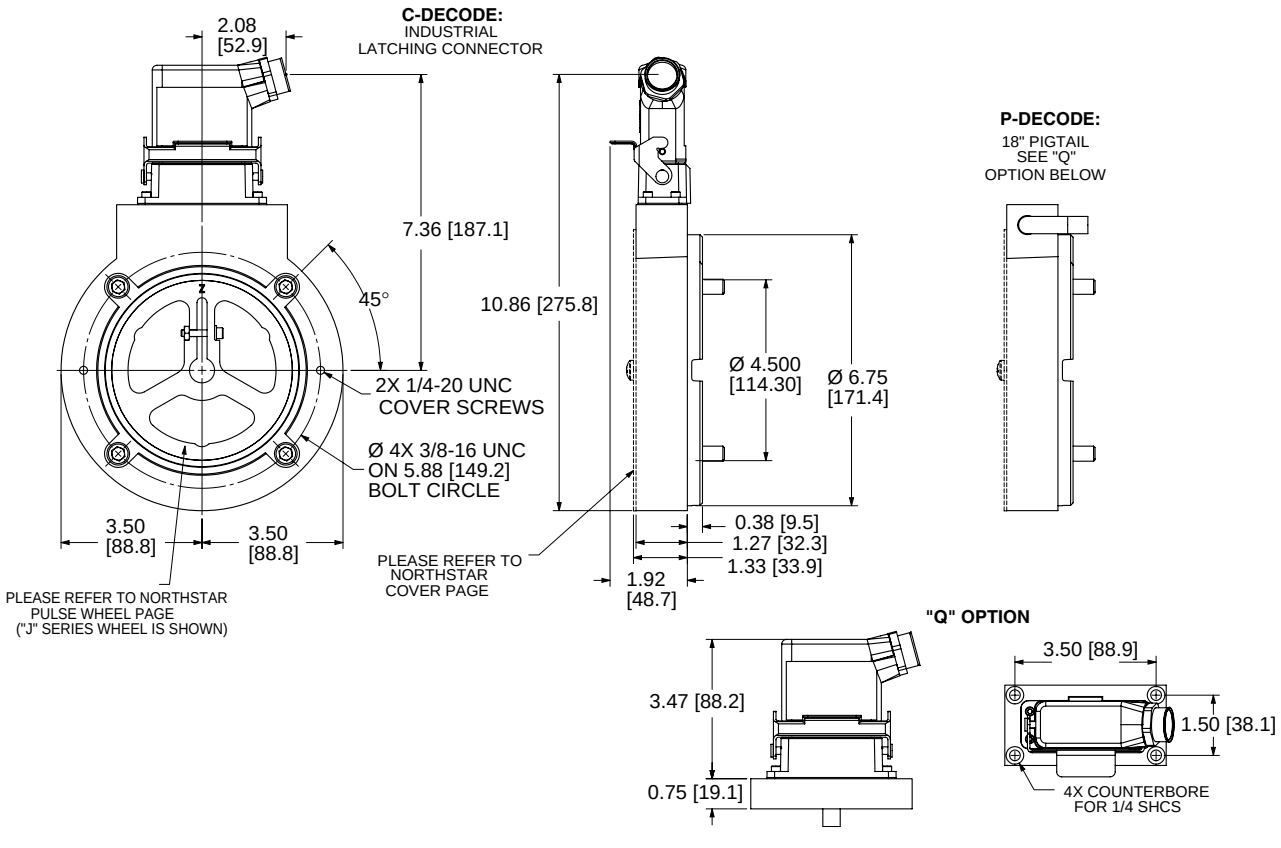
Ordering Information

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 C-Face Motors or Reliance Electric Style 6.75" Recess	**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" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2.00" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" pigtail cable **Q** Latching Industrial Connector on 18" pigtail cable	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 120°C **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, $\overline{A}$, 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]



SERIES SL85

NorthStar™ brand

Bearingless Encoder

Key Features

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

CE EN 61326 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
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	□□□□	□	□□□	□	□	□

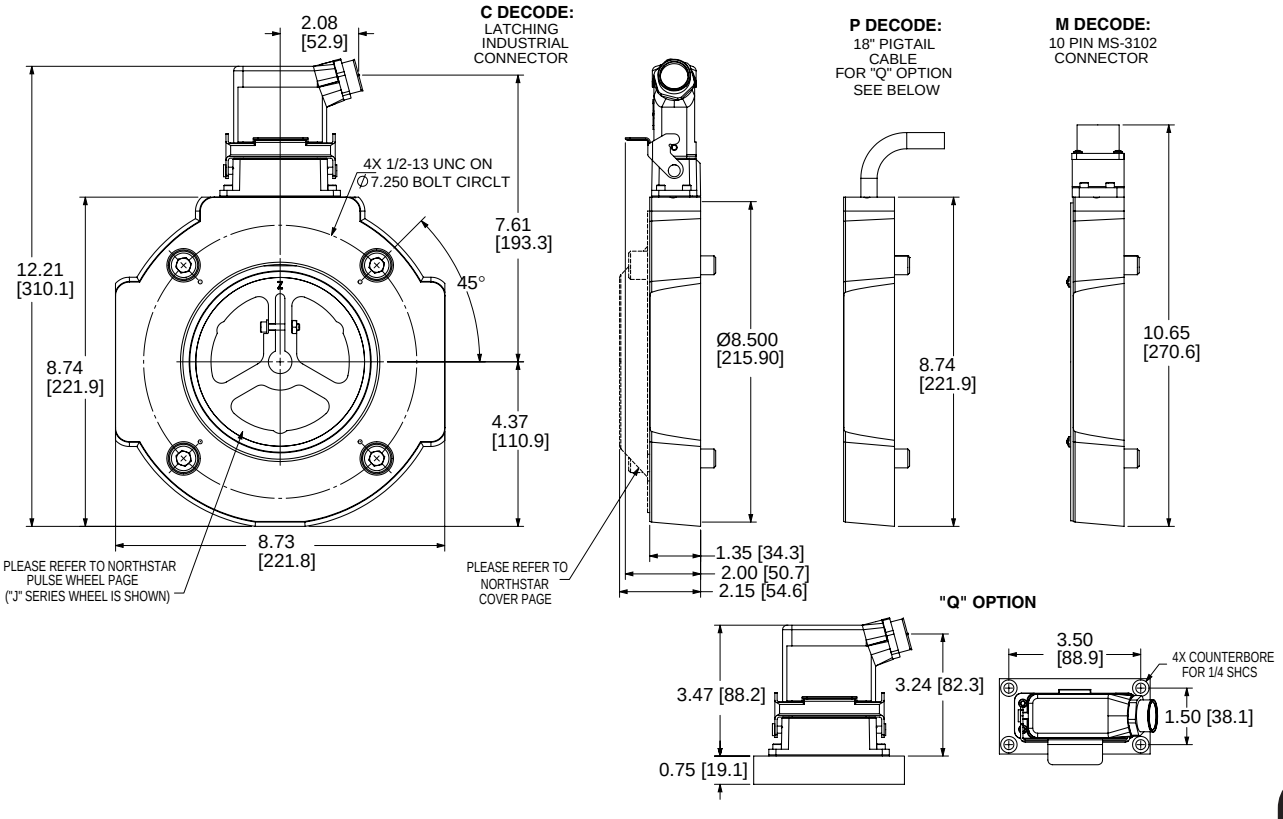
Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Cover/Adapter
S8 Motor Mount Ring, for 8 1/2" C-Face Motors (180C) Single Output **D8** Motor Mount Ring, for 8 1/2" C-Face Motors (180C) Dual Output	**0064** **0128** **0256** **0512** **1024** **2048**	**L** No Index Available when Code 2 is 0512, 1024 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**J04** 5/8" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2.00" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum **End of Shaft Mounting for GE & Emerson Motors** N01 1.125" EOS N06 2.375" EOS N08 2.625" EOS N10 2.875" EOS	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **Double C-face Sandwich Version** **D** 1" Extended height connector **E** 3" extended height connector **P** 18" pigtail cable **Q** Latching Industrial Connector on 18" pigtail cable	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 120°C **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, $\overline{A}$, 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



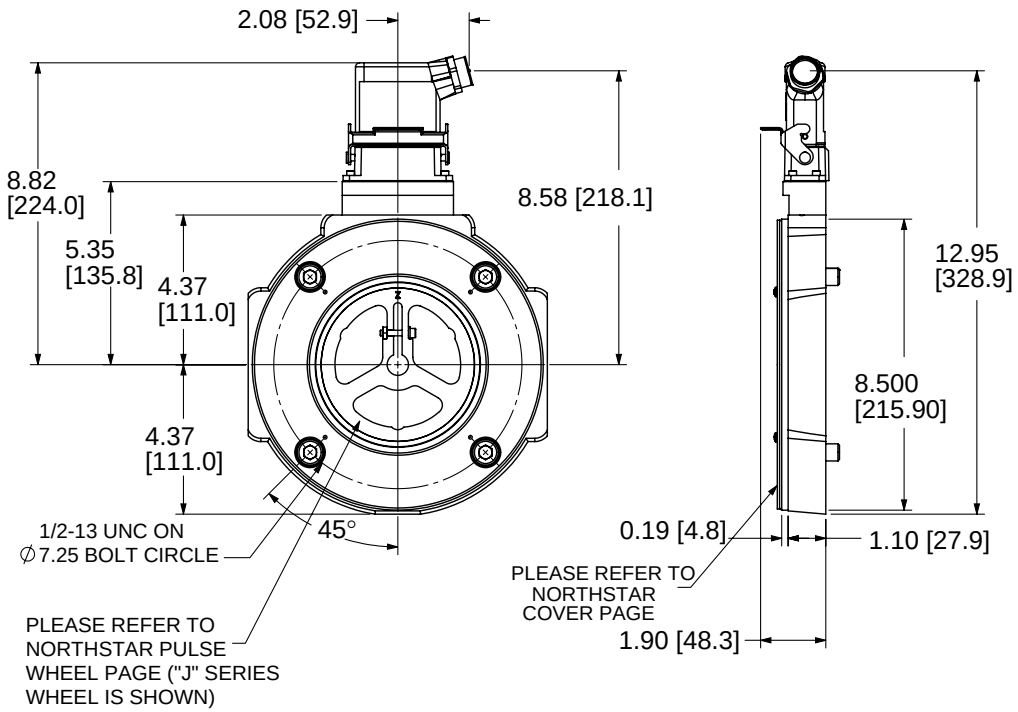
SERIES SL85

NorthStar™ brand

DIMENSIONS inch [mm]

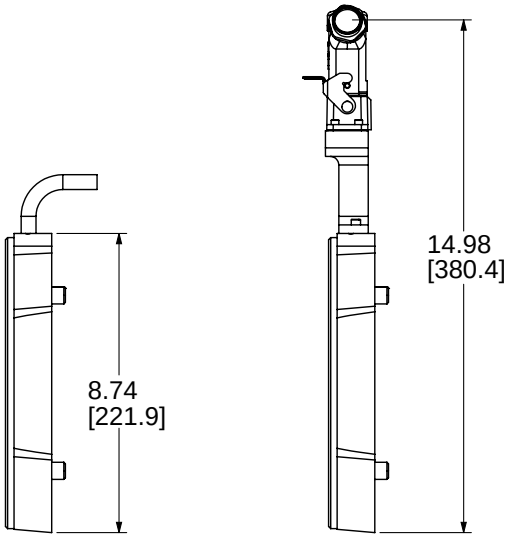
DOUBLE C-FACE HOUSING

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

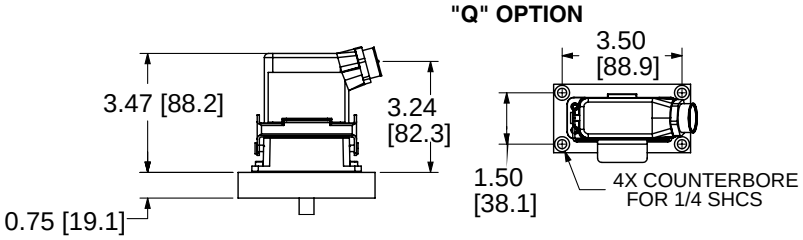


P-DECODE:
DOUBLE C-FACE
18" PIGTAIL
SEE "Q"
OPTION BELOW

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



"Q" OPTION

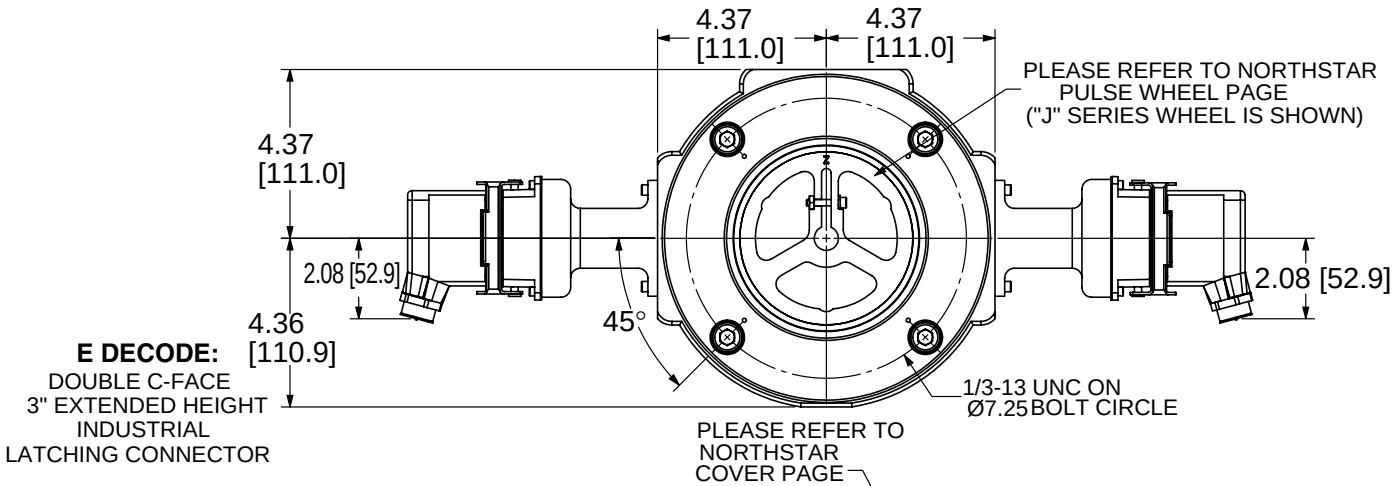


by DYNAPAR™

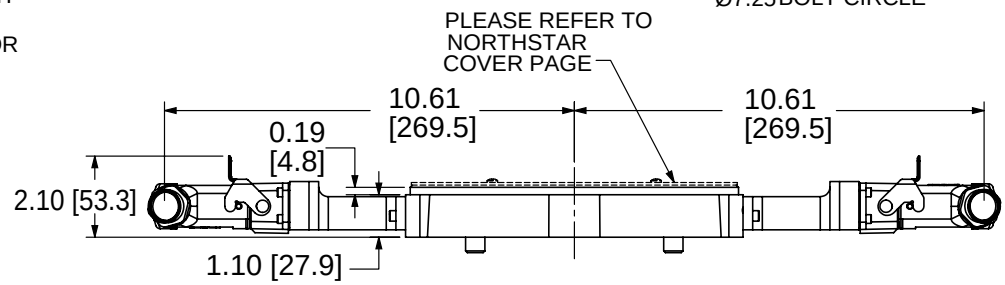
SERIES SL85

DIMENSIONS inch [mm]

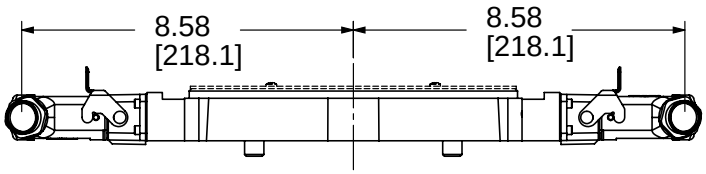
DUAL OUTPUT HOUSING



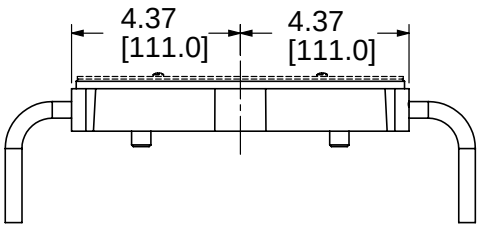
E DECODE:
DOUBLE C-FACE
3" EXTENDED HEIGHT
INDUSTRIAL
LATCHING CONNECTOR



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



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



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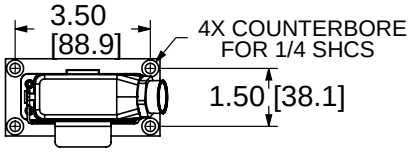
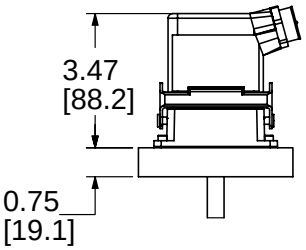




SERIES SL1250

NorthStar™ brand

Bearingless Encoder

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Pulses per Revolution: 64-1024
Phasing Sense: A leads B for Counter-Clockwise rotation (CCW) viewing encoder-mounted end
Quadrature Phasing: 90° ± 22°
Symmetry: 180° ± 54°
Index: 270°, ungated (optional gated to falling B edge)

ELECTRICAL

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

MECHANICAL

Shaft Speed: 5,000 RPM
Mounting Configuration: 12.5” C face mount for NEMA MG1-4 standards (excluding C-Face runout)
Housing Material: Cast Aluminum
Acceleration Rate: 12,000 rpm/sec max
Shaft Length Required: 1.1” min
Allowable Shaft End-Play: ± 0.045”
Allowable Shaft Runout: 0.003” TIR
Weight: 11 lbs.

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	F
B	2	Green	B
A	3	Blue	A
Z *	4	Violet	C
No Connection	5	—	E
Vcc (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

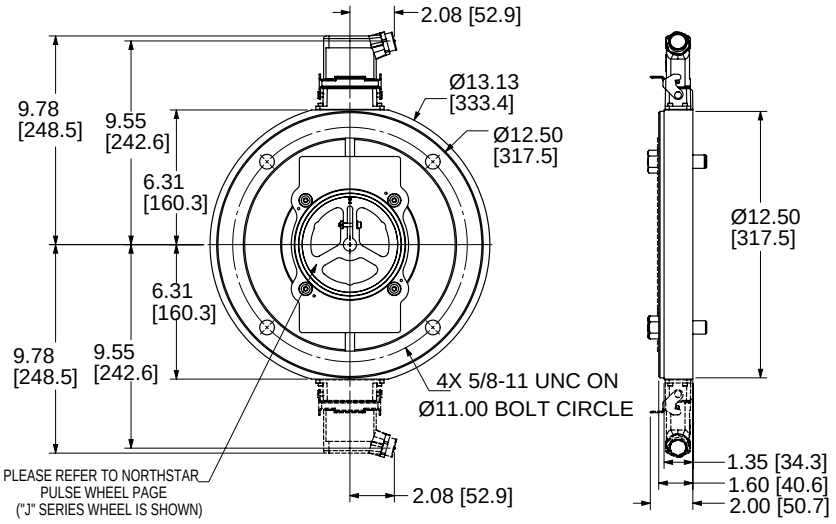
To order, complete the model number with code numbers from the table below:

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" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2.00" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum	**C** Latching Industrial Connector with 1/2" NPT **D** 1" extended height Latching industrial connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" pigtail cable **Q** Latching Industrial Connector on 18" pigtail cable	**L** 5-15V in, 5-15V Line Driver (4428) out **H** Same as L with extended temp. to 120°C **V** 5-26V in, 5-26V Line Driver (IC-WE) out **5** 5-15V in, 5V Line Driver (4428) out Differential, bidirectional signals (A, $\overline{A}$, B, $\overline{B}$)	**C** No Cover **F** Flat Thru-hole cover

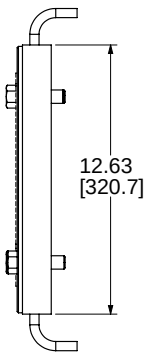
Note: See ACCESSORIES Section For Connectors, Spare Parts and Pulse Wheels

DIMENSIONS inch [mm]

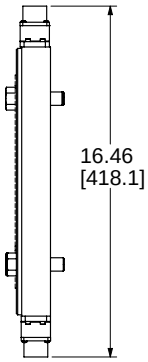
C-DECODE:
INDUSTRIAL
LATCHING CONNEECTOR



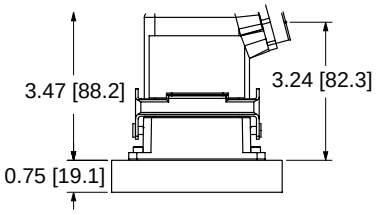
P-DECODE:
18" PIGTAIL
SEE "Q"
OPTION BELOW

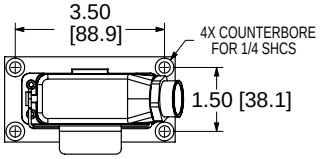


M-DECODE:
10 PIN
MS CONNECTOR
(MS-3102)



"Q" OPTION





SERIES RIM8500

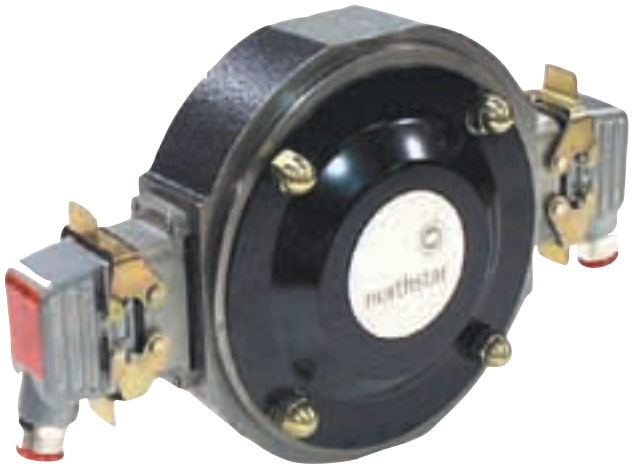
NorthStar™ brand

Bearingless Encoder

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**

CE EN 61326 RoHS



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	A
B	2	Green	E
A	3	Blue	D
Z *	4	Violet	C
No Connection	5	—	—
Vcc (5-15 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

by DYNAPAR™

SERIES RIM8500

Ordering Information

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

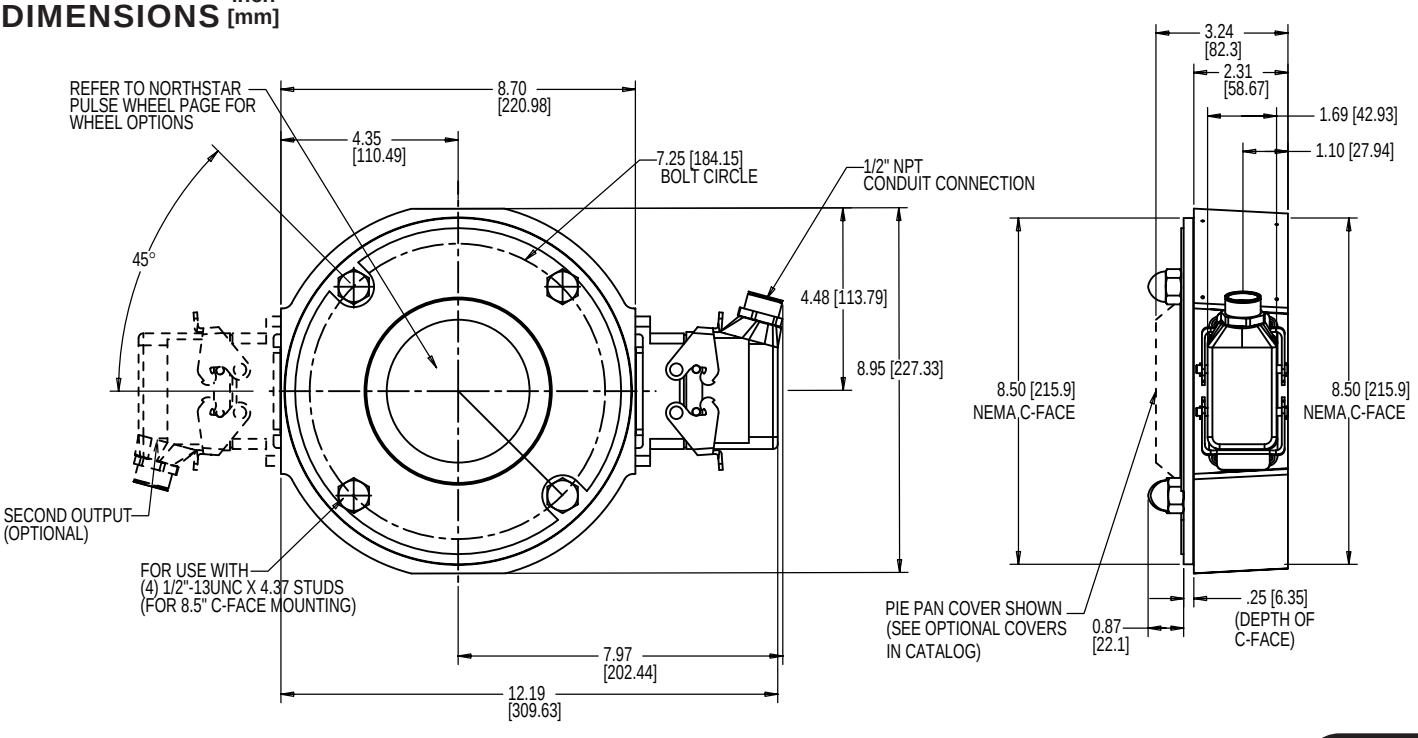
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
R8	□□□□	□	□□□	□	□	□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
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" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 3.75" Maximum **End of shaft mounting for GE & Emerson Motors** E01 1.125" EOS E06 2.125" EOS E08 2.375" EOS E10 2.875" EOS	**1** Single **2** Dual (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 120°C **R** 15-26V in, 15V Line Driver (4428) out **5** 5-15V in, 5V Line Driver (4428) out	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" Pigtail **Q** Latching industrial connector on 18" cable

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

DIMENSIONS inch [mm]



SERIES RIM 1250

NorthStar™ brand

Bearingless Encoder

Key Features

- **Bearingless Design Mounts to 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**

CE EN 61326

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 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 1250

Ordering Information

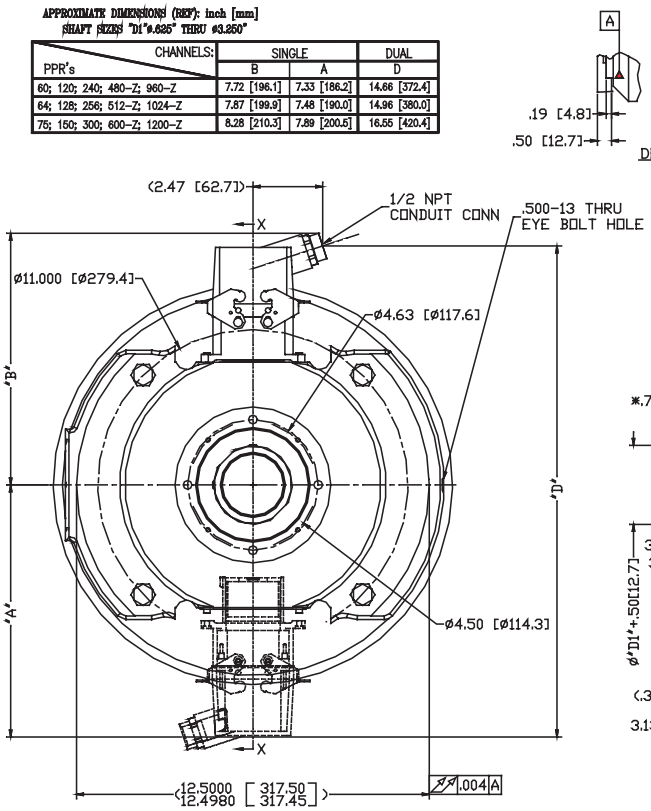
To order, complete the model number with code numbers from the table below:

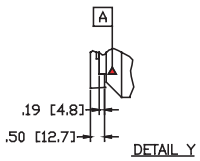
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
R1	□□□□	□	□□□	□	□	□
Ordering Information						
R1 Motor Mount Ring, for 12-1/2" C-Face Motors	**0060** **0300** **0064** **0480** **0075** **0512** **0120** **0600** **0128** **0960** **0150** **1024** **0240** **1200** **0256** **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, $\overline{Z}$)	**J04** 5/8" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore **K09** 1-3/8" bore **K10** 1-1/2" bore **K11** 1-5/8" bore **K12** 1-3/4" bore **K13** 1-7/8" bore **K14** 2" bore **K15** 2-1/8" bore **K16** 2-1/4" bore **K17** 2-3/8" bore **K18** 2-1/2" bore **K19** 2-7/8" bore Additional Shaft Sizes Available Up to 8.00" Maximum	**1** Single **2** Dual (Isolated) Differential, bidirectional signals (A, $\overline{A}$, 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 **M** 10 pin MS Connector **P** 18" Pigtail

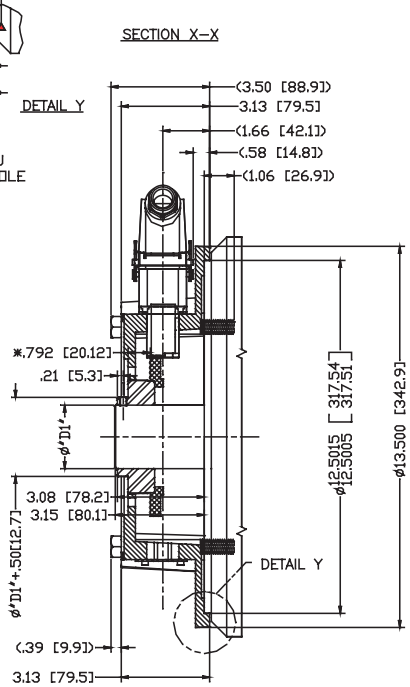
DIMENSIONS inch [mm]

APPROXIMATE DIMENSIONS (REF): inch [mm]
SHAFT SIZES "D1"=.625" THRU =3.250"

CHANNELS: / PPR's	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 6200

NorthStar™ brand

Severe Duty Encoder

Key Features

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

CE EN 61326 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

Output Signals:
With Elec Option L: 5-15 V Line Driver, 150mA
With Elec Option R: 15 V Line Driver, 150mA
With Elec Option 5: 5V Line Driver, 150mA
Frequency Response: 0 - 120kHz Data & Index
Electrical Immunity: 2kV ESD, Reverse Polarity, Short Circuit
Connector: 10 pin industrial duty latching, sealed NEMA 4 &12, IP65

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	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 6200

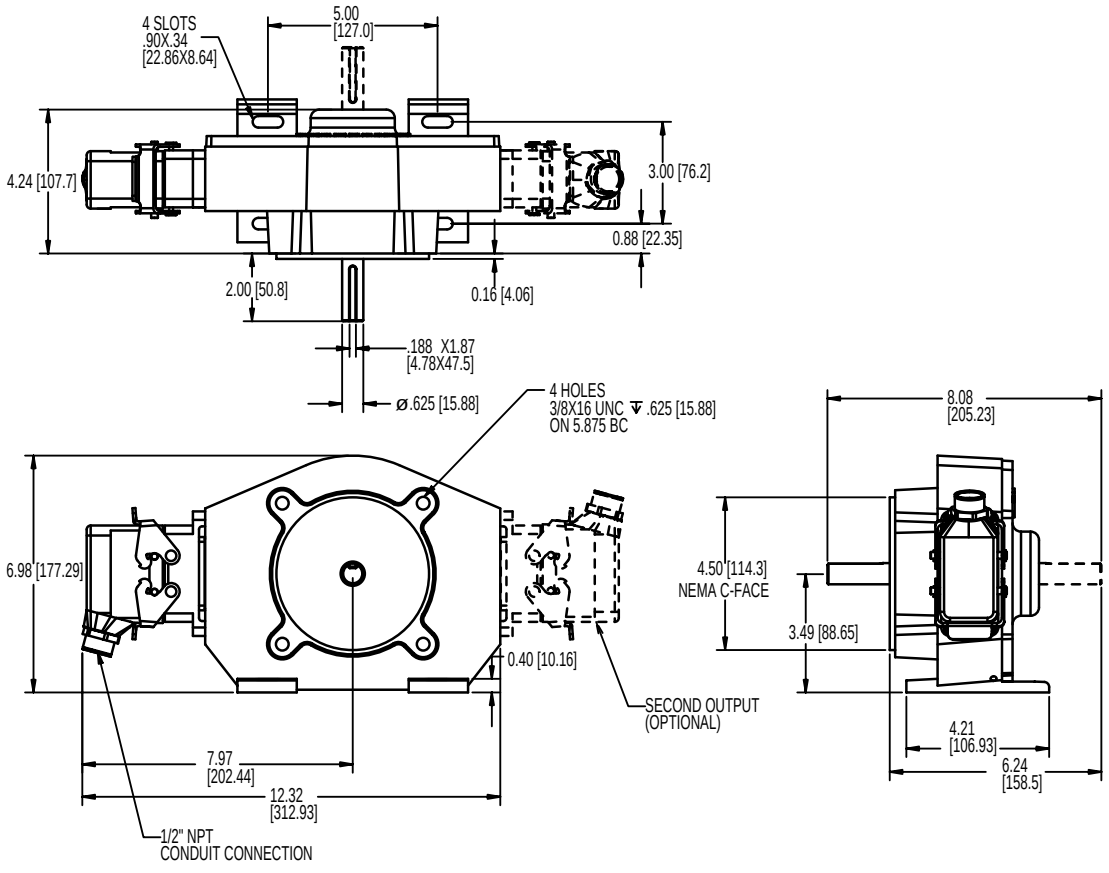
Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Shaft	Code 5: Output	Code 6: Electrical	Code 7: Termination
R6	□□□□	□	□□□	□	□	□
Ordering Information						
R6 Foot Mount or Close Coupled	**0060** **0064** **0075** **0120** **0128** **0150** **0240** **0256** **0300** **0480** **0512** **0600** **0960** **1024** **1200** **2048**	**L** No Index Available when Code 2 is 0480, 0512, 0600, 0960 1024, 1200 or 2048 **G** Gated Index (Z, $\overline{Z}$) **Z** Differential Index (Z, $\overline{Z}$)	**A** Single Shaft, Stainless Steel **B** Dual Shaft, Stainless Steel **S** Single Shaft, Steel **D** Dual Shaft, Steel	**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 **M** 10 pin MS Connector **P** 18" Pigtail

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

DIMENSIONS inch [mm]



SERIES HS56

NorthStar™ brand

Hollow Shaft Encoder

Key Features

- **Hollowshaft Design with Heavy-Duty Bearings Ideal for 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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	F
B	2	Green	B
A	3	Blue	A
Z *	4	Violet	C
No Connection	5	—	E
Vcc +	6	Red	D
$\overline{B}$	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

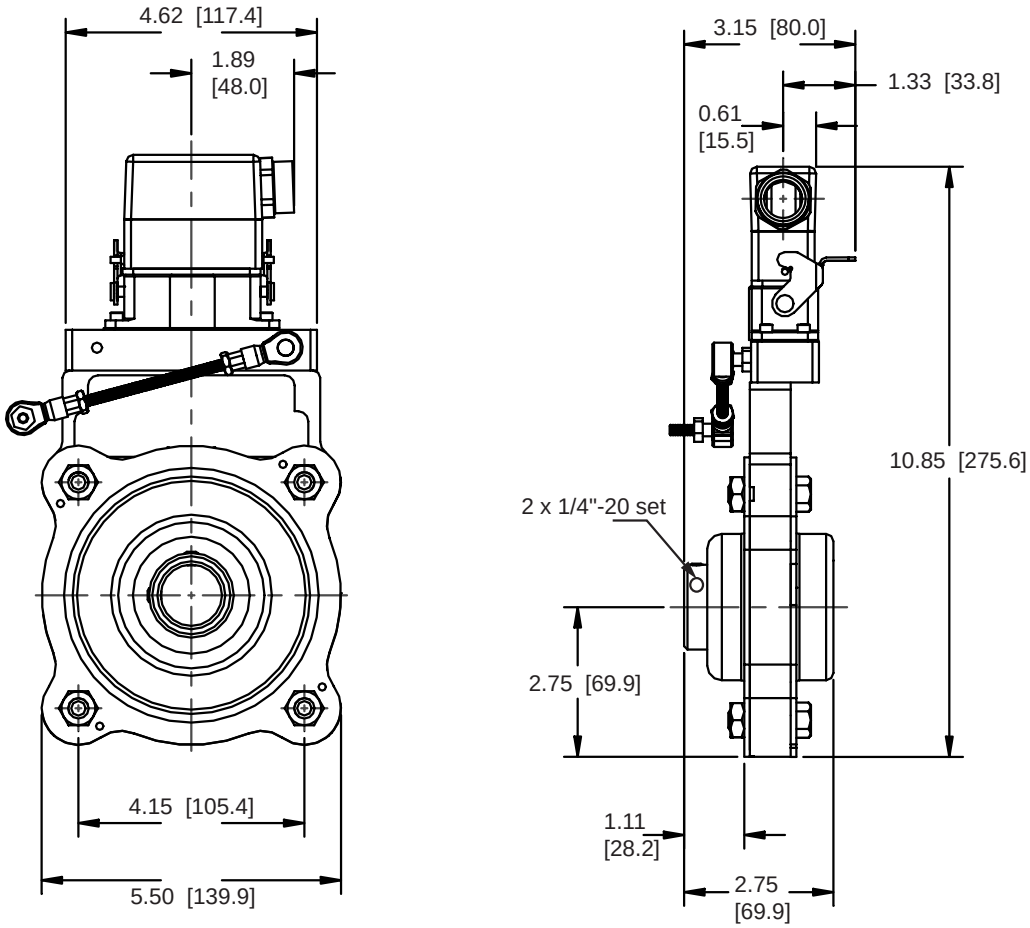
Ordering Information

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" bore **J05** 7/8" bore **J06** 1.00" bore **J07** 1-1/8" bore	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" pigtail cable **Q** Latching Industrial Connector on 18" pigtail cable	**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

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

ELECTRICAL CONNECTIONS

Signal	Connector Pin	Pigtail Cable	MS 3102E18-IT#
Common	1	Black	F
B	2	Green	B
A	3	Blue	A
Z *	4	Violet	C
No Connection	5	—	E
Vcc +	6	Red	D
$\overline{B}$	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 HS60

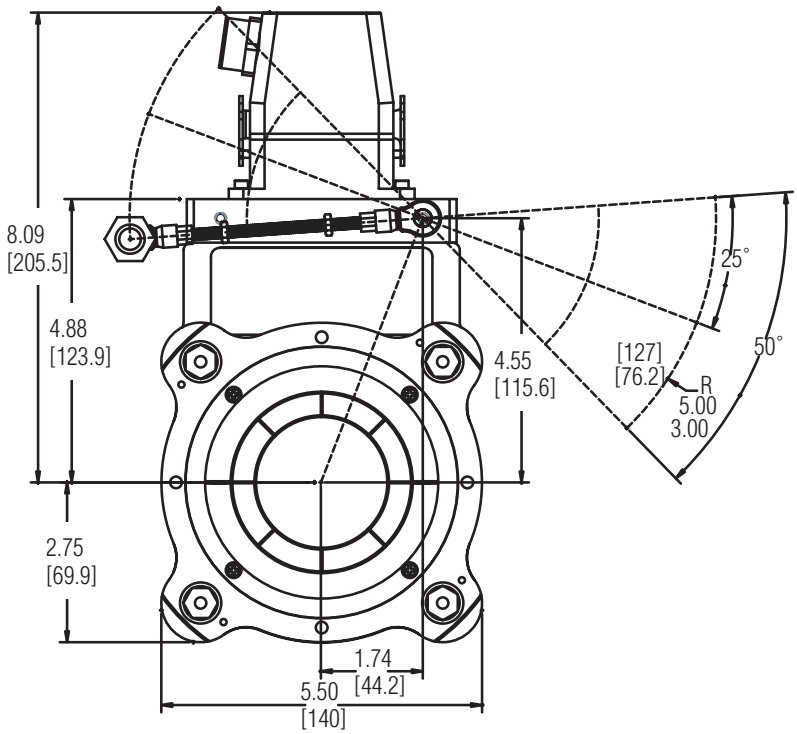
Ordering Information

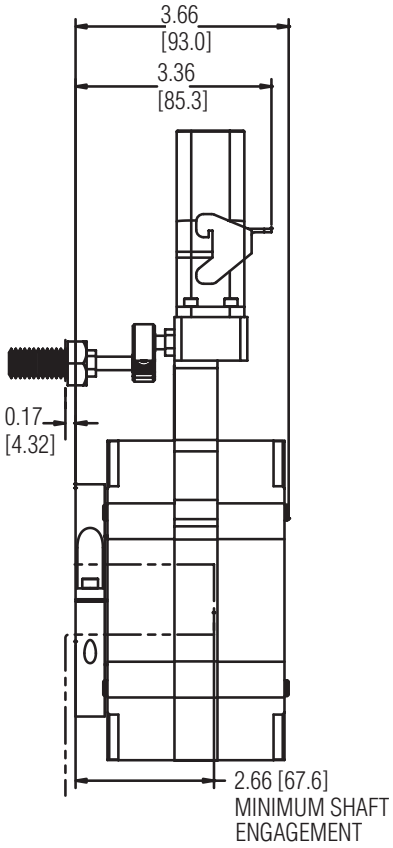
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Termination	Code 6: Electrical	Code 7: Seal
□6	□□□□	□	T□□	□	□	□
Ordering Information						
H6 HS60 Hollowshaft, single output **D6 Dual output**	**0064** **0128** **0256** **0512** **1024** **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" **T02** 1-3/8" **T03** 1-5/8" **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" *Metric bore sizes available. Consult factory for details.*	**C** Latching Industrial Connector with 1/2" NPT **M** 10 pin MS Connector **P** 18" pigtail cable **Q** Latching industrial connector on 18" pigtail cable	**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 Differential, bidirectional signals	**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

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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

ELECTRICAL

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

MECHANICAL

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

ENVIRONMENTAL

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

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:

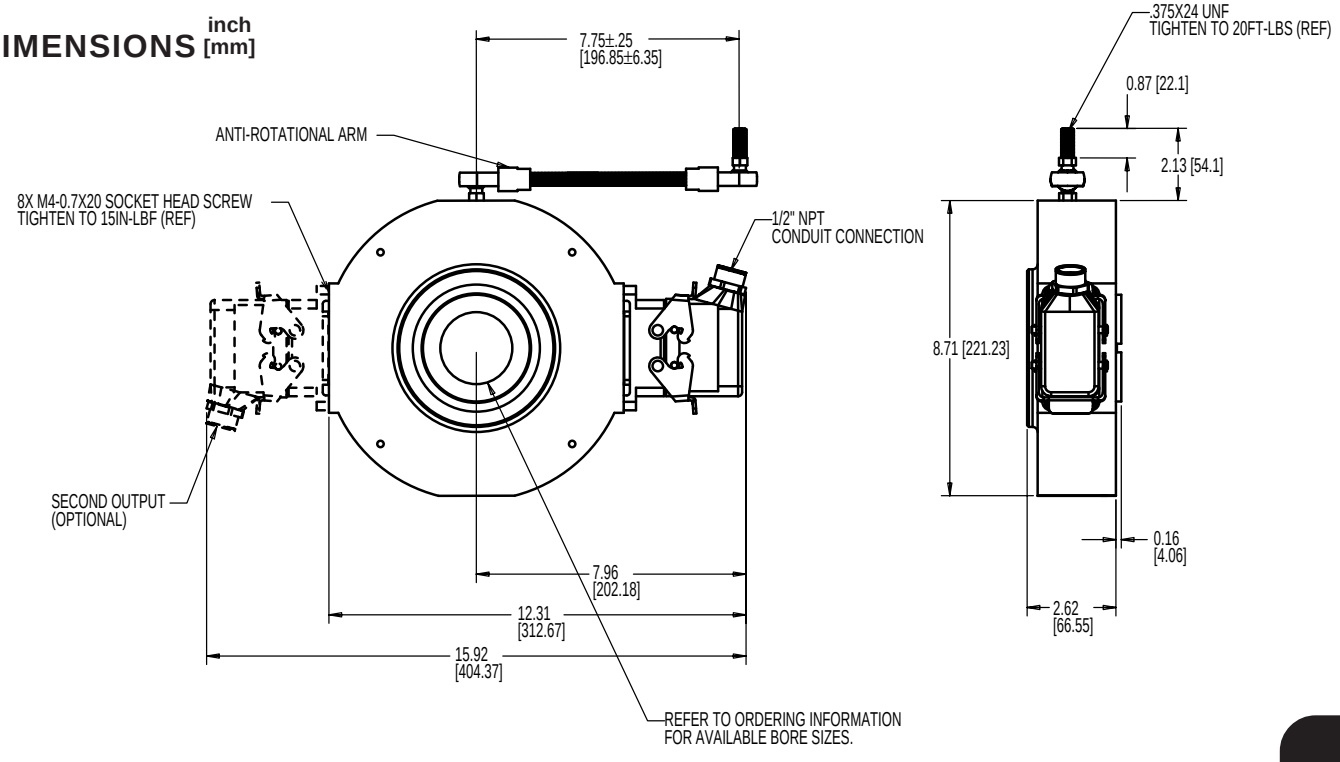
Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
H8	□□□□	□	□□□	□	□	□

Ordering Information

Code 1: Model	Code 2: PPR	Code 3: Index	Code 4: Wheel Bore	Code 5: Output	Code 6: Electrical	Code 7: Termination
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" bore **T02** 1-3/8" bore **T03** 1-5/8" bore **T04** 1-7/8" bore **T05** 2.00" bore **T06** 2-1/8" bore **T07** 2-1/4" bore **T08** 2-3/8" bore **T09** 2-1/2" bore **T10** 2-7/8" bore **Bores with 1.25" per foot taper** **P01** 1-1/8" bore **P02** 1-3/8" bore **P03** 1-5/8" bore **P04** 1-7/8" bore **P05** 2.00" bore **P06** 2-1/8" bore **P07** 2-1/4" bore **P08** 2-3/8" bore **P09** 2-1/2" bore **P10** 2-7/8" bore Additional Shaft Sizes Up to 4.50" Maximum Available (thru and taper shaft) Call factory for details	**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 **M** 10 pin MS Connector **P** 18" Pigtail

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

DIMENSIONS inch [mm]



SERIES AR62/AR63

ACURO™ brand

Magnetic Absolute Encoder

Key Features

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

CE EN 61326

RoHS

NEW!

SPECIFICATIONS

ELECTRICAL

Supply voltage: 5VDC, 10-30VDC, or 17-30VDC (see "Ordering Information")
EMC: EN 61326 (external protective circuit required)
Resolution singleturn: 12 Bit
Resolution multiturn: 12, 13, 16 Bit
Absolute accuracy: ±0.6°
Repeatability: ±0.2°
Parametrization: Preset

MECHANICAL

Housing diameter: 58 mm
Mounting depth: 32 mm
Shaft diameter: 3/8", 10 mm
Flange: Synchro clamping or 2.5" Square flange
Protection Class (EN 60529)**:** Housing & Shaft, IP67 or IP69k
Shaft load: axial 300 N max.; radial 300 N max.

