



BRITISH
ENCODER
PRODUCTS COMPANY



Optical Encoder and Accessories Catalogue



www.encoder.co.uk

The Responsive People In Motion Control

Company History

British Encoder Products is the European branch of Encoder Products Company Inc (EPC). EPC is a leading designer and world-wide manufacturer of motion sensing devices. Founded in 1969 by William Watt, EPC began operations with a small line of custom encoders. Today, more than 40 years later, EPC's popular Accu-Coder™ brand is the most complete line of incremental and absolute shaft encoders in the industry. Our core philosophy is that each and every customer deserves quality products, superior customer service and expert support.

Business Partnerships

Fostering long term business partnerships with satisfied customers is what we do best, and the heart of our mission. We take pride in providing superior customer service and supplying you an encoder that functions precisely, dependably and flawlessly. Listening to our customers needs, and designing products that provide solutions for them, is a key to our success. It isn't every company that can say they have satisfied their customers for over 40 years!

Innovative Design Team

At EPC and BEPC, we concentrate on encoders, making us famous for paving the path of the encoder industry and providing encoder standards for our industry since 1969. First to design the cube style encoder, now an industry standard. First to resolve mounting installation problems by providing an industry first flexible-mounting system. First to include Opto-ASIC technology, which virtually eliminates miscounts by removing electrical noise, and enhancing signal quality. First to provide an encoder that operates at 120° C. First to provide 6000 PPR in a 38mm diameter encoder. First to provide a 3 year standard warranty, demonstrating that we stand proudly behind the reliability of each of our products.



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Solving Problems

For over 40 years, we have been solving encoder problems. Custom designs, faster delivery and reliable products are all areas in which we excel. We believe that an encoder supplier should solve problems, not cause them.

Custom Encoders Our Speciality

Through years of experience, we understand each industrial environment is different so you need an encoder that fits your specific situation. This ultimately means not having to make do with someone else's specifications or configurations, but having your own custom designed unit. Many of our customers have come to depend on us for this special area of customization. Using state of the art technology, we can design and deliver custom encoders faster than most suppliers standard products. Often shipping your unique encoder in 2 to 6 days or sooner.

ISO 9001 Quality Systems

At BEPC, quality is designed into every product. Before it's offered for sale, each Encoder model is developed using state-of-the-art design tools and fully tested against BEPC's exacting quality standards. But quality does not stop at design. During the manufacturing process, each Encoder is subjected to a series of stringent quality control tests to ensure you are receiving the best encoder available. Our quality system has successfully been audited to the requirements of ISO 9001:2015, an internationally recognized standard for comprehensive Quality Systems. By paying close attention to detail, our Encoder brand has become known throughout the industry for quality and reliability.

BS OHSAS 18001:2007

British Encoder Products are committed to maintaining a safe and caring work place. In order to demonstrate our commitment to this we have had our health and safety procedures and systems audited and approved to BS OHSAS 18001:2007. We believe this benefits our customers due to our employees producing higher quality products with less wastage and rework necessary.

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Quick Selection Guide



Incremental Modules and Modular Encoders



Pg 8 Ø30mm

- Model 30M Incremental Encoder Module**
- Large Air Gap & Tolerance to Misalignment
 - Up to 1024ppr (4096 with Quadrature Count)
 - Optional 2,4 or 8-Pole Commutation
 - Sealing options to IP69K
 - Temperature Range -40° to 120°C
 - Easy Alignment and Installation



Pg 12 Ø30mm

- Model 30MT Threaded Encoder Module**
- Large Air Gap & Tolerance to Misalignment
 - Up to 1024ppr (4096 with Quadrature Count)
 - Sealing options to IP69K
 - Temperature Range -40° to 120°C
 - Easy Alignment and Installation



Pg 14 Ø50.8mm

- Model 121**
- Patented Auto Aligning Modular Encoder
 - Up to 12 Pole Commutation Available
 - Bore Sizes to 0.625", or 15 mm
 - Ideal for higher speed motor applications
 - Resolutions to 2540 PPR

Incremental Thru-Bore & Motor Mount Encoders



Pg 16 Ø38.1mm

- Models 15T & 15H**
- Resolutions to 10,000 PPR
 - Up to 12 Pole Commutation Available
 - Bore Sizes to 0.375", or 10 mm
 - Operating Temps from -40° to +120° C
 - Sealing Up to IP64



Pg 18 Ø38.1mm

- Model 755HS**
- Resolutions to 30,000 PPR
 - Bore Sizes to 0.375", or 14 mm
 - A Variety of Flexible Mounting Brackets
 - Operating Temps from -40° to +100° C
 - Frequencies to 1 MHz



Pg 20 Ø50.8mm

- Model 260**
- Resolutions to 10,000 PPR
 - Bore Sizes to 0.625", or 15 mm
 - A Variety of Flexible Mounting Brackets
 - Operating Temps from -40° to +120° C
 - Sealing Up to IP64



Pg 24 Ø63.5mm

- Model 25T**
- Replaces 2.0" to 3.5" Encoders
 - Resolutions to 10,000 CPR
 - Bore Sizes to 1.125", or 28 mm
 - Versatile Flexible Mounting Options
 - Operating Temps from -20° to +105° C



Pg 26 Ø50.8mm

- Model 58TF**
- 58 mm Thru-Bore or Hollow Bore Encoder
 - Bore Sizes up to 5/8" and 15 mm
 - Resolution from 1 to 65,536 PPR
 - Several Flexible Mounting Options
 - Sealing Options up to IP67
 - Multiple Connector Options



Pg 28 Ø63.5mm

- Models 760**
- Resolutions to 10,000 PPR
 - Up to 12 Pole Commutation Available
 - Bore Sizes to 0.500", or 15 mm
 - Operating Temps from 0° to +100° C
 - Sealing Up to IP64



Pg 30 Ø110mm **Pg 32**

- Models 775 & 776**
- Slim Profile - to 1.36" Thru-Bores
 - Resolutions to 4096 PPR
 - Bore Sizes to 1.875", or 43 mm
 - Large Selection of Connector Options
 - Operating Temps from 0° to +100° C



Pg 34 Ø165mm

- Model 770**
- Fits NEMA Frame Size 56C Thru 184C
 - Resolutions to 4096 PPR
 - Bore Sizes to 1.00", or 24 mm
 - Large Selection of Connector Options
 - Operating Temps from 0° to +100° C



- Pg 36**
- Model 755A NEMA**
- NEMA 23 or 34 Motor Mount with Coupling
 - Resolutions to 30,000 PPR
 - Frequencies to 1 MHz
 - Coupling Sizes to 0.375", or 6 mm
 - Operating Temps from -40° to +100° C



- Pg 38** Ø50.8mm
- Model 702 Motor Mount**
- 50.8mm Ultra-rugged, Compact Encoder
 - Resolutions to 30,000 PPR
 - Frequencies to 1 MHz
 - Coupling Sizes to 0.500"
 - Operating Temps from 0° to +100° C

Quick Selection Guide



Incremental Shaft Encoders



Pg 40 57.15mm

- Models 711/716 & Cube Housings**
- The Original Cube Encoders
 - Single Channel or Quadrature
 - Versatile Heavy Duty Housing Styles
 - Resolutions up to 10,000 PPR
 - Single and Double Shaft Options



Pg 44 Ø38.1mm

- Model 15S**
- Resolutions to 10,000 PPR
 - Up to 12 Pole Commutation Available
 - Wide Variety of Mounting Options
 - Operating Temps from -40° to +120° C
 - Sealing up to IP64



Pg 48 Ø38.1mm

- Model 755RG & 755 Lid Accessories**
- Resolutions up to 30,000 PPR
 - Frequencies to 1MHz
 - Variety of Servo and Flange Mounts
 - Available with In-Line M12 Connectors
 - Operating Temps from -40° to +100° C



Pg 52 Ø50.8mm

- Model 702**
- Resolutions to 30,000 PPR
 - 35 Kg Max Radial and Axial Load
 - Shaft Sizes up to 0.375" or 10mm
 - Operating Temps from 0° to +100° C
 - Sealing Up to IP67



Pg 56 Ø63.5mm

- Model 725**
- Industrial Isolated Flex Housing Available
 - Resolutions to 30,000 PPR
 - Frequencies Up to 1 MHz
 - Sealing Up To IP67
 - Operating Temps from 0° to +100° C



Pg 60 Ø115mm

- Models 744 "444" Tacho Style**
- Standard "444" Style, 115mm Dia
 - Up to 30,000 PPR
 - Choice of Shaft Sizes
 - IP64 Sealing Available



Pg 62 Ø90mm

- Models 745 Heavy Duty**
- European 90/80/40mm Configuration
 - Resolutions to 30,000 PPR
 - Hohner 3000/4000 Direct Replacement
 - IP64 Sealing Available



Pg 64 Ø58mm

- Model 758**
- 36Kg Max Radial and Axial Load
 - Resolutions up to 30,000 PPR
 - Clamping or Synchro Flange Options
 - Operating Temps from 0° to +100° C
 - Sealing Up to IP66



Pg 66 Ø90mm

- Models 7RP Extra Heavy Duty**
- Extra Heavy Duty Mechanical Assembly
 - Single or Double Ended Shaft
 - Reversible Face Fixing Option
 - Incorporates Opto-ASIC Technology



Pg 68 Ø68mm

- Models 86A Extra Heavy Duty**
- Standard 68mm Dia Package
 - Resolutions to 30,000 PPR
 - Incorporates Opto-ASIC Technology
 - Square Flange Mounting
 - IP65 Double "O" Ring Sealed



Pg 70 Ø90mm

- Model 86F Extra Heavy Duty**
- Transverse Slotted Shaft
 - Up to 3000 PPR
 - Incorporates Opto-ASIC Technology
 - 90mm Round Flange with 3 x 4.5mm Dia Holes at 120 Degrees apart on a 82mm PCD
 - Double "O" Ring Sealed



Pg 72 Ø63.5mm

- Model 25SF**
- Industry Standard Size 25 (63.5mm) Package
 - Resolutions from 1 to 65,536 PPR
 - Heavy Duty Bearings
 - Sealing Up To IP67
 - Servo and Flange Mounting

Linear Solutions Encoders



- Pg 74**
- Model LCE**
- Low Cost Linear Solution
 - Imperial and Metric Options
 - Sealing up to IP65
 - Up to 1.27M or 50 Inches Full Stroke Length



- Pg 76**
- Model TR1**
- Integrated Encoder and Measuring Wheel
 - Spring Loaded Torsion Arm Adjusts Wheel Pressure for Multi Surfaces; Easy Installation
 - Resolutions to 10,000 PPR
 - Sealing Up to IP66



- Pg 78**
- Model TR3**
- Integrated Heavy Duty Encoder and Measuring Wheel
 - Easy Installs in a Vertical, Horizontal or Upside Down Orientation
 - Resolutions to 10,000 PPR
 - Single or Dual Wheel
 - Sealing Up to IP66

Quick Selection Guide



Stainless Steel Encoders



- Pg 82**
Model 802S
 • 50.8mm Industrial 316 Stainless Steel Housing
 • 36 Kg. Max. Radial and Axial Load
 • Resolutions to 30,000 PPR
 • Shaft Sizes to 0.375", or 10 mm
 • Sealing Up to IP66

Ø50.8mm



- Pg 84**
Model 858S
 • 58 mm Industrial 316 Stainless Steel Housing
 • 36 Kg. Max. Radial and Axial Load
 • Resolutions to 30,000 PPR
 • Clamping or Synchro Flange Options
 • Sealing Up to IP66

Ø58 mm



- Pg 86**
Model 865T
 • Fits NEMA Frame Size 56C Thru 184C Motors
 • Slim 1" Profile Housing in 316 Stainless Steel
 • Resolutions to 4096 PPR
 • Bore Sizes to 1.00", or 24 mm
 • Sealing Up to IP66 with Optional Cover

Ø165mm

Absolute Encoders



- Pg 88**
Model 925
 • Industrial Housed 63.5mm Single Turn Absolute Encoder
 • Gray, Natural Binary and Excess Gray Code
 • Shaft Sizes to 0.375" or 10mm
 • Flange and Servo Mounts
 • Sealing Up to IP66

Ø63.5mm



- Pg 90**
Model 958
 • European Size 58mm
 • Gray, Natural Binary and Excess Gray Code
 • Shaft Sizes to 0.375" or 10mm
 • Clamping or Synchro Flange Options
 • Sealing Up to IP66

Ø58mm



- Pg 92**
Model 960
 • Low Profile - 39.37mm Single Turn Absolute
 • Opto-ASIC Circuitry in an All Metal Housing
 • Resolutions Up to 11 Bits
 • Bore Sizes to 0.375" or 10mm
 • A Variety of Flexible Mounting Brackets

Ø50.8mm



- Pg 94**
Model A36HB
 • Standard Size 36mm Package
 • Double Magnetic Technology
 • Single/Multi Turn (16 bit ST/43 Bit MT)
 • SSI and CANopen Communications
 • Hollow Shaft and Flex Mounting

Ø36mm



- Pg 96**
Model A36SB
 • Standard Size 36mm Package
 • Double Magnetic Technology
 • Single/Multi Turn (16 bit ST/43 Bit MT)
 • SSI and CANopen Communications
 • 6mm or 0.250" Shaft & Servo Mounting

Ø36mm



- Pg 98**
Model A58HB
 • 58mm Diameter
 • Durable Magnetic Technology
 • Single/Multi Turn (16 bit ST/43 Bit MT)
 • SSI and CANopen Communications
 • Retains Absolute Position After Power Outage

Ø58mm



- Pg 100**
Model A25SB
 • Standard Size 25 Package 63.50mm Dia
 • Double Magnetic Technology
 • Single/Multi Turn (16 bit ST/43 Bit MT)
 • SSI and CANopen Communications
 • Servo & Flange Mounting

Ø63.5mm



- Pg 102**
Model A58HE Ethernet
 • EtherCAT Deterministic Communication
 • 58 mm Diameter Package
 • Hollow Bore Construction
 • Durable Magnetic Technology
 • Multi-Turn Absolute Encoder (16 Bit ST /43 Bit MT)
 • Proven Turns Counting Technology
 • Flex Mount Eliminates Couplings
 • Works in various configurations

Ø58mm



- Pg 104**
Model A58SE Ethernet
 • EtherCAT Deterministic Communication
 • 58 mm Diameter Package
 • Shaft Unit with 2 Mounting Options
 • Durable Magnetic Technology
 • Multi-Turn Absolute Encoder (16 Bit ST /43 Bit MT)
 • Proven Turns Counting Technology
 • 2 Colour LEDs for Op Condition and Bus Status
 • Works in various configurations

Ø58mm

Quick Selection Guide



Programmable Encoders



Pg 106

- Model 25SP**
- Industry Standard Size 25 Package (63.5mm)
 - Fully Programmable with Optional USB Module or Factory Configured
 - Optical Technology for High Accuracy
 - Resolutions from 1 to 65,536 PPR
 - Servo and Flange Mounting
 - IP67 Sealing Available



Pg 110

- Model 58TP**
- 58 mm Thru-Bore or Hollow Bore Encoder
 - Fully Programmable with Optional USB Module or Factory Configured
 - Optical Technology for High Accuracy
 - Resolutions from 1 to 65,536 PPR
 - Several Flexible Mounting Options
 - IP67 Sealing Available

Accessories



Pg 114

- RX/TXD**
- Din Rail Mountable
 - Level Changes to 5V, 12V or Vcc
 - Signal Conditioning
 - 2 or 3 Way Splitter
 - Encoder Tester



Pg 116

- Measuring Wheels**
- Rubber, Urethane or Knurled
 - Sizes up to 500mm Circumference
 - Custom Bore Options



Pg 118

- Cables**
- 4 Pin up to 19 Pin
 - MS Style, M12 EuroFast, 9-Pin "D" Style
 - Cable Length Options



Pg 119

- Couplings**
- Bore Sizes Up to 12mm Bore
 - Magnetic And Flexible Options



Pg 120

- Flanges, Brackets and Misc Items**
- Flanges and Brackets
 - Flex Mount Kits
 - Servo Clamps
 - Protective Covers
 - C-Face Gasket Kits



Pg 126

- Power Supply Unit**
- 5V, 12V or 24 Vcc
 - LED Indicators
 - Screw Type Terminals for AWG 24 to 14
 - Shock Proof Housing

When deciding whether a modular or bearing encoder is the best solution for your application, consider these factors:

1. First and foremost, shaft end float and total indicated runout (TIR) must be within the encoder's specifications. This is so important that if you don't have (or can't get) this information, or don't trust what you have, an encoder with bearings is strongly recommended since it will be a much safer choice.
2. Modular encoders can be a good choice for high-speed applications – above 10,000 RPM – because there are no speed limitations dictated by encoder bearings. For example, BEPC's Model 121 Modular Encoder has been successfully operated at speeds in excess of 40,000 RPM. The speed limiting factor is the maximum frequency of the encoder (which is a function of disk resolution), RPMs, and the signal processing circuitry. Most encoder manufacturers include maximum frequency in product specifications.
3. If the motor is to be used under considerable mechanical load, where the motor bearings could experience extra wear, then an encoder with bearings would be the better choice. Remember, the bearings of the host device serve as the bearings of the modular encoder.
4. Modular encoders are difficult to seal. If your application requires washdown, or if the operating environment is dirty, dusty or wet, then an encoder with bearings and seals should be your first consideration. Such environments effectively rule out modular encoders, unless external protection, such as an IP sealed motor cover, is used.
5. If your application requirements combine high maximum frequency (> 200kHz), high temperature (100° C or higher), and higher resolution (> 2048 PPR), then an encoder with bearings is recommended. For long term reliability, this combination of factors requires the air-gap between the disk and sensor to be very narrow and tightly controlled. An encoder with bearings simply provides a more stable optical platform.
6. Lower resolutions (up to 1024 PPR) are more forgiving of end float and TIR, and are often well-suited for modular applications if the operating environment is appropriate.
7. If you plan to use numerous encoders, then the relatively lower price of a modular encoder could save you some money. On the other hand, the greater durability and easier installation of an encoder with bearings might be worth a slightly higher unit price. In any case, carefully weigh the factors of long term support costs versus lower acquisition costs before making your final decision.

Quick Selection Chart

Parameter	Attribute	Use Modular	Use Encoder with Bearings
Motor shaft end float and TIR	Within the encoder manufacturer's specifications	Yes	Yes
Motor shaft end float and TIR	Outside the encoder manufacturer's specifications	No	Yes
Motor shaft end float and TIR	Don't have the information or don't trust	Not suggested	Suggested
High-speed applications	Above 10,000 RPM	Good possibility	Not suggested
Severe duty application	Motor bearings have extra load and wear	Not suggested	Suggested
Dirty environment	May need seals	Not suggested	Suggested
Combination of high frequency response, temperature, PPR	> 200kHz, > 100° C, > 2048 PPR	Not suggested	Suggested
Lower resolution requirement	< 1024 pulses per revolution	Good possibility	Good
Number of units needed	Acquisition cost vs. life cycle cost	Consider if large volume	Good

Encoder Basics



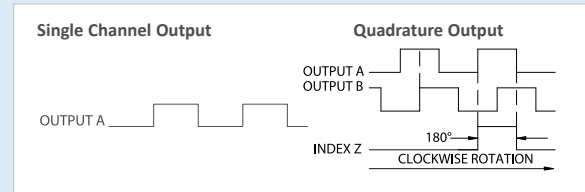
What is an encoder?

An encoder is a sensing device that provides feedback from the physical world – it converts motion to an electrical signal that can be read by some type of control device, such as a counter or PLC. The control device can then use that signal to control a conditional event, such as activating a print head to create a mark at a specific location.

Encoders use different types of technologies to create a signal. Some common encoder technologies are: mechanical, magnetic, resistive, and optical. Currently, the most common technology employed by encoders is optical.

Encoders may produce either incremental or absolute signals. Incremental signals do not indicate specific position, only that the position has changed. Absolute encoders, on the other hand, use a different “word” for each position, meaning that an absolute encoder provides both the indication that the position has changed and an indication of the absolute position of the encoder.

Incremental encoders are available in two basic output types, single channel and quadrature, shown below.

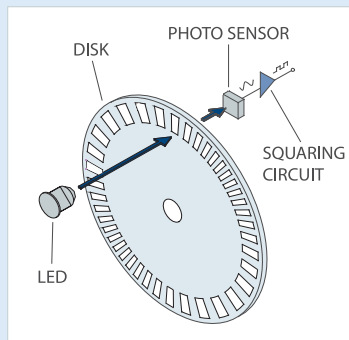


A single channel encoder, often called a tachometer, is normally used in systems that rotate in only one direction and require simple position and velocity information.

Quadrature encoders have dual channels (A and B), phased 90 electrical degrees apart. These two output signals determine the direction or rotation by detecting the leading or lagging signal in their phase relationship. Quadrature encoders provide very high speed bi-directional information for very complex motion control applications.

How an incremental encoder square wave is produced:

The inset diagram outlines the basic construction of an incremental encoder. A beam of light emitted from an LED passes through a transparent disk patterned with opaque lines. The light beam is picked up by a photodiode array, also known as a photosensor. The photosensor responds to the light beam, producing a sinusoidal wave form, which is transformed into a square wave or pulse train. This pulse signal is then sent to the counter or controller, which will then send the signal to produce the desired function.



Resolution is a term used to describe the Pulses Per Revolution (PPR) for incremental encoders. Each incremental encoder has a defined number of cycles that are generated for each 360 degree revolution of the shaft. These cycles are monitored by a counter or motion controller and converted to counts for position or velocity control. The diagram shows how the whole encoder comes together.

If you still have questions as to how an encoder works in your specific application, please call us. When you contact BEPC, you can talk to engineers and encoder experts for your toughest encoder questions.

The diagram is for a typical rotary encoder. Incremental encoders can provide a once-per-revolution pulse (often called the index, marker, or reference) that occurs at the same mechanical point of the encoder shaft revolution. This pulse is on a separate output channel (Z) from the signal channel or quadrature outputs. The index pulse is often used to position motion control applications to a known mechanical reference.



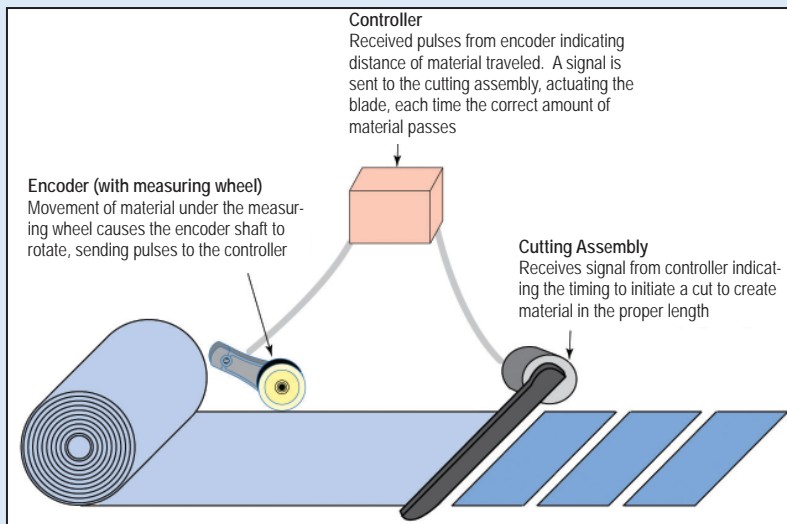
Typical Usage



Motor feedback is the most common use for rotary encoders. In this type of application, an encoder is either mounted directly to the motor or indirectly using a measuring wheel or chain-and-sprocket arrangement. The parameter of interest is primarily the speed of the motor.

Web tensioning is an application in which the encoder is not usually mounted to the drive motor but to one of the tensioning arm rollers. Any unevenness in the speed of this roller indicates that proper web tension is not being maintained and must be adjusted. The rotating speed of the tensioning roller is fed back to the controller, which then adjusts the drive motor so that web material is kept at an even tension.

Cut-to-Length is a very practical application of an encoder combined with simple mathematics. If, for example a system were to be designed with a roller that is exactly one foot in circumference, the roller would feed one foot of material for every revolution of the roller. An encoder mounted to the roller would reflect this situation and could tell a controller how much material had been fed through the roller. The resolution of the encoder would also directly reflect the accuracy of the cut. In the above example, 96 PPR would yield cuts to an 1/8" accuracy.



Elevators are just one example where encoders can perform a dual role. They can determine the position of the elevator through a mathematical calculation similar to the above, and they can determine the speed of travel of the elevator.

Registration Mark Timing uses encoders to determine the position of a unit relative to a known point, and then to determine the unit's speed relative to that mark. Radar antenna rotation is a good example of this type of application.

In **Backstop Gauging** the encoder is used to make sure that the unit, typically a machine tool does not exceed a preset position or direction of travel. Very often, this is combined with a determination of the speed of travel of the table, tool head or similar component. A typical filling application is just one example where Table Positioning is critical since the item being filled must arrive at filling tube at the same time the fluid control is turned on.

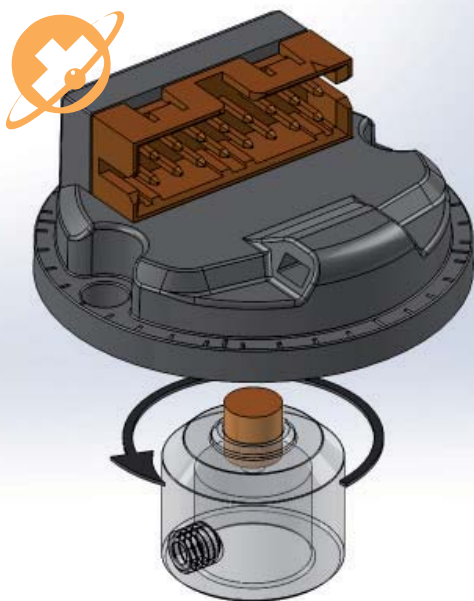
Conveying is another common industry where encoders are widely used. They may be attached to the motor, to intermediate axle shafts or to both. Encoders are an especially effective feedback device where the positioning and/or speed of multi-element conveying systems must be carefully coordinated.

Spooling (sometimes referred to as Level Wind) is another application where encoders can prove invaluable. Not only is it necessary that the speed of the supply and take-up reels be kept in proper relation to each other, but the amount of material being spooled must also often be tracked.

Electronics is just one industry that widely uses encoders in Pick and Place applications. Here many of the capabilities of encoders (rate, position, speed, velocity) can often be found combined in a single system.



Model 30M Incremental Encoder Module



Features

- Large Air Gap and Tolerance to Misalignment
- Up to 1024 PPR
- Optional 1-Pole to 16-Pole Commutation
- Temperature Range -40°C to 120°C
- Sealing Options to IP69K
- Easy Alignment and Installation

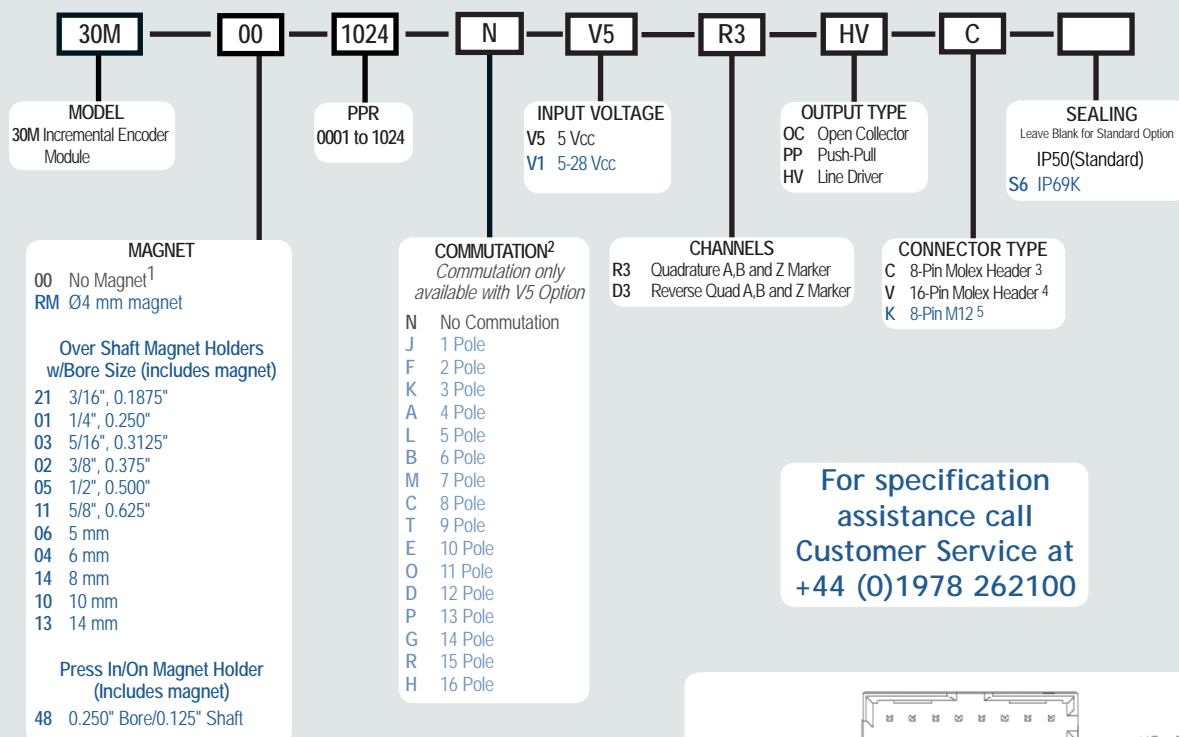
The Model 30M is a compact, incremental encoder module with advanced magnetic sensing and signal processing technology. Featuring resolutions from 1 to 1024 PPR, commutation channels, several output types and two supply voltage options, it can be configured for a wide range of industrial, commercial and consumer feedback applications. With a non-contact magnetic sensor and optional sealing up to IP69K, the Model 30M can be applied in environments where dirt, dust and liquids are present.

COMMON APPLICATIONS

Servo/stepper motor feedback, Mobile equipment speed and steering sensing, Timber processing machinery, Studio lighting and stage equipment control, Rotary valve position monitoring and control, Solar panel positioning, Vending machines, Punch presses, Tank level monitoring, Robotics

Model 30M Ordering Guide

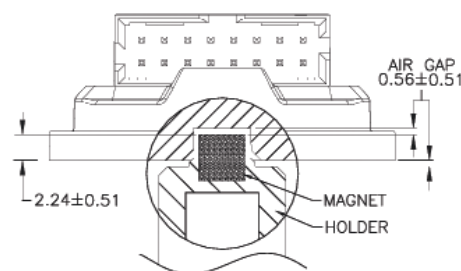
Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 A high quality magnet is required to generate a reliable signal; magnet options provided by BEPC have been pre-qualified to provide a clear and reliable signal.
- 2 Commutation available with 5 Vcc & 16-Pin Molex Header Connector Type only.
- 3 If V5 Input Voltage is selected for the 8-Pin Molex Header Connector Type, then OC Output Type is not available.
- 4 Only available in V5 Input Voltage; OC Output Type not available.
- 5 Only available in V1 Input Voltage.
- 6 IP69K sealing available with 8-Pin M12 Connector Type only.



Nominal Magnet Position

Model 30M Incremental Encoder Module



Model 30M Specifications

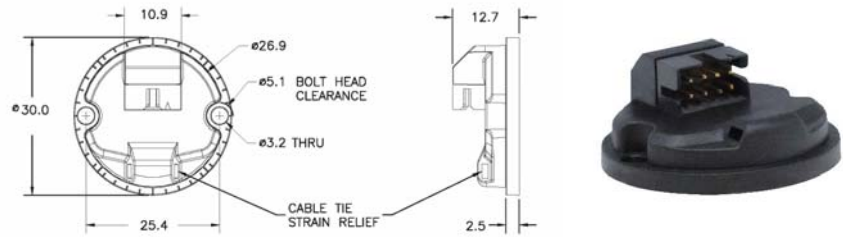
ELECTRICAL

Input Voltage	5 Vcc +10% Fixed Voltage 4.5 to 28 Vcc (4.5 to 20 Vcc over 105°C)
Input Current	80 mA max, 50 mA or less typical with no output load
Output Format	Two square waves in quadrature with channel A leading B for clockwise rotation as viewed from the encoder mounting face. Index gated to A and B.
Output Types	Open Collector Open Collector with Differential Outputs Differential Line Driver (Meets RS422 at 5 Vcc) Push-Pull
Electrical Protection	All outputs 20 mA max per channel Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.
Max Frequency	350 kHz
Min Edge Sep	20° electrical min, 50° electrical typical
Accuracy	Typically within ±0.7° mechanical from true position. Accuracy improves at nominal air gap with minimized magnet runout, offset and endplay.

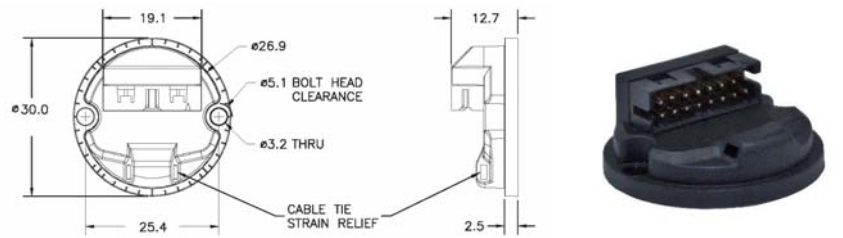
MECHANICAL/ENVIRONMENTAL

Air Gap	0.56mm nominal recommended
User Shaft Tolerances	
Axial Endplay	±0.50mm max
Radial Runout	0.20mm max
Axial Offset	0.20mm max
Mounting Bolts	Max Ø5.08mm Head, 2-56 or M2.5 Button, Socket or Pan Head or 4-40 Socket Head
Housing Material	High Temp, Toughened Nylon Composite
Weight	14.17 Grams typical or less
Humidity	98% RH non-condensing
Vibration	20 g @ 10 to 2000 Hz (MIL-STD-202G Method 204D)
Shock	100 g @ 11 ms duration (MIL-STD-202G Method 213B)
Sealing	IP50 standard; IP69K available with M12 connector option

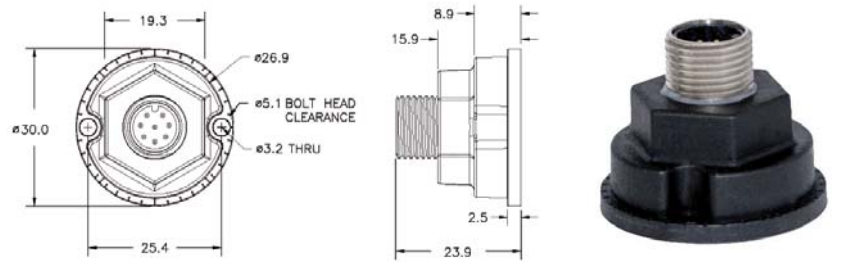
8-Pin Header Option (C)



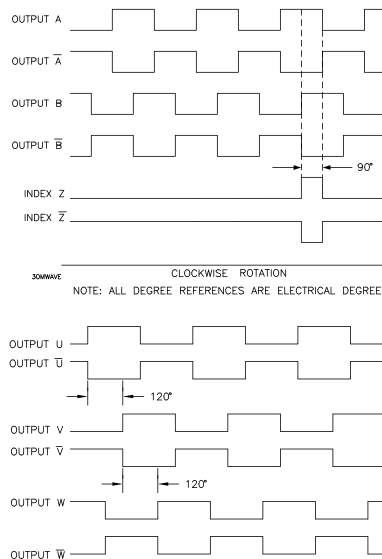
16-Pin Header Option (V)



8-Pin M12 Option (K)



Waveform Diagrams



Wiring Table

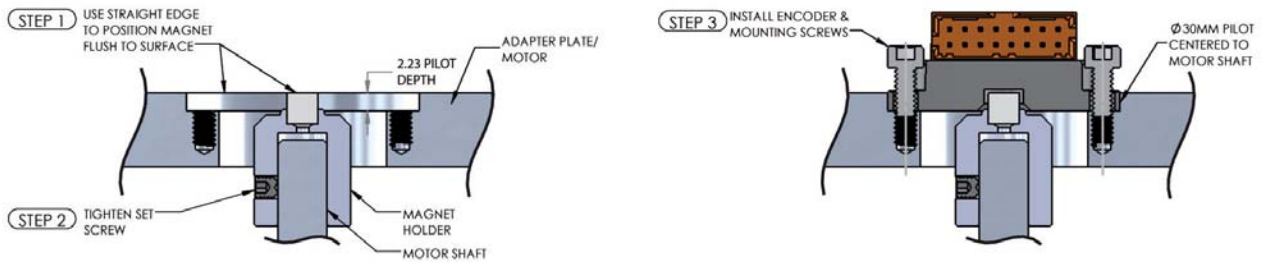
Function	8-pin M12	8-pin Header	16-pin Header
0 Volts	7	4	8
+VCC	2	2	6
A	1	8	12
A'	3	6	10
B	4	5	9
B'	5	7	11
Z	6	1	5
Z'	8	3	7
U	--	--	2
U'	--	--	1
V	--	--	14
V'	--	--	13
W	--	--	4
W'	--	--	-3

Model 30M Incremental Encoder Module



Preferred Installation

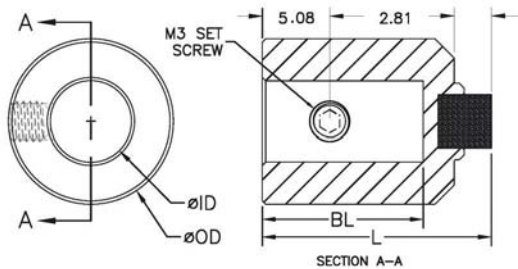
Contact BEPC Support for assistance with additional installation options.



OVER SHAFT MAGNET HOLDERS

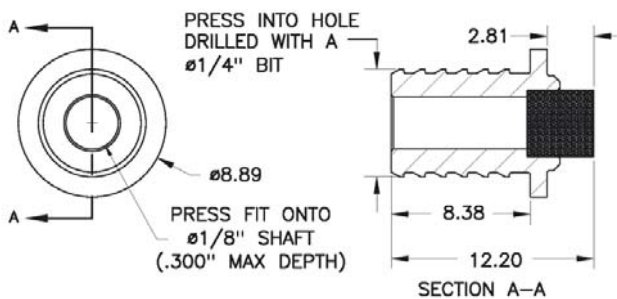
STOCK #	Ø ID	Ø OD	BL	L
176596-01	3/16"	9.27	9.525	14.73
176597-01	5mm	9.27	9.525	14.73
176598-01	6mm	12.44	9.525	14.73
176599-01	1/4"	12.44	9.525	14.73
176600-01	5/16"	12.44	12.06	17.27
176601-01	8mm	12.44	12.06	17.27
176602-01	3/8"	15.62	12.06	17.27
176603-01	10mm	15.62	12.06	17.27
176604-01	1/2"	18.79	19.05	24.25
176605-01	14mm	18.79	19.05	24.25
176606-01	5/8"	21.97	19.05	24.25

OD, BL and L all in mm



Over Shaft Magnet Holder

PRESS IN/ON MAGNET HOLDER : stock #176607-01



Press In/On Magnet Holder

All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

MATING CABLES & CORDSETS

Molex Mating Cables (24 AWG Wires)	
Stock #	Description
075230	8-pin Molex Mating Connector w/ 24" Cable
075232	16-Pin Molex Mating Connector w/ 24" Cable

M12 Mating Cordsets	
Stock #	Description
075100	8-Pin M12 Mating Cordset, 0.5 Meters
075101	8-Pin M12 Mating Cordset, 2 Meters
075102	8-Pin M12 Mating Cordset, 4 Meters
075103	8-Pin M12 Mating Cordset, 6 Meters
075104	8-Pin M12 Mating Cordset, 10 Meters

INSTALLATION, CENTERING AND GAPPING TOOLS

Stock #	Description
176615	Centers magnet and sets proper distance to 30M Encoder sensor.



When to Choose a Magnetic Encoder Module

Magnetic encoder modules can be used in a wide range of applications, including, but certainly not limited to, the following:

- Servo/stepper motor feedback
- Mobile equipment speed and steering sensing
- Timber processing machinery
- Studio lighting and stage equipment control
- Rotary valve position monitoring and control
- Solar panel positioning
- Vending machines
- Punch presses
- Tank level monitoring
- Robotics



The Model 30M Incremental Magnetic Encoder Module has 3 connector options.

How do you know when you need something as specialized as a magnetic encoder module? There are many points to consider when trying to determine if it's the best solution for your application.

1. You need an encoder with a bearing-less design. In the vast majority of applications, an encoder with bearings is the best choice, because it provides an easier installation and a more stable platform for the encoder to run on. However, there are instances where a bearing-less encoder is a better option:

- In your application, there are factors that are hard on bearings. Magnetic encoder modules tend to be more tolerant to shock and vibration – factors that typically shorten bearing life. If your encoder will be subjected to factors that are hard on bearing life, a magnetic encoder module might be the right encoder solution for your application.
- You need an encoder that can work in a high-speed application. An encoder's bearings often limit operational speed to 12,000 RPMs or less. If you need to run at higher speeds, a bearing-less module might be the solution.
- Cost is a major factor. Since encoder modules have no bearings and associated support parts, they often cost less and can be more economical. If cost is a factor, an encoder module might be the right solution.

2. You have limited space. It can happen for different reasons. Maybe the encoder was overlooked in the design phase, and you suddenly find yourself with very little space for a key component in your configuration. Maybe the constraints of your machine's design simply won't allow more space. In any case, magnetic encoder modules tend to be compact in size, but – when designed well – will still give you the accurate feedback and motion control you need.



The Model 30MT Incremental Magnetic Encoder Module comes with a threaded housing.

3. You need versatile mounting options. The "magnetic" in "magnetic encoder module" gives you some options you may not have with typical encoders. Even with the tolerance for a large air gap and tolerance for misalignment, you may still have a tricky installation that requires a creative solution. Both the Model 30M and the Model 30MT have been designed with that in mind, and they are easy to mount and install.

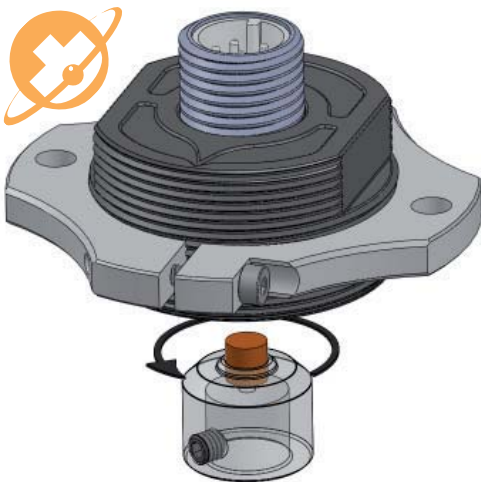
4. You need a heavy-duty seal on your encoder. Not all magnetic encoder modules offer heavy-duty sealing options, so be sure to check the IP Ratings. If you need protection from washdown, you cannot settle for IP50. Conversely, if your encoder will be fairly well protected, it might not make sense to pay for a higher IP Seal than you need. EPC's Model 30M and Model 30MT are compact magnetic encoder modules with sealing options up to IP69K and an operating temperature range of -40° to 120° C, so it can handle the most extreme industrial environments.

With a large air gap and tolerance to misalignment, up to 1024 PPR (4096 PPR with Quadrature Counting), optional 1 to 16 pole commutation, and easy alignment and installation, the Model 30M or the threaded Model 30MT are excellent solutions when you need a magnetic encoder module.

Contact BEPC today and you'll talk to real engineers who can help you incorporate the 30M or 30MT into your application.

For specification assistance call Customer Service at +44 (0)1978 262100

Model 30MT - Threaded Incremental Encoder Module



Ø30 mm

Features

- Large Air Gap and Tolerance to Misalignment
- Up to 1024 PPR (4096 With Quadrature Counting)
- Temperature Range -40°C to 120°C
- Sealing Options to IP69K
- Easy Alignment and Installation

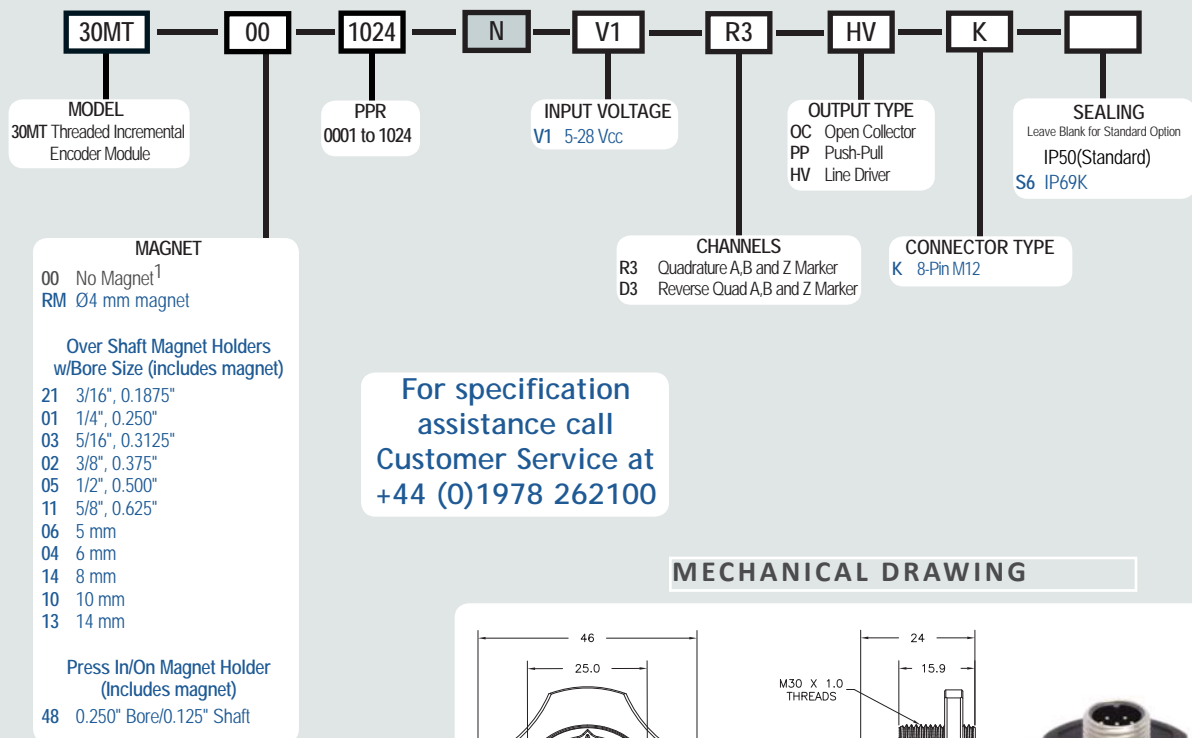
New from British Encoder Products Company, the Model 30MT is a compact, modular incremental encoder with advanced magnetic sensing and signal processing technology. With built in alignment feature, the threaded housing allows for quick, accurate air-gap setting. Featuring resolutions up to 1024 PPR, several output types and a wide range for supply voltage, it can be configured for a variety of industrial, commercial and consumer feedback applications. The non-contact magnetic sensor and optional sealing up to IP69K allows the Model 30MT to be applied to environments where dirt, dust and liquids are present.

COMMON APPLICATIONS

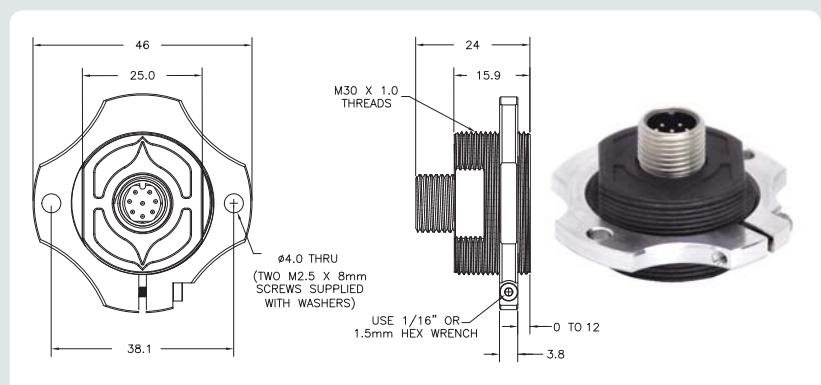
Motor feedback, Mobile equipment speed and steering sensing, Timber processing machinery, Studio lighting and stage equipment control, Rotary valve position monitoring and control, Solar panel positioning, Vending machines, Punch presses, Tank level monitoring, Robotics

Model 30MT Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



MECHANICAL DRAWING



NOTES:

- 1 A high quality magnet is required to generate a reliable signal; magnet options provided by BEPC have been pre-qualified to provide a clear and reliable signal.

Model 30MT - Threaded Incremental Encoder Module



Model 30MT Specifications

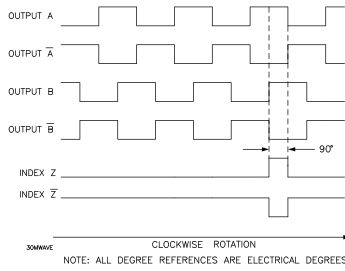
ELECTRICAL

Input Voltage 4.5 to 28 Vcc (4.5 to 20 Vcc over 105°C)
 Input Current 80 mA max, 50 mA or less typical with no output load
 Output Format Two square waves in quadrature with channel A leading B for clockwise magnet rotation as viewed from the encoder mounting face. Index gated to A and B.
 Output Types Open Collector
 Open Collector with Differential Outputs
 Differential Line Driver (Meets RS422 at 5 Vcc)
 Push-Pull
 Electrical Protection Reverse voltage and output short circuit protected
 Max Frequency 350 kHz
 Min Edge Sep 20° electrical min, 50° electrical typical
 Accuracy Typically within ±0.7° mechanical from true position. Accuracy improves at nominal air gap with minimized magnet runout, offset and endplay.

MECHANICAL/ENVIRONMENTAL

Air Gap 0.56mm nominal recommended
 User Shaft Tolerances
 Axial Endplay ±0.50mm max
 Radial Runout 0.20mm max
 Axial Offset 0.20mm max
 Mounting Bolts Two M2.5 x 8mm screws & washers provided
 Housing Material High Temp, Toughened Nylon Composite
 Weight 14.17 Grams typical or less
 Humidity 98% RH non-condensing
 Vibration 20 g @ 10 to 2000 Hz (MIL-STD-202G Method 204D)
 Shock 100 g @ 11 ms duration (MIL-STD-202G Method 213B)
 Sealing IP50 standard; IP69K available

Waveform Diagram and Wiring Table



Function	8-pin M12
0 Volts	7
+ Vcc	2
A	1
A'	3
B	4
B'	5
Z	6
Z'	8

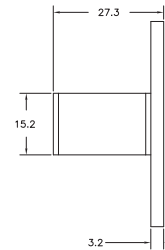
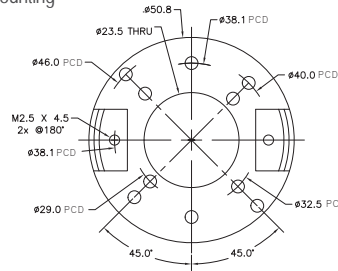
WIRING TABLE

For BEPC-supplied mating cables, refer to wiring table provided with cable.

Universal Mounting Adaptor : stock #176672

Provides the following mounting patterns, 2x @ 180°

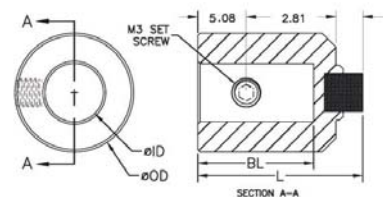
- Ø29.0 PCD
- Ø32.5 PCD
- Ø38.1 PCD
- Ø40.0 PCD
- Ø46.0 PCD



Over Shaft Magnet Holders

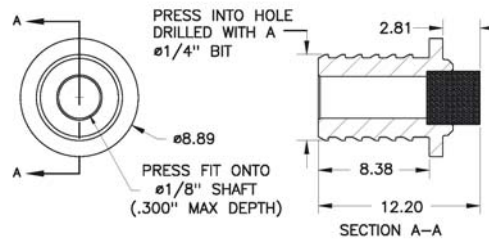
STOCK #	Ø ID	Ø OD	BL	L
176596-01	3/16"	9.27	9.525	14.73
176597-01	5mm	9.27	9.525	14.73
176598-01	6mm	12.44	9.525	14.73
176599-01	1/4"	12.44	9.525	14.73
176600-01	5/16"	12.44	12.06	17.27
176601-01	8mm	12.44	12.06	17.27
176602-01	3/8"	15.62	12.06	17.27
176603-01	10mm	15.62	12.06	17.27
176604-01	1/2"	18.79	19.05	24.25
176605-01	14mm	18.79	19.05	24.25
176606-01	5/8"	21.97	19.05	24.25

OD, BL and L all in mm



Over Shaft Magnet Holder

Press In / On Magnet Holder: stock #176607-01



Press In/On Magnet Holder

All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Mating Cables / Cordsets

M12 Mating Cordsets	
Stock #	Description
075100	8-Pin M12 Mating Cordset, 0.5 Meters
075101	8-Pin M12 Mating Cordset, 2 Meters
075102	8-Pin M12 Mating Cordset, 4 Meters
075103	8-Pin M12 Mating Cordset, 6 Meters
075104	8-Pin M12 Mating Cordset, 10 Meters

Incremental Modules & Modular Encoders

Model 121 Auto-Aligning Modular



Features

- Simple, Hassle Free Mounting
- Accepts Larger Shafts up to 15mm
- Up to 12 Pole Commutation Available
- 0° to 100°C Operating Temperature Available
- Patented Design
- Includes New IP50 Dust Seal Kit

A reliable modular encoder that requires no calibration, gapping, or special tools to install! We have taken the performance of modular encoders to a new level with the Model 121 Auto-Aligning Modular Encoder. This new and innovative design provides simple, reliable, hassle free installation. Simply tighten the shaft clamp, install the mounting screws, and you're done!

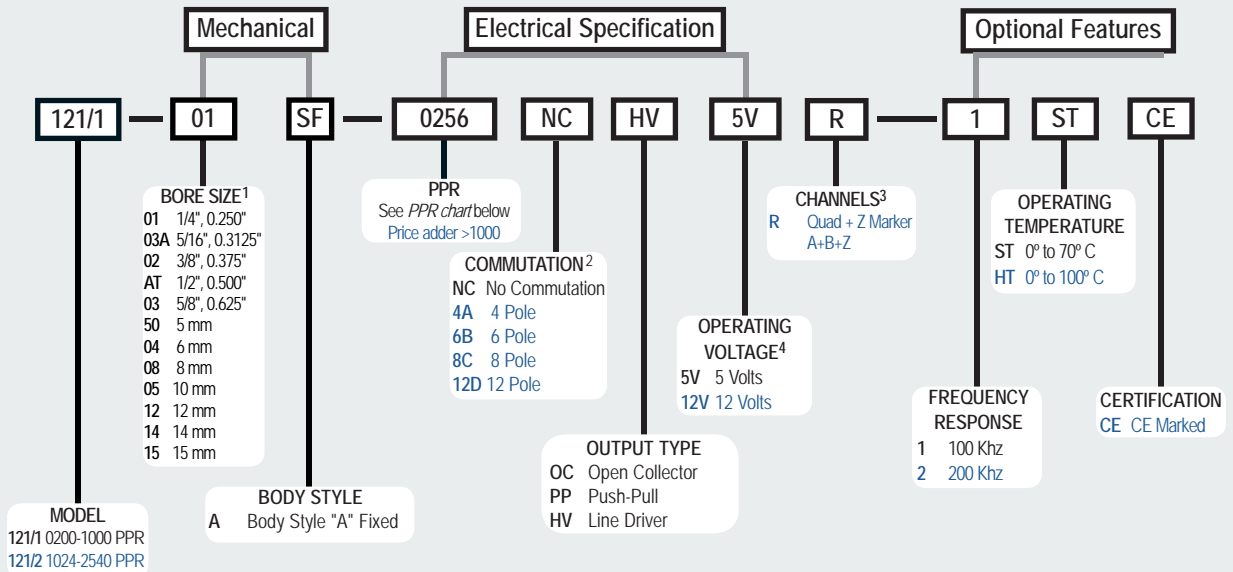
The Model 121 incorporates the latest Optical ASIC technology for greatly enhanced performance. Common problems with other modular encoder designs are warping and deflection, caused by their extensive use of plastic, both of which are virtually eliminated by the Model 121's all metal construction. For brushless servo motor applications, the Model 121 can be specified with three commutation tracks to provide motor feedback. The optional 100° C temperature capability allows servo motors to operate at higher power outputs and duty cycles.

Common Applications

Servo Motor Control, Robotics, Speciality Assembly Machines, Digital Plotters, High Power Motors

Model 121 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 121 PPR Options

0200	0250	0254	0256	0300
0360	0500	0512	0600	0720
0800	0840	1000	1024	1200
1250	1500	1800*	2000*	2048*
2500*	2540*			

*Contact Customer service for application analysis

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Not available in all configurations, Contact Customer Service for availability.
- 3 Contact Customer Service for non-standard index gating options.
- 4 Please note - Fixed operating voltages, please specify.

Model 121 Auto-Aligning Modular



Model 121 Specifications

Electrical

Input Voltage.....5 Vcc $\pm 10\%$ Fixed Voltage
 12 Vcc $\pm 10\%$ Fixed Voltage

Input Current.....100 mA maximum with no output load

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. Index optional

Output Types.....Open Collector- 20 mA per channel max
 Push-Pull- 20 mA per channel max
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)

Index.....Once per revolution gated to channel A. Contact Customer Service for additional gating options.

Freq. Response.....100 kHz standard, 200 kHz,

Symmetry.....180° ($\pm 18^\circ$) electrical at 100 kHz

Quad. Phasing.....90° ($\pm 22.5^\circ$) electrical at 100 kHz

Min. Edge Sep.....67.5° electrical at 100 kHz

Accuracy.....Within 0.1° mechanical from one cycle to any other cycle, or 6 arc minutes

Commutation.....Optional- three 120° electrical phase tracks for commutation feedback. (4, 6, 8, or 12 poles. Others available upon request)

Comm. Accuracy.....1° mechanical

Mechanical

Max. Shaft Speed.....Determined by maximum frequency response

Bore Size.....6mm through 15mm

Bore Tolerance.....H7 bore fit for g6 shaft Class LC5

User Shaft Tolerance
 Radial Runout.....0.05mm max
 Axial End Play..... ± 0.40 for PPR ≤ 512
 ± 0.250 for PPR 513 to 1250
 ± 0.125 for PPR > 1250

Electrical Conn.....0.5 Metre cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated)

Housing.....All Metal Aluminum and Zinc Alloy

Mounting.....Two screws on a 46mm PCD. (M3 maximum screw size)

Weight.....150 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
 0° to 100° C for high temperature option

Storage Temp.....-25° to +100° C

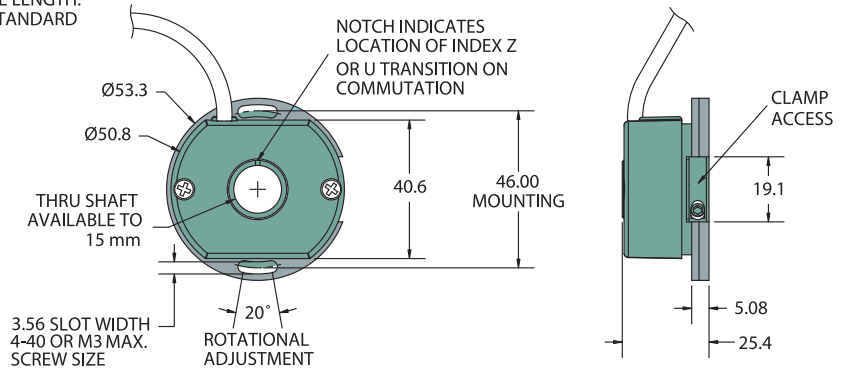
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

Shock.....50 g @ 11 ms duration

Model 121 Auto-Aligning Modular

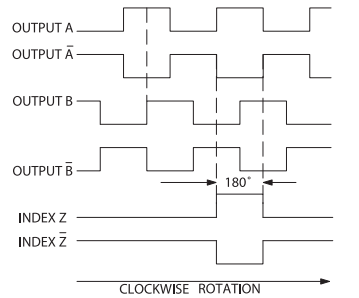
CABLE LENGTH:
2M STANDARD



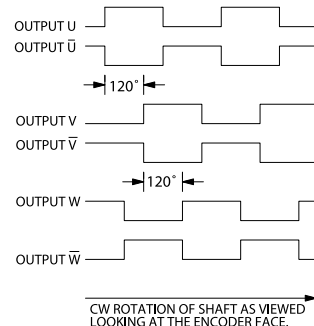
All dimensions are in mm with a tolerance of ± 0.127 or ± 0.254 unless otherwise specified.



Waveform Diagrams



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.

Wiring Table

Function	Cable Wire Color
Com	Black
+Vcc	White
A	Brown
A'	Yellow
B	Red
B'	Green
Z	Orange
Z'	Blue
U	Violet
U'	Gray
V	Pink
V'	Tan or Turq
W	Red/Green
W'	Red/Yellow
Shield	Bare

Model 15T Thru-Bore Encoder Model 15H Hollow Blind Bore



Incremental Thru-Bore
& Motor Mount Encoders



Features

- Very High Performance Economical Encoder
- Low Profile 25.4 mm Height and 38 mm Diameter
- Thru-Bore sizes up to 10 mm
- Simple, Innovative Flex Mounting System (Global Mounting Standards)
- Up To 12 Pole Commutation Optional (for brushless motor control)

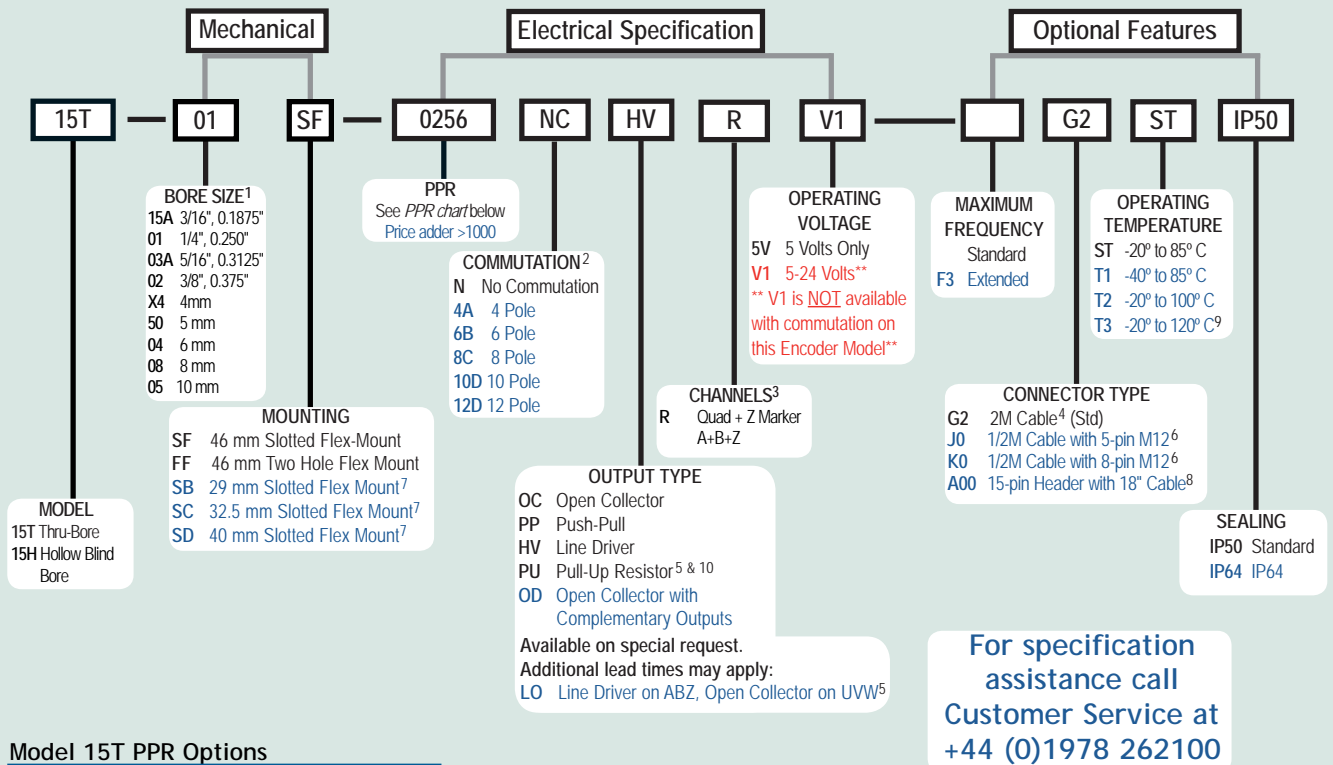
The Model 15T or 15H offer a high performance feedback solution in a low profile package. Unlike modular or kit encoders, the Model 15 utilizes an integral bearing set, and an innovative flexible mounting system which is much more tolerant to axial misalignment or radial shaft run-out. The slotted flex mounts provide 20 or 30 degrees of rotational adjustment for commutation or index pulse timing. Installation is quick and easy! For brushless servo motor applications, three 120° electrical phase tracks can provide up to 12 pole commutation feedback. The optional 100° C temperature options allow servo motors to operate at higher power outputs and duty cycles. The Model 15 provides stable and reliable operation and is an excellent replacement for other manufacturer's modular encoders where a high performance solution is desired.

Common Applications

Servo Motor Control, Robotics, Speciality Assembly Machines, Digital Plotters, High Power Motors

Model 15T/H Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 15T PPR Options

0001 thru 0189*	0198	0200	0250
0256	0300	0315	0360
0500	0512	0580	0600
0800	1000	1024	1125
1250	1500	1800	2000
2500	2540	3000	3600
4096	5000	6000	7200
10,000			8192

* Contact customer service for availability

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Not available in all configurations, and not available with V1 Input Voltage. Contact Customer Service for availability (12D Only Available with 80 ppr).
- 3 Contact Customer Service for non-standard marker gating or phase relationship options.
- 4 For non-standard cable lengths contact sales for availability and cost.
- 5 With Input Voltage above 16 Vcc, operating temperature is limited to 85° C. Not available with A00 15 Pin Header option.
- 6 Not available with commutation. 5-pin not available with Line Driver (HV, OD, LO) outputs. Additional cable lengths available. Please consult Customer Service.
- 7 This mount requires button head screws and a modified Hex wrench. Order appropriate Installation Kit listed under Specifications.
- 8 Pin Header available with 5 VDC Input Voltage, HV Line Driver and standard quadrature phasing only. Not available with CE Certification. IP50 sealing option only.
- 9 Only available with 5 Vcc Input Voltage.
- 10 Reverse Quadrature not available with PU output type.

Model 15T Thru-Bore Encoder Model 15H Hollow Blind Bore



Model 15T/H Specifications

Electrical

Input Voltage 5 Vcc $\pm 10\%$ Fixed Voltage for Commutation
4.75 to 24 Vcc max for temperatures up to 85° C
4.75 to 24 Vcc for temperatures between 85° to 100° C

Input Current 100 mA max (65 mA typical) with no output load

Output Format Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams*.

Output Types Open Collector- 20 mA max per channel
Push-Pull- 20 mA max per channel
Pull-Up- Open collector with 2.2K ohm
Pull-Up 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Marker/Index Once per revolution.
190 to 10,000 PPR: Gated to output A
1 to 189 PPR: Ungated
See *Waveform Diagrams*.

Max. Frequency Standard Frequency Response is
200 kHz for PPR 1 to 2540
500 kHz for PPR 2541 to 5000
1 MHz for PPR 5001 to 10,000
Extended Frequency Response (optional) is 300 kHz for PPR 2000, 2048, 2500, and 2540

Noise Immunity Tested to BS EN61000-6-2; BS EN50081-2;
BS EN61000-4-2; BS EN61000-4-3;
BS EN61000-4-6; BS EN500811

Symmetry 180° ($\pm 18^\circ$) electrical

Quad. Phasing 90° ($\pm 22.5^\circ$) electrical

Min. Edge Sep 67.5° electrical

Accuracy Within 0.017° mechanical or 1 arc-minute from true position. (for PPR>189)

Commutation Up to 12 pole. Contact Customer Service for availability.

Comm. Accuracy 1° mechanical

Mechanical

Max Shaft Speed 8000 RPM. Higher speeds may be achievable, contact Customer Service.

Bore Size 0.1875" through 0.375", 5 mm through 10 mm

Bore Tolerance H7 (Sliding Fit for g6)

User Shaft Tolerances
Radial Runout 0.20mm max
Axial Endplay ± 0.75 mm max

Starting Torque IP50 Hollow Bore: 1.4123×10^{-3} Nm
IP50 Thru-Bore: 2.1185×10^{-3} Nm
IP64: 4.2370×10^{-3} Nm

Electrical Conn 2M cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 0.5M cable (braid shield), 15-pin Header with 18" cable

Mounting 46 mm Slotted Flex mount
46 mm Two Hole Flex Mount
29 mm Slotted Flex Mount
32.5 mm Slotted Flex Mount
40 mm Slotted Flex Mount
15-pin Single Row PCB Mount Connector (See mechanical drawings for dimensions)

Weight 100 grams typical

Environmental

Operating Temp -20° to +85° C standard models
-40° to +85° C for low temperature option
-20° to +100° C for high temperature option
-20° to +120° C for extreme temperature option

Storage Temp -25° to +85° C

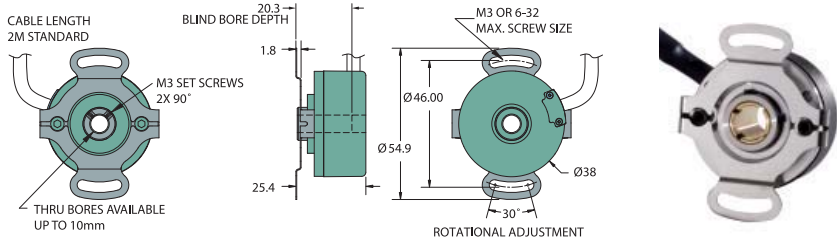
Humidity 98% RH non-condensing

Vibration 10 g @ 58 to 500 Hz

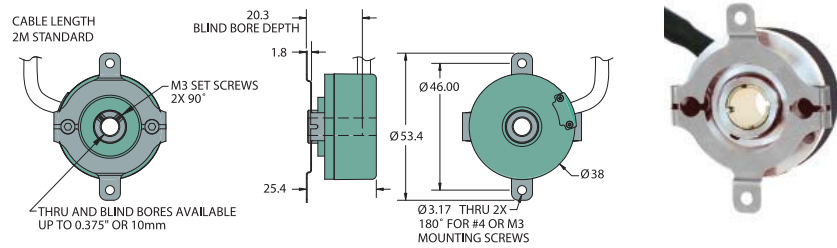
Shock 80 g @ 11 ms duration

Sealing IP50 standard; IP64 available

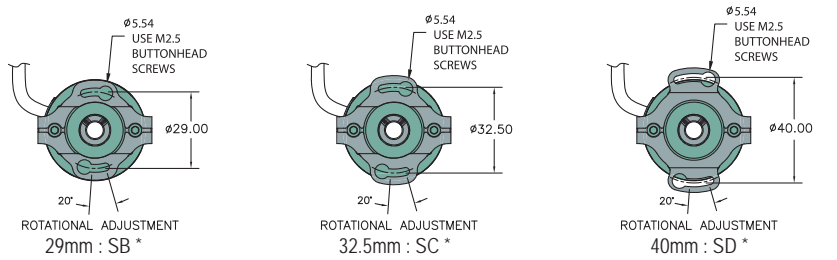
Model 15T/H 46mm Slotted Flex Mount (SF)



Model 15T/H 46mm Two Hole Flex Mount (FF)



Model 15T/H Small Diameter Slotted Flex Mounts

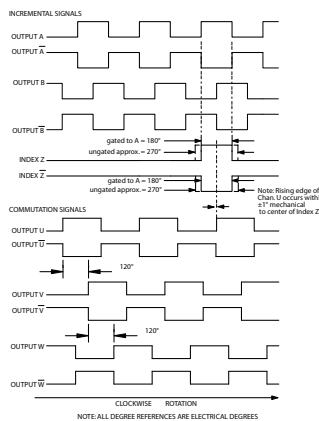


* Order Appropriate Mounting and Installation Kit for SB, SC, or SD Option
176149-01 Installation Kit, M 2.5 Buttonhead Screws with 1.5 mm Shortened Hex Wrench
Each kit contains 10 screws for mounting 5 encoders

Encoder Length and Diameter are the same as SF and FF mounts detailed above. All dimensions are in mm with a tolerance of ± 0.254 unless otherwise specified.



Waveform Diagrams

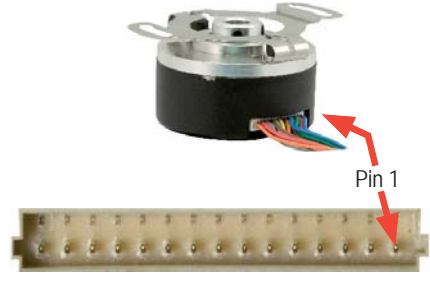


Wiring Table

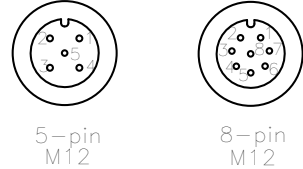
Function	Cable Wire Color	5-pin M12 ¹	8-pin M12 ²	15-pin Header
0 Volts	Black	3	7	1
+ Vcc	White	1	2	2
A'	Brown	4	1	4
A	Yellow	--	3	3
B'	Red	2	4	6
B	Green	--	5	5
Z'	Orange	5	6	7
Z	Blue	--	8	8
U'	Violet	--	--	10
U	Gray	--	--	9
V'	Pink	--	--	14
V	Turquoise	--	--	13
W'	Red/Green	--	--	12
W	Red/Yellow	--	--	11
Shield	Bare ³	--	--	--

¹Cable shield (bare wire) is connected to internal case.
²Cable shield and M12 connector body is connected to internal case.
³Shield

15 Pin Header



In-Line Connector Pin-Outs



Incremental Thru-Bore & Motor Mount Encoders

Model 755HS 38mm High Precision Hollow Bore Encoder



Incremental Thru-Bore & Motor Mount Encoders



Features

- Miniature Size (38.1mm Diameter)
- Up to 30,000 Pulses per Revolution
- Hollow Bore sizes up to 14 mm
- Flex Mounting
- High Temperature Option

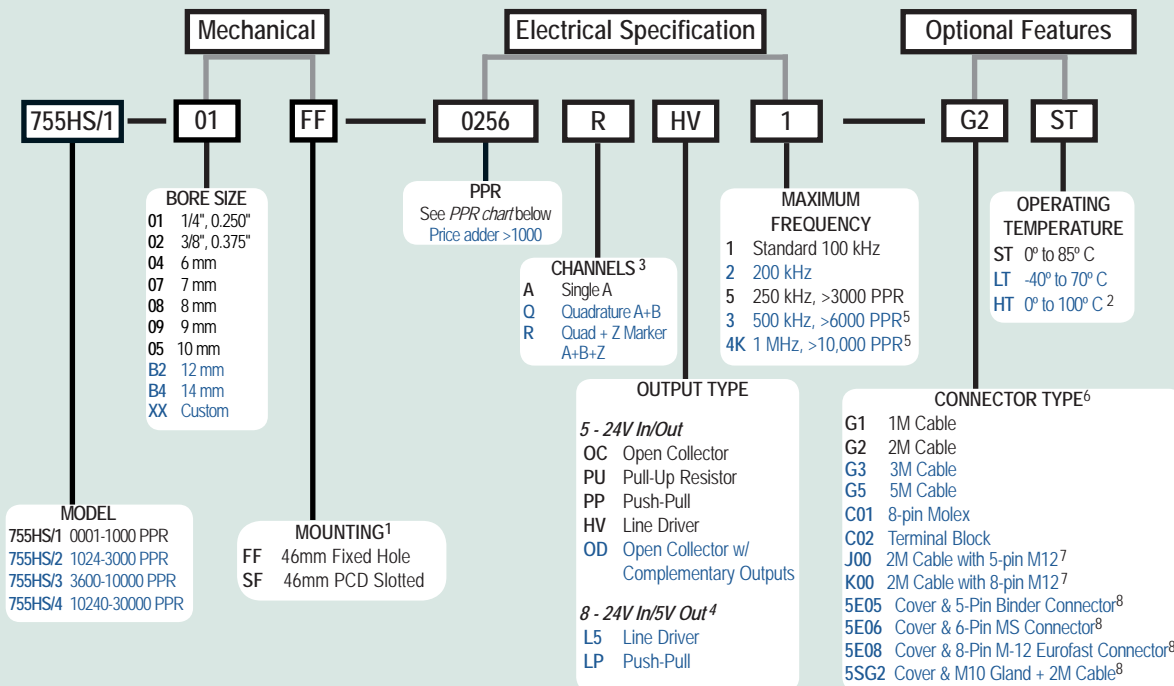
The Model 755HS is ideal for applications requiring a small, high precision, high performance encoder. Approximately 38.1mm in diameter and 38.1mm long, it will fit where many encoders cannot. All metal construction and shielded ball bearings provide years of trouble-free use. A variety of blind hollow bore sizes are available. Large bores allow for shafts up to 14 mm. Attaching directly to a motor is quick and simple with the innovative flex mount. This industry standard mount eliminates couplings and increases reliability, while reducing overall length and cost. Where critical alignment is required, a Slotted Flex Mount (SF) is available. A perfect replacement encoder where high reliability is required.

Common Applications

Robotics, Assembly Machines, Motor-Mounted Feedback, Phototypesetters, Printers & Digital Plotters, Elevator Controls, Medical Diagnostic Equipment

Model 755HS Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 755HS PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 See 755 Appendix sheet for flange options or Contact Customer Service for additional options.
- 2 0° to 85°C for certain resolutions - Please see PPR options table.
- 3 Contact Customer Service for marker gating options.
- 4 Standard temperature, 60 to 3000 PPR only.
- 5 Standard cable lengths only.
- 6 For non-standard cable lengths, please call our sales office.
- 7 5-pin not available with Line Driver (HV, L5) outputs. Additional cable lengths available. Please consult Customer Service.
- 8 See 755 Special Covers page 51 for Cover Diagrams & options.

Model 755HS 38mm High Precision Hollow Bore Encoder



Model 755HS Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
 4.75 to 24 Vcc for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Open Collector- 100 mA max per channel
 Pull-Up- 100 mA max per channel
 Push-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Index.....Occurs once per revolution. The Index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.

Max Frequency.....Up to 1 MHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
 6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
 6001 to 20,480 PPR: 90° (±36°) electrical

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
 6001 to 20,480 PPR: 54° electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Bore Size.....Up to 14 mm

Bore Tolerance.....H7, Sliding fit for g6

User Shaft Tolerances

Radial Runout.....0.2mm max

Axial End Play.....±0.8mm max

Starting Torque.....9.886 x 10⁻⁴ typical
 2.824 x 10⁻² typical for -40° C operation

Electrical Conn.....2M cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 2M cable (braid shield), 8-pin Molex, Terminal Block, 5 Pin Cover, 6 Pin Cover, 8 Pin Cover, Gland Cover (See appendix sheet for cover options)

Housing.....Black non-corrosive finish

Bearings.....Precision ABEC ball bearings

Mounting.....Flex, and Slotted Flex Mounting

Weight.....100 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
 -40° to 70° C for low temperature option
 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp.....-25° to +85° C

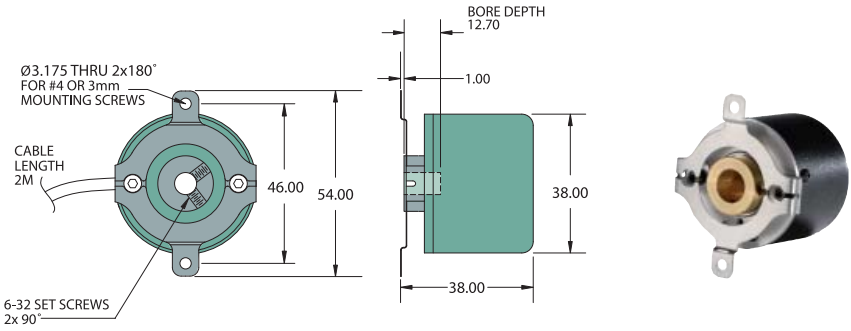
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

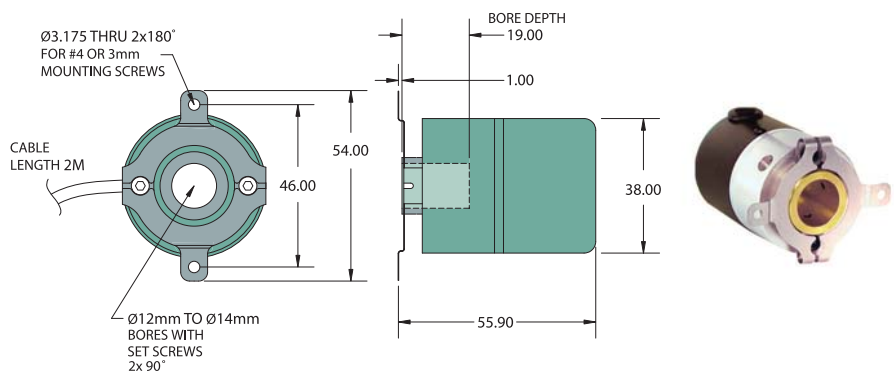
Shock.....50 g @ 11 ms duration

Sealing.....IP50 Standard

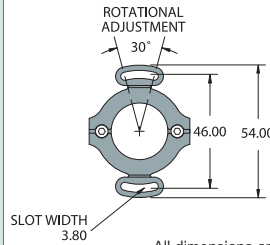
Model 755HS Flex Mount (FF)



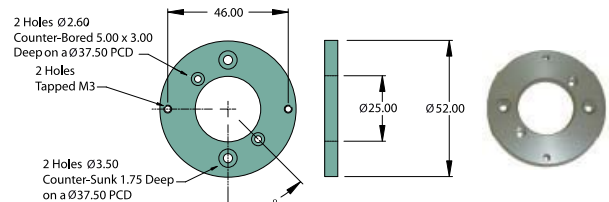
Model 755HS Large Bore



Optional Slotted Flex Mount (SF)



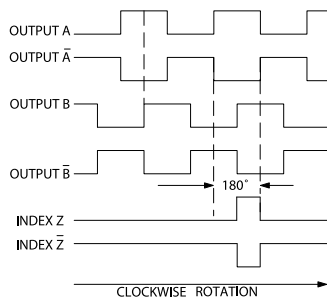
Also Available - PARVEX Flange Kit (M-9)



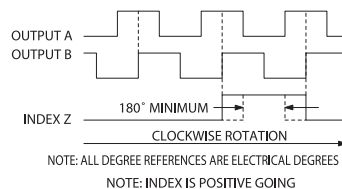
All dimensions are in mm with a tolerance of ±0.127 or ±0.254 unless otherwise specified

Waveform Diagrams

Line Driver (HV), Push-Pull (PP - No /A, /B & /Z)



Open-Collector, Pull-Up (OC, PU)



Wiring Table

Function	Cable Wire Color	Terminal Block	8-pin ¹ Molex	5-pin ¹	8-pin M12 ¹	6-pin MS ¹
0 Volts	Black	7	2	3	7	A
+ Vcc	White	8	1	1	2	B
A	Brown	1	8	4	1	D
A'	Yellow	2	7	—	3	—
B	Red	3	4	2	4	E
B'	Green	4	3	—	5	—
Z	Orange	6	6	5	6	C
Z'	Blue	5	5	—	8	—
Shield	Bare ¹	—	—	—	—	—

¹See Appendix Data Sheet for Connector Cover Options

Incremental Thru-Bore & Motor Mount Encoders

Model 260 Ultra Versatile Commutated Encoder



Incremental Thru-Bore & Motor Mount Encoders



Features

- Low Profile 30.30mm
- Up to 12 Pole Commutation
- Thru-Bore and Hollow Bore (Blind) Styles
- Simple, Innovative Flexible Mounting System
- Incorporates Opto-ASIC Technology

Optional M12 Body Mount!



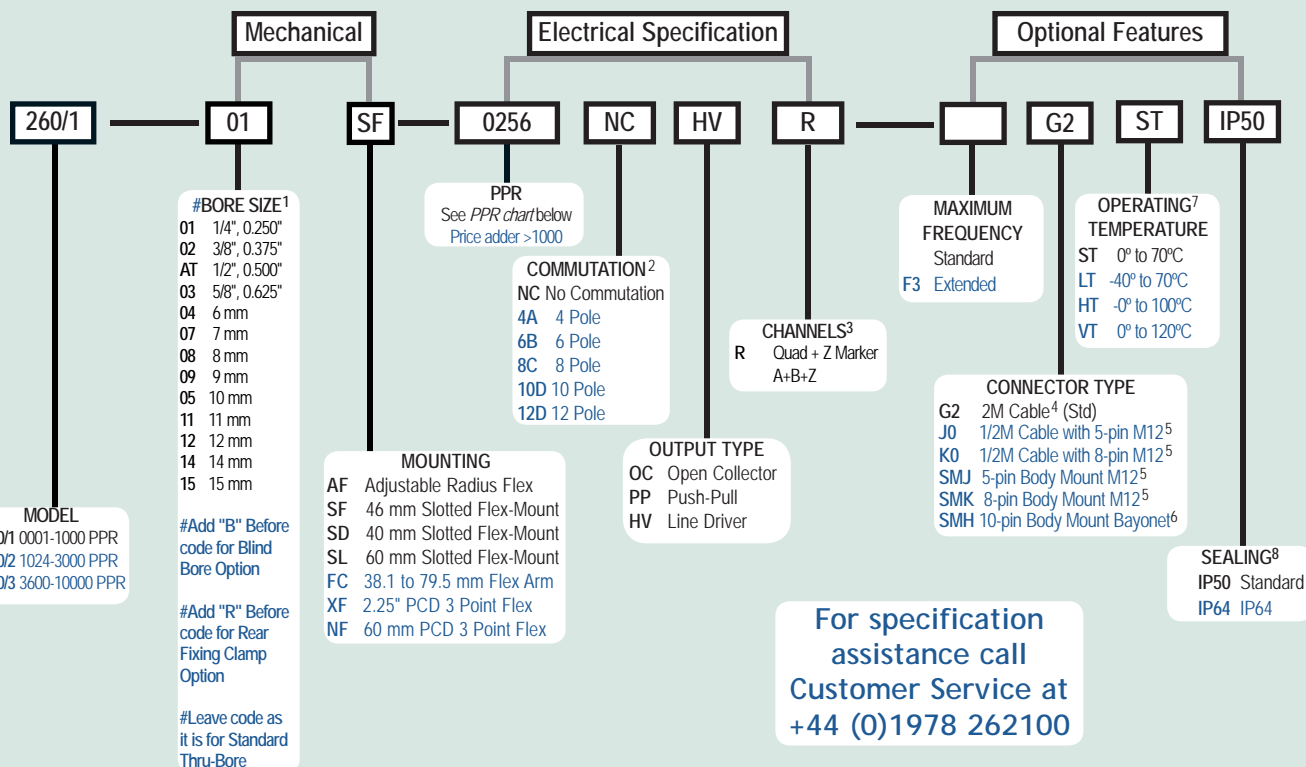
The Model 260's larger bore (up to 15.87mm) and low profile make it the perfect solution for many machine and motor applications. Available in two distinct formats - a Hollow Bore and a complete Thru-Bore - the Model 260 uses pioneering Opto-ASIC design. The Model 260 uses innovative anti-backlash mounting system, allowing simple, reliable, and precise encoder attachment. Unlike traditional kit or modular encoder designs, its integral bearing set provides stable and consistent operation without concerns for axial or radial shaft runout. For brushless servo motor applications, the Model 260 can be specified with three 120° electrical phase tracks to provide up to 12 pole commutation feedback. The optional extended temperature capability allows servo motors to operate at higher power outputs and duty cycles.

Common Applications

Servo Motor Control, Robotics, Speciality Assembly Machines, Digital Plotters, High Power Motors

Model 260 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 260 PPR Options

0001 thru 0189*	0200	0250	0254	0256
0300	0360	0400*	0500	0512
0720	0800	0840	1000	1024
1220	1250	1270	1500	1800*
2048	2500	2540	3000	3600*
4096	5000	6000	8192	7200*
10,000				8192

* Contact customer service for availability

Contact Customer Service for other disc resolutions; not all disc resolutions available with every commutation option.

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Not available in all configurations, Contact Customer Service for availability.
- 3 Contact Customer Service for non-standard marker gating or phase relationship options.
- 4 For non-standard cable lengths contact sales for availability and cost.
- 5 Not available with commutation or extreme temperature (VT) Option. 5-pin not available with Line Driver (HV) output. Additional cable lengths available. Please consult customer service.
- 6 Not available with commutation.
- 7 5 to 16 Vcc supply only for HT option. 5 Vcc supply only for VT option.
- 8 Increased starting torque with IP64 Option.

Model 260 Ultra Versatile Commutated Encoder



Model 260 Specifications

Electrical

Input Voltage.....5 to 24 Vcc for temperatures up to 70° C
5 to 16 Vcc for 0° to 100° C operating temperature
5 Vcc for 0° to 120° C operating temperature

Input Current.....100 mA max with no output load
Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face.
See *Waveform Diagrams*.

Output Types.....Open Collector- 20 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Index.....Once per revolution gated to channel A.
See *Waveform Diagrams*.

Max. Frequency.....Standard Frequency Response is 200 kHz for PPR 1 to 2540
500 kHz for PPR 2541 to 5000
1 MHz for PPR 5001 to 10,000
Extended Frequency Response (optional) is 300 kHz for PPR 2000, 2048, 2500, and 2540

Noise Immunity.....Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN55011

Symmetry.....180° (±18°) electrical
Quad. Phasing.....90° (±22.5°) electrical
Min. Edge Sep.....67.5° electrical

Accuracy.....Within 0.01° mechanical from one cycle to any other cycle, or 0.6 arc minutes.

Commutation.....Up to 12-pole. Contact Customer Service for availability.

Comm. Accuracy.....1° mechanical

Mechanical

Max Shaft Speed.....7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Note: For extreme temperature operation, de-rate temperature by 5° C for every 1000 RPM above 3000 RPM

Bore Size.....0.250" through 0.625"
5 mm through 15 mm

Bore Tolerance.....H7 (Sliding fit for g6)

User Shaft Tolerances

Radial Runout.....0.2mm max
Axial Endplay.....±0.75mm max

Starting Torque.....IP50 Thru-Bore: 3.53 x 10⁻³ Nm
IP50 Hollow Bore: 2.12 x 10⁻³ Nm
IP64 Thru-Bore: 1.765 x 10⁻² Nm
IP64 Hollow Bore: 1.141 x 10⁻² Nm
Note: Add 38.84 x 10⁻³ Nm for -40° C operation

Electrical Conn.....2M cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 0.5M cable (foil and braid shield), 5- or 8-pin M12 body mount, 10-pin Bayonet

Housing.....Non-Corrosive material

Mounting.....Slotted Flex Mount standard, additional flex mount options available (see Ordering Guide)

Weight.....200 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
-40° to 70° C for low temperature option
0° to 100° C for high temperature option
0° to 120° C for extreme temperature option

Storage Temp.....-40° to +100° C

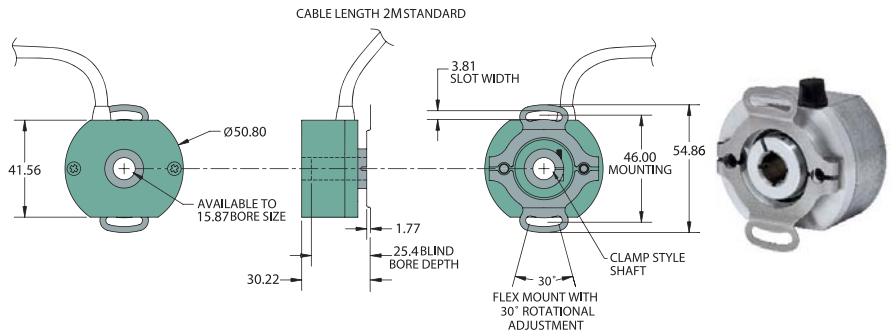
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

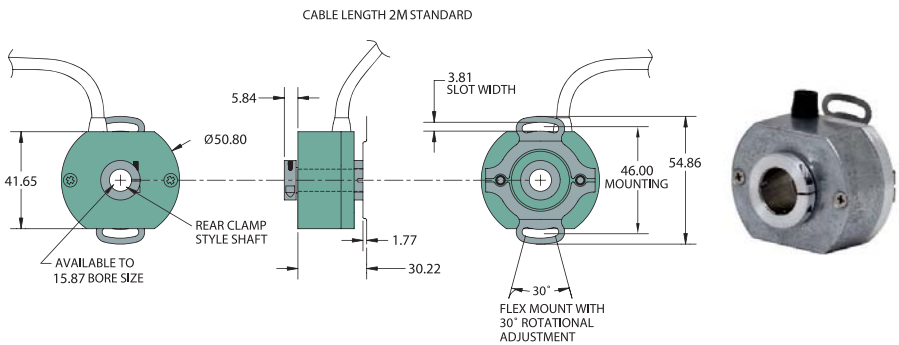
Shock.....50 g @ 11 ms duration

Sealing.....IP50; IP64 available

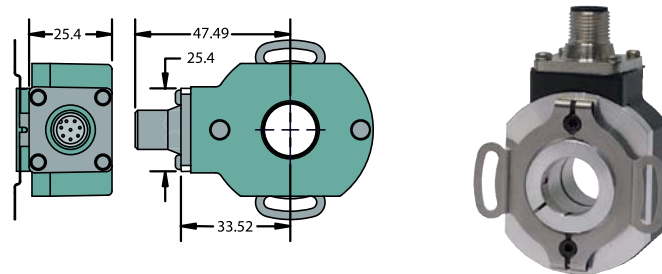
Model 260 with Front Shaft Clamp (Standard) With 46mm PCD Slotted Flex (SF)



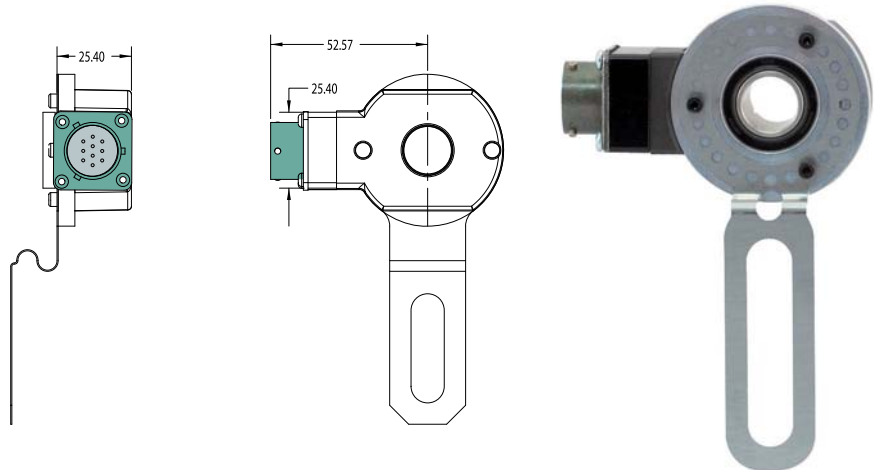
Model 260 with Rear Fixing Clamp With 46mm PCD Slotted Flex (SF)



Body Mount M12 (SMJ & SMK)



Body Mount 10-Pin Bayonet (SMH)



All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

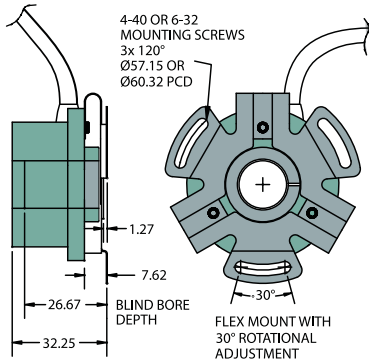
Incremental Thru-Bore & Motor Mount Encoders

Model 260 Ultra Versatile Commutated Encoder

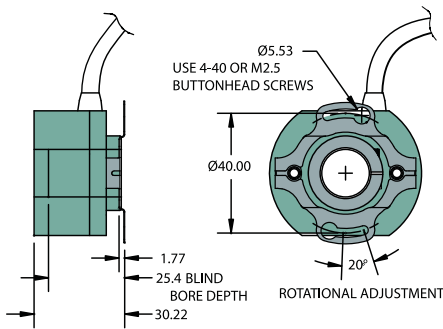


Incremental Thru-Bore & Motor Mount Encoders

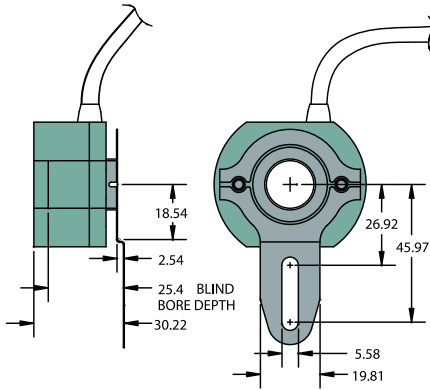
Three Point Flex Mount (XF,NF)



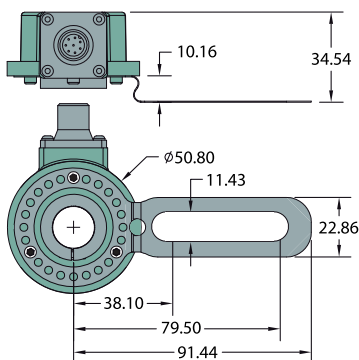
40mm PCD Flex Mount (SD)



Adjustable Radius Flex Arm (AF)



38.1 to 79.5mm Flex Arm (FC)

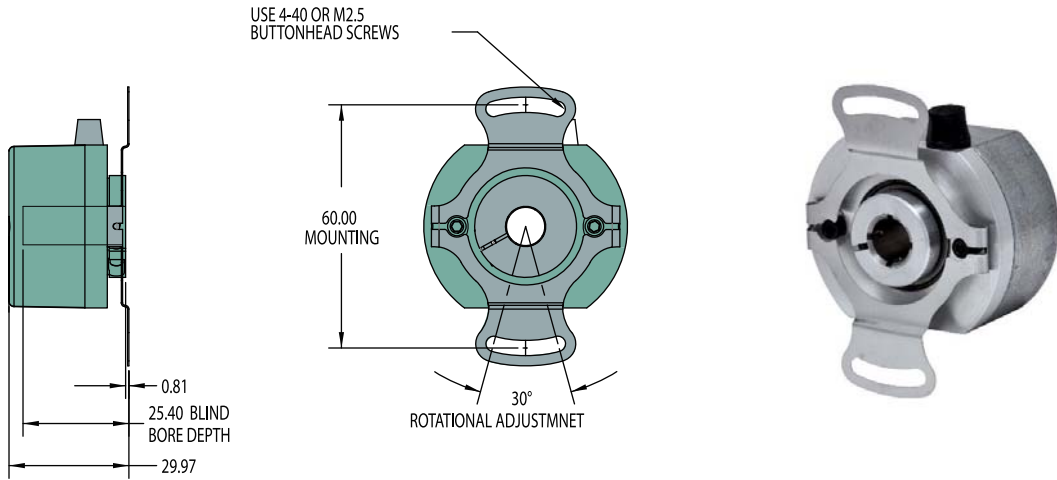


All dimensions are in mm with a tolerance of $\pm 0.127\text{mm}$ or $\pm 0.254\text{mm}$ unless otherwise specified

Model 260 Ultra Versatile Commutated Encoder



60mm PCD Flex Mount (SL)

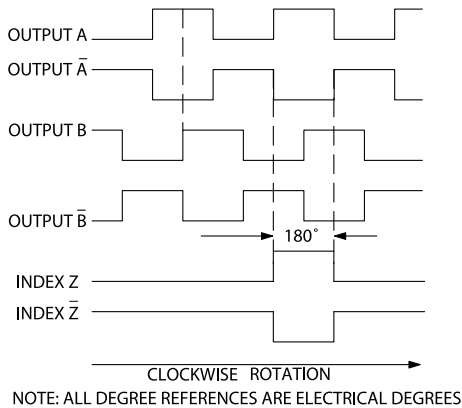


All dimensions are in mm with a tolerance of $\pm 0.127\text{mm}$ or $\pm 0.254\text{mm}$ unless otherwise specified

Incremental Thru-Bore & Motor Mount Encoders

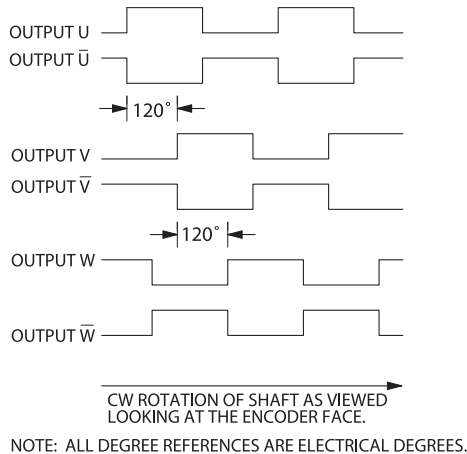
Model 260 Connector Options

Waveform Diagrams

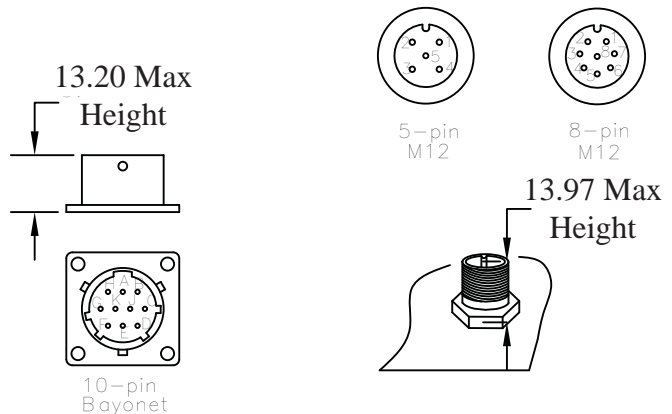


Wiring Table

Function	Cable Wire Color	5-pin M12 ²	8-pin M12 ²	10-pin Bayonet ³	
0 Volts	Black	3	7	F	1 Cable shield (bare wire) is connected to internal case.
+ Vcc	White	1	2	D	
A	Brown	4	1	A	
A'	Yellow	--	3	H	
B	Red	2	4	B	2 Cable shield and M12 connector body is connected to internal case.
B'	Green	--	5	J	
Z	Orange	5	6	C	
Z'	Blue	--	8	K	3 Pin G is connected to internal case.
U	Violet	--	--	--	
U'	Gray	--	--	--	
V	Pink	--	--	--	
V'	Turquoise	--	--	--	
W	Red/Green	--	--	--	
W'	Red/Yellow	--	--	--	
Shield	Bare ¹	--	--	G	



Connector Pin-Outs



Model 25T Thru-Bore Encoder Model 25H Hollow Blind Bore



Features

- 63.50mm Opto-Asic Encoder with a low profile (50mm)
- Bore Sizes Ranging From 0.250" to 1.125" and 6mm to 28mm
- Resolutions to 10,000 PPR, Frequencies up to 1MHz
- Single Replacement Solution For 50.80mm to 88.90mm Encoders
- Versatile Flexible Mounting Options
- RoHS Compliant

Introducing the next generation of high performance encoders - the Model 25T/H. As contemporary as its appearance, the Model 25T/H features the largest bore available in a 63.50mm encoder, mounting directly on shafts as large as 28 mm. With resolutions of up to 10,000 PPR, and frequencies of up to 1MHz this industrial strength encoder is perfect for fast rewinding motors. The 25T/H features the next generation of proprietary Opto-ASIC sensor which provides superior accuracy and precision counts. The injection moulded housing, made from a blend of nylon composites, is grooved with "cooling fins" and can take the extreme heat of the motion control industry. With sealing available up to IP65 and many new rugged flexible mounting options, the Model 25T/H can perform in demanding industrial environments.

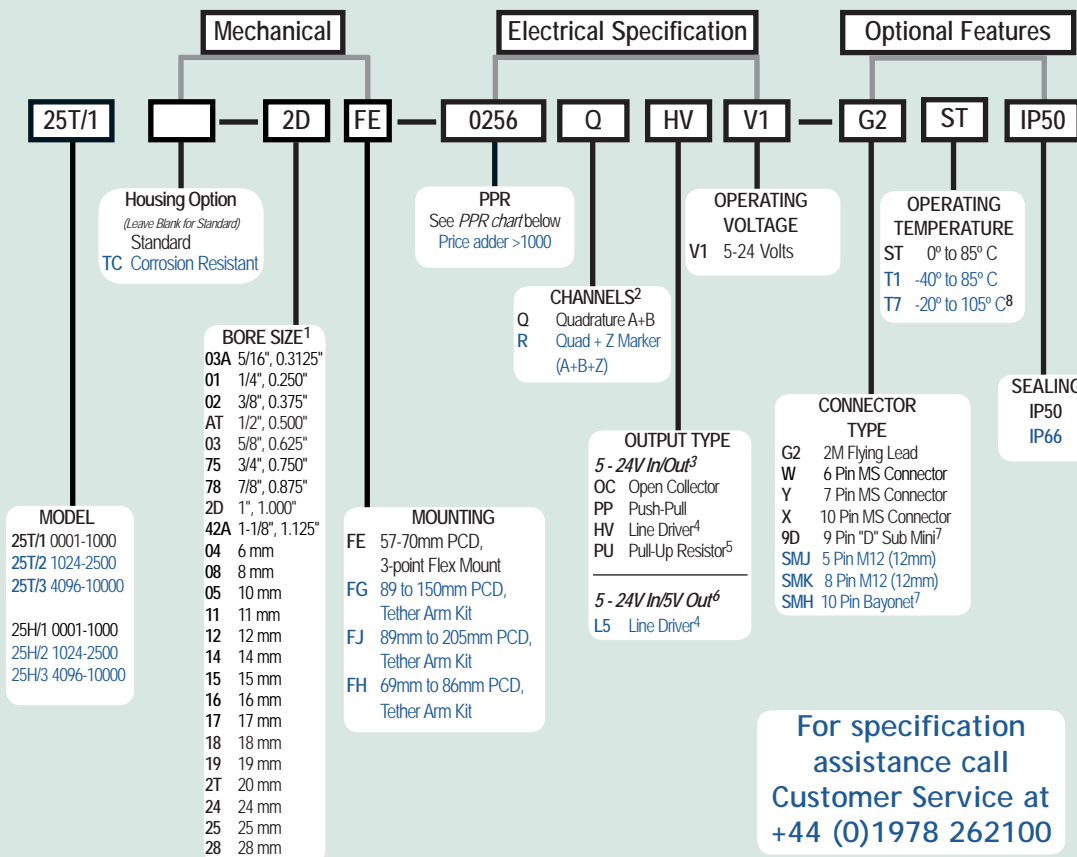
Common Applications

Motor-Mounted Feedback and Vector Control, Speciality Machines, Robotics, Web Process Control, Paper and Printing, High Power Motors

Incremental Thru-Bore & Motor Mount Encoders

Model 25T/H Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 25T PPR Options

0001	0002	0003	0005	0008	0010	0011
0012	0024	0025	0030	0032	0050	0060
0064	0070	0080	0100	0105	0115	0120
0125	0150	0180	0192	0200	0240	0250
0256	0300	0336	0360	0500	0512	0600
0625	1000	1024	1200	1250	1800	2000
2048	2400	2500	4096	5000	7200	8192
10,000						

Contact Customer Service For other disc resolutions.

NOTES:

- 1 [More Bore Sizes Available](#) - Contact Customer Service for additional options not shown.
- 2 Contact Customer Service for non-standard index gating.
- 3 24Vcc Max for T2 temperature option.
- 4 Not available with 5-pin M12 or 6-pin MS style connectors. Available with 7-pin MS style connector without index Z.
- 5 With Input Voltage above 16 Vcc, operating temperature is limited to 85° C max.
- 6 Standard operating temperature only.
- 7 Not available with corrosion resistant option.
- 8 Contact Sales for availability on resolutions < 360 PPR.

Model 25T Thru-Bore Encoder Model 25H Hollow Blind Bore



Model 25T/H Specifications

Electrical

- Input Voltage.....5 to 24 Vcc max
- Input Current.....100 mA max (65mA Typical) with no output load
- Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face.
See *Waveform Diagram*.
- Output TypesOpen Collector- 20 mA max per channel
Pull Up - Open Collector with 2.2K ohm resistor, 20 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
- Index.....Once per revolution.
361 to 10,000 PPR: Gated to output A
1 to 360 PPR: Ungated
See *Waveform Diagram*.
- Max Frequency.....250 kHz for 1 to 2500 PPR
500 kHz for 2501 to 5000 PPR
1 MHz for 5001 to 10,000 PPR
- CE TestingEmissions tested per EN61000-6-3:2001 as applicable. Immunity tested per EN61000-6-2: 2005 as applicable
- Min. Edge Sep.....45° electrical min, 63° electrical or better typical
- Quad Phasing.....90° (±22.5°) electrical
- Symmetry180° (±18°) electrical
- Rise Time.....Less than 1 microsecond
- Accuracy.....Within 0.1° mechanical from one cycle to any other cycle, or 6 arc minutes.