ENVIRONMENTAL

Shaft speed (maximum): 5000 rpm
Vibration resistance: (DIN EN 60068-2-6) 200 m/s²
Shock resistance: (DIN EN 60068-2-27) 2000 m/s² (6 ms)
Operating temperature: -40 °C to +100 °C
Connection: Cable, radial; M12 connector, radial

ELECTRICAL CONNECTIONS – BiSS / SSI

Cable Color	PIN	Signal
Yellow	6	Clock
Pink	5	Data
Green	4	$\overline{\text{Clock}}$
Grey	8	$\overline{\text{Data}}$
White	1	UB
Brown	2	0V
Red	3	Preset (set to 0)
Screen	Screen	Screen

ELECTRICAL CONNECTIONS – CANopen

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

ELECTRICAL CONNECTIONS – Analog

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

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

by DYNAPAR™ SERIES AR62/AR63

Ordering Information

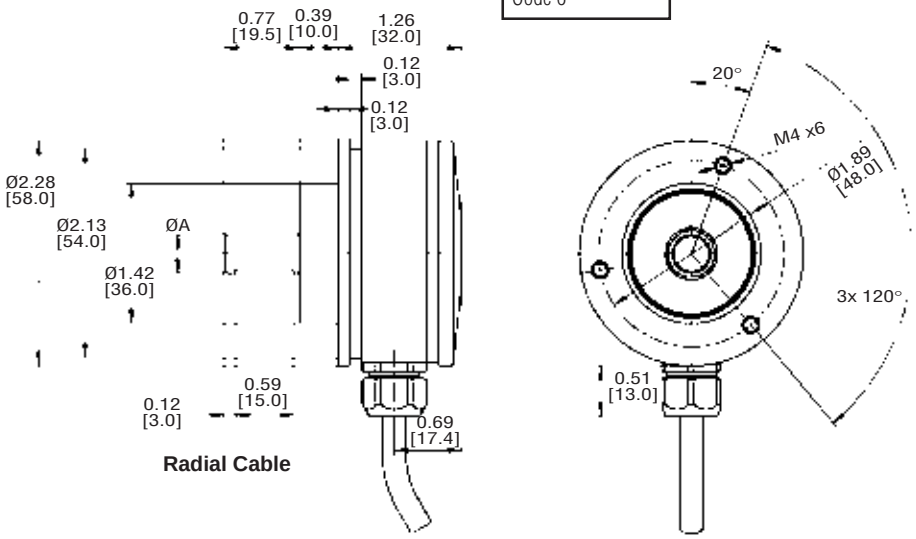
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Mounting	Code 5: Protection	Code 6: Shaft Size	Code 7: Interface	Code 8: Connection	Code 9: Cable Length
Ordering Information								
AR62	**□□12**	**□**	**□**	**□**	**□**	**□□**	**□**	**□□**
AR62 Aluminum **AR63** Stainless	**0012** 12 bit single-turn **1212** 12 bit single turn, 12 bit multi-turn **1312** 12 bit single turn, 13 bit multi-turn **1612** 12 bit single turn, 16 bit multi-turn	**A** 5 VDC **E** 10-30VDC "F" is available only when Code 7 is AV or A4 **F** 17-30VDC	**L** Synchro, Clamping **Q** Square Flange	**7** IP67 **9** IP69k	**2** 10mm "2" is available only when Code 4 is L **6** 3/8" "6" is available only when Code 4 is Q	**BI** BiSS **SG** SSI-Gray **SB** SSI-Binary **OL** CAN Open Available only when Code 2 is 0012, 1212, or 1612 **AV** Analog, 0-10V **A4** Analog, 4-20mA	**B** Radial Cable Available when Code 1 is AR62 and code 5 is 7 **8** M12 radial connector, 8-pin	**Blank** 1.5m **D0** 3m **F0** 5m **K0** 10m **P0** 15m **U0** 20m **V0** 25m **W0** 30m **X0** 40m **Y0** 50m

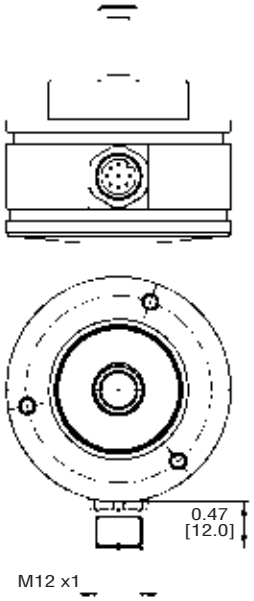
DIMENSIONS inch [mm]

ØA: See "Ordering Information" Code 6

Synchro Clamping

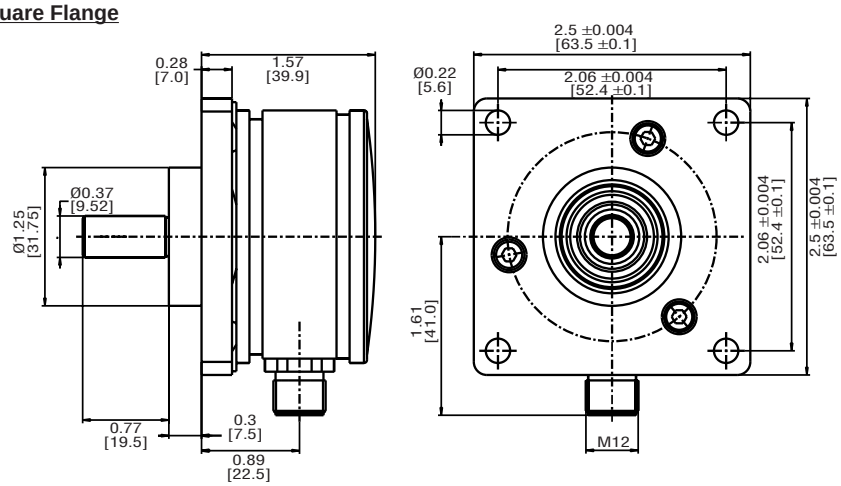


Radial Cable



M12 Connector

Square Flange



SERIES AX70/AX71 ACURO™ brand

Magnetic Absolute Encoder

Key Features

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

CE EN 61326

Ex E Ex d II C T6/T4

NEW!

SPECIFICATIONS

ELECTRICAL - DeviceNet / CANopen

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

ELECTRICAL CONNECTIONS - DeviceNet / CANopen

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

by DYNAPAR™

SERIES AX70/AX71

ELECTRICAL - SSI/ SSI-P

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

Note: Parameterization is programmable with WIN SSI software

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

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

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

For Clock /$\overline{\text{Clock}}$ and Data /$\overline{\text{Data}}$ please use twisted pairs. Use shielded cable.

ELECTRICAL CONNECTIONS — SSI

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

ELECTRICAL CONNECTIONS — SSI-P

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

ELECTRICAL - Profibus

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

ELECTRICAL CONNECTIONS — Profibus

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

[1] used for power supply for an external bus termination resistor

MECHANICAL - All Types

Shaft diameter: 10 mm (Solid shaft)
Mounting: Clamping flange
Max. Shaft load: Axial= 40 N; Radial= 100 N
Max. shaft speed: T4= 10 000 rpm; T6= 6000 rpm
Torque: ≤1 Ncm
Moment of inertia: approx. 20 gcm^2
Material shaft: Stainless Steel
Material housing: AX 70= Aluminum;
AX 71= Stainless Steel
Weight: AX 70= approx. 1.4 kg; AX 71= approx. 4.8 kg
Connection: Cable, axial

ENVIRONMENTAL - All Types

Protection class, shaft (EN 60529)[1]: T4= IP64 or IP67; T6= IP64
Protection class, housing (EN 60529): T4= IP65 or IP67;
T6= IP65 (IP64 for CANopen or DeviceNet)
Vibration resistance (DIN EN 60068-2-6): 100 m/s^2 (10 to 500 Hz)
Shock resistance (DIN EN 60068-2-27): 1000 m/s^2 (6 ms)
Operating temperature: T4= -40°C to +60°C;
T6= -40°C to +40°C
Storage temperature: -25°C to +85°C

[1] No dust explosion-proof (D) for IP64

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

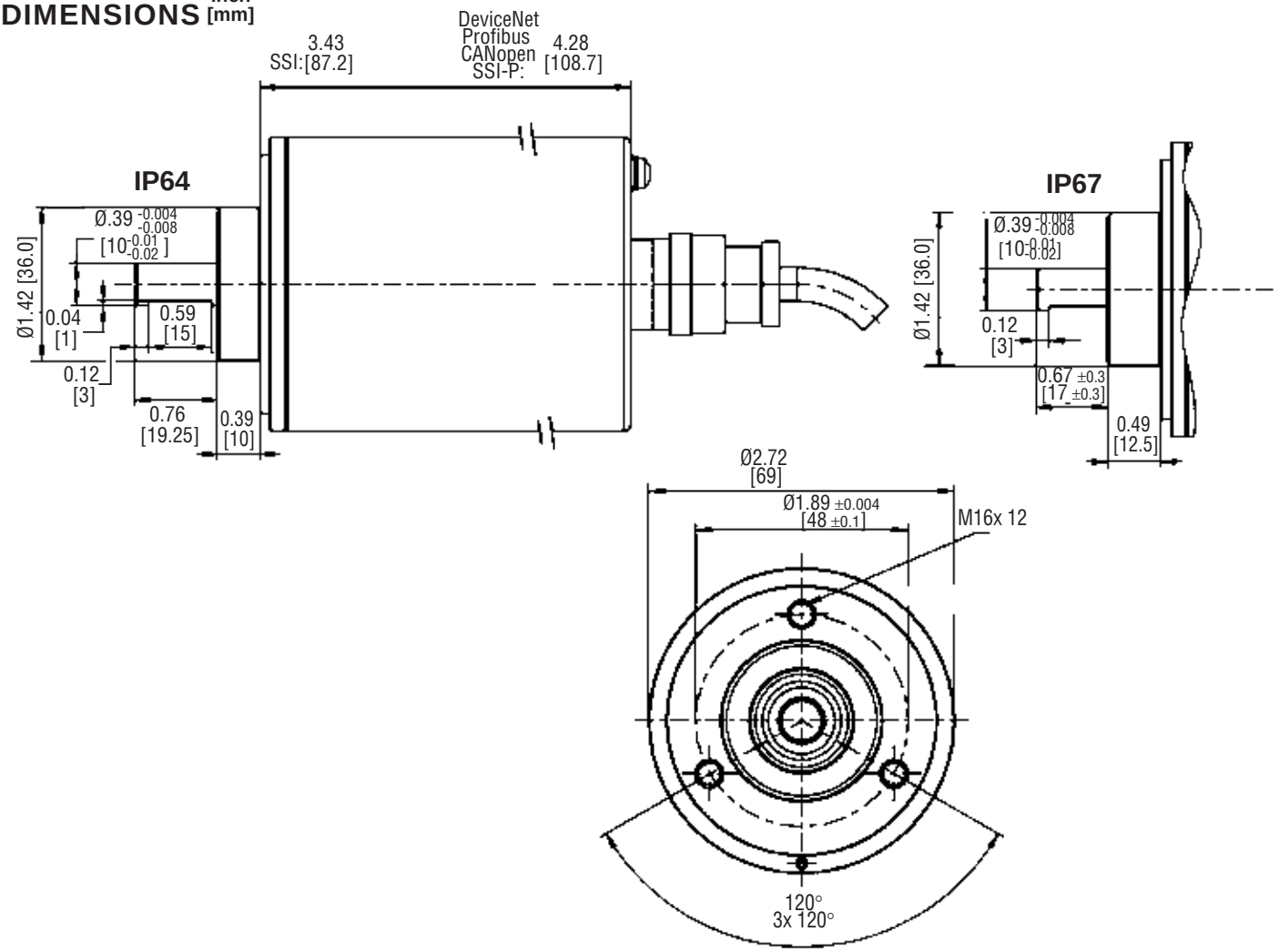
SERIES AX70/AX71 ACURO™ brand

Ordering Information

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

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Mounting	Code 5: Protection Class	Code 6: Shaft Size	Code 7: Interface	Code 8: Connection	Code 9: Cable Length
Ordering Information								
AX70	□□□□	□	□	□	□	□	□	□
Acuro Series **AX70** Heavy Duty Absolute encoder, Aluminum Housing **AX71** Stainless Steel Housing	SSI Only **Single Turn** **0010** **0012** **0013** **0014** **0017** **Multi Turn** **1212** **1213** **1214** **1217** CAN, Profibus, DeviceNet **Single Turn** **0014** **Multi Turn** **1214**	**A** 5 VDC **E** 10-30VDC	**K** Clamping Flange	**4** IP64 **7** IP67	**2** 10mm	**SB** SSI-Binary **SG** SSI-Gray **SP** SSI-Programmable **DP** Profibus DP **VD** DeviceNet **CL** CAN-L2 **OL** CAN-Open	**A** Axial Cable	**F0** 5m **K0** 10m **P0** 15m **U0** 20m **V0** 25m

DIMENSIONS inch [mm]



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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

RoHS
Most Models

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

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)	0.454	26	65	2400	8	Rotor
1M *	1 (2)	0.5	4	25	5000	-6	Rotor
2A	2 (4)	0.250	8.0	20	4000	+5.5	Rotor
3A	3 (6)	0.470	4.25	55	7000	+5.5	Rotor
3B	3 (6)	0.95	7	12	5000	4	Rotor

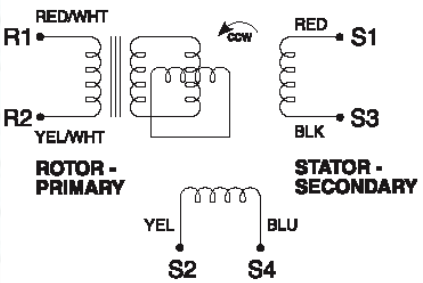
*Radiation Hardened

MECHANICAL

Inertia:	0.0040 oz-in-sec^2
Friction:	2 oz-in (5 oz-in w/shaft seal)
Shaft Load: (max.)	40 lb (axial), 60 lb (radial)
Shaft Material:	#416 S/S
Play: (max.)	Radial: .0015 in @ 1 lb load; End: .005 in @ 5 lb load
Bearing Life:	2 x 10^8 revs at rated shaft loading

ELECTRICAL CONNECTIONS

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



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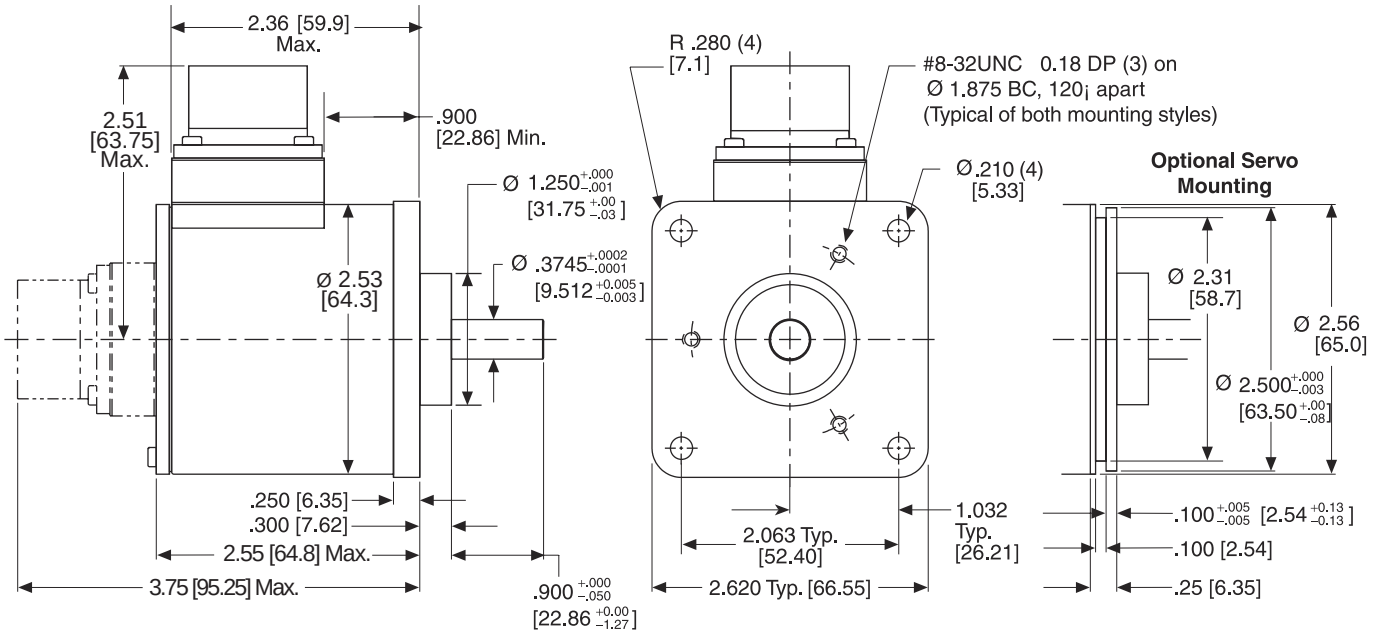
SERIES R25

Ordering Information

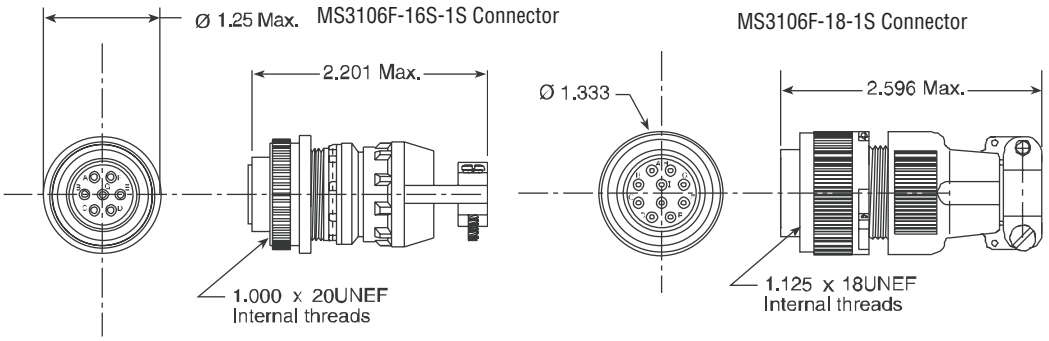
To order, complete the model number with code numbers from the table below:

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 **F** FLYING LEADS **G** MS3112E-10-6P **L** MS3112-18-11P **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 **04** 4 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

DIMENSIONS inches [mm]



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



Accessories:

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

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

DYNAPAR™

INDUSTRIAL DUTY ENCODERS GUIDE

DYNAPAR 2010

Dynapar's Industrial duty encoders are well-suited for general purpose use in today's factories and manufacturing environments. Applications such as vector motor feedback, machine tool positioning, printing equipment, medical equipment, material handling machinery, and elevators all benefit from such features as:

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

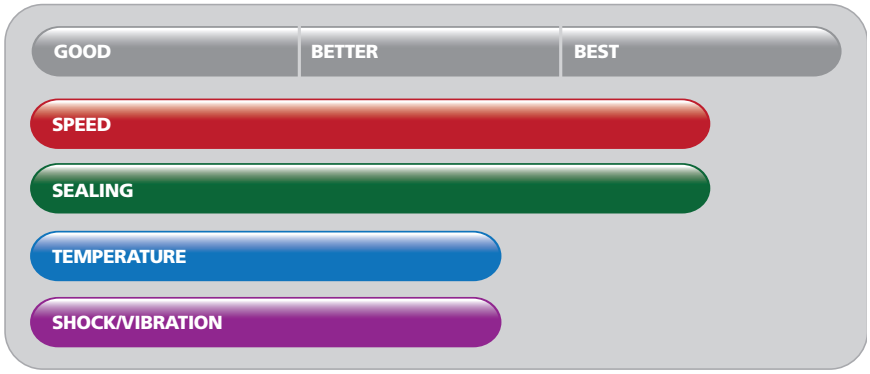
High performance feedback in industry standard sizes with some of the shortest lead times in the industry is the benchmark of the Dynapar product line. Most models are manufactured right here in the USA in Gurnee, IL using the advanced cellular manufacturing concept, ensuring Just-In-Time delivery to meet your needs.

DYNAPAR™

Often considered the “workhorse” of the encoder world, industrial duty encoders achieve a good compromise between ruggedness and performance. These encoders are typically used in factory environments where contaminants like dust and moisture are common. The hollow-shaft variety of industrial duty encoders is often the preferred choice of vector motor OEM’s for speed feedback.

HA25 Pictured

INDUSTRIAL DUTY ENCODER GENERAL PERFORMANCE DATA



DYNAPAR™

OPTICAL - INCREMENTAL

									
Product	Qube 22	H20	HA25	HR25	HC25	H58	H42	HA725	
Shaft/Bore Sizes	1/4″ or 3/8"	1/4″ or 3/8"	1/4″ or 3/8"	1/4″ or 3/8"	1/4″ or 3/8"	6 or 10mm	3/8"	3/8"	
Available Resolutions (PPR)	1 to 1270	1 to 2540	1 to 2540	1 to 1024	3000 to 5000	1 to 2540	1 to 600	8192 to 10000	
Input Voltage (VDC)	5-26	5-26	5-26	5-26	5 to 26	5-26	5-26	5 or 10 to 30	
Operating Temperature (°C)	0 to +70	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	-10 to +70	
Enclosure Rating	NEMA 12/IP54	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 4/IP66 opt.)	NEMA 12/IP54 (NEMA 4/IP66 opt.)	NEMA 12/IP54	NEMA 4/IP66	
Key Features	Economical anodized housing	Reliable dual-row bearing design	Wide range of resolutions available	Unbreakable code disc	High 5000PPR capability	Euro-Standard 58mm mounting	Simplified economical design	Direct-read resolution up to 10,000PPR	
Page Number	2.04	2.08	2.12	2.16	2.20	2.24	2.28	2.30	

OPTICAL - ABSOLUTE

				NEW 	NEW 	
Product	AI25 (DeviceNet)	AI25 (Profibus)	AI25 (Interbus)	AI25 (CANBus)	AI25 (CANLayer2)	
Shaft/Bore Sizes	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	
Available Resolutions (Bits)	Up to 14 bit SingleTurn, 12 bit Multiturn	Up to 14 bit SingleTurn, 12 bit Multiturn	Up to 12 bit SingleTurn, 12 bit Multiturn	Up to 14 bit SingleTurn, 12 bit Multiturn	Up to 14 bit SingleTurn, 12 bit Multiturn	
Input Voltage (VDC)	10 to 30	10 to 30	10 to 30	10 to 30	10 to 30	
Operating Temperature (°C)	–40 to +85	–40 to +85	–40 to +85	–40 to +85	–40 to +85	
Enclosure Rating	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64 or IP67	
Key Features	DeviceNet interface	Profibus interface	Interbus interface	CANBus interface	CANLayer 2 interface	
Page Number	2.64	2.70	2.72	2.66	2.68	

DYNAPAR™

OPTICAL - INCREMENTAL

				NEW 	NEW 				
	H20 Hub	HS20	HS35	HS35R	RI80E	HA26	HR26	HC26	Product
	3/8″ or 5/8"	1/4″ to 5/8" 6mm to 16mm	1/4″ to 1 1/8" 6mm to 24mm	up to 1-1/4" hollow shaft	Max 45mm	1/4", 3/8" or 1/2"	1/4", 3/8" or 1/2"	1/4", 3/8" or 1/2"	Shaft/Bore Sizes
	1 to 2540	1 to 2540	1 to 2500	1 to 5000	1024, 2048, 4096	1 to 2540	1 to 1024	3000 to 5000	Available Resolutions (PPR)
	5-26	5-26	5-26	5-26	5-30	5-26	5-26	5-26	Input Voltage (VDC)
	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	-40 to +70 (0 to +100)	-40 to +70 (0 to +100)	–20 to +70	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	0 to +70 (-40 to +85 opt.)	Operating Temperature (°C)
	NEMA 12/IP54 (NEMA 4/IP66 opt.)	NEMA 4/IP65	NEMA 4/IP65	IP67	NEMA 1/IP50	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	Enclosure Rating
	Hubshaft with spring tether	Electrically isolated hollow shaft	Electrically isolated hollow shaft sizes up to 1.25”	New ruggedized design	Fault detection	Integral coupling	Unbreakable code disc	High 5000PPR resolution capability	Key Features
	2.32	2.36	2.40	2.44	2.48	2.50	2.54	2.58	Page Number

OPTICAL - ABSOLUTE

					NEW 	
	AI25 (Parallel)	AI25 (SSI)	AI25 (BiSS)	AC36	AC110	Product
	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	Shaft: 6 & 10mm, 3/8″ Bore: 10 & 12mm, 3/8″	8mm	50mm	Shaft/Bore Sizes
	Up to 14 bit SingleTurn, 12 bit Multiturn	Up to 17 bit SingleTurn, 12 bit Multiturn	Up to 22 bit SingleTurn, 12 bit Multiturn	Up to 22 bit SingleTurn 12 bit Multiturn	Up to 22 bit SingleTurn 12 bit Multiturn	Available Resolutions (Bits)
	5 or 10-30	5 or 10-30	5 or 10-30	5 or 7-30	5 or 10-30	Input Voltage (VDC)
	–40 to +100	–40 to +100	–40 to +100	–15 to +120	–20 to +70	Operating Temperature (°C)
	IP64 or IP67	IP64 or IP67	IP64 or IP67	IP64	IP40	Enclosure Rating
	Parallel output	SSI output	BiSS interface	Multi-turn positioning in compact size	Large 50mm hollow shaft	Key Features
	2.80	2.76	2.74	2.62	2.84	Page Number

SERIES 22

Dynapar™ brand

"QUBE" Encoder

Key Features

- Economical Anodized Housing
- Dual Shaft Output Option
- Up to 1270PPR with Optional Index

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 1 to 1270 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 shaft rotation as viewed from the shaft end of the encoder farthest from the connector or cable

Quadrature Phasing: 90° ± 18° electrical

Symmetry: 180° ± 18° electrical

Index: 225° ± 90° electrical (active high)

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 110 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: 120 kHz min. data, 50 kHz min. Index

CONNECTIONS

Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

Mechanical

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

Shaft Speed: 6,000 RPM max.

Shaft Tolerance: Nominal -0.0003"/-0.0007"

Starting Torque: 2.5 oz-in max.

Moment of Inertia: 1.3 x 10^{-4} oz–in–sec^2

Weight: 14 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C;

Storage Temperature: –40 to +90 °C

by DYNAPAR™

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** **0400** **0050** **0480** **0060** **0500** **0100** **0512** **0120** **0600** **0125** **0720** **0150** **0800** **0180** **0900** **0192** **1000** **0200** **1024** **0250** **1200** **0256** **1250** **0300** **1270**	**0** 3/8" Double Ended Shaft **1** 3/8" Single Ended Shaft **2** 1/4" Double Ended Shaft **3** 1/4" Single Ended Shaft available when Code 1 = 22M: **4** 6mm Double Ended Shaft **5** 6mm Single Ended Shaft	**0** Single Ended, Table 1 **2** Differential, Table 2 available only when code 6 is 0: **4** Differential, Table 4 available only when Code 1 is 22 or 22M: **1** Single Ended, with Index, Table 3 available only when Code 6 is 1 to 5: **3** Differential, with Index, Table 5 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 Code4 = 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 Code4 = 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 **1** 18" Cable **2** 3' Cable **3** 6' Cable **4** 10' Cable **5** 15' Cable available when Code 4 = 5, 6, 7, 8, 9 or A: **6** M12 Connector

10 foot Cable Assemblies with MS Connector

1400607-0010 6 Pin MS, Cable Assy. For Use with Single Ended Outputs
108241-0010 6 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs
1400664-0010 6 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs
1400431-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

SERIES 22

Dynapar™ brand

ELECTRICAL CONNECTIONS

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

Table 1 – Current Sink Output

Pin	Function	Wire Color Code	Cable Acc'y #14006070010 Color Code
A	Common	BLK	BLK
B	Power Source	RED	RED
C	Case (Ground)	GRN/BLK	GRN
D	Signal A	GRN	BRN
E	Signal B	ORN	ORN
F	Supply Common	BLK	BLK

Table 2 – 7 Pin Line Driver Output

Pin	Function	Wire Color Code	Cable Acc'y #14004310010 Color Code
A	Signal A	GRN	RED
B	Signal B	ORN	BLU
C	Signal $\overline{A}$	RED/BLK	YEL
D	Power Source	RED	WHT
E	Signal $\overline{B}$	WHT/BLK	GRN
F	Common	BLK	BLK
G	Case (Ground)	GRN/BLK	

Table 3 – Current Sink Output w/Marker

Pin	Function	Wire Color Code	Cable Acc'y #108241-0010 Color Code
A	Common	BLK	BLK
B	Power Source	RED	RED
C	Signal Z	WHT	GRN
D	Signal A	GRN	BRN
E	Signal B	ORN	ORN
F	Common	BLK	BLK

Table 4 – 6-Pin Line Driver

Pin	Function	Wire Color Code	Cable Acc'y #14006640010 Color Code
A	Common	BLK	BLK
B	Power Source	RED	RED
C	Signal A	GRN	BRN
D	Signal $\overline{A}$	RED/BLK	BRN/WHT
E	Signal B	ORN	ORN
F	Signal $\overline{B}$	WHT/BLK	ORN/WHT

Table 5 – Cable termination Line Driver Output with Marker

Function	Wire Color Code
Signal A	GRN
Signal B	ORN
Signal Z	WHT
Power Source	RED
Supply Common	BLK
Case (Ground)	GRN/BLK
Signal $\overline{A}$	RED/BLK
Signal $\overline{B}$	WHT/BLK
Signal $\overline{Z}$	BLU

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

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.

	Table 6 5 Pin Single Ended		Table 7 8 Pin Single Ended		Table 8 8 Pin Differential	
Encoder Function	Cable # 112859-		Cable # 112860-		Cable # 112860-	
	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

* Index not provided on all models. See ordering information

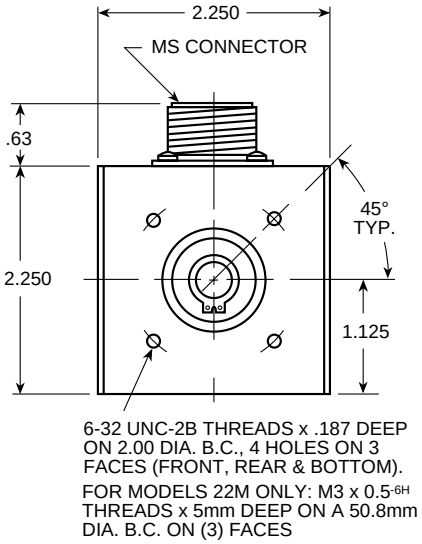
Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

DIMENSIONS

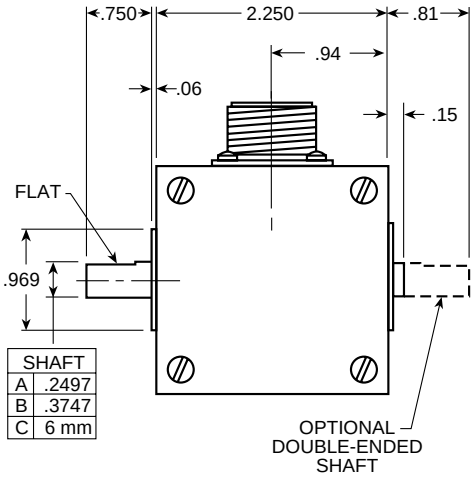
MS Connector Models

Approximate Dimensions (in inches)



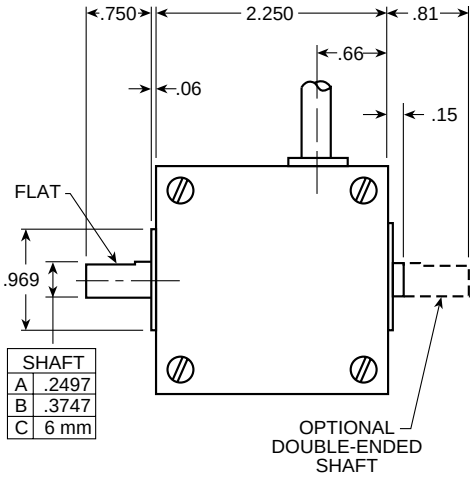
6-32 UNC-2B THREADS x .187 DEEP ON 2.00 DIA. B.C., 4 HOLES ON 3 FACES (FRONT, REAR & BOTTOM).

FOR MODELS 22M ONLY: M3 x 0.5-6H THREADS x 5mm DEEP ON A 50.8mm DIA. B.C. ON (3) FACES



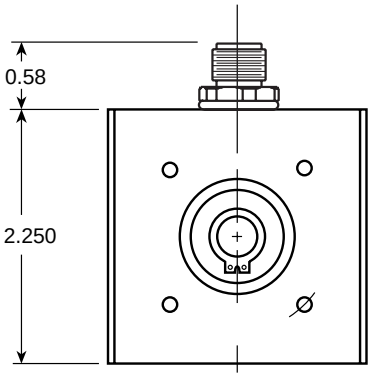
SHAFT	
A	.2497
B	.3747
C	6 mm

Prewired Cable Models



SHAFT	
A	.2497
B	.3747
C	6 mm

M12 Connector Models



SERIES H20

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients.

CONNECTIONS

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)

5 pin, style M12: Cable with connector available

8 pin, style M12: Cable with connector available

MECHANICAL

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: 3.0×10^{-4} oz–in–sec^2

Disk Material: Glass or plastic based on PPR

Weight: 10 oz. max.

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: to 98% without condensation

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, washdown) when ordered with shaft seal and either MS connector or watertight cale 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	Code 3: 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** **0500** **0005** **0512** **0010** **0600** **0012** **0800** **0050** **0900** **0060** **1000** **0086** **1024** **0100** **1200** **0120** **1250** **0125** **1270** **0180** **1500** **0200** **1600** **0240** **1800** **0250** **1968** **0254** **2000** **0256** **2048** **0300** **2400** **0360** **2500** **0400** **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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

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. H20 models with direct cable exit carry the same color coding as shown for each output configuration.

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 # 1400635-10 Pin Dif Line Drv w/ Idx	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN
Sig. B	D	ORN	B	ORG	B	ORG	B	ORG
Sig. Z	C	YEL	C	YEL	—	—	C	YEL
Power +V	B	RED	D	RED	D	RED	D	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK
Case	—	—	G	GRN	G	GRN	G	GRN
N/C	F	—	E	—	—	—	E	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT
Sig. $\overline{Z}$	—	—	—	—	—	—	J	YEL/WHT

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

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.

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

* Index not provided on all models. See ordering information

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

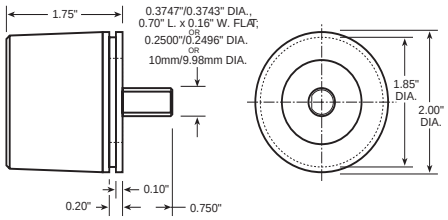
by DYNAPAR™

SERIES H20

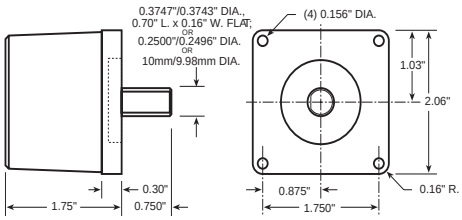
DIMENSIONS

Code 3: Housings

0 Servo Mount

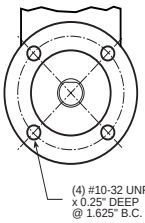


1 Flange Mount

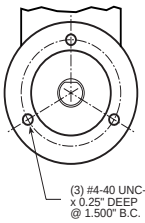


Code 5: Face Mounts

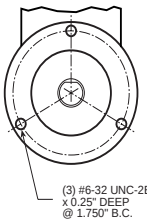
1



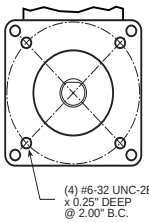
2



3

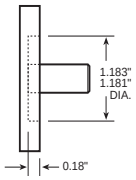


4

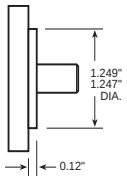


Code 6: Pilots

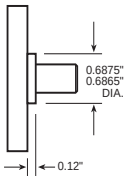
0 Female



1, 2 Male

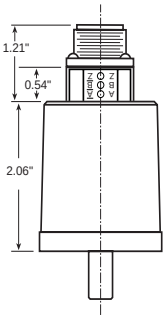


3, 4 Male

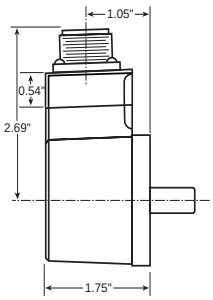


Code 8: Terminations

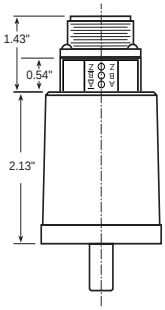
0, 2
6, 7 Pin End Conn



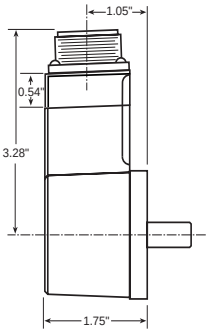
1, 3
6, 7 Pin Side Conn



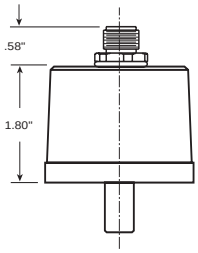
4
10 Pin End Conn



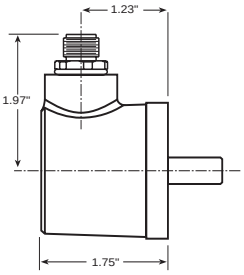
5
10 Pin Side Conn



N, Q
M12 End Conn

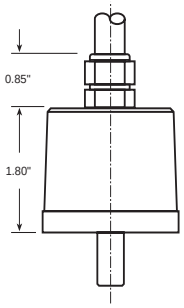


P, R
M12 Side Conn

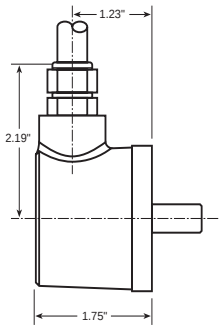


Code 8: 0-5 dimensions shown with LED Output Indicator Option (Code 9: **PS**)

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



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



SERIES HA25

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

CONNECTIONS

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available

8 pin, style M12: Cable with connector available

MECHANICAL

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

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: to 98% without condensation

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

Code 2: PPR

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

Code 3: Mechanical

- **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

Code 4: Output

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

Code 5: Electrical

- **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

Code 6: Termination

- **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
- **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

Code 7: Options

available when Code 4 is 0 thru G, and Code 6 is 0 or 1:

- **PS** LED Output Indicator

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index 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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)

SERIES HA25

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

Table 1 – Differential

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

*Cable Accessory: P/N 14006350010

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 2 – Single Ended

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD

*Cable Accessory: P/N 14004310010

Table 3 – Differential

Pin	Function (If Used)	Cable Accessory Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal $\overline{A}$	BRN/WHT
D	Power Source	RED
E	Signal $\overline{B}$	ORN/WHT
F	Common	BLK
G	Case	GRN

*Cable Accessory: P/N 108596

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

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.

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-		Cable # 112860-		Cable # 112860-	
	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

* Index not provided on all models. See ordering information

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

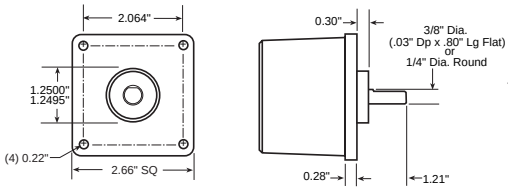
by DYNAPAR™

SERIES HA25

DIMENSIONS

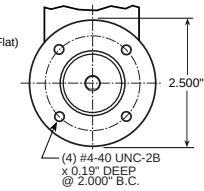
Code 3: Mechanical

0,2: Flange

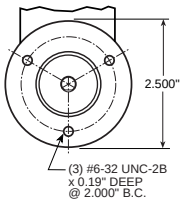


Note: Flat provided on 3/8" shaft

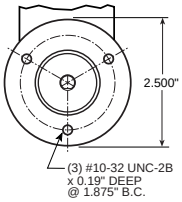
1,3: 2.5" Servo



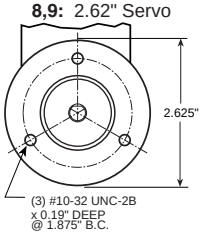
4,5: 2.5" Servo

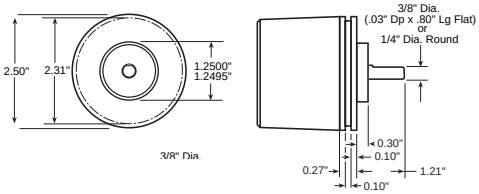


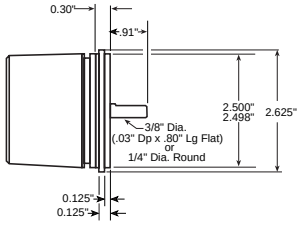
6,7: 2.5" Servo



8,9: 2.62" Servo



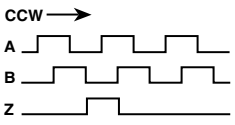




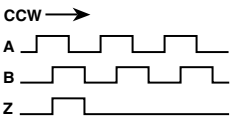
Note: Flat provided on 3/8" shaft

Code 4: Output

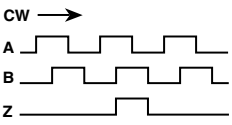
0 - 3: Format A



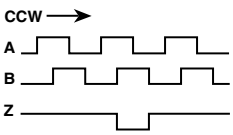
4,5: Format B



6 - D: Format C



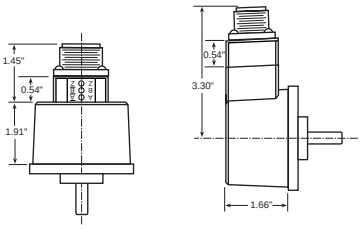
G: Format D



Code 6: Termination

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

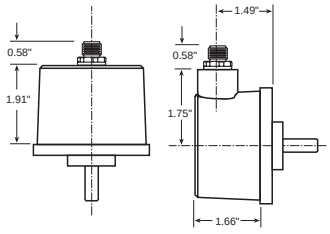
When Code 5 is 0 to 6 or A to G



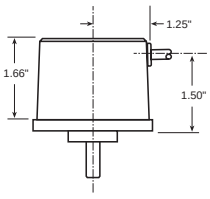
Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

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

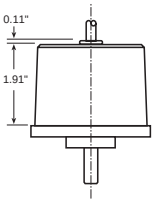
When Code 5 is H to Z



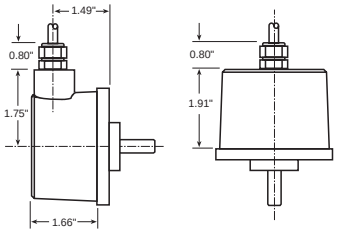
2 - 6: Side Cable



J - N: End Cable



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



SERIES HR25

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

CONNECTIONS

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

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

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: to 98% without condensation

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
0005 0256
0010 0300
0012 0360
0050 0400
0060 0500
0086 0512
0100 0600
0120 0635
0125 0800
0180 0900
0200 1000
0240 1024

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

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
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

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index 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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)

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

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	BRN
B	Signal B	ORN	ORN
C	Signal Z	YEL	YEL
D	Power Source	RED	RED
E	No Connection	—	—
F	Common	BLK	BLK
G	Case	GRN	GRN
H	Signal $\overline{A}$	BRN/WH	BRN/WH
I	Signal $\overline{B}$	ORN/WH	ORN/WH
J	Signal $\overline{Z}$	YEL/WH	YEL/WH
*Cable Accessory: P/N 14006350010			

Table 2 – Single Ended

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD
*Cable Accessory: P/N 14004310010			

Table 3 – Differential

Pin	Function (If Used)	Cable Accessory Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal $\overline{A}$	BRN/WHT
D	Power Source	RED
E	Signal $\overline{B}$	ORN/WHT
F	Common	BLK
G	Case	GRN
*Cable Accessory: P/N 1085960010		

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

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.

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-		Cable # 112860-		Cable # 112860-	
	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

* Index not provided on all models. See ordering information

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

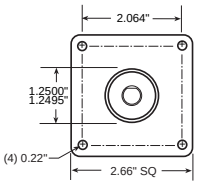
by DYNAPAR™

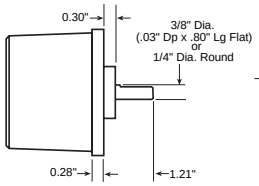
SERIES HR25

DIMENSIONS

Code 3: Mechanical

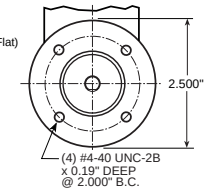
0,2: Flange



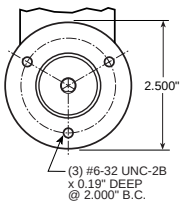


Note: Flat provided on 3/8" shaft

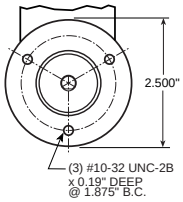
1,3: 2.5" Servo



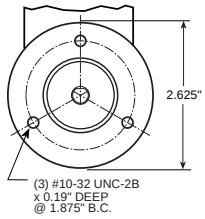
4,5: 2.5" Servo

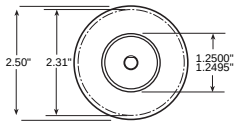


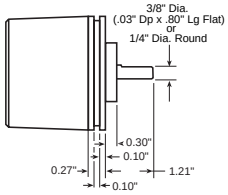
6,7: 2.5" Servo

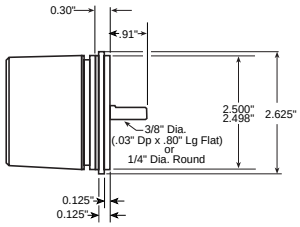


8,9: 2.62" Servo





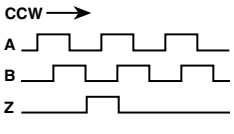




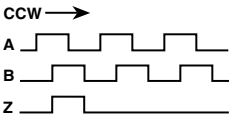
Note: Flat provided on 3/8" shaft

Code 4: Output

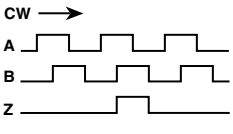
0-3: Format A



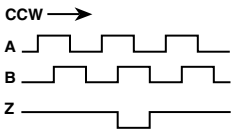
4,5: Format B



6-D: Format C



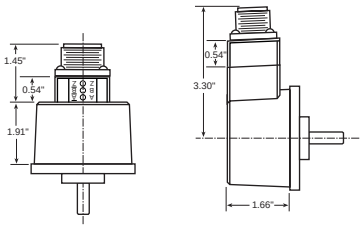
G: Format D



Code 6: Termination

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

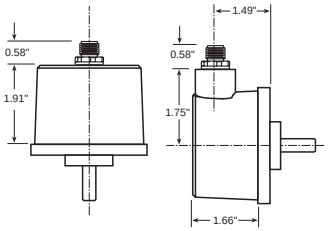
When Code 5 is 0 to 6 or A to G



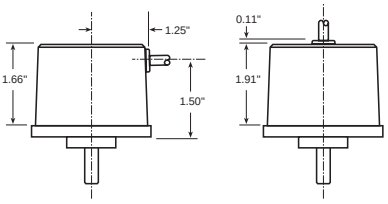
Code 6: 0 & 1 dimensions shown with LED Output Indicator Option (Code 7: **PS**)

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

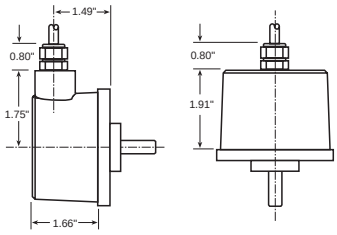
When Code 5 is H to Z



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

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

Frequency Response: 250 kHz

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

CONNECTIONS

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

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

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: to 98% without condensation

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

HC525 Size 25 Enclosed, Shielded Bearings

HC625 Size 25 Enclosed, with Shaft Seal

Code 2: PPR

3000 3,000
3600 3,600
4096 4,096
5000 5,000

Code 3: Mechanical

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

Code 4: Output

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

Code 5: Electrical

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

Code 6: Termination

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

Code 7: Options

Blank None

available when Code 4 is 0 thru G, and Code 6 is 0 or 1:

PS LED Output Indicator

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index 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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

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

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	BRN
B	Signal B	ORN	ORN
C	Signal Z	YEL	YEL
D	Power Source	RED	RED
E	No Connection	—	—
F	Common	BLK	BLK
G	Case	GRN	GRN
H	Signal $\overline{A}$	BRN/WH	BRN/WH
I	Signal $\overline{B}$	ORN/WH	ORN/WH
J	Signal $\overline{Z}$	YEL/WH	YEL/WH
*Cable Accessory: P/N 14006350010			

Table 2 – Single Ended

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD
*Cable Accessory: P/N 14004310010			

Table 3 – Differential

Pin	Function (If Used)	Cable Accessory Color Code
A	Signal A	BRN
B	Signal B	ORN
C	Signal $\overline{A}$	BRN/WHT
D	Power Source	RED
E	Signal $\overline{B}$	ORN/WHT
F	Common	BLK
G	Case	GRN
*Cable Accessory: P/N 1085960010		

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

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.

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-		Cable # 112860-		Cable # 112860-	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	BLK	1	BRN	1	BRN
Sig. B	2	WHT2	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

* Index not provided on all models. See ordering information

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

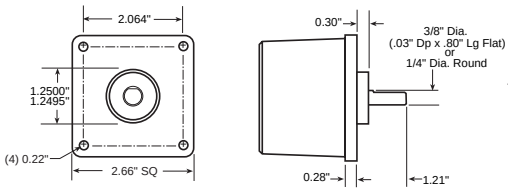
by DYNAPAR™

SERIES HC25

DIMENSIONS

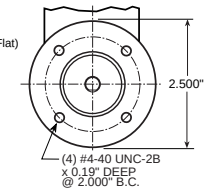
Code 3: Mechanical

0,2: Flange

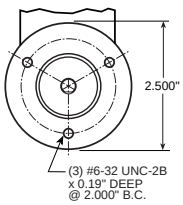


Note: Flat provided on 3/8" shaft

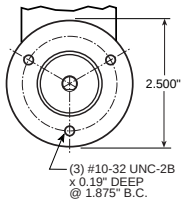
1,3: 2.5" Servo



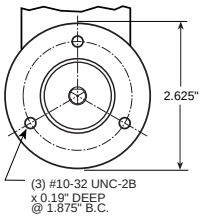
4,5: 2.5" Servo

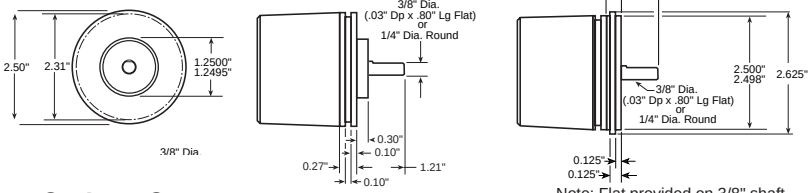


6,7: 2.5" Servo



8,9: 2.62" Servo

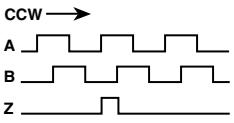




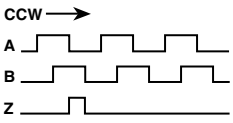
Note: Flat provided on 3/8" shaft

Code 4: Output

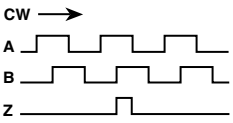
0 - 3: Format A



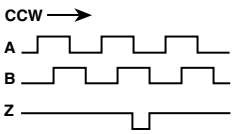
4,5: Format B



6 - D: Format C



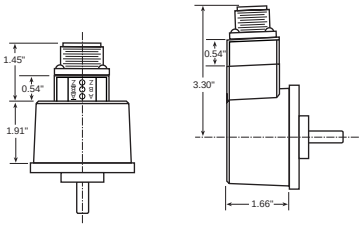
G: Format D



Code 6: Termination

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

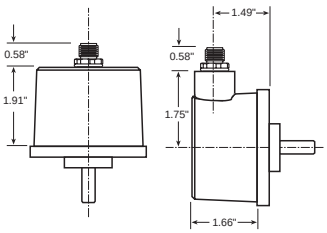
When Code 5 is 0 to 6 or A to G



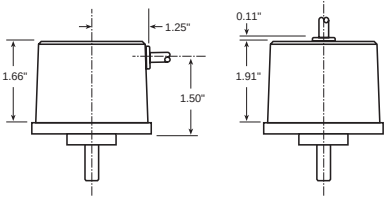
Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

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

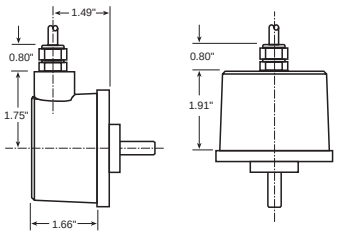
When Code 5 is H to Z



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



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



SERIES H58

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

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

4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

CONNECTIONS

Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
12 pin style M23, CW (605560-0001)

12 pin style M23, CCW (605560-0002)
5 pin, style M12: Cable with connector available

8 pin, style M12: Cable with connector available

MECHANICAL

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-cm^2

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

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: to 98% without condensation

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, washdown) when ordered with shaft seal and either MS 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** **0500** **0005** **0512** **0010** **0600** **0012** **0800** **0050** **0900** **0060** **1000** **0086** **1024** **0100** **1200** **0120** **1250** **0125** **1270** **0180** **1500** **0200** **1600** **0240** **1800** **0250** **1968** **0254** **2000** **0256** **2048** **0300** **2400** **0360** **2500** **0400** **2540**	**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 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) **A** Same as "**0**" with extend. temp range **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

10 foot Cable Assemblies with MS Connector

108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

108615-0010 12 Pin CCW (if used) MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

108616-0010 12 Pin CW (if used) MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

15 foot Cable Assemblies with M12 Connector

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

112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs

112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

SERIES H58

Dynapar™ brand

ELECTRICAL CONNECTIONS

7, 10 and 12 Pin 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 same color coding as shown for each output configuration.

Encoder Function	Cable # 108595-7 Pin (If Used)		Cable # 1400635-10 Pin (If Used)		Cable # 108615-12 Pin CCW (If Used)		Cable # 108616-12 Pin CW (If Used)	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	A	BRN	A	BRN	5	BRN	3	BRN
Sig. B	B	ORN	B	ORG	8	ORG	4	ORG
Sig. 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	—	—	—
Sig. $\overline{A}$	—	—	H	BRN/WHT	6	BRN/WHT	5	BRN/WHT
Sig. $\overline{B}$	—	—	I	ORG/WHT	1	ORG/WHT	6	ORG/WHT
Sig. $\overline{Z}$	—	—	J	YEL/WHT	4	YEL/WHT	8	YEL/WHT
5V Sense	—	—	—	—	2	GRN	—	—
0V Sense	—	—	—	—	11	BLK/WHT	—	—

Mating connector/cable assembly wire color information is provided here for reference. H58 models with direct cable exit carry the same color coding as shown for each output configuration.

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

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.

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

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

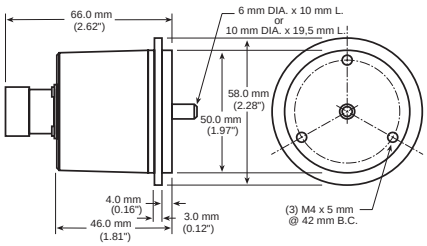
by DYNAPAR™

SERIES H58

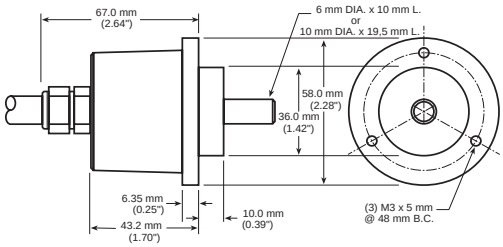
DIMENSIONS

Code 3: Pilot, Face Mounts

0 no Pilot, 42mm B.C.

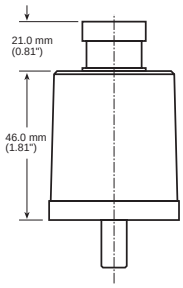


1 36mm Pilot, 48mm B.C.

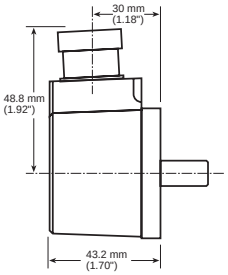


Code 7: Terminations

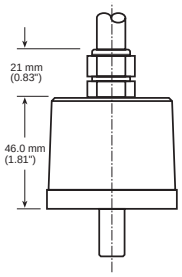
4, 6
12 Pin End Conn



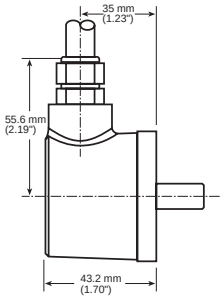
5, 7
12 Pin Side Conn



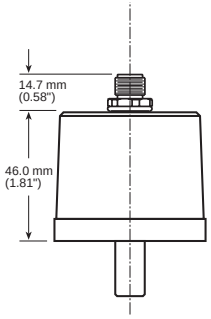
8, A
End Exit Cable



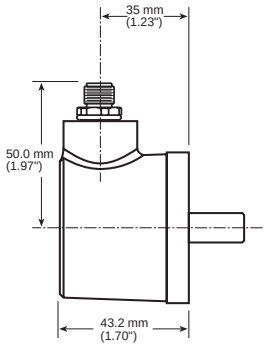
9, B
Side Exit Cable



C, E
M12 End Conn

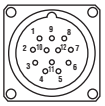


D, F
M12 Side Conn



Code 7: Terminations

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



SERIES H42

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 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.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

ELECTRICAL CONNECTIONS

With Line Driver Output		
Pin	**Function (If Used)**	**#14004310010* Cable Accessory Color Code**
A	Signal A	RED
B	Signal B	BLUE
C	Signal $\bar{A}$	YELLOW
D	Power Source	WHITE
E	Signal $\bar{B}$	GREEN
F	Common	BLACK
G	Case	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.

CONNECTIONS

Connector Termination:
7 pin, style MS3102E-16S-1P
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);

MECHANICAL

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

Weight: 13 oz.

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: to 98% without condensation

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

by DYNAPAR™

SERIES H42

Ordering Information

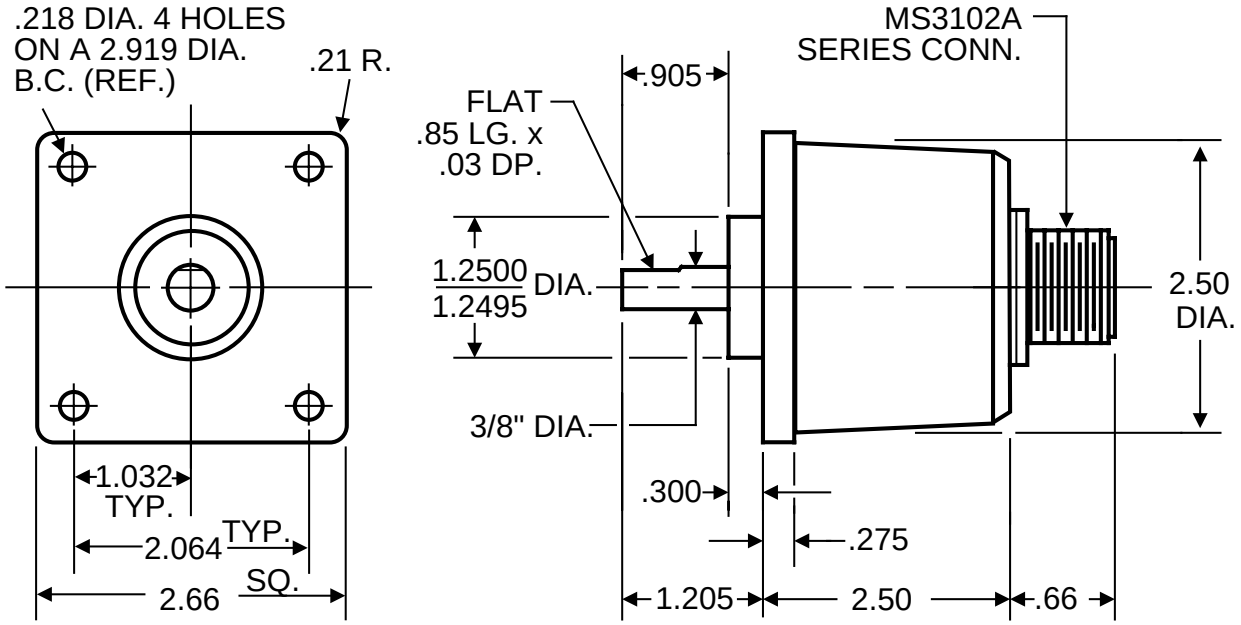
To order, complete the model number with code numbers from the table below:

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

10 foot Cable Assembly with MS Connector

1400635-0010 7 Pin MS, Cable Assy. For Use with Differential Line Driver Outputs

DIMENSIONS



SERIES HA725

Dynapar™ brand

Shafted Encoder

Key Features

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

CE RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

CONNECTIONS

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

MECHANICAL

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

Shaft Speed: 10,000 RPM max.mechanical

Bearing Life:
10^9 revolutions at 35% of rated load
10^8 revolutions at 75% of rated load
10^7 revolutions at 100% of rated load

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

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: to 98% without condensation

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

ELECTRICAL CONNECTIONS

*Mating connector/cable assembly wire color information is provided here for reference.

Encoder Function	Cable #108595-* 7 Pin Single Ended		Cable #1400635-* 10 Pin Dif Line Drv w/Inx	
	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	F	BLK	F	BLK
Case	G	GRN	G	GRN
N/C	E	—	E	—
Sig. $\bar{A}$	—	—	H	BRN/WHT
Sig. $\bar{B}$	—	—	I	ORG/WHT
Sig. $\bar{Z}$	—	—	J	YEL/WHT

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

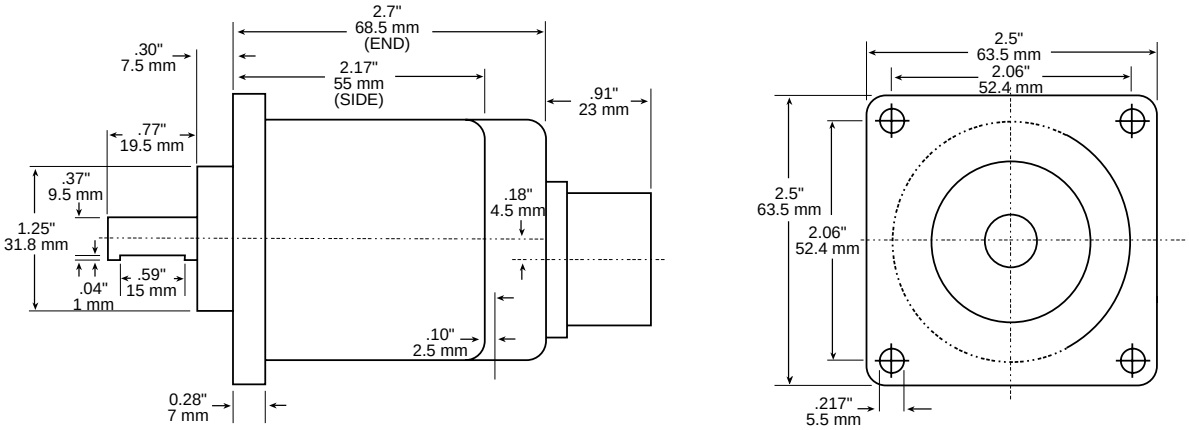
10 foot Cable Assemblies with MS Connector

108595-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

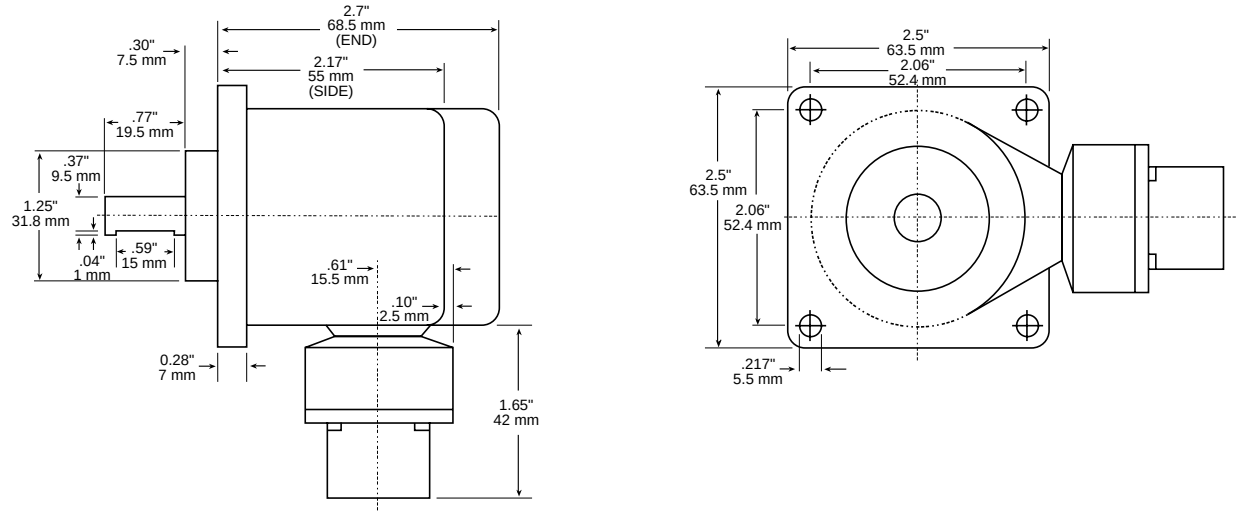
1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

DIMENSIONS

Code 6: Termination: 0



Code 6: Termination: 1



SERIES H20 Hubshaft

Dynapar™ brand

Shafted Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

4469 Differential Line Driver: 100 mA sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)

5 pin, style M12: Cable with connector available

8 pin, style M12: Cable with connector available

MECHANICAL

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

Weight: 10 oz. max.

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: to 98% without condensation

Enclosure Rating: NEMA12/IP54 (dirt tight, splashproof); NEMA4/IP66 (dust proof, washdown) when ordered with shaft seal and either MS connector or watertight cale 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: Shaft	Code 5: Face Mount	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** **0500** **0005** **0512** **0010** **0600** **0012** **0800** **0050** **0900** **0060** **1000** **0086** **1024** **0100** **1200** **0120** **1250** **0125** **1270** **0180** **1500** **0200** **1600** **0240** **1800** **0250** **1968** **0254** **2000** **0256** **2048** **0300** **2400** **0360** **2500** **0400** **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

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

15 foot Cable Assemblies with M12 Connector

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

112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs

112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

SERIES H20 Hubshaft

Dynapar™ brand

ELECTRICAL 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. H20 models with direct cable exit carry the same color coding as shown for each output configuration.

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 # 1400635-10 Pin Dif Line Drv w/ Idx	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	E	BRN	A	BRN	A	BRN	A	BRN
Sig. B	D	ORN	B	ORG	B	ORG	B	ORG
Sig. Z	C	YEL	C	YEL	—	—	C	YEL
Power +V	B	RED	D	RED	D	RED	D	RED
Com	A	BLK	F	BLK	F	BLK	F	BLK
Case	—	—	G	GRN	G	GRN	G	GRN
N/C	F	—	E	—	—	—	E	—
Sig. $\overline{A}$	—	—	—	—	C	BRN/WHT	H	BRN/WHT
Sig. $\overline{B}$	—	—	—	—	E	ORG/WHT	I	ORG/WHT
Sig. $\overline{Z}$	—	—	—	—	—	—	J	YEL/WHT

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

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.

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

* Index not provided on all models. See ordering information

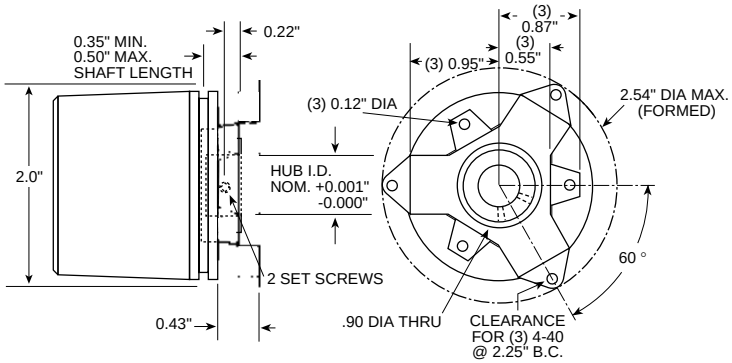
Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

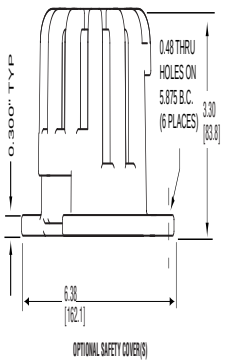
by DYNAPAR™ SERIES H20 Hubshaft

DIMENSIONS

Codes 3-5: Housing, Shafts, Face Mount

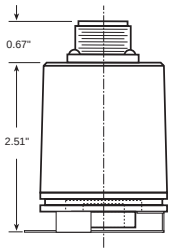


Cover Option: **C, F**

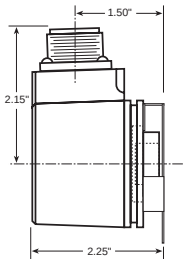


Code 8: Terminations

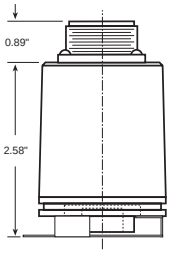
0, 2
6, 7 Pin End MS Conn



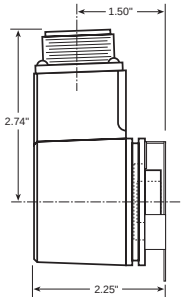
1, 3
6, 7 Pin Side MS Conn



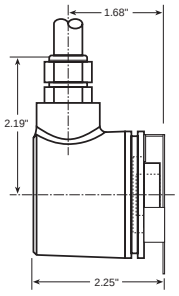
4
10 Pin End MS Conn



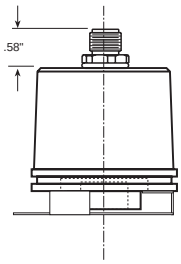
5
10 Pin Side MS Conn



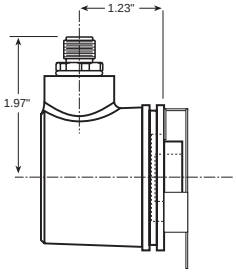
7, 9, B, D, F, H
Side Exit Cable



N, Q
End M12 Conn



P, R
Side M12 Conn



SERIES HS20

Dynapar™ brand

Sealed Hollowshaft Encoder

Key Features

- **Hollowshaft Design Eliminates Brackets and Couplings**
- **Electrically Isolated Shaft Design**
- **Compact Size for Tight Mounting Constraints**

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 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:
4.5 min. to 26 VDC max. at 100 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

Frequency Response: 100 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

Mating Connector:
6 pin, style MS3106A-14S-6S (MCN-N4);
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6);
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

Bearing Life: (at maximum tether loading)
Standard tether: $5x10^9$ revolutions
Slotted tether: $8x10^9$ revolutions

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: 5.1×10^{-4} oz–in–sec^2

Weight: 10 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: 0 to +70° C
Extended: –40 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: **0001 0300** **0005 0360** **0010 0400** **0012 0500** **0050 0512** **0060 0600** **0100 0720** **0120 0768** **0180 0800** **0200 0900** **0240 1000** **0250 1024** **0256** 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	**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 ($A\bar{A}$ $B\bar{B}$) available when Code 6 is 3, 4, A or B and code 7 is 2, or 7 thru G: **4** differential, bidirectional with index ($A\bar{A}$ $B\bar{B}$ $Z\bar{Z}$)	**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. –40˚ to 85˚C **B** same as **'4'** with extended temp. –40˚ to 85˚C	**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" (.5m) cable **B** 36" (1m) cable **C** 72" (2m) cable **D** 10' (3m) cable **F** 13" (.3m) cable with 10 pin connector plus mating connector **G** 13" (.3m) 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 or 5 and Code 5 is 0-2, or Code 7 is 1, 2, 6, 7: **PS** LED Output Indicator

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

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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

SERIES HS20

Dynapar™ brand

ELECTRICAL CONNECTIONS

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

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HS20 models with direct cable exit carry the same color coding as shown for each output configuration.

Encoder Function	Cable #108594-* 6 Pin Single Ended		Cable #112123-* 6 Pin Dif Line Drv w/o Idx		Cable #108596-* 7 Pin Dif Line Drv w/o Idx		Cable #108595-* 7 Pin (If Used)		Cable #1400635-* 10 Pin (If Used)	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN
Sig. B	D	ORN	D	ORN	B	ORN	B	ORN	B	ORN
Sig. 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
Sig. $\overline{A}$	—	—	C	BRN/WHT	C	BRN/WHT	—	—	H	BRN/WHT
Sig. $\overline{B}$	—	—	F	ORN/WHT	E	ORN/WHT	—	—	I	ORN/WHT
Sig. $\overline{Z}$	—	—	—	—	—	—	—	—	J	YEL/WHT

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

5 & 8 Pin M12 Accessory Cables when Code 7= H or J

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

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

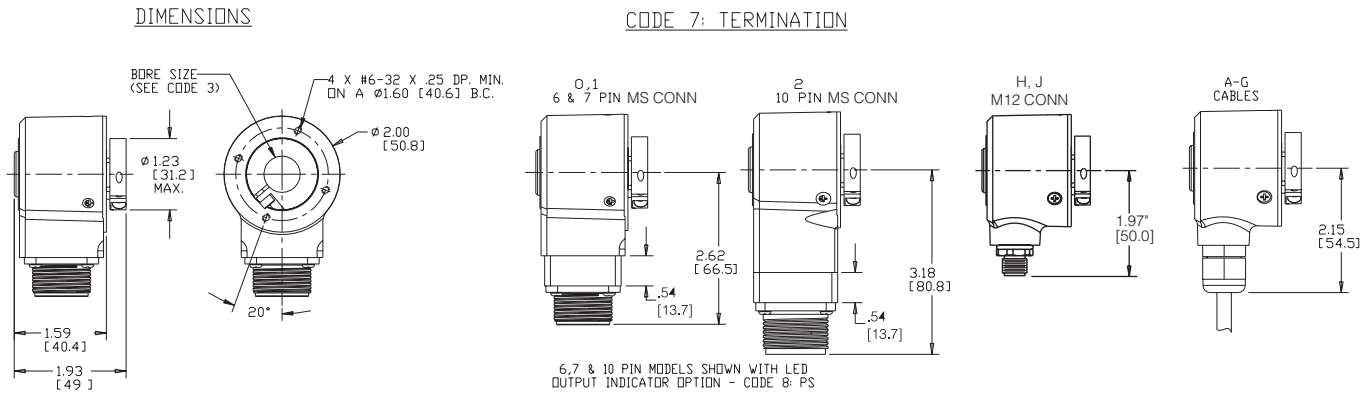
Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

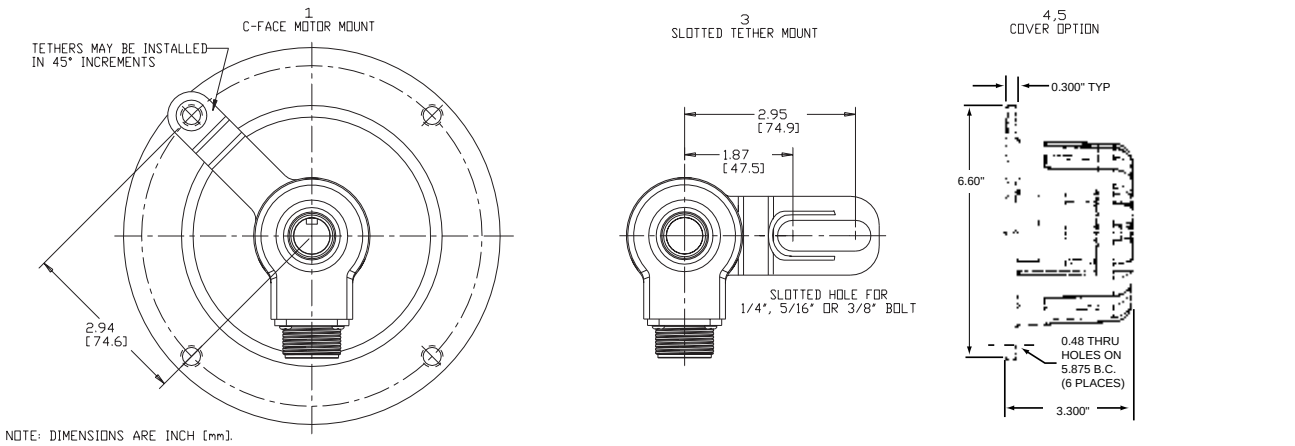
***Note:** Standard cable length is 10 feet but may be ordered in any length in 5 foot increment. For example, -0020 is a 20 foot cable.

†Note: Index not provided on all models. See ordering information

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

DIMENSIONS


DIMENSIONS
BORE SIZE (SEE CODE 3)
4 X #6-32 X .25 DP. MIN. ON A Ø1.60 [40.6] B.C.
Ø 1.23 [31.2] MAX.
Ø 2.00 [50.8]
20°
1.59 [40.4]
1.93 [49]
CODE 7: TERMINATION
0,1 6 & 7 PIN MS CONN
2 10 PIN MS CONN
H, J M12 CONN
A-G CABLES
2.62 [66.5]
.54 [13.7]
3.18 [80.8]
.54 [13.7]
1.97" [50.0]
2.15 [54.5]
6,7 & 10 PIN MODELS SHOWN WITH LED OUTPUT INDICATOR OPTION - CODE 8: PS


CODE 4: FIXING
1 C-FACE MOTOR MOUNT
TETHERS MAY BE INSTALLED IN 45° INCREMENTS
2.94 [74.6]
3 SLOTTED TETHER MOUNT
2.95 [74.9]
1.87 [47.5]
SLOTTED HOLE FOR 1/4", 5/16" OR 3/8" BOLT
4,5 COVER OPTION
0.300" TYP
6.60"
0.48 THRU HOLES ON 5.875 B.C. (6 PLACES)
3.300"
NOTE: DIMENSIONS ARE INCH [mm].

SERIES HS35

Dynapar™ brand

Sealed Hollowshaft Encoder

Key Features

- **The Original Vector-Duty Hollowshaft Size 35 Encoder**
- **Electrically Isolated Shaft Sizes up to 1.25”**
- **Multitude of Configurations and Accessories Available**
- **Hazardous Location Certification Available**

SPECIFICATIONS

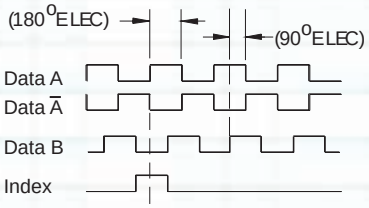
STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 1 to 2500 PPR (pulses/revolution)
Accuracy: (worst case any edge to any other edge) ±7.5 arc-min.
Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp 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: (each output)
4.5 min. to 26 VDC max. at 100 mA max., not including output loads
Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA sink or source
Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

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



A Leads B CW

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)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

Bearing Life: 80,000 hours at 3600 RPM; 128,000 hours at 1800 RPM
Shaft Loading: 40 lbs. radial, 30 lbs. axial
Shaft Speed: 3600 RPM max. (Important: see Operating Temperature derating for >1800 RPM)
Shaft Bore Tolerance: Nominal +0.0003” +0.0005” (+0.008/+0.013 mm)
Mating Shaft Requirements:
Runout: ±0.025" (063 mm) radial typical ;
Endplay: ±0.050" (1.27 mm) axial typical ;
Minimum: 1.25" (32 mm) recommended;
Maximum: 2.0" (51 mm) to fit inside cover;
Solid shaft recommended; keyway allowed; flatted shaft should not be used

Starting Torque: 5.0 oz-in max.
Running Torque: 4.5 oz.-in max.
Moment of Inertia:
≤ 5/8" bore: 7.9 x 10^{-4} oz–in–sec^2
> 5/8" bore: 25.6 x 10^{-4} oz–in–sec^2
Weight: 16 oz. max.

ENVIRONMENTAL

Operating Temperature:
Standard: –40 to +70 °C;
Extended: –40 to +100 °C;
≤ 5/8" bore: Derate 5 °C per 1000 RPM above 1800 RPM;
> 5/8" bore: Derate 10 °C per 1000 RPM above 1800 RPM.
Storage Temperature: –40 to +90 °C
Shock: 50 Gís for 11 milliseconds duration
Vibration: 5 to 2000 Hz at 20 Gs
Humidity: to 98% without condensation
Enclosure Rating: NEMA4/IP67
Hazardous Location Certification:
Available as Optional Feature. Class I, Division 2, Group A, B, C & D. CSA File No. LR86404

by DYNAPAR™

SERIES HS35

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
HS35	□□□□	□	□	□	□	□	□□

Ordering Information

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
HS35 Size 35 heavy-duty, sealed hollowshaft encoder	**0001** **0500** **0003** **0512** **0010** **0600** **0012** **0900** **0050** **1000** **0060** **1024** **0064** **1200** **0100** **1270** **0120** **1500** **0240** **1800** **0250** **2000** **0300** **2048** **0360** **2400** **2500**	**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** 19 mm **C** 3/4" **D** 20 mm **E** 7/8" **F** 24 mm **G** 1" **H** 1-1/8" **P** 1-1/4"	**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) **2** Clearance hole for 1/2" bolt on 7.25" dia. bolt circle (to fit 8-1/2" NEMA C-face) **3** Slotted hole for bolt on 2.5" to 4.0" radius (to fit standard AC motor fan cover slots) Available when Code 5 is 0-4: **4** Same as **'1'**, w/ cover kit **5** Same as **'3'**, w/ cover kit Available when Code 5 is 5: **6** Same as **'1'** w/ dual cover kit **7** Same as **'3'** w/ dual 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, 5, 6, A or B: **3** differential, bidirectional ($A\bar{A}$ $B\bar{B}$) available when Code 6 is 3, 4, 5, 6, A or B and Code 7 is 2, 3, or 7 thru G, J: **4** differential, bidirectional with index ($A\bar{A}$ $B\bar{B}$ $Z\bar{Z}$) available when Code 6 is 3, 4, 5, 6, A or B, and Code 7 is 2, 7, A thru G, J: **5** Dual isolated differential, bi-directional w/index ($A\bar{A}B\bar{B}Z\bar{Z}$)	**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, 4 or 5: **3** 5-26V in, 5V line driver out (7272) **4** 5-26V in, 5-26V 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 **'3'** with extended temp. to 100˚C **B** same as **'4'** with extended temp. to 100˚C	**0** 6 pin connector **1** 7 pin connector **2** 10 pin connector **3** 12 pin connector **5** 6 pin connector, plus mating connector **6** 7 pin connector, plus mating connector **7** 10 pin connector, plus mating connector **8** 12 pin connector, plus mating connector **A** 18" (.5m) cable **B** 36" (1m) cable **C** 72" (2m) cable **D** 10' (3m) cable **F** 13" (.3m) cable with 10 pin connector plus mating connector **G** 13" (.3m) cable **J** 8 Pin M12 Connector available when Code 5 is 0 thru 2 **H** 5 Pin M12 Connector	**D2** Hazardous Location Certified available when Code 7 is 2 **D3** Same as D2 including adapter for CSA Div. 2, Group F & G Certification (see specifications) ***Note: Requires use of Mating Cable Assembly 114074-XXXX*** available when Code 7 is 0 or 5 and Code 5 is 0-2, or Code 7 is 1, 2, 6, 7: **PS** LED Output Indicator ***Not provided with "Hazardous Location Certified" Option*** **Leave Blank** : No Option

109473-0001 Tether kit (clearance hole for 3/8" bolt on 5.88" dia. bolt circle)
109473-0002 Tether kit (clearance hole for 1/2" bolt on 7.25" dia. bolt circle)
109473-0003 Tether kit (slotted hole for bolt on 2.5" to 4.0" radius)
112121-0001 Spare Hub Clamp (Bore size Code 3: 0 - 9)
112121-0002 Spare Hub Clamp (Bore size Code 3: A - H)
110533-0001 Cover Kit, 56C face
110533-0002 Cover Kit, fan cover
110533-0003 Dual Cover Kit, 56C face
110533-0004 Dual Cover Kit, fan cover
114064-0001 Adapter Kit, CSA Division 2, Group F & G, Cert.
114074-XXXX D3 Mating Cable Assembly. "-XXXX" denotes length in feet; example -0010 equals 10 feet.

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
112123-0010 6 Pin MS, Cable Assy. For Use with Differential Line Driver without Index Outputs
108615-0010 12 Pin CCW MS, Cable Assy.

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

SERIES HS35

Dynapar™ brand

ELECTRICAL CONNECTIONS

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

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HS35 models with direct cable exit carry the same color coding as shown for each output configuration.

Encoder Function	Cable #108594-* 6 Pin Single Ended		Cable #112123-* 6 Pin Dif Line Drv w/o Id x		Cable #108596-* 7 Pin Dif Line Drv w/o Id x		Cable #108595-* 7 Pin (If Used)		Cable #1400635-* 10 Pin (If Used)		Cable #108615-* 12 Pin CCW (If Used)	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN
Sig. B	D	ORN	D	ORN	B	ORN	B	ORN	B	ORN	8	ORN
Sig. Z	C	YEL	—	—	—	—	C	YEL	C	YEL	3	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED	12	RED
N/C	F	—	—	—	—	—	E	—	E	—	7	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN	9	—
Sig. $\overline{A}$	—	—	C	BRN/WHT	C	BRN/WHT	—	—	H	BRN/WHT	6	BRN/WHT
Sig. $\overline{B}$	—	—	F	ORN/WHT	E	ORN/WHT	—	—	I	ORN/WHT	1	ORN/WHT
Sig. $\overline{Z}$	—	—	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT
0V Sense	—	—	—	—	—	—	—	—	—	—	2	GRN
5V Sense	—	—	—	—	—	—	—	—	—	—	11	BLK/WHT

5 & 8 Pin M12 Accessory Cables when Code 7= H or J

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

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

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

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

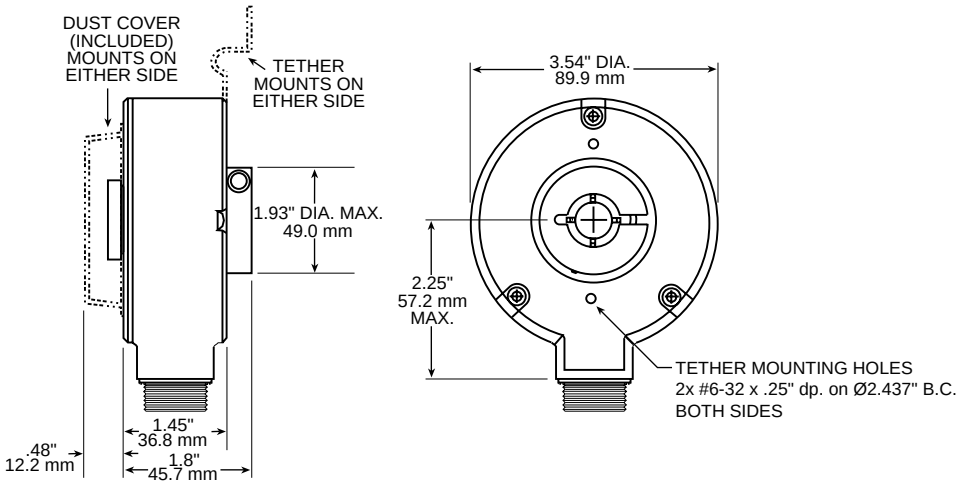
†Note: Index not provided on all models. See ordering information

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

by DYNAPAR™

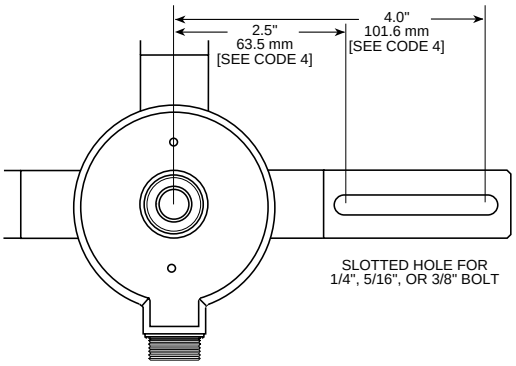
SERIES HS35

DIMENSIONS

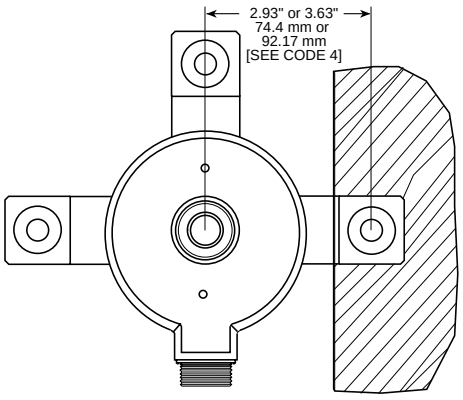


Code 4: Fixing

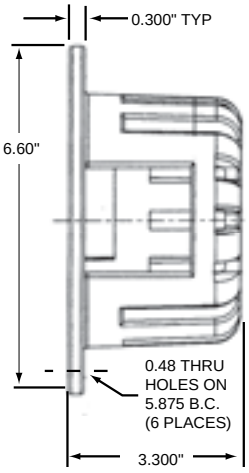
3
Fan Cover Motor Mount



1, 3
Machine Mount

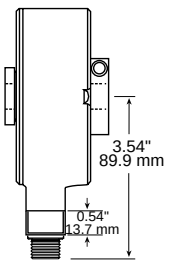


4, 5, 6, 7
Cover Option

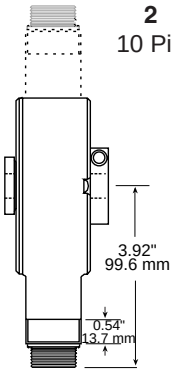


Code 7: Termination

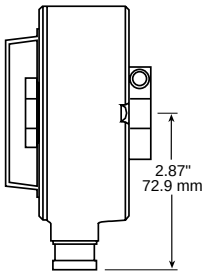
0, 1
6 & 7 Pin MS



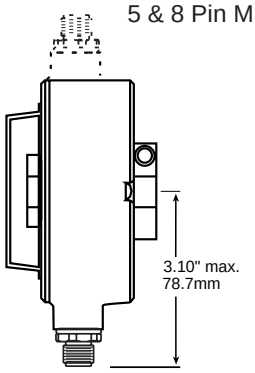
2
10 Pin MS



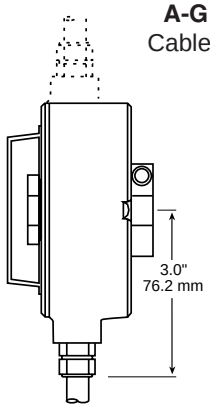
3
12 Pin MS



H, J
5 & 8 Pin M12



A-G
Cables



6 & 7 Pin and 10 Pin shown with
LED Output Indicator Option - Code 8: **PS**

NEW for 2010!

SERIES HS35R

Dynapar™ brand

Sealed Hollowshaft Encoder

Key Features

- **Phased Array Sensor for Reliable Signal Output**
- **Rugged Design Withstands up to 400g Shock**
- **Unbreakable Code Disc up to 5000PPR**
- **Improved Seal Design for Increased Moisture Resistance**

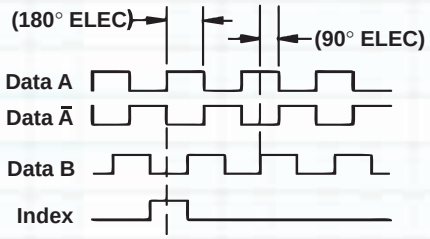
STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z), and complementary outputs
Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing: For resolutions to 1200 PPR: 90° ± 15° electrical; For resolutions over 1250 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: 5-26VDC, 5-15VDC. 50 mA max., not including output loads.
Outputs: ET7272, ET7273, 4469
Frequency Response: 125 kHz (data & index)
Noise Immunity: Tested to EN61326-1 EMC
Termination: MS Connector; M12 Connector; cable exit w/seal. See Ordering Information
Mating Connector:
6 pin MS, style MS3106A-14S-6S (MCN-N4)
7 pin MS, style MS3106A-16S-1S (MCN-N5)
10 pin MS, style MS3106A-18-1S (MCN-N6)
10 pin Bayonet, MS3116-F12-10S (607545-0001)
Cable w/ 5 pin M12 connector, p/n 112859-xxx
Cable w/ 8 pin M12 connector, p/n 112860-xxx

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



A leads B, CW (from clamp end)
(Reverse Phasing, A leads B for CCW also available: See Code 7 in Ordering Information)

MECHANICAL

Shaft Material: 6061-T6 Aluminum
Bore Diameter: 6mm to 28mm, 1.4" to 1.25", electrically isolated
Mating Shaft Length: 1.25", Minimum, 1.60", Recommended
Shaft Speed: 6000 RPM, Maximum (Enclosure Rating is IP64 at speed over 5000 RPM)
Starting torque: 8.0 in-oz. maximum (at 25°C)
Running torque: 5.0 in-oz. maximum (at ambient)
Bearings: ABEC 1
Housing and cover: Hard Anodized and Powder Coated Aluminum
Disc material: Plastic or metal (unbreakable)
Weight: 1.76lb (28 Oz) Typical

ENVIRONMENTAL

Standard Operating Temperature: -40 to +85°C (0 to +70°C with 4469 line driver, see "Ordering Information"). At shaft speed above 3000 RPM, derate 10°C per 1000 RPM
Extended Temperature Range: -40 to +100°C (See ordering information)
Storage temperature: -40 to +100°C
Shock: 400g, 6mSec
Vibration: 5 to 3000 Hz, 20g
Humidity: 100%
Enclosure Rating: IP67 (IP64 at shaft speed above 5000 RPM)
Note: "MS" type mating connectors and prebuilt cables are rated NEMA 12. "M12" Cable assemblies are rated IP67

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 Industrial-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" **K** 1-1/4" **M** 14mm **N** 18mm **P** 25mm **R** 28mm	**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 Not available when Code 5 is 0 through C or H through P **6** Same as 1 w/dual cover **7** Same as 3 w/dual cover	**0** ABZ, 5-26VDC push-pull **1** ABZ, 5-26VDC O/C **2** ABZ, 5-26VDC O/C w2.2kOhm **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	**0** 6 pin **1** 7 pin **2** 10 pin **3** 12 pin **4** 10 pin bayonet **5** 6 pin+mating **6** 7 pin+mating **7** 10 pin+mating **8** 12 pin+mating **9** 10pin bayonet+mating **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 connector and mate **G** 0.3m (13") cable **H** 5 pin M12 **J** 8 pin M12	**01** Reverse Phasing (A leads B, CCW) Not available when Code 6 is 3, 8, A through J or when Code 5 is 4, 5, 6, 7, 8, 9, A, C, D, E, F, G, L, M, N, P, Q, R and Code 6 is 0 or 5 **PS** LED Output

10 foot Cable Assemblies with MS Connector

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

10 foot Cable Assemblies with M23 Connector

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

15 foot Cable Assemblies with M12 Connector

112859-0015 5 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs
112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

6 pin, style MS3106A-14S-6S (MCN-N4)
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
10 pin bayonet, style MS3116-F12-10S (607545-0001)

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

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-* 6 Pin Single Ended		Cable #112123-* 6 Pin Dif Line Drv w/o Id x		Cable #108596-* 7 Pin Dif Line Drv w/o Id x		Cable #108595-* 7 Pin (If Used)		Cable #1400635- or 109209- (NEMA4)10 Pin Dif Line Drv w/Idx (If Used)		Cable #108615-* 12 Pin CCW (If Used)		Cable #114448-* 10Pin Bayonet	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	E	BRN	E	BRN	A	BRN	A	BRN	A	BRN	5	BRN	A	BRN
Sig. B	D	ORN	D	ORN	B	ORN	B	ORN	B	ORN	8	ORN	B	ORN
Sig. Z	C	YEL	—	—	—	—	C	YEL	C	YEL	3	YEL	C	YEL
Power +V	B	RED	B	RED	D	RED	D	RED	D	RED	12	RED	D	RED
N/C	F	—	—	—	—	—	E	—	E	—	7	—	E	—
Com	A	BLK	A	BLK	F	BLK	F	BLK	F	BLK	10	BLK	F	BLK
Case	—	—	—	—	G	GRN	G	GRN	G	GRN	9	—	G	GRN
Sig. $\overline{A}$	—	—	C	BRN/WHT	C	BRN/WHT	—	—	H	BRN/WHT	6	BRN/WHT	H	BRN/WHT
Sig. $\overline{B}$	—	—	F	ORN/WHT	E	ORN/WHT	—	—	I	ORN/WHT	1	ORN/WHT	J	ORN/WHT
Sig. $\overline{Z}$	—	—	—	—	—	—	—	—	J	YEL/WHT	4	YEL/WHT	K	YEL/WHT
0V Sense	—	—	—	—	—	—	—	—	—	—	2	GRN	—	—
5V Sense	—	—	—	—	—	—	—	—	—	—	11	BLK/WHT	—	—

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

5 & 8 Pin M12 Accessory Cables when Code 6 = H orJ

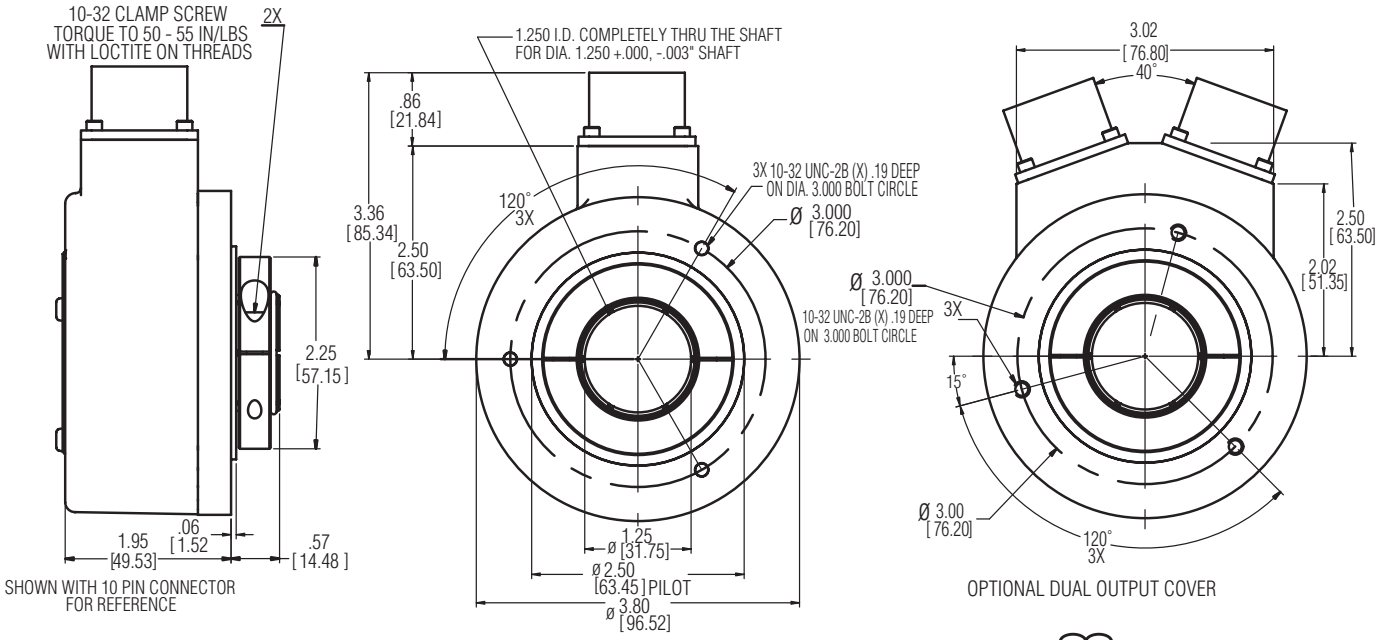
Connector pin numbers and cable assembly wire color information is provided here for reference.