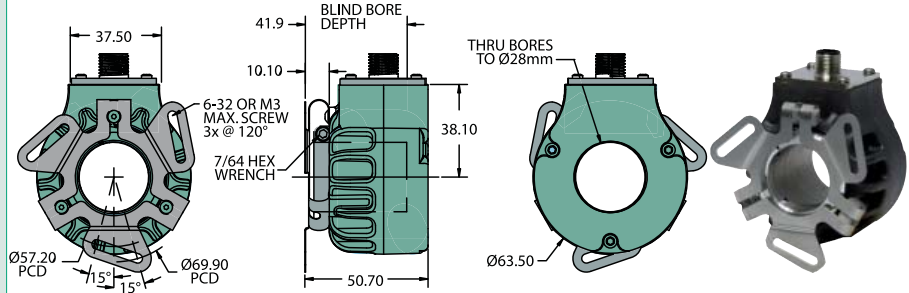
Mechanical

- Max Shaft Speed.....6000 RPM, 8000 RPM intermittent
4000 RPM for IP66 seal option
- Bore Size0.250" through 28mm
- Bore Tolerance-0.00mm/+0.02mm
- User Shaft Tolerances
Radial Runout.....0.127mm max
Axial Endplay.....±1.27mm max
- Starting TorqueIP50 sealing: 7.0 x 10⁻³ Nm
IP66 sealing: 28.0 x 10⁻³ Nm
Note: Add 7.0 x 10⁻³ for -20° C operation
- Electrical Conn6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 10-pin Bayonet or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors), 9-pin D-Sub
- Housing.....Proprietary nylon composite
- Mounting.....57.1mm to 69.8mm PCD 3-point flex mount
88.9mm to 149.8mm PCD tether arm kit,
88.9mm to 205.7 PCD tether arm kit and
69mm to 86.8mm PCD tether arm kit.
See mechanical drawing for dimensions
- Weight.....226 grams typical

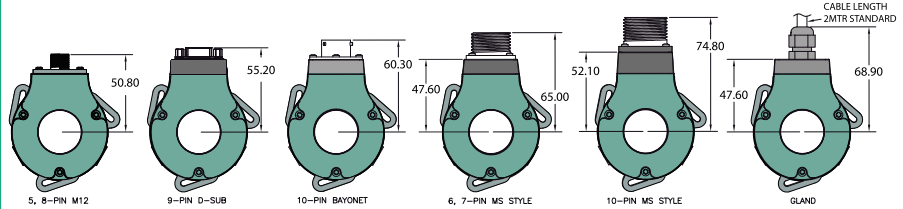
Environmental

- Operating Temp.....-20° to 85° C for standard models
-20° to 105° C for high temperature option
- Storage Temp.....-20° to +85° C
- Humidity.....98% RH non-condensing
- Vibration.....20 g @ 5 to 2000 Hz
- Shock.....80 g @ 11 ms duration
- Sealing.....IP50, IP66 with shaft seals at both ends

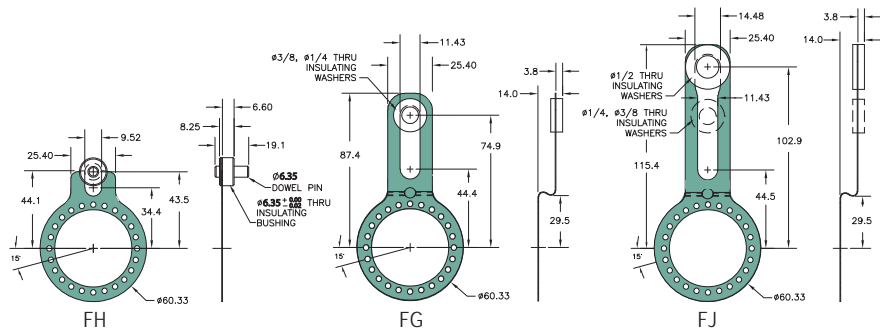
Model 25T/H



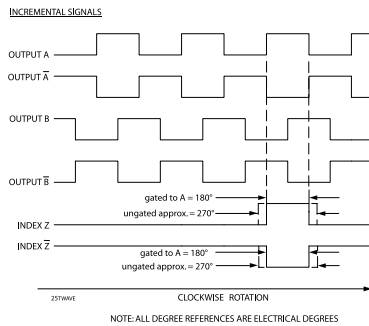
Model 25T/H Connector Options



Model 25T/H Mounting Options



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS HV, L5	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC	9-pin D-sub	10-pin Bayonet HV, L5, OD PU, PP, OC
0 Volts	Black	3	7	F	F	F	A, F	9	F
+VCC	White	1	2	D	D	D	B	1	D
A	Brown	4	1	A	A	A	D	2	A
A'	Yellow	---	3	H	C	---	---	3	H
B	Red	2	4	B	B	B	E	4	B
B'	Green	---	5	I	E	---	---	5	J
Z	Orange	5	6	C	---	C	C	6	C
Z'	Blue	---	8	J	---	---	---	7	K
Case	---	---	---	G	G	G	---	8	G
Shield	Bare ¹	---	---	---	---	---	---	---	---

¹ Cable shield (bare wire) is connected to internal case

Incremental Thru-Bore & Motor Mount Encoders

Model 58TF Incremental Thru-Bore Encoder



Ø58mm

FEATURES

- 58 mm Thru-Bore or Hollow Bore Encoder
- Standard and Metric Thru-Bore Sizes up to 5/8" and 15 mm
- Resolution from 1 to 65,536 PPR
- Several Flexible Mounting Options
- Sealing Options up to IP67
- Multiple Connector Options

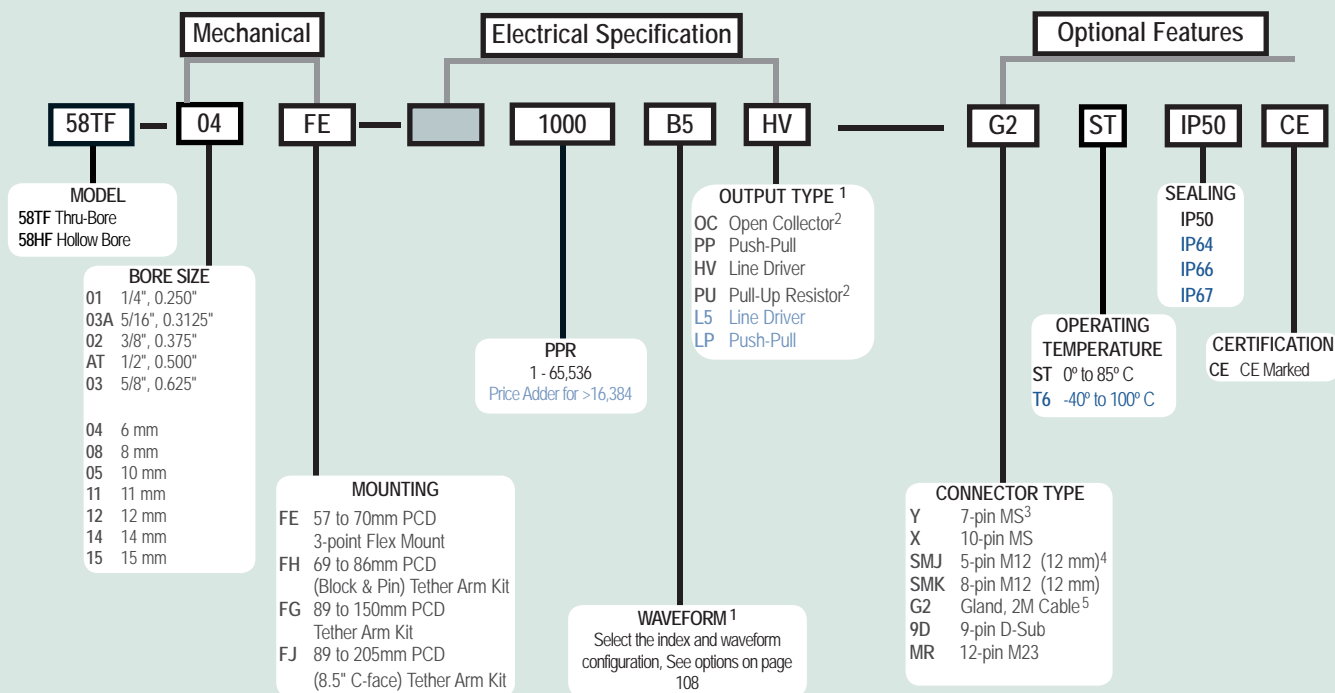
The Model 58TF is a 58 mm thru-bore encoder that is specifically designed for the challenges of an industrial environment. Its advanced set of electronics allow the encoder to be configured to meet your exact application needs. Choose from 6 output types, 32 different waveforms, and select any resolution from 1 to 65,536 PPR (that's 262,144 counts in full quadrature). The Model 58TF is also highly mechanically configurable, with bore options up to 5/8" or 15 mm, several flexible mounting options, multiple connector options, and sealing up to IP67. This versatile thru-bore encoder can go in almost any application.

Common Applications

Motor Control, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines and all types of Motion Control Feedback

Model 58TF Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 All output types are 5V to 30V in/out *except* L5 Line Driver and LP Push-Pull output types, which are 5-30VCC in and 5VCC out.
- 2 Open Collector (OC) and Pull-Up Resistor (PU) outputs not recommended for PPR > 8192 and/or frequencies > 150 kHz.
- 3 7-pin MS Connector does not provide Index Pulse Z when selected output is Line Driver (HV or L5).
- 4 5-pin M12 Connectors only available with Pull-Up, Open Collector, and Push-Pull output types.
- 5 For non-standard English cable lengths enter 'G' plus cable length expressed in Meters.
Example: G6 = 6 Meters of cable. Frequency above 300 kHz standard cable lengths only.

Model 58TF

Incremental Thru-Bore Encoder



Model 58TF Specifications

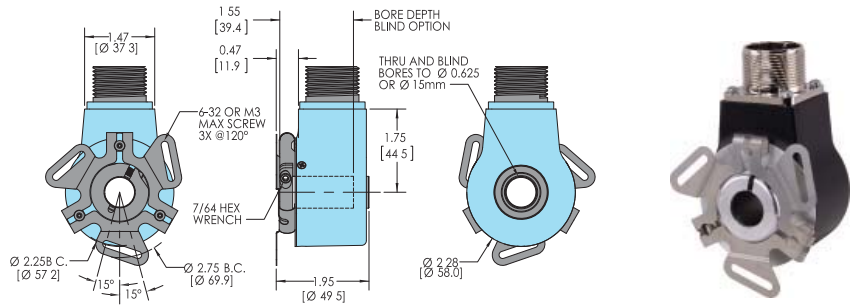
Electrical

Input Voltage.....	4.75 to 30 Vcc max. See Output Types for limitations
Input Current.....	100 mA max with no output load (65 mA typical)
Output Format.....	Incremental, Programmable. See Waveforms on page 3 for options.
Output Types.....	Line Driver* (HV) – 20 mA max per channel, max freq 1.0 MHz, 5 Vcc max at 100° C or 24 VDC max at 85° C. Line Driver* (L5) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max freq 2.7 MHz, 5 VDC max at 100° C. Push-Pull (PP) – 20 mA max per channel, max frequency 1.0 MHz, 5 Vcc max at 100° C or 24 Vcc max at 85° C. Push-Pull (LP) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max frequency 2.7 MHz, 5 Vcc max at 100° C. Open Collector (OC) – 100 mA max per channel, 200 KHz max freq recommended Pull-Up (PU) – 2.2K ohm internal resistors, 100 mA max per channel, 150 KHz max freq recommended, max temp 85° C at > 24 Vcc *Meets RS 422 at 5 Vcc supply
Index.....	Once per revolution, programmable. BEPC standard is 180° gated to output A (waveform B5). See Waveform Diagrams for additional options.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
CE/EMC.....	Immunity tested per EN 61000-6-2:2005 Emission tested per EN 61000-6-4:2007 + A1: 2011
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

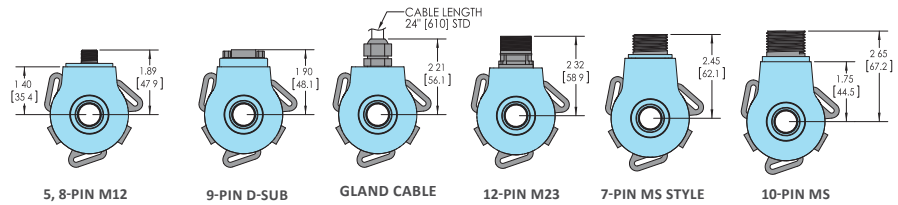
Max Shaft Speed.....	6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Material.....	303 Stainless Steel
Shaft Rotation.....	Bi-directional
Bore Tolerance.....	-0.0000/+0.0254 mm
User Shaft Tolerances	
Radial Runout.....	0.012 max
Axial Endplay.....	±0.762 max
Starting Torque.....	IP50 sealing: 2.118 X 10 ⁻² Nm typical IP64 sealing: 2.824 X 10 ⁻² Nm typical IP66 or IP67 sealing: 4.943 X 10 ⁻² Nm typical
Housing.....	Black non-corrosive finish
Weight.....	283 grams typical

Environmental	
Operating Temp.....	-20° to 85° C for standard models -40° to 100° C for extended temp option
NOTE: For IP66 or IP67 sealing derate max temperature of 100° C by 4° C for every 1000 RPM above 2000 RPM.	
Humidity.....	95% RH non-condensing
Vibration.....	10 to 2000 Hz A 20g (International Standard IEC 60068-2-6)
Shock.....	80g @ 6 ms Duration (International Standard IEC 60068-2-27)
Sealing.....	IP50 standard; IP64, IP66 or IP67 optional

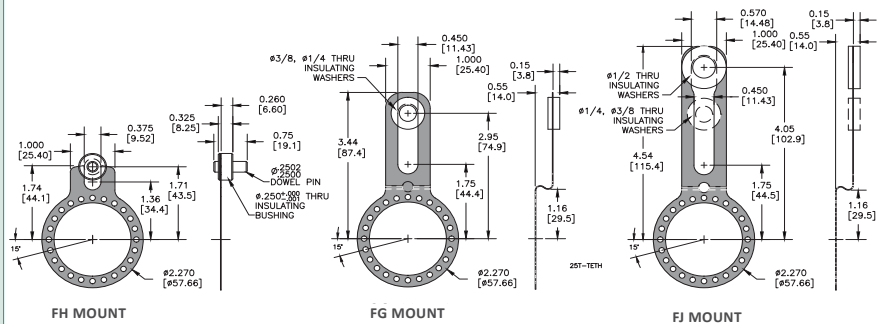
Model 58TF / 58HF 3 Point Flex Mount (FE)



Model 58TF / 58HF Connector Options



Model 58TF / 58HF Mounting Options



All dimensions are in Imperial & Metric with a tolerance of 0.005" (±0.127mm) or 0.01" (±0.254) unless otherwise specified
 Metric dimensions are in brackets (mm)

ENCODER WIRING TABLE

(For BEPC-supplied mating cables, wiring table is provided with cable.)

Function	Gland Cable ¹ Wire Color	5-pin M12**	8-pin M12**	10-pin MS	7-pin MS HV/L5	7-pin MS PU,PP,OC,LP	9-pin D-sub	12-pin M23
0 Volts	Black	3	7	F	F	F	9	10
+VCC	Red	1	2	D	D	D	1	12
A	White	4	1	A	A	A	2	5
A'	Brown	--	3	H	C	--	3	6
B	Blue	2	4	B	B	B	4	8
B'	Violet	--	5	I	E	--	5	1
Z	Orange	5	6	C	--	C	6	3
Z'	Yellow	--	8	J	--	--	7	4
Case	Green	--	--	G	G	G	8	9
Shield	Bare*	--	--	--	--	--	--	--
+VCC Sense	--	--	--	--	--	--	--	2
0 Volts Sense	--	--	--	--	--	--	--	11

*CE: Cable shield (bare wire) is connected to internal case.

¹Standard cable is 24 AWG conductors with foil and braid shield.

**CE: Use cable cordset with shield connected to M12 connector coupling nut.

Incremental Thru-Bore & Motor Mount Encoders

Model 760 Commutated Thru-Bore / Blind-Bore



Incremental Thru-Bore & Motor Mount Encoders

Features

- Size 25 / 63.5 mm Diameter (Hollow Shaft)
- Up to 12 Pole Commutation Available
- Thru-Bore or Blind-Bore Options
- Simple, Innovative Flexible Mounting System
- Incorporates Opto-ASIC Technology

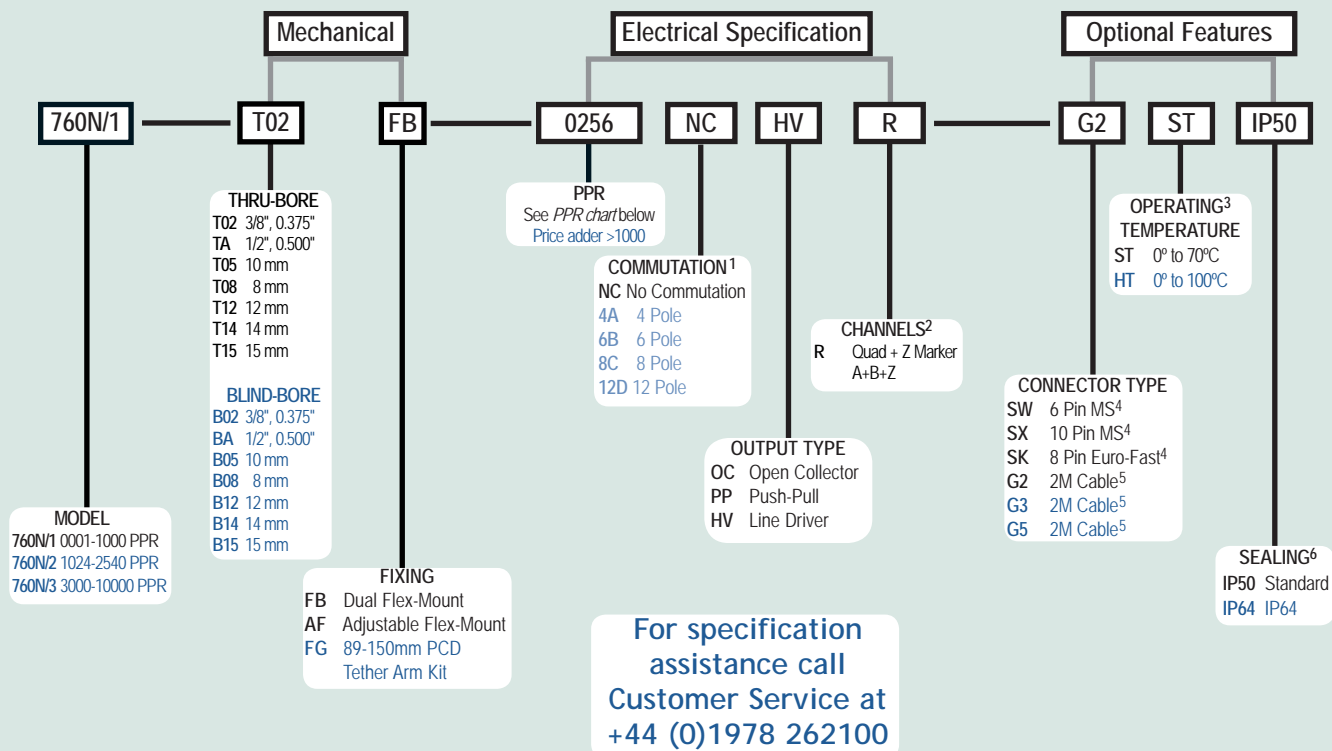
The 760N encoder is configured with either a full thru-bore (which may be fixed at either end of the shaft), or with a blind-bore which uses the front shaft fixing only. The encoder body is retained by means of 2 flexible mountings, or by a single adjustable radius fixing, which compensate for minor shaft misalignment. This encoder can now be provided with commutation signals for use with brushless motor control. Output circuits available include 5-24V Line Driver, 5-24V push-pull or 5-24V input / NPN open-collector. This encoder also now uses the same pioneering Opto-ASIC technology used in the model 260 encoder.

Common Applications

Brushless Servo Motor Commutation, Robotics, Motor-Mounted Feedback, Assembly Machines, Digital Plotters, High Power Motors

Model 760 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 760 PPR Options

0001*	0010*	0011*	0012*	0020*	0025*
0030*	0040*	0060	0100	0120	0128*
0200	0250	0254	0256	0300	0360
0400	0500	0512	0600	0720	0800
1000	1024	1200	1220	1250	1270
1500	1800	2000	2048	2500	2540
3000	4096	5000	6000	8192	10,000

* Contact customer service for availability

Contact Customer Service for other disc resolutions; not all disc resolutions available with every commutation option.

NOTES:

- 1 Not available in all configurations, Contact Customer Service for availability.
- 2 Contact Customer Service for non-standard marker gating or phase relationship options.
- 3 5 to 16 Vcc supply only for HT option.
- 4 Not available with commutation.
- 5 For non-standard cable lengths contact sales for availability and cost.
- 6 Blind-Bore + Flying Lead options only.

Model 760 Commutated Thru-Bore / Blind-Bore



Model 760 Specifications

Electrical

Input Voltage.....	4.75 to 24 VCC for temperatures up to 70° C 5 to 16 VCC for 0° to 100° C operating temperature
Input Current.....	100 mA max with no output load, Typical
Output Format.....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See <i>Waveform Diagrams</i> below.
Output Types.....	Open Collector- 20 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index.....	Once per revolution gated to channel A. See <i>Waveform Diagrams</i> below.
Freq. Response.....	200 kHz standard (up to 1MHz)
Noise Immunity.....	Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN55011
Symmetry.....	180° (±18°) electrical
Quad. Phasing.....	90° (±22.5°) electrical
Min. Edge Sep.....	67.5° electrical
Accuracy.....	Within 0.01° mechanical from one cycle to any other cycle, or 0.6 arc minutes.
Commutation.....	Up to 12-pole. Contact Customer Service for availability.
Comm. Accuracy.....	1° mechanical

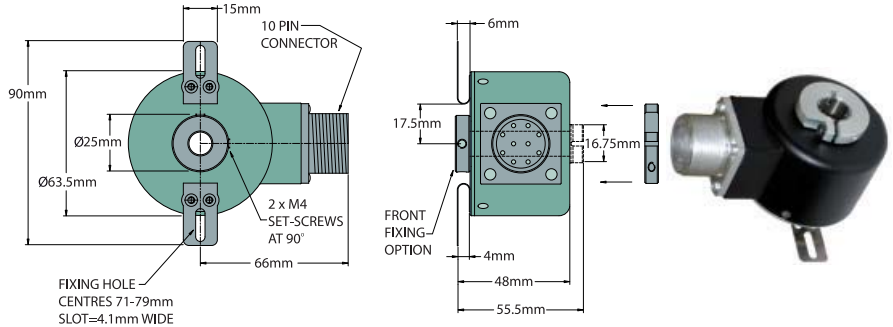
Mechanical

Max Shaft Speed.....	6000 RPM.
Bore Size.....	8mm through 15mm
Bore Tolerance.....	H7 (SLIDING FIT FOR g6)
User Shaft Tolerances	
Radial Runout.....	0.2mm max TIR
Axial Endplay.....	0.75mm max
Starting Torque.....	IP50 Thru-Bore: 3.53 x 10 ⁻³ Nm IP64 Thru-Bore: 1.765 x 10 ⁻² Nm
Electrical Conn.....	2M cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 6-pin MS, 10 Pin MS, or 8 Pin Euro-Fast
Housing.....	Black non-corrosive finish
Mounting.....	Dual adjustable radius Flex Mount standard, or single adjustable radius options.
Weight.....	600 grams typical

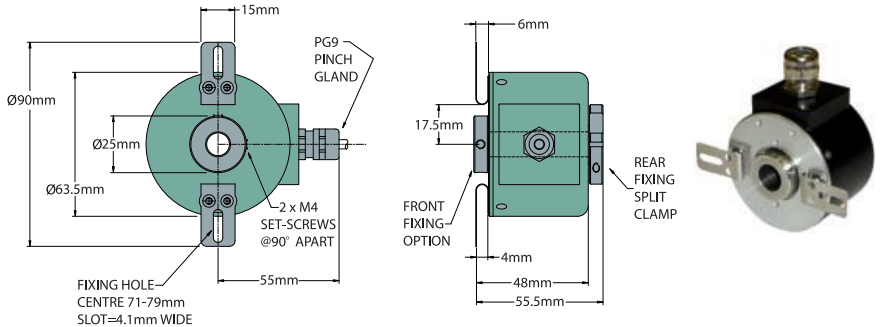
Environmental

Operating Temp.....	0° to 70° C for standard models 0° to 100°C for high temperature option
Storage Temp.....	-40° to +100° C
Humidity.....	98% RH non-condensing
Vibration.....	10 g @ 58 to 500 Hz
Shock.....	50 g @ 11 ms duration
Sealing.....	IP50; IP64

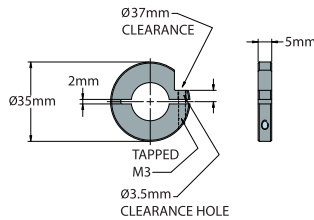
Model 760 with 10 Pin Connector & FB Fixings



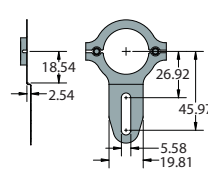
Model 760 with PG9 Pinch Gland & FB Fixings



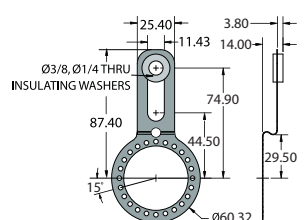
Rear Fixing Clamp



Adjustable Flex-Arm (AF)

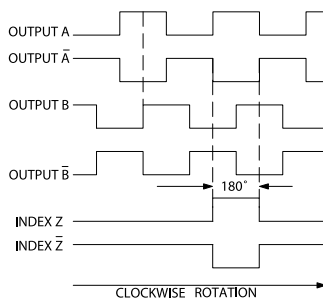


89-150mm PCD Flex-Mount (FG)

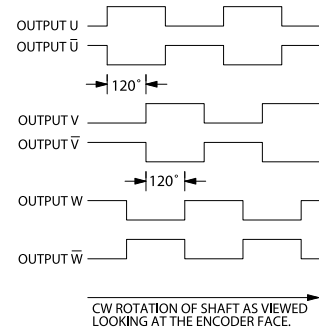


All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Waveform Diagrams



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.

Wiring Table - With Commutation

Function	Cable Wire Color	8-pin M12**
Com	Black	7
+VDC	White	2
A	Brown	1
A'	Yellow	3
B	Red	4
B'	Green	5
Z	Orange	6
Z'	Blue	8
U	Violet	--
U'	Gray	--
V	Pink	--
V'	Turquoise	--
W	Red/Green	--
W'	Red/Yellow	--
Shield	Bare *	--

Wiring Table - Non-Commutation

Function	Gland Cable Wire Color	8-pin M12 HV	10-pin MS HV	6-pin MS PP, OC
Com	Black	7	F	F
+VDC	White	2	D	D
A	Brown	1	A	A
A'	Yellow	3	H	---
B	Red	4	B	B
B'	Green	5	I	---
Z	Orange	6	C	C
Z'	Blue	8	J	---
Case	---	---	G	---
Shield	Screen	---	---	---

Incremental Thru-Bore & Motor Mount Encoders

Model 775 Slim Thru-Bore Encoder



Ø109.22mm

Incremental Thru-Bore & Motor Mount Encoders

Features

- Thru-Bore Design For Easy Mounting
- Bore Options to 1.375"
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 PPR
- 100° C Operating Temperature Available

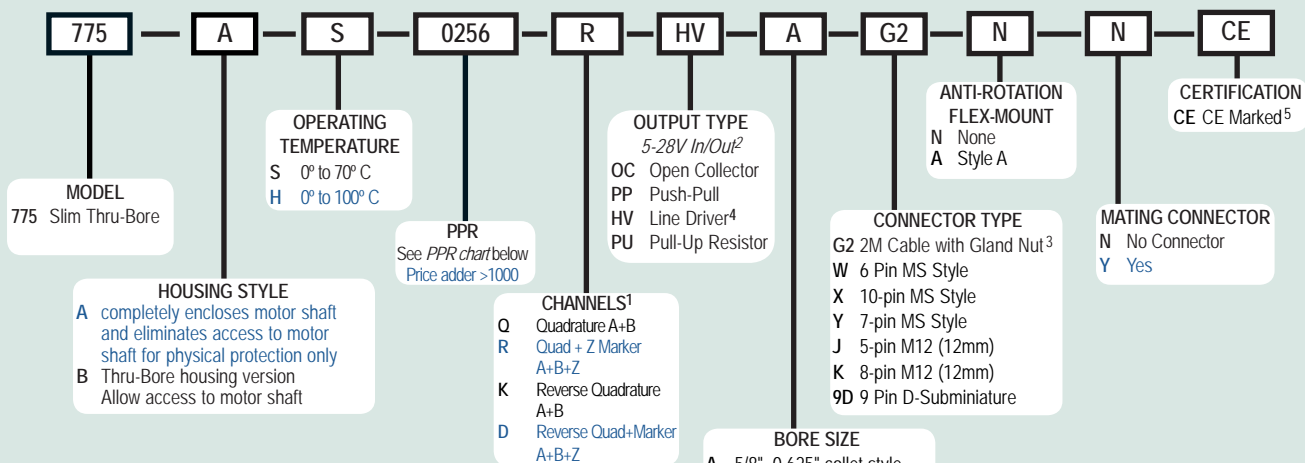
The sleek design of the Model 775 Thru-Bore Series makes form and function a successful reality. The slim profile and Thru-Bore design, makes installation easy by simply slipping the bore over motor shafts up to 1.375" in diameter. The advanced Opto-ASIC based electronics provide the superior noise immunity necessary in many industrial applications. With a variety of bore sizes, resolutions, and connector types, application possibilities are endless.

Common Applications

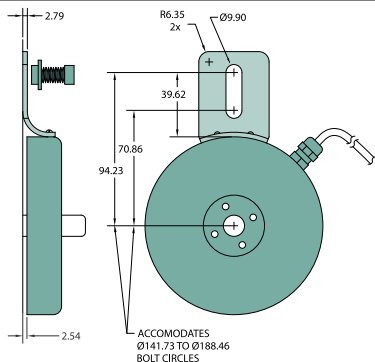
Motor Feedback, Velocity & Position Control, Food Processing, Robotics, Material Handling

Model 775 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 775 Shown with Anti-Rotation flex-Mount



Model 775 PPR Options

0060	0100	0120	0240	0250	0256
0500	0512	1000	1024	2048	2500
4096					

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 Contact Customer Service for index/Marker gating options.
- 2 5 to 24 VCC max for high temperature option.
- 3 For non-standard cable lengths, Please contact the sales office.
- 4 Not available with 5-pin M12 or 6-pin MS connector. Available with 7-pin MS connector only without Index Z.
- 5 For 4096ppr - Please be aware that CE is not available if choosing High Temp option and over 2 Metre Cable Length.

Model 775 Slim Thru-Bore Encoder



Model 775 Specifications

Electrical

Input Voltage.....4.75 to 28 VCC max for temperatures up to 70° C
4.75 to 24 VCC for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple100 mV peak-to-peak at 0 to 100 kHz

Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.

Output TypesOpen Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)

IndexOnce per revolution.
0475 to 4096 PPR: Gated to output A
0001 to 0474 PPR: Ungated
See *Waveform Diagrams* below.

Max Frequency.....200 kHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Quadrature67.5° electrical or better is typical, 54°

Edge Separationelectrical minimum at temperatures > 99° C

Rise Time.....Less than 1 microsecond

Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Bore Size0.625", 0.750", 0.875", 1.000", 14 mm, 19 mm, 24 mm, 1.125", 1.250", 1.375", 25 mm, 28 mm, 30 mm, 32 mm
Note: Bore sizes 1.125", 1.250", 1.375", 25 mm, 28 mm, 30 mm, 32 mm are clamp style. All others are collet style.

User Shaft Tolerances
Radial Runout.....0.15mm TR
Axial Endplay±0.70mm with appropriate flex mount

Electrical ConnGland nut with 2M cable (foil and braid shield, 24 AWG conductors), 6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature

Housing.....All metal construction

Mounting.....Thru-Bore with collet clamp or single-screw clamp mount

Weight.....450 grams with gland nut or D-sub connector option / 680 grams with MS connector options - Note: All weights typical -

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option

Storage Temp.....-25° to 100° C

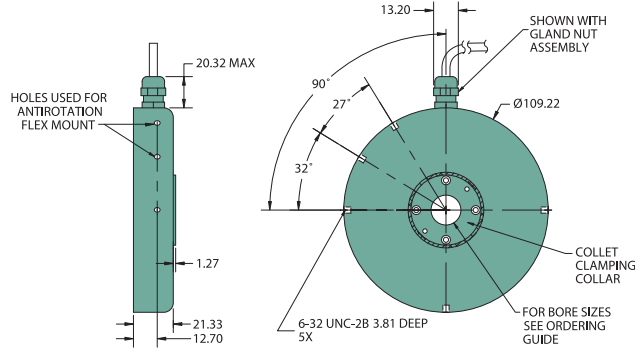
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

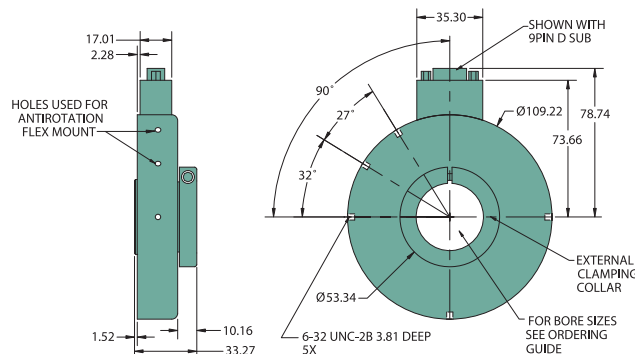
Shock.....50 g @ 11 ms duration

Sealing.....IP50

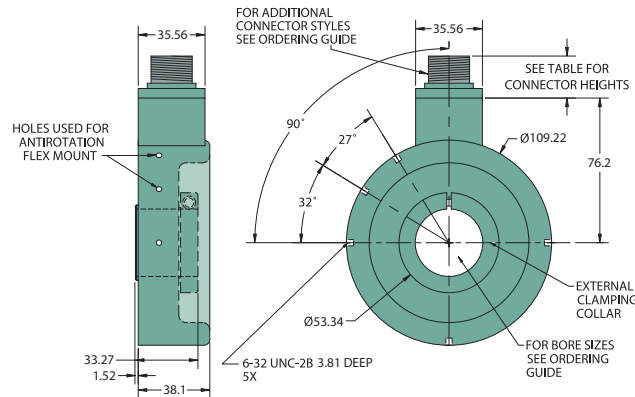
Model 775 Collet Clamp (A, B, C, D, H, I, K)



Model 775 Clamp Style (O, T, V, M, L, Q, R)



Model 775 Extended Housing (W, X, Y, J, K)

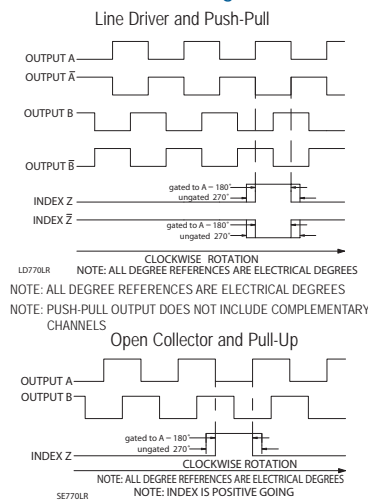


CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	17.00
10-PIN MS	22.86
5- or 8-PIN M12	12.70



All dimensions are in mm with a tolerance of ±0.254 unless otherwise specified.

Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12 PU, PP, OC	8-pin M12	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VCC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	---	3	H	C	---	---	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	---	5	I	E	---	---	5
Z	Orange	5	6	C	---	C	C	6
Z'	Yellow	---	8	J	---	---	---	7
Shield	Bare	---	---	---	---	---	---	---
Case	---	---	---	G	G	G	---	8

Incremental Thru-Bore & Motor Mount Encoders

Model 776 Large Bore Slim Thru-Bore Encoder



Incremental Thru-Bore & Motor Mount Encoders

Features

- Slim Profile - Only 34.54mm In Depth
- Thru-Bore Design For Easy Mounting
- Incorporates Opto-ASIC Technology
- Resolutions to 4096
- Bore Options to 1.875"

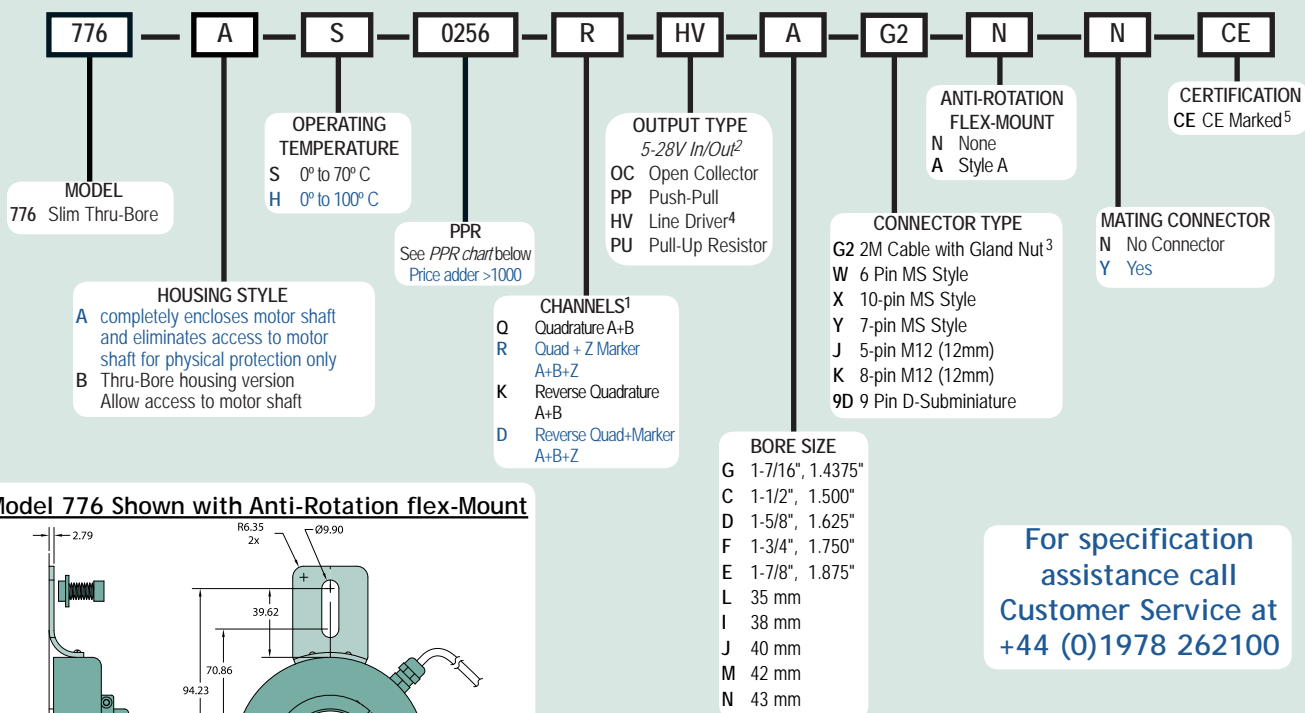
The Thru-Bore Series Model 776 encoder is designed to fit directly on either a motor or other shaft where position, direction, or velocity information is needed. The advanced Opto-ASIC based electronics provide the superior noise immunity necessary in many industrial applications. The Model 776 conveniently features a clamp type mount for fast and easy mounting over a large range of shaft sizes. An optional anti-rotation flex mount maintains housing stability.

Common Applications

Motor Feedback, Velocity & Position Control, Food Processing, Robotics, Material Handling

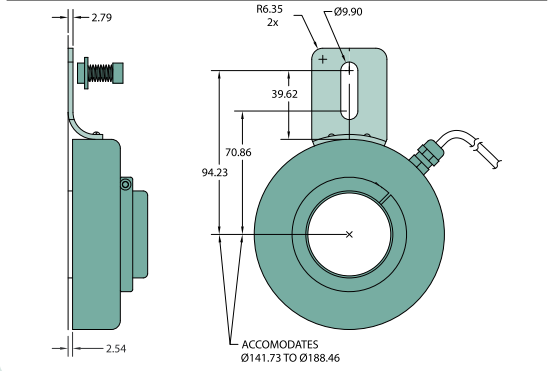
Model 776 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model 776 Shown with Anti-Rotation flex-Mount



Model 776 PPR Options

0060	0100	0120	0240	0250	0256
0500	0512	1000	1024	2048	2500
4096					

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

- NOTES:**
- 1 Contact Customer Service for index/Marker gating options.
 - 2 5 to 24 VCC max for high temperature option.
 - 3 For non-standard cable lengths, Please contact the sales office.
 - 4 Not available with 5-pin M12 or 6-pin MS connector. Available with 7-pin MS connector only without Index Z.
 - 5 For 4096ppr - Please be aware that CE is not available if choosing High Temp option and over 2 Metre Cable Length.

Model 776 Large Bore Slim Thru-Bore Encoder



Model 776 Specifications

Electrical

Input Voltage.....4.75 to 28 VCC max for temperatures up to 70° C
4.75 to 24 VCC for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple100 mV peak-to-peak at 0 to 100 kHz

Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.

Output TypesOpen Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)

Index.....Once per revolution.
0475 to 4096 PPR: Gated to output A
0001 to 0474 PPR: Ungated
See *Waveform Diagrams* below.

Max Frequency.....200 kHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Quadrature67.5° electrical or better is typical, 54°

Edge Separation electrical minimum at temperatures > 99° C

Rise Time.....Less than 1 microsecond

Mechanical

Max Shaft Speed.....3500 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Bore Size1.500", 1.625", 1.750", 1.875", 35 mm, 38 mm, 40 mm, 42 mm, 43 mm

User Shaft Tolerances
Radial Runout.....0.15mm TR
Axial Endplay±0.70mm with appropriate flex mount

Electrical ConnGland nut with 2M cable (foil and braid shield, 24 AWG conductors), 6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), or 9-pin D-sub- miniature

Housing.....All metal construction

Mounting.....Thru-bore with single-screw clamp mount

Weight.....450 grams with gland nut or D-sub connector option / 680 grams with MS connector option
Note: All weights typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option

Storage Temp.....-25° to 100° C

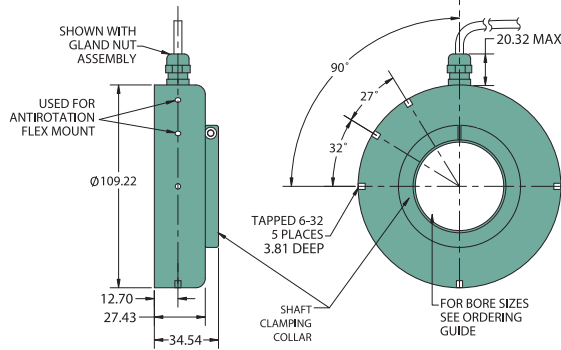
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

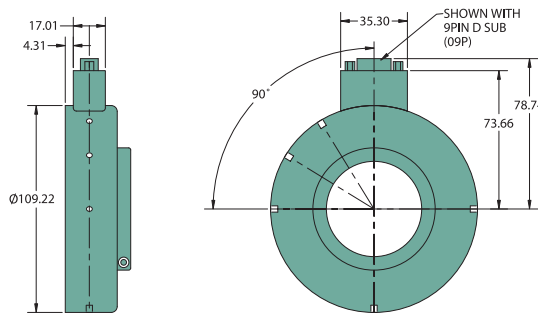
Shock.....50 g @ 11 ms duration

Sealing.....IP50

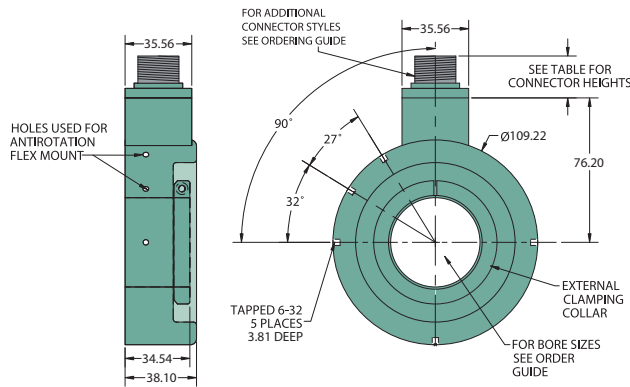
Model 776 With Gland Nut Cable (G2)



Model 776 With 9-Pin D-Sub Connector (9D)



Model 776 Extended Housing (W, X, Y, J, K)



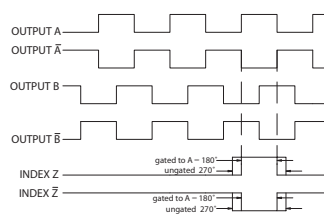
CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	17.00
10-PIN MS	22.86
5- or 8-PIN M12	12.70



All dimensions are in mm with a tolerance of ±0.254 unless otherwise specified.

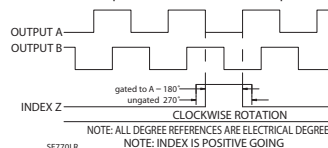
Waveform Diagrams

Line Driver and Push-Pull



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: PUSH-PULL OUTPUT DOES NOT INCLUDE COMPLEMENTARY CHANNELS

Open Collector and Pull-Up



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Gland Cable Wire Color	5-pin M12 PU, PP, OC	8-pin M12	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC	9-pin D-sub
Com	Black	3	7	F	F	F	A, F	9
+VCC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	---	3	H	C	---	---	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	---	5	I	E	---	---	5
Z	Orange	5	6	C	---	C	C	6
Z'	Yellow	---	8	J	---	---	---	7
Shield	Bare	---	---	---	---	---	---	---
Case	---	---	---	G	G	G	---	8

Incremental Thru-Bore & Motor Mount Encoders

Model 770 Thru-Bore Encoder



Ø165.1mm

Incremental Thru-Bore
& Motor Mount Encoders

Features

- Slim Profile - Only 25.4mm Deep
- Fits NEMA Size 56C Thru 184C Motor Faces (114.3mm AK)
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 PPR

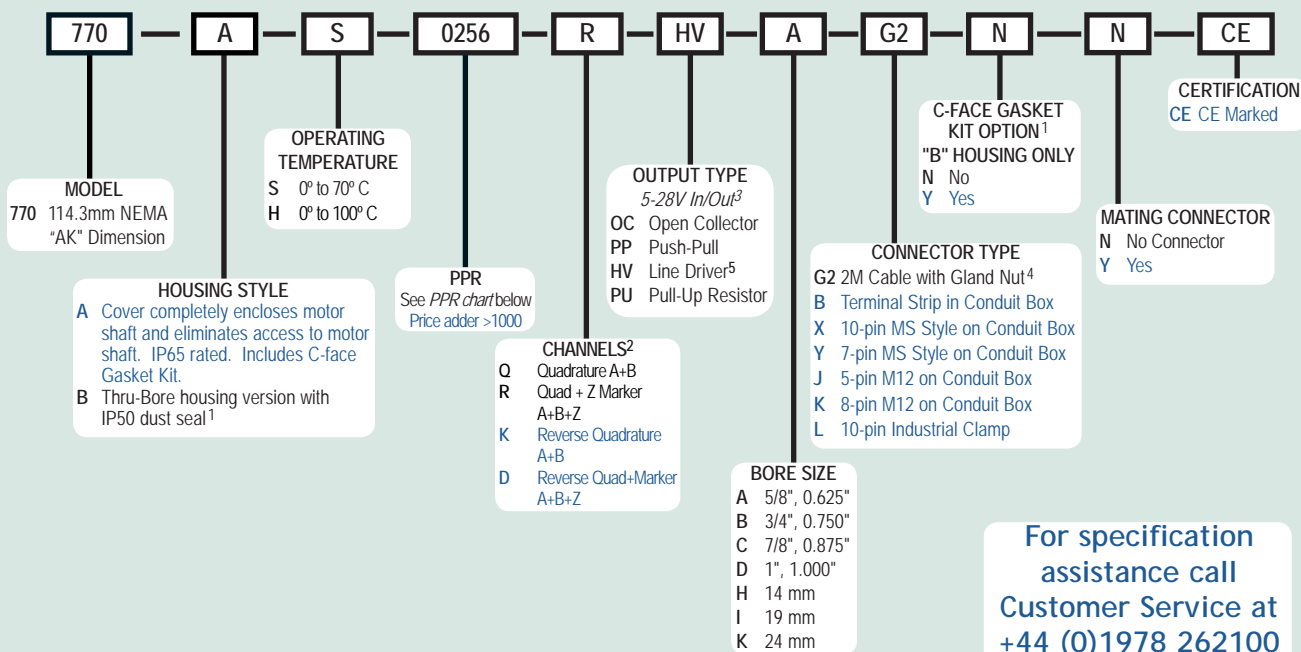
The Model 770 C-face encoder is a rugged, high resolution encoder designed to mount directly on NEMA C-face motors. Both sides of the encoder are C-face mounts, allowing additional C-face devices to be mounted to this encoder. Unlike many C-face kit type encoders, the Model 770 contains precision bearings and an internal flex mount, virtually eliminating encoder failures and inaccuracies induced by motor shaft runout or axial endplay. The advanced Opto-ASIC design provides advanced noise immunity necessary for many industrial applications. This encoder is ideal for applications using induction motors and flux vector control. The Model 770 provides speed and position information for drive feedback in a slim profile - only 25.4mm thick. The Thru-Bore design allows fast and simple mounting of the encoder directly to the accessory shaft or to the drive shaft of the motor, using the standard motor face (NEMA sizes 56C - 184C). The tough, all metal housing resists the vibration and hazards of an industrial environment.

Common Applications

Motor Feedback, Velocity & Position Control, Conveyors, Variable Speed Drives, Mixing & Blending Motors, Assembly & Speciality Machines

Model 770 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 770 PPR Options

0060	0100	0120	0240	0250	0256
0500	0512	1000	1024	2048	2500
4096					

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

NOTES:

- 1 Thru-Bore version may be IP65 sealed if mounted between two C-face devices with optional gasket kit. Select 'Yes' under C-face Gasket Kit Option.
- 2 Contact Customer Service for Marker gating options.
- 3 5 to 24 VCC max for high temperature option.
- 4 For non-standard cable lengths, Contact the sales office for more information.
- 5 Not available with 5-pin M12 connector. Available with 7-pin MS connector only without Index Z.

Model 770 Thru-Bore Encoder



Model 770 Specifications

Electrical

Input Voltage.....4.75 to 28 VCC max for temperatures up to 70° C
4.75 to 24 VCC for temperatures between 70° C to 100° C
Input Current.....100 mA max with no output load
Input Ripple100 mV peak-to-peak at 0 to 100 kHz
Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.
Output TypesOpen Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)
Index.....Once per revolution.
0475 to 4096 PPR: Gated to output A
0001 to 0474 PPR: Ungated
See *Waveform Diagrams* below.

Max Frequency.....200 kHz
Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry180°(±18°) electrical
Quad. Phasing.....90°(±22.5°) electrical
Min. Edge Sep.....67.5° electrical
Rise Time.....Less than 1 microsecond

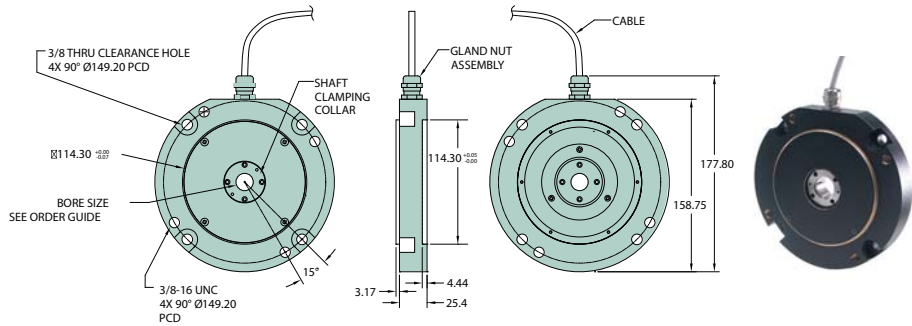
Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Bore Size.....0.625", 0.750", 0.875", 1.000", 14 mm, 19 mm, and 24 mm
Bore Tolerance+0.03/-0.00 mm
User Shaft Tolerances
Radial Runout.....0.127mm
Axial Endplay.....±1.27mm
Electrical Conn.....Gland nut with 2M cable (foil and braid shield, 24 AWG conductors), Terminal Strip in conduit box, 7- or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 10-pin Industrial Clamp
Housing.....All metal construction
Mounting.....NEMA 56C to 184C
Weight.....1.17kg with gland nut
1.36kg with all other connector options
Note: All weights typical

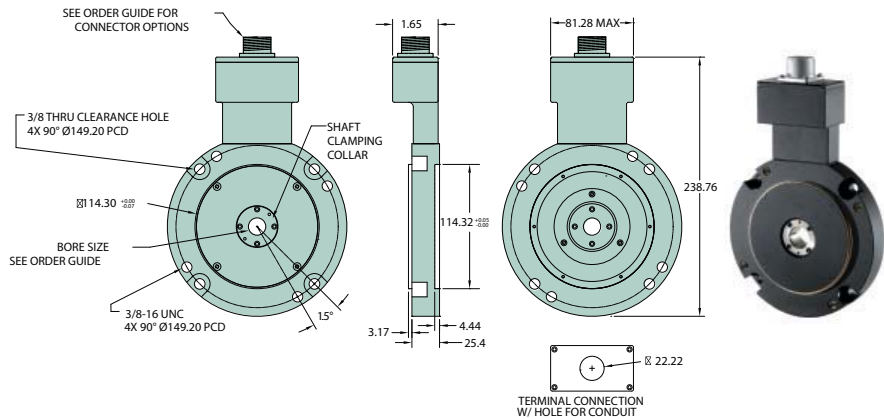
Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option
Storage Temp.....-25° to 100° C
Humidity.....98% RH non-condensing
Vibration.....10 g @ 58 to 500 Hz
Shock.....50 g @ 11 ms duration
Sealing.....IP65 for Option A housing style with gasket kit IP50 for Option B housing style

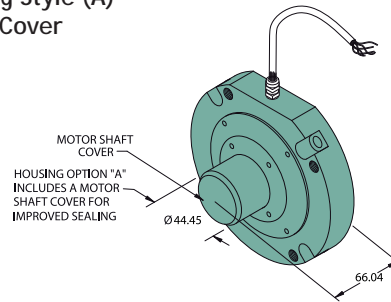
Model 770 w/Gland Nut (G2)



Model 770 w/Conduit Box (B, X, Y, J, K)



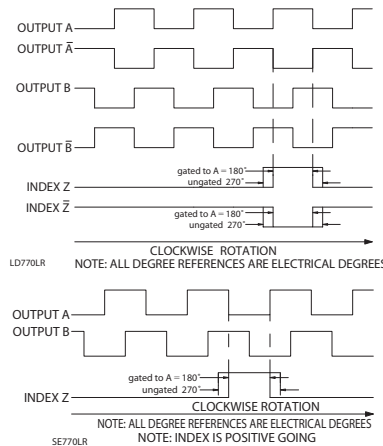
Optional Housing Style (A) Protective Cover



CONNECTOR TYPE	HEIGHT
6- or 7-PIN MS	17.00
10-PIN MS	22.86
5- or 8-PIN M12	12.70

All dimensions are in mm with a tolerance of ±0.254 unless otherwise specified.

Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12 PU, PP, OC	8-pin M12	10-pin MS	7-pin MS HV	7-pin MS PU, PP, OC	Term. Block	10-pin Indust. Clamp
0 Volts	Black	3	7	F	F	F	2	1
+VCC	Red	1	2	D	D	D	1	6
A	White	4	1	A	A	A	3	3
A'	Brown	---	3	H	C	---	4	8
B	Blue	2	4	B	B	B	5	2
B'	Violet	---	5	I	E	---	6	7
Z	Orange	5	6	C	---	C	7	4
Z'	Yellow	---	8	J	---	---	8	9
Shield	Bare'	---	---	---	---	---	---	---
Case	---	---	---	G	G	G	9	10

Incremental Thru-Bore & Motor Mount Encoders

Model 755 NEMA Motor Mount Encoder



Incremental Thru-Bore
& Motor Mount Encoders

Features

- Standard NEMA Mounting
- Up to 30,000 Pulses Per Revolution
- High Temperature Option

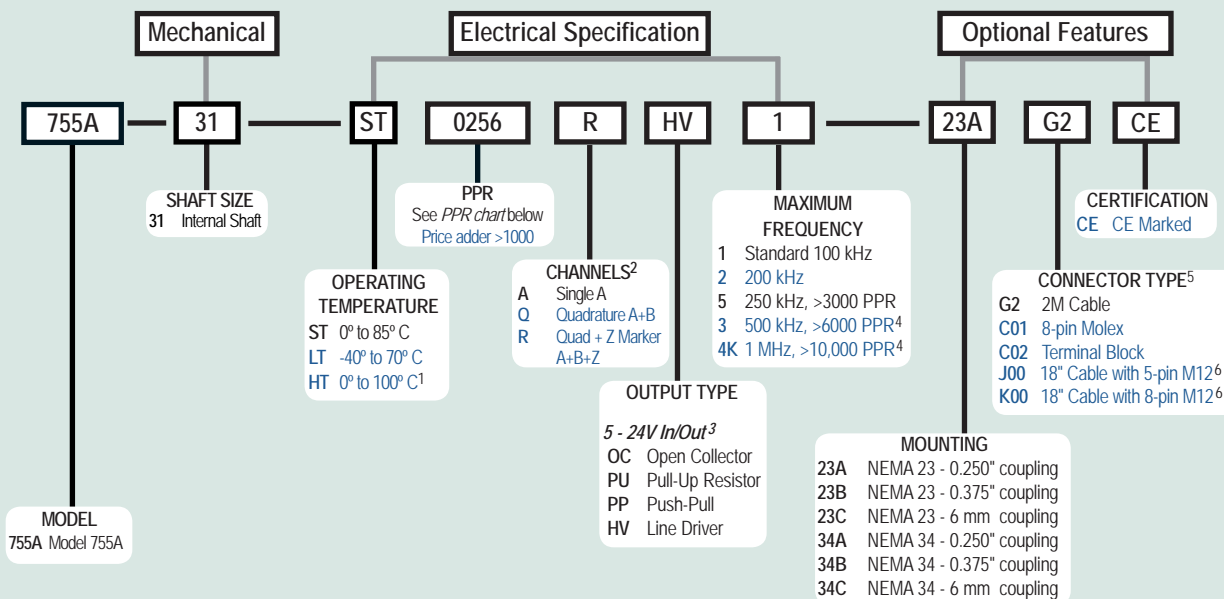
The Model 755A NEMA Mount with its integral shaft coupling, mounts directly onto NEMA motors. It is designed for easy installation on industrial size 23 or 34 motor frames. It features standard bolt circle patterns, and can accommodate shaft sizes of 0.250", 0.375", or 6 mm. With its rugged all metal housing, and a wide range of PPR options, it will fit in many different applications, providing years of trouble free use.

Common Applications

Robotics, Assembly Machines, Motor-Mounted Feedback, Phototypesetters, Printers & Digital Plotters, Elevator Controls, Medical Diagnostic Equipment

Model 755 NEMA Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 755 NEMA PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 0° to 85°C for certain resolutions - Please see PPR options table.
- 2 Contact Customer Service for marker gating options.
- 3 24Vcc Max for high temperature option.
- 4 Standard cable lengths only.
- 5 For non-standard cable lengths, please call our sales office.
- 6 5-pin not available with Line Driver (HV) output. Additional cable lengths available. Please consult Customer Service.

Model 755 NEMA Motor Mount Encoder



Model 755 NEMA Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
4.75 to 24 Vcc for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Open Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Index.....Occurs once per revolution. The Index for units >3000 CPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.

Max Frequency.....Up to 1 MHz

Noise Immunity.....Tested to BS EN61000-4-2: IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
6001 to 20,480 PPR: 90° (±36°)

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
6001 to 20,480 PPR: 54° electrical
>20,480 PPR: 50° electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Coupling Bore.....0.250", 0.375" or 6mm

User Shaft Tolerances

Radial Shaft0.2mm max
Axial End Play.....±0.8mm max
Starting Torque9.886 x 10⁻⁴ typical
2.824 x 10⁻² typical for -40° C operation

Electrical Conn2M cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 2M cable (braid shield), 8-pin Molex, Terminal Block, 5 Pin Cover, 6 Pin Cover, 8 Pin Cover, Gland Cover (See appendix sheet for cover options)

Housing.....Black non-corrosive finish
Bearings.....Precision ABEC ball bearings
Mounting.....Servo or Optional Flange
Weight.....100 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
-40° to 70° C for low temperature option
0° to 100° C for high temperature option
(0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp.....-25° to +85° C

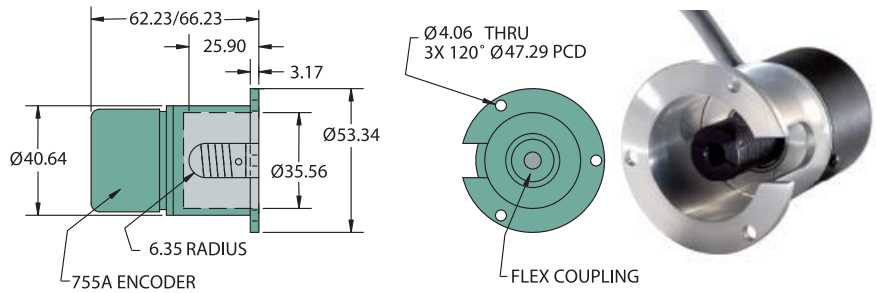
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

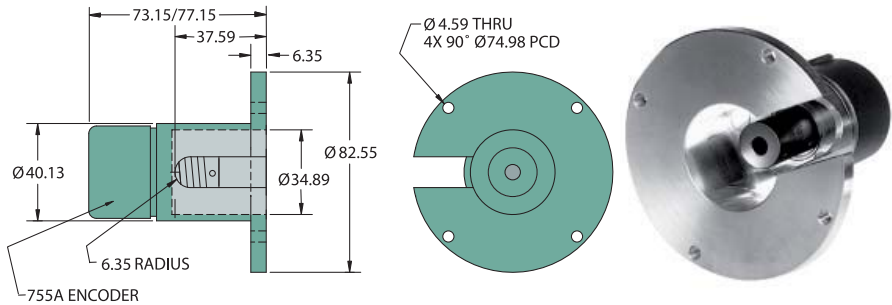
Shock.....50 g @ 11 ms duration

Sealing.....IP50 Standard

Model 755A Size 23 NEMA Mount (23A, 23B, 23C)



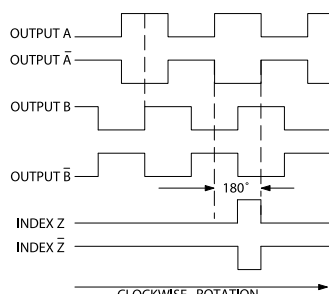
Model 755A Size 34 NEMA Mount (34A, 34B, 34C)



All dimensions are in mm with a tolerance of ±0.127 or ±0.254 unless otherwise specified

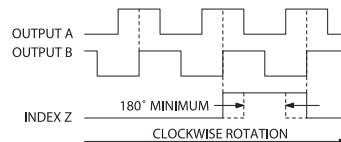
Waveform Diagrams

Line Driver (HV), Push-Pull (PP - No /A, /B & /Z)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
Marker Gated A+B

Open-Collector, Pull-Up (OC, PU)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Cable Wire Color	Terminal Block	8-pin Molex	5-pin M12	8-pin M12
Com	Black	7	2	3	7
+Vcc	White	8	1	1	2
A	Brown	1	8	4	1
A'	Yellow	2	7	---	3
B	Red	3	4	2	4
B'	Green	4	3	---	5
Z	Orange	6	6	5	6
Z'	Blue	5	5	---	8
Shield	Bare ¹	---	---	---	---

Incremental Thru-Bore
& Motor Mount Encoders

Model 702M Motor Mount Encoder



Features

- Up to 30,000 PPR
- IP66 Sealing Available
- Mounting Flange Available With Boss

The Model 702M Motor Mount is a heavy duty, ultra-rugged, reliable, yet compact industry standard 50.8mm diameter encoder. It is designed to withstand harsh factory and plant floor environments. The mounting flange with integral shaft and coupling, allows the 702M encoder to be easily installed on a motor or shaft assembly, without the need for additional brackets or couplings. With the ability to handle shaft speeds of up to 8000 RPM, and withstand the shock and vibration of high speed servo motors, you are sure to be pleased with the 702M Motor Mount.

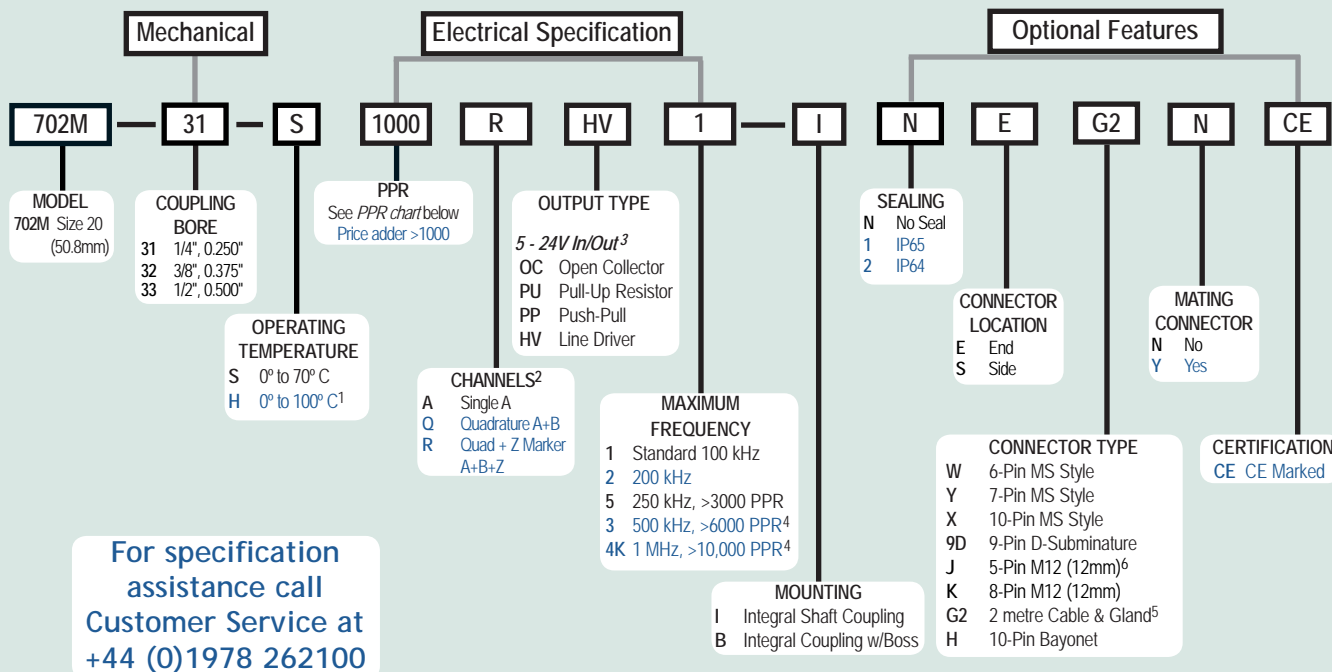
Common Applications

Servo & Stepper Motor Control, Robotics, X-Y Positioning Tables, Machine Tools

Incremental Thru-Bore
& Motor Mount Encoders

Model 702M Motor Mount Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 702M Motor Mount PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

NOTES:

- 1 0° to 85°C for certain resolutions - Please see PPR options table.
- 2 Contact Customer Service for marker gating options.
- 3 24Vcc Max for high temperature option.
- 4 Standard cable lengths only.
- 5 For non-standard cable lengths, please call our sales office.
- 6 5-pin not available with Line Driver (HV, L5) outputs. Additional cable lengths available. Please consult Customer Service.

Model 702M Motor Mount Encoder



Model 702M Specifications

Electrical

Input Voltage.....	4.75 to 28 Vcc max for temperatures up to 70° C 4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current	100 mA max with no output load
Input Ripple	100 mV peak-to-peak at 0 to 100 kHz
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See <i>Waveform Diagrams</i> below.
Output Types.....	Open Collector- 100 mA max per channel Pull-Up- 100 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)
Index	Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See <i>Waveform Diagrams</i> below.
Max Frequency.....	Up to 1 MHz.
Noise Immunity.....	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry	1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 CPR: 180° (±36°) electrical
Quad Phasing.....	1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 PPR: 90° (±36°) electrical
Min Edge Sep.....	1 to 6000 PPR: 67.5° electrical at 100 kHz output 6001 to 20,480 PPR: 54° electrical
Rise Time.....	Less than 1 microsecond
Accuracy.....	Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

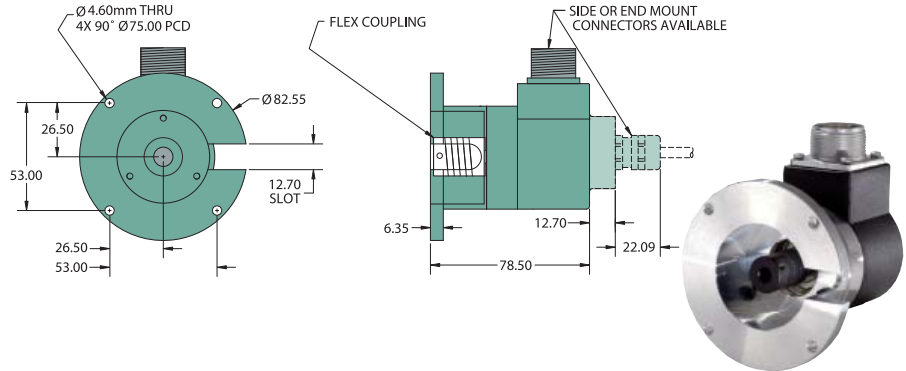
Mechanical

Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Coupling Size	0.250", 0.375", or 0.500"
Starting Torque	7.0615 x 10 ⁻³ Nm typical with IP64 seal or no seal 2.0118 x 10 ⁻² Nm typical with IP66 shaft seal
Connector Type.....	6-, 7-, and 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors), 10-pin Bayonet
Housing.....	Black non-corrosive finish
Bearings.....	Precision ABEC ball bearings
Weight.....	396 grams typical

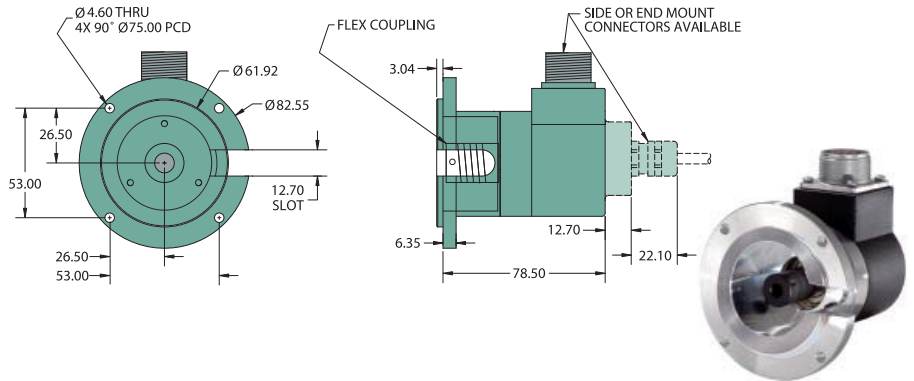
Environmental

Operating Temp.....	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)
Storage Temp.....	-25° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	20 g @ 58 to 500 Hz
Shock.....	75 g @ 11 ms duration
Sealing.....	IP66 (NEMA 13 and 4/4X) with shaft seal; IP64 available

Model 702M With Integral Coupling (I)



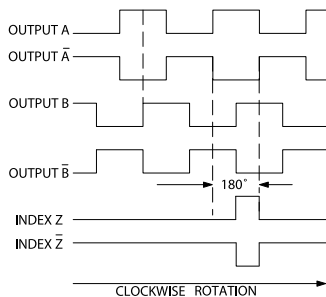
Model 702M With Integral Coupling and Boss (B)



All dimensions are in mm with a tolerance of ±0.127 or ±0.254 unless otherwise specified

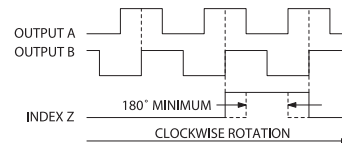
Waveform Diagrams

Line Driver (HV), Push-Pull (PP - No /A, /B & /Z)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
Marker Gated A+B

Open-Collector, Pull-Up (OC, PU)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC, LP HV-R	6-pin MS PP OC, LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub	10-pin Bayonet
Com	Black	3	7	F	F	F	F	F	9	F
+Vcc	White	1	2	D	D	D	D	D	1	D
A	Brown	4	1	A	A	A	A	A	2	A
A'	Yellow	—	3	H	C	—	—	C	3	H
B	Red	2	4	B	B	B	B	B	4	B
B'	Green	—	5	I	E	—	—	E	5	I
Z	Orange	5	6	C	—	C	C	—	6	C
Z'	Blue	—	8	J	—	—	—	—	7	K
Case	—	—	—	G	G	G	—	—	8	G
Shield	Screen	—	—	—	—	—	—	—	—	—

Incremental Thru-Bore & Motor Mount Encoders

Model 711 Single Channel Model 716 Quadrature



Features

- The Original Industry-Standard Cube
- Wide Choice of PPR's
- Enhanced Technology Using Opto-ASIC Circuitry
- Industrial and Heavy Duty Options Available

The Model 711/716 is ideally suited for applications requiring a quadrature output. Designed for compatibility with most programmable controllers, electronic counters, motion controllers and motor drives. It is ideally suited for industrial applications where it is important that the direction of rotation be known.

The new Opto-ASIC version increases critical performance specifications for the most popular resolutions. This version features advanced Opto-ASIC circuitry, a single chip design that eliminates many board level components. This increases the reliability of an already dependable and durable encoder. With new options continually being added, the 711/716 just keeps getting better and better.

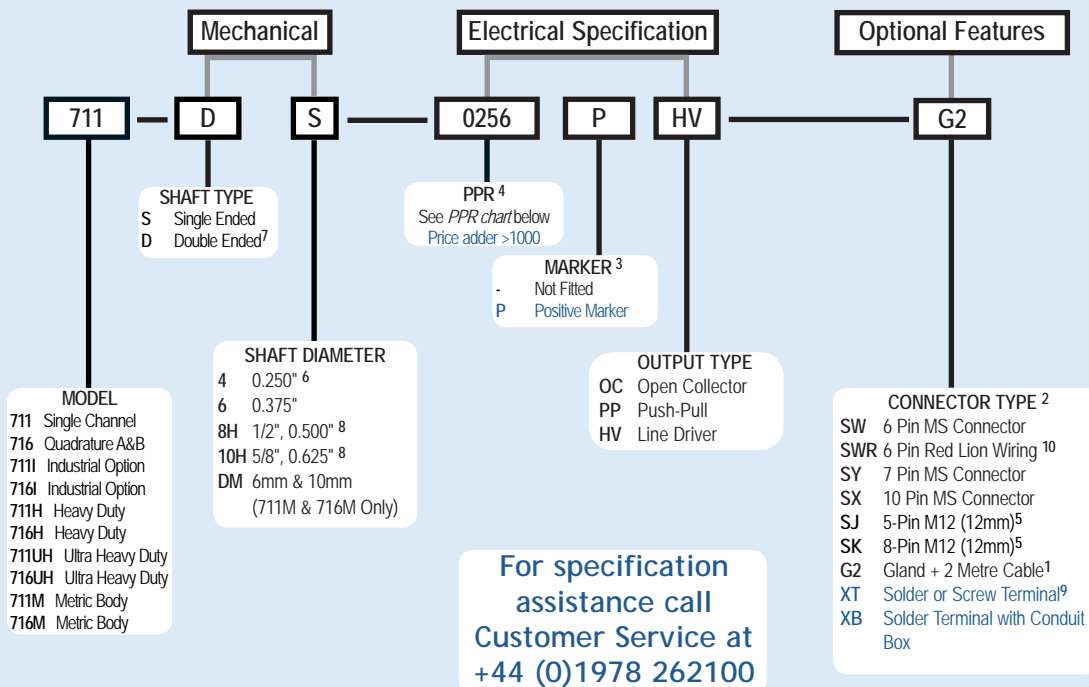
Common Applications

Feedback for counters, PLC's & Motors, Cut to Length, Labelling, Measuring for Packaging, Filling & Materials Handling Machines, Wire Winding, Film Extrusion.

Incremental Shaft Encoders

Model 711/716 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 711/716 PPR Options

Standard Cube: All resolutions from 1 to 900 except where Opto-ASIC resolutions are available

0001 thru 0189	0193	0198	0200	0205	0210	0240
0250	0256	0276	0298	0300	0305	0308
0315	0333	0336	0350	0360	0400	0480
0500	0512	0580	0597	0600	0700	0720
0800	0840	0960	1000	1024	1200	1250
1270	1500	1800*	2000	2048	2500	3000
3600*	4096	5000	6000	7200*	8192	10000

*Contact Customer Service for Availability.

Contact Customer Service for other disc resolutions; not all disc resolutions available with all output types See [Note 4](#) for Details

NOTES:

- 1 For Non-standard cable lengths - call the sales office.
- 2 For mating connectors - see accessories pages.
- 3 Call sales office for marker availability and configuration options.
- 4 For PPR between 0001 and 0189 call sales office for availability.
- 5 Not Available in Heavy Duty and Ultra Heavy Duty Housing.
- 6 Standard 711/716 Only.
- 7 Double ended not available in Heavy Duty and Ultra Heavy Duty Housing.
- 8 Ultra Heavy Duty Housing only.
- 9 Screw Terminals available for Heavy Duty housing Solder Terminals available for Standard Housing
- 10 See Wiring Tables for Red Lion Configuration Options.

Model 711 Single Channel Model 716 Quadrature



Model 711/716 Specifications

Electrical

- Input Voltage 4.75 to 24 Vcc max to temperatures up to 70°C
- Input Current 100 mA max (65 mA typical) with no output load
- Input Ripple 100 mV peak to peak at 0 to 100 kHz
- Output Format 711. Square wave with single channel
716. Quadrature two square waves, channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
- Output Types Open Collector- 20 mA max per channel
Push-Pull- 20 mA max per channel
20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)
- Index Once per revolution.
- Freq. Response 20 kHz standard
- Noise Immunity Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6; BS EN500811
- Symmetry 180° (±18°) electrical
- Quad. Phasing 90° (±22.5°) electrical
- Min. Edge Sep 67.5° electrical
- Accuracy Within 0.10° mechanical or 6 arc-minutes from true position
- Electrical Conn. Refer to ordering guide notes

Mechanical

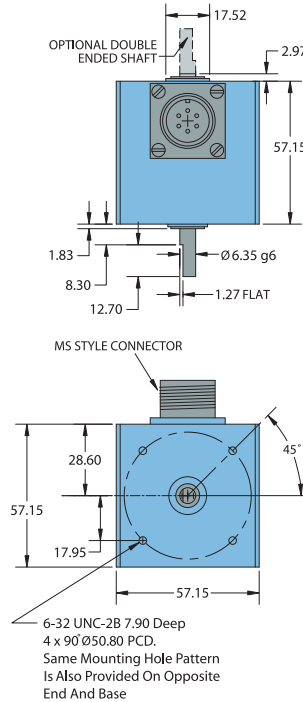
- Shaft Size 0.250" or 0.375"
- Shaft Type Single or double-ended (specify choice)
- Shaft Material 303 stainless steel
- Radial Loading 7 Kg maximum (0.250" diameter shaft)

18 Kg maximum (0.375" diameter shaft)
- Axial Loading 4.5 Kg maximum (0.250" diameter shaft)
13.6 Kg maximum (0.375" diameter shaft)
- Starting Torque 9.18 x 10⁻⁴ Nm typical for 0.250" shaft
2.68 x 10⁻³ Nm typical for 0.375" shaft
- Housing Black non-corrosive finished 6063-T6 aluminum
- Bearings Precision ABEC Ball Bearings
- Mounting Tapped mounting holes on three sides for base or face mounting
- Weight 300 grams typical

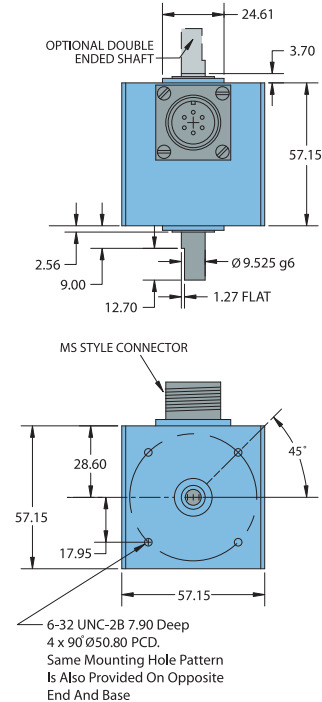
Environmental

- Operating Temp 0° to +70° C standard models
- Storage Temp -25° to +85° C
- Humidity 98% RH non-condensing
- Vibration 10 g @ 58 to 500 Hz
- Shock 80 g @ 11 ms duration
- Sealing IP50 standard

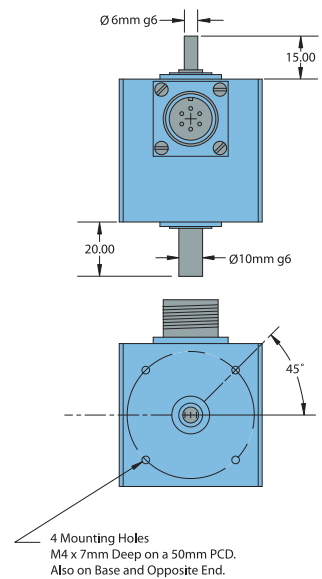
Model 711/716 Encoder 711/716 Housing With 1/4" Shaft



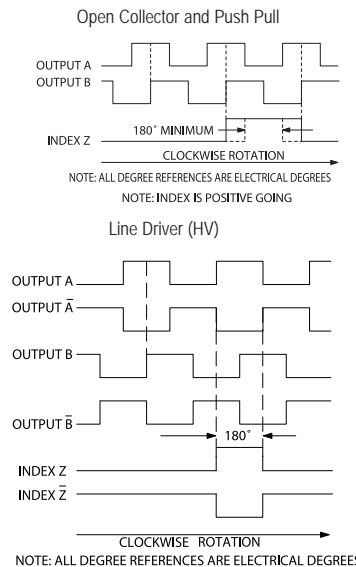
711/716 Housing With 3/8" Shaft



711M/716M Metric Housing



Waveform Diagrams



All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Wiring Table

Function	Gland Cable Wire Color	5-pin M12	6-pin M12	10-pin MS	7-pin MS HV	7-pin MS OC PP	6-pin MS HV A+B	6-pin MS OC PP	6-pin MS HV A+Z	Term. Block HV/No Marker	Term. Block OC PP
0 Volts	Black	3	7	F	F	F	A	A	A	1	1, 6
+Vcc	Red	1	2	D	D	D	B	B	B	2	2
A	White	4	1	A	A	A	D	D	D	3	4
A'	Brown	—	3	H	C	—	C	—	C	4	—
B	Blue	2	4	B	B	B	E	E	—	5	5
B'	Violet	—	5	I	E	—	F	—	—	6	—
Z	Orange	5	6	C	—	C	—	C	E	—	3
Z'	Yellow	—	8	J	—	—	—	—	F	—	—
Case	Bare	—	—	G	G	G	—	—	—	—	—
Shield	Bare	—	—	—	—	—	—	—	—	—	—

SWR Red Lion Wiring Options

Function	711R HV/OC PP	711RZ HV/OC PP	716R HV/OC PP	716RZ HV/OC PP
0 Volts	B	B	A	B
+Vcc	A	A	A	A
A	C	C	C	C
A'	E*	E*	E*	---
B	---	---	D	D
B'	---	---	F*	----
Z	---	F	---	E
Z'	---	D*	---	---
Case	---	---	---	---
Shield	---	---	---	---

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Model 711/716 Cube Housings and Brackets



Industrial Cube Housing (711I/716I)

Industrial Housing Features

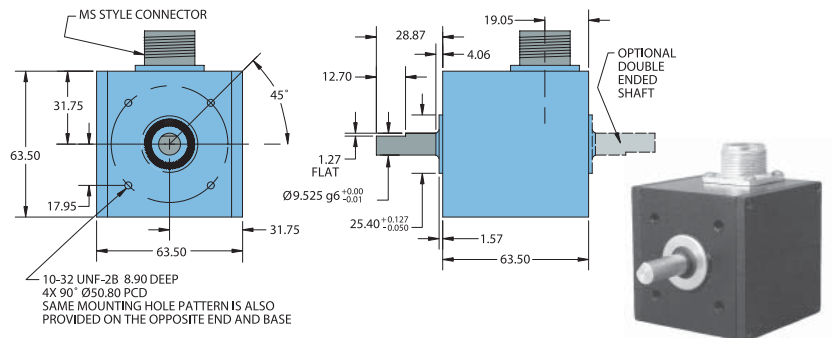
This more robust unit meets requirements between Standard and Heavy Duty housings while retaining the Cube design. The Industrial model features an IP65 shaft seal. The tough, sealed aluminium housing has a wall thickness of 4.75mm and offers greater protection from wash down, sprays, dust, moisture, shock, vibration, and other hazards found in industrial environments.

Industrial Cube Housing (711I/716I) Specifications

Refer to all Standard Cube Housing specifications except as follows:

Mechanical

Shaft Size.....0.375" diameter
 Shaft Type.....Single- or Double-Ended Shaft Available
 Radial Loading.....10 Kg Maximum
 Axial Loading.....5 Kg Maximum
 Starting Torque.....0.0219 Nm Starting Torque w/IP65 Shaft Seal



Heavy Duty Cube Housing (711H/716H)

The Heavy Duty housing uses a separate 0.375" diameter external shaft and bearing assembly to rotate the shaft of an internally mounted Cube Housing. This provides mechanical isolation from external loads and stress. A flexible coupling between the external shaft and the encoder protects the internal unit from axial and radial loading. The 6.35mm aluminium walls protect the encoder from external shock, vibration, and the outside environment.

Heavy Duty Housing Measurement

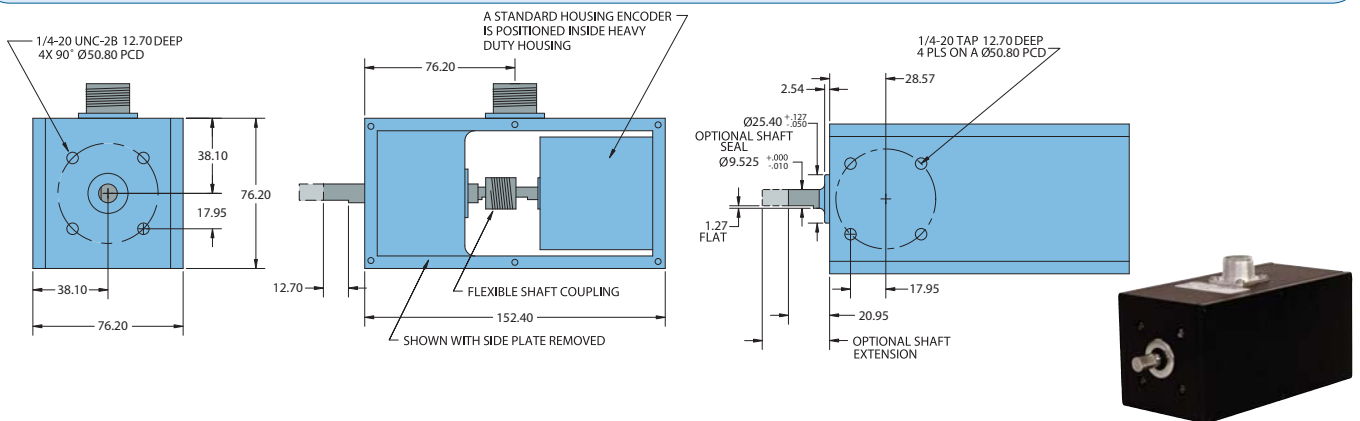
- Heavy Duty 76.20mm X 152.40mm housing

Heavy Duty Cube Housing (711H/716H) Specifications

Refer to all cube specifications except as follows:

Mechanical

Max Speed.....6000 RPM
 Shaft Size.....0.375"
 Rotation.....Either direction
 Radial Loading.....15 Kg maximum
 Axial Loading.....10 Kg maximum
 Bearings.....Precision ABEC ball bearings
 Mounting.....Tapped holes face and base
 Weight.....2.0 Kg



Ultra Heavy Duty Cube Housing (711UH/716UH)

The Ultra Heavy Duty Encoder is designed for use in applications with severe shaft loading conditions. The 711UH/716UH offers two shaft sizes: 0.500" and 0.625". Shaft material is 303 stainless steel, Bearings are conservatively rated at 43Kg radial and 27Kg axial shaft loading. IP65 is standard on all units.

The 711UH/716UH Ultra Heavy Duty housing uses a larger external shaft and R10 bearing assembly to rotate the shaft of an internally mounted Cube housing. This provides mechanical isolation from external loads and stress. A flexible coupling between the external shaft and the encoder protects the internal unit from axial and radial loading. The 0.250" aluminium walls protect the encoder from shock, vibration and the outside environment.

Heavy Duty Cube Housing (711UH/716UH) Specifications

Refer to all cube specifications except as follows:

Mechanical

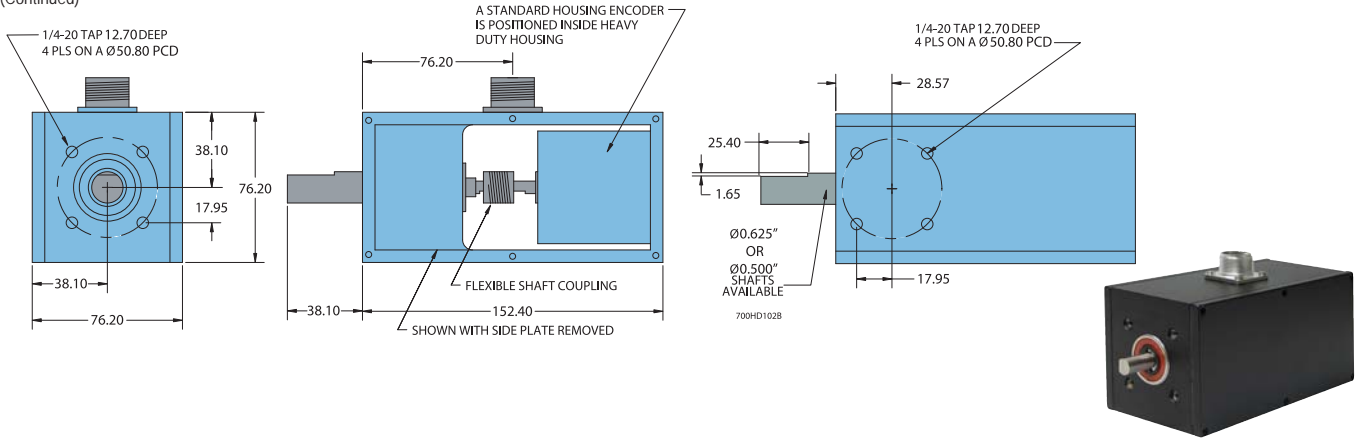
Max Speed.....6000 RPM
 Shaft Size.....0.500" or 0.625"
 Rotation.....Either direction
 Radial Loading.....43 Kg maximum
 Axial Loading.....27 Kg maximum
 Bearings.....Precision ABEC ball bearings
 Starting Torque.....0.0211 Nm IP65 Rated
 Mounting.....Tapped holes face and base
 Weight.....1.78 Kg

Model 711 Single Channel Model 716 Quadrature



Ultra Heavy Duty Cube Housing (711UH/716UH)

(Continued)



Pivot Brackets

700 Series Pivot Brackets

Gravity Driven Pivot Brackets allow an Encoder and Measuring Wheel to adjust to variations in the material surface being measured.

A spring loaded version is also available

These Brackets replace our original Pivot brackets (140039 & 140040)

These are for Standard Cube and Industrial Cube Housing's Only

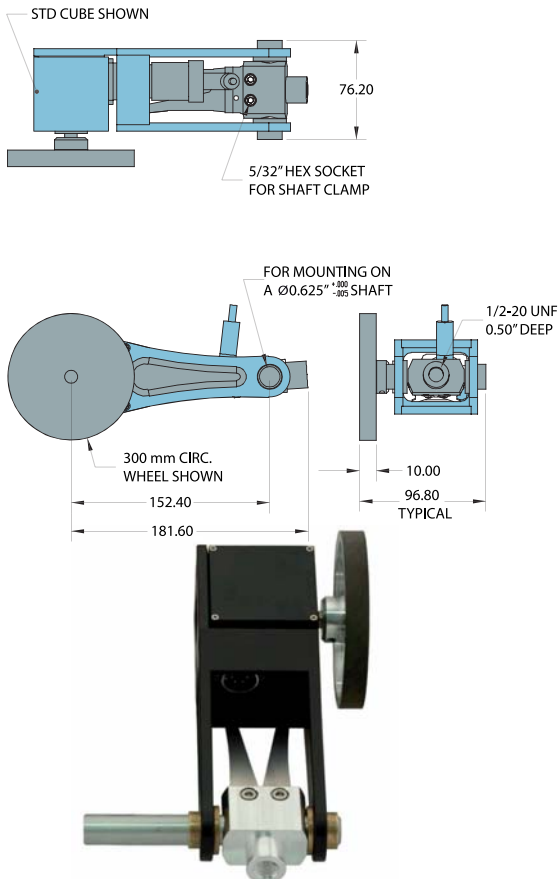
176430-01
Single Pivot Mounting Bracket

176431-01
Double Pivot Mounting Bracket

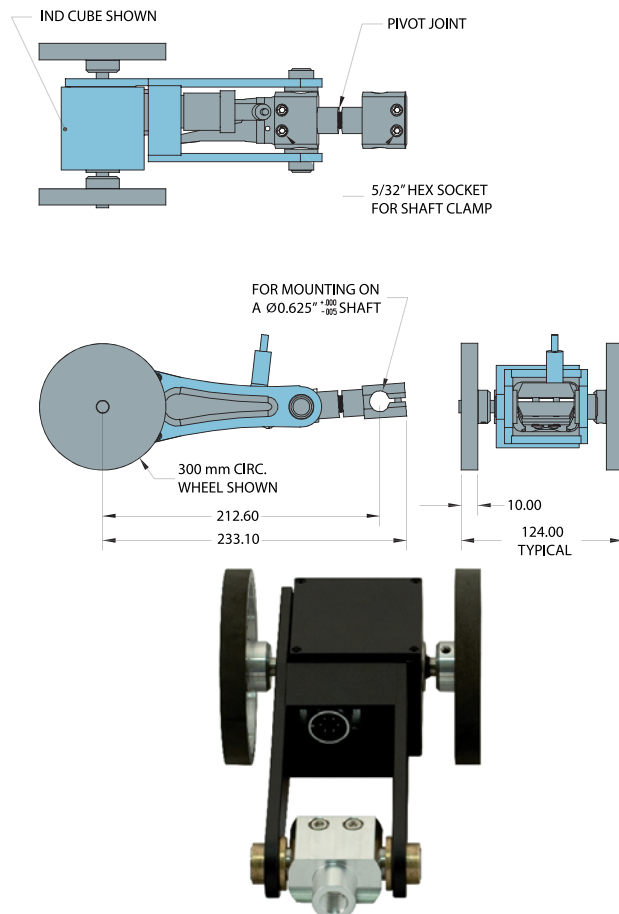
176430-02
Spring Loaded Single Pivot Mounting Bracket

176431-02
Spring Loaded Double Pivot Mounting Bracket

Single Wheel Bracket



Dual Wheel Bracket



Incremental Shaft Encoders

Model 15S Servo-Style Encoder



Incremental Shaft Encoders



Features

- Very High Performance Economical Encoder
- Low Profile - Less Than 25.4 mm Height and 38 mm Diameter
- Extended Temperature Operating Ranges Available
- Up To 12 Pole Commutation Optional (for brushless motor control)

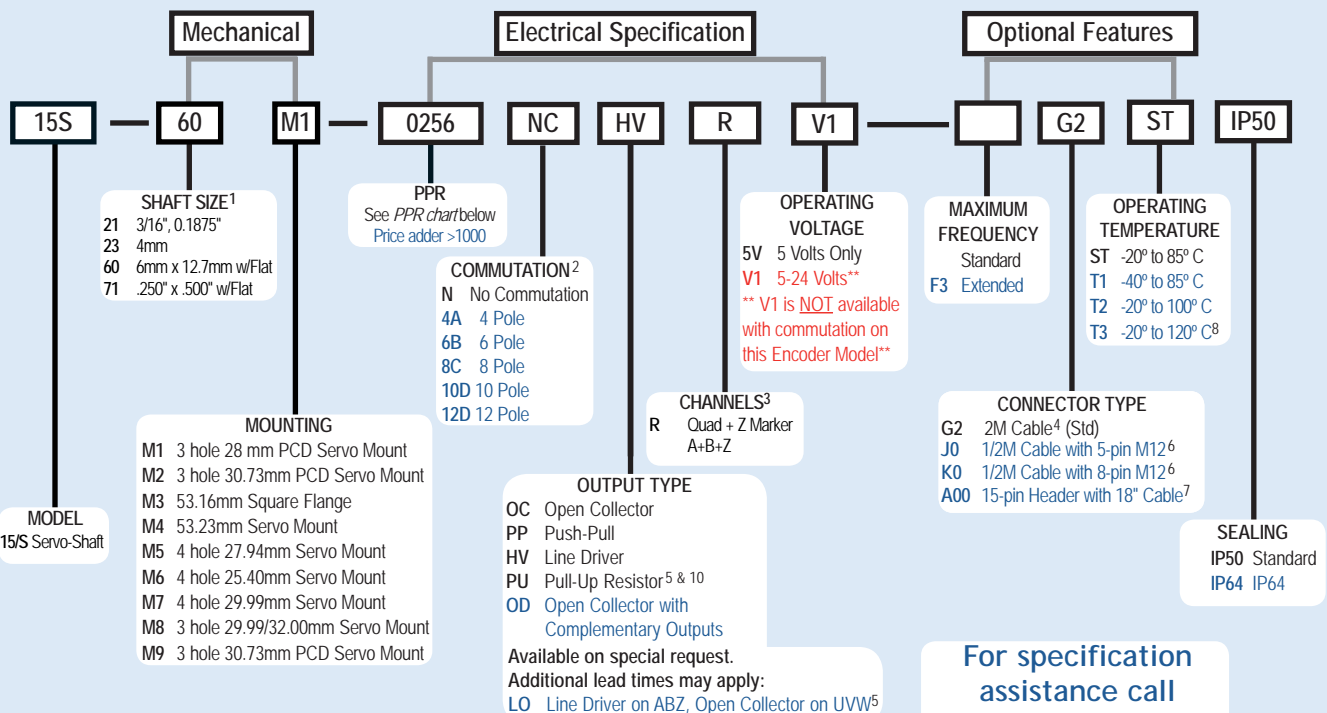
The Model 15S offers a high performance feedback solution in a low profile package, making the Model 15S ideal for commercial and light-duty industrial applications. This industry standard Size 15 (38mm diameter) encoder features a precision bearing set, sealing available to IP64, a durable stainless steel shaft, and a selection of servo, flange, and face mount options. The Model 15S may also be specified with features such as extended operating temperatures from -20° C to +120° C, or up to 12 pole commutation for brushless motor control. The Model 15S features our Opto-ASIC circuitry for a clean, reliable signal. Its durable, yet economical design makes it an ideal encoder for high precision OEM applications.

Common Applications

Servo Motor Control, Robotics, Medical Diagnostic Equipment, Speciality Assembly Machines, Digital Plotters, Printers, Typesetting Equipment

Model 15S Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 15S PPR Options

0001 thru 0189*	0198	0200	0250
0256	0300	0315	0360
0500	0512	0580	0600
0800	1000	1024	1125
1250	1500	1800	2000
2500	2540	3000	3600
4096	5000	6000	7200
10,000			8192

*Contact customer service for Availability

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disc resolutions are available upon request and may be subject to a one-time NRE fee.

For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Not available in all configurations, and not available with V1 Input Voltage. Contact Customer Service for availability (12D Only Available with 80 ppr).
- 3 Contact Customer Service for non-standard marker gating or phase relationship options.
- 4 For non-standard cable lengths contact sales for availability and cost.
- 5 With Input Voltage above 16 Vcc, operating temperature is limited to 85° C. Not available with A00 15 Pin Header option.
- 6 Not available with commutation. 5-pin not available with Line Driver (HV, OD, LO) outputs. Additional cable lengths available. Please consult Customer Service.
- 7 Pin Header available with 5 VDC Input Voltage, HV Line Driver and standard quadrature phasing only. Not available with CE Certification. IP50 sealing option only.
- 8 Only available with 5 Vcc Input Voltage.
- 9 Reverse Quadrature not available with PU output type.

Model 15S Servo-Style Encoder



Model 15S Specifications

Electrical

Input Voltage.....	5 Vcc ±10% Fixed Voltage 4.75 to 28 Vcc max for temperatures up to 85° C 4.75 to 24 Vcc for temperatures between 85° to 100° C 5V Only for Commutation Encoders
Input Current.....	100 mA max (65 mA typical) with no output load
Output Format.....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See <i>Waveform Diagrams</i> .
Output Types.....	Open Collector- 20 mA max per channel Push-Pull- 20 mA max per channel Pull-Up- Open collector with 2.2K ohm Pull-Up 20mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index.....	Once per revolution. 190 to 10,000 PPR: Gated to output A 1 to 189 PPR: Ungated See <i>Waveform Diagrams</i> .
Max. Frequency.....	Standard Frequency Response is 200 kHz for PPR 1 to 2540 500 kHz for PPR 2541 to 5000 1 MHz for PPR 5001 to 10,000 Extended Frequency Response (optional) is 300 kHz for PPR 2000, 2048, 2500, and 2540
Noise Immunity.....	Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN500811
Symmetry.....	180° (±18°) electrical
Quad. Phasing.....	90° (±22.5°) electrical
Min. Edge Sep.....	67.5° electrical
Accuracy.....	Within 0.017° mechanical or 1 arc-minute from true position. (for PPR>189)
Commutation.....	Up to 12 pole. Contact Customer Service for availability.
Comm. Accuracy.....	1° mechanical

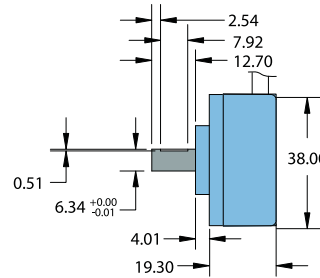
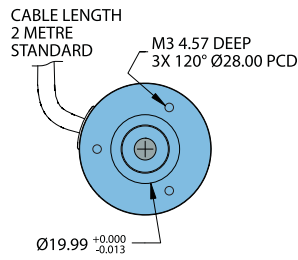
Mechanical

Max Shaft Speed....	8000 RPM. Higher speeds may be achievable, contact Customer Service.
Shaft Material.....	Stainless Steel
Radial Shaft Load ..	2.27 Kg max. Rated load of 0.91 Kg to 1.36Kg
Axial Shaft Load.....	2.27 Kg max. Rated load of 0.91 Kg to 1.36Kg
Starting Torque.....	IP50: 3.531 x 10 ⁻⁴ Nm IP64: 2.825 x 10 ⁻³ Nm
Electrical Conn.....	2M cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 2M cable (braid shield), 15-pin Header with 2M Cable
Weight.....	100 grams typical

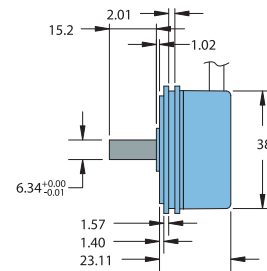
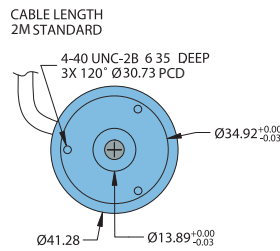
Environmental

Operating Temp.....	-20° to +85° C for standard models -40° to +85° C for low temperature option -20° to +100° C for high temperature option -20° to +120° C for extreme temperature option
Storage Temp.....	-25° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	10 g @ 58 to 500 Hz
Shock.....	80 g @ 11 ms duration
Sealing.....	IP50 standard; IP64 available

Model 15S Standard Servo Mount (M1)

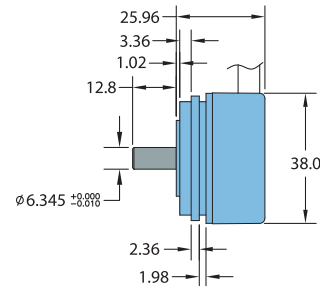
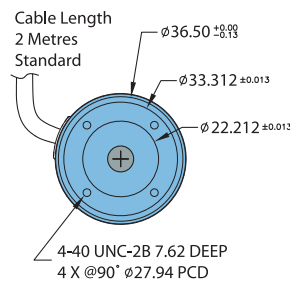


Model 15S Servo Mount M2 & M9*

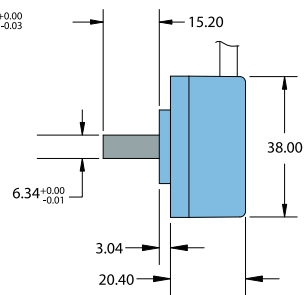
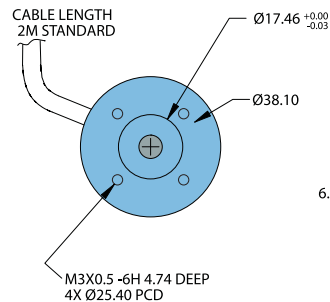


*M9 mount includes a 19.05mm boss

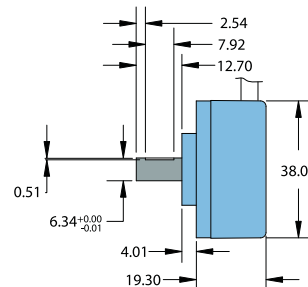
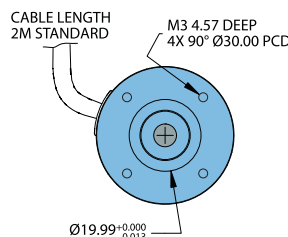
Model 15S Servo Mount (M5)



Model 15S Servo Mount (M6)



Model 15S Servo Mount (M7)

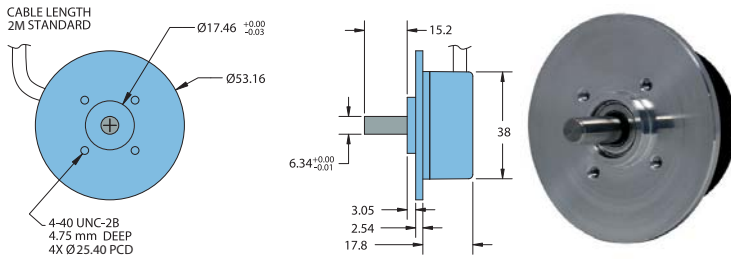


All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

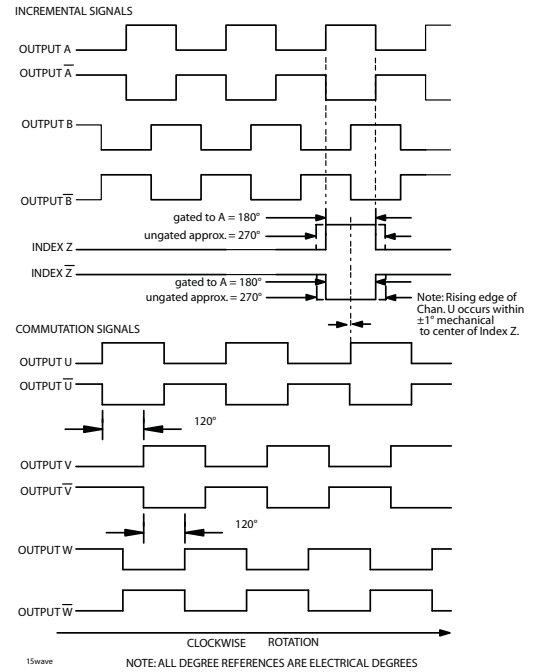
Model 15S Servo-Style Encoder



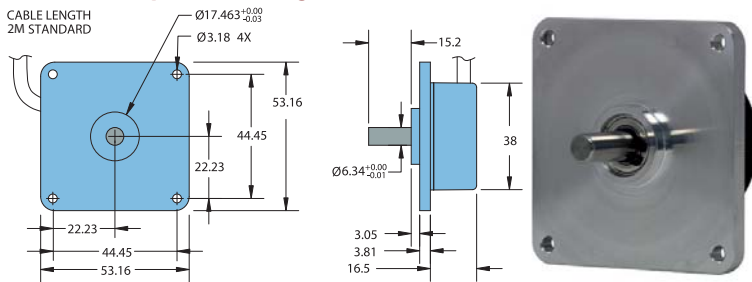
Model 15S Standard Servo Mount (M4)



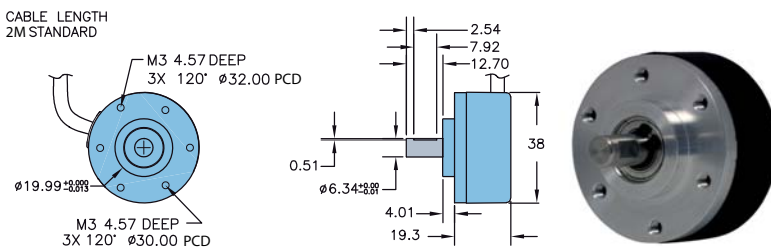
Waveform Diagram



Model 15S Square Flange (M3)

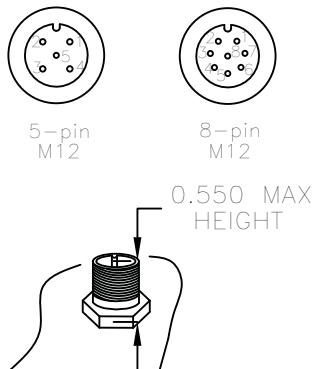


Model 15S Servo Mount (M8)

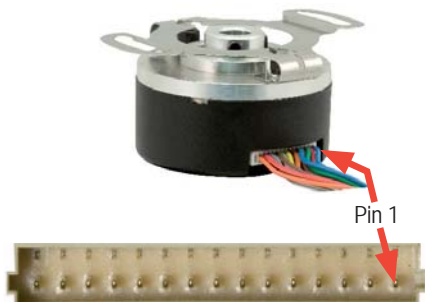


All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

Connector Pin-Outs



15-pin Header



Wiring Table

Function	Cable Wire Color	5-pin M12 ²	8-pin M12 ²	15-pin Header	
0 Volts	Black	3	7	1	
+ Vcc	White	1	2	2	
A	Brown	4	1	4	¹ Cable shield (bare wire) is connected to internal case.
A'	Yellow	--	3	3	
B	Red	2	4	6	
B'	Green	--	5	5	
Z	Orange	5	6	7	
Z'	Blue	--	8	8	
U	Violet	--	--	10	² Cable shield and M12 connector body is connected to internal case.
U'	Gray	--	--	9	
V	Pink	--	--	14	
V'	Turquoise	--	--	13	
W	Red/Green	--	--	12	
W'	Red/Yellow	--	--	11	
Shield	Bare ¹	--	--	--	

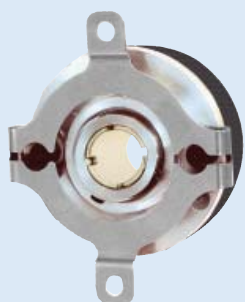
Replacing your encoder has never been simpler.