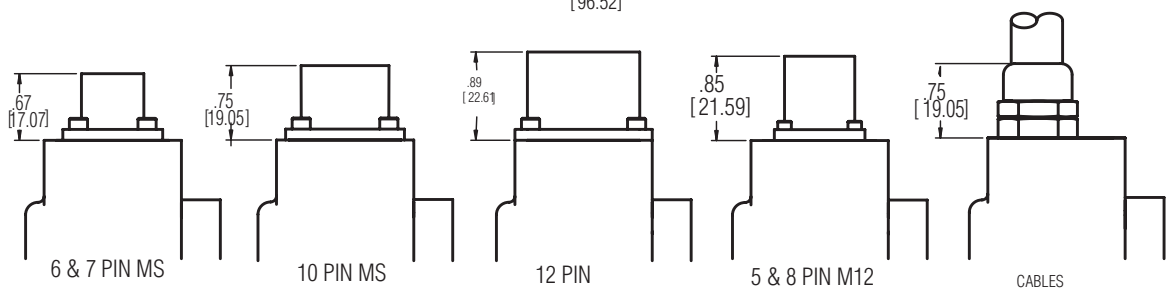
Encoder Function	Cable # 112859- 5 Pin Single Ended		Cable # 112860- 8 Pin Single Ended		Cable # 112860- 8Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig.A	4	BLK	1	BRN	1	BRN
Sig.B	2	WHT	4	ORG	4	ORG
†Sig.Z	5	GRY	6	YEL	6	YEL
Power +V	1	BRN	2	RED	2	RED
Com	3	BLU	7	BLK	7	BLK
Sig. $\overline{A}$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

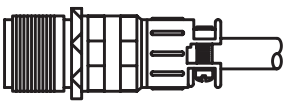
† Index not provided on all models. See ordering information

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

DIMENSIONS inch [mm]





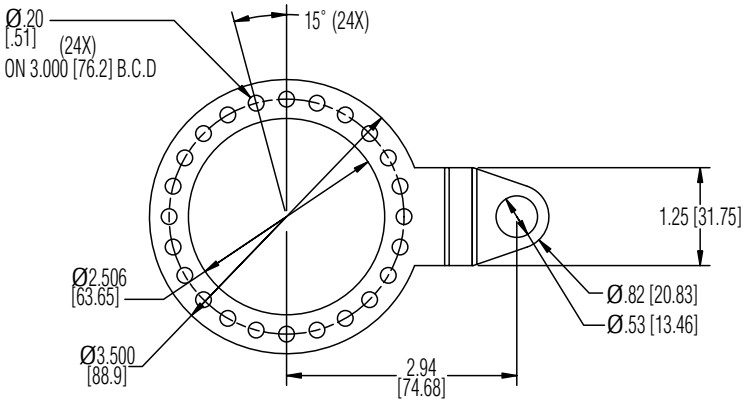


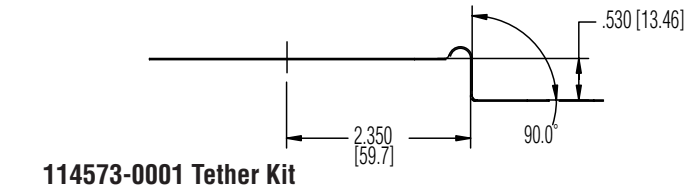
PIGTAIL WITH MS CONNECTOR (OPTION F)

by DYNAPAR™

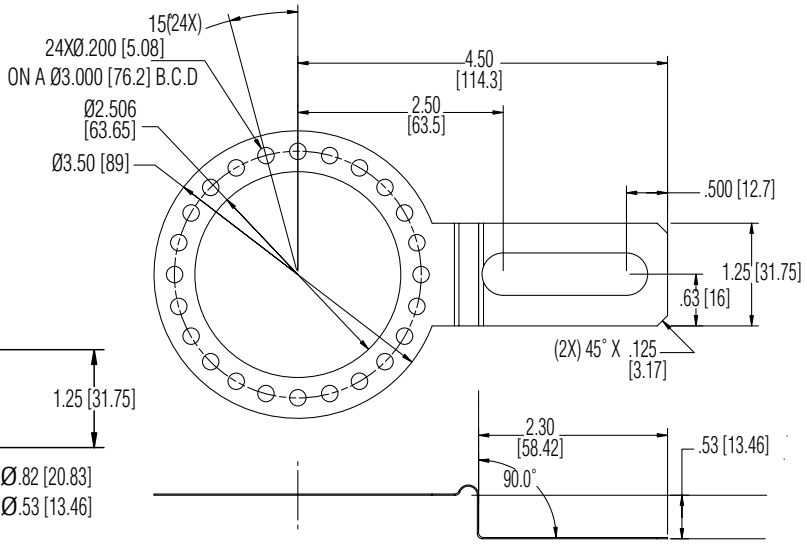
SERIES HS35R

DIMENSIONS inch [mm]

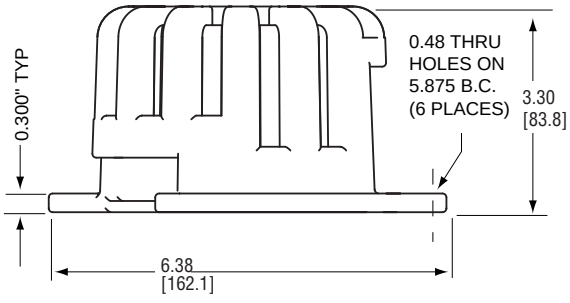




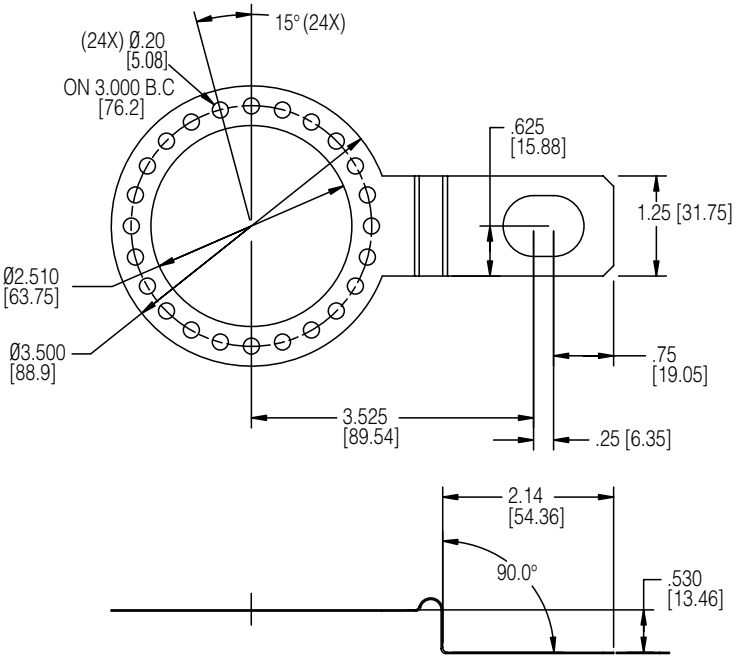
114573-0001 Tether Kit



114574-0001 Slotted Tether Kit



OPTIONAL SAFETY COVER(S)



114575-0001 Tether Kit

SERIES RI80E

Hengstler™ brand

Hollowshaft Encoder

Key Features

- **Advanced Opto-ASIC Provides Fault Detection**
- **Oversized Bearings for Long Life**
- **Unbreakable Code Disc**
- **Specifically Designed for Elevator Geared Traction Drives**

SPECIFICATIONS

MECHANICAL

Shaft fixation: Keyway,set screw
Coupling: Spring tether (single,double)
Protection: IP50, IP64
Max.Speed: 3600 min -1 (IP50); 1500 min -1 (IP64)
Moment of inertia: 240 kgmm 2
Max.parallel shaft misalignment:
Axial: ± 0.5 mm
Radial: ± 0.05 mm
Operating temperature: -20 ...+70 °C
Storage temperature: -40 ...+70 °C
Housing Material: Glass fiber-reinforced plastic/ aluminum
Weight: 1000 g

ELECTRICAL

General design: As per DIN EN 61010,protection class III, Contamination level 2 ,over voltage class II
Supply voltage: DC 5V ±10% or DC 5-30V [1]
Max. current: w/o load max 60mA (DC 5V), 60mA (DC 10V),35mA (DC 24V)
Standard output versions:
With RS 422 (R): A,B,N, $\overline{A}$, $\overline{B}$, $\overline{N}$, $\overline{Alarm}$, Sense
With push-pull (K): A,B,N, $\overline{Alarm}$
With push-pull (I): A,B,N, $\overline{A}$, $\overline{B}$, $\overline{N}$, $\overline{Alarm}$, Sense
Connection: Sub-D 15-pole,cable radial

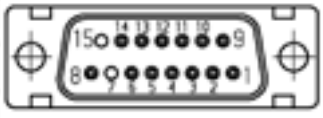
[1] Pole protection with supply voltage DC 5 …30 V

Color	RS 422 + Alarm + Sense (R)	Push-pull (K)	Push-pull Complement. (I)
brown	Channel A	Channel A	Channel A
green	Channel $\overline{A}$ Channel		$\overline{A}$
grey	Channel B	Channel B	Channel B
pink	Channel $\overline{B}$ Channel		$\overline{B}$
red	Channel N	Channel N	Channel N
black	Channel $\overline{N}$ Channel		$\overline{N}$
violet	$\overline{Alarm}$	$\overline{Alarm}$	$\overline{Alarm}$
white	Sense GND		Sense GND
blue	Sense V_{CC}		Sense V_{CC}
brown/green	DC 5 - 30 V	DC 5 - 30 V	DC 5 - 30 V
white/green	GND	GND	GND
screen [1]	screen [1]	screen [1]	screen [1]

[1] connected with encoder housing

ELECTRICAL CONNECTIONS

Pin	Signal 15 pole	Signal 9 pole
1	$\overline{B}$	GND
2	B	+Ub
3	$\overline{A}$	A
4	A	B
5	GND	N
6	+Ub	$\overline{A}$
7	n.c.	$\overline{B}$
8	screen	$\overline{N}$
9	$\overline{N}$	
10	N	
11	n.c.	
12	n.c.	
13	n.c.	
14	n.c.	
15	n.c.	



by DYNAPAR™

SERIES RI80E

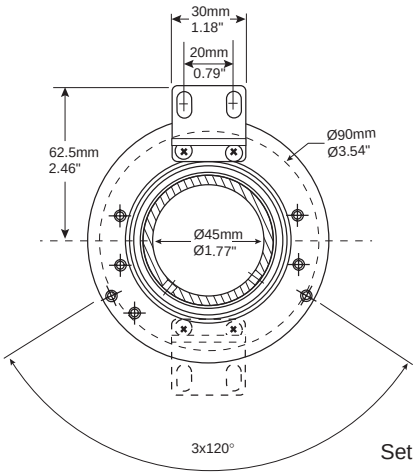
Ordering Information

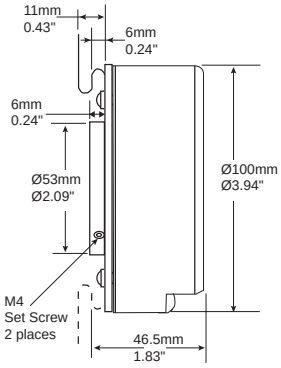
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Mounting	Code 5: Protection	Code 6: Shaft Fixing	Code 7: Shaft Size	Code 8: Output	Code 9: Connection	Code 10: Cable Length
Ordering Information									
RI80E	☐☐☐☐	☐	☐	☐	☐	☐☐	☐	☐	☐☐
RI80E	**1024** **2048** **4096** **5000**	**A** 5 VDC **B** 5-30VDC	**O** No Tether **A** Single Tether **B** Dual Tether	**0** IP40 **1** IP50 **4** IP64	**K** Keyway **G** Setscrew	**30** 30mm **32** 32mm **38** 38mm **45** 45mm	**I** Push-Pull, Diff+Alarm with Voltage B **K** Push-Pull + Alarm with Voltage B **R** RS422 + Alarm with Voltage A or B	**F** Radial Cable **3** 9 pin d-Sub Connector **4** 15 pin d-Sub Connector	Blank 1.5m (standard) **DO** 3m **FO** 5m **KO** 10m **PO** 15m **UO** 20m **VO** 25m

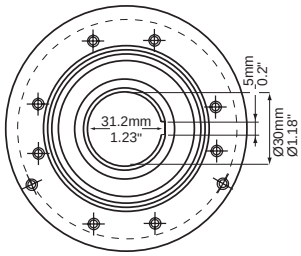
DIMENSIONS

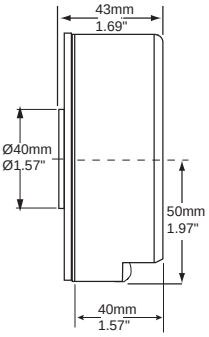
Codes 4, 6: Tether, Mounting/Shaft





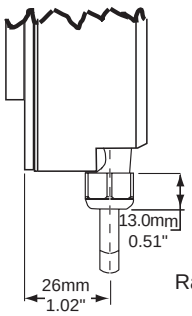
Set Screw Mounting

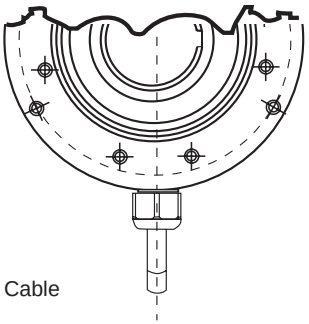




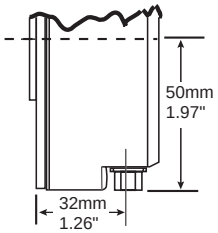
Keyway Mounting

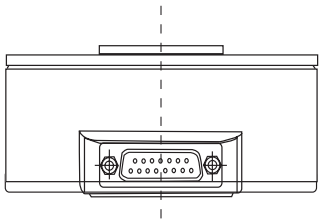
Code 8: Connections





Radial Cable





SUB-D Connector

SERIES HA26

Dynapar™ brand

Integral Coupling Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA sink or source
Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

Shafts 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
Shaft Speed: 5,000 RPM max.
Starting Torque: (max at 25 °C) 1.0 oz-in;
Moment of Inertia: 4.3 x 10^{-4} oz–in–sec^2

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: to 98% without condensation
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

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

605512-0020	Flexible Coupling 3/8"; 1/4", 3/8", 1/2"

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

15 foot Cable Assemblies with M12 Connector

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

112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs

112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

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

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

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD
*Cable Accessory: P/N 14004310010			

Table 2 – Differential

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	BRN
B	Signal B	ORN	ORN
C	Signal Z	YEL	YEL
D	Power Source	RED	RED
E	No Connection	—	—
F	Common	BLK	BLK
G	Case	GRN	GRN
H	Signal $\bar{A}$	BRN/WH	BRN/WH
I	Signal $\bar{B}$	ORN/WH	ORN/WH
J	Signal $\bar{Z}$	YEL/WH	YEL/WH
*Cable Accessory: P/N 14006350010			

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

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

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-		Cable # 112860-		Cable # 112860-	
	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

* Index not provided on all models. See ordering information

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

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

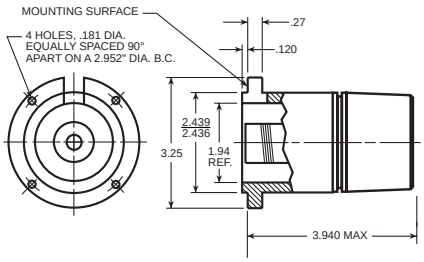
by DYNAPAR™

SERIES HA26

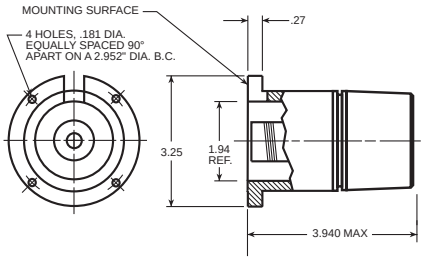
DIMENSIONS

Code 3: Mechanical

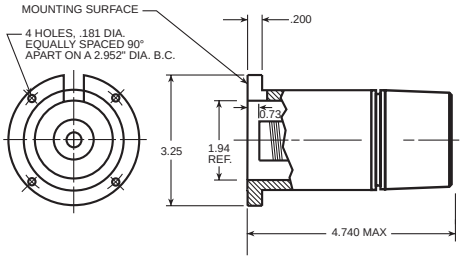
A: Flange with Pilot



B: Flange without Pilot



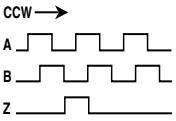
C: NEMA 42 Flange



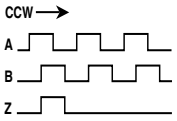
Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

Code 4: Output

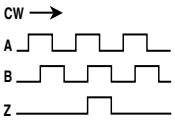
0 - 3: Format A



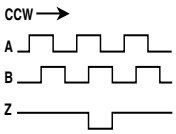
4 - 5: Format B



6 - D: Format C

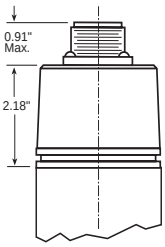


G: Format D

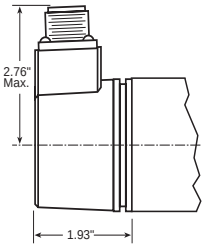


Code 6: Termination

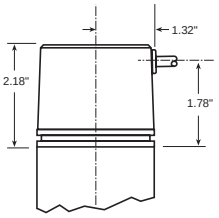
0: End MS Connector
When Code 5 is 0 to 5 or A to G



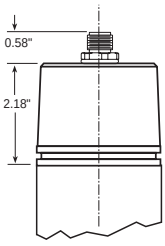
1: Side MS Connector
When Code 5 is 0 to 5 or A to G



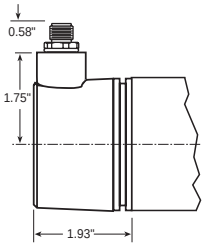
2 - A: Side Cable



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

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads
Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA sink or source
Frequency Response: 100 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5)
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

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
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

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: 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** **0005 0256** **0010 0300** **0012 0360** **0050 0400** **0060 0500** **0086 0512** **0100 0600** **0120 0635** **0125 0800** **0180 0900** **0200 1000** **0240 1024**	**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
605512-0020	Flexible Coupling 3/8"; 1/4", 3/8", 1/2"					

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

15 foot Cable Assemblies with M12 Connector

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

112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs

112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

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

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

Pin	Function (If Used)	Wire Color Code	Cable Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD
Cable Accessory: P/N 14004310010			

Table 2 – Differential

Pin	Function (If Used)	Wire Color Code	Cable Accessory Color Code
A	Signal A	BRN	BRN
B	Signal B	ORN	ORN
C	Signal Z	YEL	YEL
D	Power Source	RED	RED
E	No Connection	—	—
F	Common	BLK	BLK
G	Case	GRN	GRN
H	Signal $\bar{A}$	BRN/WH	BRN/WH
I	Signal $\bar{B}$	ORN/WH	ORN/WH
J	Signal $\bar{Z}$	YEL/WH	YEL/WH
Cable Accessory: P/N 14006350010			

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

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

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-*		Cable # 112860-*		Cable # 112860-*	
	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

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

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

†Note: Index not provided on all models. See ordering information

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

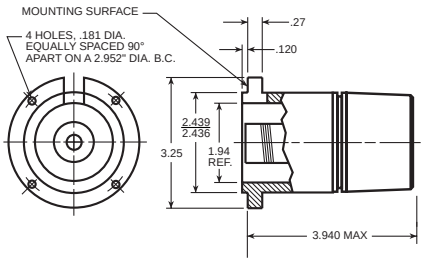
by DYNAPAR™

SERIES HR26

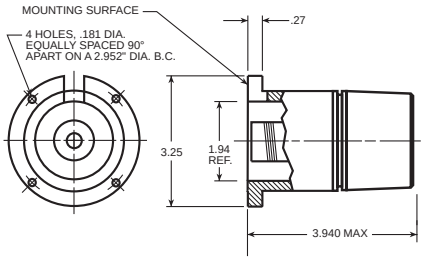
DIMENSIONS

Code 3: Mechanical

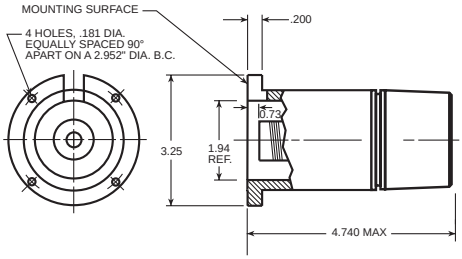
A: Flange with Pilot



B: Flange without Pilot



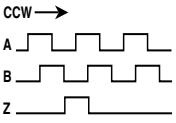
C: NEMA 42 Flange



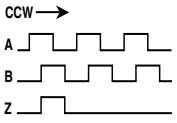
Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

Code 4: Output

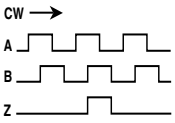
0 - 3: Format A



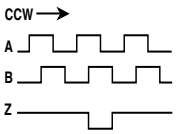
4 - 5: Format B



6 - D: Format C

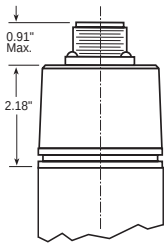


G: Format D

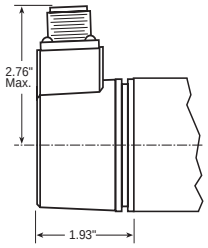


Code 6: Termination

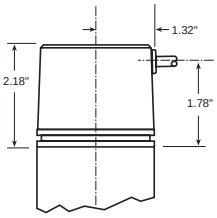
0: End MS Connector
When Code 5 is 0 to 5 or A to G



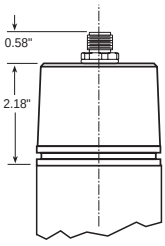
1: Side MS Connector
When Code 5 is 0 to 5 or A to G



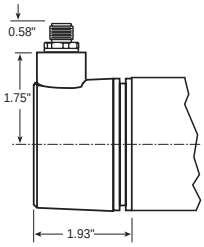
2 - A: Side Cable



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



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



SERIES HC26

Dynapar™ brand

Integral Coupling Encoder

Key Features

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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental
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: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
Frequency Response: 250 kHz min.
Electrical Protection: Overvoltage, reverse voltage and output short circuit protected
Noise Immunity: Tested to EN61326 (Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference
Mating Connector:
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

MECHANICAL

Shafts 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
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

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: 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

Code 1: Model	Code 2: PPR	Code 3: Mechanical	Code 4: Output	Code 5: Electrical	Code 6: Termination	Code 7: Options
HC526 Size 25 Enclosed with Integral Coupling and Flange Adapter	**3000** 3,000 **3600** 3,600 **4096** 4,096 **5000** 5,000	**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) **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
CPLX1250375	Flexible Coupling 3/8" to 1/4", 3/8" or 1/2"					

10 foot Cable Assemblies with MS Connector

1400431-0010 7 Pin MS, Cable Assy. For Use with Single Ended w/Index Outputs

1400635-0010 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs

15 foot Cable Assemblies with M12 Connector

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

112860-0015 8 Pin M12, Cable Assy. For Use with Single Ended Outputs

112860-0015 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs

Mating Connectors (no cable)

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

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

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

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	RED
B	Signal B	ORN	BLUE
C	Signal Z	YEL	YEL
D	Power Source	RED	WHT
E	No Connection	—	GRN
F	Common	BLK	BLK
G	Case	GRN	SHIELD
*Cable Accessory: P/N 14004310010			

Table 2 – Differential

Pin	Function (If Used)	Wire Color Code	Cable* Accessory Color Code
A	Signal A	BRN	BRN
B	Signal B	ORN	ORN
C	Signal Z	YEL	YEL
D	Power Source	RED	RED
E	No Connection	—	—
F	Common	BLK	BLK
G	Case	GRN	GRN
H	Signal $\bar{A}$	BRN/WH	BRN/WH
I	Signal $\bar{B}$	ORN/WH	ORN/WH
J	Signal $\bar{Z}$	YEL/WH	YEL/WH
*Cable Accessory: P/N 14006350010			

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

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

	Table 4 5 Pin Single Ended		Table 5 8 Pin Single Ended		Table 6 8 Pin Differential	
Encoder Function	Cable # 112859-*		Cable # 112860-*		Cable # 112860-*	
	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

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

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

†Note: Index not provided on all models. See ordering information

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

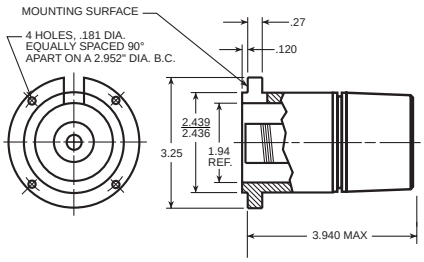
by DYNAPAR™

SERIES HC26

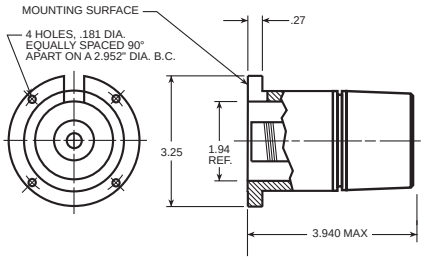
DIMENSIONS

Code 3: Mechanical

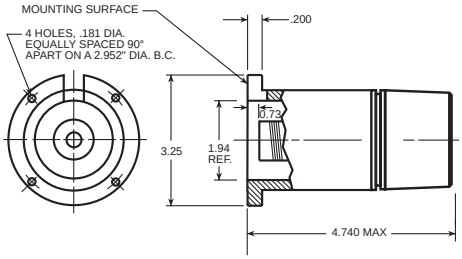
A: Flange with Pilot



B: Flange without Pilot



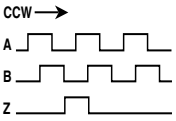
C: NEMA 42 Flange



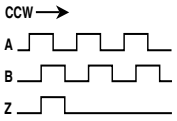
Mating shaft lengths: Typically: 0.5" max. available into the coupling as measured from the A/B mounting surface.
1.3" max. available into the coupling as measured from the C mounting surface.

Code 4: Output

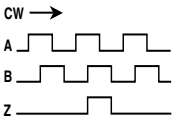
0 - 3: Format A



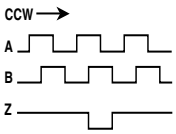
4 - 5: Format B



6 - D: Format C



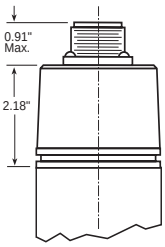
G: Format D



Code 6: Termination

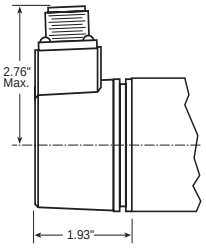
0: End MS Connector

When Code 5 is 0 to 5 or A to G

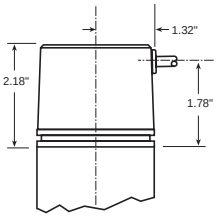


1: Side MS Connector

When Code 5 is 0 to 5 or A to G

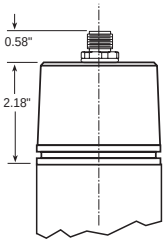


2 - A: Side Cable



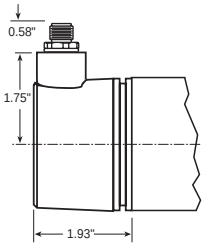
0: End M12 Connector

When Code 5 is H to Z



1: Side M12 Connector

When Code 5 is H to Z



SERIES AC36

ACURO

Absolute Encoder

Key Features

- **Up to 22 bit Singleturn and 12 bit multiturn true absolute positioning**
- **Small 38mm diameter housing**
- **Wide -15 to +100C temperature range**

CE RoHS

SPECIFICATIONS

ELECTRICAL

Supply Voltage: -5%/ 10% DC 5 V; DC 7-30 V
Max. Current: w/o load 50 mA (ST), 100 mA (MT)
Resolution: singleturn 12 -17 Bit; multiturn 12 Bit
Output Code: Gray, Binary
Drives: Clock and Data / RS422
Incremental signals: Optional Sine-Cosine 1 Vpp
Number of Pulses: 2048
3dB Limiting Frequency: 500 kHz
Alarm Output: Alarm bit (SSI Option), warning and alarm bit (BiSS)

MECHANICAL

Housing Diameter: 37.5 mm
Shaft Diameter: 6 mm (Solid shaft)
Flange (Mounting of housing): Pilot flange
Protection Class Shaft Input (EN 60529): IP64
Protection Class Housing (EN 60529):IP64
Max. Shaft Speed: 10 000 rpm (continuous), 12 000 rpm (short term)
Torque: 0.01 Nm
Moment of Inertia: ca. 2.5 x 10^{-6} kgm^2

ENVIRONMENTAL

Vibration Resistance (DIN EN 60068-2-6): 100 m/s^2 (10 to 2000 Hz)
Shock resistance (DIN EN 60068-2-27): 1000 m/s^2 (6 ms)
Operating Temperature: -40°C to +100°C
StorageTemperature: -15°C to +85°C
Weight: approx. 80 g (ST) / 130 g (MT)
Connection: Cable, axial or radial

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

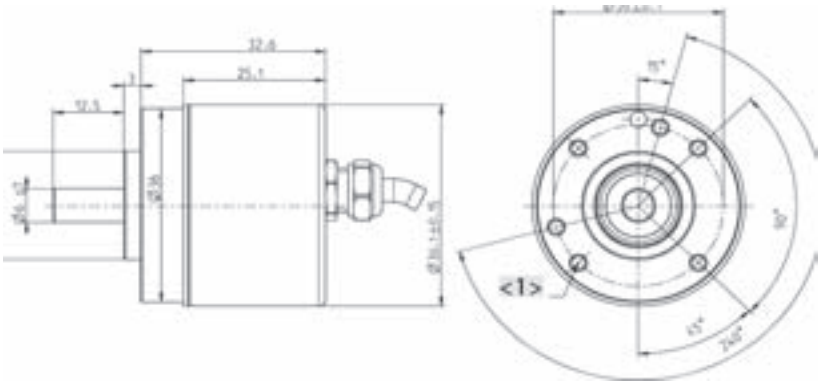
Ordering Information

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

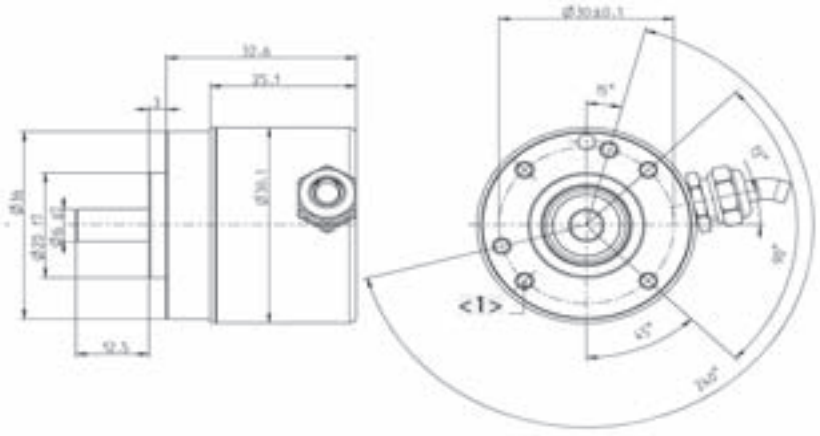
Code 1: Model	Code 2: Resolution	Code 3: Supply Voltage	Code 4: Mounting	Code 5: Protection Class	Code 6: Shaft Size	Code 7: Interface	Code 8: Connection
AC36/□□□□	□	□	. □	□	□□	□
Ordering Information							
ACURO Series AC36 Absolute Encoder	**Single Turn** **0012** **0013** **0014** **0017** Available when Code 7 is BI **0019** **0022** **Multiturn** **1212** **1213** **1214** **1217** Available when Code 7 is BI **1219** **1222**	**A** 5 VDC **E** 7-30 VDC	**R** Round Flange	**4** IP 64	**1** 6mm	**BI** BISS **SB** SSI Binary **SC** SSI Gray + sin/cos 1Vpp **SG** SSI Gray	**A** Cable, axial, 1.5m, 12 pole **B** Cable, radial, 1.5m, 12 pole

DIMENSIONS

Axial



Radial



SERIES AI25 DeviceNet

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **DeviceNet Interface**

E321846 c UL us LISTED CE RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14 Bit
Multi-turn Resolution: 12 bit
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary
Electrical
Connection: Bus Cover with spring terminal clamps
Supply voltage: 10-30 VDC
Intrinsic current consumption: 200 mA (ST), 220 mA (MT)
Baud Rate: 125, 250, 500 kBaud
Interface: CAN Highspeed according to ISO/DIS 11898,CAN Specification 2.0 B (11 and 29 bit identifier)
Protocol: According to DeviceNet V2.0
Transfer mode:
Poll mode
Bit strobe (time-synchronous for all devices)
Change of State (automatic after change of values) Cyclic, with adjustable cycle timer

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb radial
Maximum shaft speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting torque: < 1.4 in-oz
Body Diameter: 58 mm, nominal
Weight (approx.): 350 g ST, 400 g MT
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 85° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

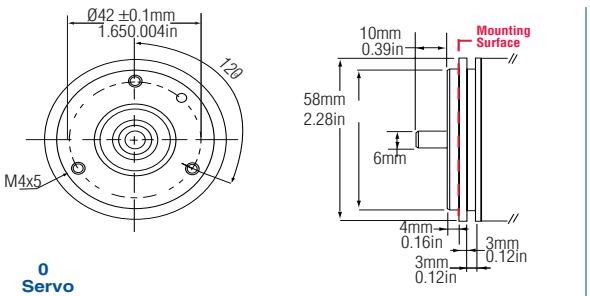
Ordering Information

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

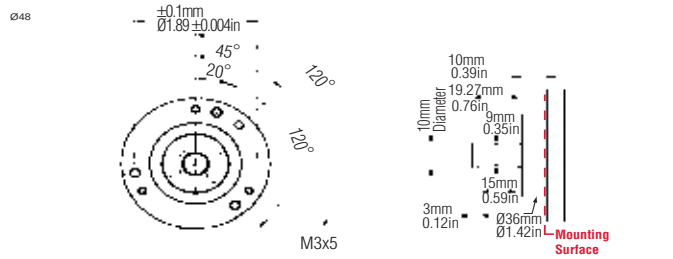
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit 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 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **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

DIMENSIONS

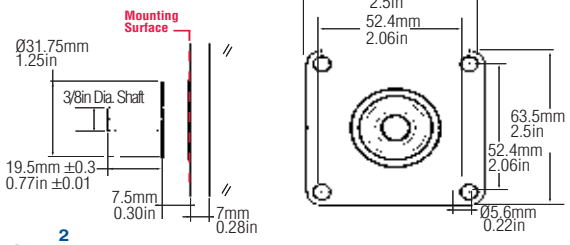
Code 3: Mounting



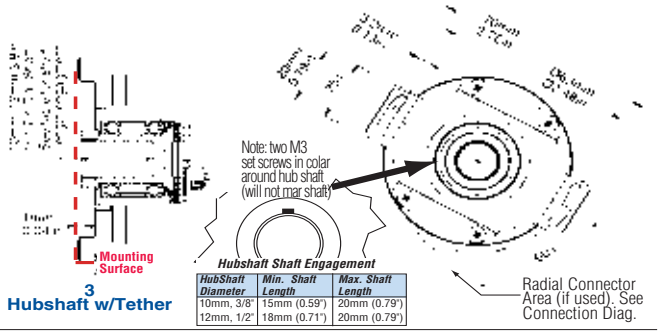
0
Servo



1
Clamping

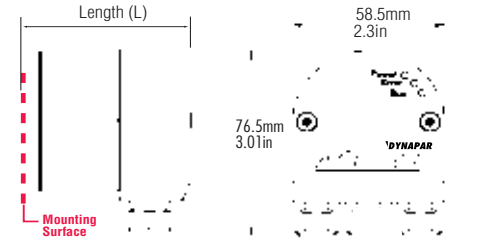


2
Square Flange



3
Hubshaft w/Tether

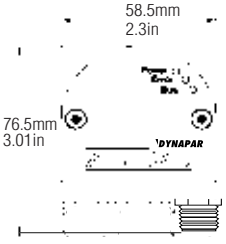
Code 7: Connector



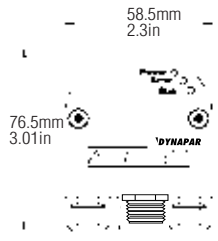
L
2 Strain Relief Exits

Length (L) Mounting Surface to Rear For connector types L, 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



F
1 M12, 5-Pole Connector



G
2 Strain Relief Exits
1 M12, 5-Pole Connector*

*M12, 5-Pole Connector used to interface Hengstler Tico 731 LCD display

SERIES AI25 CAN Open

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **CAN Open Interface**

E321846 c UL us LISTED CE RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14 Bit
Multi-turn Resolution: 12 bit
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary
Electrical
Connection: Bus Cover with spring terminal clamps; 12 pin Conin CW; Cable with Pigtail
Supply voltage: 10-30 VDC
Intrinsic current consumption: 200 mA (ST), 220 mA (MT)
Baud Rate: 125, 250, 500 kBaud
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

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb radial
Maximum shaft speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting torque: < 1.4 in-oz
Body Diameter: 58 mm, nominal
Weight (approx.): 350 g ST, 400 g MT
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 85° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

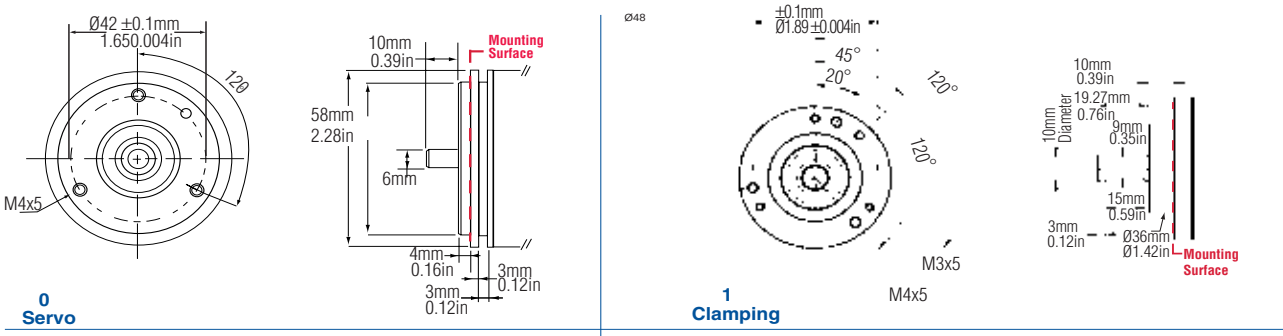
Ordering Information

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

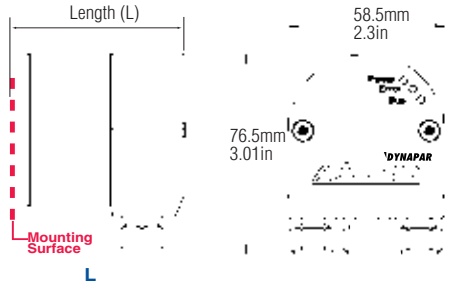
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit 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 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**8** CANopen	**2** 10-30 VDC	**0** 1.5m Axial Cable **1** 1.5m Radial Cable **2** M23 Conin 12 pin Axial CW **3** M23 Conin 12 pin Radial CW **F** Bus Cover 1 M12, 5-Pole Connector **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

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **CANbus CAN Layer 2 Interface**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14 Bit
Multi-turn Resolution: 12 bit
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary
Electrical
Connection: Bus Cover with spring terminal clamps; 12 pin Conin CW; Cable with Pigtail
Supply voltage: 10-30 VDC
Intrinsic current consumption: 220 mA (ST), 250 mA (MT)
Baud Rate: Range of 10 through 1000 Kbits/s
Interface: CAN High-Speed according to ISO/DIS 11898
Protocol: CAN 2.0A

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb radial
Maximum shaft speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting torque: < 1.4 in-oz
Body Diameter: 58 mm, nominal
Weight (approx.): 350 g ST, 400 g MT
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 85° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

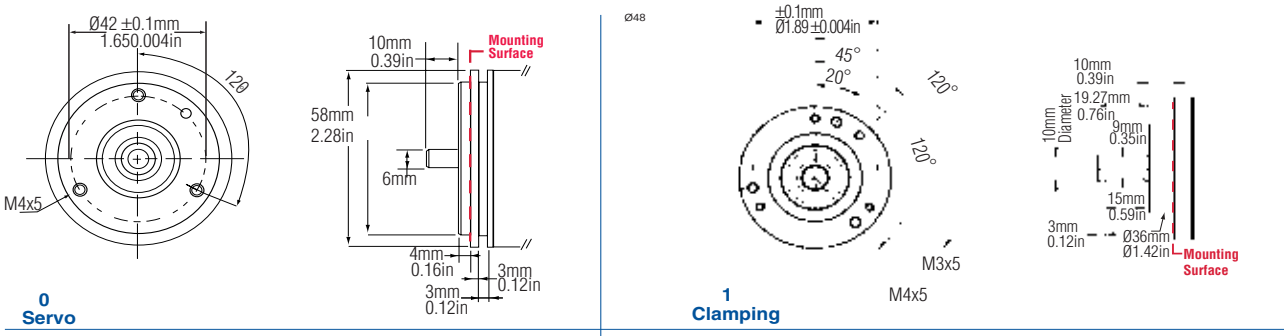
Ordering Information

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

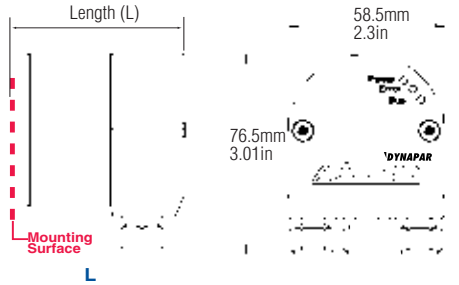
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit 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 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**7** CAN L2	**2** 10-30 VDC	**0** 1.5m Axial Cable **1** 1.5m Radial Cable **2** M23 Conin 12 pin Axial CW **3** M23 Conin 12 pin Radial CW **F** Bus Cover 1 M12, 5-Pole Connector **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 Profibus

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **Profibus Interface**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14 Bit
Multi-turn Resolution: 12 bit
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary
Electrical
Connection: Bus Cover with spring terminal clamps
Supply voltage: 10-30 VDC
Intrinsic current consumption: 200 mA (ST), 220 mA (MT)
Baud Rate: 12 Mbaud
Interface: Profibus-DP, Encoder Profile
Programmable: According to Class 2
Special Functions: Speed, Acceleration

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb 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
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 85° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

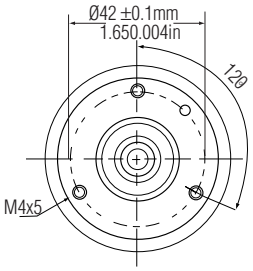
Ordering Information

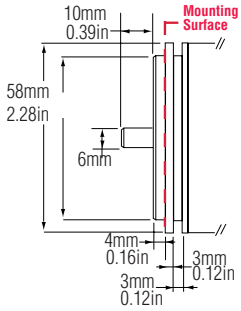
To order, complete the model number with code numbers from the table below:

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 **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 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **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

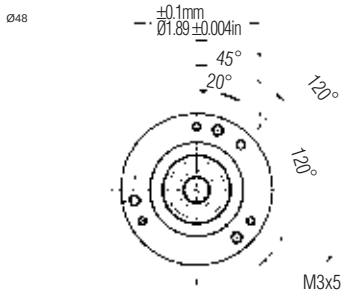
DIMENSIONS

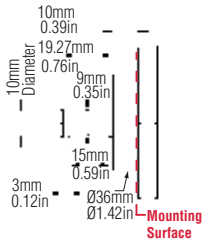
Code 3: Mounting





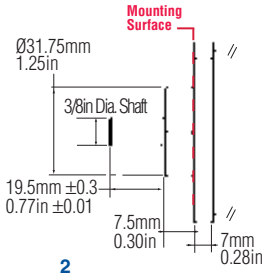
0
Servo

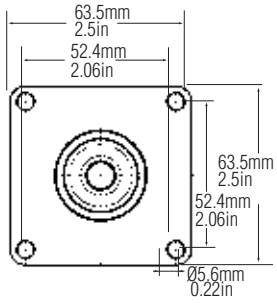




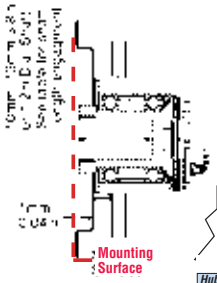
1
Clamping

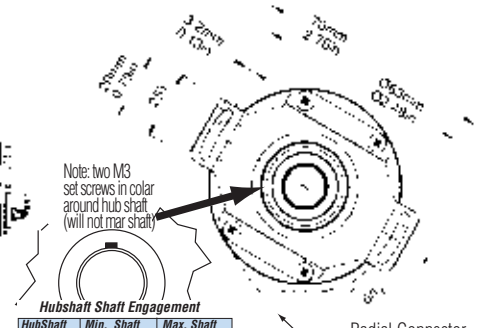
M4x5





2
Square Flange



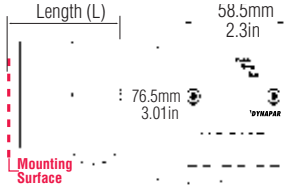


Hubshaft Shaft Engagement

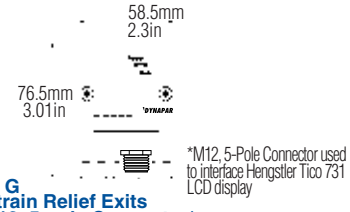
HubShaft Diameter	Min. Shaft Length	Max. Shaft Length
10mm, 3/8"	15mm (0.59")	20mm (0.79")
12mm, 1/2"	18mm (0.71")	20mm (0.79")

3
Hubshaft w/Tether

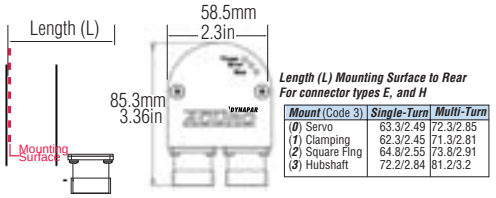
Code 7: Connector



E
3 Strain Relief Exits



G
2 Strain Relief Exits
1 M12, 5-pole Connector*



Length (L) Mounting Surface to Rear
For connector types E, and H

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

H
Double Conin

SERIES AI25 Interbus

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **Interbus Interface**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12 Bit
Multi-turn Resolution: 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.)
Code format: 32 Bit Binary
Electrical
Connection: Bus Cover with spring terminal clamps; cable with connector
Supply voltage: 10-30 VDC
Intrinsic current consumption: 220 mA (ST), 250 mA (MT)
Baud Rate: 500 kBaud according to ENCOM
Interface: Interbus, ENCOM Profile K3 (parameterizable)
Programmable: Direction, scaling factor, preset, offset

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb 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
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 85° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

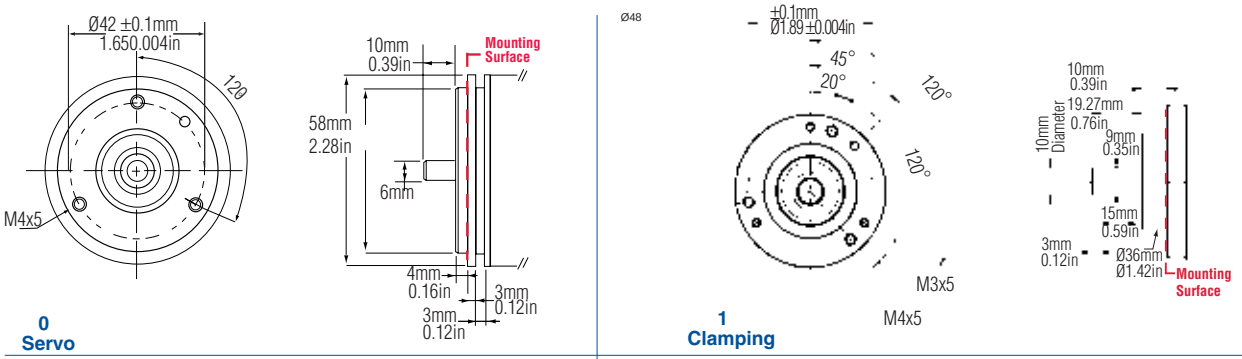
Ordering Information

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 Multi-Turn, 12 Bit Single-Turn	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**5** Interbus K3	**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

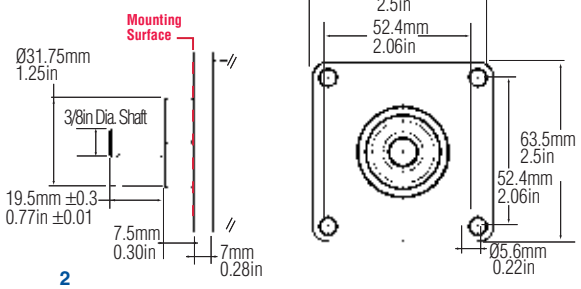
DIMENSIONS

Code 3: Mounting

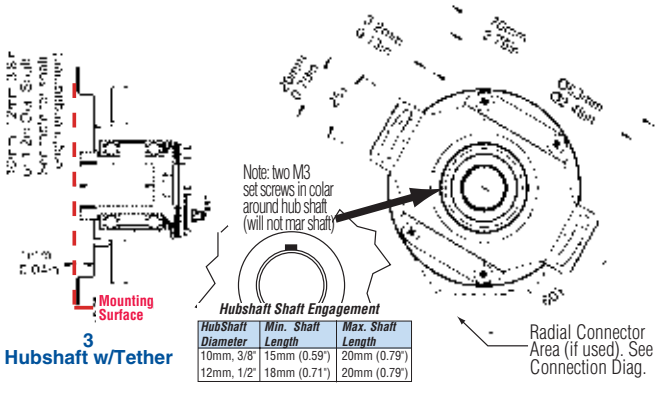


0 Servo

1 Clamping



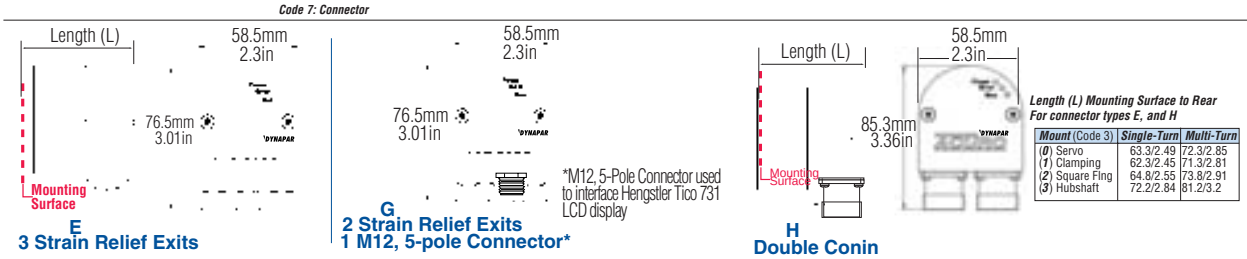
2 Square Flange



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")

3 Hubshaft w/Tether

Code 7: Connector



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 Fing	64.8/2.55	73.8/2.91
(3) Hubshaft	72.2/2.84	81.2/3.2

E
3 Strain Relief Exits

G
2 Strain Relief Exits
1 M12, 5-pole Connector*

H
Double Conin

SERIES AI25 BiSS

ACURO

Absolute Encoder

Key Features

- Up to 22 Bit True Singleturn Positioning
- Onboard Diagnostics
- BiSS Interface

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14, 17 Bit
Multi-turn Resolution: 12 bit (only available with 12, 13, 14 or 17 bit ST resolution)
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary, Gray, Gray Excess, parameterization through *AcuroSoft*
Parameterization: Resolution code type, sense of rotation, warning, alarm
Electrical
Connection: Cable, M23 - 12 pole Conin connector, M12 - 8-pole connector
Supply voltage: 5 VDC -5%/+10% or 10-30 VDC
Intrinsic current consumption: 50 mA (ST), 100 mA (MT) not including output current
Output current: 60 mA per bit, short circuit protected
Frequency response: 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)

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb 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
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 100° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s^2 (6 ms)
Vibration: 100 m/s^2 (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

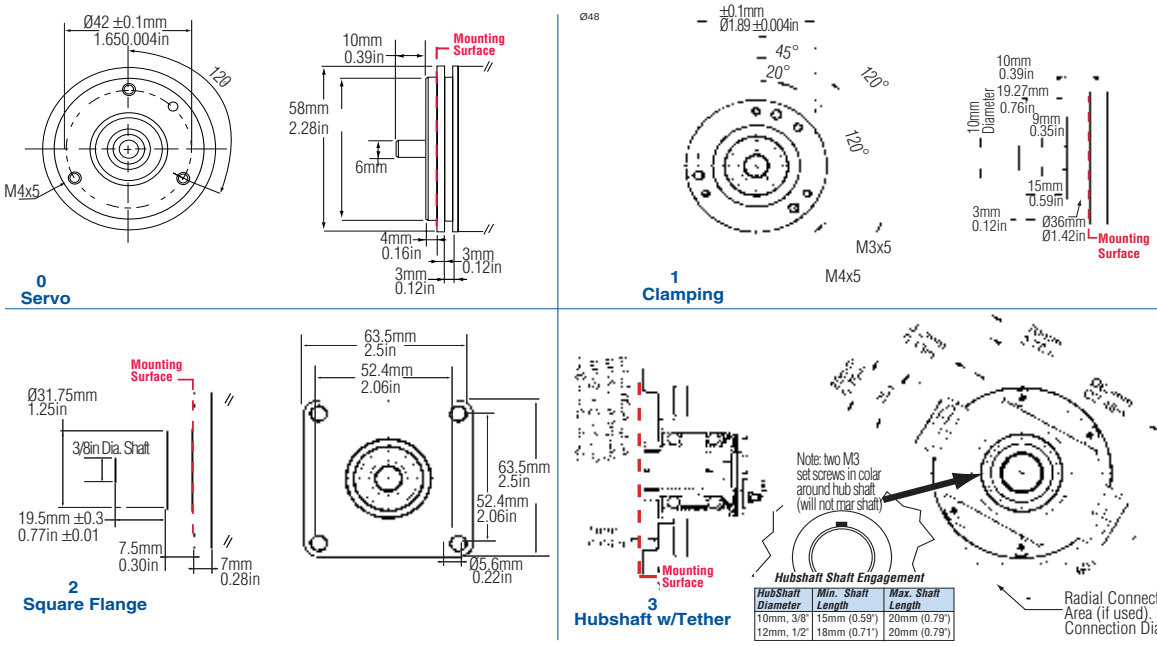
Ordering Information

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 **0013** 13 Bit **0014** 14 Bit **0017** 17 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 **1217** 12 Bit Multi-Turn, 17 Bit Single-Turn	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**A** BiSS	**0** 5 VDC **2** 10-30 VDC	**0** 1.5m axial cable **1** 1.5m radial cable **2** M23 Conin 12 pin axial CW **3** M23 Conin 12 pin radial CW **C** M12 , 8-pole connector axial **D** M12 , 8-pole connector radial

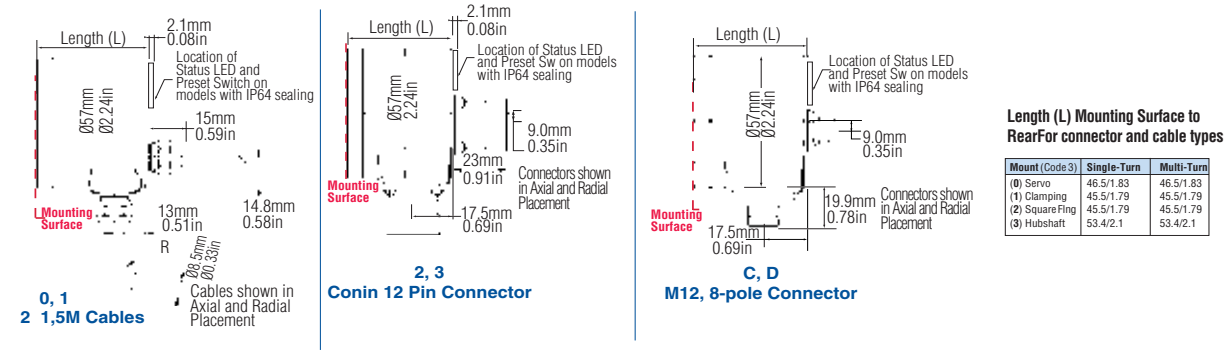
DIMENSIONS

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 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 SSI

ACURO

Absolute Encoder

Key Features

- **Up to 17 Bit True Singleturn Positioning**
- **Onboard Diagnostics**
- **SSI Interface**

E321846

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14, 17 Bit
Multi-turn Resolution: 12 bit (only available with 12 or 13 bit ST resolution)
Linearity: +/- 1/2 LSB
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary, Gray, Gray Excess, parameterization through *AcuroSoft*
Parameterization: Resolution code type, sense of rotation, warning, alarm
Electrical
Connection: Cable, M23 - 12 pole Conin connector, M12- 8-pole connector
Supply voltage: 5 VDC -5%/+10% or 10-30 VDC
Intrinsic current consumption: 50 mA (ST), 100 mA (MT) not including output current
Output current: 60 mA per bit, short circuit protected
Frequency response: 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)

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb 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
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1 x 10^{10} revolutions at 35% full rated shaft load
1 x 10^{9} revolutions at 75% full rated shaft load
1 x 10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 100° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s^2 (6 ms)
Vibration: 100 m/s^2 (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

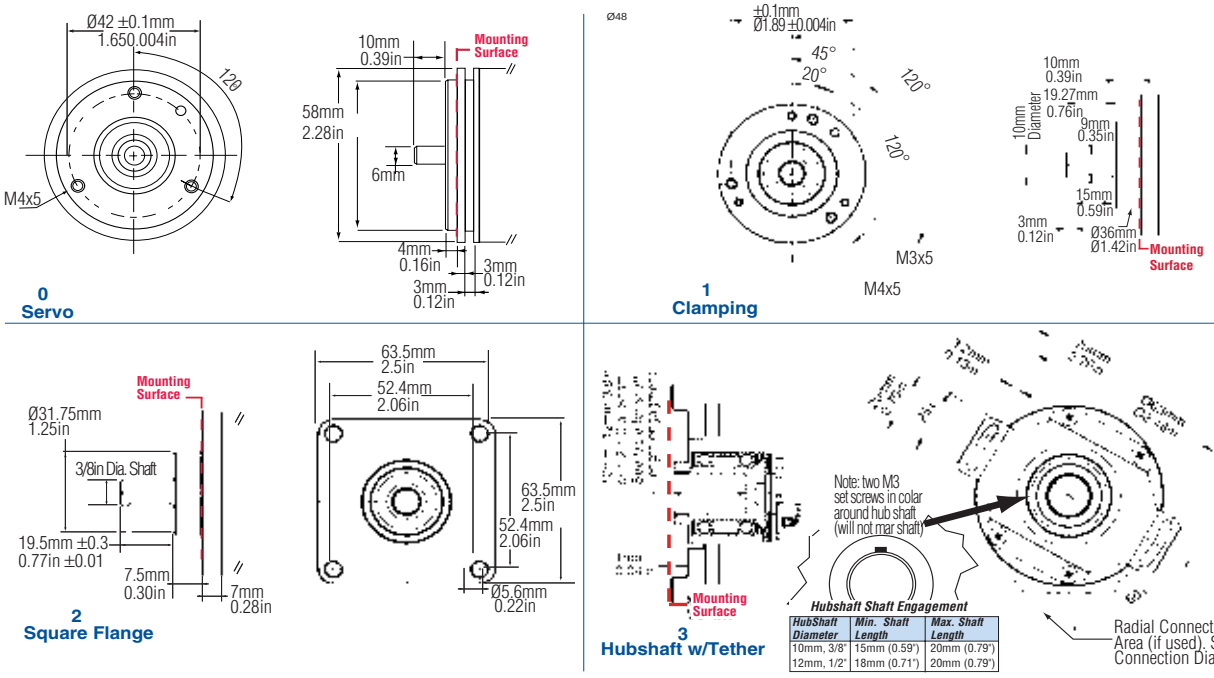
Ordering Information

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

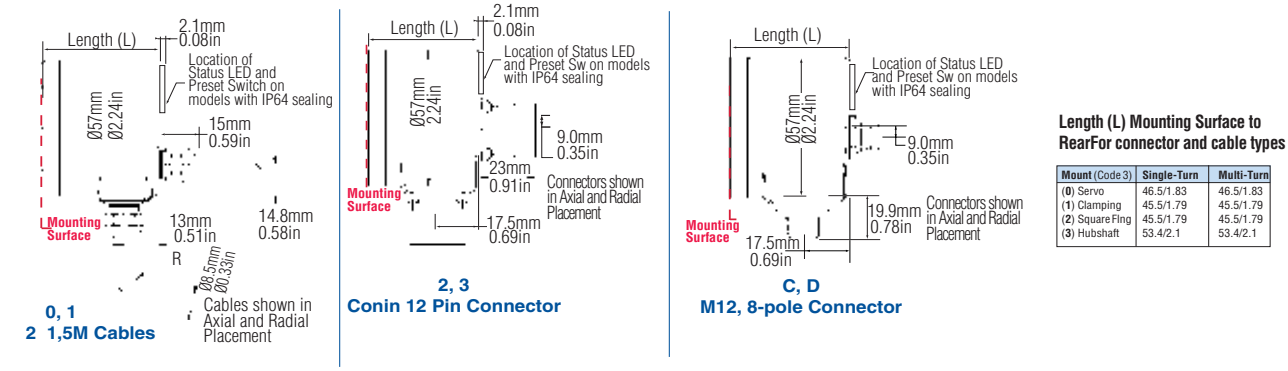
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **0017** 17 Bit **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit Single-Turn **1213** 12 Bit Multi-Turn, 13 Bit Single-Turn	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **w/ shaft seal (IP67)** **A** 6 mm **B** 3/8" **C** 10 mm	**2** SSI Gray **3** SSI Binary	**0** 5 VDC **2** 10-30 VDC	**0** 1.5m axial cable **1** 1.5m radial cable **2** M23 Conin 12 pin axial CW **3** M23 Conin 12 pin radial CW **4** M23 CCW axial **5** M23 CCW Radial **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 SSI

ACURO

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

Electrical Connections 12 pin CONIN

Wire Color	Pin	Function
Brown	1	0V
Pink	2	Data
Yellow	3	Clock
——	4	N.C.
Blue	5	$\overline{\text{Direction}}$
Red	6	N.C.
Violet	7	N.C.
White	8	5V/10-30V
——	9	N.C.
Gray	10	$\overline{\text{Data}}$
Green	11	$\overline{\text{Clock}}$
Black	12	0 V Data

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**

Electrical Connections 8 pin M12

Wire Color	Pin	Function
White	1	5/10-30 Volt
Brown	2	0 Volt
——	3	N.C.
Green	4	$\overline{\text{Clock}}$
Pink	5	Data
Yellow	6	Clock
Blue	7	$\overline{\text{Direction}}$
Gray	8	$\overline{\text{Data}}$

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**

by DYNAPAR™

NOTES

SERIES AI25 Parallel

ACURO

Absolute Encoder

Key Features

- **Up to 14 Bit of Singleturn and 12 Bits of True Multiturn Absolute Positioning**
- **Onboard Diagnostics**
- **Parallel Interface**

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SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Single-turn Resolution: 10, 12, 13, 14 Bit, 360 PPR, 720 PPR
Multi-turn Resolution: 12 bit (only available with 12 bit ST resolution)
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Code format: Binary, Gray, Gray Excess
Electrical
Connection: Cable, Conin Connector, MS Connector, Cable with Sub-D Connector (MT only)
Supply voltage: 5 VDC -5%/+10%, or 10-30 VDC
Intrinsic current consumption: 200 mA (ST), 300 mA (MT)
Output current: 30 mA per bit, short circuit protected
Frequency response: 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)
Control Inputs: Latch, Direction, Tri-state (see table below)

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 impedence (Tristate mode)
Tristate (MT)	1	Outputs at high impedence (Tristate mode)
	0	Outputs active

MECHANICAL

Shaft diameter:
Shaft: 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: 24 lb axial, 35 lb 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
Shaft tolerance (hubshaft only): +/- 1.5 mm axial, +/- 0.2 mm radial
Flange configurations: Square, Clamp, Servo, Hubshaft with flexible tether
Bearing life:
1×10^{10} revolutions at 35% full rated shaft load
1×10^{9} revolutions at 75% full rated shaft load
1×10^{8} revolutions at 100% full rated shaft load

ENVIRONMENTAL

Operating Temperature: -40 to 100° C
Storage Temperature: -40 to 100° C
Enclosure Rating: IP64 or IP67
Shock: 1,000 m/s² (6 ms)
Vibration: 100 m/s² (10 to 2,000 Hz)

by DYNAPAR™

SERIES AI25

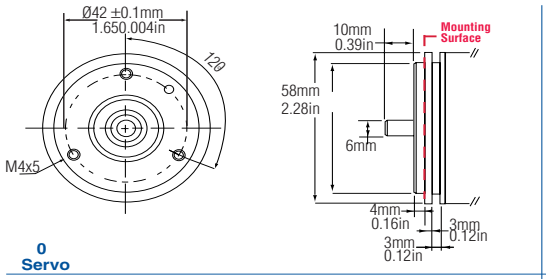
Ordering Information

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

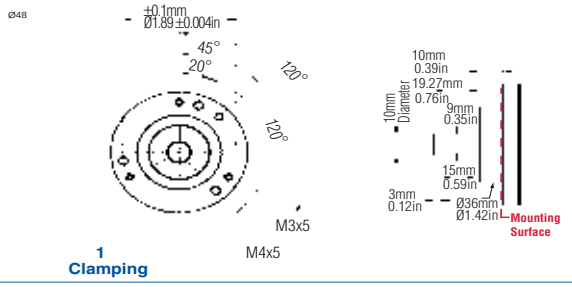
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25	☐☐☐☐	☐	☐	☐	☐	☐
AI25 Size25 Acuro Absolute Encoder	**Single-Turn** **0010** 10 Bit **0012** 12 Bit **0013** 13 Bit **0014** 14 Bit **0360** 360 PPR (Gray excess) **0720** 720 PPR (Gray excess) Available when Code 6 is 2 **Multi-Turn** **1212** 12 Bit Multi-Turn, 12 Bit Single-Turn	Available when Code 4 is 0 or A **0** Servo* Available when Code 4 is 2 or C **1** Clamping* Available when Code 4 is 1 or B **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" Hub Shaft **4** 12 mm Hubshaft **5** 1/2" Hubshaft **6** 10 mm Hub Shaft **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** 1.5m axial cable **1** 1.5m radial cable 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 **J** 17 pin MS axial * **K** 19 pin Bayonet radial 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 * Status LED and Preset Switch features not available with "**J**"

DIMENSIONS

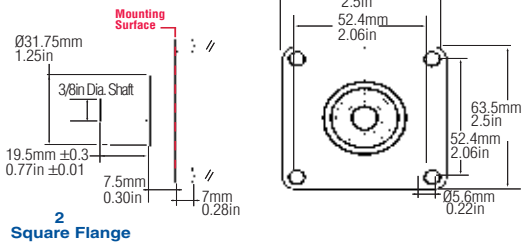
Code 3: Mounting



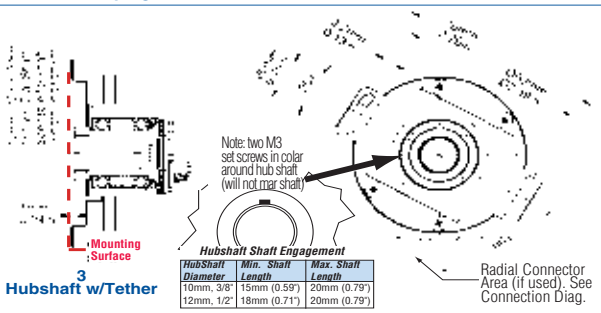
0
Servo



1
Clamping

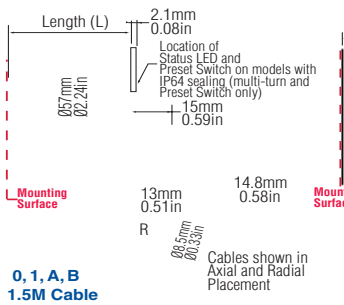


2
Square Flange

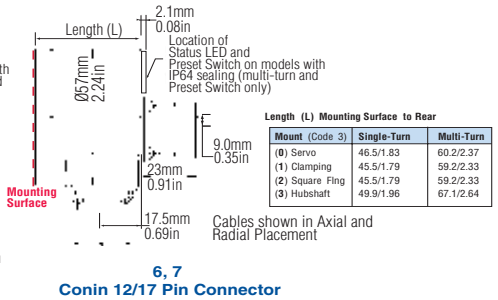


3
Hubshaft w/Tether

Code 7: Connector



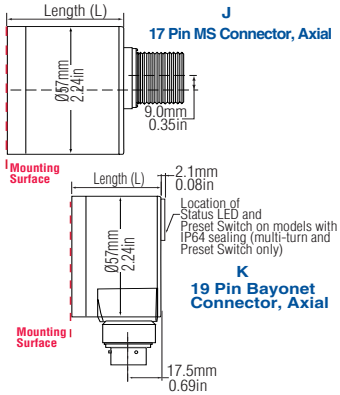
0, 1, A, B
1.5M Cable



Length (L) Mounting Surface to Rear

Mount (Code 3)	Single-Turn	Multi-Turn
(0) Servo	46.5/1.83	60.2/2.37
(1) Clamping	45.5/1.79	59.2/2.33
(2) Square Flng	45.5/1.79	59.2/2.33
(3) Hubshaft	49.9/1.96	67.1/2.64

6, 7
Conin 12/17 Pin Connector



J
17 Pin MS Connector, Axial

K
19 Pin Bayonet Connector, Axial

SERIES AI25 Parallel

ACURO

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

CONNECTOR WIRING

MS style 17 pin connectors					
Pin	Function 12 Bit 4096 CPR	Function 10 Bit 1024 CPR	107865 Cable Accessory* 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	Tristate S0...S12	Tristate S0...S13
pnk	Latch 4)	Latch 4)
grn	Direction	Direction
blk	0 V	0 V
red	5/10...30VDC	5/10...30VDC
brn	Alarm	Alarm

4) Binary Only

Bayonet style 19 pin connectors							
Pin	Function 14 Bit 16384 CPR	112077 Cable Accessory* Color Code	Function 13 it 8192 CPR	112076 Cable Accessory* Color Code	Function 12 Bit 4096 CPR	Function 10 Bit 1024 CPR	110158 Cable Accessory* 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 AC110

ACURO

Absolute Encoder

Key Features

- **Large 50mm Hollowshaft Available**
- **Integrated Diagnostic System**
- **Up to 22 bits of True Singleturn Absolute Positioning**

CE RoHS

SPECIFICATIONS

ELECTRICAL

Supply Voltage: -5%/ +10% DC 5 V; DC 10-30 V
Max. Current w/o Load: 120 mA
EMC: EN 61326 Class A
Resolution: Singleturn 11 - 19 Bit (22 Bit on request); Multiturn: 16 Bit
Output Code: Binary, Gray
Drives: Clock and Data / RS422
Incremental Signals: Optional Sine-Cosine 1 Vpp
Number of Pulses: 4096
3dB Limiting Frequency: 500 kHz
Alarm Output: Alarm bit (SSI Option), Warning and Alarm bit (BiSS)

ELECTRICAL CONNECTIONS

Cable Color	Cable Connector	Signal
brown[4]	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
—	4	N.C.
blue	5	$\overline{\text{Direction}}$[1]
—	6	N.C.
—	7	N.C.
white[4]	8	DC 5 V[3] / DC 10 - 30 V
—	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output[2]
Screen		Shielded with housing

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 logical "0" if required.
3 Notice: when supply voltage = 5VDC or more, max. cable length is 10 m
4 Use only thin wires 0.14mm²

MECHANICAL

Housing Diameter: 110 mm
Shaft Diameter: 50 mm (Hub shaft)
Mounting of Shaft: Keyway, Rear clamping ring
Hubshaft Axial Endplay: ± 0.5 mm
Hubshaft Radial Runout: ± 0.05 mm
Max. Speed: IP40: 3600 rpm; IP50: 2000 rpm; IP64: 1500 rpm
Torque: 15 Ncm
Shaft Material: Stainless Steel / Aluminum, ceramic coated
Housing Material: Aluminum
Weight approx.: 1000g (2.2lbs.)
Connection: Cable, radial; Cable 1.5 m with M23 connector (Conin), 12 pole, axial or radial

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

Maximum data transfer rate depends on cable length. For Clock / $\overline{\text{Clock}}$ and Data / $\overline{\text{Data}}$. Use cable with twisted pairs in shield.

ENVIRONMENTAL

Operating Temperature: -20°C to +100°C (-20°F to 212°F)
Storage Temperature: -50°C to +80°C (-58°F to 176°F)
Vibration (DIN EN 60068-2-6)**:** 100 m/s² (10 to 500 Hz)
Shock (DIN EN 60068-2-27): 1000 m/s² (6 ms)
Enclosure Rating: (EN 60529) IP40 or IP64
Shaft Rating: (EN 60529) IP50 or IP64

by DYNAPAR™

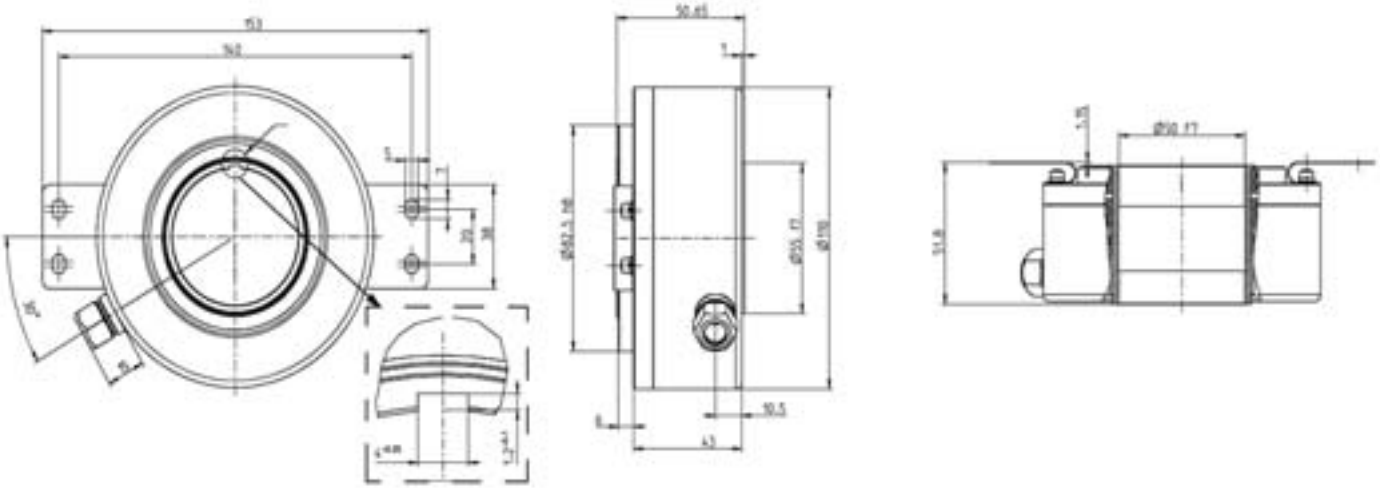
SERIES AC110

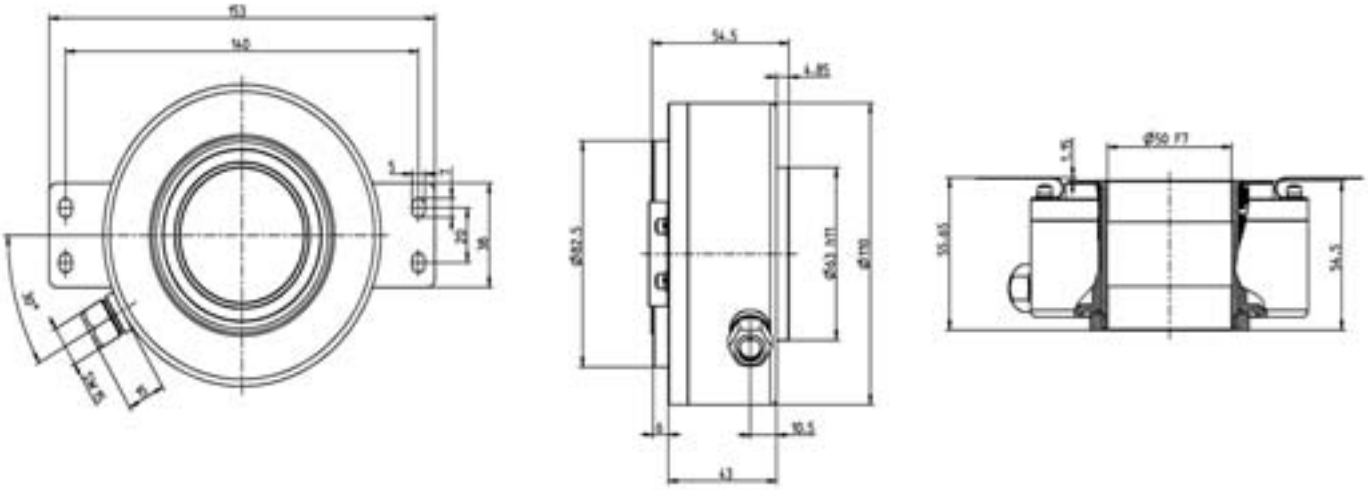
Ordering Information

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: Spring Tether	Code 5: Protection Class	Code 6: Shaft Mounting	Code7: Shaft Size	Code 8: Interface	Code 9: Connection	Code 10: Cable Length
AC110/□□□□	□	□	. □	□	□	□□	□	- □□	
Ordering Information									
ACURO Series AC110 Absolute Encoder	**0011** **0012** **0013** **0014** **0017** **0019** **0022**	**A** 5 VDC **E** 10-30 VDC	**0** None **B** With Spring Tether	**0** IP 40 **1** IP 50 **4** IP 64	**K** Keyway 4 x 1.2 **H** Clamping Ring	**50** 50mm	**SB** SSI Binary **SG** SSI Gray **BI** BISS	**B** Cable, radial, 1.5m	**B5** 1.5m **D0** 3m **F0** 5m **K0** 10m

DIMENSIONS





DYNAPAR™

SERVO DUTY FEEDBACK GUIDE

DYNAPAR 2010

Rotary encoders designed for servomotor duty face special challenges such as high temperatures, high peak speeds, and commutation chores. 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 Acuro™ 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

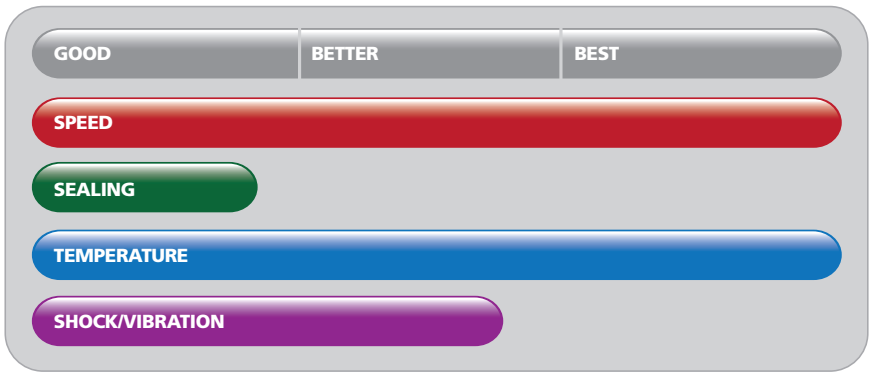
For those OEM customers with special requirements, Dynapar has an engineering team ready to tackle custom modifications whether electrical, mechanical, or environmental. With these custom products manufactured across the globe, Dynapar supports today’s servomotor manufacturer by combining high performance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

DYNAPAR™

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.

AD35 Pictured.

SERVO DUTY ENCODER GENERAL PERFORMANCE DATA



DYNAPAR™

OPTICAL - ABSOLUTE

	NEW 	NEW 		
Product	AD34	AD35	AD36	AD25
Shaft/Bore Sizes	6mm	8mm	8mm	10mm
Available Resolutions (Bits)	Up to 19 bit Singleturn	Up to 22 bit Singleturn	Up to 22 bit Singleturn, 12 bit multiturn	Up to 22 bit Singleturn, 12 bit multiturn
Input Voltage (VDC)	5 or 7 to 30	5 or 7 to 30	5 or 7 to 30	5
Operating Temperature (°C)	-15 to +120	-15 to +120	-15 to +120	-15 to +120
Enclosure Rating	IP40	IP40	IP40	IP40
Key Features	Unique one-step notched shaft mounting	Short mounting depth	Up to 22 bit singleturn resolution	Unique conical shaft for concentric motor mounting
Page Number	3.04	3.06	3.08	3.10

INDUCTIVE - RESOLVER

		
11	R11	
0.120" (3.05mm)	0.120" (3.05mm)	
+/- 3 arcmin	+/- 6 arcmin	
2 to 26	2 to 6	
Up to 155	Up to 155	
N/A	N/A	
Brushless construction	Brushless construction	
3.40	3.40	

OPTICAL - INCREMENTAL

	NEW 	NEW 				
Product	M602/M832 Module	LM/LAM	E9	M9	M14	M15
Shaft/Bore Sizes	1/4″ to 10mm	N/A	1.5 to 4mm, .125", .156"	1.5 to 4mm, .125", .156"	3 to 8mm, .1248", .375"	1/8″ or 3/8″ 6 to 10mm
Available Resolutions (PPR)	1 to 5000 (M832) 1 to 3600 (M602)	Up to 720 CPI/500 CPI	100 to 512	100 to 512	200 to 1024	200 to 1024
Input Voltage (VDC)	5	5	5	5	5	5 or 12
Operating Temperature (°C)	-40 to +100	-40 to +100	-20 to +100	-20 to +100	-20 to +100	-20 to +120
Enclosure Rating	IP00	IP00	N/A	N/A	N/A	NEMA 1/ IP50 (w/cover)
Key Features	Tool-less gapping	Choice of Digital or Analog Output	Super-compact size for small motors	Up to 512 PPR resolution	Short mounting depth	Easy installation without special tools
Page Number	3.12	3.15	3.18	3.20	3.22	3.24

DYNAPAR™

INDUCTIVE - RESOLVER

	Frameless 10	Frameless 15	Frameless 21	Frameless 31	Frameless 55	HaroMax® 15	HaroMax® 21	Product
	0.25" (6mm)	0.472" (12mm)	0.800" (20mm)	1.576" (40mm)	3.651" (93mm)	0.472" (12mm)	0.800" (20mm)	Shaft size/ Max bore size
	+/- 15 arcmin	+/- 10 arcmin	+/- 7 arcmin	+/- 20 arcmin	+/- 30 arcmin	+/- 5 arcmin	+/- 5 arcmin	Accuracy (Single Speed Only)
	2 to 12	2 to 12	2 to 12	2 to 12	2 to 12	2 to 12	2 to 12	Input Voltage (Vrms)
	Up to 200	Up to 200	Up to 200	Up to 200	Up to 200	Up to 200	Up to 200	Operating Temperature (°C)
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Enclosure Rating
	Compact mounting depth	Compact mounting depth	Compact mounting depth	Compact mounting depth	Compact mounting depth	Machine wound stator for high accuracy	Machine wound stator for high accuracy	Key Features
	3.41	3.41	3.41	3.41	3.41	3.42	3.43	Page Number

OPTICAL - INCREMENTAL

	M53	F10	F14	F15	F18	F21	HC20	Product
	1/4˝ to 1/2˝ 6 to 12mm	6mm	1/4", 6mm, 8mm	3/8"	1/4˝ to 1/2˝ 6 to 12mm	1/2"	6mm, 8mm hub or hollow, 9mm tapered	Shaft/Bore Sizes
	500 to 2500	1024 to 2048	200 to 5000	1024 to 2048	500 to 1000	1024 to 2048	500 to 2500	Available Resolutions (PPR)
	5 or 12	5	5	5	5	5	5 or 5 to 26	Input Voltage (VDC)
	0 to +120	0 to +120	0 to +120	0 to +120	0 to +120	0 to +120	0 to +120	Operating Temperature (°C)
	NEMA 1/ IP50 (w/cover)	N/A	NEMA 1/ IP40 (w/cover)	N/A	NEMA 1/ IP40 (w/cover)	N/A	IP51	Enclosure Rating
	Up to 2500PPR with commutation tracks	Compact 1.0" diameter servo ring mount	Non-marring hollow shaft	Industry standard size 15 servo mounting	Under 2.0" dia package with high 10,000PPR capability	Industry standard size 21 servo mounting	Economical servomotor feedback	Key Features
	3.26	3.28	3.30	3.32	3.34	3.36	3.38	Page Number

SERIES AD34

ACURO™ brand

Single Turn Absolute Encoder

Key Features

- **Special Notched Shaft Installs Easily in One Step and Eliminates Coupling Issues**
- **Up to 19 bits of Singleturn Absolute Positioning**
- **Wide -15° to +120°C Operating Temperature Covers Majority of Servomotor Applications**

CE RoHS

NEW!

SPECIFICATIONS

ELECTRICAL

Supply Voltage: 5 VDC -5 %/+10 % or 7 - 30 VDC
Max. Current w/o Load: 50 mA
Resolution Singleturn: 12 -17 Bit
Output Code: Gray
Drives: Clock and Data / RS422
Incremental signals: Optional Sinus-Cosinus 1 Vpp
Number of Pulses: 2,048
3dB Lmiting Frequency: 500 kHz
Absolute Accuracy: ±35"
Repeatability: ±7"
Alarm Output: Alarm bit (SSI-Option), warning bit and alarm bit (BiSS)

MECHANICAL

Housing Diameter: 37.5 mm (1.48")
Shaft Diameter: 6 mm (Notched Shaft)
Mounting: Spring Tether
Protection Class (EN 60529): IP40 Housing & Shaft
Shaft Speed (maximum): 10,000 RPM (continuous), 12,000 RPM (peak)
Torque: 0.01 Ncm
Moment of Inertia: approx. 2.5 x 10^{-6} kgm²
Weight: approx. 80g (2.8 oz.)
Connections: Cable, radial; PCB connector, 12 pole

ENVIRONMENTAL

Vibration: 100 m/s² (10 to 2,000 Hz) (DIN EN 60068-2-6)
Shock: 1,000 m/s² for 6 msec duration (DIN EN 60068-2-27)
Operating Temperature: -15°C to +120°C
Storage temperature: -15°C to +85°C (due to packaging)

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

by DYNAPAR™

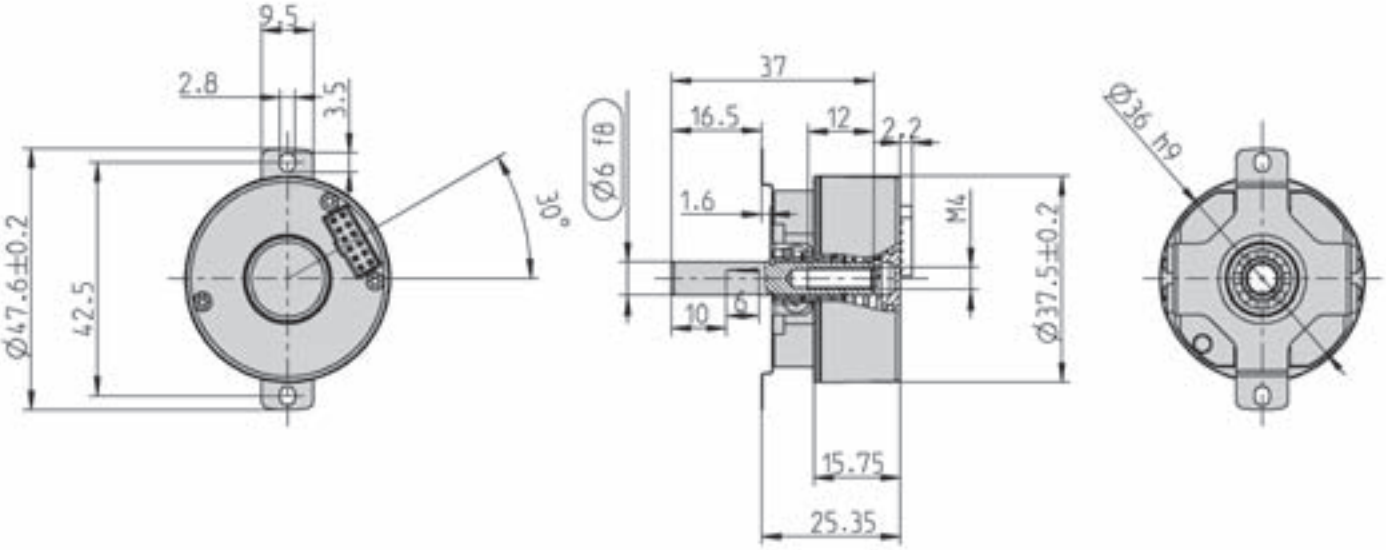
SERIES AD34

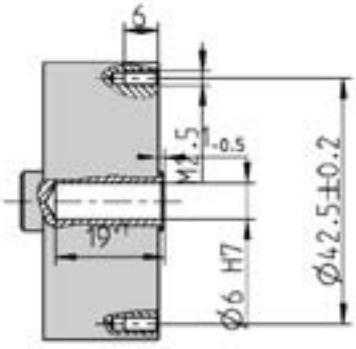
Ordering Information

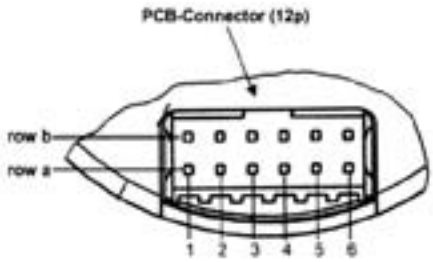
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Flange/Protection/Shaft	Code 5: Output	Code 6: Connection
AD34	□□□□	□	□.□□	□□	□
AD34 ACURO Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST	**A** 5 VDC* **E** 7-30 VDC ***Note:** No inverse polarity protection	**U.0N** Spring Tether, IP40, 8mm Notched Shaft	**BI** BiSS **SG** SSI Gray **SC** SSI Gray (+SinCos 1Vpp)	**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

Dimensions (mm)







12 pin PCB connector
manufacture Berg, type Minitek

SERIES AD35

ACURO™ brand

Single Turn Absolute Encoder

Key Features

- **Short Mounting Depth Allows Installation in Tight Motor Endbells**
- **Up to 10,000RPM Speed Capability for Majority of Servomotor Applications**
- **8mm Hubshaft Mount for Easy Installation**

NEW!

SPECIFICATIONS

ELECTRICAL

Supply Voltage: 5 VDC -5 %/+10 % or 10 - 30 VDC
Max. Current w/o Load: 50 mA
Resolution Singleturn: 17 Bit
Output Code: Gray
Lines/Drives: Clock and Data / RS422
Incremental signals: Sine-Cosine 1 Vpp
Number of Increments: 2,048
3dB Lmiting Frequency: 500 kHz
Absolute Accuracy: ±35"
Repeatability: ±7"
Alarm Output: Alarm bit (SSI); Warning bit and alarm bit (BiSS)

MECHANICAL

Housing Diameter: 37.5 mm (1.48")
Material Shaft/ Flange/ Housing: Stainless steel/ aluminum/ plastic
Shaft Diameter: 6 mm solid shaft (8 mm hub shaft optional)
Mounting: Spring Tether (Hub Shaft)
Protection Class: IP40 Housing & Shaft
Shaft Speed (maximum): 10,000 RPM (continuous), 12,000 RPM (peak)
Torque: ≤1 Ncm
Moment of Inertia: approx. 25 gcm^2
Shaft Load (solid-shaft): Axial ≤5 N; Radial ≤10 N
Shaft Load (hubshaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Weight: Aprox. 80g (2.8 oz.)
Connections: Cable, PCB connector, 12 pole

ENVIRONMENTAL

Vibration: 100 m/s^2 (10 to 500 Hz) (IEC 68-2-6)
Shock: 1,000 m/s^2 for 6 msec duration (IEC 68-2-27)
Operating Temperature: -15°C to +100°C
Storage temperature: -15°C to +85°C (due to packaging)

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Function	DC 5V / 7-30V (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	Yellow/Black	White	Red	White/Green	Yellow	Black
PIN	1a	2a	3a	4a	5a	6a
Function	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	5V Sensor
Color	Violet	Green	Brown/Green	Blue	Brown	Red/Black

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

by DYNAPAR™

SERIES AD35

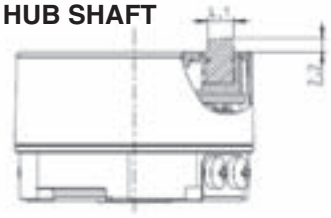
Ordering Information

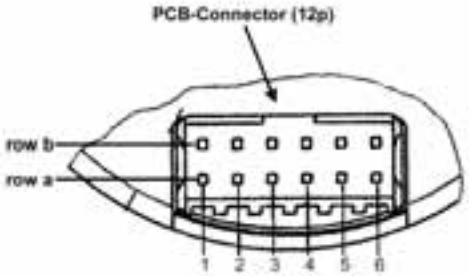
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Flange/Protection/Shaft	Code 5: Output	Code 6: Connection
AD35	☐☐☐☐	☐	☐.☐☐	☐☐	☐
AD35 ACURO 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 * No Inverse polarity protection	**F.OC** Optional, Spring Tether, IP40, 8mm Hub Shaft	**BI** BiSS **SC** SSI Gray +1Vpp	**0** PCB Connector, 12 pole **B** Cable Radial, 0.5 m

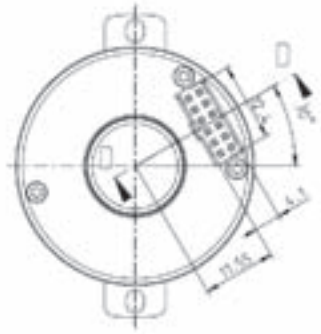
Dimensions (mm)

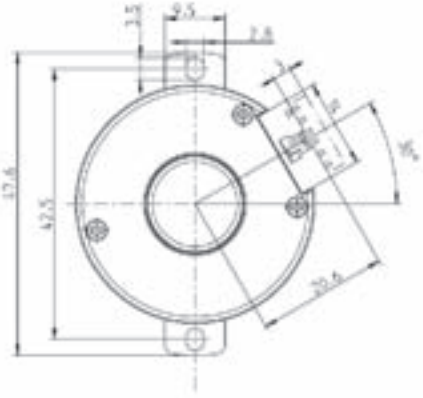
HUB SHAFT

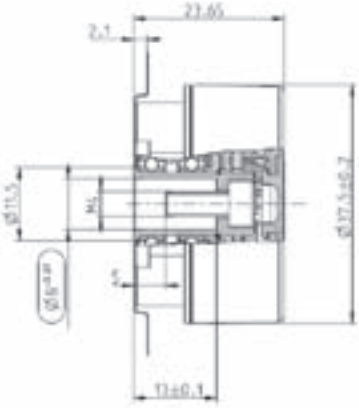




12 pin PCB connector
manufacture Berg, type Minitek







SERIES AD36

ACURO™ brand

Single- / Multi- Turn Absolute Encoder

NEW!