Model 15S



Our Model 15S has more mounting face options than any other 38mm shaft encoder. A variety of bosses and bolt hole patterns will provide cross-reference adaptability like no other encoder.

Model 15T



Model 15H



Models 15T and 15H are the superior choice for your servo or stepper motor application. Endurance in High Temperatures, High Resolution Performance, Commutation, and Flexible Mounting Options make the 15T/H an unbeatable encoder.

Cross References:

The Model 15 can be crossed to many encoders- this is NOT a complete list. Please contact Customer Service for additional offerings and to ensure complete and accurate cross-referencing.

Competitors Model	15S Mounting Face
Automation Dir TRDS	M1
DRC 23	M4
DRC 77L	M4
DRC M2	M3, M4
Dynapar E14	M5
Dynapar E23	M6
Nemicon OEW	M7
Nemicon OVW	M1
Renco RS15	M6
Sumtak IRS3	M1
Tamagawa OIS38	M1
Tekel TK-15	M6
Omron E6B2	M8
Sumtak LBL	M9

Competitors Model	15T/H Flex Mount PCD
DRC 730	FF
DRC 731	FF
DRC H15	SF
DRC T23	FF
Dynapar M14	SC
Dynapar M15	SF
Dynapar M21	SF
Dynapar F14	SB, SF
Renco RHS15	SF
Renco RCM15	SC
Sumtak IRH3	SD
Sumtak IRT3	SD
Sumtak LBK/LDA	FF, SF
Turck 8.3720	SF

For specification assistance call Customer Service at +44 (0)1978 262100

Incremental Shaft Encoders

Model 755RG 38mm High Precision Servo or Square Flange Mount



Features

- Miniature Size (38mm Diameter)
- Up to 30,000 Pulses Per Revolution
- Servo or Flange Mounting
- 1 MHz Frequency Response Available
- Extended Temperature Operating Range Available

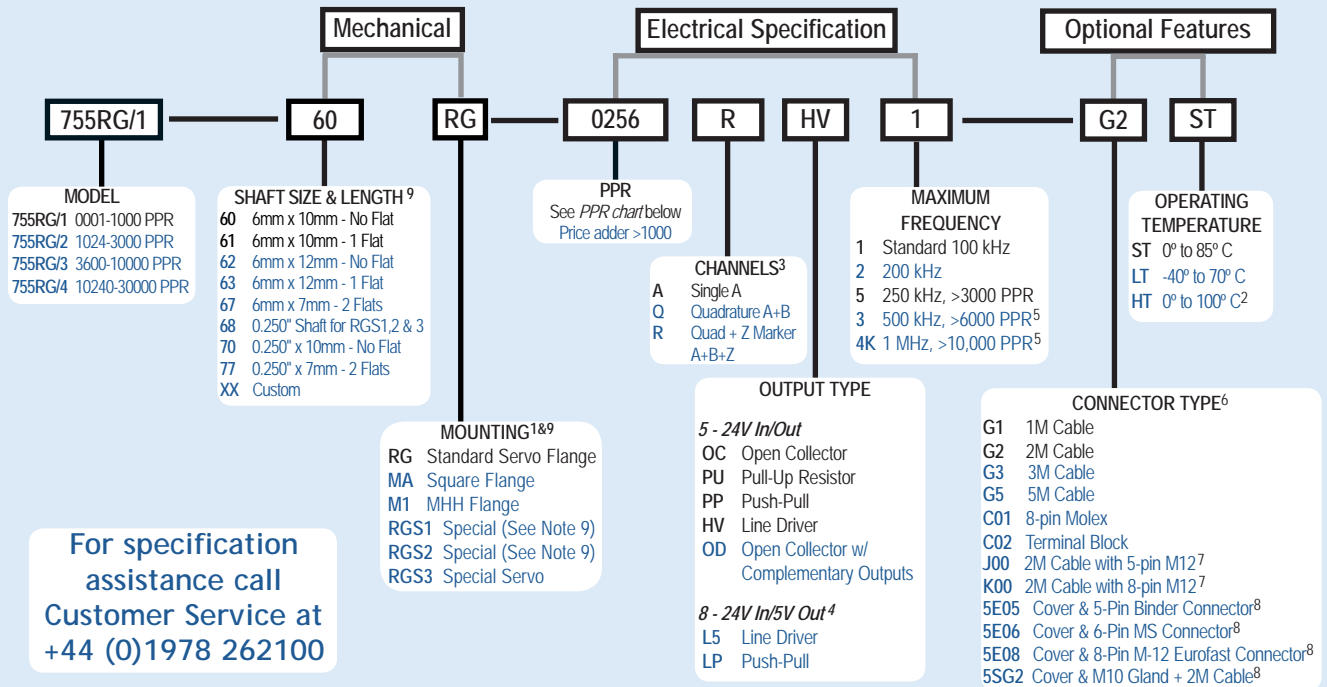
The Model 755RG is ideal for applications requiring a small, high precision, high performance encoder. Approximately 38mm in diameter and 38mm long, it will fit where many encoders cannot. Designed with all metal construction and shielded ball bearings, it will provide years of trouble-free use. The standard servo mount (RG) version is available with a variety of shaft sizes and lengths. Three additional servo style mounts (RGS1, RGS2, RGS3) are also available. The optional flange mounting (MA) is ideal for applications requiring a bolt-on, high precision encoder. And the optional MHH flange (M-1) converts the mounting to be the same as the 58 style 426 package. With its high reliability and quick delivery, the Model 755A encoder is the perfect replacement encoder for less reliable encoders of this size.

Common Applications

Servo Motor Control, Robotics, Medical Diagnostic Equipment, Speciality Assembly Machines, Digital Plotters, Printers, Typesetting Equipment

Model 755RG Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 755RG PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0144*	0150*	0160*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

NOTES:

1 See drawing diagrams for dimension and hole placements for all mountings.

2 0° to 85°C for certain resolutions - Please see PPR options table.

3 Contact Customer Service for marker gating options.

4 Standard temperature, 60 to 3000 PPR only.

5 Standard cable lengths only.

6 For non-standard cable lengths, please call our sales office.

7 5-pin not available with Line Driver (HV, L5) outputs. Additional cable lengths available. Please consult Customer Service.

8 See 755 Special Covers page 51 for Cover Diagrams & options.

9 Please Note: - RGS1, RGS2 Bodies are ONLY available with shafts 62, 63 and 68 - If choosing shaft 62 and 63 - the length from of the shaft from the face will be 7mm - shaft 68 length will be the same as diagram.

Model 755RG 38mm High Precision Servo or Square Flange Mount



Model 755RG Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
4.75 to 24 Vcc for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Open Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Index.....Occurs once per revolution. The Index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.

Max Frequency.....Up to 1 MHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
6001 to 20,480 PPR: 90° (±36°) electrical

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
6001 to 20,480 PPR: 54° electrical
>20,480 PPR: 50° electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size.....Up to 0.250" Diameter

Bore Tolerance.....g6, Sliding fit for H7 host bore

User Shaft Tolerances

Radial Shaft Load.....2.25 Kg max

Axial Shaft Load.....1.36 Kg max

Starting Torque..... 9.886×10^{-4} typical

Electrical Conn.....2M cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 2M cable (braid shield), 8-pin Molex, Terminal Block, 5 Pin Cover, 6 Pin Cover, 8 Pin Cover, Gland Cover (See appendix sheet for cover options)

Housing.....Black non-corrosive finish

Bearings.....Precision ABEC ball bearings

Mounting.....Servo or Optional Flange

Weight.....100 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
-40° to 70° C for low temperature option
0° to 100° C for high temperature option
(0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp.....-25° to +85° C

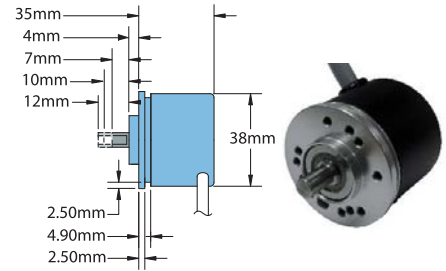
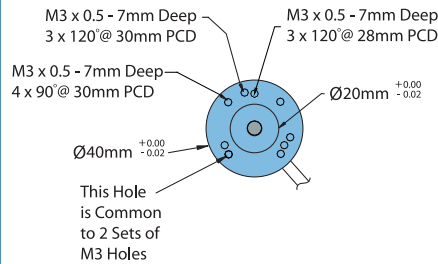
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

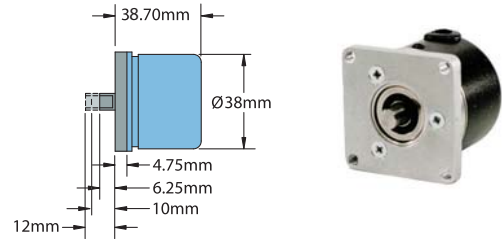
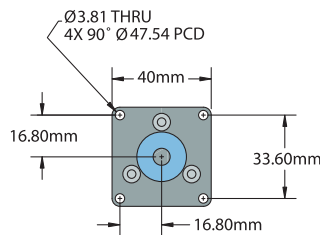
Shock.....50 g @ 11 ms duration

Sealing.....IP50 Standard

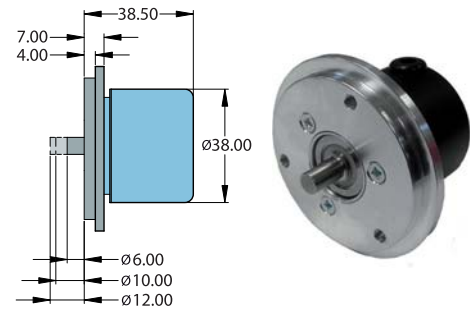
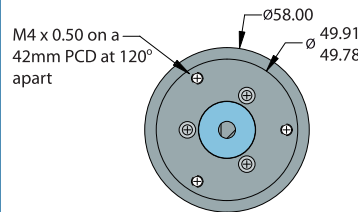
Model 755RG Standard Servo Mount (RG)



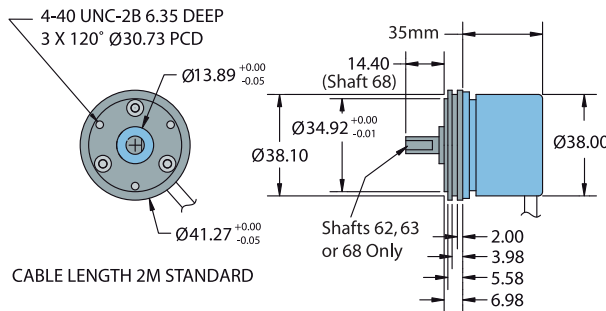
Model 755RG Square Flange Option (MA)



Model 755RG MHH 58mm Flange (M1)



Model 755RG Servo Mounts RGS1 and RGS2



RGS1 has a 13.89mm Boss. RGS2 Pictured below has a 19.05mm Boss.



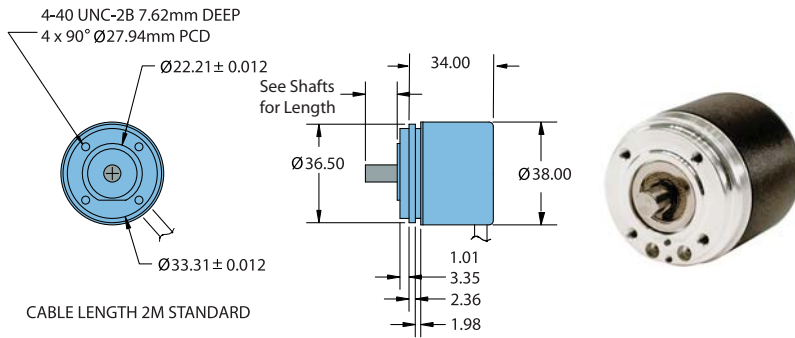
All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

Model 755RG 38mm High Precision Servo or Square Flange Mount



Model 755RG Mounting RGS3

Wiring Table

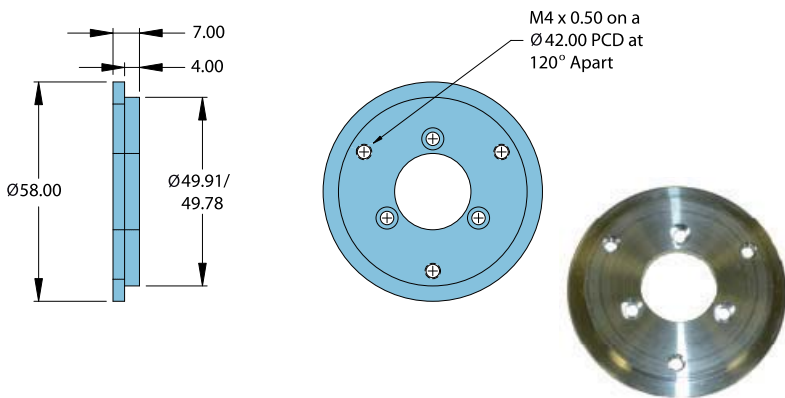


Function	Cable Wire Color	Terminal Block	8-pin ¹ Molex	5-pin ¹	8-pin M12 ¹	6-pin MS ¹
0 Volts	Black	7	2	3	7	A
+ Vcc	White	8	1	1	2	B
A	Brown	1	8	4	1	D
A'	Yellow	2	7	---	3	---
B	Red	3	4	2	4	E
B'	Green	4	3	---	5	---
Z	Orange	6	6	5	6	C
Z'	Blue	5	5	---	8	---
Shield	Bare ¹	---	---	---	---	---

¹See Appendix Data Sheet for Connector Cover Options

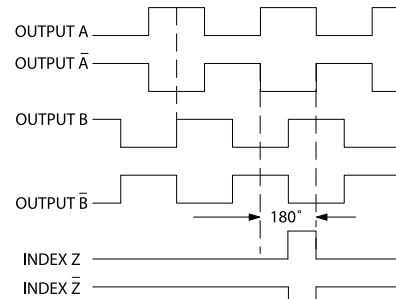
Also Available as Separate Flanges are the M-1 and MA Flanges Below.

Individual M-1 Flange Kit (MHH)



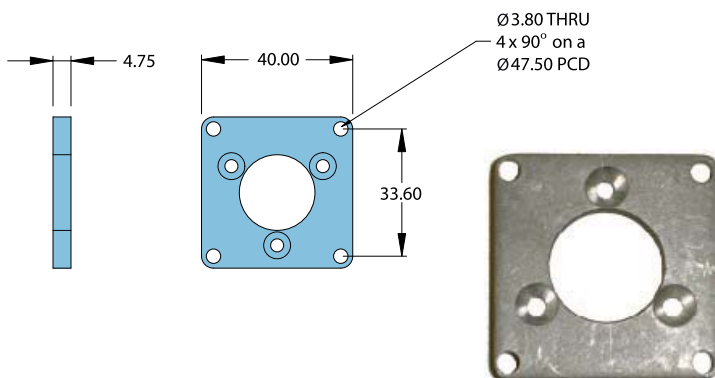
Waveform Diagram

Line Driver (HV), Push-Pull (PP - No /A, /B & /Z)

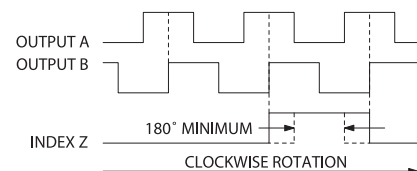


NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
Marker Gated A+B

Individual MA Flange Kit (Square Flange)



Open-Collector, Pull-Up (OC, PU)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

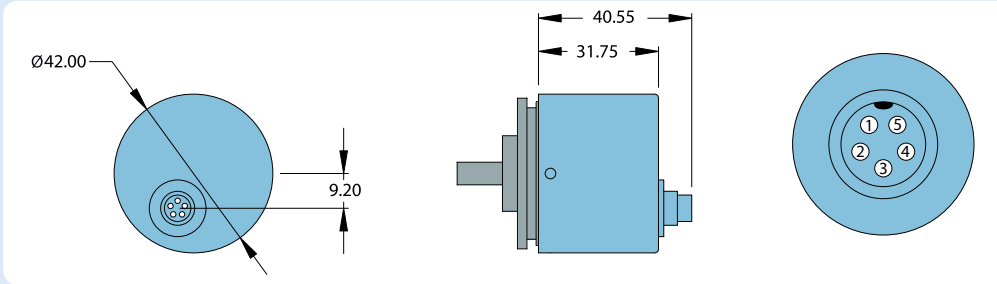
755 Special Covers Appendix Sheet



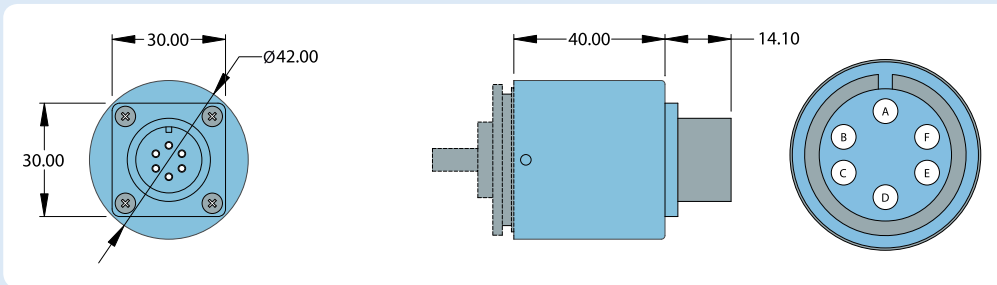
755HS and 755RG Special Covers

Please see Specific Model (755RG or 755HS) Ordering Guides for Options

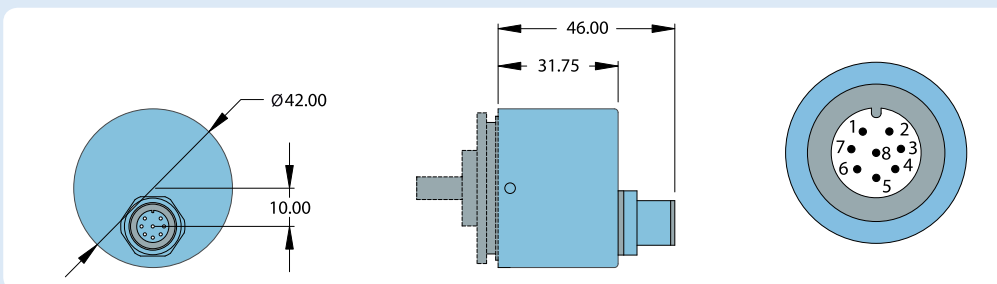
755 Cover & 5 Pin Binder Connector (5E05)



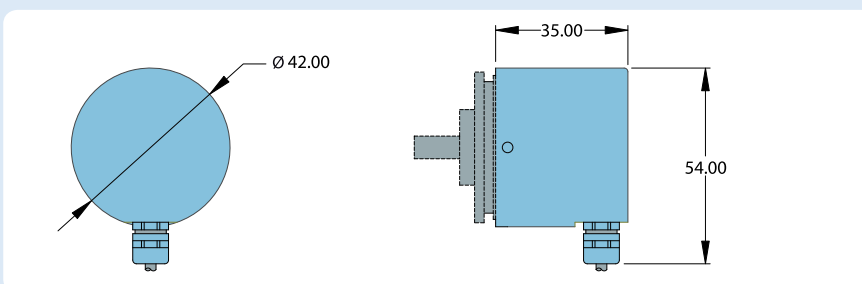
755 Cover & 6 Pin MS Connector (5E06)



755 Cover & 8 Pin EuroFast Connector (5E08)



755 Cover & M10 Gland + 2M Cable (5SG2)



For specification assistance call Customer Service at +44 (0)1978 262100

Incremental Shaft Encoders

Model 702 Ultra Rugged 50.80mm Diameter



Ø50.80

Features

- Standard Size 20 Package (50mm x 50mm)
- Flange, and Servo Mounting
- Up to 30,000 PPR
- 35Kg Max. Axial and Radial Shaft Loading
- IP67 Sealing Available

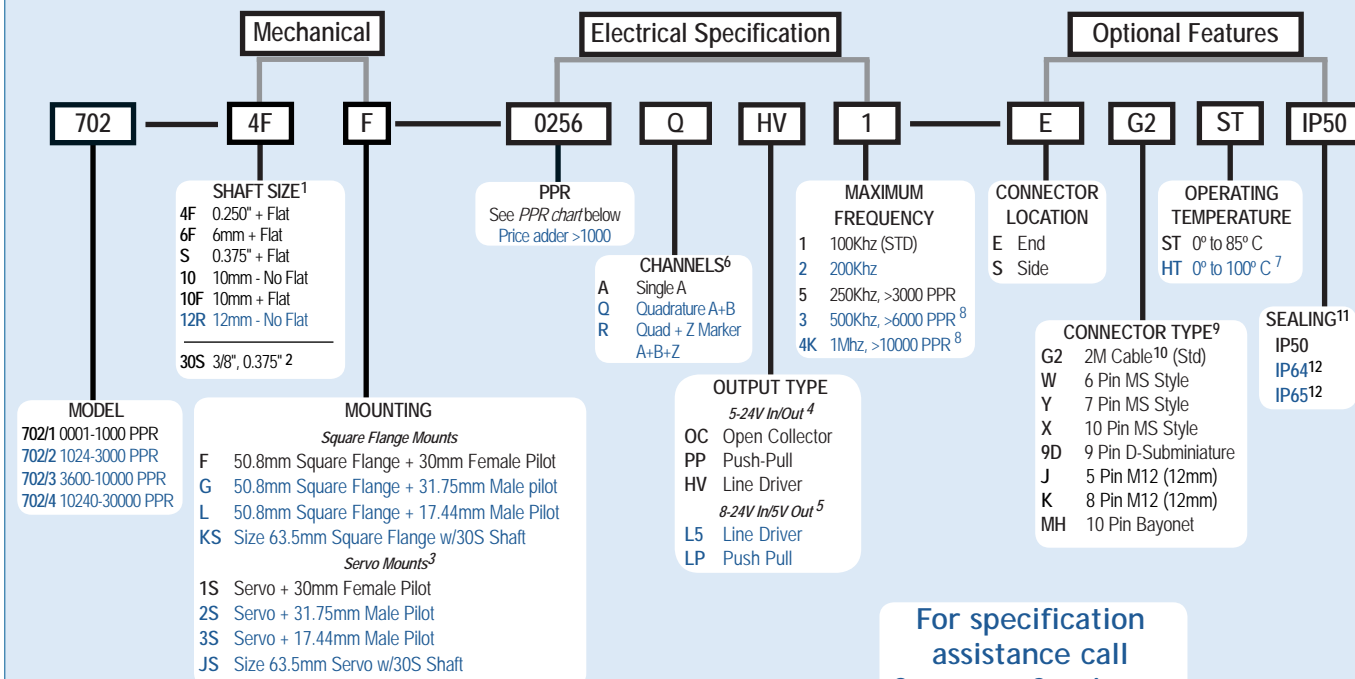
The Model 702 Size 20 is a heavy duty, extremely rugged, reliable, yet compact industry standard 50.80mm diameter encoder, designed for harsh factory and plant floor environments. The double shielded ball bearings are rated at 35Kg maximum axial and radial shaft loading to ensure a long operating life. Made to withstand the harsh effects of the real world, both the flange and servo models are rated IP67 with the optional heavy duty shaft seal. With a variety of mounting options in both the flange and servo models, the Model 702 is ideal for both new applications and replacements. If you need an encoder that won't let you down, the Model 702 is it.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Model 702 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 702 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request.

A one-time NRE fee may apply.

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Shaft Size 30S **ONLY** available with KS and JS Mountings.
- 3 Please make sure you state the type of Servo option for 1S, 2S and 3S - See opposite page for mounting hole arrangements for the 2 Versions (Servo #1 and Servo #2)
- 4 Not available with 5-Pin & HV option / Marker not available with 6-Pin (HV-Q) or 7-Pin MS Connector & HV option.
- 5 24Vcc Max for High Temperature Option / Standard Temperature 60 to 3000 PPR only.
- 6 Contact Customer Service for non-standard marker gating or phase relationship options.
- 7 0° to 85° C for certain PPR resolutions - See PPR options.
- 8 Standard Cable Length Only.
- 9 For Mating Connectors & Cables please refer to Accessories pages.
- 10 For non-standard cable lengths contact sales for availability and cost.
- 11 Increased starting torque with IP64, IP65 sealing.
- 12 IP66 & IP67 available in certain configurations - Please contact sales office for information and availability.

Model 702 Ultra Rugged 50.80mm Diameter



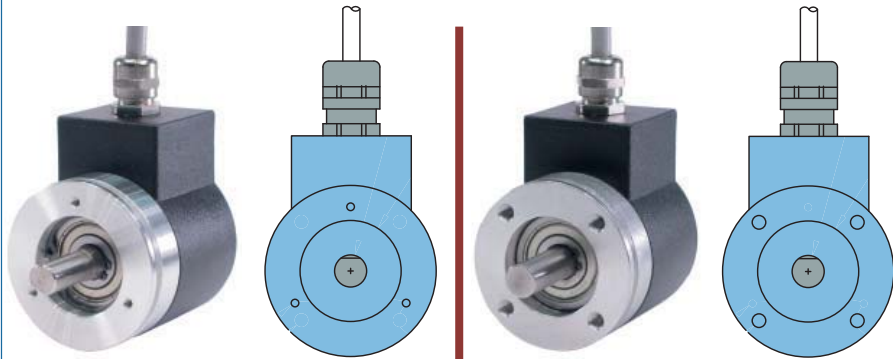
Model 702 Specifications

Electrical	
Input Voltage.....	4.75 to 24 Vcc max for temperatures up to 70° C 4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current.....	100 mA max with no output load
Input Ripple.....	100 mV peak-to-peak at 0 to 100 kHz
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See <i>Waveform Diagrams</i> .
Output Types	Open Collector- 100 mA max per channel Pull-Up- 100 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index	Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See <i>Waveform Diagrams</i> .
Max Frequency.....	Up to 1 MHz.
Noise Immunity.....	Tested to BS EN61000-4-2: IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry.....	1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 PPR: 180° (±36°) electrical
Quad Phasing.....	1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 PPR: 90° (±36°) electrical
Min Edge Sep.....	1 to 6000 PPR: 67.5° electrical at 100 kHz output 6001 to 20,480 PPR: 54° electrical >20,480 CPR: 50° electrical
Rise Time.....	Less than 1 microsecond
Accuracy	Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)
Mechanical	
Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Size	0.250", 0.375", 10 mm or 12 mm
Shaft Rotation.....	Bi-directional
Radial Shaft Load.....	35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Axial Shaft Load.....	35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Starting Torque	7.0615×10^{-3} Nm Typical with IP64 or no seal 2.0118×10^{-2} Nm Typical with IP65 Seal 4.0943×10^{-2} Nm Typical with IP67 Seal
Connector Type.....	6-, 7-, and 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors), 10-pin Bayonet
Housing.....	Black non-corrosive finish
Bearings.....	Precision ABEC ball bearings
Mounting.....	Various flange or servo mounts
Weight.....	320 grams typical
Environmental	
Operating Temp.....	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)
Storage Temp.....	-25° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	20 g @ 58 to 500 Hz
Shock.....	75 g @ 11 ms duration
Sealing.....	IP50 standard; IP64, IP66 or IP67 optional

Model 702 Servo Mounts

Servo #1 (S)

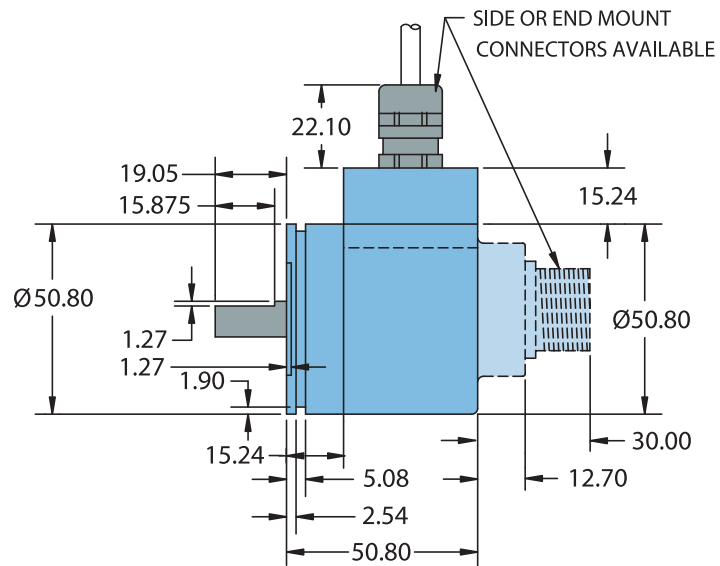
Servo #2 (C)



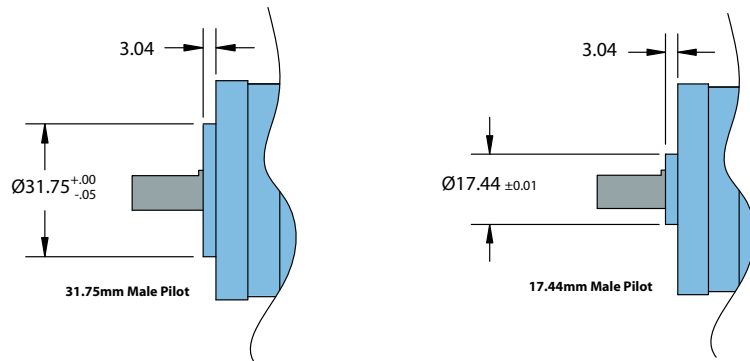
SERVO MOUNT #1
4-40 UNC-2B 6.35mm DEEP
3 x 120° on a 38.20mm PCD

SERVO MOUNT #2
10-32 UNF-2B 6.35mm DEEP
4 x 90° on a 41.27mm PCD

Body Dimensions for Servo Mounts #1 and #2



Optional Male Pilots for Flange and Servo Mounts



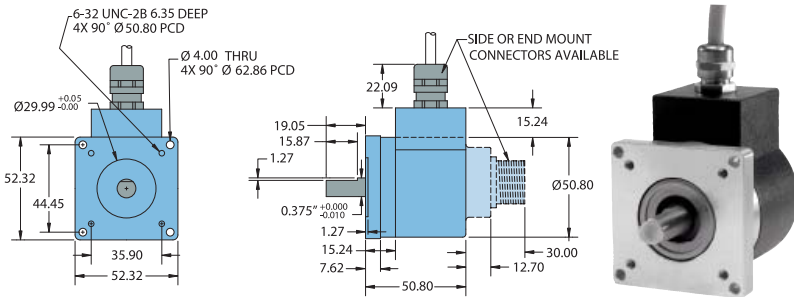
All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

Incremental Shaft Encoders

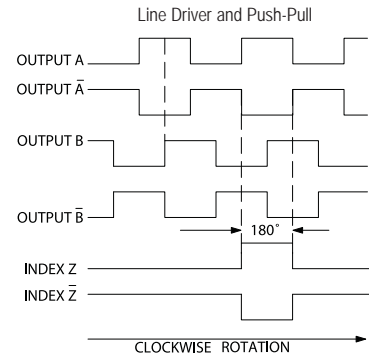
Model 702 Ultra Rugged 50.80mm Diameter



Model 702 Square Flange Mount (F)



Waveform Diagrams

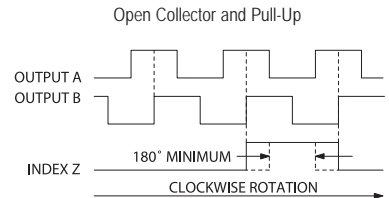
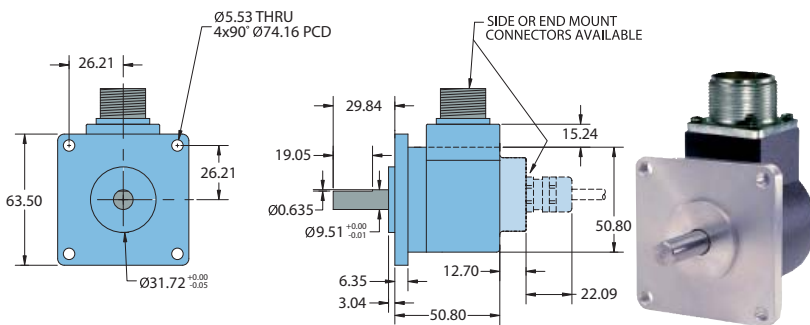


NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: PUSH-PULL OUTPUT DOES NOT INCLUDE COMPLEMENTARY CHANNELS

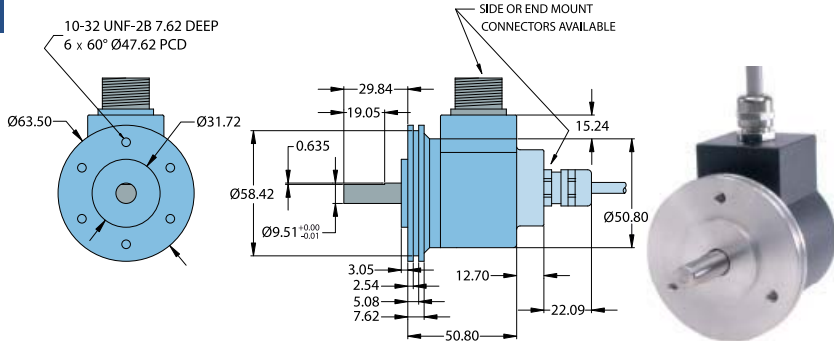
Model 702 63.5mm Square Flange (KS)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: INDEX IS POSITIVE GOING

Model 702 63.5mm Servo Mount (JS)



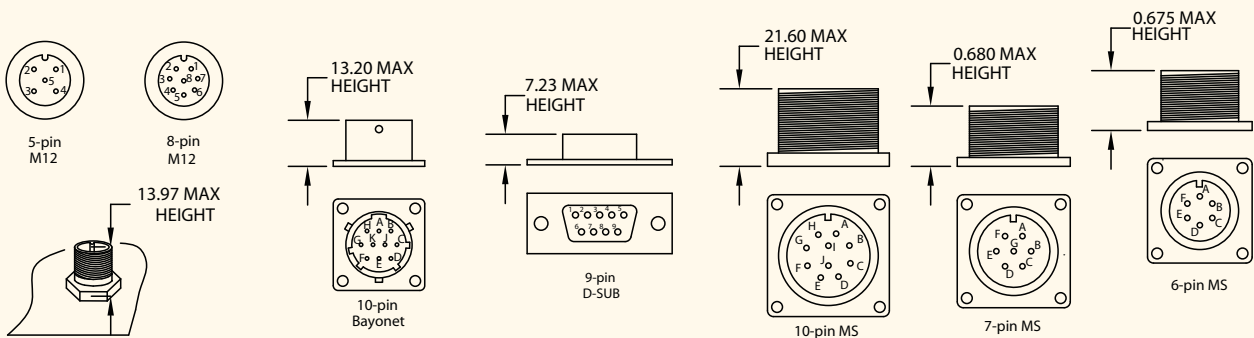
All dimensions are in mm with a tolerance of $\pm 0.127\text{mm}$ or ± 0.254 unless otherwise specified

Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC, LP HV-R	6-pin MS PP OC, LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub	10-pin Bayonet
Com	Black	3	7	F	F	F	F	F	9	F
+Vcc	White	1	2	D	D	D	D	D	1	D
A	Brown	4	1	A	A	A	A	A	2	A
A'	Yellow	—	3	H	C	—	—	C	3	H
B	Red	2	4	B	B	B	B	B	4	B
B'	Green	—	5	I	E	—	—	E	5	J
Z	Orange	5	6	C	—	C	C	—	6	C
Z'	Blue	—	8	J	—	—	—	—	7	K
Case	—	—	—	G	G	G	—	—	8	G
Shield	Screen	—	—	—	—	—	—	—	—	—

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Connector Pin-Outs



Ultra Rugged 50.80mm Encoder & Related Products



Quick Specs

- Rugged Industrial Encoder
- 50.80mm x 50.80mm Housing
- PPR to 30,000
- Many Output Types
- RPM to 8000
- Sealing to IP66
- High Temperature Option

Mounting Options

The 702 Motor Mount comes with coupling and available with a Bossed Hub to attach directly to fast revving motors.

The 702 Shaft has many different servo mounts and mounting flanges available and able to handle heavy loads.

Other Related Products



The Model 802S is an industry standard Size 20 (50.80mm diameter) encoder housed in a heavy duty 316 stainless steel package. It's specifically designed for harsh factory and plant floor environments. A variety of flange and servo mounting styles, make it easy to use in a broad range of applications.



Model 725 Size 25 optical shaft encoder is specifically designed for the challenges of an industrial environment. But don't let its tough, industrial package fool you! it still has the performance to reach resolutions up to 30,000 pulses per revolution.



The Model 858S European Size 58 is a heavy duty, extremely rugged, reliable encoder, in a 316 stainless steel package. Its compact design is well suited for harsh factory and plant floor environments, calling for a metric solution.



The Best Choice

- A 3-Year Satisfaction Guaranteed Warranty
- Encoder Products Company has Specialised in Building Only Durable, Dependable Encoders for More Than 40 Years
- Superior Customer Service
- More Configurations Than Any Other Encoder Manufacturer
- Expert Cross Reference Service
- Next Day Expedite Delivery Available

Incremental Shaft Encoders

For specification assistance call Customer Service at +44 (0)1978 262100

Model 725 Heavy Duty (Formerly 730 & 735 Series)



Features

- Standard Size 25 Package (63.5 x 63.5)
- Up to 30,000 PPR
- Standard and Industrial Housings
- Servo and Flange Mounting
- IP67 Sealing Available

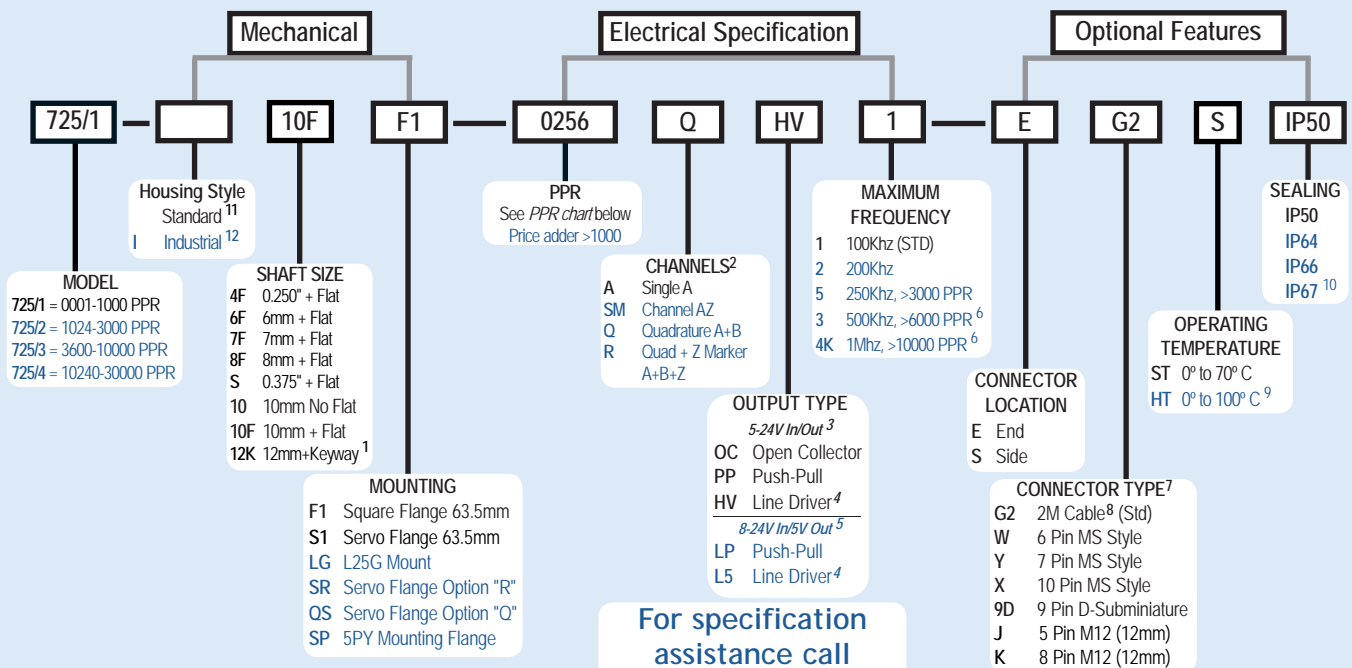
Model 725 Size 25 (Formerly 730 Series) optical shaft encoder is specifically designed for the challenges of an industrial environment. But don't let its tough, industrial package fool you! It still has the performance to reach resolutions up to 30,000 pulses per revolution. The Model 725 offers both flange and servo mounting options, and is available in two distinct housing styles. The rugged Standard Housing isolates the internal electronics from the shock and stress of the outer environment. The extra heavy-duty Industrial Housing (I) features a fully isolated internal encoder unit that prolongs bearing life by using an internal flexible mount to protect the encoder from severe axial and radial shaft loading. The Industrial Housing option is the recommended solution for applications subject to continuous side loads, such as applications that drive the encoder with a measuring wheel, pulley or chain & sprocket.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Model 725 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 725 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (HT) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request.

A one-time NRE fee may apply.

NOTES:

- 1 Only available on IP50 and IP64 rated units, Not available on Industrial Housing and LG, SR, QS, SP Mountings.
- 2 Contact customer service for non-standard marker gating and phase relationship options.
- 3 24Vcc Max for High Temperature Option.
- 4 Marker Not available with 5-Pin, 6-Pin (HV-Q) or 7-Pin MS Connectors and HV option.
- 5 Standard Temperature, 60-3000 PPR Only.
- 6 Standard Cable Length Only.
- 7 For Mating Connectors, Cables - please see the Accessories Pages.
- 8 For non-standard cable lengths please contact the sales office.
- 9 0° to 85° C for certain PPR resolutions - See PPR options.
- 10 IP67 Only Available on Industrial Housing.
- 11 Leave blank for standard option.
- 12 The M4 holes on the S1 option are not available for Industrial Version - The holes are 6 x 10-23 @ 60° apart on a 47.62 PCD. The Spigot length on the S1 and F1 Industrial Options is also shorter at 4.06mm not 7.62 as in the standard version.

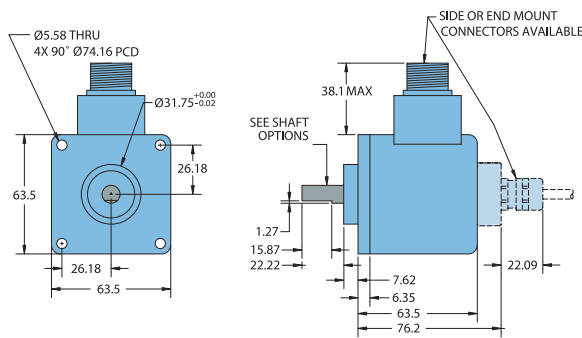
Model 725 Heavy Duty (Formerly 730 & 735 Series)



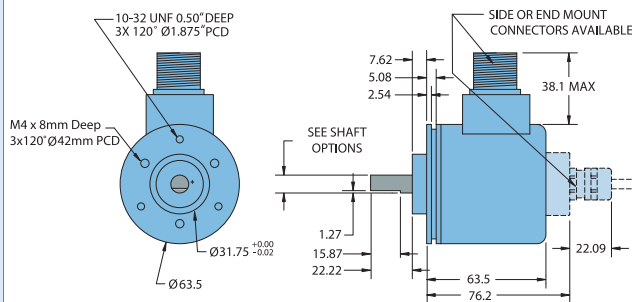
Model 725 Specifications

Electrical	
Input Voltage.....	4.75 to 24 Vcc max for temperatures up to 70° C 4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current.....	100 mA max with no output load
Input Ripple.....	100 mV peak-to-peak at 0 to 100 kHz
Output Format.....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See <i>Waveform Diagrams</i> below.
Output Types.....	Open Collector- 100 mA max per channel Pull-Up- 100 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index.....	Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See <i>Waveform Diagrams</i> below.
Max Frequency.....	Up to 1 MHz
Noise Immunity.....	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry.....	1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 PPR: 180° (±36°) electrical
Quad Phasing.....	1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 PPR: 90° (±36°) electrical
Min Edge Sep.....	1 to 6000 CPR: 67.5° electrical at 100 kHz output 6001 to 20,480 PPR: 54° electrical >20,480 PPR: 50° electrical
Rise Time.....	Less than 1 microsecond
Accuracy.....	Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)
Mechanical	
Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Size.....	0.375" (standard), 0.250", 6 mm, 8 mm, 10 mm and 12 mm
Shaft Material.....	303 stainless steel
Shaft Rotation.....	Bi-directional
Radial Shaft Load.....	16 Kg max (standard housing) 36 Kg max (industrial housing)
Axial Shaft Load.....	18 Kg max (standard housing) 36 Kg max (industrial housing)
Starting Torque.....	7.0615 X 10 ⁻³ Nm typical with no seal 1.412 X 10 ⁻² Nm with IP64 shaft seal 2.118 X 10 ⁻² Nm typical with IP66 shaft seal 4.943 X 10 ⁻² Nm typical with IP67 shaft seal
Electrical Conn.....	6-, 7-, or 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors)
Housing.....	Black non-corrosive finish
Bearings.....	Precision ABEC ball bearings
Mounting.....	Flange, servo, or 5PY
Weight.....	566 grams typical
Environmental	
Operating Temp.....	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.) -40° to 70° C
Storage Temp.....	-25° to +85° C
Humidity.....	95% RH non-condensing
Vibration.....	725N: 10 g @ 58 to 500 Hz 725I: 20 g @ 58 to 500 Hz
Shock.....	725N: 50 g @ 11 ms duration 725I: 75 g @ 11 ms duration
Sealing.....	IP50 standard, IP64, IP66 and IP67 optional

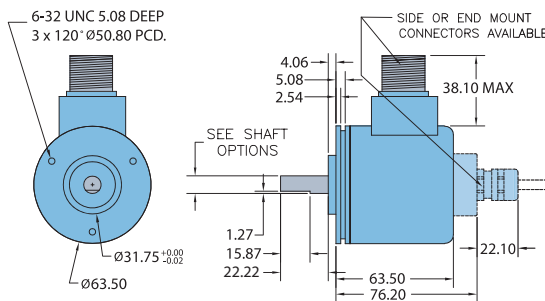
Model 725 Flange Mount (F1)



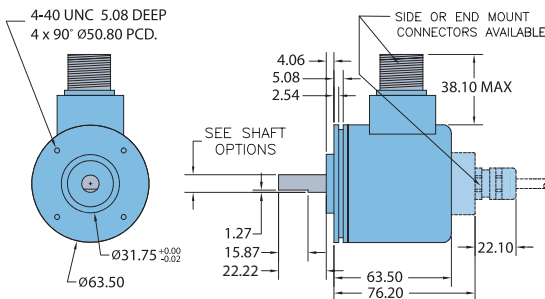
Model 725 63.5mm Servo Mount (S1)



Model 725 63.5mm Servo Mount (SR)



Model 725 63.5mm Servo Mount (QS)



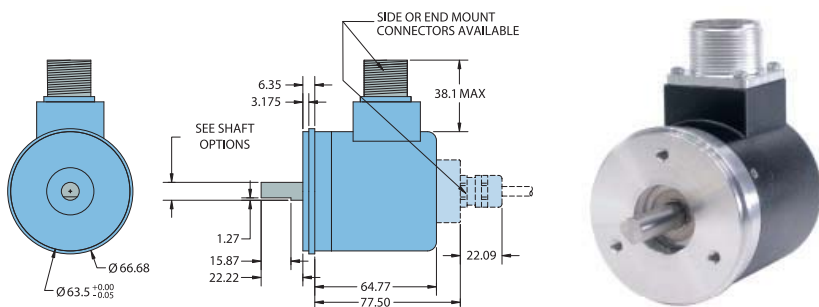
All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Incremental Shaft Encoders

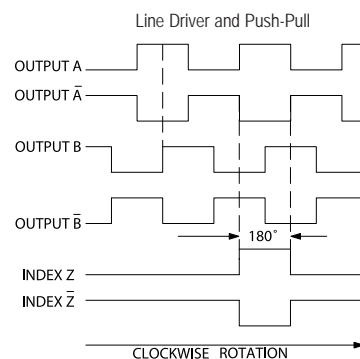
Model 725 Heavy Duty (Formerly 730 & 735 Series)



Model 725 66.54mm Servo Mount (LG)

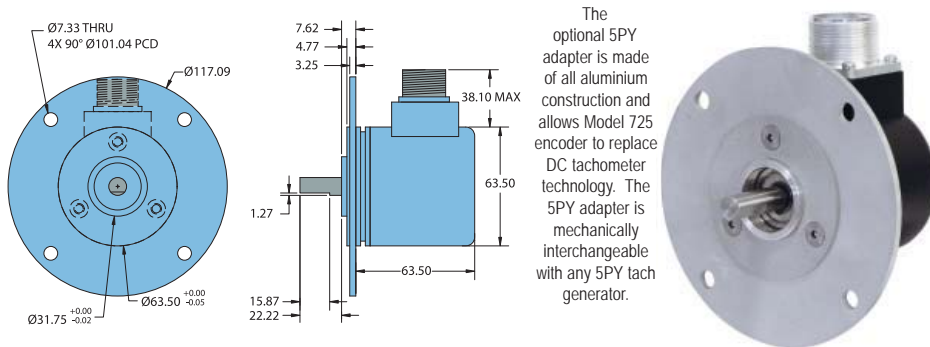


Waveform Diagrams



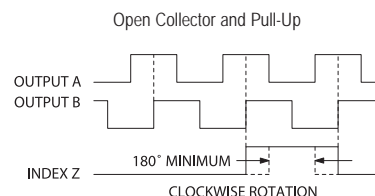
NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: PUSH-PULL OUTPUT DOES NOT INCLUDE COMPLEMENTARY CHANNELS

Model 725 5PY Optional Mounting (SP)



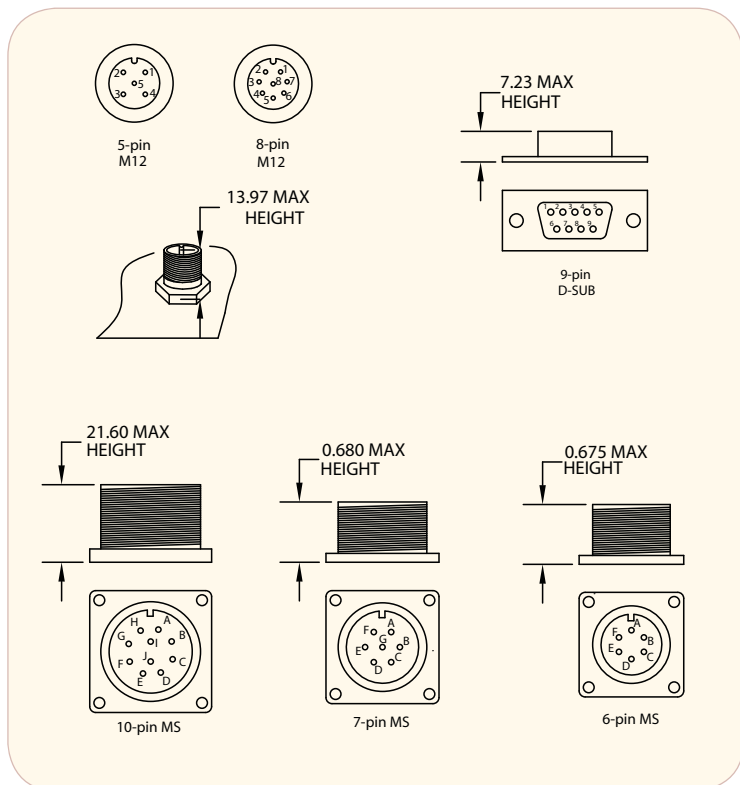
The optional 5PY adapter is made of all aluminium construction and allows Model 725 encoder to replace DC tachometer technology. The 5PY adapter is mechanically interchangeable with any 5PY tach generator.

All dimensions are in mm with a tolerance of $\pm 0.127\text{mm}$ or ± 0.254 unless otherwise specified



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Connector Pin-Outs



Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC, LP HV-R	6-pin MS PP OC, LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub
Com	Black	3	7	F	F	F	F	F	9
+Vcc	White	1	2	D	D	D	D	D	1
A	Brown	4	1	A	A	A	A	A	2
A'	Yellow	---	3	H	C	---	---	C	3
B	Red	2	4	B	B	B	B	B	4
B'	Green	---	5	I	E	---	---	E	5
Z	Orange	5	6	C	---	C	C	---	6
Z'	Blue	---	8	J	---	---	---	---	7
Case	---	---	---	G	G	G	---	---	8
Shield	Screen	---	---	---	---	---	---	---	---

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

A Step Above The Rest



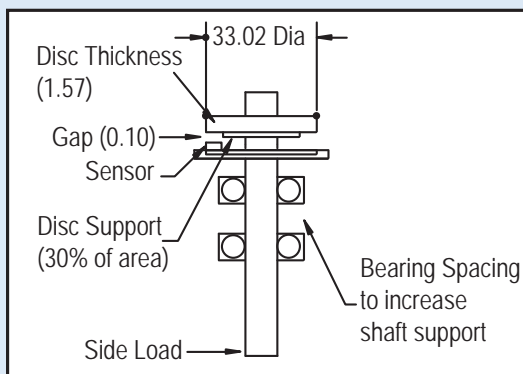
Size 25 encoders (63.50mm diameter) are among the most popular encoders in the world. As a result, nearly every encoder manufacturer in the world makes them. The problem is, not every Size 25 encoder is built to the same exacting standards of quality and reliability as the Model 725 from British Encoder Products Company and Encoder Products Company (BEPC & EPC).

So, what's the problem? If you have used other Size 25 encoders, you have probably experienced reliability problems such as sensor crashes and disc breakage. The typical construction of a Size 25 encoder (shown below) uses a single set of closely spaced shaft bearings and a large diameter (typically 50.80mm) glass disc mounted to the shaft. The glass disc is generally supported on the shaft hub by just 15% of the surface area and has a thickness of 0.7mm. In addition, these units commonly require a relatively narrow air gap (typically 0.05mm) between the disc and sensor in order to properly calibrate the signal. Because of this combination, a small amount of side loading (force from installation requirements, vibration, shock, or other conditions) can move the shaft enough for the attached disc to make contact with the sensor or some other portion of the stationary PCB. The result is damage to the disc or sensor, or even disc breakage.

Then, what's the solution? When design engineers at EPC/BEPC set out to design a better Size 25 encoder, their goal was to solve the typical problems without affecting the price of the encoder. The result - the Model 725, a Size 25 encoder. The first goal was to

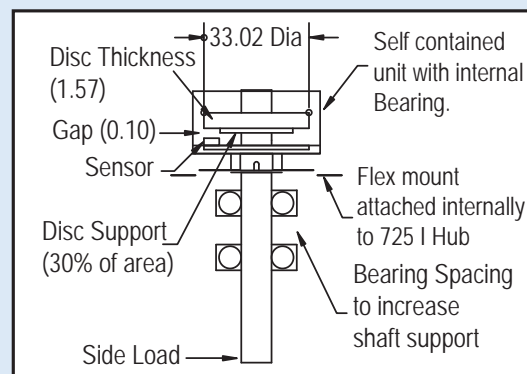
make it more difficult for shaft movement from side load to cause damage. Using BEPC's advanced sensor technology, the air gap between the disc and sensor doubled from 0.05mm to 0.1mm, and the disc diameter was reduced from 50.80mm to 33.02mm. The next goal was to increase the durability of the disc itself. Disc thickness was more than doubled (from 0.7mm to 1.50mm), manufactured using EPC's proprietary process, and supported by 30% of the disc surface area. Finally, it was time to improve the resistance to side load movement altogether, so the 725 was given dual heavy-duty bearings, generously spaced to disperse the load over a larger portion of the shaft.

But EPC's innovative engineering team wasn't satisfied. They really wanted to solve the problems of a truly rough environment. What they designed was the Model 725-I - the industrial 725 housing option. An encoder that is as robust as possible within its price category. Using the improvements developed in the 725N, EPC's engineering team developed the "encoder-within-an-encoder" design. With this design, the 725-I adds two extra, heavy-duty bearings to the two contained within the internal encoder for a total of four bearings! These two extra bearing sets are separated in such a way that side load stresses become isolated between the two bearing sets and never reach the inner encoder. In addition, the internal encoder is mounted to the 725-I's housing using EPC's pioneering flex mount, further isolating the internal optics and electronics from outside forces.



Better - The Model 725 Standard

BEPC has designed out the common problems experienced by the average Size 25 encoder. Notice the generous air gap (double that of typical Size 25 encoders), thick code disc (more than twice the thickness), small diameter, large disk support area, and large bearing spacing - each an element which increases durability and reliability.



Best - The Model 725 Industrial

The design improvements made in the Model 725 I, places them in their own internal encoder housing, and surrounds the internal unit with a second, rugged housing with a separate set of heavy duty bearings, all for an encoder that laughs at applications which eat other encoders alive!

For specification assistance call Customer Service at +44 (0)1978 262100

Model 744 Heavy Duty 444 Tacho Style



Features

- Standard "444" Style, 115mm Diameter
- Up to 30,000 PPR
- Choice of Shaft Sizes
- IP64 Sealing Available

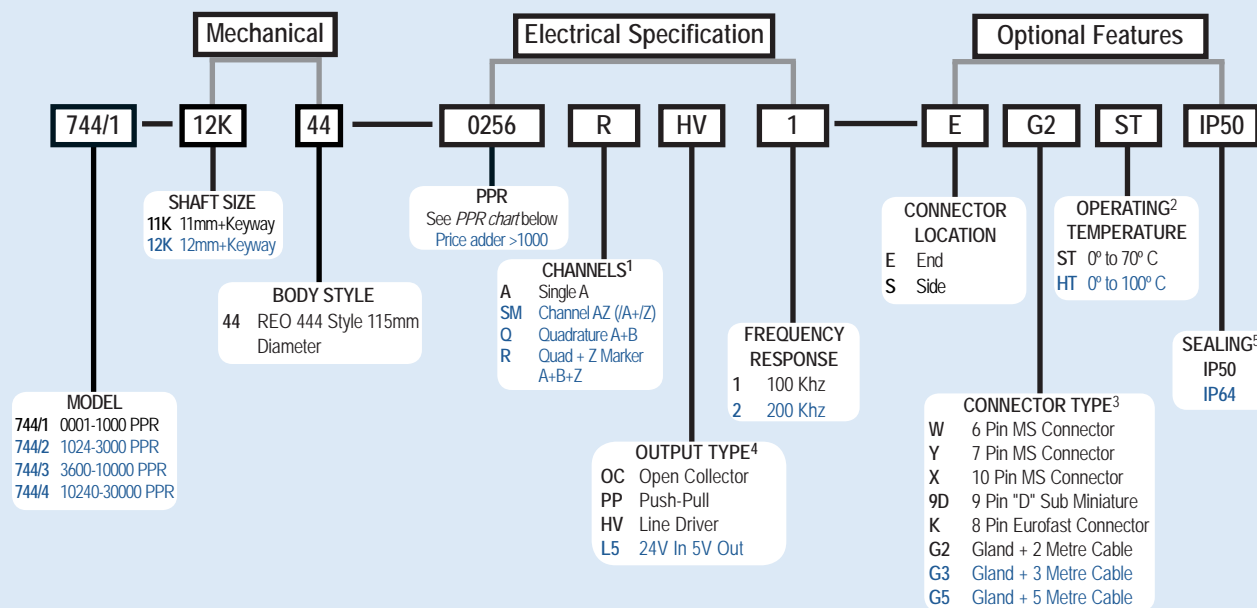
The 744 is designed to provide a digital encoder signal format to replace traditional Tacho style feedback devices. The heavy duty bearings and mechanical assembly make the 744 perfect for those applications requiring a rugged and dependable encoder.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile machines

Model 744 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



MODEL

744/1	0001-1000 PPR
744/2	1024-3000 PPR
744/3	3600-10000 PPR
744/4	10240-30000 PPR

Model 744 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disc resolutions are available upon request.

A one-time NRE fee may apply.

NOTES:

- 1 Contact Customer Service for additional index gating options.
- 2 24 Vcc max for high temperature option.
- 3 Contact Customer Service for non-standard cable lengths.
- 4 Marker (Index) not available with 6-Pin (HV-Q) or 7-Pin MS connector & HV Output.
- 5 Increased starting torque with IP64 option.

For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 744 Heavy Duty 444 Tacho Style



Model 744 Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max for temperatures up to 70° C

Input Current.....100 mA max with no output load

Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Open Collector- 50 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)

Index.....Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.

Freq Response.....Up to 200 KHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output
6001 to 20,480 PPR: 90° (±36°) electrical

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
6001 to 20,480 PPR: 54° electrical
>20,480 PPR: 50° electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size.....See order code

Shaft Material.....303 stainless steel

Shaft Rotation.....Bi-directional

Radial Shaft Load.....120N Operating

Axial Shaft Load.....120N Operating

Starting Torque.....7.0615 x 10⁻³ Nm typical with no seal
2.118 x 10⁻² Nm typical with IP64 shaft seal

Electrical Conn.....6-, 7-, or 10-pin MS Style, 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2M of cable (foil and braid shield, 24 AWG conductors)

Housing.....Black non-corrosive finish

Bearings.....Precision ABEC ball bearings

Mounting.....115/85mm, 6 x M6 @ 100mm PCD

Weight.....600 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp.....-25° to +85° C

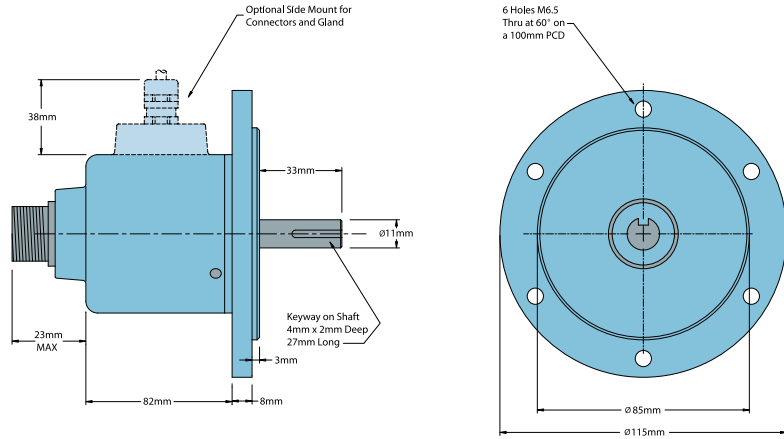
Humidity.....95% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

Shock.....50 g @ 11 ms duration

Sealing.....IP50 standard, IP64 optional

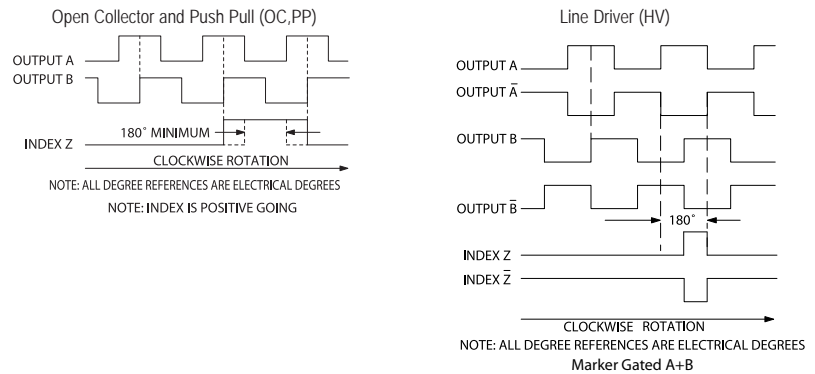
Model 744 '444' Style 115mm Diameter



All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC, LP HV-R	6-pin MS PP OC, LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub
Com	Black	3	7	F	F	F	F	F	9
+Vcc	White	1	2	D	D	D	D	D	1
A	Brown	4	1	A	A	A	A	A	2
A'	Yellow	--	3	H	C	--	--	C	3
B	Red	2	4	B	B	B	B	B	4
B'	Green	--	5	I	E	--	--	E	5
Z	Orange	5	6	C	--	C	C	--	6
Z'	Blue	--	8	J	--	--	--	--	7
Case	--	--	--	G	G	G	--	--	8
Shield	Screen	--	--	--	--	--	--	--	--

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Incremental Shaft Encoders

Model 745 Heavy Duty 90mm Encoder



Features

- European 90/80/40mm Configuration
- Up to 30,000 PPR
- Hohner 3000/4000 Direct Replacement
- IP64 Sealing Available

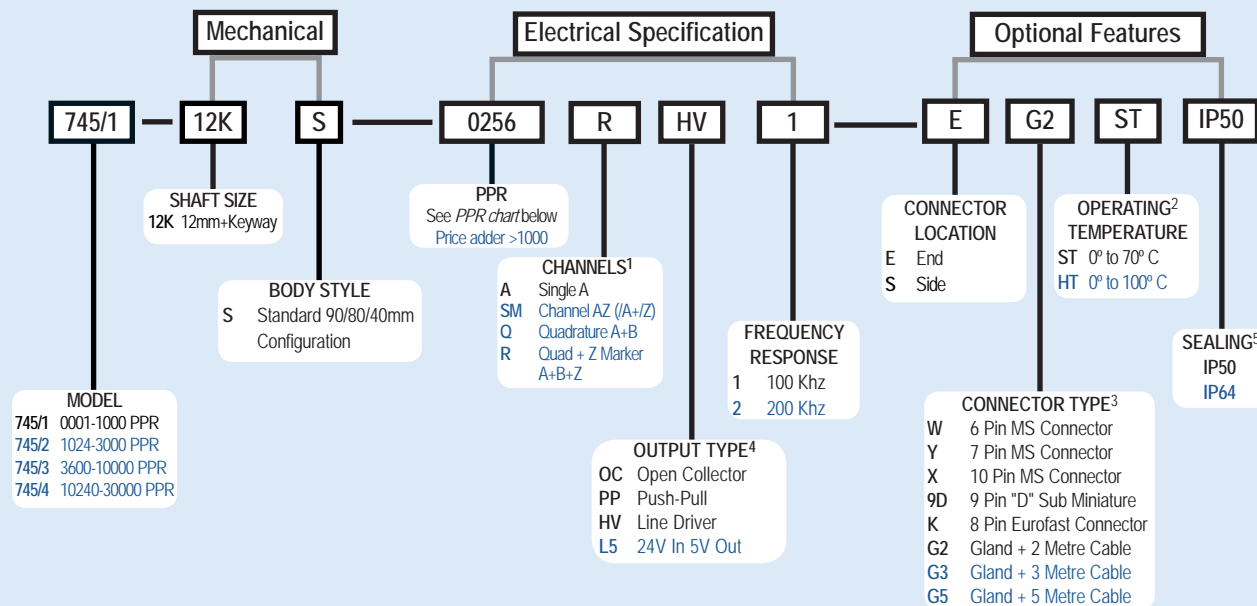
Due to some major technology enhancements, the 745 Encoder is now available from 0001 PPR thru to 30000 PPR. This Encoder is a direct replacement for the popular 90/80/40 spigot style encoder and may be ordered with a variety of output circuits, shaft sizes and connector styles. Using the same Opto-Asic technology as most of our encoder range, you have the advantage of high tech signal generation and a rugged mechanical assembly.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile machines

Model 745 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 745 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disc resolutions are available upon request.

A one-time NRE fee may apply.

For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 Contact Customer Service for additional index gating options.
- 2 24 Vcc max for high temperature option.
- 3 Contact Customer Service for non-standard cable lengths.
- 4 Marker (Index) not available with 6-Pin (HV-Q) or 7-Pin MS connector & HV Output.
- 5 Increased starting torque with IP64 option.

Model 745 Heavy Duty 90mm Encoder



Model 745 Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max for temperatures up to 70° C
 Input Current.....100 mA max with no output load
 Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz
 Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
 Output Types.....Open Collector- 50 mA max per channel
 Push-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)
 Index.....Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.
 Freq Response.....Up to 200 KHz
 Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
 Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
 6001 to 20,480 PPR: 180° (±36°) electrical
 Quad Phasing.....1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output
 6001 to 20,480 PPR: 90° (±36°) electrical
 Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
 6001 to 20,480 PPR: 54° electrical
 >20,480 PPR: 50° electrical
 Rise Time.....Less than 1 microsecond
 Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

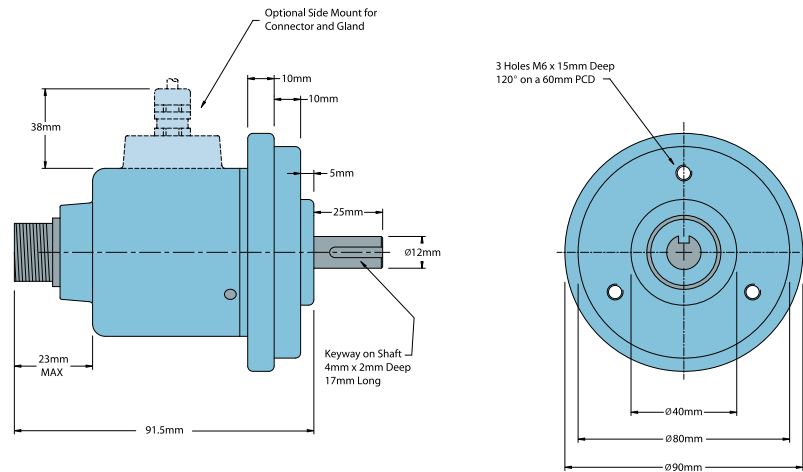
Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
 Shaft Size.....See order code
 Shaft Material.....303 stainless steel
 Shaft Rotation.....Bi-directional
 Radial Shaft Load.....120N Operating
 Axial Shaft Load.....120N Operating
 Starting Torque.....7.0615 x 10⁻³ Nm typical with no seal
 2.118 x 10⁻² Nm typical with IP64 shaft seal
 Electrical Conn.....6-, 7-, or 10-pin MS Style, 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2M of cable (foil and braid shield, 24 AWG conductors)
 Housing.....Black non-corrosive finish
 Bearings.....Precision ABEC ball bearings
 Mounting.....90/80/40mm, 3 x M6 @ 60mm PCD
 Weight.....800 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)
 Storage Temp.....-25° to +85° C
 Humidity.....95% RH non-condensing
 Vibration.....10 g @ 58 to 500 Hz
 Shock.....50 g @ 11 ms duration
 Sealing.....IP50 standard, IP64 optional

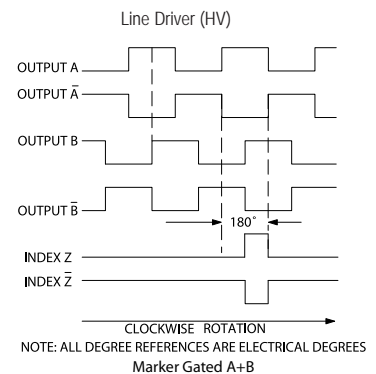
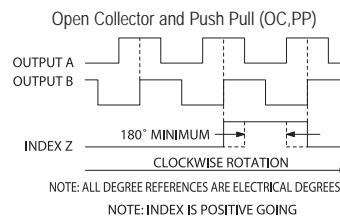
Model 745 Heavy Duty 90mm Encoder



All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC,LP HV-R	6-pin MS PP OC,LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub
Com	Black	3	7	F	F	F	F	F	9
+Vcc	White	1	2	D	D	D	D	D	1
A	Brown	4	1	A	A	A	A	A	2
A'	Yellow	--	3	H	C	--	--	C	3
B	Red	2	4	B	B	B	B	B	4
B'	Green	--	5	I	E	--	--	E	5
Z	Orange	5	6	C	--	C	C	--	6
Z'	Blue	--	8	J	--	--	--	--	7
Case	--	--	--	G	G	G	--	--	8
Shield	Screen	--	--	--	--	--	--	--	--

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Incremental Shaft Encoders

Model 758 - 58mm Euro-Standard Encoder



Features

- Standard Size 58mm Mounting (58mm Diameter)
- Up to 30,000 PPR
- 36Kg Max. Axial and Radial Shaft Loading
- High Temperature Option (100°C)
- IP65 Sealing Available

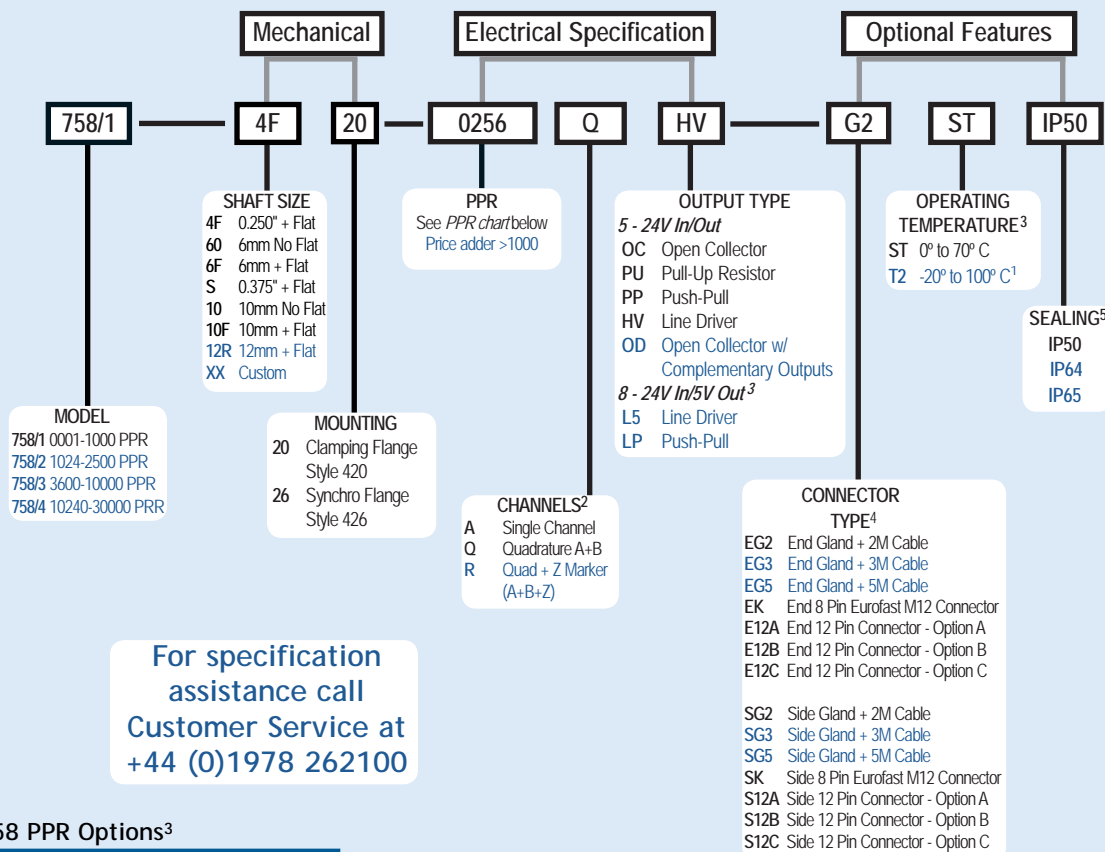
The Model 758 is a heavy duty, extremely rugged, reliable, yet compact European standard 58mm diameter encoder. Designed for harsh factory and plant floor environments. Shaft loading is no problem for the double-shielded ball bearings: their 36Kg load rating ensures a long operating life. If fitted with the optional heavy-duty shaft seal; the model 758 is rated IP65. Two standard mounting options are available: Clamping Flange (20 Type) or Synchro Flange (26 Type). The Model 758 is the perfect replacement encoder for units requiring the popular European mount.

Common Applications

Motor-Mounted Feedback, Machine & Elevator Controls, Food Processing, Robotics, Material Handling, Conveyors, Textile Machines.

Model 758 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 758 PPR Options³

0010*	0020	0025*	0030*	0040*	0060	0100	0120	0125
0128*	0144*	0150*	0160*	0200	0240*	0250	0254*	0256*
0300	0333*	0360	0400	0500	0512	0600	0625*	0635
0720	0800	1000	1024	1200 ^a	1250 ^a	1270 ^a	1440	1500
1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a	3000 ^a	3600 ^a
4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a	10,000 ^a	10,240 ^a
12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a	25,000 ^a	30,000 ^a	

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request.

A one-time NRE (Non Recurring Engineering) fee may apply.

NOTES:

- 1 0° to 85° for certain resolutions, See PPR options.
- 2 Contact customer service for marker gating options.
- 3 Standard temperature, 60 to 3000 PPR only.
- 4 For non-standard cable lengths - call sales office.
- 5 IP66 & IP67 available in certain configurations - Please call sales office for information and availability.

Model 758 - 58mm Euro-Standard Encoder



Model 758 Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
4.75 to 24 Vcc for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Open Collector- 50 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

Index.....Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams* below.

Freq Response.....Up to 1 MHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output
6001 to 20,480 PPR: 90° (±36°)

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
6001 to 20,480 PPR: 54° electrical
>20,480 PPR: 50° electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size6 mm, 10 mm

Shaft Rotation.....Bi-directional

Radial Shaft Load.....36 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions

Axial Shaft Load.....36 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions

Starting Torque7.061 x 10⁻³ Nm typical with IP64 seal or no seal
2.118 x 10⁻² Nm typical with IP66 shaft seal

Electrical ConnGland with 2M cable (foil and braid shield, 24 AWG conductors) 12-pin connector, or 8-pin M12 (12 mm)

Housing.....Anodised Aluminium

Bearings.....Precision ABEC ball bearings

Mounting.....European Standard Clamping Flange (20 Type) and Synchro Flange (26 Type)

Weight.....320 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp.....-25° to +85° C

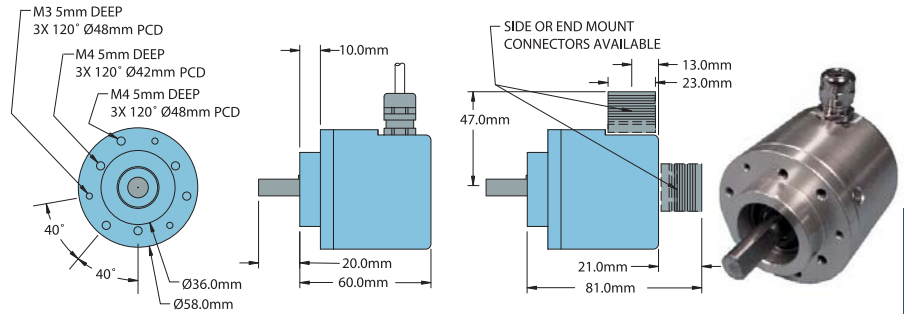
Humidity.....98% RH non-condensing

Vibration.....20 g @ 58 to 500 Hz

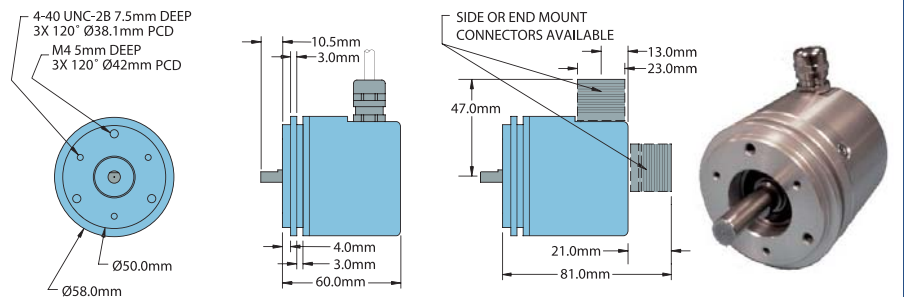
Shock.....75 g @ 11 ms duration

Sealing.....IP64 shaft seal or IP65 shaft seal

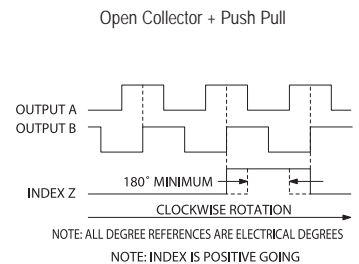
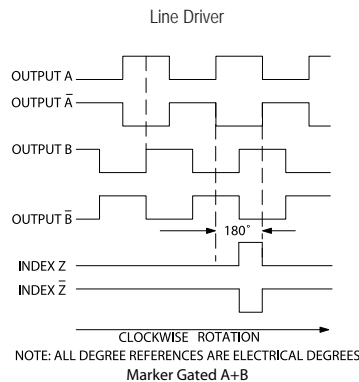
Model 758 Clamping Flange 20 Type



Model 758 Synchro Flange 26 Type



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	8-pin M12 ²	12-pin Option A CW	12-pin Option B CW	12-pin Option C CCW
Com	Black	7	1	11	10
+VCC	White	2	2	7	12
A	Brown	1	3	4	5
A'	Yellow	3	6	3	6
B	Red	4	4	1	8
B'	Green	5	7	8	1
Z	Orange	6	5	6	3
Z'	Blue	8	8	5	4
Shield	Screen	---	---	---	---
+VDC Sense	---	---	---	10	2
Com Sense	---	---	---	12	11
Case	---	---	12	---	9

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Model 7RP Extra Heavy Duty Thru-Shaft



Features

- Extra Heavy Duty Mechanical Assembly
- Single Ended or Double Ended Shaft
- Reversible Face Fixing Option
- Incorporates Opto-ASIC Technology

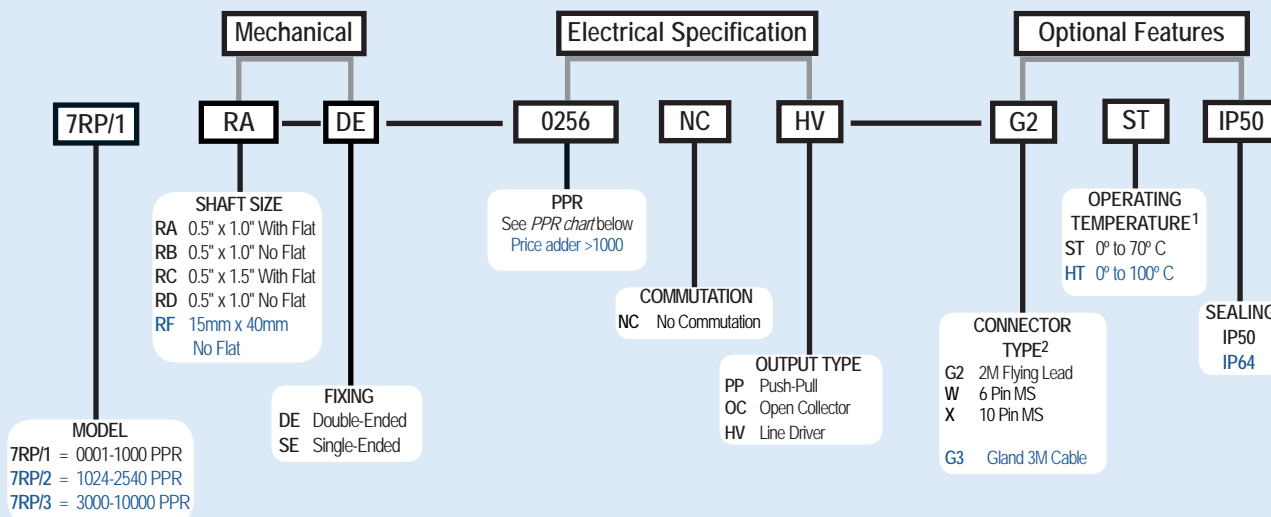
The Model 7RP provides yet another extra heavy duty encoder which has the advantage of a double-ended male shaft together with a totally reversible mounting configuration. This arrangement will allow for the fixing of measuring wheels on both shafts, thus ensuring secure and error free contact with conveyor, or moving product, during length measurement applications. A single-ended shaft configuration is also available. This encoder employs our highly reliable Opto-ASIC technology.

Common Applications

Robotics, Motor-Mounted Feedback, Assembly Machines, High Power Motors

Model 7RP Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model 7RP PPR Options

0001 thru 0189*	0200	0250	0254	0256
0300	0360	0400*	0500	0512
0720	0800	0840	1000	1024
1220	1250	1270	1500	1800*
2048	2500	2540	3000	3600*
4096	5000	6000	8192	7200*
10,000				8192

* Contact customer service for availability

Contact Customer Service for other disc resolutions; not all disc resolutions available with every commutation option.

NOTES:

- 1 5 to 16 VCC supply only for HT option.
- 2 For Non-Standard cable length please contact the sales office.

Model 7RP Extra Heavy Duty Thru-Shaft



Model 7RP Specifications

Electrical

Input Voltage.....4.75 to 24 VCC for temperatures up to 70° C
 5 to 16 VCC for 0° to 100° C operating temperature

Input Current.....100 mA max with no output load

Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face.
 See *Waveform Diagrams* below.

Output TypesPush-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)

IndexOnce per revolution gated to channel A.
 See *Waveform Diagrams* below.

Freq. Response.....200 kHz standard

Noise Immunity.....Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN55011

Symmetry180° (±18°) electrical

Quad. Phasing.....90° (±22.5°) electrical

Min. Edge Sep.....67.5° electrical

Accuracy.....Within 0.01° mechanical from one cycle to any other cycle, or 0.6 arc minutes.

CommutationUp to 12-pole. Contact Customer Service for availability.

Comm. Accuracy.....1° mechanical

Mechanical

Max Shaft Speed.....3600 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size10mm through 15mm

Shaft Tolerance.....g6 (SLIDING FIT FOR H7)

Starting Torque.....IP50: 7.0615×10^{-3} Nm
 IP64: 2.0118×10^{-2} Nm

Electrical Conncable (foil and braid shield, 24 AWG or 6-pin or 10-Pin MS connector)

Housing.....Anodised Aluminium

Weight.....800 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
 0° to 100°C for high temperature option

Storage Temp-40° to +100° C

Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

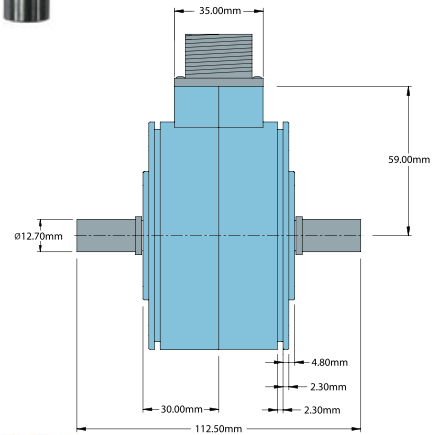
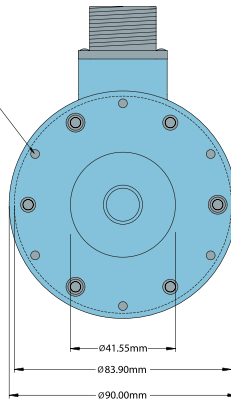
Shock.....50 g @ 11 ms duration

Sealing.....IP50; IP64 available

Model 7RP Double-Ended w/10 Pin

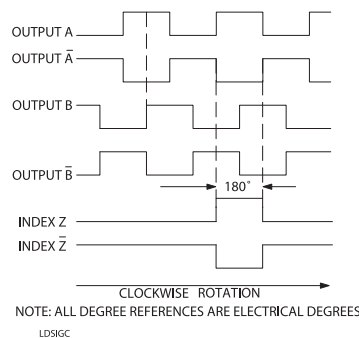


6 Holes 60° Apart on a Ø80.20mm PCD Tapped M3 x 9mm Deep



Incremental Shaft Encoders

Waveform Diagrams



Wiring Tables

Function	Gland Cable Wire Color	10-pin MS HV	6-pin MS PP,OC
Com	Black	C	C
+VCC	White	E	E
A	Brown	B	B
A'	Yellow	G	---
B	Red	D	D
B'	Green	H	---
Z	Orange	A	A
Z'	Blue	I	---
Case	---	F	F
Shield	Screen	---	---

Model 86A Extra Heavy Duty Machine Tool Encoder



Incremental Shaft Encoders



Features

- Standard 68mm Diameter Package
- Up to 30000 PPR, Opto-Asic Technology
- Square Flange Mounting
- IP65 Double O-ring Sealed

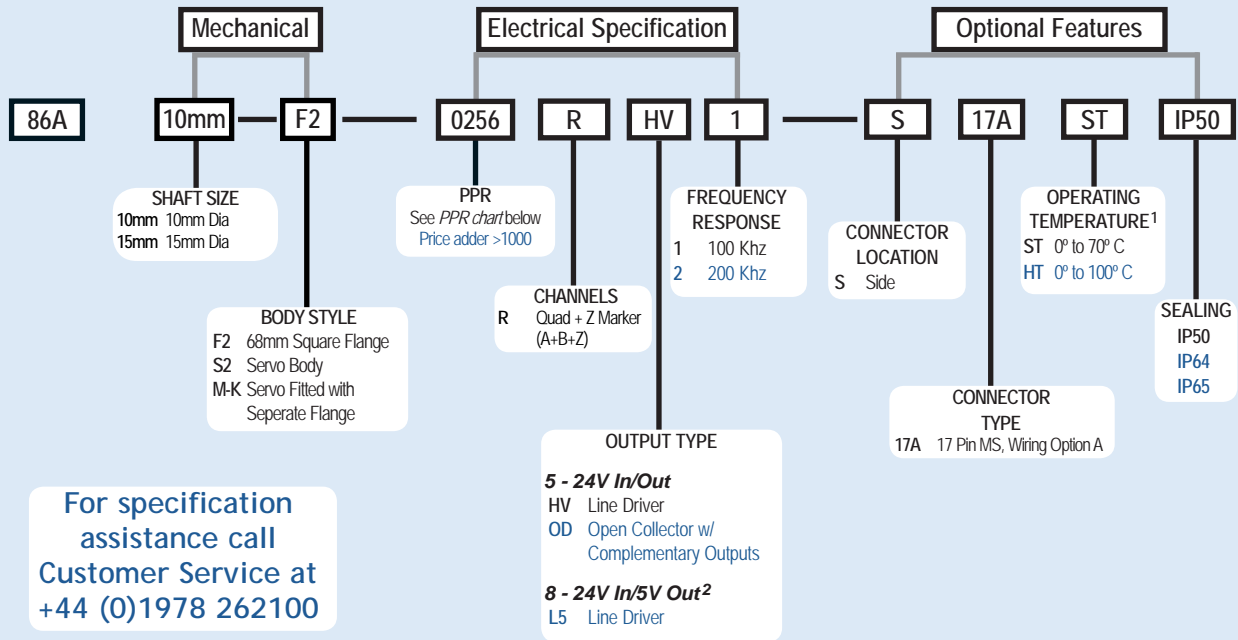
The Model 86A is an extra heavy duty unit which employs a highly reliable Opto-Asic encoder module mounted with a rugged mechanical housing. The heavy duty sealed bearings, together with double O-ring sealing makes this encoder a serious and reliable alternative to a wide range of machine tool encoders, and at an advantageous price.

Common Applications

Motor Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines.

Model 86A Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 86A PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

NOTES:

- 1 24 Vcc Max for high temperature option.
- 2 Standard temperature, 60 to 3000 PPR only.

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

Model 86A Extra Heavy Duty Machine Tool Encoder



Model 86A Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max for temperatures up to 70° C

Input Current.....100 mA max with no output load

Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz

Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.

Output Types.....Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)

Index.....Occurs once per revolution. The index is Ungated. See *Waveform Diagrams* below.

Freq Response.....Up to 200 KHz

Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DENV 50141; DENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....180° (±18°) electrical at 100 kHz output

Quad Phasing.....1 to 2540 PPR: 90° (±22.5°) electrical at 100 kHz output

Min Edge Sep.....1 to 2540 PPR: 67.5° electrical at 100 kHz output

Rise Time.....Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 0500 to 2540 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle.

Mechanical

Max Shaft Speed.....3600 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size.....See order code

Shaft Material.....303 stainless steel

Shaft Rotation.....Bi-directional

Radial Shaft Load.....35kg max

Axial Shaft Load.....35kg max

Starting Torque.....2.118 x 10⁻² Nm typical.

Electrical Conn.....17-pin MS Style, or gland with 2M of cable (foil and braid shield, 24 AWG conductors)

Housing.....Anodised Aluminium

Bearings.....Precision ABEC ball bearings

Mounting.....Square Flange with 4 Holes 5.50mm Dia on a 71.19 PCD

Weight.....800 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option

Storage Temp.....-25° to +85° C

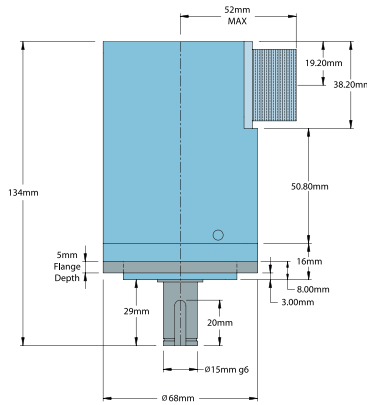
Humidity.....95% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

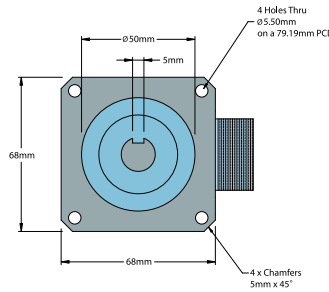
Shock.....50 g @ 11 ms duration

Sealing.....IP64, (IP65 optional)

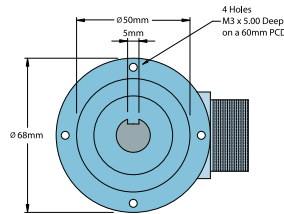
Model 86A F2 Body Option



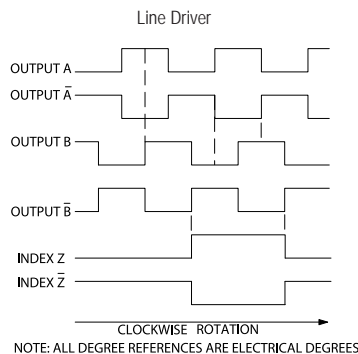
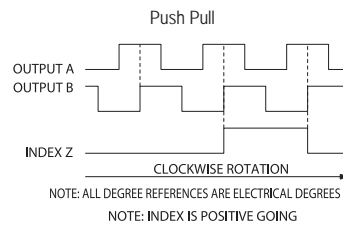
Model 86A M-K Body Option



Model 86A S2 Body Option



Waveform Diagrams



Wiring Tables

17pin Conn	Option A
A	A
B	Z
C	B
D	—
E	—
F	—
G	—
H	+Vcc
J	—
K	0 Volts
L	—
M	—
N	/A
P	/Z
R	/B
S	—
T	—

Incremental Shaft Encoders

Model 86F Extra Heavy Duty Machine Tool Encoder



Features

- Transverse Slotted Shaft
- Up to 30000 PPR, Opto-Asic Technology
- 90mm Round Flange with 3 x 4.5mm Dia Fixing Holes at 120° Apart on a 82mm PCD
- Double O-ring Sealed

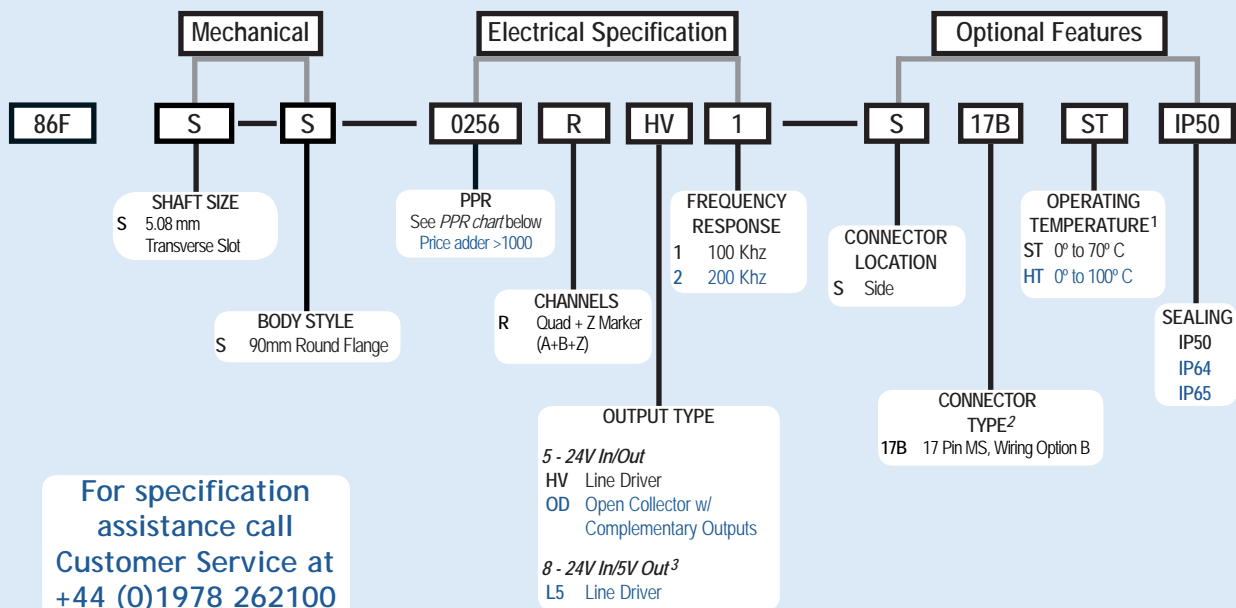
The Model 86F is an extra heavy duty unit which employs a highly reliable Opto-Asic encoder module mounted with a rugged mechanical housing. The heavy duty sealed bearings, together with double O-ring sealing makes this encoder a serious and reliable alternative to a wide range of machine tool encoders, and at an advantageous price.

Common Applications

Motor Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines.

Model 86F Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 86F PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

NOTES:

- 1 24 Vcc Max for high temperature option.
- 2 Option 17B + 0.5M Cable standard.
- 4 Standard temperature, 60 to 3000 PPR only.

Model 86F Extra Heavy Duty Machine Tool Encoder



Model 86F Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max for temperatures up to 70° C
 Input Current.....100 mA max with no output load
 Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz
 Output Format.....Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams* below.
 Output Types.....Push-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VCC supply)
 Index.....Occurs once per revolution. The index is Ungated. See *Waveform Diagrams* below.
 Freq Response.....Up to 200 KHz
 Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
 Symmetry.....180° (±18°) electrical at 100 kHz output
 Quad Phasing.....1 to 2540 PPR: 90° (±22.5°) electrical at 100 kHz output
 Min Edge Sep.....1 to 2540 PPR: 67.5° electrical at 100 kHz output
 Rise Time.....Less than 1 microsecond
 Accuracy.....Instrument and Quadrature Error: For 0500 to 2540 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle.

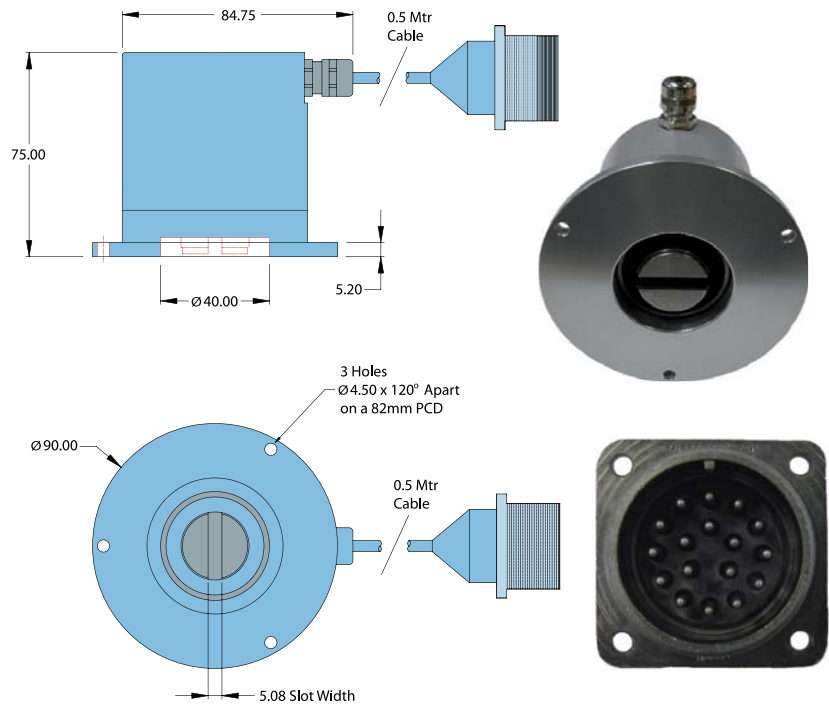
Mechanical

Max Shaft Speed.....3600 RPM. Higher shaft speeds may be achievable, contact Customer Service.
 Shaft Size.....Transverse Slotted
 Shaft Material.....303 stainless steel
 Shaft Rotation.....Bi-directional
 Axial Shaft Load.....35kg max
 Starting Torque.....2.118 x 10⁻² Nm typical.
 Electrical Conn.....17-pin MS Style
 Housing.....Anodised Aluminium
 Bearings.....Precision ABEC ball bearings
 Mounting.....90mm Round Flange with 3 x 4.5mm Dia Holes at 120° Apart on a 82mm PCD.
 Weight.....800 grams typical

Environmental

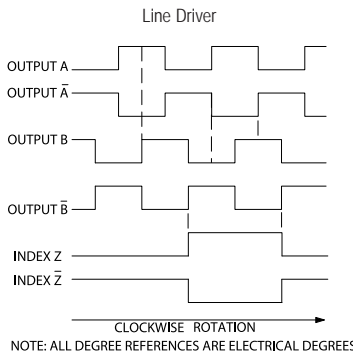
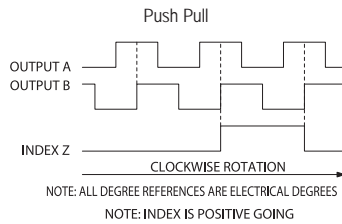
Operating Temp.....0° to 70° C for standard models
 0° to 100° C for high temperature option
 Storage Temp.....-25° to +85° C
 Humidity.....95% RH non-condensing
 Vibration.....10 g @ 58 to 500 Hz
 Shock.....50 g @ 11 ms duration
 Sealing.....IP50, IP64, IP65

Model 86F Round Flange



Incremental Shaft Encoders

Waveform Diagrams



Wiring Table

17pin Conn	Option B
A	A
B	B
C	+Vcc
D	/A
E	/B
F	Z
G	/Z
H	Screen
J	+Vcc
K	+Vcc
L	—
M	—
N	0 Volts
P	0 Volts
R	*T*
S	*T*
T	0 Volts

T = Thermal Wire

Model 25SF Incremental Shaft Encoder



Features

- Industry Standard Size 25 Package (63.5mm x 63.5mm)
- Optical Technology for High Accuracy
- Resolutions from 1 to 65,536 PPR (262,144 quadrature counts)
- Servo and Flange Mounting
- Standard with Heavy-Duty Dual Bearings Rated load of 36 Kg axial & radial
- IP67 Sealing Available

The Model 25SF Size 25 shaft encoder offers the performance advantages of the programmable model 25SP, but in an economical, fixed resolution version. The versatile model 25SF offers 32 different waveform options, six output types, and any resolution from 1 up to 65,536 PPR. Specifically designed for the challenges of an industrial environment, the model 25SF features a rugged, industrial housing and comes standard with dual bearings rated 36Kg axial or radial. Offering shaft sizes up to 10mm, multiple mounting options, and sealing up to IP67, this encoder can take on your most demanding application.

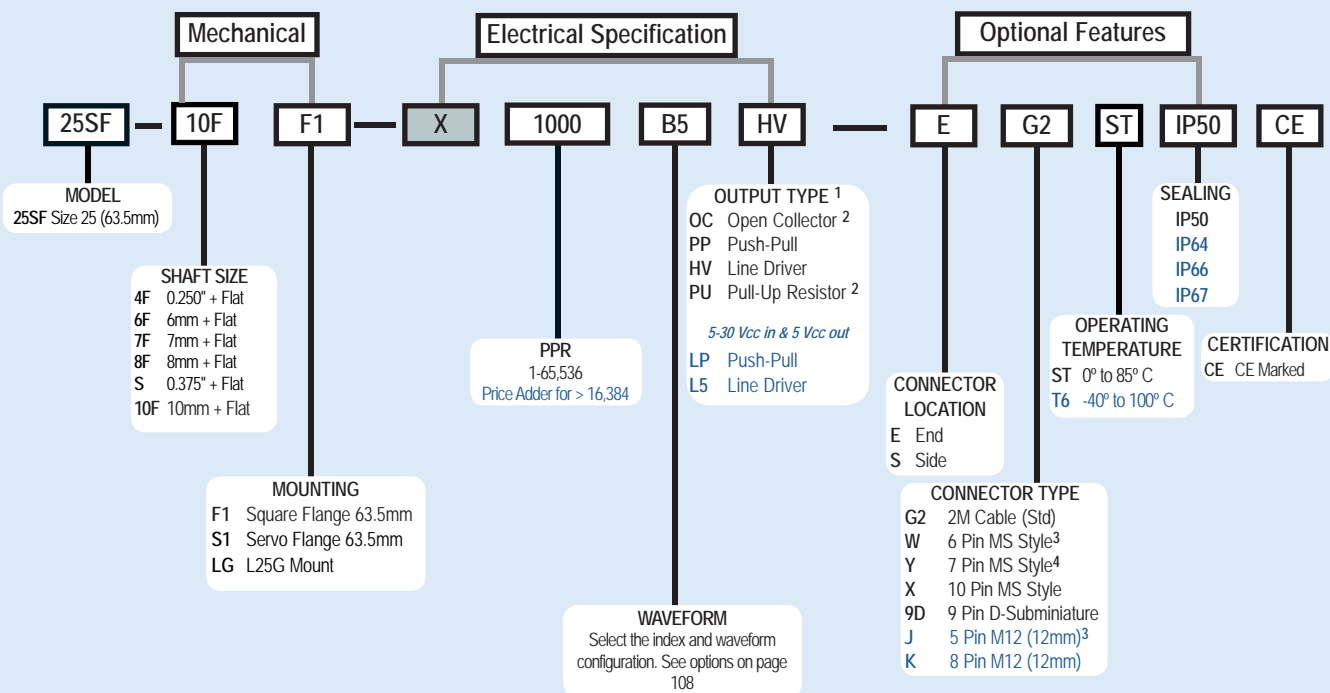
Ø2.5" (63.5mm)

Model 25SF Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines



For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 All Output types are 5V to 24V in/out Except L5 Line Driver and LP Push-Pull output types which are 5-24Vcc in and 5Vcc out.
- 2 Open Collector (OC) and Pull-Up Resistor (PU) outputs not recommended for PPR > 8192 and/or frequencies > 150 KHz.
- 3 6-Pin MS and 5-Pin M12 Connectors only available with Pull-Up, Open Collector and Push-Pull output types.
- 4 7-Pin MS Connector does not provide index (Marker) Pulse Z when selected output is Line Driver (HV or L5)

Model 25SF Incremental Shaft Encoder



Model 25SP Specifications

Electrical

Input Voltage.....	4.75 to 30 Vcc max. See Output Types for limitations
Input Current.....	100 mA max with no output load (65 mA typical)
Output Format.....	Incremental, See Waveforms on page X for options.
Output Types.....	Line Driver* (HV) – 20 mA max per channel, max freq 1.0 MHz, 5 Vcc max at 100° C or 24 VDC max at 85° C. Line Driver* (L5) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max freq 2.7 MHz, 5 VDC max at 100° C. Push-Pull (PP) – 20 mA max per channel, max frequency 1.0 MHz, 5 Vcc max at 100° C or 24 Vcc max at 85° C. Push-Pull (P5) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max frequency 2.7 MHz, 5 Vcc max at 100° C. Open Collector (OC) – 100 mA max per channel, 200 KHz max freq recommended Pull-Up (PU) – 2.2K ohm internal resistors, 100 mA max per channel, 150 KHz max freq recommended, max temp 85° C at > 24 Vcc *Meets RS 422 at 5 Vcc supply
Index.....	Once per revolution, BEPC standard is 180° gated to output A (waveform B5). See Waveform Diagrams on model 25SP for options.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.