Key Features

- **Compact Dimensions Compatible with Size 15 Resolvers**
- **Up to 22 Bit Singleturn and 12 Bit True Multiturn Absolute Positioning**
- **Optional Sinewave 1Vp-p Output for Easy Integration Into Older Controls**

CE RoHS

SPECIFICATIONS

ELECTRICAL

Supply Voltage: 5 VDC -5 %/+10 % or 10 - 30 VDC
Max. Current w/o Load: Single-Turn: 50 mA; Multi-Turn: 100 mA
Resolution Singleturn: SSI: 13 Bit; Biss: 19 Bit
Output Code: Gray
Lines/Drives: Clock and Data / RS422
Incremental Signals: Sine-Cosine 1 Vpp
Number of Increments: 2,048
3dB Lmiting Frequency: 500 kHz
Absolute Accuracy: ±35"
Repeatability: ±7"
Alarm Output: Alarm bit (SSI); Warning bit and alarm bit (BiSS)

MECHANICAL

Housing Diameter: 37.5 mm (1.48")
Material Shaft/ Flange/ Housing: Stainless steel/ aluminum/ plastic
Shaft Diameter: 8 mm solid shaft
Mounting: Spring Tether (Hollow Shaft)
Protection Class: IP40 Housing & Shaft
Shaft Speed (maximum): 10,000 RPM (continuous), 12,000 RPM (peak)
Torque: 0.01 Ncm
Moment of Inertia: approx. 25 gcm²
Shaft Load (solid-shaft): Axial ≤5 N; Radial ≤10 N
Shaft Load (hollowshaft): Spring Tether Tolerance: Axial ±0.5mm; Radial ±0.05mm
Weight ST/MT: 80g (2.8 oz.) / 130g (4.6 oz.)
Connections: Cable, PCB connector, 12 pole

ENVIRONMENTAL

Vibration: 100 m/s² (10 to 500 Hz) (IEC 68-2-6)
Shock: 1,000 m/s² for 6 msec duration (IEC 68-2-27)
Operating Temperature: -15°C to +120°C
Storage temperature: -15°C to +85°C (due to packaging)

CONNECTIONS

PIN	1b	2b	3b	4b	5b	6b
Function	DC 5V / 7-30V (U_p)	Clock	B -	0 V (U_n)	A -	Data
Color	Yellow/Black	White	Red	White/Green	Yellow	Black
PIN	1a	2a	3a	4a	5a	6a
Function	$\overline{\text{Data}}$	A +	0 V -Sen	B +	$\overline{\text{Clock}}$	5V Sensor
Color	Violet	Green	Brown/Green	Blue	Brown	Red/Black

U_p = power Supply
Sensor is connected to Power Supply and 0 V (U_n)
Shield connected to case

by DYNAPAR™

SERIES AD36

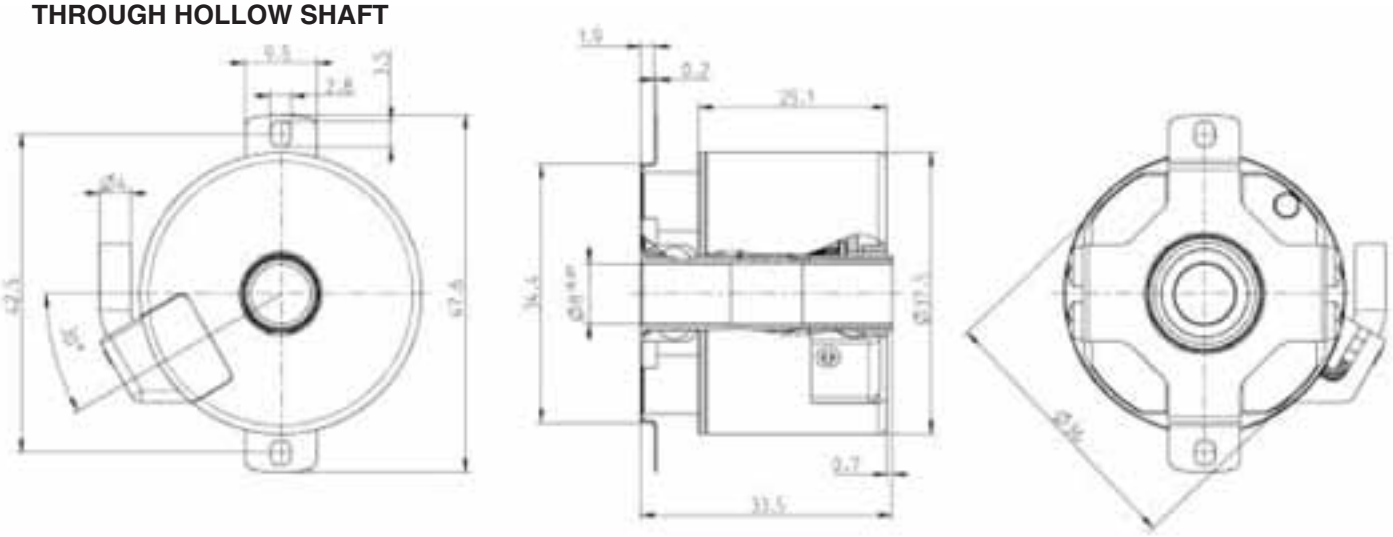
Ordering Information

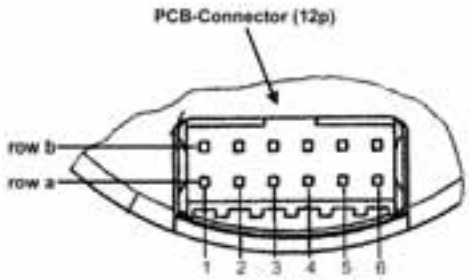
To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3: Voltage	Code 4: Flange/Protection/Shaft	Code 5: Output	Code 6: Connection
AD36	□□□□	□	□.□□	□□	□
AD36 ACURO Absolute Encoder	**0012** 12 Bit ST **0013** 13 Bit ST **0014** 14 Bit ST **0017** 17 Bit ST **0019** 19 Bit ST (Biss) **0022** 22 Bit ST **1213** 12 Bit MT+13 Bit ST **1217** 12 Bit MT+17 Bit ST **1219** 12 Bit MT+19 Bit ST (Biss) **1222** 12 Bit MT+22 Bit ST	**A** 5 VDC* **E** 7-30 VDC * No Inverse polarity protection	**F.OC** Optional, Spring Tether, IP40, 8mm Through Hollow Shaft **F.OR** Spring Tether, IP40, 8mm Hub Shaft	**BI** BiSS (1 Vss redundant, optional) **SC** SSI Gray +1Vpp	**0** PCB Connector, 12 pole **B** Cable Radial, 0.5 m

Dimensions (mm)

THROUGH HOLLOW SHAFT





12 pin PCB connector
manufacture Berg, type Minitek

SERIES AD25

ACURO™ brand

Single- / Multi- Turn Absolute Encoder

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 RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Supply Voltage: 5 VDC, +10% / –5%
Current Consumption (w/o output current):
Single-turn: £ 45 mA (at 5V)
Multi-turn: £ 85 mA (at 5V)
Absolute Accuracy: ± 0.01° mechanical (36 arc-sec.)
Repeatability: ± 0.002° mechanical (7.2 arc-sec.)
Connection: 1 ft. Cable (30 cm)
Incremental Signals (SSI models only)
Resolution: 2048
Format: A, B Quadrature,1 Vpp Sine wave
SSI Interface
Resolution:
Single-turn: 13 Bits
Multi-turn resolution: 12 Bits
Interface:
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
BiSS Interface
Resolution:
Single-turn resolution: 22 Bits
Multi-turn resolution: 12 Bits
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

For further information on the BiSS interface please consult: http://www.biss-ic.de/

MECHANICAL

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
Weight: 6.2 oz.
Diameter: 2.28”
Length: 1.85”

ENVIRONMENTAL

Operating Temperature: -15 to +120° C
Storage Temperature: -25 to +85° C (due to packaging)
Enclosure Rating: IP40
Shock: 100 g’s for 6 msec duration
Vibration: 10 g’s (10 to 2000 Hz)

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

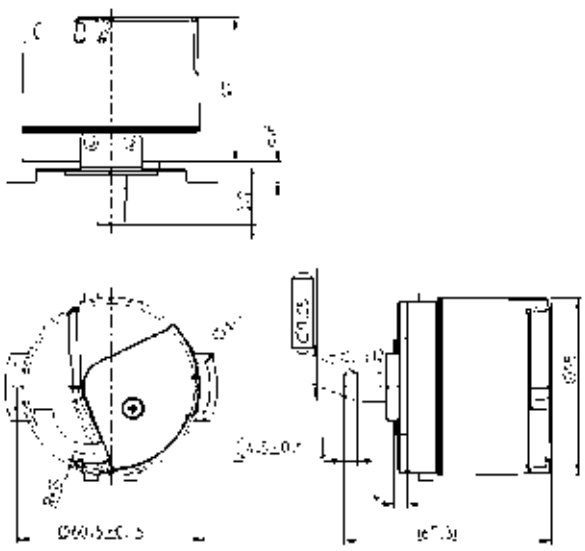
Ordering Information

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

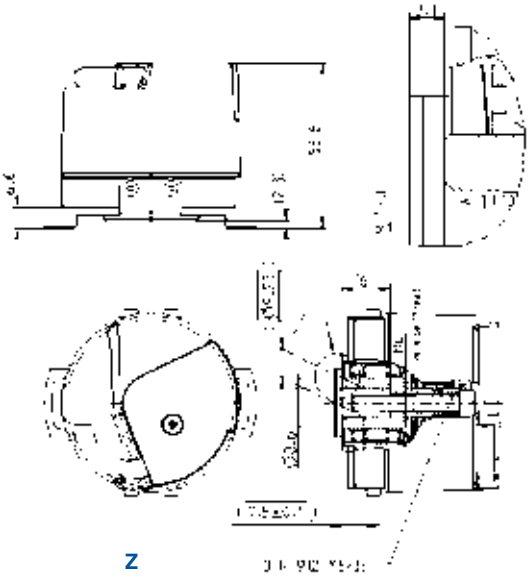
Code 1: Model	Code 2: Bits	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AD25	☐☐☐☐	☐	☐	☐	☐	☐
AD25 Size25 Acuro Absolute Encoder	**Single-Turn** **0013** 13 Bit **0022** 22 Bit **Multi-Turn** **1213** 12 Bit Multi-Turn, 13 Bit Single-Turn **1222** 12 Bit Multi-Turn, 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 Available when Code 2 is 0013 or 1213 **F** SSI-Gray Code, + 1Vpp	**0** 5 VDC	**M** Drive cable, 1 foot (30 cm)

Dimensions (mm)

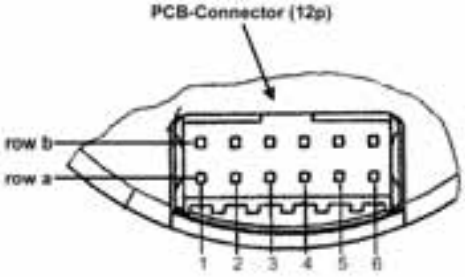
Code 4: Shaft Size



Y
10mm (10:1 taper) Shaft



Z
10mm Hub Shaft



12 pin PCB connector
manufacture Berg, type Minitek

SERIES M602 & M832

Dynapar™ brand

Kit Encoder

Key Features

- **Compact Size for Easy Integration**
- **Advanced Phased-Array Sensor Technology with Digital or Analog Output**
- **Available with Unbreakable Plastic or Stainless Code Discs**
- **Commutation Tracks Available for Brushless Motor Commutation**
- **Line Driver Output Board Available**

RoHS

NEW!

SPECIFICATIONS

ELECTRICAL

Code: Incremental
Resolution: See ordering information for standard resolutions
Supply Voltage: 5Vdc + 10% at 60mA maximum
Output Format: Dual channel quadrature
Output Format Options: Index and commutation. *ComTracks available on Digital version only*
Output Type – Digital: Square wave, TTL and CMOS compatible, 10mA sink
Output Type – Analog: Current Source
Frequency Response: 125 kHz (data and index)

MECHANICAL

Dimensions: See module outline dimensions
Weight: <0.25 ounces
Termination: .025 sqr. discrete pins

Materials

Module: Molded PPS 40% glass (R-4)
Pins: gold plated
Disc: mylar or etched metal
Hub: aluminum

Disc Interface

Runout: 0.005 inches TIR
Endplay: + 0.010 inches
Optical Radius (data): 0.602 or 0.832 inches

Motor Interface

Mounting Holes: See recommended mounting

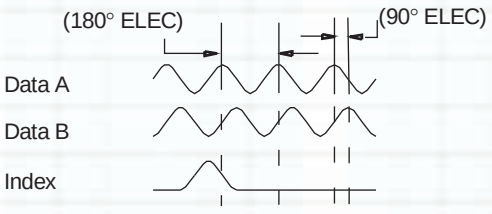
Connector Interface

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

ENVIRONMENTAL CONDITIONS

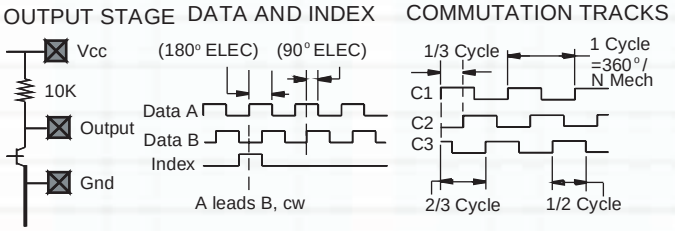
Operating Temperature: -40° to 100°C (non-condensing)
Storage Temperature: -40° to 100°C
Enclosure: Unsealed housing

Analog Output Wave Forms



Output signal shown after analog signal processing

Digital Output Format



Reading from top as shown in pi cture.

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.		

Analog AM

602	–	2000	–	6T
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.
Analog 602 Module
Available Resolutions: 1000 & 1024
Analog 832 Module
Available Resolutions: 2000 & 2048

3. Lead Positions

Digital

Side Exit		Top Exit	
A	1S	A	1T
AB	2S	AB	2T
ABZ	3S	ABZ	3T
		ABZ + COMS	6T

Analog
Top Exit
ABZ 6T

1. Disc Outside Diameter

1.30 inches 602
1.75 832

2. Standard Resolutions

See "Current Resolutions: list.

3. Commutation Tracks (Option)

(Available on 6T digital module only)
Not required 0
Specify 2, 3, 4, 6 or 8 motor pole pairs

4. Hub Bore Size*

1/4 inch	25	6mm	6M
3/8 inch	38	8mm	8M
		10mm	10M

*Consult factory for other sizes

NOTE: When ordering Modules with Index add a "G" to the end of the part number for GATED INDEX or "U" for UNGATED INDEX.

When ordering Modules in 1000 or 1024PPR to specify DOUBLER CIRCUIT add a "D" to the last digit. Example: M602-1000-3T-UD

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, 2000, 2048, 2500, 2540, 2600 3600

With Commutation for Brushless Motors:

CPR	Pole Pairs
500	5 or 6
512	3 or 6

M832 Digital Modules

Direct Read: 360, 1000, 1024

Doubler: 2000, 2048, 3600, 4096, 5000

With Commutation for Brushless Motors:

CPR	Pole Pairs
1000	2, 3, 4, 6 or 8
1024	6

AM602/AM832 Analog Modules

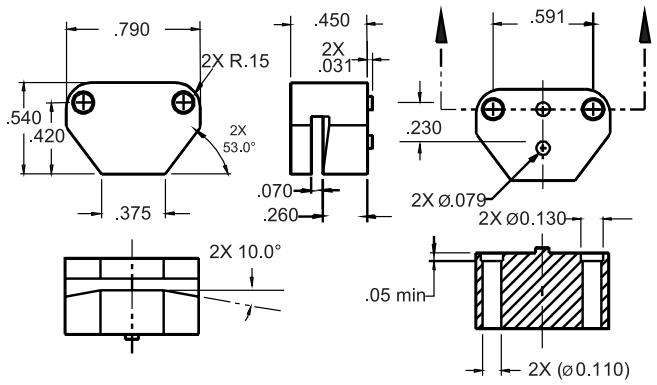
AM602	AM832
1000,	1024 2000, 2048

Analog Modules available in –6T configuration only
For new Disc resolutions or radii please consult factory for availability and NRE. We are constantly adding new resolutions so if the one you require is not listed please call the factory for availability

SERIES M602 & M832

by DYNAPAR™

Module Outline Dimensions

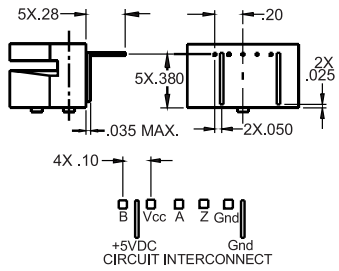


Pin Layouts

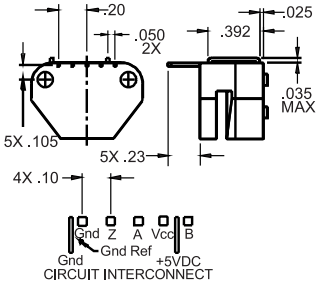
The Optical Encoder Modules come standard in either top mount or s mount with A,B, and Index Channels. Commutation Channels are optionally available for Digital modules in top-mounted configurations only.

ABZ CONFIGURATION
5X .025 square pins

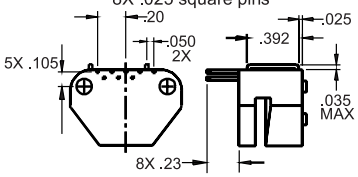
SIDE MOUNT (-1S,-2S,-3S)

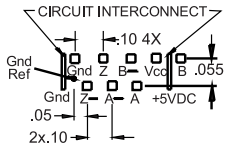


TOP MOUNT (-1T, -2T, -3T)

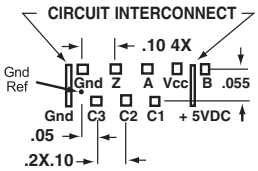


ANALOG CONFIGURATIONS (-6T)
8X .025 square pins





Analog Pinouts

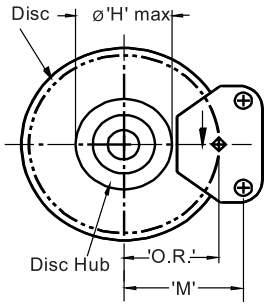


Digital Pinouts

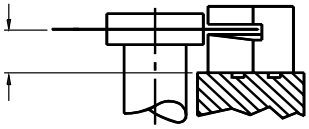
Module Interface

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

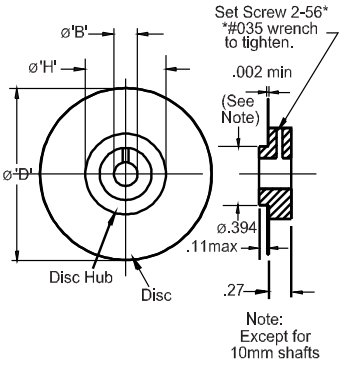


Disc and Hub Dimensions

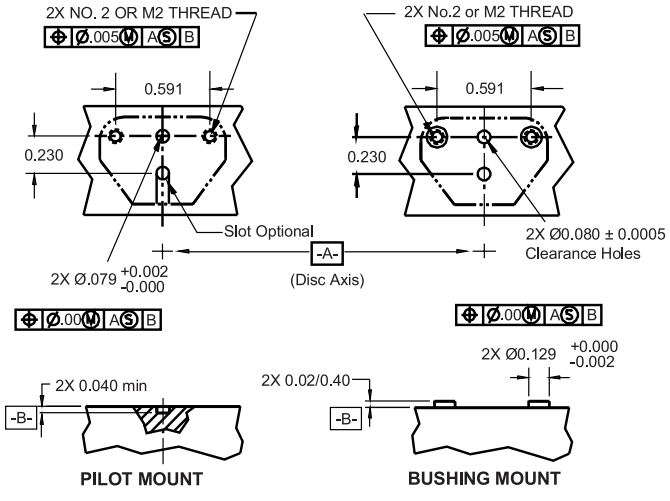
Module 602 Disc and Hub
∅'D' – Disc O.D. .....1.30 in.
∅ 'H' – Hub O.D. .....0.61 in.
Module 832 Disc and Hub
∅'D' – Disc O.D. .....1.75 in.
∅ 'H' – Hub O.D.....1.00 in.

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



Recommended Mounting Configurations



SERIES LM & LAM

Dynapar™ brand

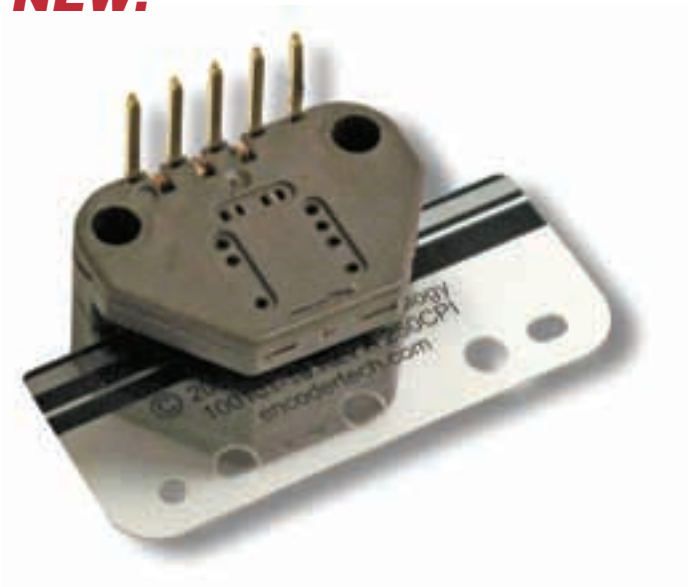
Kit Encoder

Key Features

- **Compact Size for Easy Integration**
- **Advanced Phased-Array Sensor Technology with Digital or Analog Output**
- **Rugged Plastic or Metal Scale Material**

RoHS

NEW!



SPECIFICATIONS

ELECTRICAL

Code: Incremental
Resolution: See ordering information for standard resolutions
Supply Voltage: 5Vdc + 10% at 60mA maximum
Output Format: Dual channel quadrature
Output Format Options: Index
Output Type – Digital: Square wave, TTL and CMOS compatible, 10mA sink
Output Type – Analog: Output from diode array
Frequency Response: 125 kHz (data and index)

MECHANICAL

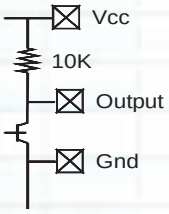
Dimensions: See module outline dimensions
Weight: <0.25 ounces
Termination: .025 sqr. discrete pins
Materials
Module: Molded PPS 40% glass (R-4)
Pins: gold plated
Scale: Mylar or etched metal

ENVIRONMENTAL CONDITIONS

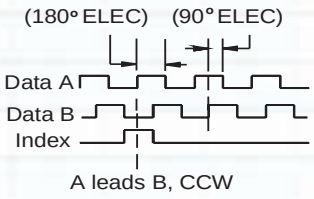
Operating Temperature: -40° to 100°C (non-condensing)
Storage Temperature: -40° to 100°C
Enclosure: Unsealed housing

Digital Output

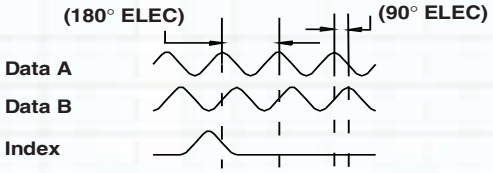
Output Stage



Data and Index

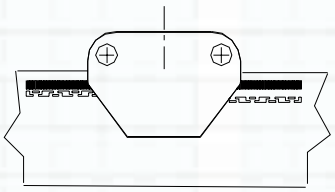


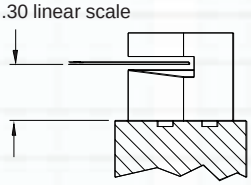
Analog Output Wave Forms



Output signal shown after analog signal processing

SCALE MOUNTING





Linear Module Scale made to order: contact factory

SERIES LM & LAM

ORDERING INFORMATION

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

Encoder Module (Linear)

Digital LM [720CPI] – [3T] – [See Note]
1. 3.

Analog LAM [500CPI] [6T]
2. 3.

1.Linear Digital Module (LM)
12CPMM.....12 cycles/mm
25CPMM.....25 cycles/mm
720CPI.....720 cycles/inch
See "Current Resolutions List" for Scale Lengths.

2. Linear Analog Module (LAM)
250CPI.....250 cycles /inch
500 cycles/inch.....500CPI
See "Current Resolutions List" for Scale Lengths.

3.Lead Positions

Digital

Side Exit		Top Exit	
A	1S	A	1T
AB	2S	AB	2T
ABZ	3S	ABZ	3T

Analog
Top Exit
ABZ.....6T

Note: When ordering Modules with a Gated Index, add a "G". For Ungated Index, add a "U".

Scale Characteristics

Standard Resolution - Digital
after 4x edge multiplication.

12 cycles/mm = 0.0008 Inch
Available Scale Length: 1.5 inches

25 cycles/mm = 0.01mm
Available Scale Length: Up to 600mm

720 cycles per inch = 0.00035 inch
Available Scale Length: 0.75, 1.0, 1.26, 1.70, 2.03, 3.255 or 4.8 inches

Standard Resolution – Analog
Available in custom lengths to 6 feet. Consult factory.

250 cycles per inch = 1.6 microns
after16x interpolate and 4x edge multiplication.

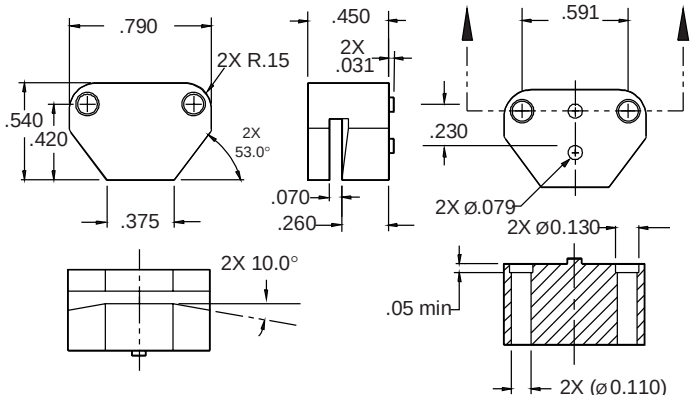
500 cycles per inch = .8 microns
after16X interpolate and 4x edge multiplication.

Length & Index Positioning
Per customer requirement
Consult factory for availability, part numbers and pricing.

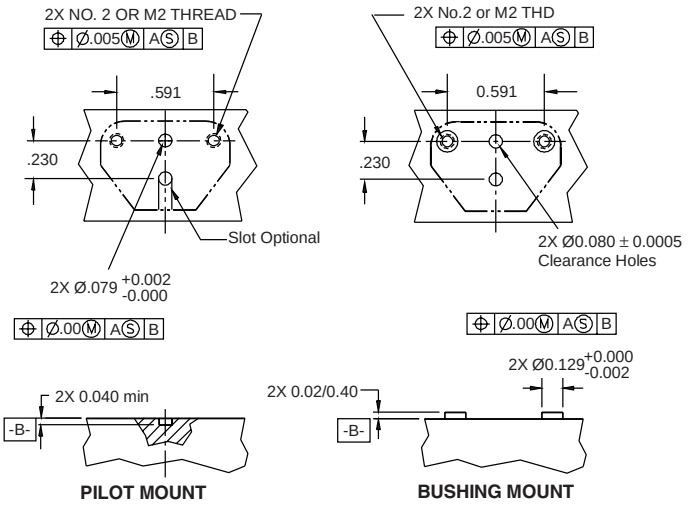
by DYNAPAR™

SERIES LM & LAM

Module Outline Dimensions



Recommended Mounting Configurations

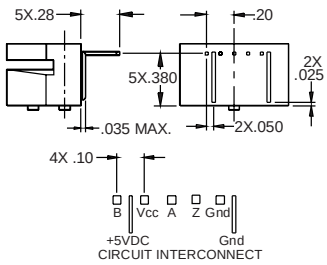


Pin Layouts

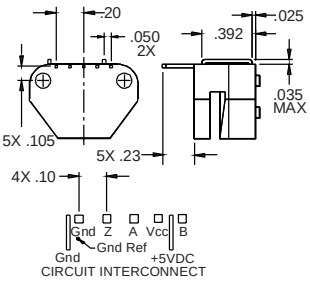
The Optical Encoder Modules come standard in either top mount or side mount with A, B, and Index Channels.

ABZ CONFIGURATION
5X .025 square pins

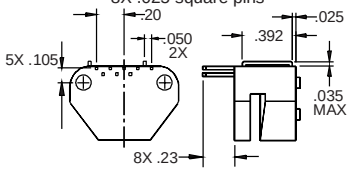
SIDE MOUNT (-1S,-2S,-3S)

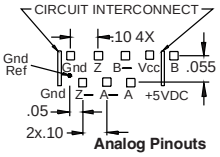


TOP MOUNT (-1T, -2T, -3T)

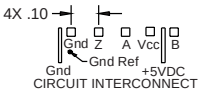


ANALOG CONFIGURATIONS (-6T)
8X .025 square pins





Analog Pinouts



Digital Pinouts

SERIES E9

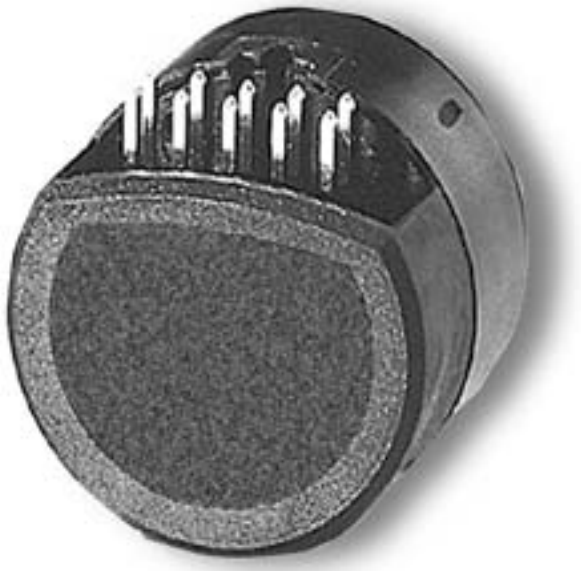
Dynapar™ brand

Miniature Encoder

Key Features

- **Super-Compact Modular Encoder for Small Servo and Stepper Motor Feedback**
- **Differential Outputs Available**
- **Low-Power Standby Mode is Ideal for Battery Powered Applications**

RoHS



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: Incremental pulses per revolution; 100 to 512
Phasing: 90° ±18° electrical degrees
Symmetry: 180° ±18° electrical
Index Pulse Width: 90° ±36° electrical

ELECTRICAL

Supply Voltage: 5 VDC ±10%
Supply Current: 10 mA, typ.
Standby Current: 50 µA, max.

Output Signals: 2.5 V min. high (V_{OH}); 0.5 V max. low (V_{OL}). 3 mA sink/source (25°C), 2 mA (100°C)
Frequency Response: 200 kHz
Termination: 10 pin header (accessory connector/ 12" ribbon cable, part no. CA0040012)
Reccomended Mating Connector: Thomas & Betts part number 622-1030

MECHANICAL

Weight: 0.18 oz (5.07 g)
Moment of Inertia: 0.28 x 10^{-5} oz-in-sec^2 (0.20 gm-cm^2)
Hub Bore: 1.5, 2.0, 2.5, 3.0, 4.0 mm; 0.125, 0.156 inch
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)

ENVIRONMENTAL

Operating Temperature: -20° to 100°C
Storage Temperature: -50° to 125°C
Relative Humidity: 90% non-condensing

OUTPUT WAVEFORMS & CONNECTIONS (direction viewing encoder cover)

Code 4= 00

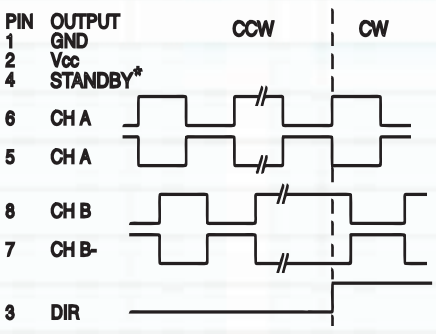


Figure 1

Code 4= 01

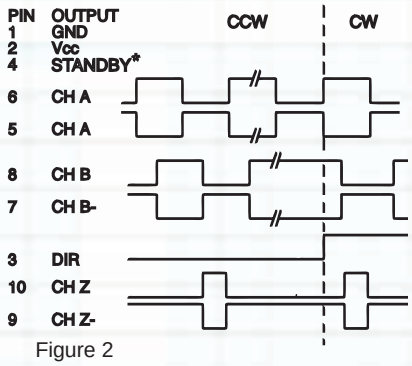


Figure 2

Code 4= 02

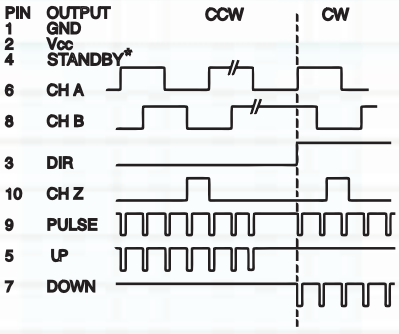


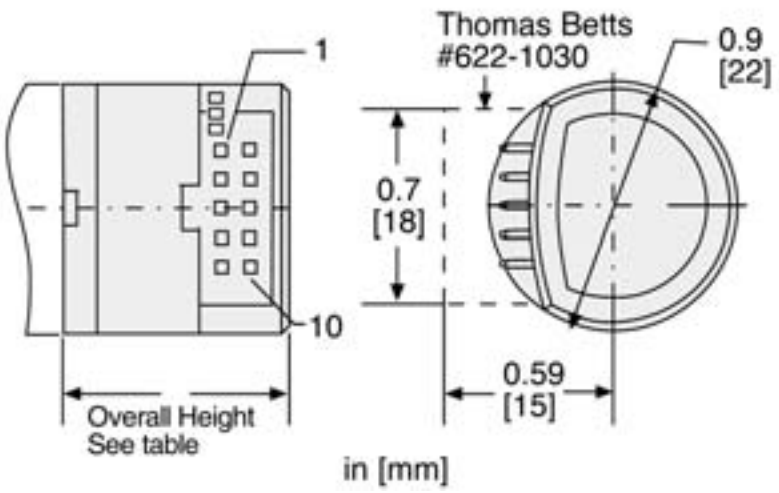
Figure 3

* For operation, connect **STANDBY (4)** to **Vcc (2)**

by DYNAPAR™

SERIES E9

DIMENSIONS/INSTALLATION



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** **0256** **0300** **0360** **0500** **0512**	**1.5** 1.5 mm **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 On 1.812" BC

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***

SERIES M9

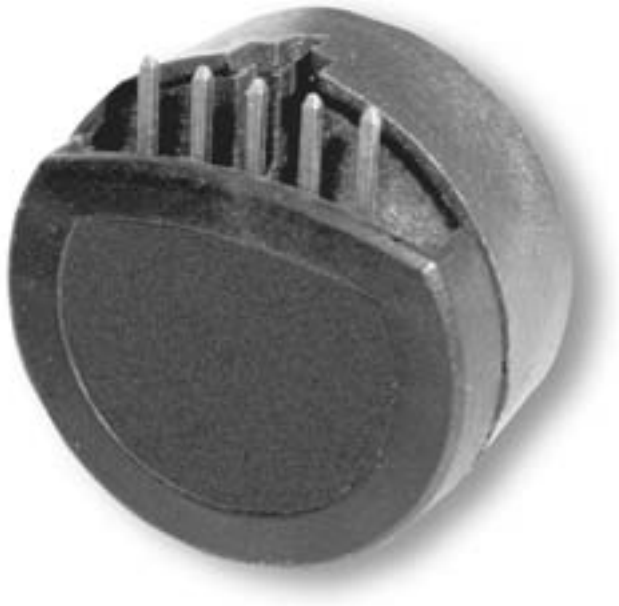
Dynapar™ brand

Miniature Encoder

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: Incremental pulses per revolution; 100 to 512

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

Weight: 0.15 oz (4.14 g)

Moment of Inertia: 0.15 x 10^{-5} oz-in-sec^2 (0.11 gm-cm^2)

Hub Bore: 1.5, 2.0, 2.5, 3.0, 4.0 mm; 0.125, 0.156 inch

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)

ENVIRONMENTAL

Operating Temperature: -20° to 100°C

Storage Temperature: -50° to 125°C

Relative Humidity: 90% non-condensing

OUTPUT WAVEFORMS & CONNECTIONS

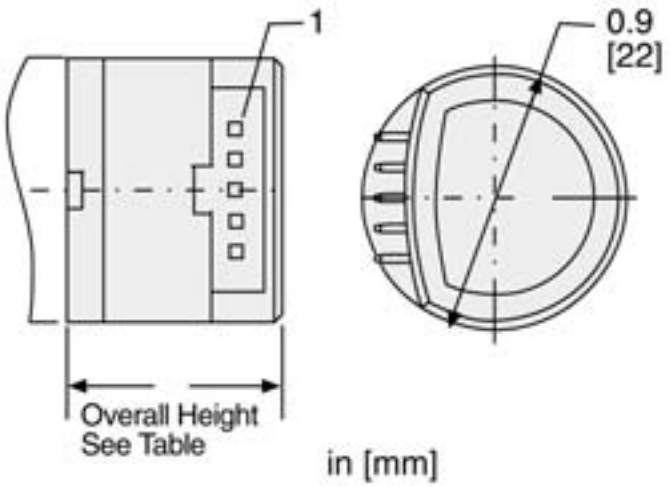
PIN	FUNCTION	CABLE WIRE
1	GND	BLACK
2	CH Z	BLUE
3	CH A	WHITE
4	Vcc	RED
5	CH B	BROWN

(Direction CCW viewing encoder cover)

by DYNAPAR™

SERIES M9

DIMENSIONS/INSTALLATION



Base (Code 3)	Overall Height inch (MM)	Motor Shaft Length inch (MM)	
		Max.	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** **0144/0** **0200/0** **0256/0** **0300/0** **0360/0** **0500/0** **0512/0**	**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 On 1.812" BC	**1.5** 1.5 mm **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	**1** 5 pin header **2** flying leads

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***

SERIES M14

Dynapar™ brand

Miniature Encoder

Key Features

- **Ideal Economical Choice for Stepper and Servo Motor Feedback**
- **Short .678" Mounting Depth and 1.5" Diameter**
- **Up to 1024PPR Resolution with Index**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical

Resolution: Incremental pulses per revolution; 200 to 1024

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 connector (accessory connector w/12" wires, part no. CA0060012)

Recommended Mating Connector: Amp Part Number 103969-4

MECHANICAL

Weight: 0.22 oz (6.2 g)

Moment of Inertia: 0.16 x 10^{-5} oz-in-sec^2 (0.13 gm-cm^2)

Hub Bore: 3.0, to 8.0 mm; 0.125, to 0.375 inch

Hub Dia. Tolerance: +0.0004"/-0.0000" (+0.010 mm/-0.000 mm)

Mating Shaft Length: 0.525" (13.3 mm) max.; 0.436" (11.07 mm) min.

Mating Shaft Runout: 0.001 TIR

Mating Shaft Endplay: >512 ppr: ±0.003" (±0.076mm); 500, 512 ppr: +0.005/-0.003" (+0.127/-0.076mm); <500 ppr: +0.007/-0.003" (+0.178/-0.076mm)

ENVIRONMENTAL

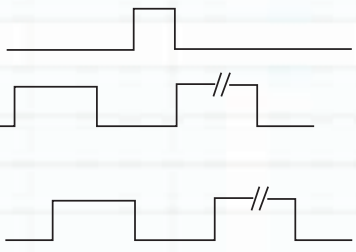
Operating Temperature: -20° to 100°C

Storage Temperature: -50° to 125°C

Relative Humidity: 90% non-condensing

OUTPUT WAVEFORM AND CONNECTIONS

PIN	FUNCTION	CABLE WIRE
5	GND	BLACK
4	CH Z	BLUE
3	CH A	WHITE
2	Vcc	RED
1	CH B	BROWN

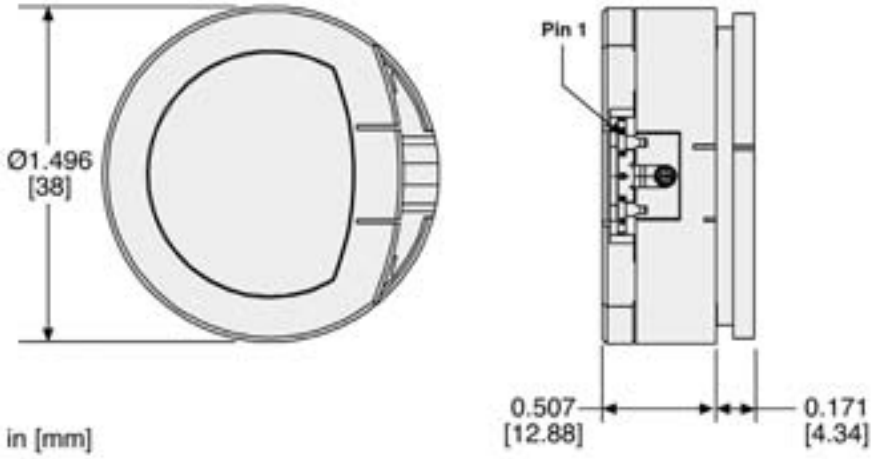


Direction: CCW viewing encoder cover

by DYNAPAR™

SERIES M14

Dimensions/Installation



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
M14	**□□□□/0**	**□**	**□□□**

Ordering Information					
M14	1.5" Diameter Incremental Modular Encoder	**0200/0** **0400/0** **0500/0** **0512/0** **1000/0** **1024/0**	**0**	No mounting base	**3.0** 3.0 mm **4.0** 4.0 mm **5.0** 5.0 mm **6.0** 6.0 mm **8.0** 8.0 mm **125** 0.1248 in **187** 0.1873 in **249** 0.2498 in **250** 0.2501 in **312** 0.3123 in **374** 0.3748 in **375** 0.3750 in
			A	2x #2-56 on1.28" BC	
			B	3x #0-80 on 0.823" BC	
			C	2x #2-56 on 0.75" BC	

IMPORTANT: To properly install Series M14, 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 M14 □□□ — *Code 4 (from Models Table, above) designating Hub Bore requirement.*

Example: Kit for installing encoders with 0.1248" hub Bore= ***MK M14 125***

SERIES M15

Dynapar™ brand

For Stepper & Small Servo Motors

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**

RoHS

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

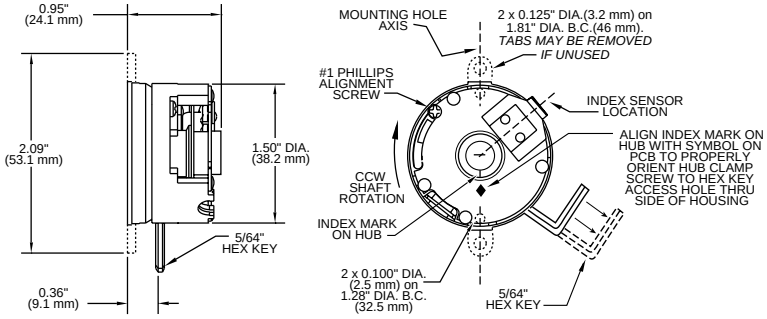
Relative Humidity: 90% non-condensing

Enclosure Rating: NEMA 1 / IP40 dirt-tight (for models with cover)

by DYNAPAR™

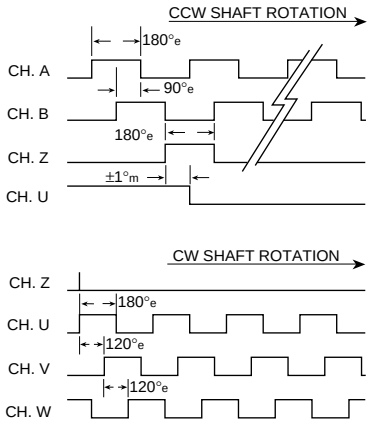
SERIES M15

Dimensions/Installation



Installation Instructions:
Incremental only models: Drawing #200638-0001
Commutation models: Drawing #200638-0002

Output Waveforms (For clarity, compliments are not shown.)

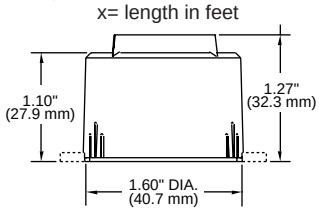


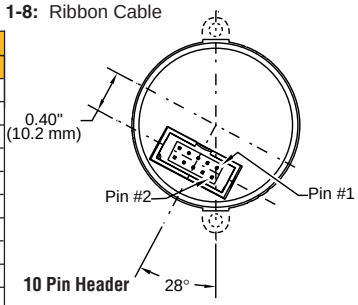
Code 6: Terminations (Not all signals present on all models)

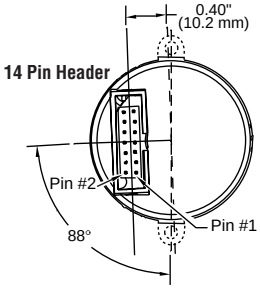
0: Pin Header **1-8:** Ribbon Cable **A-H:** Shielded Cable

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'

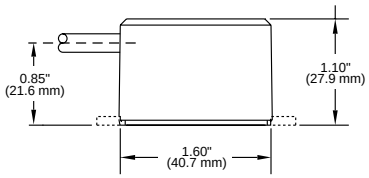
Mating Cable Assembly:
10 pin, 109524-000x
14 pin, 110527-000x
x= length in feet

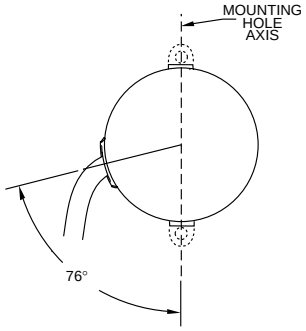






Function	Wire Color: Incr. Only	Wire Color: Incr. & Comm.
Vcc com	—	RED/WHT
Vcc Inc	RED	RED
GND Inc	BLK	BLK
GND com	—	BLK/WHT
A'	RED/BLK	BLU/BLK
A	GRN	BLU
B'	WHT/BLK	GRN/BLK
B	ORN	GRN
Z'	BLU	VIO/BLK
Z	WHT	VIO
U'	—	BRN/BLK
U	—	BRN
V'	—	GRY/BLK
V	—	GRY
W'	—	WHT/BLK
W	—	WHT





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

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

0 No cover
1 Enclosed, end-of-shaft mount
2 Through shaft

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.

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.

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

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

NEW!

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 and B high

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)

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), 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)

Noise Immunity: Conforms to EN50082-1 Light Industrial for Electro-Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted Interference, and Magnetic Fields (for models or applications with shielded cable)

MECHANICAL

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.

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.

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: 6.64 x 10^{-5} in-oz sec.^{2} (4.7 gm-cm^2)

Hub Diameters: 1/4", 3/8", 7/16", 1/2", 6 mm, 8 mm, 10 mm, 12 mm nominal

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)

Mounting:
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)

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

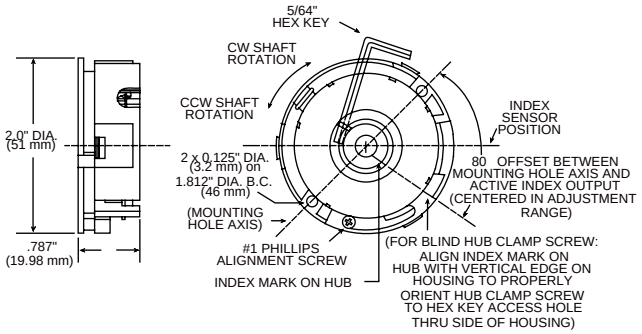
Relative Humidity: 90% non-condensing

Enclosure Rating: NEMA 1 / IP50 dirt-tight (for models with cover)

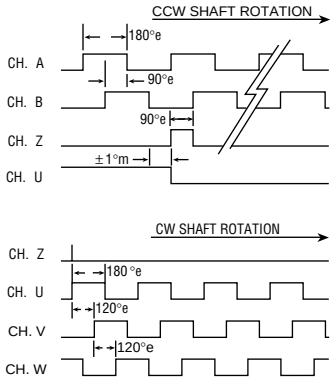
by DYNAPAR™

SERIES M53

Dimensions/Installation



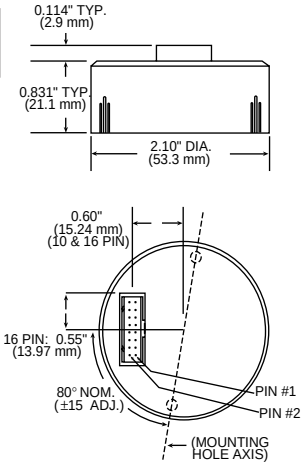
Output Waveforms (For clarity, compliments are not shown.)



Code 6: Terminations (Not all signals present on all models)

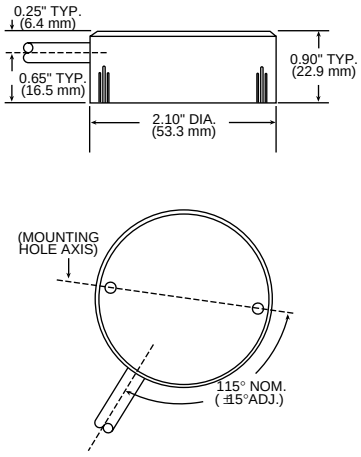
0: 16 Pin JST connector 1-8: Shielded Cable with JST connector

	16 Pin
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

	Wire Color	
Function	Incr. Only	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	Code3:Cover	Code 4: Electrical	Code5:Hub	Code6:Termination
M53	□□□□/□	□	□	□	□

Ordering Information

Code 1: Model

M53 Size 20 Commutating Modular

Code 2: PPR, Poles

Incremental channels only

0500/0	**1024/0**
0512/0	**2000/0**
1000/0	**2048/0**

Incremental plus Commutation channels

0500/4	**1024/4**	**2048/4**
0500/6	**1024/6**	**2048/6**
0500/8	**1024/8**	**2048/8**
0512/8	**2000/4**	**2048/8**
1000/4	**2000/6**	
1000/6	**2000/8**	
1000/8		

Code3:Cover

- **0** No cover
- **1** Radial exit cover(for shielded cable)
- **2** Axial exit(for shielded cable with JST connector)

Code 4: Electrical

- **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

Code5:Hub

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

Code6:Termination

- **0** JST connector
- **1-8** Shielded cable with connector; 1=1 ft., 2=2 ft., etc.

Available when Code 4 is 3 or higher:

- **A-H** Shielded cable; A=1 ft., B=2 ft., etc.