Min Edge Sep.....	1 to 16384 PPR: 36° electrical min, 63° or better typical 16385 to 65536 PPR: 20° electrical min, 36° or better typical
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position

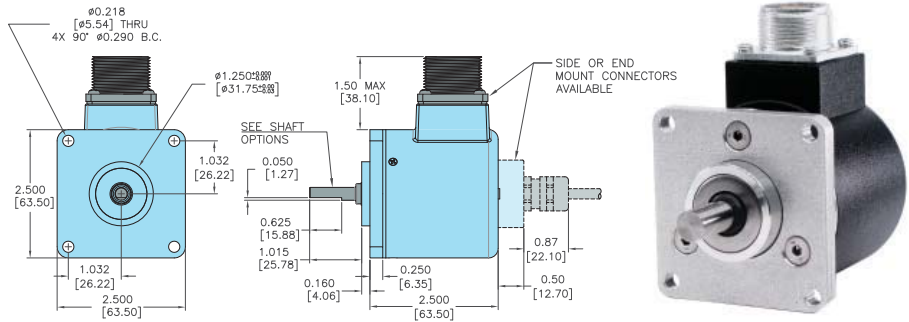
Mechanical

Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Material.....	303 Stainless Steel
Shaft Rotation.....	Bi-directional
Radial Shaft Load.....	36 Kg max. Rated load of 9 to 18 Kg for rated life of 1.5x10 ⁹ revs
Axial Shaft Load.....	36 Kg max. Rated load of 9 to 18 Kg for rated life of 1.5x10 ⁹ revs
Starting Torque.....	7.0615 X 10 ⁻³ Nm typical with IP64 seal or no seal 2.118 X 10 ⁻² Nm typical with IP66 shaft seal 4.943 X 10 ⁻² Nm typical with IP67 shaft seal
Housing.....	Black non-corrosive finish
Bearings.....	Precision ABEC ball bearings
Weight.....	566 grams typical

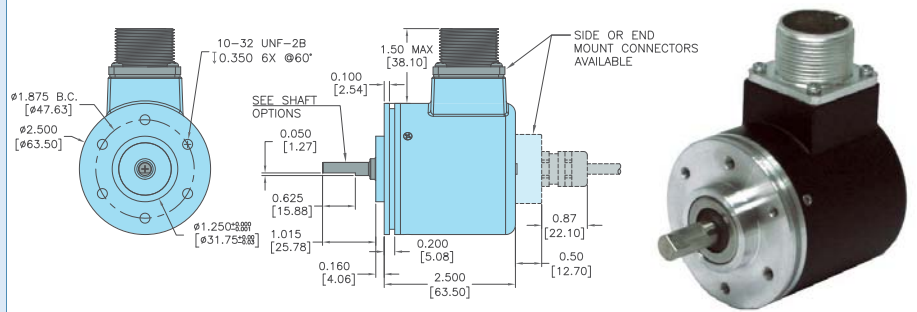
Environmental

Operating Temp.....	-20° to 85° C for standard models -40° to 100° C for extended temp option
Humidity.....	95% RH non-condensing
Vibration.....	20 g @ 5 to 2000 Hz
Shock.....	80 g @ 11 ms duration
Sealing.....	IP50 standard; IP64, IP66 or IP67 optional

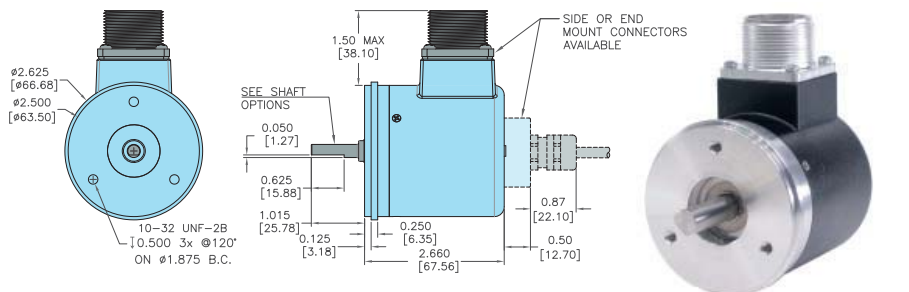
Model 25SF Flange Mount (F1)



Model 25SF 63.5mm Servo Mount (S1)



Model 25SF 66.54mm Servo Mount (LG)



All dimensions are in Imperial & Metric with a tolerance of 0.005" (±0.127mm) or 0.01" (±0.254) unless otherwise specified

ENCODER WIRING TABLE

(For BEPC-supplied mating cables, wiring table is provided with cable.)

Function	Gland Cable† Wire Color	5-pin M12**	8-pin M12**	10-pin MS	7-pin MS HV,L5	7-pin MS PU,PP, OC,LP	6-pin MS PU,PP, OC,LP	9-pin D-sub
Com	Black	3	7	F	F	F	A	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	--	3	H	C	--	--	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	--	5	I	E	--	--	5
Z	Orange	5	6	C	--	C	C	6
Z'	Yellow	--	8	J	--	--	--	7
Case	Green	--	--	G	G	G	F	8
Shield	Bare*	--	--	--	--	--	--	--

*CE : Cable shield (bare wire) is connected to internal case.

†Standard cable is 24 AWG conductors with foil and braid shield.

**CE : Use cable cordset with shield connected to M12 connector coupling nut.

Incremental Shaft Encoders

Model TR1 - Tru-Trac™

Encoder and spring loaded measuring wheel



Features

- Encoder and Measuring Wheel Solution Integrated Into One Compact Unit
- Spring Loaded Torsion Arm Makes Wheel Pressure Adjustments So Easy
- Easily Installed In a Vertical, Horizontal, or Upside-Down Orientation
- Operates Over a Variety Of Surfaces At Speeds Up To 3000 Feet per Minute
- Integrated Module Simplifies Your System Design, Reducing Cost

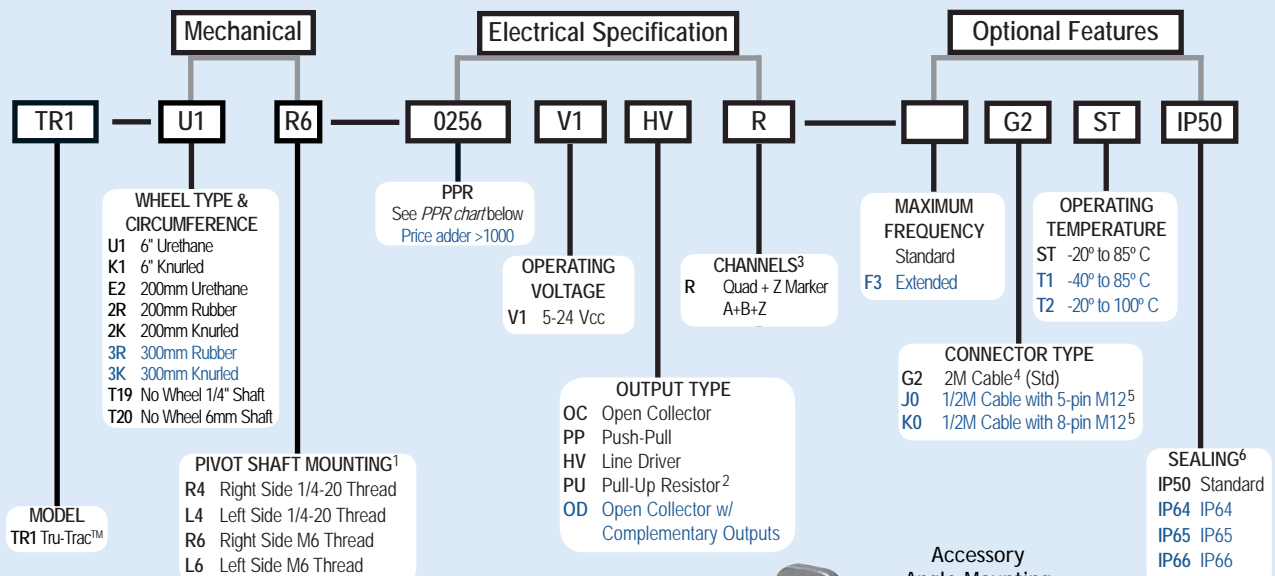
An integrated encoder and spring loaded measuring wheel assembly available in one, easy-to-use compact unit. The Tru-Trac™ is a versatile solution for tracking velocity, position, or distance over a wide variety of surfaces in almost any application. Its spring-loaded torsion arm provides a simple-to-adjust torsion load, allowing the Tru-Trac™ to be mounted in almost any orientation, even upside-down. The threaded shaft on the pivot axis is field reversible providing mounting access from either side. The Tru-Trac™ housing is a durable, conductive composite material that will eliminate static build up. With operating speeds up to 3000 Feet Per Minute and a wide variety of configuration options, it is easy to see the Tru-Trac™ is the ideal solution for countless applications.

Common Applications

Web Tension Control, Paper Monitoring, Glue Dispensing, Linear Material Monitoring, Conveyor Systems, Printing, Labelling, Document Handling

Model TR1 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model TR1 PPR Options

0001 thru 0189*	0198	0200	0250
0256	0300	0315	0360
0500	0512	0580	0600
0800	1000	1024	1125
1250	1500	1800	2000
2500	2540	3000	3600
4096	5000	6000	7200
10,000			8192

*Contact Customer Service for Availability

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available values. Special disk resolutions are available upon request and may be subject to a one-time NRE fee.



Accessory Angle Mounting Bracket for TR1 Tru-Trac™ can be ordered separately as part #140104
Dimensional Drawing Located in Accessories Section.

NOTES:

- 1 Shaft is reversible in the field.
- 2 With input voltage higher than 16 Vcc, The operating temperature is limited to 85°C.
- 3 Contact customer service for non-standard index gating or phase relationship options.
- 4 For non-standard cable lengths - Contact Customer Service for availability and cost.
- 5 5-Pin not available with Line Driver(HV) output. Additional cable lengths available Please consult Customer Service.
- 6 Increased starting torque with IP64+ selection.

Model TR1 - Tru-Trac™

Encoder and spring loaded measuring wheel



Model TR1 Specifications

Electrical

- Input Voltage 4.75 to 28 VCC max for temperatures up to 85° C
4.75 to 24 VCC for temperatures between 85° C to 100° C
- Input Current 100 mA max (65 mA typical) with no output load
- Output Format Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the wheel side. See *Waveform Diagrams* below.
- Output Types Open Collector- 20 mA max per channel
Push-Pull- 20 mA max per channel
Pull-Up 20mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
- Index Once per revolution.
0190 to 2540 PPR: Gated to output A
0001 to 0189 PPR: Ungated
See *Waveform Diagrams* below.
- Max. Frequency Standard Frequency Response is 200 kHz for PPR 1 to 2540
500 kHz for PPR 2541 to 5000
1 MHz for PPR 5001 to 10,000
Extended Frequency Response (optional) is 300 kHz for PPR 2000, 2048, 2500, and 2540
- Noise Immunity Tested to BS EN61000-6-2: BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN500811
- Symmetry 180° (±18°) electrical
- Quad. Phasing 90° (±22.5°) electrical
- Min. Edge Sep 67.5° electrical
- Accuracy Within 0.017° mechanical or 1 arc-minute from true position. (for PPR>189)

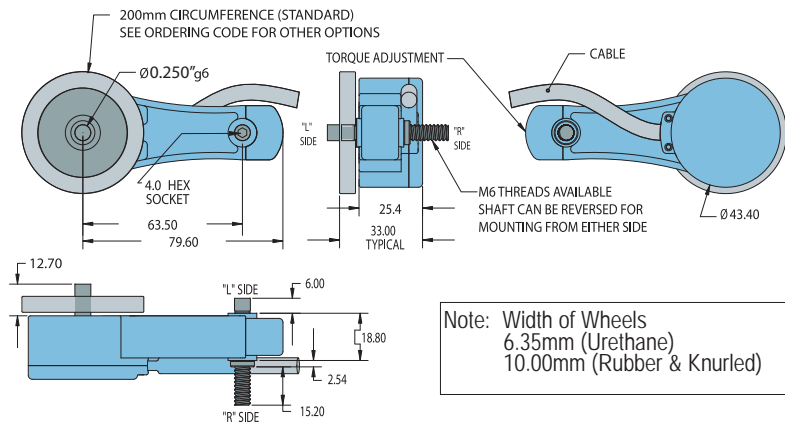
Mechanical

- Max Shaft Speed 6000 RPM. Higher speeds may be achievable, contact Customer Service.
- Shaft Material Stainless Steel
- Shaft Tolerance g6
- Radial Shaft Load . 2.5kg max. Rated load of 1.25kg to 1.75kg for bearing life of 1.2×10^{10} revolutions
- Axial Shaft Load..... 2.5kg max. Rated load of 1.25kg to 1.75kg for bearing life of 1.2×10^{10} revolutions
- Starting Torque..... IP50 3.531×10^{-4} Nm
IP64 2.825×10^{-3} Nm
- Electrical Conn..... 2M cable (foil and braid shield, 24 AWG conductors), 5-Pin & 8-pin M12 (12 mm) in-line connector with 0.5M cable (braid shield)
- Mounting Pivot shaft can be mounted from either side of the Tru-Trac™ housing, and is reversible in the field. Specify 1/4-20 or M6 threads
- Housing Stainless steel fibres in a high temperature nylon composite
- Wheel Width 6.35mm to 10mm
- Weight 150 grams typical

Environmental

- Operating Temp..... -20° to +85° C for standard models
-40° to +85° C for low temperature option
-20° to +100° C for high temperature option
- Storage Temp..... -25° to +85° C
- Humidity 98% RH non-condensing
- Vibration 10 g @ 58 to 500 Hz
- Shock 80 g @ 11 ms duration
- Sealing IP50 standard; IP64 available

Model Tr1 Tru-Trac™



All dimensions are in mm with a tolerance of ± 0.127 mm or ± 0.254 unless otherwise specified

Model Tr1 Tru-Trac™ Applications



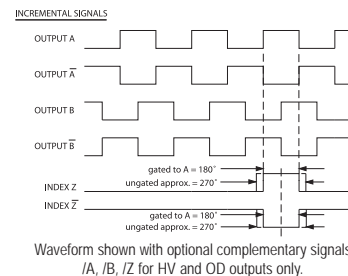
For Linear Applications the Tru-Trac™ can be mounted above or below the moving object, and the tension on the wheel adjusted for a wide range of applications such as packaging, conveyors, mail sorting, cut to length, labelling, gantries etc.



For Rotational Applications the Tru-Trac™ can be mounted in any orientation to monitor the position or velocity of many types of rotating equipment such as web tension control drums, rotary tables, printing, spooling, etc.



Waveform Diagrams

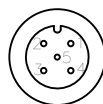


Wiring Table

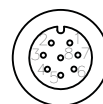
Function	Cable Wire Color	5-pin M12 ²	8-pin M12 ²
0 Volts	Black	3	7
+ Vcc	White	1	2
A	Brown	4	1
A'	Yellow	--	3
B	Red	2	4
B'	Green	--	5
Z	Orange	5	6
Z'	Blue	--	8
Shield	Bare ¹	--	--

¹Cable shield (bare wire) is connected to internal case.

²Cable shield and M12 connector body is connected to internal case.



5-pin M12



8-pin M12

Model TR3 Heavy Duty Tru-Trac™

Encoder and Spring Loaded Measuring Wheel



Linear Encoders



Features

- Heavy Duty Encoder And Measuring Wheel Solution Integrated Into One Industrial Strength Unit
- Spring Loaded Torsion Arm Makes Wheel Pressure Adjustments A Snap
- Easily Installed In A Vertical, Horizontal, or Upside-Down Orientation
- Operates Over A Variety Of Surfaces At Speeds Up To 3000 Feet Per Minute
- Integrated Module Simplifies Your System Design, Reducing Cost

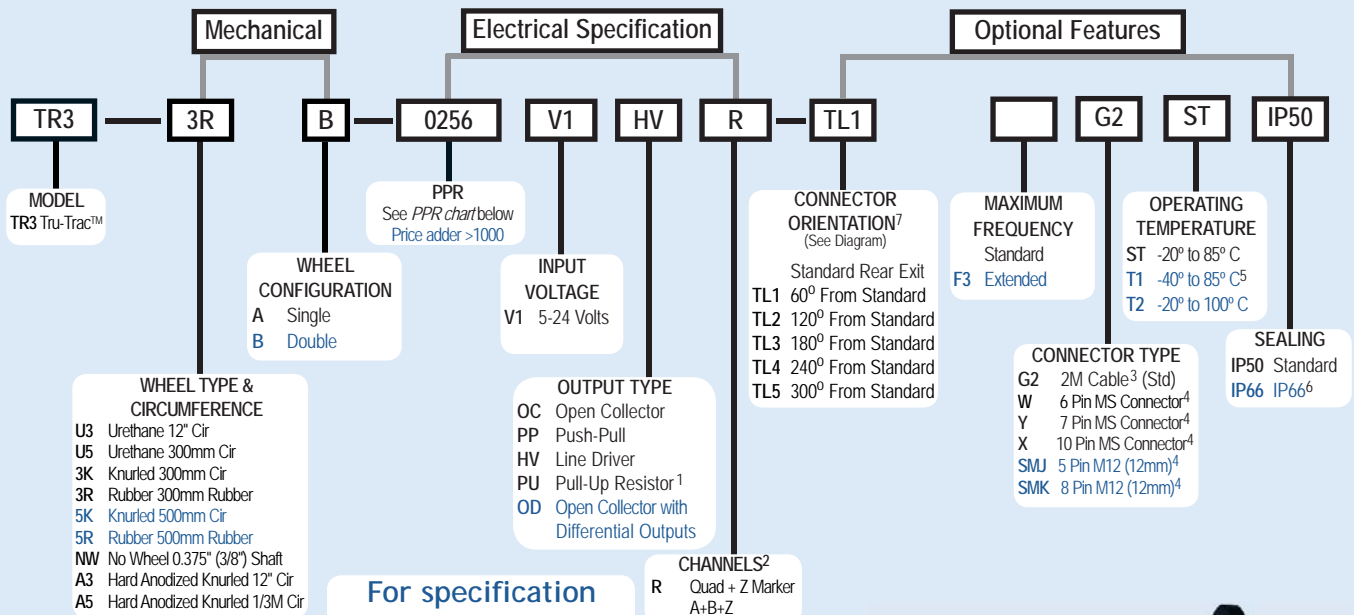
The TR3 Heavy Duty Tru-Trac™ is an integrated heavy duty encoder and spring loaded measuring wheel assembly all in one, easy-to-use, compact unit. Available in a single, or optional dual-wheel format, the TR3 Heavy Duty Tru-Trac™ is a versatile solution for tracking velocity, position or distance over a wide variety of surfaces in almost any industrial application. Its spring loaded torsion arm provides a simple-to-adjust torsion load, allowing the TR3 Heavy Duty Tru-Trac™ to be mounted in any orientation, even upside-down. The TR3 Heavy Duty Tru-Trac™ housing is an all metal work horse, specifically designed to take on your toughest application environments at operating speeds up to 1000M per minute. Just one look and it's easy to see the TR3 Heavy Duty Tru-Trac™ is the ideal solution for countless applications.

Common Applications

Lumber, Corrugated, Converting, Metal Roll Forming, Paper Monitoring, Glue Dispensing, Linear Material Monitoring, Conveyor Systems, Printing, Labeling, Mining, Construction

Model TR3 - Tru-Trac™ Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model TR3 - Tru-Trac™ PPR Options

0001 thru 0189*	0198	0200	0250
0256	0300	0315	0360
0500	0512	0580	0600
0800	1000	1024	1125
1250	1500	1800	2000
2500	2540	3000	3600
4096	5000	6000	7200
10,000			8192

Contact Customer Service for other disc resolutions.

New PPR values are periodically added to those listed.

Contact Customer Service to determine all currently available values.

Special disc resolutions are available upon request and may be subject to a one-time NRE fee.

Optional Accessories Mounting Bracket (Stock #176389-01) and Double Pivot (Stock #176391-01) for TR3 Heavy Duty Tru-Trac™ can be ordered separately.



NOTES:

- 1 With Input Voltage above 16 Vcc, operating temperature is limited to 85° C.
- 2 Contact Customer Service for non-standard marker gating or phase relationship options.
- 3 For non-standard cable lengths contact sales for availability and cost.
- 4 Body Mount Connector options only available with connector orientation options L1 thru L5.
- 5 Rated to -40° C during encoder operation. Storage and startup below -25° C not recommended.
- 6 Increased starting torque for IP66 option.
- 7 Leave blank for standard cable exit.

Model TR3 Heavy Duty Tru-Trac™

Encoder and Spring Loaded Measuring Wheel



Model TR3 - Specifications

Electrical

Input Voltage.....	5 to 28 Vcc max for temperatures up to 85° C 5 to 24 Vcc for temperatures between 85° C to 100° C
Input Current.....	100 mA max (65 mA typical) with no output load
Output Format.....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the wheel side. See <i>Waveform Diagrams</i> below.
Output Types.....	Open Collector- 20 mA max per channel Push-Pull- 20 mA max per channel Pull-Up- Open collector with 2.2K ohm Pull-Up 20mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index.....	Once per revolution. 0190 to 10,000 PPR: Gated to output A 0001 to 0189 PPR: Ungated See <i>Waveform Diagrams</i> below.
Max. Frequency.....	Standard Frequency Response is 200 kHz for PPR 1 to 2540 500 kHz for PPR 2541 to 5000 1 MHz for PPR 5001 to 10,000 Extended Frequency Response (optional) is 300 kHz for PPR 2000, 2048, 2500, and 2540
Noise Immunity.....	Tested to BS EN61000-6-2: BS EN50081-2; BS EN61000-4-2: BS EN61000-4-3; BS EN61000-4-6, BS EN500811
Symmetry.....	180° (±18°) electrical
Quad. Phasing.....	90° (±22.5°) electrical
Min. Edge Sep.....	67.5° electrical
Accuracy.....	Within 0.017° mechanical or 1 arc-minute from true position. (for PPR>189)

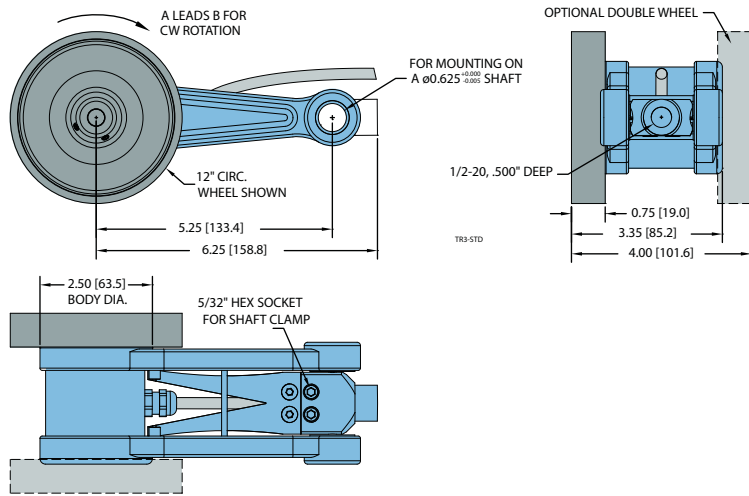
Mechanical

Max Linear Speed...	3000 FPM not to exceed a maximum shaft speed of 6000 RPM.
Shaft Material.....	Stainless Steel
Shaft Size.....	Ø0.375"
Radial Shaft Load ..	Up to 5kg max. Controlled by spring torsion feature
Starting Torque.....	7.06 x 10 ⁻³ Nm for IP50 2.82 x 10 ⁻² Nm for IP65 seal
Electrical Conn.....	2M cable (foil and braid shield, 24 AWG conductors) 6-, 7-, or 10-pin MS style, 5- or 8-pin M12 (12mm)
Mounting.....	15.87mm diameter thru hole with clamp
Housing.....	Powder coated aluminum
Wheel Width.....	Up to 20mm
Weight.....	1.15kg typical with single wheel 1.40kg typical with dual wheel

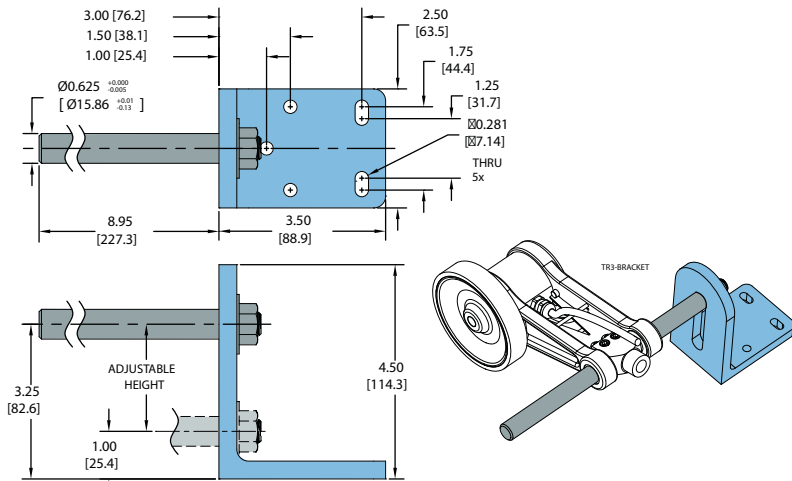
Environmental

Operating Temp.....	-20° to +85° C for standard models -40° to +85° C for low temperature option 20° to +100° C for high temperature option
Storage Temp.....	-25° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	10 g @ 58 to 500 Hz
Shock.....	80 g @ 11 ms duration
Sealing.....	IP50 standard; IP65 available

Model TR3 - Heavy Duty Tru-Trac™



Model TR3 - Mounting Bracket (Order #176389-01)



All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

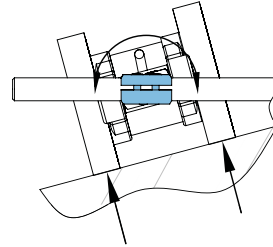
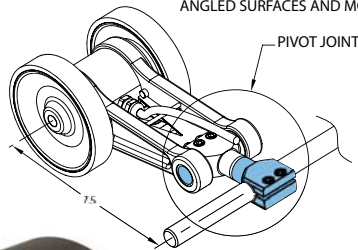


Model TR3 Heavy Duty Tru-Trac™ Encoder and Spring Loaded Measuring Wheel



Model TR3 Double Wheel Pivot (Order #176391-01)

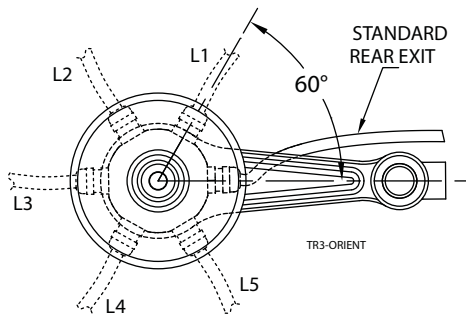
ALLOWS UNIT TO ROTATE FREELY TO MAINTAIN EQUAL PRESSURE ON BOTH WHEELS, ACCOMODATING UNEVEN/ ANGLED SURFACES AND MOUNTING MISALIGNMENT



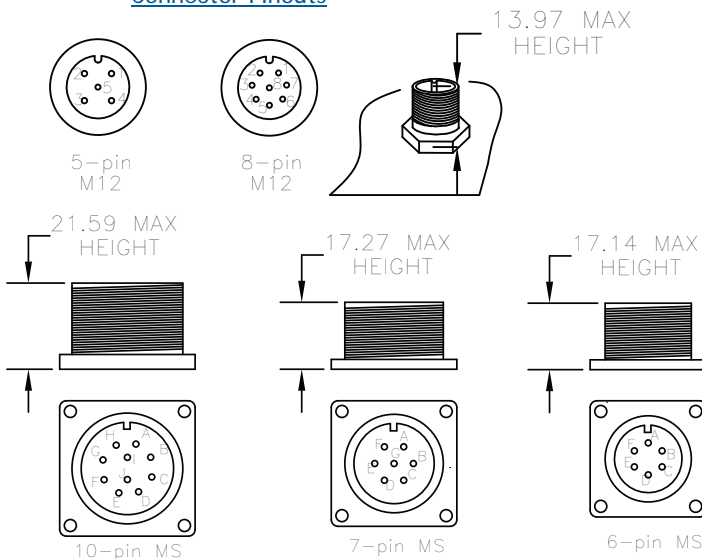
Linear Encoders

Model TR3 Connector Options

Connector Orientation



Connector Pinouts

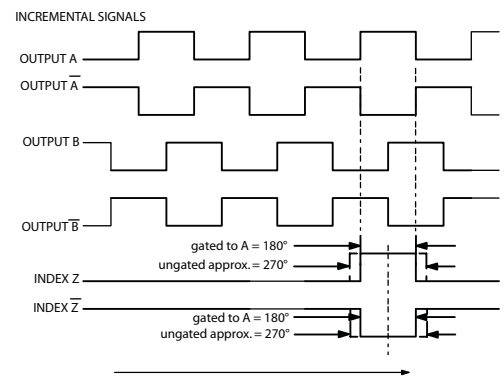


Wiring Table

Function	Gland ¹ Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS HV, OD	7-pin MS PU, PP, OC	6-pin MS PU, PP, OC
Com	Black	3	7	F	F	F	A, F
+VCC	White	1	2	D	D	D	B
A	Brown	4	1	A	A	A	D
A'	Yellow	—	3	H	C	—	—
B	Red	2	4	B	B	B	E
B'	Green	—	5	I	E	—	—
Z	Orange	5	6	C	—	C	C
Z'	Blue	—	8	J	—	—	—
Case	—	—	—	G	G	G	—
Shield	Bare	—	—	—	—	—	—

¹ Cable shield (bare wire) is connected to internal case

Waveform Diagram



Clockwise rotation as viewed from the single wheel side.
Note: All degree references are electrical degrees.
Waveform shown with optional complementary signals A, B, Z for HV and OD outputs only.

Measuring Wheels: Increasing the Versatility of Encoders

When properly selected and installed, measuring wheel encoders can provide years of trouble free and cost effective performance. In many types of applications, wheeled encoders can provide more convenient installations and higher accuracy than shaft or hollow bore encoders. The basic components of a completely integrated measuring wheel solution include: the encoder, the measuring wheel(s), a spring mechanism to apply a wheel load and a pivot mounting bracket. There are many important considerations when selecting a measuring wheel encoder but two of the more significant decisions will be the number of wheels needed as well as what type of wheel will best suit the application's environment.

A single measuring wheel may be the only option for your application, depending on the width of the material being measured. Single measuring wheels must be aligned perpendicular to the material to avoid error induced by uneven wear and a change in the wheel's effective turning diameter. Double measuring wheels result in twice the traction, reducing the potential for wheel slippage, and when coupled with a pivot mount that allows the encoder to rotate freely, the measuring wheels will align with the measured material and maintain equal pressure on both wheels. BEPC's TR3 has this option, and more.



TR3 Wheels

Important factors in selecting the best measuring wheel are the circumference and the surface material. The surface material must be chosen to give optimal traction without unduly compromising wear, while the circumference should be selected to give the best accuracy within the mounting constraints available. BEPC offers many different measuring wheel sizes, including but not limited to 6", 12", 1/3 meter, 200 mm, 500mm and all with a choice of either rubber, knurled or knurled anodized styles, and are made of aluminum alloy.

The actual selection of the various materials is determined by the type of material that is to be measured. The rubber offers the best traction in most applications, but it can be short lived with some materials. The 80 urethane is somewhat harder than the rubber and usually lasts longer. The 90 urethane is the hardest of the coated wheels and provides the longest life under the most circumstances at the cost of less traction. Performance may vary depending on your application.

Another important consideration to keep in mind when selecting a measuring wheel encoder is that it is capable of handling both the mechanical and electrical speed of your application. For instance, BEPC's model TR1 can handle applications with linear speeds up to 3000 feet per minute and electrical frequencies up to 1 MHz.



TR1 Wheels

Debris collecting on a measuring wheel will increase the effective diameter of the wheel and cause potentially unacceptable error. If there will be significant debris in your application, it is best to install the measuring wheel encoder in a location that is least likely to have the debris collect on the wheel. Rather than mounting the measuring wheel on the top surface of a conveyor belt, mount it upside down and on the interior surface of the belt. If not possible, then installing a brush on the measured material just ahead of the wheel, or in contact with the wheel itself can reduce or even eliminate this problem.

For long service life a measuring wheel encoder should be selected that will withstand the environment in which it will be exposed. All measuring wheels, like BEPC's Accu-Coder™ brand encoders, are manufactured to BEPC's exacting standards, and feature BEPC's exclusive 3-year standard product warranty, ensuring you years of trouble free use.

Check out our complete list of measuring wheels on page's 94 to 95

For specification assistance call Customer Service at +44 (0)1978 262100

Model LCE Linear Cable Encoder



Features

- Low Cost Linear Solution
- Imperial and Metric Options
- IP65 Sealing Available
- Up to 1.27M or 50 Inches Full Stroke Length

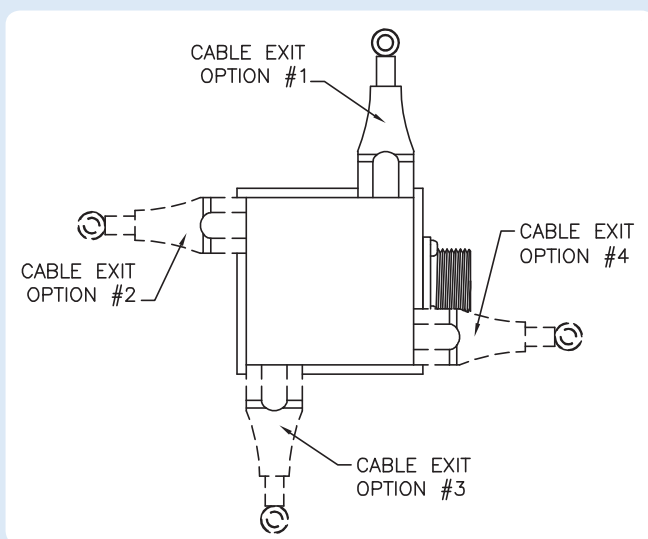
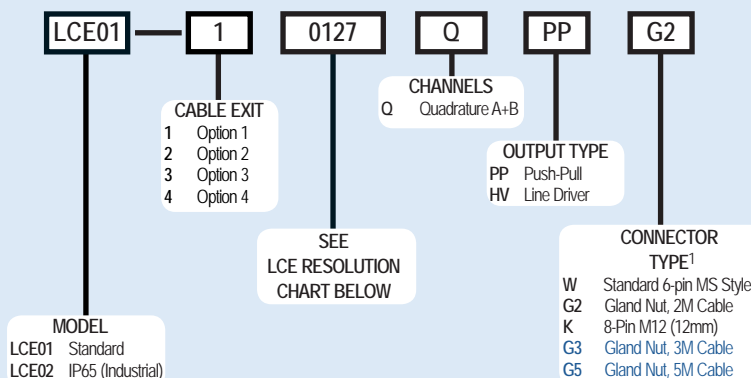
The Linear Cable Encoder (LCE) provides a low cost alternative for obtaining accurate linear measurements. As opposed to typical rotary shaft style encoders, the LCE has a retractable stainless steel cable, allowing for numerous and unusual measuring configurations. Placing the LCE away from harsh environmental conditions, while still providing precise measurements, gives the LCE an outstanding advantage over shaft style encoders. Installation is easy with a variety of cable exit directions, and perfect parallel alignment no longer necessary. The heart of the LCE is the popular 716 Series Encoder, the finest cube style encoder available. The 716 provides a reliable digital pulse train in either single channel or quadrature format, with resolutions down to 0.1mm per cycle. The small overall size, a variety of resolutions, and many different connector types, makes the versatility of the LCE unbeatable!

Common Applications

Robotics, Extrusion Presses, Valve Positioning, Textile Machinery, Control Gate Positioning

Model LCE Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model LCE Resolution Table

Pulses Per 127mm / 5.0" Linear Travel	0127	1270	0050	0500
Linear Resolution	1.00mm	0.10mm	0.10"	0.01"

NOTES:

1 For non-standard cable lengths, please call the sales office.

Model LCE Linear Cable Encoder



Model LCE Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max for temperatures up to 70° C
 Input Current.....80 mA maximum with no output load
 Input Ripple100 mV peak-to-peak at 0 to 100 kHz
 Output FormatIncremental- Square wave with channel A leading B during linear extension
 Output Type Push-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel
 (Meets RS 422 at 5 VCC supply)
 Freq Response.....Up to 125 kHz
 Symmetry180° (±18°) electrical
 Quad Phasing.....90° (±22.5°) electrical
 Rise Time.....Less than 1 microsecond

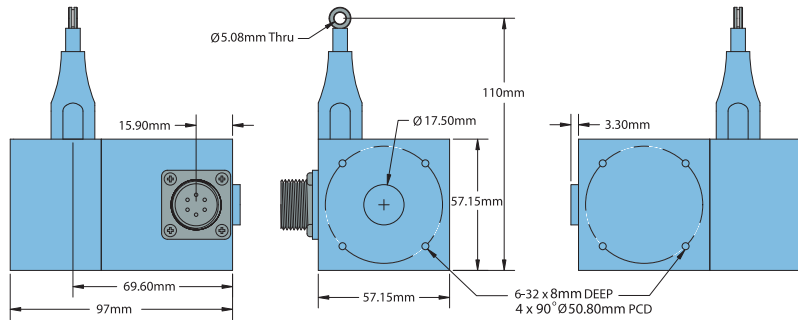
Mechanical

Full Stroke.....1.27M / 50" standard.
 FinishBlack powder coated aluminum
 Accuracy.....±0.10% of FSL
 Repeatability.....±0.015% of FSL
 Linear ResolutionSee resolution table
 Cable Material0.864mm Dia nylon coated stainless steel rope
 Cable Tension.....570 grams maximum typical
 Life (cycles)1,000,000 predicted at zero angle cable exit
 Electrical Conn6-pin MS, or 8-pin M12 Eurofast
 Gland with 2M cable (foil and braid shield, 24 AWG conductors)

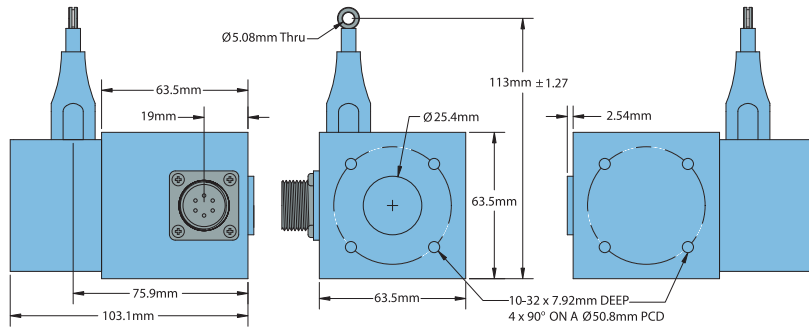
Environmental

Operating Temp.....0° to 70° C standard
 Sealing.....IP50 Standard

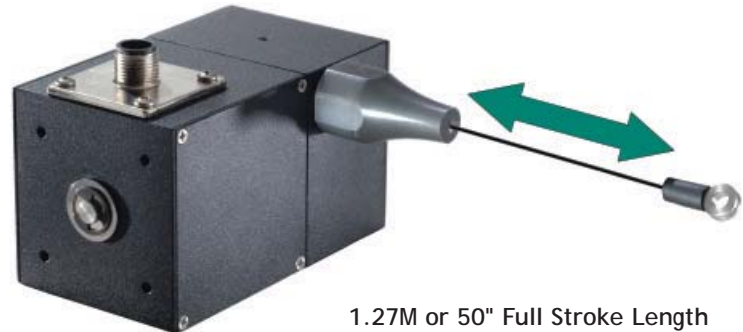
Model LCE Standard Housing (LCE01)



Model LCE IP65 Industrial Housing (LCE02)



All dimensions are in mm with a tolerance of ±0.127 or ±0.254 unless otherwise specified

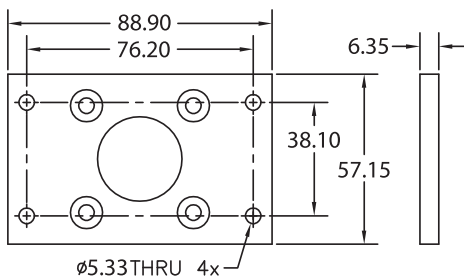


1.27M or 50" Full Stroke Length

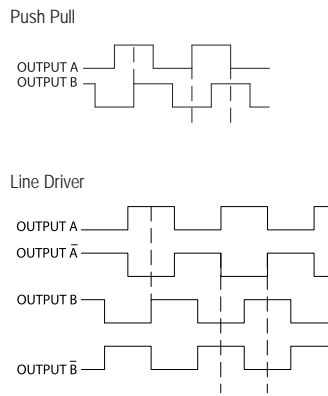
Linear Encoders

Optional Mounting Plate

Attaches to Standard or Industrial LCE in three different orientations.
 Order Accessory Item 176064-01



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	8-pin M12 HV A+B	6-pin MS HV A+B	6-pin MS PP A+B
Com	Black	7	A	A
+VDC	Red	2	B	B
A'	Brown	1	C	—
A	White	3	D	D
B	Blue	4	E	E
B'	Violet	5	F	—
Shield	Screen	—	—	—

Model 802S Stainless Steel 50.80mm Diameter



Stainless Steel Encoders



Features

- Industry Standard Size 20 (50.8mm diameter) Stainless Steel Package
- Flange and Servo Mounting
- Up to 30,000 PPR
- 36 Kg Maximum Axial and Radial Shaft Loading
- IP66 Sealing Available

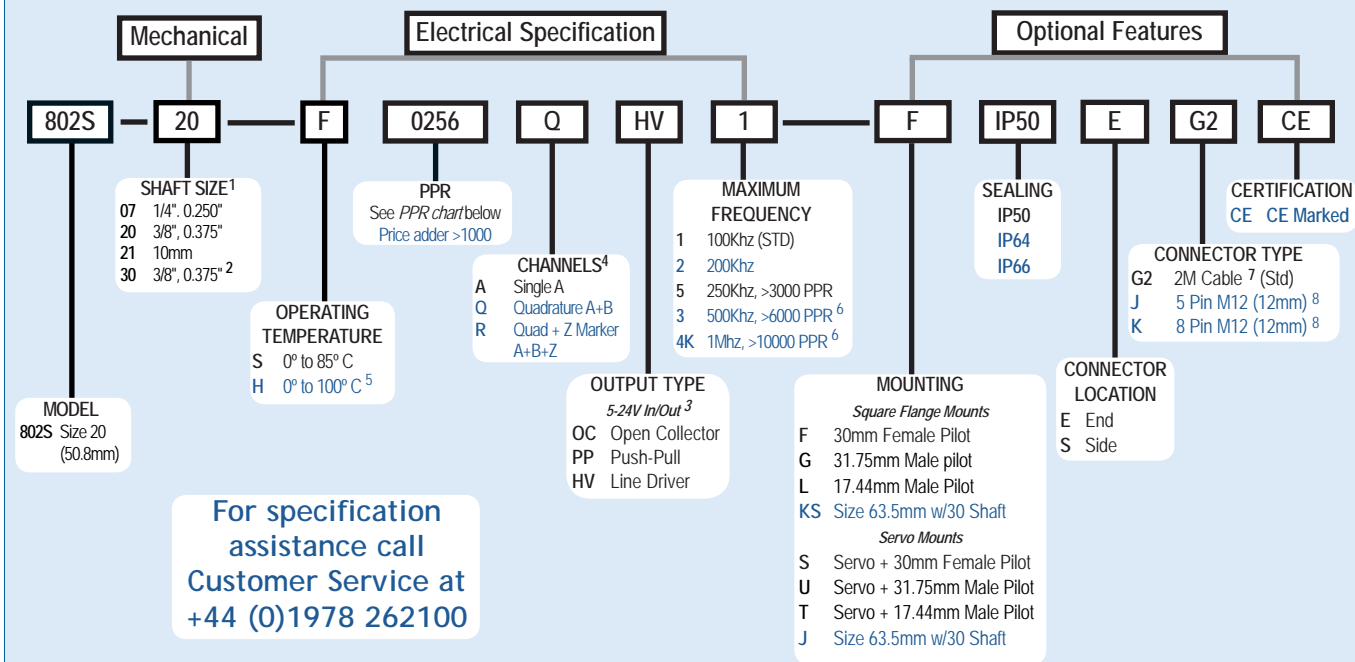
The Model 802S is a heavy duty, industry standard Size 20 (50.8 diameter) encoder specifically designed for harsh factory and plant floor environments. The Model 802S is available with a variety of flange and servo mounting styles, making it easy to use in a broad range of applications. Its heavy duty, double shielded ball bearings are rated at 36 Kg maximum axial and radial shaft load, ensuring long operating life. This ultra-rugged, yet compact encoder is housed in a type 316 stainless steel enclosure, making it ideal for applications where contamination or exposure to caustic chemicals is a concern. But don't let its tough exterior fool you, the Model 802S provides the precise, reliable output you've come to expect from BEPC.

Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Model 802S Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



Model 802S PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	1000	1024	1200	1201 ^a	1203 ^a	1204 ^a	1250 ^a	1270 ^a
1440	1500	1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a
3000 ^a	3600 ^a	4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a
10,000 ^a	10,240 ^a	12,000 ^a	12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a
25,000 ^a	30,000 ^a							

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request.

A one-time NRE fee may apply.

NOTES:

- 1 Contact Customer Service for additional options not shown.
- 2 Shaft Size 30 **ONLY** available with KS and JS Mountings.
- 3 24Vcc Max for High Temperature Option.
- 4 Contact Customer Service for non-standard marker gating or phase relationship options.
- 5 0° to 85°C for certain PPR resolutions - See PPR options.
- 6 Standard Cable Length Only.
- 7 For non-standard cable lengths contact sales for availability and cost.
- 8 M12 Connector available on side mount option only.

Model 802S Stainless Steel 50.80mm Diameter



Model 802S Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current.....100 mA max with no output load
Input Ripple.....100 mV peak-to-peak at 0 to 100 kHz
Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams*.

Output TypesOpen Collector- 100 mA max per channel
Pull-Up- 100 mA max per channel
Push-Pull- 20 mA max per channel
Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)

IndexOccurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams*.

Max Frequency.....Up to 1 MHz.
Noise Immunity.....Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry.....1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output
6001 to 20,480 PPR: 180° (±36°) electrical

Quad Phasing.....1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output
6001 to 20,480 PPR: 90° (±36°) electrical

Min Edge Sep.....1 to 6000 PPR: 67.5° electrical at 100 kHz output
6001 to 20,480 PPR: 54° electrical
>20,480 CPR: 50° electrical

Rise Time.....Less than 1 microsecond
Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed.....8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Shaft Size0.250", 0.375" or 10 mm

Shaft Rotation.....Bi-directional

Radial Shaft Load.....35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5 x 10⁹ revolutions

Axial Shaft Load.....35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5 x 10⁹ revolutions

Starting Torque7.0615 x 10⁻³ Nm Typical with IP64 or no seal
2.0118 x 10⁻² Nm Typical with IP66 Seal

Connector Type.....M12 (12 mm) or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors)

Housing.....316 Stainless Steel

Bearings.....Precision ABEC ball bearings

Mounting.....Various flange or servo mounts

Weight.....680 grams typical

Environmental

Operating Temp.....0° to 70° C for standard models
0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)

Storage Temp-25° to +85° C

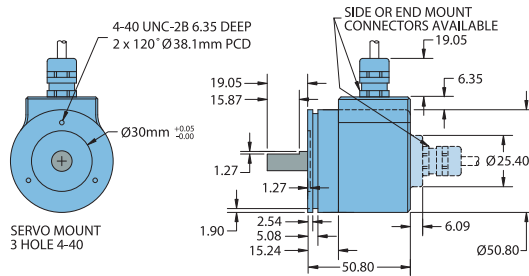
Humidity.....98% RH non-condensing

Vibration.....20 g @ 58 to 500 Hz

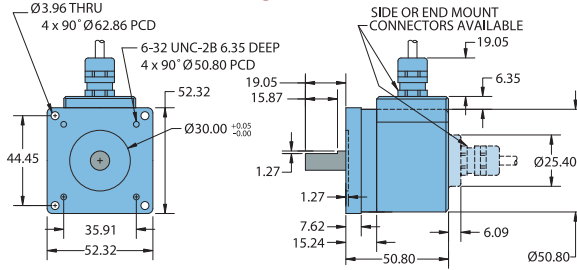
Shock.....75 g @ 11 ms duration

Sealing.....IP50 standard; IP64, IP66 or IP67 optional

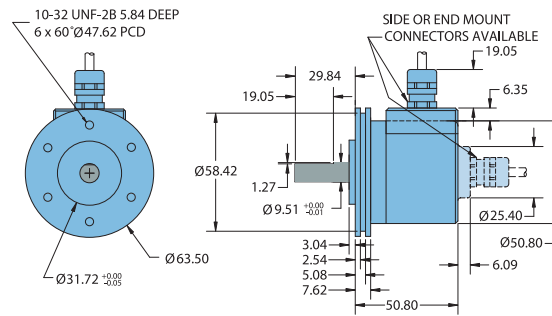
Model 802S Servo Mount (S)



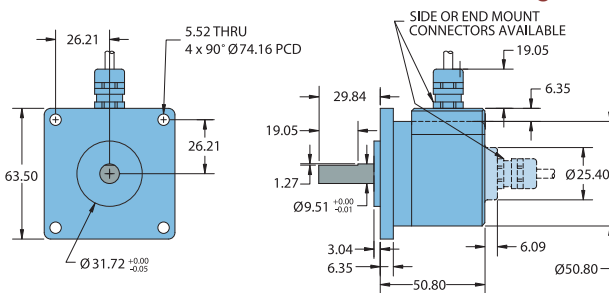
Model 802S Flange Mount (F)



Model 802S Size 25 (63.5mm) Servo Mount (J)

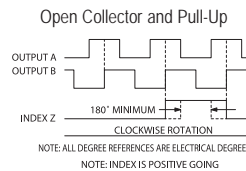
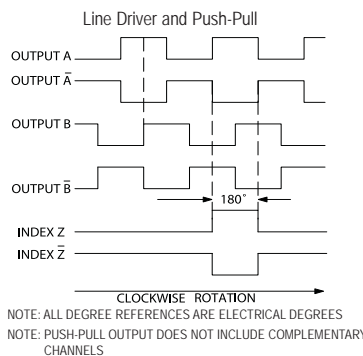


Model 802S Size 25 (63.5mm) Flange Mount (K)



All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color	5-pin M12 ²	8-pin M12 ²
Com	Black	3	7
+Vcc	Red	1	2
A	White	4	1
A'	Brown	—	3
B	Blue	2	4
B'	Violet	—	5
Z	Orange	5	6
Z'	Yellow	—	8
Case	Green	—	—
Shield	Bare ¹	—	—

Model 858 - 58mm Stainless Steel Encoder



Features

- Standard Size 58mm Mounting (58mm Diameter)
- Up to 30,000 PPR
- 36Kg Max. Axial and Radial Shaft Loading
- High Temperature Option (100°C)
- IP65 Sealing Available
- Manufactured in Food Grade 316 Stainless Steel.

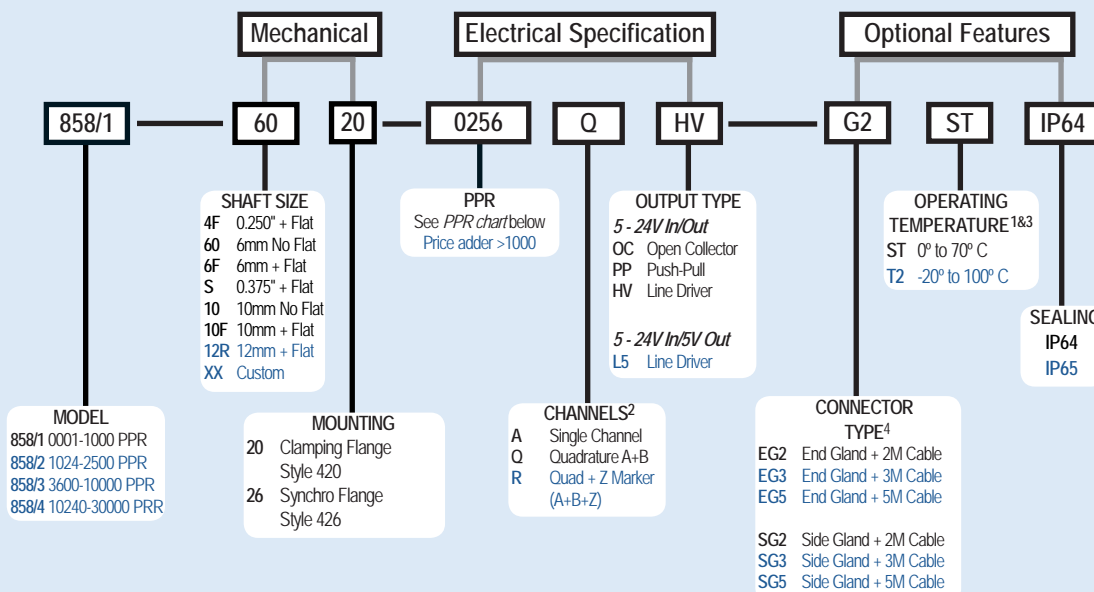
The Model 858 is a heavy duty, Stainless Steel, extremely rugged, reliable, yet compact European standard 58mm diameter encoder, Designed for harsh factory and food industry environments. Shaft loading is no problem for the double-shielded ball bearings and their 36Kg load rating ensures a long operating life. If fitted with the optional heavy-duty shaft seal the model 758 is rated IP65. Two standard mounting options are available: Clamping Flange (20 Type) or Synchro Flange (26 Type). The Model 858 is the perfect replacement encoder for food industry, wash-down or marine environments.