SERIES F10

Dynapar™ brand

For Stepper & Small Servo Motors

Key Features

- **Digital Encoder Replaces size 10 Pancake Resolver**
- **Up to 2048PPR with Commutation Tracks**
- **Up to 120C 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

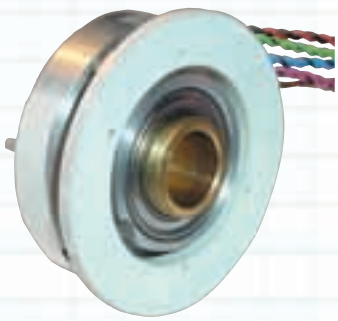
Input Power Requirements: 5±10% VDC at 100 mA max (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LS31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector w/2.0 kΩ pull-ups, 8 mA sink max.; or 26LS31 Differential Line Driver, sink / source 40 mA max.
Frequency Response: 300 kHz, max.
Termination: Flying leads, stranded 26 AWG, twisted pair, PVC insulation, 6.5" length ±0.5"

MECHANICAL

Weight: 1.6 oz. (45 gm) typ.
Dimensions: Outside Diameter : 1.25" (31.7mm), max.; Height: 0.89" (24.1mm), max.
Material: Housing: cast-aluminum; Servo Ring: glass reinforced engineering resin; Hub: Brass; Disk: 0.030" (0.76mm) thick glass
Moment of Inertia: $2.22X10^{-5}$ in-oz-sec.^{2} (1.6 gm-cm^2)
Bore Diameter: 6mm
Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/ -0.000 mm)
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
Bearing Life:[(3.6×10^9) / RPM] Hours ; e.g. 605,000 hours @6,000 RPM

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
Relative Humidity: 90% non-condensing

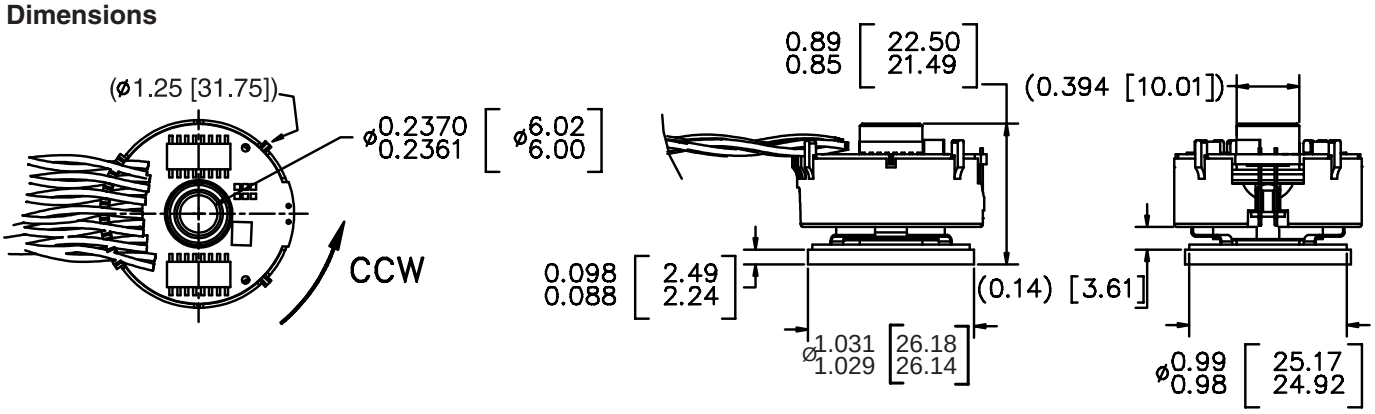


Servo ring mounting with integral flexure is size 10 pancake resolver equivalent

by DYNAPAR™

SERIES F10

Dimensions

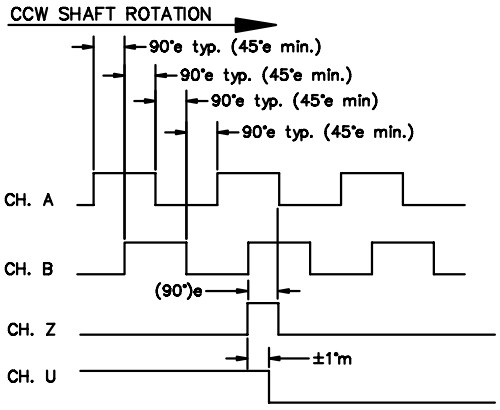


Connections

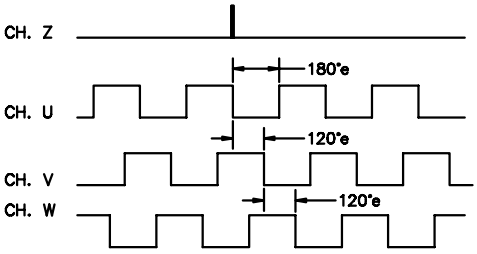
Function*	Cable Wire Color
VCC	RED
GND	BLACK
$\overline{A}$	BLUE/BLACK
A	BLUE
$\overline{B}$	GREEN/BLACK
B	GREEN
$\overline{Z}$	VIOLET/BLACK
Z	VIOLET
$\overline{U}$	BROWN/BLACK
U	BROWN
$\overline{V}$	GRAY/BLACK
V	GRAY
$\overline{W}$	WHITE/BLACK
W	WHITE

* 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: Shaft/Bore	Code 6: Termination
F10	□□□□/□	**0**	□	**4**	**0**

Ordering Information

F10 Size 10 Commutating Encoder	Incremental channels only **1024/0** **2048/0** Incremental plus Commutation channels **1024/6** **2048/6**	**0** Servo mount 1.030 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 **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	**4** 6mm thru bore	**0** 6.5" ±0.5" Twisted Pair Flying Leads

SERIES F14

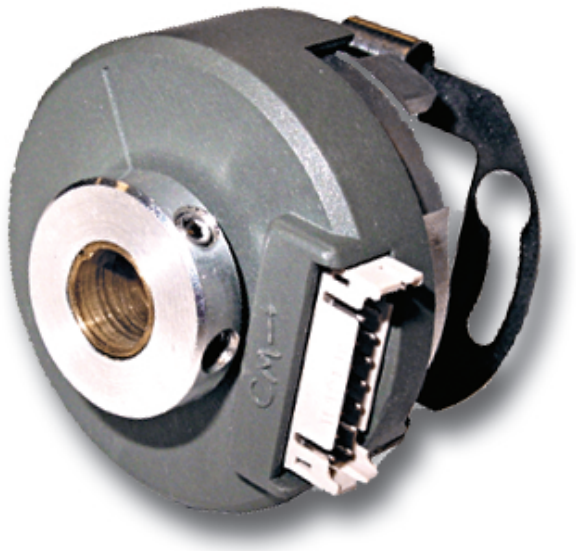
Dynapar™ brand

For Stepper & Small Servo Motors

Key Features

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

RoHS



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical

Resolution: 200, 400, 500, 1000, 1024, 2000, 2048, 2500, 4096, 5000 PPR incremental with 4, 6 and 8 pole commutation channels

Accuracy: Incremental: ±2.5 arc-mins. max. edge to 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:
Line Driver: sink / source 40 mA max.,
Open Collector Incremental (≤ 1024 PPR): 16 mA sink max.
Open Collector Commutation: 30 mA sink max.
(2.0 kΩ pull-ups in encoder)

Frequency Response:
PPR ≤ 1024: 250 kHz; PPR > 1024: 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

Weight: 1.6 oz. (45gm) typ.

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)

Material: Bearing housing: aluminum;
Cover: high temperature, glass filled polymer;
Hub: Brass; Disk: 0.030" thick glass

Finish: Cover: RAL 7010 (dark grey)

Moment of Inertia: $8.2X10^{-5}$ in-oz $sec.^2$ (5.8 gm-cm^2)

Hub Diameters: 1/4", 6mm, 8mm standard

Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/ -0.000 mm)

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: 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;

Bearing Life: [$(1.4 X 10^9)$ / RPM] Hours ; e.g. 230,000 hours @6,000 RPM
(*Based on bearing manufacturer's suggested calculation for 6801ZZ with 44N equivalent dynamic load - including preload and tether reaction loads - at 6000 RPM continuous with adequate lubrication*)

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

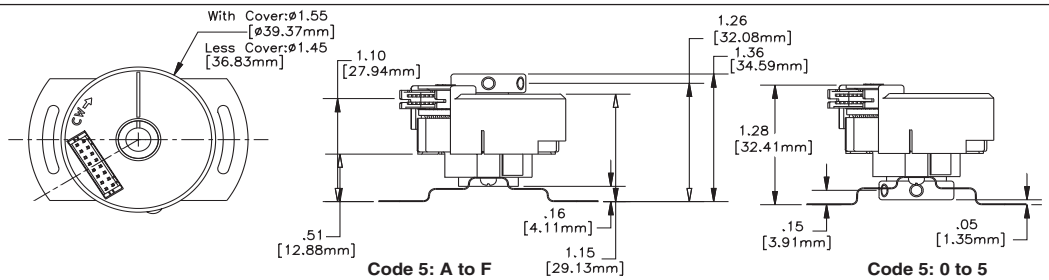
Relative Humidity: 90% non-condensing

Enclosure Rating: NEMA 1 / IP40 (for models with cover)

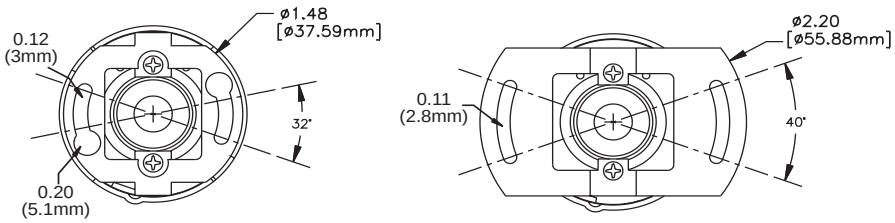
by DYNAPAR™

SERIES F14

Dimensions



Code 3: Tethers



Electrical Connections

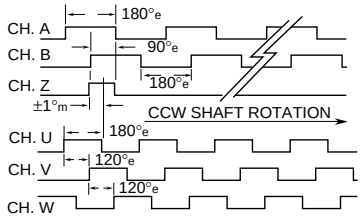
Pin	Function*	Cable Wire Color
1	VCC	RED
2	U	Brown
3	GND	BLACK
4	V	GRAY
5	A	BLUE
6	W	WHITE
7	$\overline{A}$	BLUE/BLACK
8	NONE	NONE
9	B	GREEN
10	$\overline{U}$	BROWN/BLACK
11	$\overline{B}$	GREEN/BLACK
12	$\overline{V}$	GRAY/BLACK
13	Z	VIOLET
14	$\overline{W}$	WHITE/BLACK
15	$\overline{Z}$	VIOLET/BLACK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

* Function availability dependant on Model

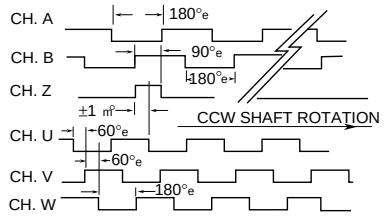
Mating Cable Assembly:
Incremental only, 111752-000x
Incremental + Comm., 111753-000x
x= length in feet

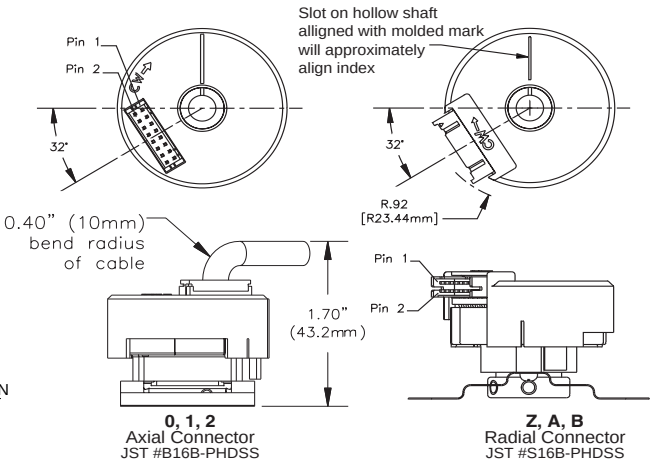
Output Waveforms

Signal Format A



Signal Format B





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: Shaft/Bore	Code 6: Termination
F14	□□□□/□	□	□	□	□

Ordering Information

F14 Size 14 Commutating Encoder

Code 2: PPR, Poles

Incremental channels only

0200/0	**2000/0**
0400/0	**2048/0**
0500/0	**2500/0**
1000/0	**4096/0**
1024/0	**5000/0**

Incremental plus Commutation channels

0500/†	**2048/†**
1000/†	**2500/†**
1024/†	**4096/†**
2000/†	**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: Shaft/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 F15

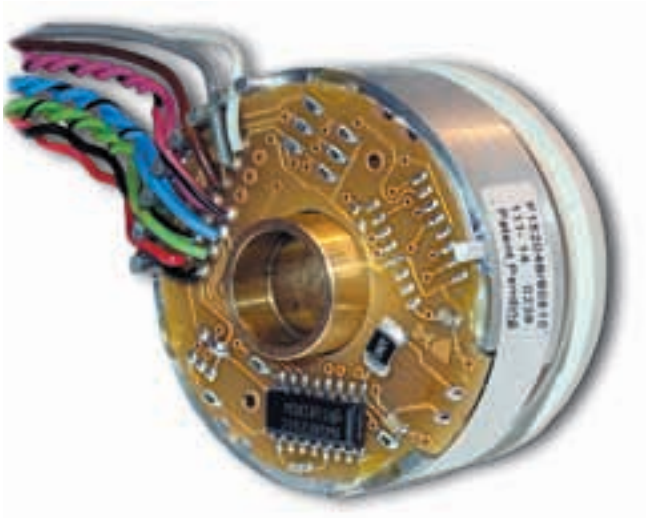
Dynapar™ brand

For Stepper & Small Servo Motors

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

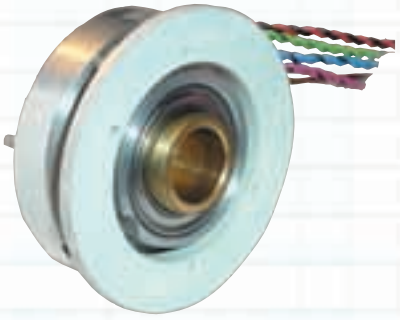
Input Power Requirements: 5±10% VDC at 100 mA max (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LS31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector w/2.0 kΩ pull-ups, 8 mA sink max.; or 26LS31 Differential Line Driver, sink / source 40 mA max.
Frequency Response: 300 kHz, max.
Termination: Flying leads, stranded 26 AWG, twisted pair, PVC insulation, 6.5" length ±0.5"

MECHANICAL

Weight: 1.6 oz. (45 gm) typ.
Dimensions: Outside Diameter : 1.45" (36.8mm), max.; Height: 0.87" (22.1mm), max.
Material: Housing: cast-aluminum; Servo Ring: glass reinforced engineering resin; Hub: Brass; Disk: 0.030" (0.76mm) thick glass
Moment of Inertia: $3.59X10^{-5}$ in-oz-sec.^{2} (2.5 gm-cm^2)
Bore Diameter: 0.375" (9.53mm)
Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/-0.000 mm)
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
Bearing Life:[(3.6 X 10^9) / RPM] Hours ; e.g. 605,000 hours @6,000 RPM

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
Relative Humidity: 90% non-condensing

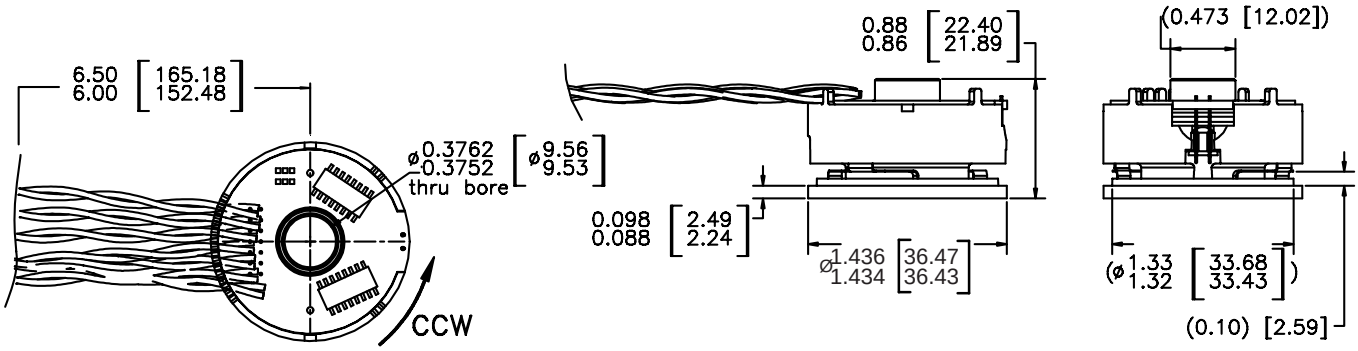


Servo ring mounting with integral flexure is size 15 pancake resolver

by DYNAPAR™

SERIES F15

Dimensions

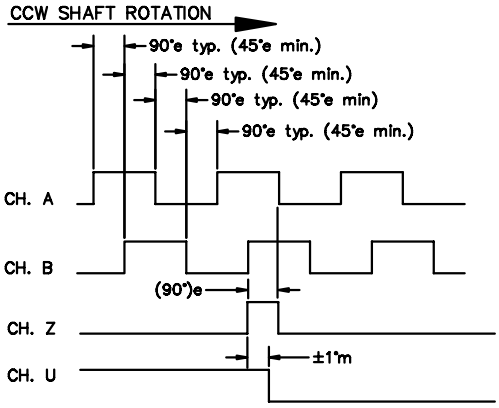


Connections

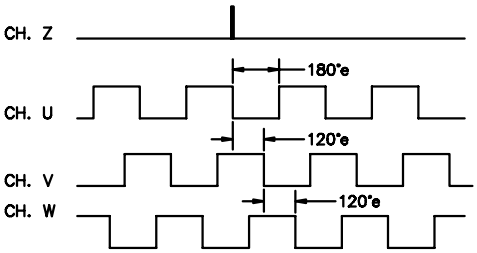
Function*	Cable Wire Color
VCC	RED
GND	BLACK
$\overline{A}$	BLUE/BLACK
A	BLUE
$\overline{B}$	GREEN/BLACK
B	GREEN
$\overline{Z}$	VIOLET/BLACK
Z	VIOLET
$\overline{U}$	BROWN/BLACK
U	BROWN
$\overline{V}$	GRAY/BLACK
V	GRAY
$\overline{W}$	WHITE/BLACK
W	WHITE

* 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: Shaft/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 F18

Dynapar™ brand

For Stepper & Small Servo Motors

Key Features

- **Under 2.0" Diameter Package with High 10,000PPR Capability**
- **Easy to Install Hollowshaft and Spring Tether Design**
- **Up to 120°C Temperature Range Doesn't Limit Motor Performance**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical

Resolution: 500, 512, 1000, 1024, 2000, 2048, 2500, 4096, 5000, 8192, 10,000 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:
Line Driver: sink / source 40 mA max.,
Open Collector Incremental (≤ 2048 PPR): 16 mA sink max.
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

Weight: 4 oz. (110 gm) typ.

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)

Material: Bearing housing: aluminum;
Cover: high temperature, glass filled polymer;

Hub: Brass; Disk: 0.030" thick glass

Finish: Cover: RAL 7010 (dark grey)

Moment of Inertia: $5.3X10^{-4}$ in-oz $sec.^2$ (37.3 gm-cm^2)

Hub 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)

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: 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;

Bearing Life:[$(3.6 X 10^9)$ / RPM] Hours ; e.g. 605,000 hours @6,000 RPM

(*Based on bearing manufacturer's suggested calculation for 6803ZZ with 37N equivalent dynamic load - including preload and tether reaction loads - at 6000 RPM continuous with adequate lubrication*)

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

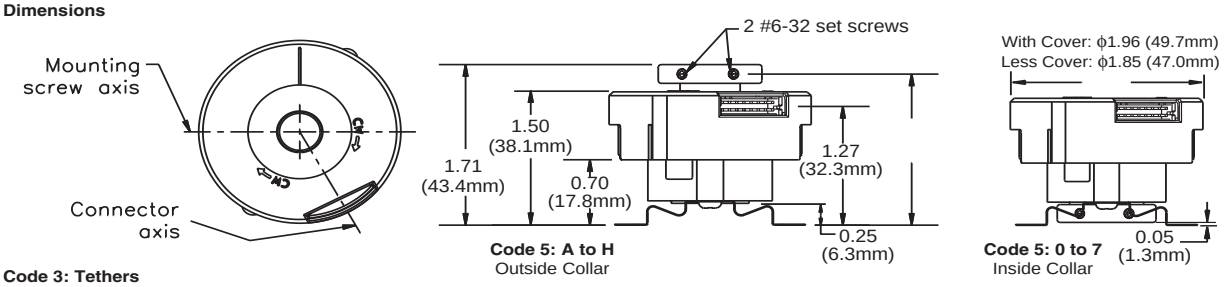
Relative Humidity: 90% non-condensing

Enclosure Rating: NEMA 1 / IP40 (for models with cover)

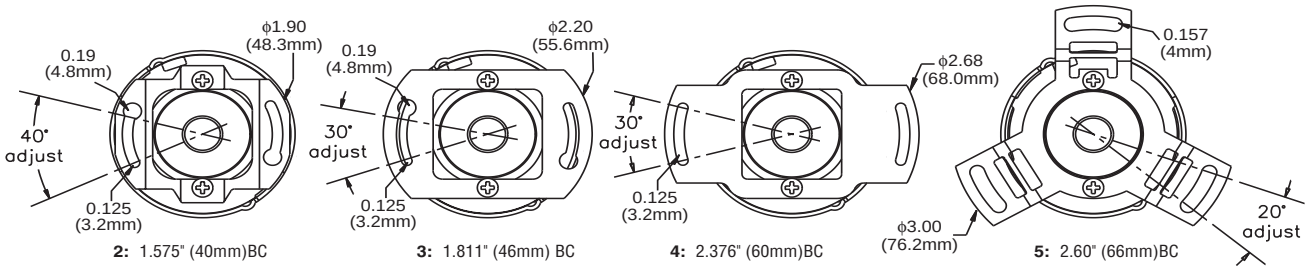
by DYNAPAR™

SERIES F18

Dimensions



Code 3: Tethers



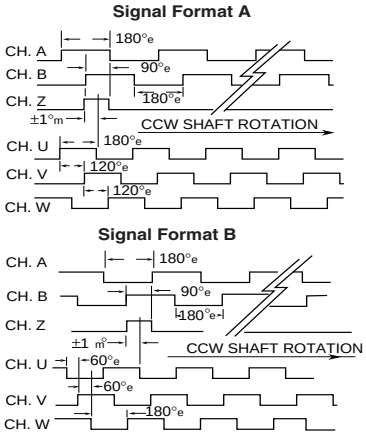
Electrical Connections

Pin	Function*	Cable Wire Color
1	VCC	RED
2	U	Brown
3	GND	BLACK
4	V	GRAY
5	A	BLUE
6	W	WHITE
7	$\overline{A}$	BLUE/BLACK
8	NONE	NONE
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	NONE	NONE

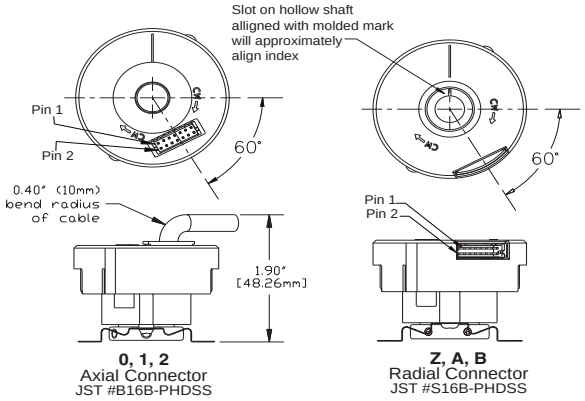
* Function availability dependant on Model

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: Shaft/Bore	Code 6: Termination
F18	□□□□/□	□	□	□	□

Ordering Information

F18 Size 18 Commutating Encoder

Incremental channels only

0500/0	**2500/0**
0512/0	**4096/0**
1000/0	**5000/0**
1024/0	**8192/0**
2000/0	**10E3/0***
2048/0	*= 10000/0

Incremental plus Commutation channels

0500/†	**2500/†**
0512/8	**4096/†**
1000/†	**5000/†**
1024/†	**8192/†**
2000/†	**10E3/†***
2048/†	*= 10000/†

† 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

Code 3: Tether

- **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

Code 4: Electrical

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

Code 5: Shaft/Bore

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 6: Termination

Code			Length
Connector/Cable		Wire Pigtail	
Axial	Radial		
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 F21

Dynapar™ brand

For Stepper & Small Servo Motors

Key Features

- **Digital Encoder with Flex Servo Ring easily Replaces Size 21 Resolver**
- **Short Mounting Depth with Jam Nut Shaft Fixing makes Installation Easy**
- **Up to 2048PPR with Commutation Channels**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental with commutation option, Optical
Resolution: 1024 or 2048 PPR incremental with 8 or 10 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 rising edge.
Index Pulse Width: 90° gated A and B high

ELECTRICAL

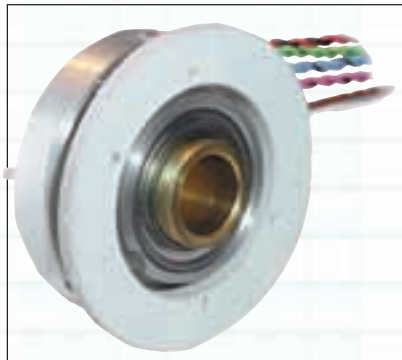
Input Power Requirements: 5±10% VDC at 100 mA max (incremental and commutation), excluding output load
Output Signals:
Incremental: 26LS31 Differential Line Driver, sink / source 40 mA max.
Commutation: Open Collector w/2.0 kΩ pull-ups, 8 mA sink max.; or 26LS31 Differential Line Driver, sink / source 40 mA max.
Frequency Response: 300 kHz, max.
Termination: Flying leads, stranded 26 AWG, twisted pair, PVC insulation, 6.5" length ±0.5"

MECHANICAL

Weight: 3.5 oz. (90 gm) typ.
Dimensions: Outside Diameter : 2.062" (52.4mm), max.; Height: 1.01" (25.65mm), max.
Material: Housing: cast-aluminum; Servo Ring: glass reinforced engineering resin; Hub: Brass; Disk: 0.030" (0.76mm) thick glass
Moment of Inertia: $2.66X10^{-4}$ in-oz-sec.^{2} (18.8 gm-cm^2)
Bore Diameter: 0.50" (12.7mm)
Bore Dia. Tolerance: +0.001"/-0.000" (+0.025 mm/-0.000 mm)
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: 2.047" (51.99mm) servo ring with integral flexure (size 21 pancake resolver equivalent)
Acceleration: 100,000 rad/sec.^{2} max.
Velocity: 5,000 RPM continuous; 12,000 RPM peak
Bearing Life:[(3.6 X 10^9) / RPM] Hours ; e.g. 605,000 hours @6,000 RPM

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
Relative Humidity: 90% non-condensing

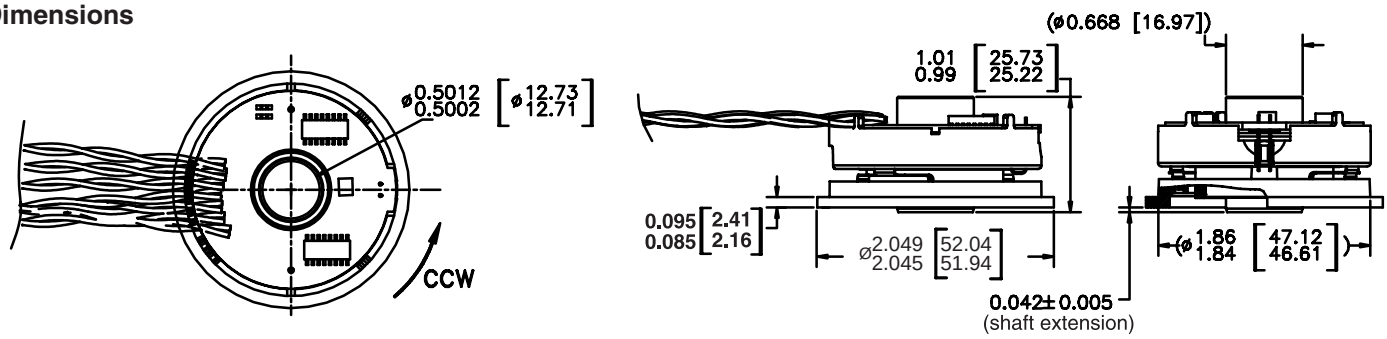


Servo ring mounting with integral flexure is size 21 pancake resolver equivalent

by DYNAPAR™

SERIES F21

Dimensions

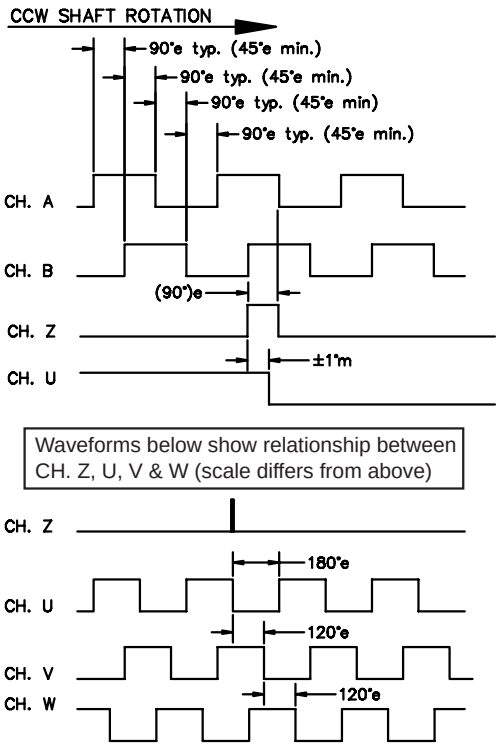


Connections

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: Shaft/Bore	Code 6: Termination
F21	□□□□/□	**0**	□	**3**	**0**

Ordering Information

F21 Size 21 Commutating Encoder	Incremental channels only **1024/0** **2048/0** Incremental plus Commutation channels **1024/8** Note: "C"= 10 poles. **2048/8** Consult factory for **1024/C** other configurations **2048/C**	**0** Servo mount 2.047 Diameter x.090 thick	Available when Code 2 is XXXX/0 **3** 5V in, line driver out incremental only Available when Code 2 is XXXX/8 or C **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	**3** 1/2 in. thru bore	**0** 6.5" ±0.5" Twisted Pair Flying Leads

SERIES HC20

Dynapar™ brand

For Stepper & Small Servo Motors

NEW!

Key Features

- **Economical Servomotor Feedback with New Phased Array ASIC**
- **High 120°C Operating Temperature Won't Limit Motor Performance**
- **Up to 2500PPR Direct-Read with Commutation Channels**

RoHS

SPECIFICATIONS

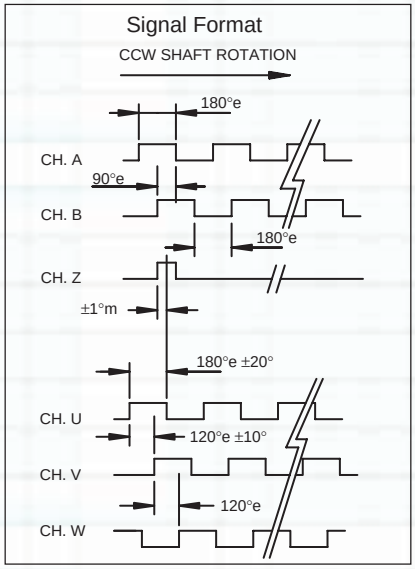
STANDARD OPERATING CHARACTERISTICS

Code: Incremental
Resolution: 500 to 2500 PPR
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
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.	—

ELECTRICAL

Supply Voltage: DC 5V ±10% (SELV)
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: Axial or Raidal cable available



MECHANICAL

Weight: 120g typical
Dimensions:
• Outside Diameter with Cover: 50 mm
• Mounting Depth: 36mm
Material:
• Bearing Housing: Aluminium;
• Cover: Aluminium;
• Shaft: Brass: 699477-0001
Shaft Style (dependant on model):
• 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

ENVIRONMENTAL

Operating Temperature: 0...+120°C
Storage Temperature: -40...+120°C
Shock Resistance: 1000 m/s^2 (6 ms)
Vibration Resistance: 25 m/s^2 (5...2000 Hz)
Protection Class: 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

Available Combinations (PPR/Poles)

Incremental PPR	Number of Poles 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

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

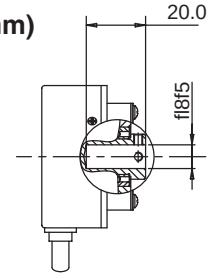
0 Taper shaft(Ø9,1:10)
1 Blind vertical shaft Ø6
2 Blind vertical shaft Ø8
3 Hollow shaft Ø6
4 Hollow shaft Ø8

Axial plug
1 1 Ft. cable
2 2 Ft. cable
3 3 Ft. cable
4 4 Ft. cable
5 5 Ft. cable
6 6 Ft. cable
7 7 Ft. cable
8 8 Ft. cable

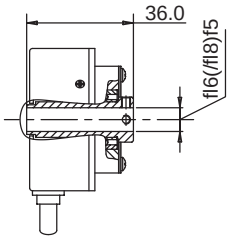
Radial plug
A 1 Ft. cable
B 2 Ft. cable
C 3 Ft. cable
D 4 Ft. cable
E 5 Ft. cable
F 6 Ft. cable
G 7 Ft. cable
H 8 Ft. cable

1 U_{inc}: Supply voltage incremental, U_{com}: Supply voltage commutation (only if commutation is selected); 2 See available combinations (pulses/poles)

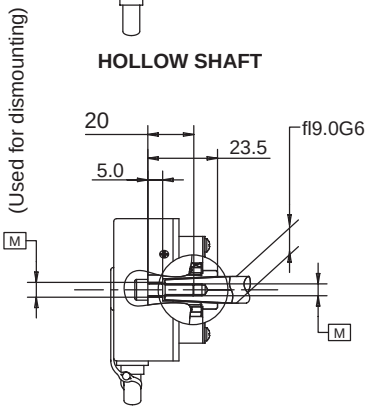
Dimensions (mm)



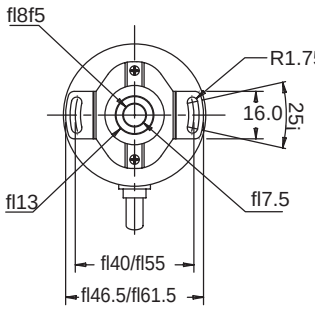
BLIND HOLE SHAFT

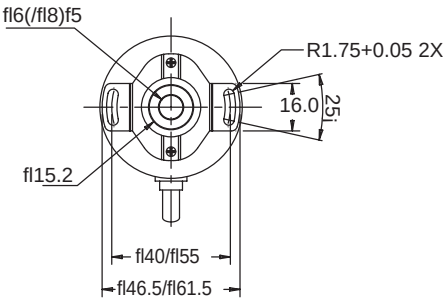


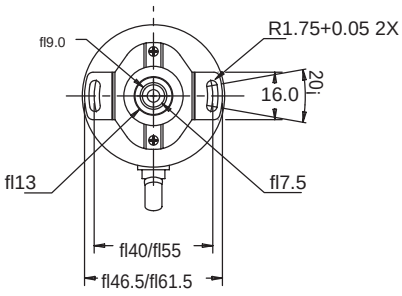
HOLLOW SHAFT

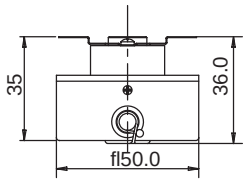


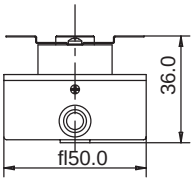
TAPER SHAFT

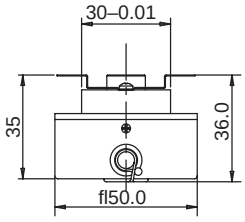












SERIES 11/R11

Harowe™ brand

Heavy Duty Brushless Resolvers

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

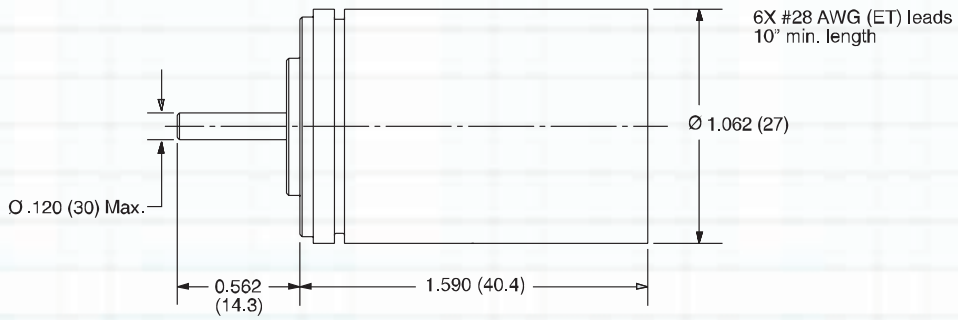
by DYNAPAR™

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.



FRAMELESS SERIES Harowe™ brand

Heavy Duty Brushless Resolvers

Key Features

- Wide Range of Sizes from 10 to 55
- Multi-Speed Available
- Up to 200°C Temperature Range
- Radiation-Hardened Models Available

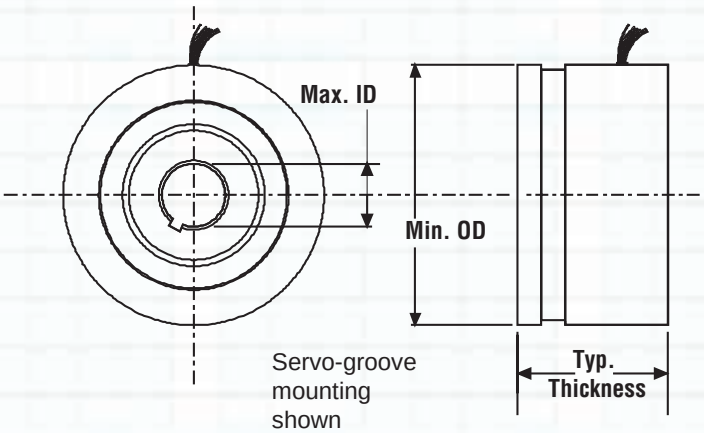
by DYNAPAR™

RoHS
Most Models

SPECIFICATIONS

Model*	Typical Thickness in (mm)	Minimum OD in (mm)	Maximum ID in (mm)
10BRCX	.65 (16.5)	1.05 (26.5)	.237 (6.0)
15BRCX	1.00 (25.4)	1.45 (36.8)	.472 (12.0)
21BRCX	1.25 (31.8)	2.06 (52.4)	.8007 (20.34)
31BRCX	1.25 (31.8)	3.05 (77.5)	1.5763 (40.04)
55BRCX	1.25 (31.8)	5.50 (139.7)	3.6515 (92.75)

*Available as transmitter and control transformer types.



HaroMax Series 15

Harowe™ brand

Heavy Duty Brushless Resolvers

Key Features

- Frameless size 15 Servo Mounting
- Anodized Aluminum Housing with Low Mass
- Machine Wound Stator for High Accuracy

RoHS
Most Models

by DYNAPAR™

SPECIFICATIONS

Part Number	Input Volts	Input Khz	Transfer Ratio	Speed	Mounting	Bore	Connections
15BRX700-B04AB	5.0	10.0	0.42	1	Servo	3/8 in	40 in leads
15BRX700-B10AA	2.0	10.0	0.98	1	Servo	3/8 in	2 in leads
15BRX700-B10AA	2.0	6.0	0.90	1	Servo	3/8 in	2 in leads
15BRX700-D10AA	8.0	8.0	0.50	1	Servo	3/8 in	12 in leads
15BRX700-D10AA	4.0	5.0	0.50	1	Servo	3/8 in	12 in leads
15BRX700-D10AA	7.0	10.0	0.48	1	Servo	3/8 in	12 in leads
15BRX700-D10AC	8.0	8.0	0.50	1	Servo	3/8 in	21 in cable
15BRX700-D10AD	8.0	8.0	0.50	1	Servo	3/8 in	4.25 in leads
15BRX700-D10AE	8.0	8.0	0.50	1	Servo	3/8 in	18 in cable
15BRX700-F10AA	4.0	5.0	0.50	1	Servo	3/8 in	12 in leads

HaroMax Series 21

Harowe™ brand

Heavy Duty Brushless Resolvers

Key Features

- Frameless size 21 Servo Mounting
- Anodized Aluminum Housing with Low Mass
- Machine Wound Stator for High Accuracy

RoHS
Most Models

by DYNAPAR™

SPECIFICATIONS

Part Number	Input Volts	Input Khz	Transfer Ratio	Speed	Mounting	Bore	Connections
21BRX700-B42AA	2.0	10.0	1.00	1	Servo	1/2 in	6.5 in leads
21BRX700-B42AA	2.0	6.0	1.00	1	Servo	1/2 in	6.5 in leads
21BRX700-B42AA	3.5	10.0	1.03	1	Servo	1/2 in	6.5 in leads
21BRX700-D11AC	11.3	8.0	0.52	1	Servo	17 mm	12 in leads
21BRX700-D42AA	8.0	8.0	0.50	1	Servo	1/2 in	6.5 in leads
21BRX700-D42AA	10.0	10.0	0.50	1	Servo	1/2 in	6.5 in leads
21BRX700-D42AA	4.0	4.0	0.50	1	Servo	1/2 in	6.5 in leads
21BRX708-H06AA	4.0	4.0	0.45	1	Flange	16 mm	12 in leads
21BRX708-H06AA	6.0	6.0	0.45	1	Flange	16 mm	12 in leads
21BRX709-E03AA	6.0	6.0	0.31	1	Flange	8 mm	9 in leads

DYNAPAR™

LIGHT DUTY ENCODERS GUIDE

DYNAPAR 2010

Light duty encoders are commonly referred to as “commercial duty” due to their frequent use in commercial or office automation products. Typically these devices reside in fairly benign environments with little temperature variation, are fairly clean, and not generally subjected to high shock loading or moisture.

Dynapar light duty encoders are especially suited for applications using small motors and actuators in relatively clean environments such as office printers, copiers, and laboratory equipment. Although intended for use in commercial applications, these encoders are manufactured with industrial features such as:

- Metal housings
- O-ring seals
- Precision bearings

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.

High performance feedback with some of the shortest lead times in the industry is the benchmark of the Dynapar product line. Most models are manufactured right here in the USA in Gurnee, IL using the advanced cellular manufacturing concept, ensuring Just-In-Time delivery to meet your needs.

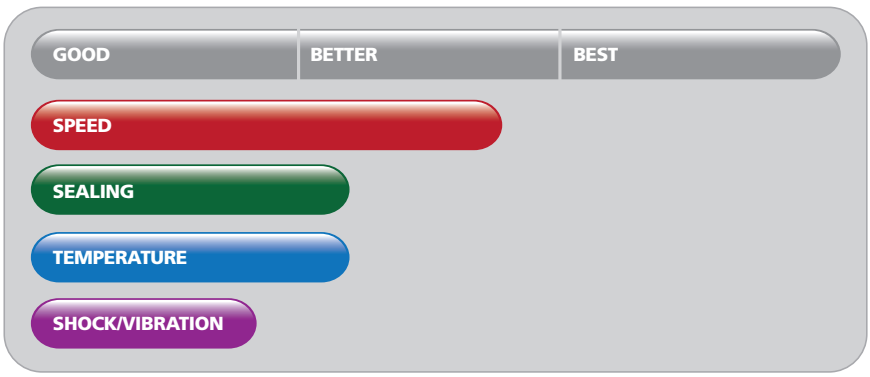
DYNAPAR™

OPTICAL - INCREMENTAL

						
Product	E12	E14	E23	EC23	E14H (Hubshaft)	E14IC (Integral Coupling)
Shaft/Bore Sizes	1/8″	1/8″ or 1/4"	1/4"	1/4"	1/4" to 5/8", 6mm to 14mm	1/4" or 3/8"
Available Resolutions (PPR)	100 to 1024	100 to 2540	1 to 2540	3000 to 5000	100 to 2540	100 to 2540
Input Voltage (VDC)	5, 12, 15	5, 12, 15	5-26	5-26	5, 12, 15	5, 12, 15
Operating Temperature (°C)	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70
Enclosure Rating	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54	NEMA 12/IP54
Special Features	Sub-Compact 1.2" diameter	Rugged Metal Housing	Screw terminal connections	High 5000PPR capability	Hubshaft with flex tether	Integrated coupling
Page Number	4.02	4.04	4.06	4.08	4.10	4.12

E14 Pictured

LIGHT DUTY ENCODER GENERAL PERFORMANCE DATA



SERIES E12

Dynapar™ brand

Miniature Encoder

Key Features

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

Resolution: 100 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 line driver (or equivalent), 40 mA sink and source

Frequency Response: 100 kHz min.

Electrical Connections

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

MECHANICAL

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

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

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

Weight: 3.0 oz.max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: to 98% without condensation

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

by DYNAPAR™

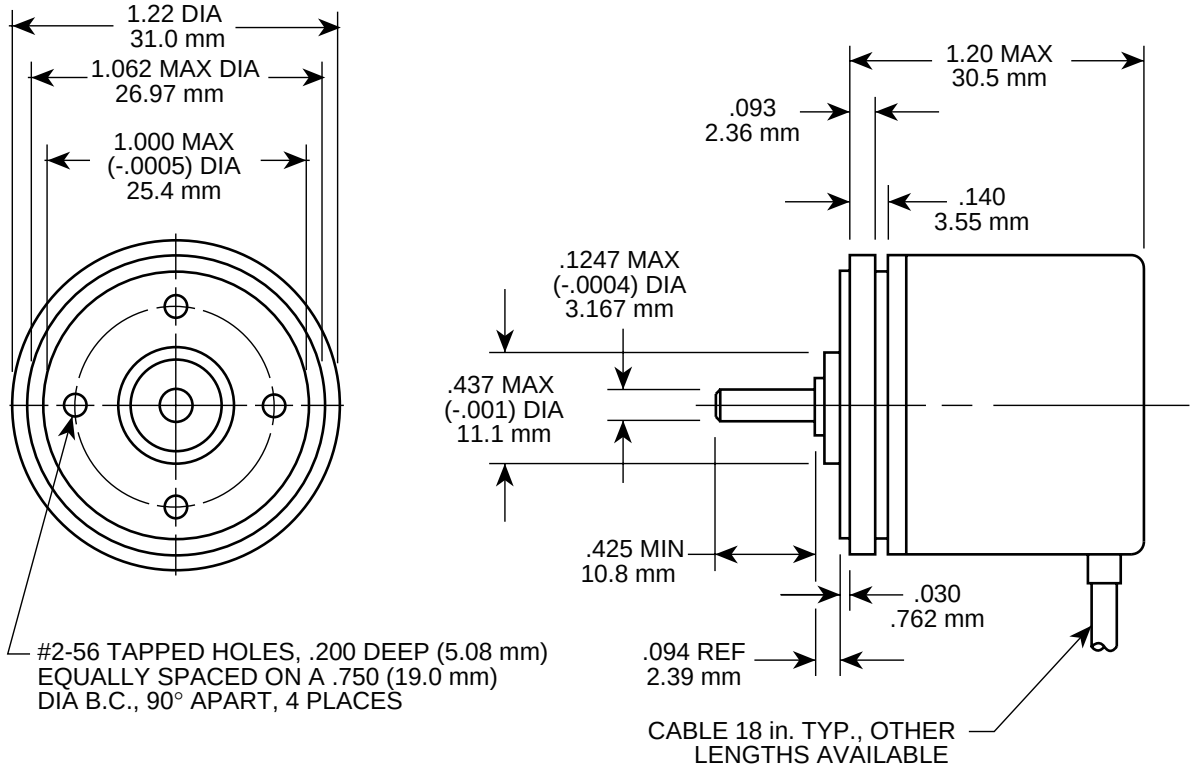
SERIES E12

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	**0100** **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

Key Features

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 (or equivalent) line driver,40 mA sink and source

Frequency Response: 100 kHz min.

MECHANICAL

Bearing Life: (16 x 10 6 ÷ RPM) hours at max. load

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

Weight: 3.0 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: to 98% without condensation

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 $\bar{A}$	Signal B
Orange	Signal Z (if used)	No Connection	Signal $\bar{B}$
Blue	No Connection	No Connection	Signal $\bar{A}$
Shield	Floating	Floating	Floating
White/Black	——	——	Signal Z (if used)
Red/Black	——	——	Signal $\bar{Z}$ (if used)

by DYNAPAR™

SERIES E14

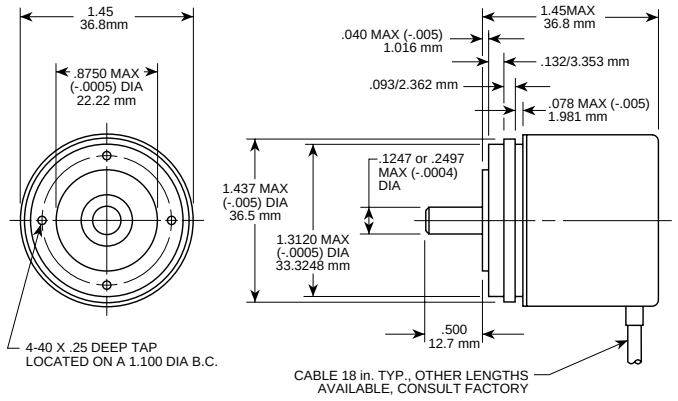
Ordering Information

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

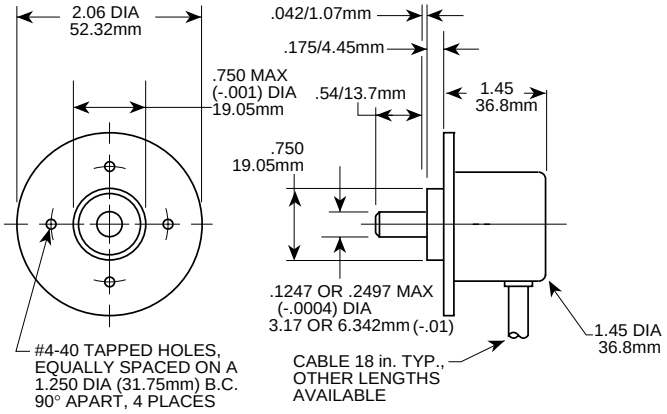
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mounting	Code 4: Mechanical	Code 5: Output	Code 6: Electrical	Code 7: Termination
E14	□□□□	□	□	□	□	□
E14 Size 14, Light Duty Enclosed	**0100** **1000** **0200** **1024** **0240** **1250** **0250** **1500** **0256** **2000** **0300** **2048** **0360** **2500** **0400** **2540** **0500** **0600** **0720** **0750** **0900**	**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



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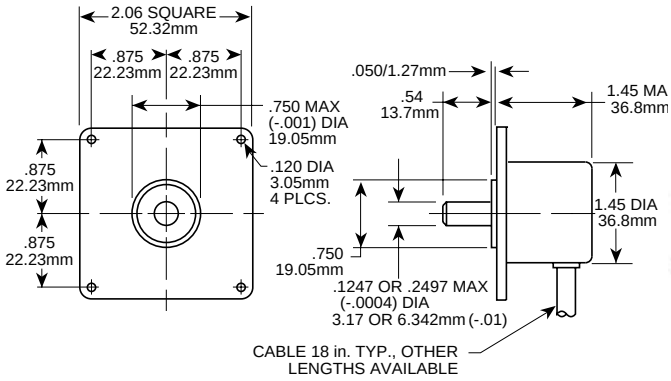
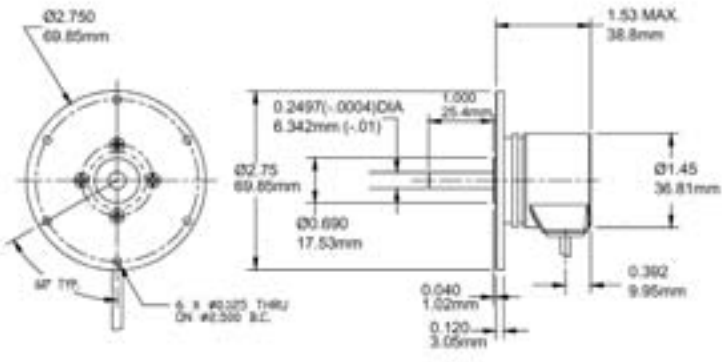


Code 3: 3



SERIES E23

Dynapar™ brand

Miniature Encoder

Key Features

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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

Input Power:
Open Collector or Totem Pole outputs: 4.5 VDC min. to 26 VDC max. at 200 mA max.;
Line Driver: 4.5 VDC min. to 26 VDC max. at 80 mA max.

Outputs:
Open Collector 7273:
V_{OH}: 30 V max.; V_{OL}: 0.4 V max. at 20 mA sink
Totem Pole, Line Driver 7272:
40 mA min. sink or source
4469 Differential Line Driver: 100 mA, sink or source

Frequency Response: 100 kHz min.

MECHANICAL

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

Weight: 13 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –40 to +80 °C

Humidity: to 98% without condensation

Shock: 50 G’s for 11 msec duration

Vibration: 5 to 2000 Hz at 2 G’s

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 E23

Ordering Information

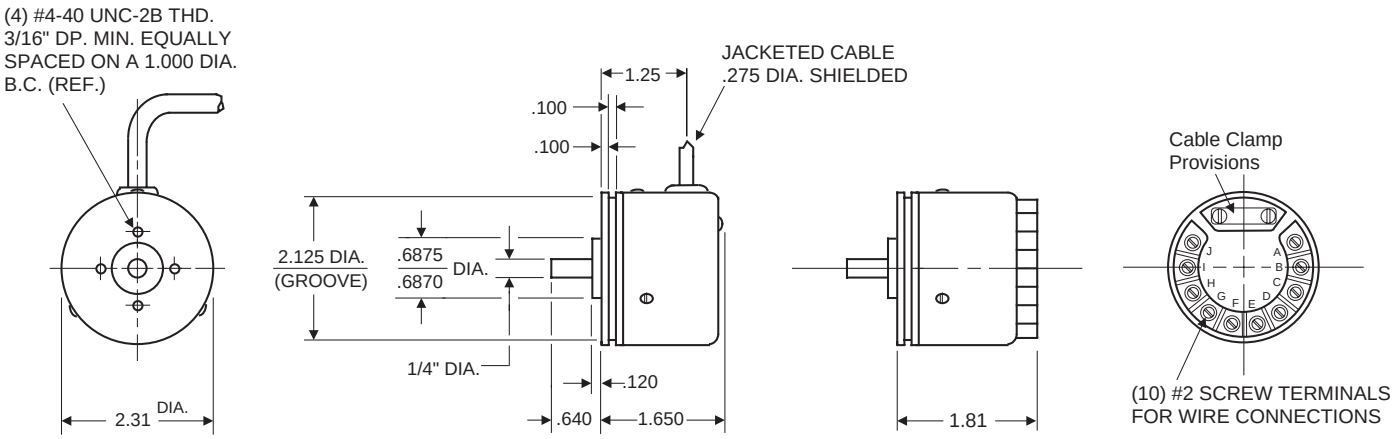
To order, complete the model number with code numbers from the table below:

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** **0300** **1024** **0005** **0344** **1200** **0010** **0360** **1250** **0012** **0400** **1270** **0050** **0500** **1500** **0060** **0512** **1600** **0100** **0600** **1800** **0120** **0625** **1968** **0150** **0635** **2000** **0180** **0720** **2048** **0200** **0800** **2400** **0240** **0900** **2500** **0250** **1000** **2540** **0256** 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/mm)

Code 6: Termination

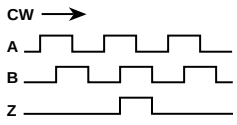
0 - 4: Cable



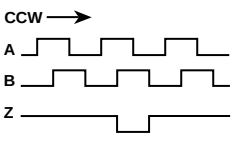
8: Terminals

Code 4: Output

4,5,8,9: Format C



6,7: Format D



SERIES EC23

Dynapar™ brand

Miniature Encoder

Key Features

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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:
4.5 min. to 26 VDC max. at 80 mA max., not including output loads

Outputs:
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source

Frequency Response: 250 kHz min.

Electrical Protection: Overvoltage, reverse voltage and output short circuit protected

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

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

Bearing Life: 1 x 10^9 revolutions at max. load

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

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: to 98% without condensation

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

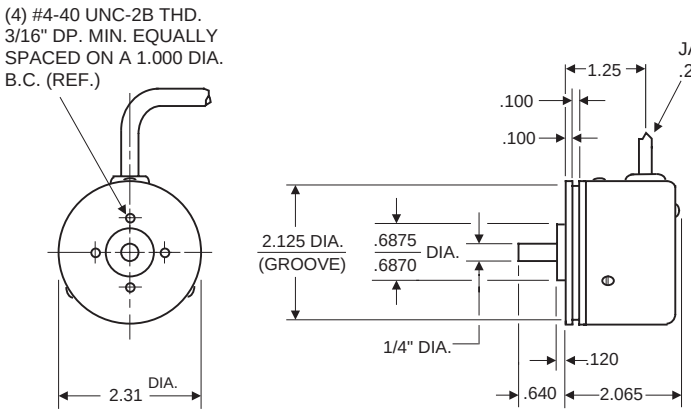
To order, complete the model number with code numbers from the table below:

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** 3,000 **3600** 3,600 **4096** 4,096 **5000** 5,000	**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

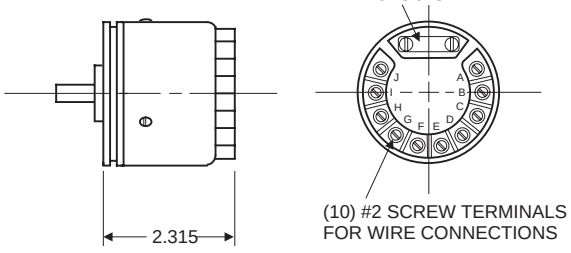
Dimensions (inches/mm)

Code 6: Termination

0 - 4: Cable

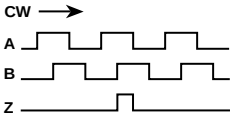


8: Terminals

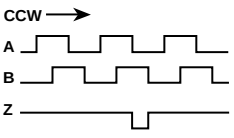


Code 4: Output

4,5,8,9: Format C



6,7: Format D



SERIES E14H

Dynapar™ brand

Miniature Encoder

Key Features

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

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 line driver (or equivalent), 40 mA sink and source

Frequency Response: 100 kHz min.

MECHANICAL

Bearing Life: (16 x 10^6 ÷ RPM) hours at max. load

Shaft Speed: 5,000 RPM max.

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

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

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: to 98% without condensation

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)

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SERIES E14H

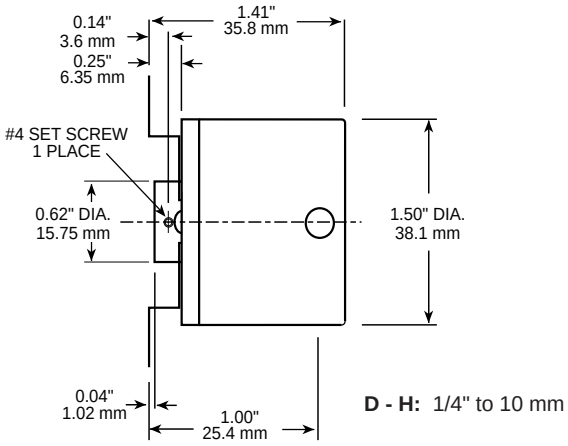
Ordering Information

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

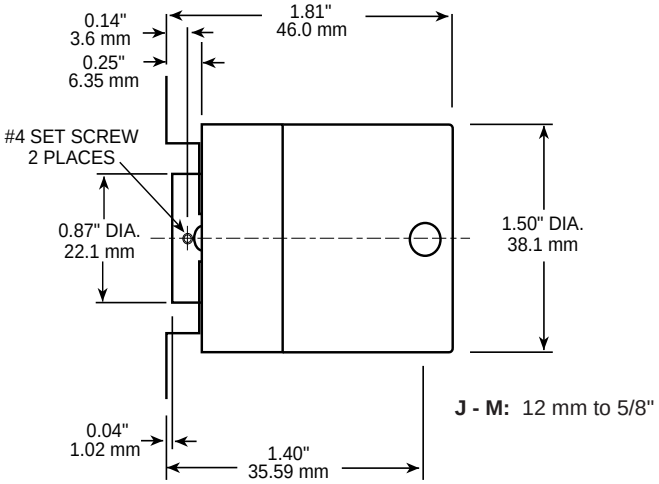
Code 1: Model	Code 2: Pulses/Rev	Code 3: Mounting	Code 4: Mechanical	Code 5: Output	Code 6: Electrical	Code 7: Termination
E14	☐☐☐☐	☐	☐	☐	☐	☐
E14 Size 14, Hub Shaft	**0100** **1000** **0200** **1024** **0240** **1250** **0250** **1500** **0256** **2000** **0300** **2048** **0360** **2500** **0400** **2540** **0500** **0600** **0720** **0750** **0900**	**0** Size E14	Hub I.D. **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)

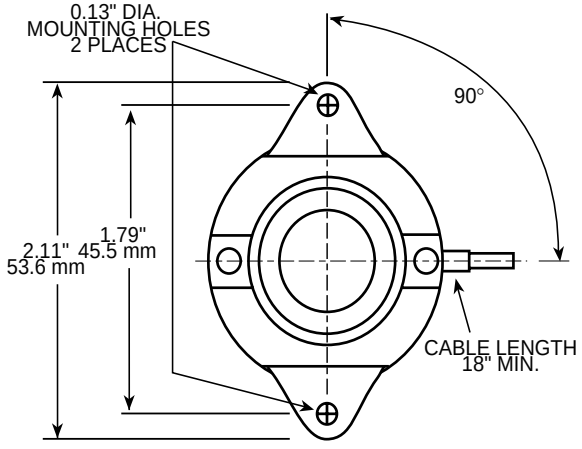
Code 4: Mechanical



D - H: 1/4" to 10 mm



J - M: 12 mm to 5/8"



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**

RoHS

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental

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 line driver (or equivalent), 40 mA sink and source

Frequency Response: 100 kHz min.

MECHANICAL

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

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

Weight: 7.0 oz. max.

ENVIRONMENTAL

Operating Temperature: 0 to +70 °C

Storage Temperature: –25 to +70 °C

Humidity: to 98% without condensation

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

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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** **1000** **0200** **1024** **0240** **1250** **0250** **1500** **0256** **2000** **0300** **2048** **0360** **2500** **0400** **2540** **0500** **0600** **0720** **0750** **0900**	**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

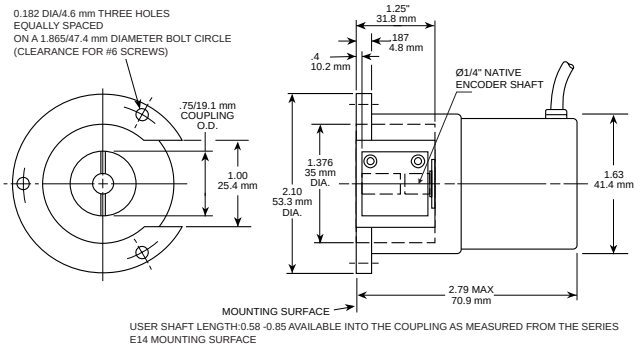
Other couplings available; consult factory.

Field Installed Kit:

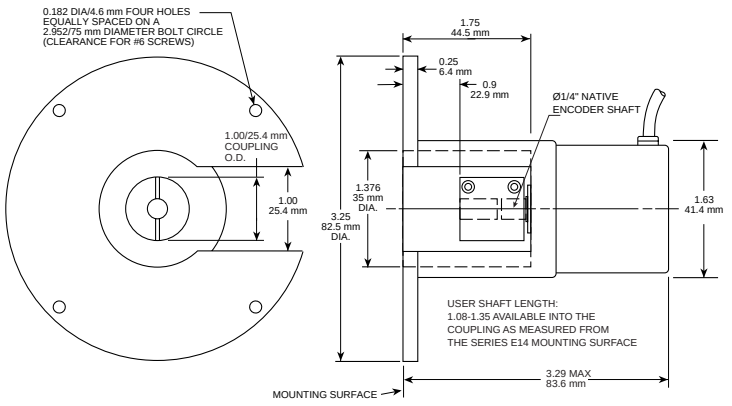
Field installed kits are available by ordering either Model No. E14-N1 (integral housing and mounting hardware for NEMA size 23 motors) or Model No. E14-N2 (integral housing & mounting hardware for NEMA size 34 motors), and the appropriate coupling listed in the table left.

Dimensions (inches/mm)

E14 for NEMA Size 23 Motors



E14 for NEMA Size 34 Motors



DYNAPAR™

NORTHSTAR REPLACEMENT WHEEL SELECTION GUIDE

NorthStar has several wheel choices. The wheel choices range from "Good" basic wheel designs comparable to competitive choices, to "Better" and "Best" wheel choices that eliminate shaft damage and aid in wheel installation.

NORTHSTAR PULSE WHEEL STYLES

Photographs are representative of each wheel style

				
Product	**J Wheel**	**K Wheel**	**E Wheel**	**T Wheel**
Description	Commonly known as a "Spoke Wheel" configuration. .675" - 1.25" ID	Commonly known as a "Clamp Wheel" configuration. This wheel consists of three components and the assembly is different for RIM style and SLIM style. Refer to next page for more detailed description. 1.375" - 3.25" ID	Commonly known as "End of Shaft" wheel configuration used on GE design motors. 1.125", 2.125", 2.375", 2.875" ID	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. 3.256" - 4.50" ID

HOW TO SELECT

Step 1

Confirm the pulse count being used in your application. Refer to the PPR listed on your RIM Tach housing or SLIM tach products

Step 2

Find your encoder resolution in the part number decode table in either columns B, C, D or E

Step 3

Then choose your base resolution in column A and order the appropriate size and family of pulse wheel

Examples

- If using 1024PPR, order 1024PPR pulse wheel
- If using 600PPR, order 600PPR pulse wheel
- If using 240PPR, order 480PPR pulse wheel

PART NUMBER DECODE

N S 0 6 0 0 Z J 0 4

Code 1	Code 2					Code 3	Code 4	Code 5
Family	**Resolution**					**Index**	**Wheel Type & Bore Size**	**For K Wheel Only**
NS NorthStar	A	B	C	D	E	**Z** Differential Index	**J04** 5/8" bore	**R** RIM Tach (Pressure plate on outside)
	0480 →				0060		**J05** 7/8" bore	
	0512 →			0064	0120		**J06** 1.00" bore	**S** SLIM Tach (Pressure plate on inside)
	0600 →		0075	0128	0240		**J07** 1-1/8" bore	
	1024 →	1024	0150	0256	0480		***K09*** *1-3/8" bore*	
		2048	0300	0512	0960		***K10*** *1-1/2" bore*	
			0600	1024			***K11*** *1-5/8" bore*	
			1200				***K12*** *1-3/4" bore*	
							K13 *1-7/8" bore*	
							K14 *2.00" bore*	
							K15 *2-1/8" bore*	
							K16 *2-1/4" bore*	
							K17 *2-3/8" bore*	
							K18 *2-1/2" bore*	
							K19 *2-7/8" bore*	
							E01 1-1/8" EOS	
							E06 2-1/8" EOS	
							E08 2-3/8" EOS	
							E10 2-7/8" EOS	

Note: For 2048 consult application engineering

SENSOR MODULE REPLACEMENT SELECTION GUIDE

Dynapar offers three different sensor modules for both "Z" and "non Z". The difference between the three sensors lies in the length of each sensor nose. They follow in length from largest to smallest, 480, 512, 600.

NORTHSTAR - SENSOR MODULE SERIES

RIM TACH SENSORS (NON Z)		
480 PPR Family	512 PPR Family	600 PPR Family
NSRS0060LC	NSRS0064LC	NSRS0075LC
NSRS0120LLC	NSRS0128LLC	NSRS0150LLC
NSRS0240LLC	NSRS0256LLC	NSRS0300LLC
NSRS0480LLC	NSRS0512LLC	NSRS0600LLC
▲ NSRS0960LLC	▲ NSRS1024LLC	▲ NSRS1200LLC

RIM TACH SENSORS (Z)		
480 PPR Family	512 PPR Family	600 PPR Family
NSRS0060ZLC	NSRS0064ZLC	NSRS0075ZLC
NSRS0120ZLC	NSRS0128ZLC	NSRS0150ZLC
NSRS0240ZLC	NSRS0256ZLC	NSRS0300ZLC
NSRS0480ZLC	NSRS0512ZLC	NSRS0600ZLC
▲ NSRS0960ZLC	▲ NSRS1024ZLC	▲ NSRS1200ZLC

Sensors fit all RIM8500, RIM6200, HS85, and RIM1250 models except large bore

To identify and order replacement sensor modules follow the steps below:
1. Identify the pulse count (which can be found on the label attached to the sensor see ▲ above)
2. Locate whether or not you want Z or Non Z
3. Locate the corresponding PPR in the chart below
4. Order using the complete part number

PART NUMBER DECODE

N S R 1 0 4 8 0 Z L C

Code 1	Code 2	Code 3			Code 4	Code 5	Code 6
Family	Model	Resolution			Index	Electrical	Termination
NS NorthStar	**RS**	**0480** →		0060	**L** No Index	**L** 5-15VDC in, 5-15V Line driver (4428) out	**C** Latching Industrial Connector
Covers all previous R1 RIM Tach 1250 R6 RIM Tach 6200 R8 RIM Tach 8500 H8 RIM Tach HS85		**0512** →	0064	0120	**Z** Differential Index	**R** 15-26VDC in, 15V Line driver (4428) out	**M** 10 Pin MS Connector
		0600 →	0075	0128	**G** Gated Index	**5** 5-15VDC in, 5V Line driver (4428) out	**P** 18" pigtail
			0150	0256		**H** Same as "L" with extended temperature to 120°C	**Q** 18" pigtail with latching industrial connector
Except Large Bore RIM 1250			0300	0512	0480		
			0600	1024	0960		
			1200				

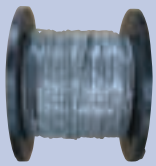
Note: For 2048 PPR contact application engineering

DYNAPAR™

MATING CONNECTORS

	Pins	Model #	Encoder Series
Industrial	2	MCN-N1	52BH
	3	MCN-N2	53Z, 53ZK, 71Z
	6	MCN-N4	H20, 21/22, 60 Single ended
	7	MCN-N5	H20, H25, H26, 525, 625, H42, 21/22 Full differential
	10 (MS)	MCN-N6	H20, H25, H26, 525, 526, 60, 60P, 625 Full differential, HS35, HD20, HD25, HSD25, HSD37, HSD38, DWD38, HSD44, H56
	10 (Bayonet)	MCN-B1	Typically a Baldor spec on HS20, HS35, HSD37, HSD38
	12	MCN-C1	H58 (CW)
	12	MCN-C2	H58 (CCW)
	17	MCN-N8	AI25
	19	MCN-N9	AI25
NEMA 4	7	MCN-N5N4	H20, H25, H26, 525, 625, (H42, 21/22 Full differential
	10 (MS)	MCN-N6N4	H20, H25, H26, 525, 526, 60, 60P, 625 Full differential, HS35, HD20, HD25, HSD25, HSD37, HSD38, DWD38, HSD44, H56
	10 (Bayonet)	MCN-B1N4	Typically a Baldor spec on HS20, HS35, HSD37, HSD38

BULK CABLE



	Model #	Description
Industrial	16002160022	3 wire, 22 gage cable for Model 53Z pickup
	16002160024	6 wire, 22 gage cable for series: X25, HA25, HR25, HA26, HR26, HC25, HC526, 21/22, 60 and H56
	107312 (Special)	10 wire special cable for series: X25, H20, HA25, HR25, HR26, HC25, HC526, H58 with Full differential options
	16002160029	4 pair 24 gage for 60/H56 DIF, H42
Heavy Duty*	RIM Cable DB1X	RIM 5 foot interface cable

* The final digit is length in 5ft increments

PATCH CORD ASSEMBLIES

	Model #	Description
Heavy Duty	114414-0001	10 PIN MS to RIM / Electrical Connection Patch Cords
	114413-0001	10 PIN MS to SLIM / Electrical Connection Patch Cords

CABLE ASSEMBLIES

NEMA 4 Cable Assemblies

Use with Encoder Series	Cable Part #	Encoder Pins	Output Type
7 Pin MS	Consult Factory	7	Differential
10 Pin Bayonet	Consult Factory	10	Differential
10 Pin Bayonete	Consult Factory	10	Differential

Standard Cable Assemblies

Use with Encoder Series	Cable Part #	Encoder Pins	Output Type
52 Pick Up	14002030010 14002030020	2	Variable reluctance
53Z Pick Up, 71Z	14003340010	3	Current Sink Open Collector
60, 60P, H56, Armoured Cable	14002090010 14002090025	6	Sngle Ended
60, 60P, H56, Full Differential	14004190010 14004190025	10	Differential
21/22 without marker	14006070010	6	Single Ended, Current Sink, Open Collector
21/22, 525, 526, 625, HA25, HR25, HC526, H42, HC25, HA26, HR26, without marker	14004310010	7	7 Pin Line Driver Differential
21/22	14006640010	6	6 Pin Line Driver Differential
22 with marker	108241-0010	6	Single Ended, Current Sink, Open Collector
525, 526, 625, HA25, HR25,H26, HC25, HA26, HA725, HR26, HC526, HS35	14006350010	10	Differential
H20, HS35	108594-0010	6	Single Ended, Current Sink, Open Collector
H20, H58, HS35, HA725	108595-0010	7	Open Collector, Push Pull, Single Ended
H20, HA25, HC25, HR25, HS35, 525, 625	108596-0010	7	Differential 7 Pin Line Driver w/out idx
H58, HS35 (CCW)	108615-0010	12	Any Output with 12 Pin CCW Connector
H58 (CW)	108616-0010	12	Any Output with 12 Pin CW Connector
AI25	110158-0010	19	Parallel Push-Pull
AI25	107865-0010 107865-0020	17	Parallel Push-Pull
HS20, HS35	112123-0010	6	Differential 6 Pin Differential line Driver w/ out index
21/22, H20, H58, HA25, HR25, HC25, HA26, HR26, HC26, HS20, HS35, HSD37, HSD38	112859-0015 112859-0030	5 Pin M12	Single Ended
21/22, H20, H58, HA25, HR25, HC25, HA26, HR26, HC26, HS20, HS35, HSD37, HSD38	112860-0015 112860-0030	8 Pin M12	Single Ended or Differential

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**

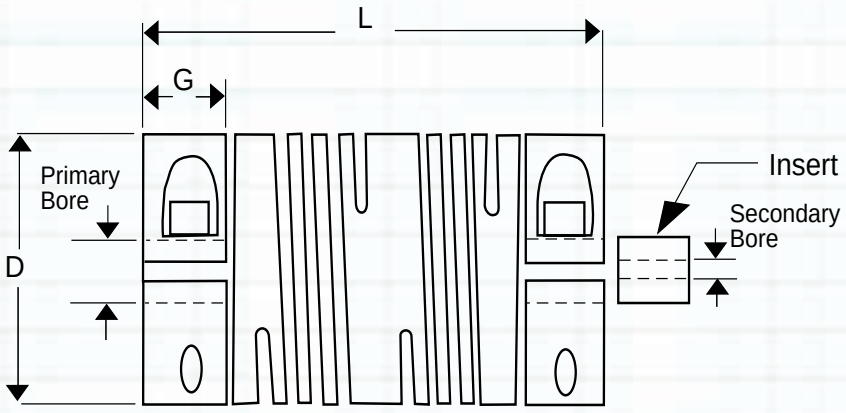
SPECIFICATIONS

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.

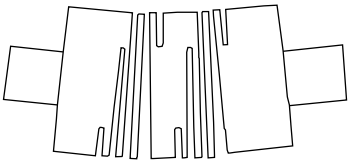
APPROXIMATE DIMENSIONS

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.

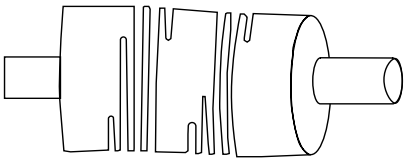
Dynapar™ brand CPL COUPLINGS



Angular Misalignment

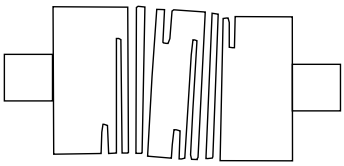
When the center lines of the shafts extend and form an obtuse angle. The intersection of this obtuse angle should be at the center of the flexible beam area.

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.



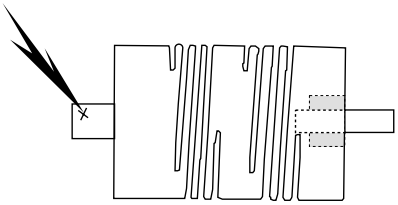
Skewed Misalignment

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.



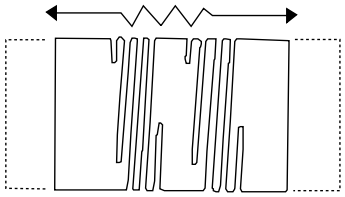
Parallel Misalignment

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 E11, E15,
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 E20, EC80, 523, 42, 525, 21/22, 31/32
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 42, 525, 625, 21/22, 60
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 625, EX625, 60, 60P
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 625, 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 E20, EC80, 523, 525, 21/22
CPLM1250375	3/8	6, 8, 10 mm	1.250	1.250	0.348	7°	0.038	0.060	75	Medium Duty 42, 525, 625, 21/22
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.

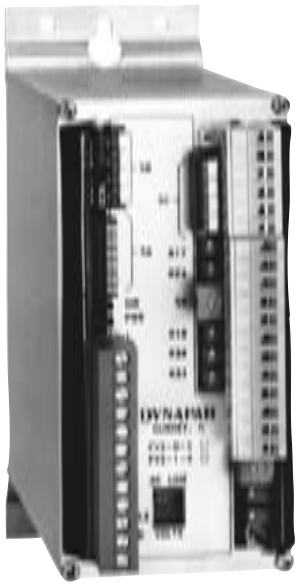
SERIES FV2

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)
845-24*	Technical Manual

*A technical manual is automatically included with each FV2 unit shipped. Use this publication number for ordering extra copies.

SERIES FV3

Dynapar™ brand

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:

$$FRQ\ (CPS\ or\ Hz) = \frac{RPM \times PPR}{60}$$

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.

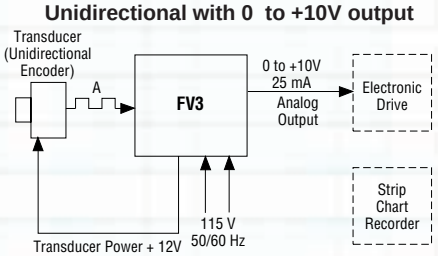
FV3 Performance: The FV3 range adjustment allows the unit to deliver full-scale output for any input frequency within the limits of each range rating. It will provide a better combination of fast response and low ripple when input frequencies for full scale output are at least 3 kHz and above. The FV3 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

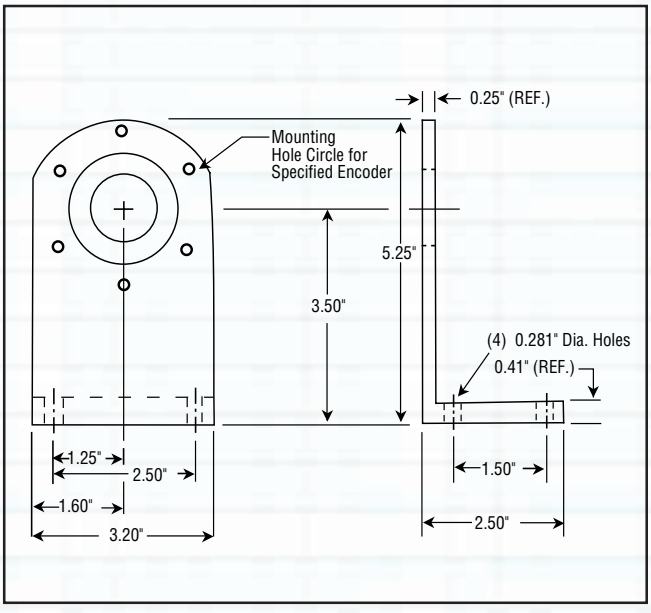
Key Features

- 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

DIMENSIONS



COMPATIBLE ENCODERS

The mounting bracket may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
	14005730000
60A	All
60C	All
H42	2.5" Flange
H25	2.5" Flange
H25	2.5" Servo
AI25	2.5" Flange
HA725	2.5" Flange
	108680-0001
H20	Servo with 1.25" Male Pilot
H20	Flange
H20	2" BC Face
21/22	Except metric
	108680-0002
AI25	Face
H58	36 mm Pilot

ORDERING INFORMATION

Model No.	Description
14005730000	Mounting Bracket for 60 Rotopulser, 2.5" Encoders
108680-0001	Mounting Bracket for QUBE Encoders
108680-0002	Mounting Bracket for 58mm Face Mount Encoders

PIVOT MOUNT

Dynapar™ brand

Pivot Mounting Bracket

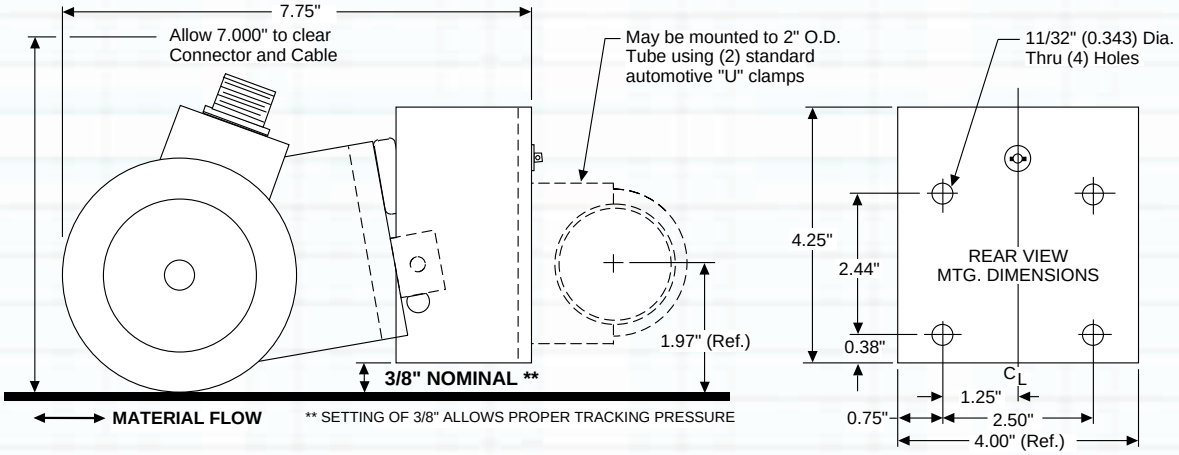
Key Features

- **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

DIMENSIONS



COMPATIBLE ENCODERS

The mounting bracket may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
60A	All
60C	All
H42	2.5" Flange
H25	2.5" Flange
H25	2.5" Servo
HA725	2.5" Flange

ORDERING INFORMATION

Model No.	Description
14005740000	Pivot Mounting Base

UNIVERSAL MOUNT

Dynapar™ brand

Universal Mounting Bracket

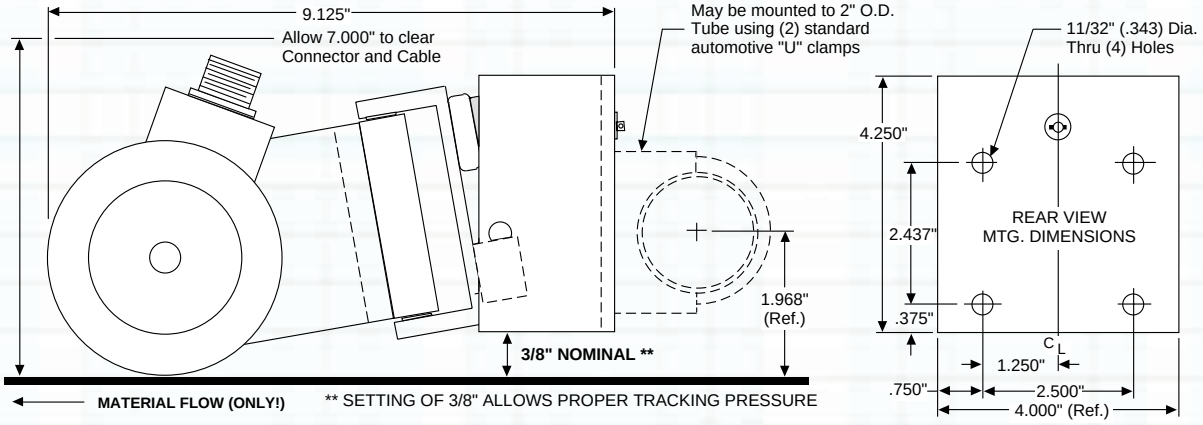
Key Features

- **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

DIMENSIONS



COMPATIBLE ENCODERS

The mount may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
60A	All
60C	All
H42	2.5" Flange
H25	2.5" Flange
H25	2.5" Servo
HA725	2.5" Flange

ORDERING INFORMATION

Model No.	Description
14005750000	Universal Tracking Mounting Base

QUBE PIVOT MOUNT Dynapar™ brand

Qube Pivot Mounting Bracket

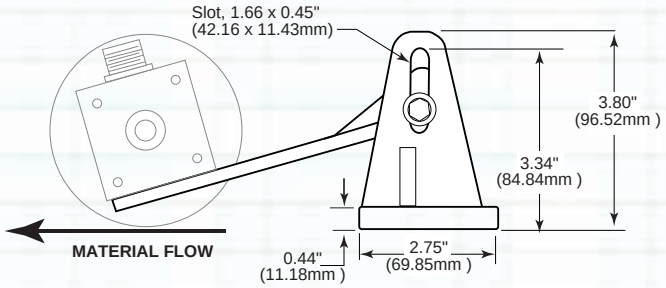
Key Features

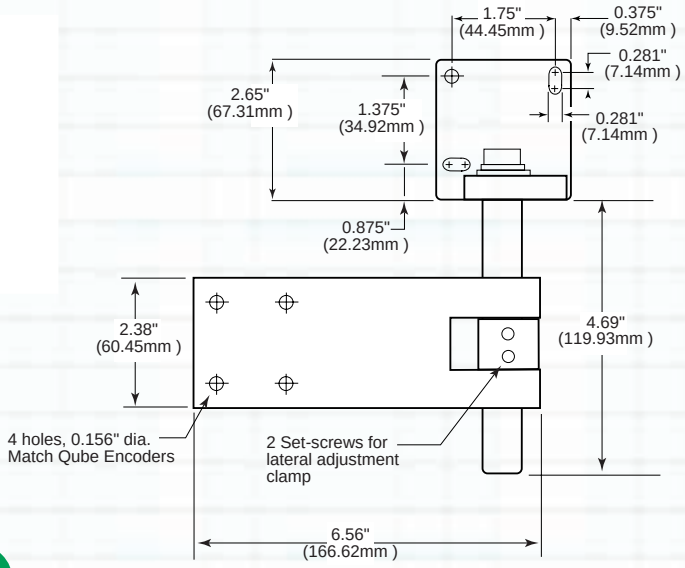
- Complete Mounting System with Hardware Included
- Single or Dual Wheel uses Same Mount
- Easy Machine Attachment
- Accepts Series 22 Qube Encoders

Encoder, cable and measuring wheels not included

SPECIFICATIONS

DIMENSIONS





ORDERING INFORMATION

Model No.	Description
111328-0001	Qube Pivot Mounting Base

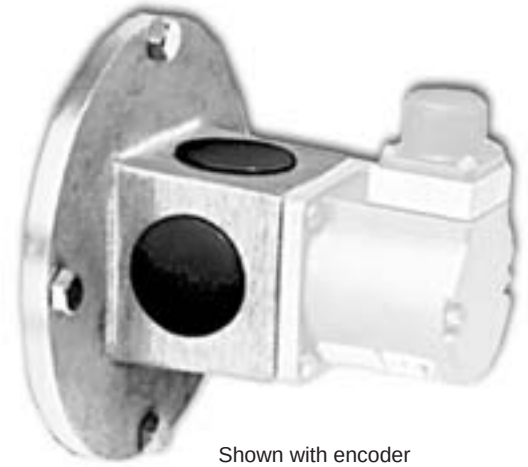
C-FACE ADAPTER

Dynapar™ brand

NEMA C-Face Adapter

Key Features

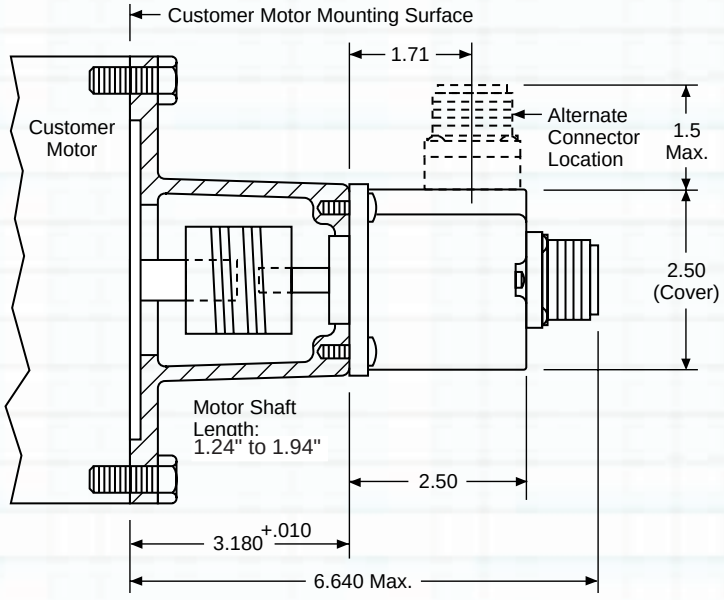
- **"Flower Pot" Style Adapter Kit**
- **Provides Spacer, Coupling and all Necessary Hardware**
- **5/8" I.D. Coupling for 56C Motor Shafts with Extensions from 1.1" to 1.8" Long**



Shown with encoder mounted (not included)

SPECIFICATIONS

DIMENSIONS



COMPATIBLE ENCODERS

The adapter may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
H42	2.5" Flange
H25	2.5" Flange
HA725	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

5PY ADAPTER

Dynapar™ brand

5PY Adapter for 2-1/2” Encoders

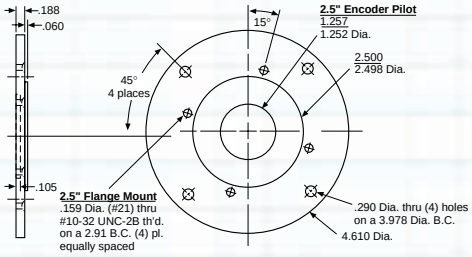
Key Features

- **Kits Include Mounting Plate and Hardware**
- **Makes Servo Mount 2.5" or 60A Encoders Interchangeable with 5PY DC Tach Generators.**

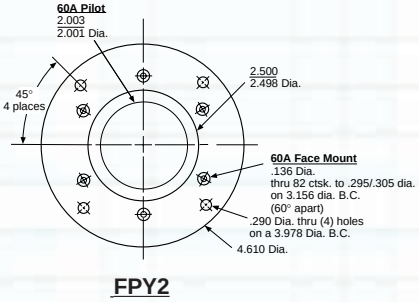
Encoder not included

SPECIFICATIONS

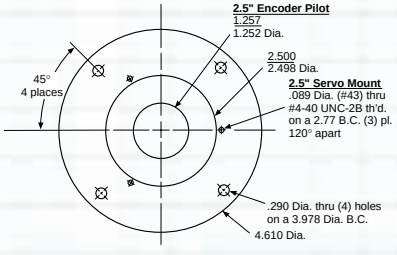
DIMENSIONS



FPY1



FPY2



FPY3

COMPATIBLE ENCODERS

The adapter may be used with the listed series encoders having the specified mounting configurations.

Encoder Series	Mounting Configuration
5PY1	
H42	2.5" Flange
H25	2.5" Flange
AI25	2.5" Flange
HA725	2.5" Flange
5PY2	
60C	All
5PY3	
H25	2.5" Servo

ORDERING INFORMATION

Model No.	Description
5PY1	5PY Adapter Kit for 2.5" flange encoders
5PY2	5PY Adapter Kit for 60A Rotopulers
5PY3	5PY Adapter Kit for 2.5" servo encoders

5PY ADAPTER

Dynapar™ brand

5PY Adapter for X25 Encoders

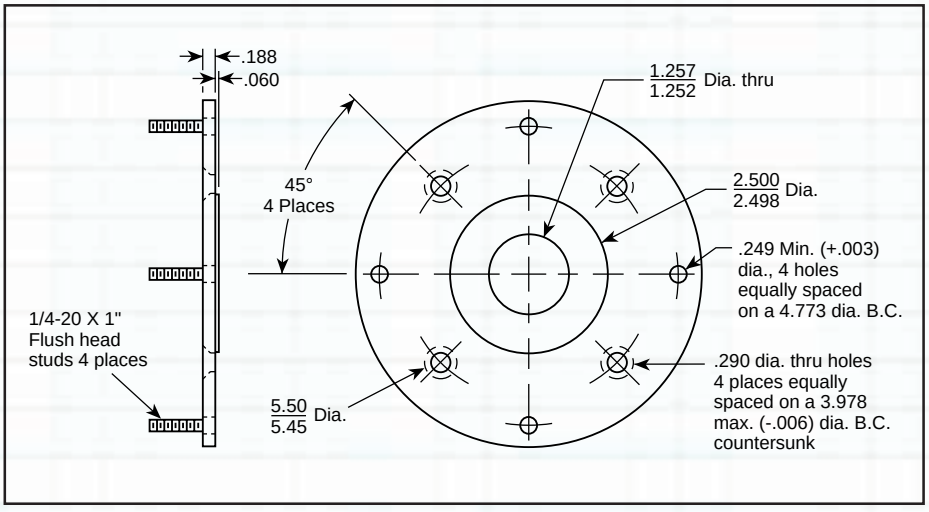
Key Features

- **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

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**

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Controller: 68HC11 microcomputer
Frequency Response: 10Hz - 10kHz
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)

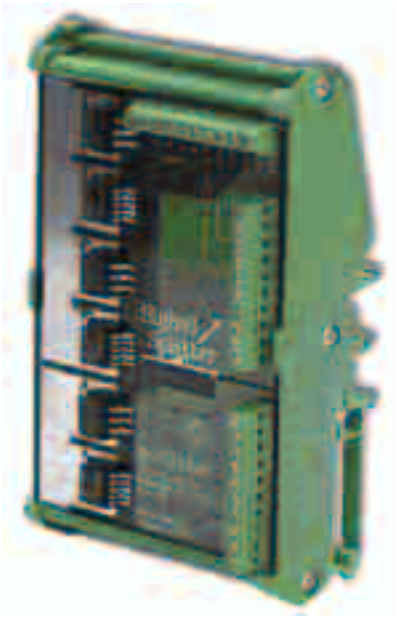
RIM SS2

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, sine or 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 Options: DIN 32 or 35

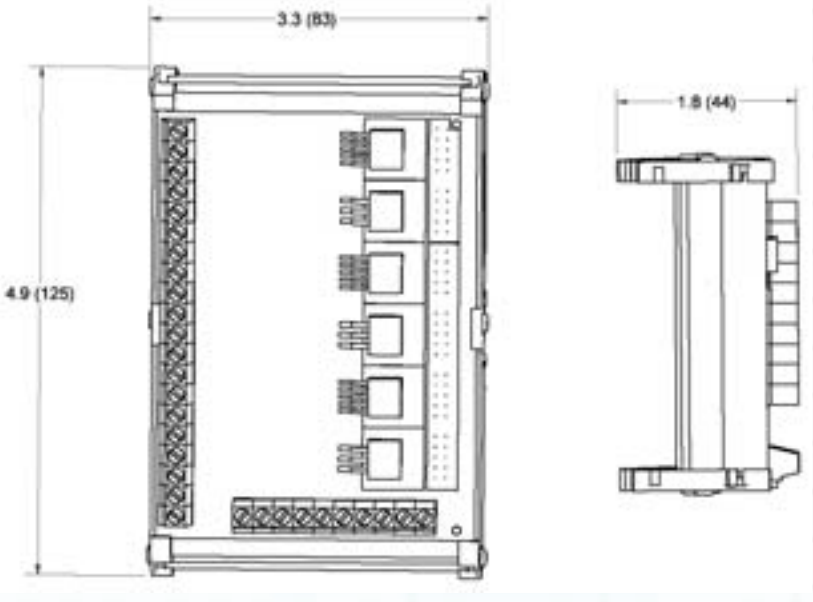
ENVIRONMENTAL

Operating Temperature: 0°C to 50°C
Storage Temperature: -20°C to 70°C
Operational Humidity: 98% non-condensing

ORDERING INFORMATION

Part Number: RIM SS2

DIMENSIONS



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

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Input Signal: 2 or 3 channel quadrature signal, sine or 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

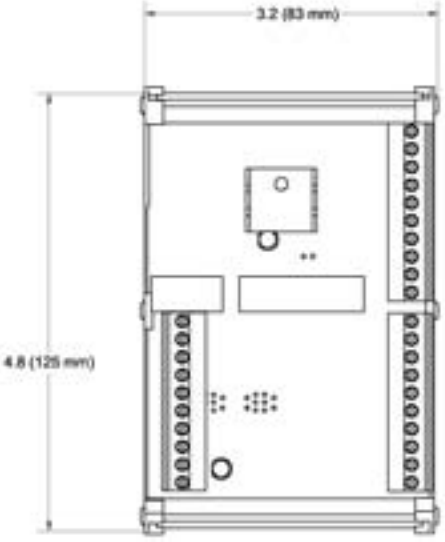
Enclosure Material: PVC
Side Element Material: Polyamide PA non-reinforced
Mounting Options: DIN 35 or 32

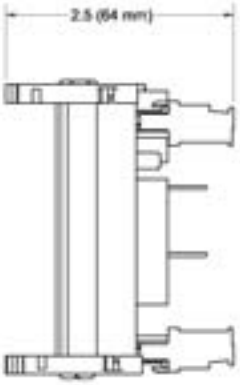
ENVIRONMENTAL

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'S GLOBAL PRESENCE

Dynapar has been manufacturing encoders for over fifty years, and our breadth of product offering has served us well in industries such as: Oil exploration and drilling, Paper and Steel production, Industrial Servomotor manufacturing, Renewable Wind Energy, and Elevator manufacturing.

The NorthStar™ brand of harsh duty optical encoders is a recognized name in Oil exploration and drilling. Oil & gas applications require reliable, intrinsically safe feedback, so ATEX-certified units are in service across the globe in some of the most hostile environments known. Environments such as Paper and Steel Mills are tough on encoders, and downtime is not an option. These production facilities rely on Dynapar's NorthStar™ brand of Magneto Resistive encoders to provide reliable digital tachometer feedback needed to control critical processes and eliminate the risk of waste and injury.

Dynapar supplies the world's Servomotor manufacturers with the broadest range of feedback available. Whether it is an absolute encoder, commutation encoder, or frameless resolver, Dynapar has a suitable feedback solution at the ready. Dynapar's Acuro™ brand encoders and Harowe™ brand resolvers are tough, reliable, and in many cases interchangeable for a "One Size Fits All" solution.

The world of Renewable Wind Energy is currently growing at a global rate of 25%. As the world continues to look for renewable energy sources, Dynapar's products continue to evolve to meet this demand. Dynapar's Acuro and NorthStar encoders are constantly being looked to for reliable feedback in critical pitch, yaw, and generator axes.

Dynapar encoders can be found busy at work within elevators around the world performing a host of functions, including governor positioning, door positioning, and traction drive speed and position control. Dynapar offers a range of industrial duty encoders designed to meet the Elevator Industry's complex manufacturing and maintenance requirements.

Dynapar is proud to be a member of the following industrial organizations:

IEEE

Associate Member
ELECTRICAL APPARATUS SERVICE ASSOCIATION
EASA
Reliable Solutions Today!

ASSOCIATION FOR HIGH TECHNOLOGY DISTRIBUTION
AHTD

DYNAPAR CERTIFICATIONS:
Many products contained in this resource are certified to the following standards, where noted:

CE

CSA C US

Ex

DYNAPAR™

INNOVATION - CUSTOMIZATION - DELIVERY

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