Common Applications

Food Processing, Oil, Gas & Chemical Processing, Material Handling, Conveyors, Robotics, Lift Controls, Textile Machines.

Model 858 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 858 PPR Options³

0010*	0020	0025*	0030*	0040*	0060	0100	0120	0125
0128*	0144*	0150*	0160*	0200	0240*	0250	0254*	0256*
0300	0333*	0360	0400	0500	0512	0600	0625*	0635
0720	0800	1000	1024	1200 ^a	1250 ^a	1270 ^a	1440	1500
1800	2000	2048	2400 ^a	2500	2540 ^a	2880 ^a	3000 ^a	3600 ^a
4000 ^a	4096 ^a	5000 ^a	6000 ^a	7200 ^a	7500 ^a	9000 ^a	10,000 ^a	10,240 ^a
12,500 ^a	14,400 ^a	15,000 ^a	18,000 ^a	20,000 ^a	20,480 ^a	25,000 ^a	30,000 ^a	

* Contact Customer Service for High Temperature Option.

^a High Temperature Option (H) limited to 85° C maximum for these PPR options.

New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request.

A one-time NRE (Non Recurring Engineering) fee may apply.

NOTES:

- 1 0° to 85° for certain resolutions, See PPR options.
- 2 Contact customer service for marker gating options.
- 3 Standard temperature, 50 to 3000 PPR only.
- 4 For non-standard cable lengths - call sales office.

Model 858 - 58mm Stainless Steel Encoder



Model 858 Specifications

Electrical

Input Voltage.....	4.75 to 28 Vcc max for temperatures up to 70° C 4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current.....	100 mA max with no output load
Input Ripple	100 mV peak-to-peak at 0 to 100 kHz
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See <i>Waveform Diagrams</i> below.
Output Types.....	Open Collector- 50 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index.....	Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See <i>Waveform Diagrams</i> below.
Freq Response.....	Up to 1 MHz
Noise Immunity.....	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry	1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 PPR: 180° (±36°) electrical
Quad Phasing.....	1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 PPR: 90° (±36°)
Min Edge Sep.....	1 to 6000 PPR: 67.5° electrical at 100 kHz output 6001 to 20,480 PPR: 54° electrical >20,480 PPR: 50° electrical
Rise Time.....	Less than 1 microsecond

Accuracy.....Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

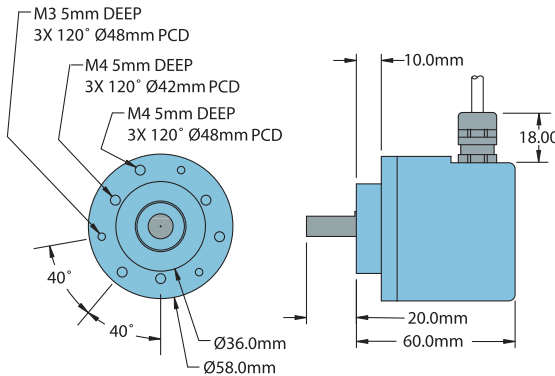
Mechanical

Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Size	6 mm up to 12 mm
Shaft Rotation.....	Bi-directional
Radial Shaft Load.....	36 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Axial Shaft Load.....	36 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Starting Torque.....	7.061 x 10 ⁻³ Nm typical with IP64 seal or no seal 2.118 x 10 ⁻² Nm typical with IP66 shaft seal
Electrical Conn	Gland with 2M cable (foil and braid shield, 24 AWG conductors) 12-pin connector, or 8-pin M12 (12 mm)
Housing.....	316 Stainless Steel
Bearings.....	Precision ABEC ball bearings
Mounting.....	European Standard Clamping Flange (20 Type) and Synchro Flange (26 Type)
Weight.....	750 grams typical

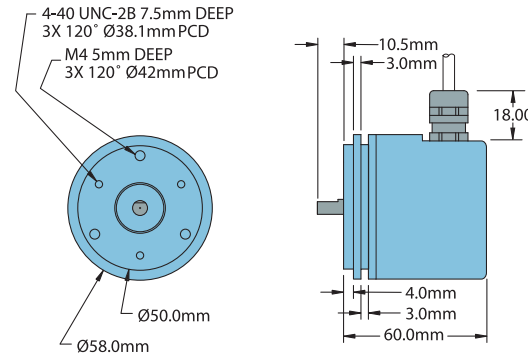
Environmental

Operating Temp.....	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)
Storage Temp.....	-25° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	20 g @ 58 to 500 Hz
Shock.....	75 g @ 11 ms duration
Sealing.....	IP64 shaft seal or IP65 shaft seal

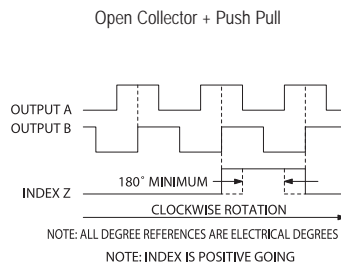
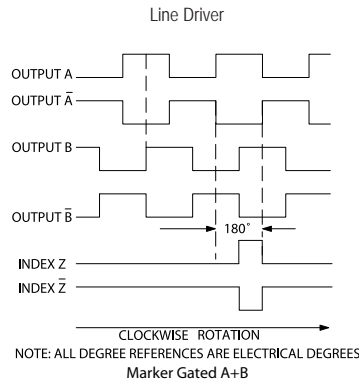
Model 858 Clamping Flange 20 Type



Model 858 Synchro Flange 26 Type



Waveform Diagrams



Wiring Table

Function	Gland Cable Wire Color
Com	Black
+VCC	White
A	Brown
A'	Yellow
B	Red
B'	Green
Z	Orange
Z'	Blue
Shield	Screen
+VDC Sense	—
Com Sense	—
Case	—

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Model 865T Stainless Steel Thru-Bore



Stainless Steel Encoders



Features

- A C-Face Thru-Bore Encoder With Stainless Steel Housing
- Fits NEMA Size 56C Thru 184 C Motor Faces (4.5" AK)
- Slim Profile - Only 1.00" (25.4mm) Deep
- Incorporates Opto-ASIC Technology
- Resolutions to 4096 PPR

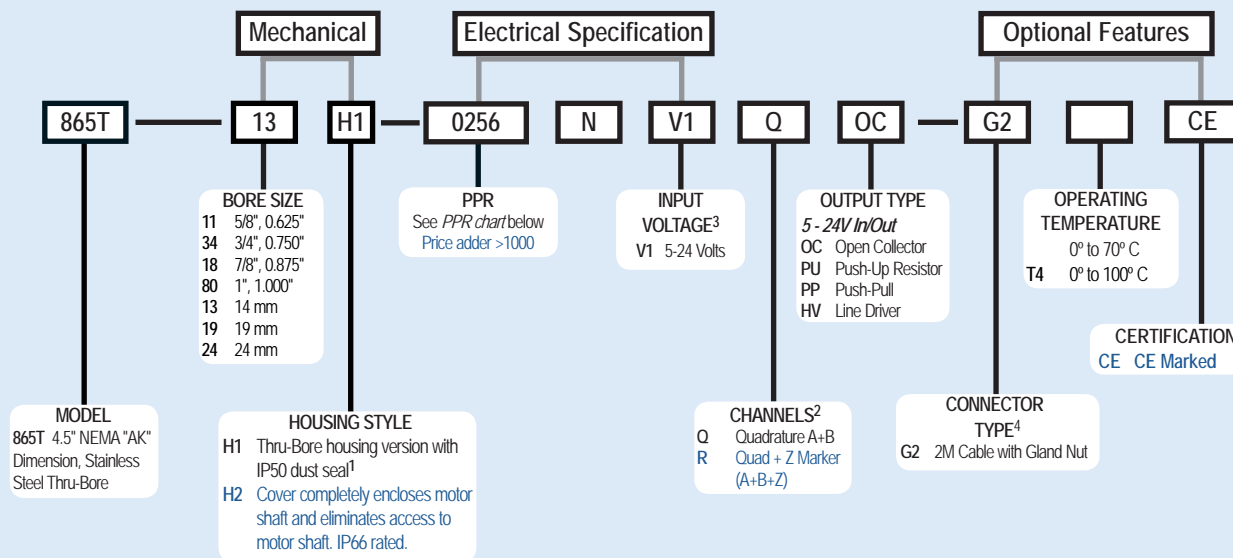
The Model 865T C-face encoder is a rugged, high resolution encoder designed to mount directly on NEMA C-face motors. Both sides of the encoder are C-face mounts, allowing additional C-face devices to be mounted to this encoder. Unlike many C-face kit type encoders, the Model 865T contains precision bearings and an internal flex mount, virtually eliminating encoder failures and inaccuracies induced by motor shaft runout or axial endplay. The advanced Opto-ASIC design provides advanced noise immunity necessary for many industrial applications. This encoder is ideal for applications using induction motors and flux vector control. The Model 865T provides speed and position information for drive feedback in a slim profile - only 25.4mm thick. The Thru-Bore design allows fast and simple mounting of the encoder directly to the accessory shaft or to the drive shaft of the motor, using the standard motor face (NEMA sizes 56C - 184C). The tough, 316 stainless steel housing resists the corrosion and hazards of a caustic industrial environment.

Common Applications

Motor Feedback, Velocity & Position Control, Conveyors, Variable Speed Drives, Mixing & Blending Motors, Assembly & Speciality Machines

Model 865T Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification
assistance call
Customer Service at
+44 (0)1978 262100

Model 865T PPR Options

0060	0100	0120	0240	0250	0256
0500	0512	1000	1024	2048	2500
4096					

Contact Customer Service for other disk resolutions;
not all disk resolutions available with all output types

NOTES:

- 1 Housing style H1 Thru-Bore version equipped with IP50 dust seal; unit must be mounted between two C-face devices with supplied gasket kit to be IP66 sealed.
- 2 Contact Customer Service for Marker gating options.
- 3 5 to 24 Vcc max for high temperature option.
- 4 For non-standard cable lengths please contact the sales office.

Model 865T

Stainless Steel Thru-Bore



Model 865T Specifications

Electrical

Input Voltage.....4.75 to 28 Vcc max for temperatures up to 70° C
 4.75 to 24 Vcc for temperatures between 70° C to 100° C

Input Current.....100 mA max with no output load

Input Ripple100 mV peak-to-peak at 0 to 100 kHz

Output FormatIncremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face. See *Waveform Diagrams* below.

Output TypesOpen Collector- 100 mA max per channel
 Pull-Up- 100 mA max per channel
 Push-Pull- 20 mA max per channel
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)

Index.....Once per revolution.
 0475 to 4096 PPR: Gated to output A
 0001 to 0474 PPR: Ungated
 See *Waveform Diagrams* below.

Max Frequency.....200 kHz

Noise Immunity.....Tested to BS EN61000-4-2: IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2

Symmetry180°(±18°) electrical

Quad. Phasing.....90°(±22.5°) electrical

Min. Edge Sep.....67.5° electrical

Rise Time.....Less than 1 microsecond

Mechanical

Max Shaft Speed.....6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.

Bore Size.....0.625", 0.750", 0.875", 1.000", 14 mm, 19 mm, and 24 mm

Bore Tolerance+0.03/0.00 mm

User Shaft Tolerances
 Radial Runout.....0.12 mm
 Axial Endplay.....±1.27 mm

Electrical Conn.....Gland nut with 2M cable (foil and braid shield, 24 AWG conductors)

Housing.....Type 316 Stainless Steel

Mounting.....NEMA 56C to 184C

Weight.....2.72 kg

Environmental

Operating Temp.....0° to 70° C for standard models
 0° to 100° C for high temperature option

Storage Temp.....-25° to 100° C

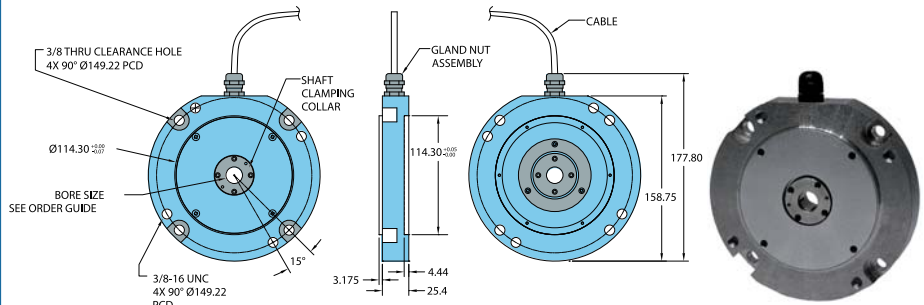
Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

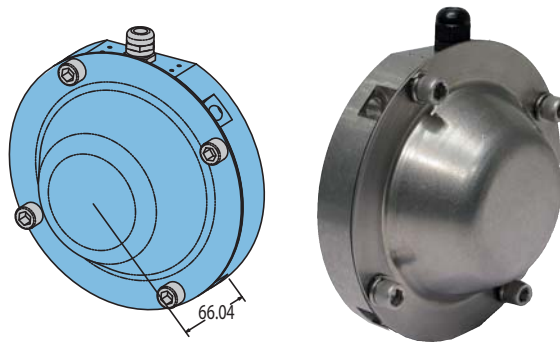
Shock.....50 g @ 11 ms duration

Sealing.....IP66 when mounted between two C-face devices with supplied gasket kit, or with H2 cover. IP50 if not installed in either manner.

Model 865T with Gland Nut (P)

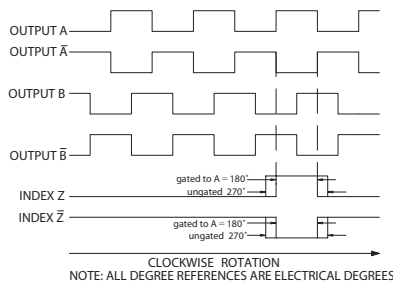


Model 865T Optional Housing Cover (H2)

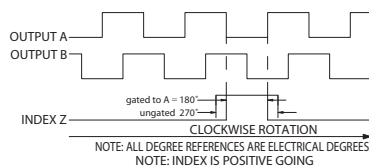


Waveform Diagrams

Line Driver



Open Collector + Push Pull



Wiring Table

Function	Gland Cable Wire Color
0 Volts	Black
+Vcc	Red
A	White
A'	Brown
B	Blue
B'	Violet
Z	Orange
Z'	Yellow
Shield	Bare*

Stainless Steel Encoders

Model 925 Heavy Duty Single Turn Absolute



Features

- Standard Size 25 Package (63.5mm)
- Resolutions up to 12 Bit (4096 Counts)
- Incorporates Opto-ASIC Technology
- Industrial Grade, Heavy Duty Housing
- Wide Range of Operating Voltages (4.75 to 24 Vcc)

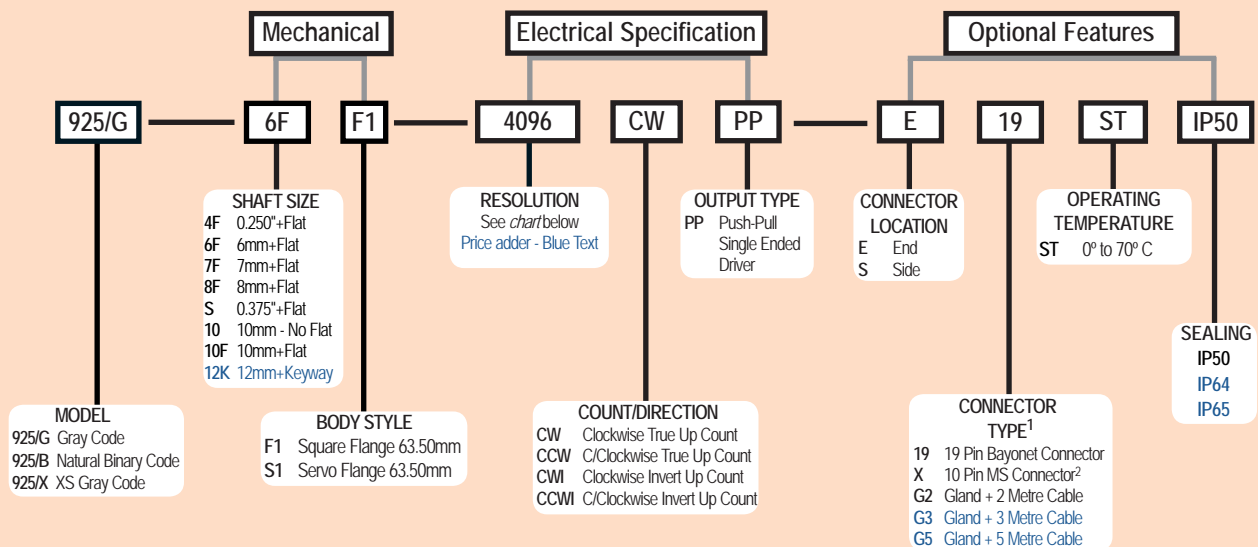
The Model 925 Single Turn Absolute is ideal for a wide variety of industrial applications that require an encoder with the capability of absolute positioning output. Its fully digital output and innovative use of Opto-ASIC technology make the model 925 an excellent choice for all applications, especially ones with a high presence of noise. Available with either a round servo or square flange mounting, and a variety of connector and cable options, the model 925 is easily designed into a variety of application requirements. The model 925, with its wide selection of shaft sizes supported by industrial grade, heavy duty bearings, is ideal for rough environments.

Common Applications

Machine tools, Robotics, Telescopes, Antennas, Rotary & X-Y Positioning Tables, Medical Scanners

Model 925 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model 925 PPR Options

	Output Code	Pulses Per Resolution					
925/G	Gray Code	0256	0512	1024	2048	4096	
925/B	Natural Binary	0250	0256	0360	0500	0512	0720
		1000	1024	1440	2000	2048	2880
		4000	4096				
925/X	Excess Gray	0180	0250	0360	0500	0720	1000
		1440	2000	2880	4000		

NOTES:

- 1 For non-standard cable lengths - contact the sales office for availability
- 2 Only available with 8 bit resolution encoder.

Model 925 Heavy Duty Single Turn Absolute



Model 925 Specifications

Electrical

Input Voltage 4.75 to 24 Vcc max
 Regulation..... 100 mV peak-to-peak, max ripple at 0 to 10 kHz
 Input Current..... 100 mA max with no external load
 Output Format Absolute- Parallel Outputs
 Output Type..... Push-Pull- 20 mA max per channel
 Code Gray Code, Natural Binary Code, Excess Gray Code
 Max Frequency..... 50 kHz (LSB)
 Rise Time..... Less than 1 microsecond
 Resolution..... Up to 12 bit
 Accuracy..... $\pm 1/2$ LSB

Control

Directional Control.... Field selectable for increasing counts (CW or CCW)

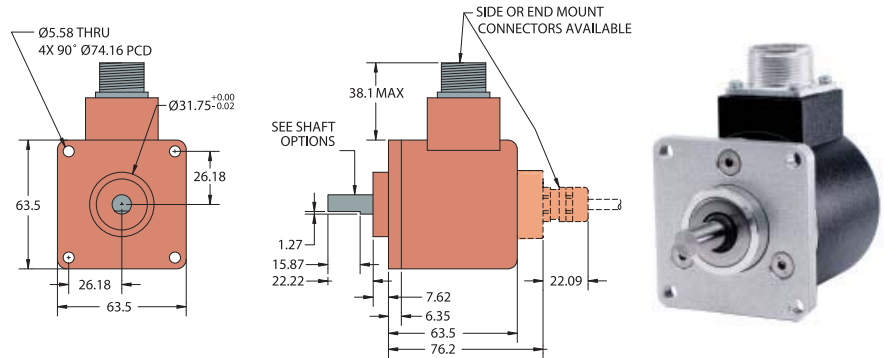
Mechanical

Max Shaft Speed..... 6000 RPM continuous
 Shaft Size 0.250", 0.375", 6 mm, 8 mm, 10mm, 12mm
 Radial Shaft Load..... 15 Kg max
 Axial Shaft Load..... 20 Kg max
 Starting Torque..... 7.061×10^{-3} Nm typical for no seal
 1.412×10^{-2} Nm with IP64 shaft seal
 Electrical Conn Gland with 2M cable (braid shield, 30 AWG conductors), 10-, 16-, and 19-pin
 Housing..... Aluminium
 Mounting..... Flange or servo type
 Weight..... 630 grams typical

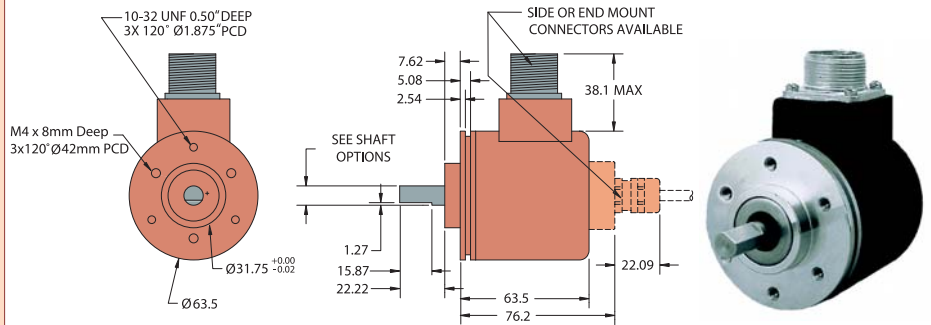
Environmental

Operating Temp..... 0° to 70° C
 Storage Temp..... -20° to +85° C
 Humidity..... 98% RH non-condensing
 Vibration..... 10 g @ 58 to 500 Hz
 Shock..... 20 g @ 11 ms duration
 Sealing..... IP50 (standard)
 IP64, or IP65 optional

Model 925 Flange Mount (F1)



Model 925 Servo Mount (S1)



Wiring Table

	19-PIN KPT02E14-19P	10-PIN* MS	Gland Cable or Mating Conn.	Wire Color	NOTES:
Function	Pin	Pin			
S1 MSB	A	A		Brown	* Only available with 8-bit resolution encoders
S2	B	B		White	** Where Fitted
S3	C	C		Green	*** Direction Control- Standard is CW increasing when viewed from the shaft end. Direction pin is pulled high normally to 5V internally. Direction pin must be pulled low (GND, Common) to reverse count direction.
S4	D	D		Orange	
S5	E	E		Blue	
S6	F	F		Violet	
S7	G	G		Grey	
S8 LSB 8-bit	H	H		Pink	
S9 LSB 9-bit	J	—		Red/Green	
S10 LSB 10-bit	K	—		Red/Yellow	
S11 LSB 11-bit	L	—		Turquoise	
S12 LSB 12-bit	M	—		Yellow	
Direction***	R	—		Red/Blue	
Case Ground	S	—		Drain/Screen	
0V Common	T	J		Black	
Special**	U	—		White/Red	
+Vcc	V	I		Red	0V only should be applied to the direction pin.

Model 958 Single Turn 58mm Absolute



Features

- 58 mm Package
- Resolutions Up To 12 Bit (4096 PPR equivalent)
- Incorporates Opto-ASIC Technology
- Industrial Grade, Heavy Duty Housing
- Wide Range of Operating Voltages (4.75 to 24 VCC)

The Model 958 Single Turn Absolute is ideal for a wide variety of industrial applications requiring an encoder with Size 58 mm mounting and absolute positioning output. A rugged, industrial grade housing allows the Model 958 to be used in a wide variety of applications calling for a reliable, heavy-duty encoder. In addition, its innovative Opto-ASIC circuitry coupled with its digital output make it an excellent choice in those applications plagued by unusually high levels of electrical noise. Available with a choice of either type 20 or type 26 servo mounting, and a variety of connector and cabling options, the Model 958 is easily designed into a variety of applications. The Model 958 can also be ordered with stainless steel housing, heavy duty bearings and an IP66 seal.

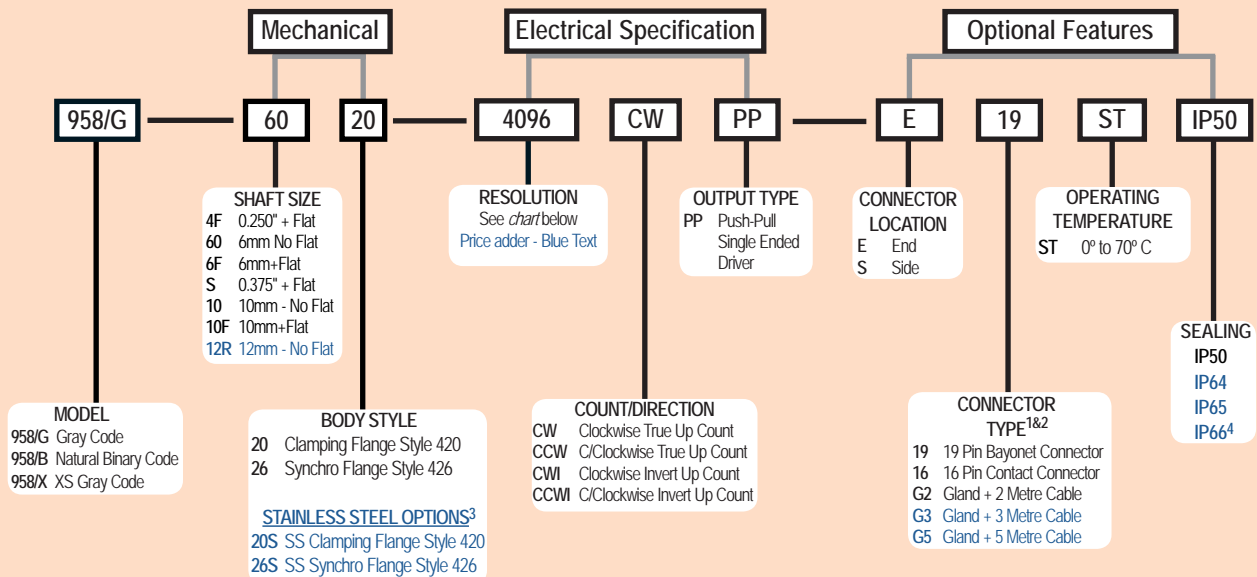
With so many options that make the Model 958 ultra-durable, this absolute encoder can tolerate the worst environments!

Common Applications

Machine Tools, Robotics, Telescopes, Antennas, Rotary & X-Y Positioning Tables, Medical Scanners

Model 958 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

Model 958 PPR Options

	Output Code	Pulses Per Resolution					
958/G	Gray Code	0256	0512	1024	2048	4096	
958/B	Natural Binary	0250	0256	0360	0500	0512	0720
		1000	1024	1440	2000	2048	2880
		4000	4096				
958/X	Excess Gray	0180	0250	0360	0500	0720	1000
		1440	2000	2880	4000		

NOTES:

- 1 For additional connector styles - contact the sales office for availability.
- 2 For non-standard cable lengths - contact the sales office.
- 3 For stainless steel options - contact the sales office.
- 4 IP66 has significantly increased torque.

Model 958 Single Turn 58mm Absolute



Model 958 Specifications

Electrical

Input Voltage.....	4.75 to 24 VCC max
Regulation.....	100 mV peak-to-peak, max ripple at 0 to 100 kHz
Input Current.....	100 mA max with no external load
Output Format.....	Absolute- Parallel Outputs
Output Type.....	Push-Pull- 20 mA max per channel
Code.....	Gray Code, Natural Binary Code, Excess Gray Code
Max Frequency.....	50 kHz (LSB)
Rise Time.....	Less than 1 microsecond
Resolution.....	Up to 12 bit
Accuracy.....	+1/6th LSB

Control

Directional Control....	Field selectable for increasing counts (CW or CCW)
-------------------------	--

Mechanical

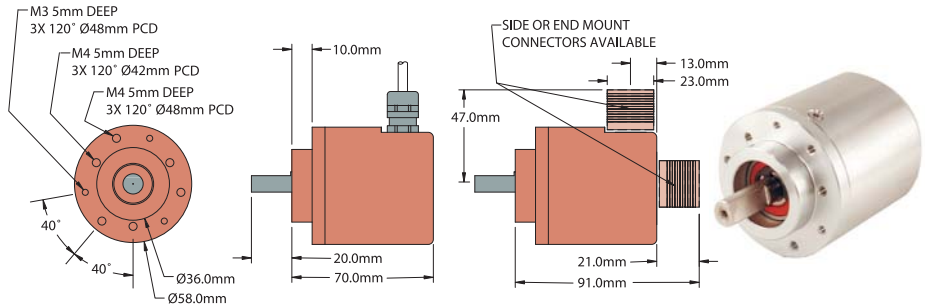
Max Shaft Speed.....	6000 RPM continuous
Shaft Size.....	6mm, 10mm, 12mm
Radial Shaft Load.....	15Kg max
Axial Shaft Load.....	20Kg max
Starting Torque.....	7.061 x 10 ⁻³ Nm typical for no seal or IP64 2.118 x 10 ⁻² Nm typical with IP65 shaft seal
Electrical Conn.....	Gland with 2M cable (braid shield, 30 AWG conductors), 16 Pin, or 19-pin connector
Housing.....	Aluminium / Stainless Steel on request
Mounting.....	European Standard Clamping Flange (20 Type) and Synchro Flange (26 Type)
Weight.....	750 grams typical

Environmental

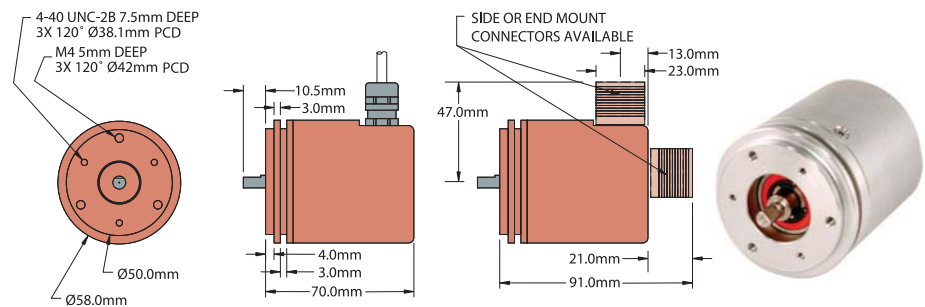
Operating Temp.....	0° to 70° C
Storage Temp.....	-20° to +85° C
Humidity.....	98% RH non-condensing
Vibration.....	10 g @ 58 to 500 Hz
Shock.....	20 g @ 11 ms duration
Sealing.....	IP50 (standard) IP64, IP65 or IP66**

** IP66 Significantly increased torque.

Model 958 Clamping Flange 20 Type (20)



Model 958 Synchro Flange 26 Type (26)



Wiring Table

Function	19-PIN	16-PIN	Gland Cable or Mating Conn.	NOTES:
	KPT02E14-19P	Pin	Wire Color	
S1 MSB	A	3	Brown	* Where Fitted ** Direction Control- Standard is CW increasing when viewed from the shaft end. Direction pin is pulled high normally to 5V internally. Direction pin must be pulled low (GND, Common) to reverse count direction. 0V only should be applied to the direction pin.
S2	B	5	White	
S3	C	6	Green	
S4	D	7	Orange	
S5	E	8	Blue	
S6	F	9	Violet	
S7	G	10	Grey	
S8 LSB 8-bit	H	11	Pink	
S9 LSB 9-bit	J	12	Red/Green	
S10 LSB 10-bit	K	13	Red/Yellow	
S11 LSB 11-bit	L	14	Turquoise	
S12 LSB 12-bit	M	15	Yellow	
Direction **	R	4	Red/Blue	
Case Ground	S	16	Drain/Screen	
0V Common	T	1	Black	
Special *	U	--	White/Red	
+VCC	V	2	Red	

Model 960 Single Turn Thru-Bore Absolute, 8-11 Bits



Features

- Low Profile - 40mm
- Thru-Bore and Blind Bore Styles
- Sturdy all Metal Construction
- State-of-the-Art Opto-ASIC Circuitry

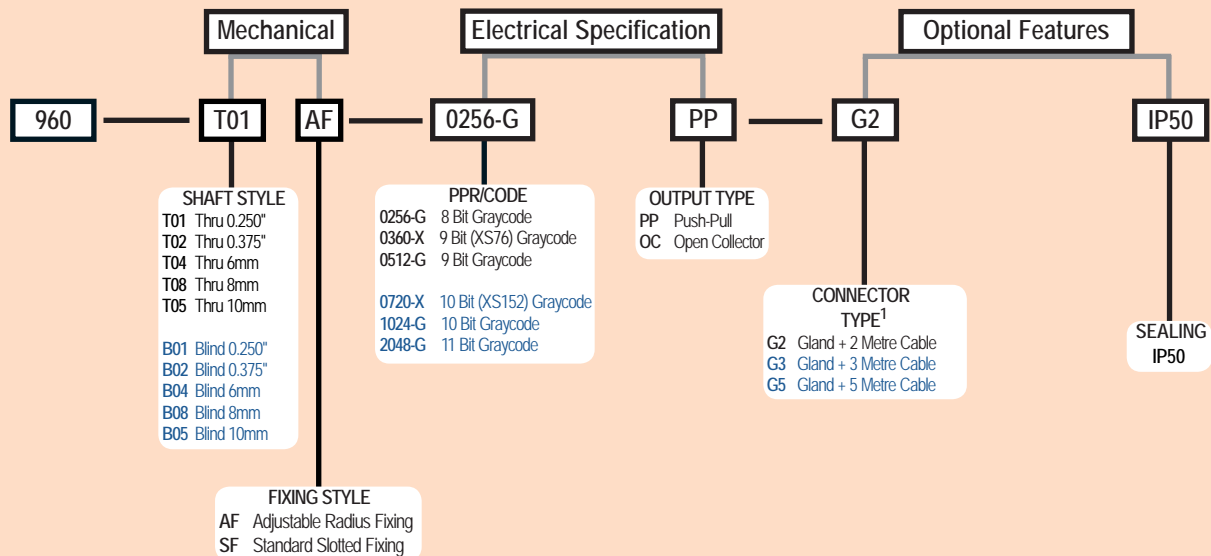
The single-turn Model 960 Absolute Series provides an unique solution to a wide variety of industrial applications requiring absolute position information. By providing a low profile package of just 40mm, a variety of thru-bore and blind-bore sizes, and an easy to use flexible mounting system, the Model 960 goes where traditional absolute encoders do not fit. In addition, its innovative Opto-ASIC circuitry, coupled with its digital output, make it an excellent choice in those applications plagued by an unusually high level of electrical noise. The Model 960 can easily be mounted directly on a motor shaft, bringing the advantage of absolute positioning in an all metal housing while eliminating the fixtures, couplers, and adapters required by other absolute encoder designs.

Common Applications

Machine Tools, Robotics, Telescopes, Antennas, Rotary & X-Y Positioning Tables, Medical Scanners

Model 960 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

Model 960 PPR Options

Output Code	Counts Per Resolution			
Gray Code	0256	0512	1024	2048
Excess Gray	0360	0720		

NOTES:

- 1 For non-standard cable lengths - contact the sales office for availability

Model 960 Single Turn Thru-Bore Absolute, 8-11 Bits



Model 960 Specifications

Electrical

Input Voltage.....4.75 to 24 VCC max
 Regulation.....100 mV peak-to-peak, max ripple at 0 to 100 kHz
 Input Current.....100 mA max with no output load
 Output Format.....Absolute- Parallel Outputs
 Output Type.....Open Collector- 20 mA max per channel Push-Pull- 20 mA max per channel
 Code.....Gray Code, Excess Gray Code
 Max Frequency.....25.6 kHz (LSB)
 Rise Time.....Less than 1 microsecond
 Resolution.....up to 11 bit
 Accuracy.....±1/6 LSB

Control

Directional Control....Field selectable for increasing counts (CW or CCW). Standard configuration user selects the applicable MSB wire for direction of count. Direction control option allows user to select count direction by applying 0V to the direction control input. See *Absolute Series Wiring Tables* below.

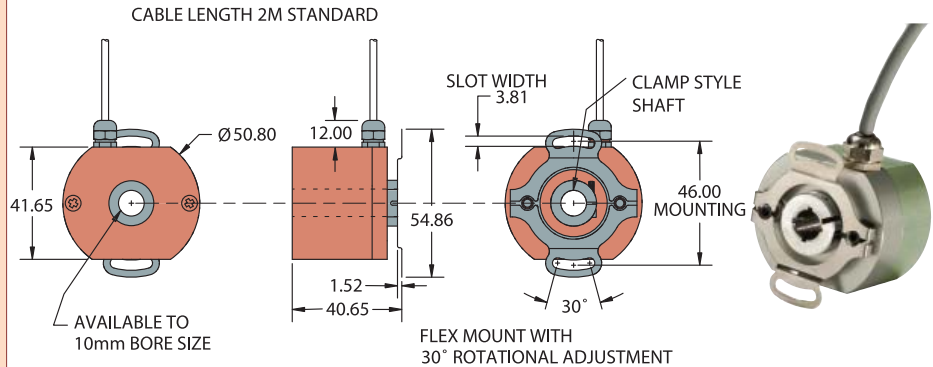
Mechanical

Max. Shaft Speed.....6000 RPM continuous
 Bore Size.....0.250", 0.375", 6 mm, 8 mm, 10 mm
 Bore Tolerance.....H7, Sliding fit for g6 host shaft
 User Shaft Tolerances
 Radial Runout.....0.2mm
 Axial Endplay.....±0.75mm
 Starting Torque.....3.53 x 10⁻³ Nm typical for IP50
 Electrical Conn.....Gland with 2M cable (braid shield, 30 AWG conductors)
 Housing.....Aluminium with non-corrosive finish
 Mounting.....Slotted Flex Mount standard, Adjustable
 Radius Fixing Optional
 Weight.....200 grams typical

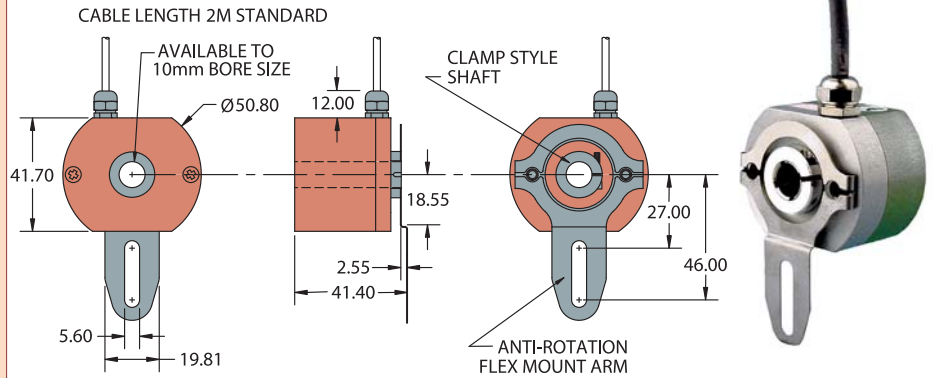
Environmental

Operating Temp.....0° to 70° C
 Storage Temp.....-20° to +85° C
 Humidity.....98% RH non-condensing
 Vibration.....10 g @ 58 to 500 Hz
 Shock.....20 g @ 11 ms duration

Model 960 Slotted Flex Mount (SF)



Model 960 with Adjustable Flex Mount (AF)



Wiring Table

Function	Gland Cable	NOTES:
	Wire Color	
Common	Black	* Standard is CW increasing count (when viewed from shaft end, and using brown wire for MSB). Direction Control is pulled up internally to 5 VDC. To reverse count direction, Direction Control must be pulled low (0 VDC). If 5 VDC is applied to Direction Control, unit remains in standard CW increasing count mode. Count direction can also be reversed by using the Yellow MSB wire instead of the Brown. 0V only should be applied to the direction pin.
+VDC	Red	
S1 cw MSB	Brown	
S1 ccw MSB	Yellow	
S2	White	
S3	Green	
S4	Orange	
S5	Blue	
S6	Violet	
S7	Grey	
S8 LSB 8-bit	Pink	
S9 LSB 9-bit	Red/Green	
S10 LSB 10-bit	Red/Yellow	
S11 LSB 11-bit	Turquoise	
Direction Control*	Red/Blue	
Case Ground	Shield	

Absolute Encoders

Model A36HB - Hollow Blind Bore 36mm Absolute Encoder



Features

- Single Turn/Multi-Turn Absolute Encoder (16 Bit ST / 43 Bit MT)
- SSI or CANopen Communication
- Maintenance-Free and Environmentally Friendly Magnetic Design
- Energy Harvesting Magnetic Multi-Turn Technology
- No Gears or Batteries
- Standard Size 36 mm (1.42") Hollow Bore (Blind) Encoder
- Flex Mount Eliminates Couplings and Is Ideal for Motors or Shafts
- Meets CE/EMC Standards for Immunity and Emissions

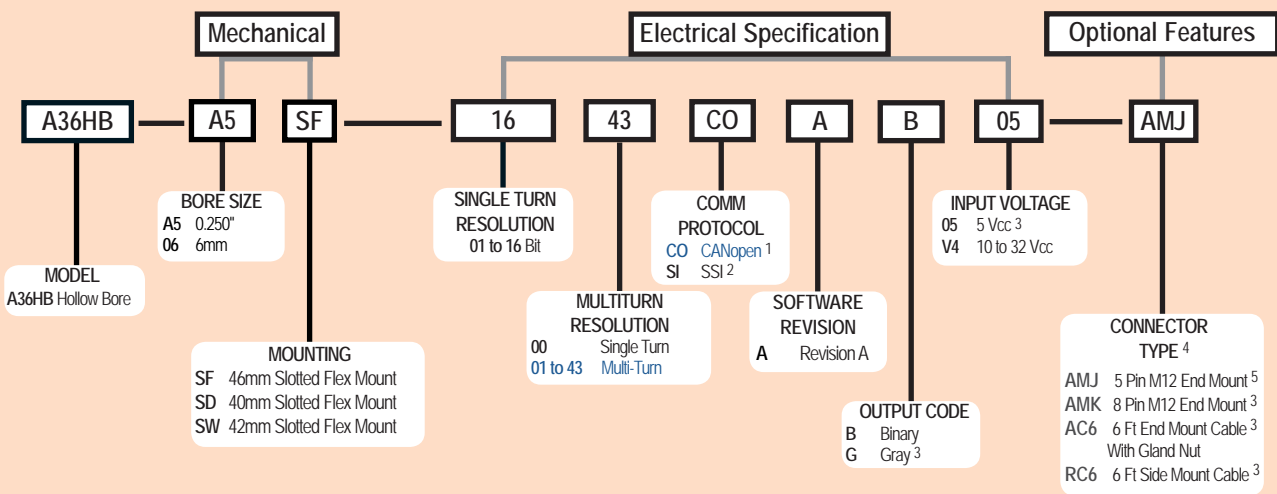
The Model A36HB Absolute Encoder offers a high performance solution for your absolute feedback needs. It provides maintenance-free feedback thanks to its innovative battery-free and gear-free multi-turn technology. This encoder is especially suited for applications where position information must be retained after loss of system power. Its rugged magnetic technology and high IP rating make the Model A36HB an excellent choice, even in tough industrial environments. Available with a 1/4" or 6 mm hollow bore (blind) and a wide selection of flexible mounting options, the Model A36HB is easily designed into a variety of applications.

Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Model A36HB Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 Please Refer to the [CANOpen Interface Technical Manual](http://www.encoder.co.uk) at www.encoder.co.uk
- 2 Please Refer to Technical Bulletin: [TB-529 Understanding BEPC SSI Encoders](http://www.encoder.co.uk) at www.encoder.co.uk
- 3 Available with SSI Only.
- 4 For Connectors, Cables and Cordsets please visit the [Accessories](http://www.encoder.co.uk) section at www.encoder.co.uk or in our Catalogue.
- 5 Available with CANopen Only.

Model A36HB - Hollow Blind Bore 36mm Absolute Encoder



Model A36HB Specifications

Electrical
 Input Voltage 10 to 32 VDC max SSI or CANopen
 5 VDC SSI Only
 Input Current 50 mA typical for 10 to 32 VDC
 80 mA typical for 5 VDC
 Power Consumption ... 0.5 W max
 Resolution (Single)..... 01 to 16 bit
 Resolution (Multi)..... 01 to 43 bit
 Accuracy ± 0.35°
 Repeatability ± 0.2°
 CE/EMC Immunity tested per EN 61000-6-2:2006
 Emissions tested per EN 61000-6-3:2011

CANopen Interface
 Protocol CANopen:
 Communication profile CIA 301
 Device profile for encoder CIA 406 V3.2
 class C2
 Node Number 0 to 127 (default 127)
 Baud Rate 10 Kbaud to 1 Mbaud with automatic bit
 rate detection

Note: The standard settings, as well as any customization in the software, can be changed via LSS (CIA 305) and the SDO protocol (e.g., PDOs, scaling, heartbeat, node-ID, baud rate, etc.).

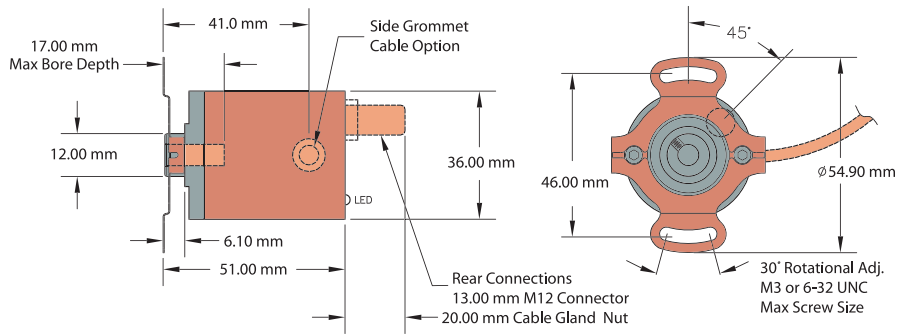
Programmable CANopen Transmission Modes
 Synchronous When a synchronization telegram (SYNC) is received from another bus node, PDOs are transmitted independently.
 Asynchronous A PDO message is triggered by an internal event (e.g., change of measured value, internal timer, etc.).

SSI Interface
 Clock Input Via opto coupler
 Clock Frequency 100KHz to 500KHz. Higher frequencies may be available. Contact Customer Service.
 Data Output RS485 / RS422 compatible
 Output Code Gray or binary
 SSI Output Angular position value
 Parity Bit Optional (even/odd)
 Error Bit Optional
 Turn On Time < 1.5 sec
 Pos. Counting Dir. Connect DIR to GND for CW
 Connect DIR to VDC for CCW
 (when viewed from shaft end)
 Set to Zero Yes, see Technical Bulletin TB-529:
 Understanding BEPC's SSI Encoders
 Protection Galvanic Isolation

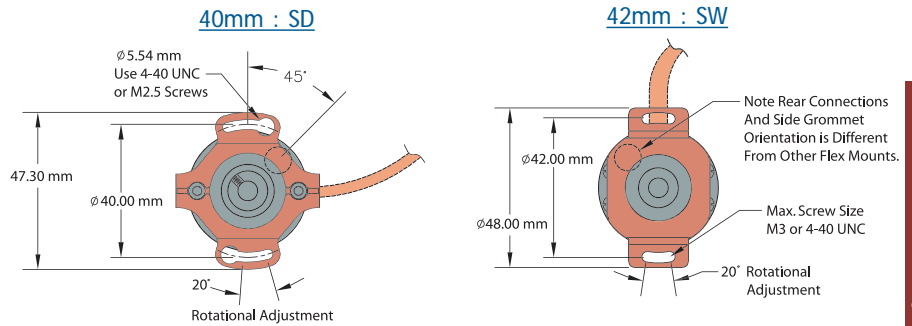
Mechanical
 Max Shaft Speed 12,000 RPM
 Bore Size 6 mm, .250"
 Bore Depth 17 mm
 User Shaft
 Radial Runout 0.005" max
 Starting Torque < 0.0032 N-m typica
 Radial Shaft Load 17 lb (80 N) = bearing life of 1.4x108 revolutions
 Axial Shaft Load 11 lb (50 N) = bearing life of 1.4x108 revolutions
 Housing Ferrous chrome-plated magnetic screening
 Mounting Hollow shaft with flex mount
 Weight 630 grams typical

Environmental
 Operating Temp -40° to +80° C
 Storage Temp -40° to +100° C
 Humidity 95% RH non-condensing
 Vibration 5 g @ 10 to 2000 Hz
 Shock 100 g @ 6 ms duration
 Sealing IP67, shaft sealed to IP65

Model A36HB 46mm Slotted Flex Mount (SF)



Model A36HB Optional Flex Mounts (SD) (SW)



All dimensions are in mm with a tolerance of ±0.127 or ±0.254 unless otherwise specified.

Wiring Table

CANopen Encoders

Function	Pin
+Vcc	2
Ground (GND)	3
CAN _{High}	4
CAN _{Low}	5
CAN _{GND} / shield	1

SSI Encoders

Function	8-pin M12	Cable
Ground (GND)	1	White
+Vcc	2	Brown
SSI CLK+	3	Green
SSI CLK-	4	Yellow
SSI DATA+	5	Grey
SSI DATA-	6	Pink
PRESET	7	Blue
DIR	8	Red
Shield	housing	Side Exit - Housing End Exit - N/C

Model A36SB - Solid Shaft 36mm Absolute Encoder



CANopen
SSI
Synchronous Serial Interface



Ø36 mm

Features

- Single Turn/Multi-Turn Absolute Encoder (16 Bit ST / 43 Bit MT)
- SSI or CANopen Communication
- Maintenance-Free and Environmentally Friendly Magnetic Design
- Energy Harvesting Magnetic Multi-Turn Technology
- No Gears or Batteries
- Standard Size 36 mm (1.42") Package
- Meets CE/EMC Standards for Immunity and Emissions

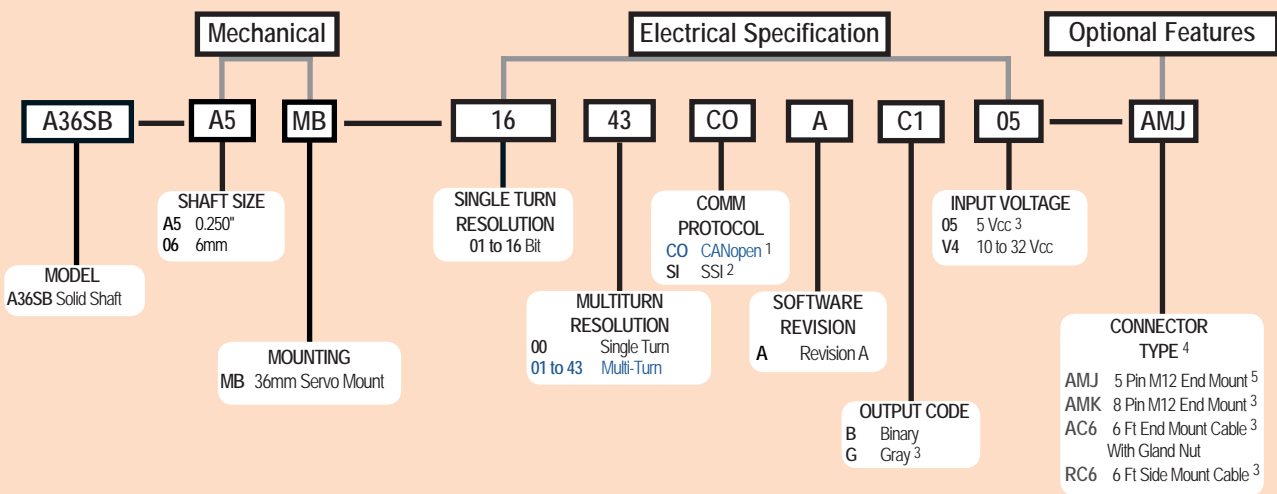
The Model A36SB Absolute Encoder offers a high performance solution for your absolute feedback needs. It provides maintenance-free feedback thanks to its innovative battery-free and gear-free multi-turn technology. This encoder is especially suited for applications where position information must be retained after loss of system power. Its rugged magnetic technology and high IP rating make the Model A36SB an excellent choice, even in tough industrial environments. Available with a 1/4" or 6 mm shaft and a servo mount, the Model A36SB is easily designed into a variety of applications.

Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Model A36SB Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 Please Refer to the [CANOpen Interface Technical Manual](http://www.encoder.co.uk) at www.encoder.co.uk
- 2 Please Refer to Technical Bulletin: [TB-529 Understanding BEPC SSI Encoders](http://www.encoder.co.uk) at www.encoder.co.uk
- 3 Available with SSI Only.
- 4 For Connectors, Cables and Cordsets please visit the [Accessories](http://www.encoder.co.uk) section at www.encoder.co.uk or in our Catalogue.
- 5 Available with CANopen Only.

Model A36SB - Solid Shaft 36mm Absolute Encoder



Model A36SB Specifications

Electrical

Input Voltage 10 to 32 VDC max SSI or CANopen
5 VDC SSI Only
Input Current 50 mA typical for 10 to 32 VDC
80 mA typical for 5 VDC
Power Consumption 0.5 W max
Resolution (Single) 01 to 16 bit
Resolution (Multi) 01 to 43 bit
Accuracy $\pm 0.35^\circ$
Repeatability $\pm 0.2^\circ$
CE/EMC Immunity tested per EN 61000-6-2:2006
Emissions tested per EN 61000-6-3:2011

CANopen Interface

Protocol CANopen:
Communication profile CiA 301
Device profile for encoder CiA 406 V3.2
class C2
Node Number 0 to 127 (default 127)
Baud Rate 10 Kbaud to 1 Mbaud with automatic bit
rate detection

Note: The standard settings, as well as any customization in the software, can be changed via LSS (CiA 305) and the SDO protocol (e.g., PDOs, scaling, heartbeat, node-ID, baud rate, etc.).

Programmable CANopen Transmission Modes

Synchronous When a synchronization telegram (SYNC) is received from another bus node, PDOs are transmitted independently.
Asynchronous A PDO message is triggered by an internal event (e.g., change of measured value, internal timer, etc.).

SSI Interface

Clock Input Via opto coupler
Clock Frequency 100KHz to 500KHz. Higher frequencies may be available. Contact Customer Service.
Data Output RS485 / RS422 compatible
Output Code Gray or binary
SSI Output Angular position value
Parity Bit Optional (even/odd)
Error Bit Optional
Turn On Time < 1.5 sec
Pos. Counting Dir. Connect DIR to GND for CW
Connect DIR to VDC for CCW
(when viewed from shaft end)
Set to Zero Yes, see Technical Bulletin **TB-529**:
Understanding BEPC's SSI Encoders
Protection Galvanic Isolation

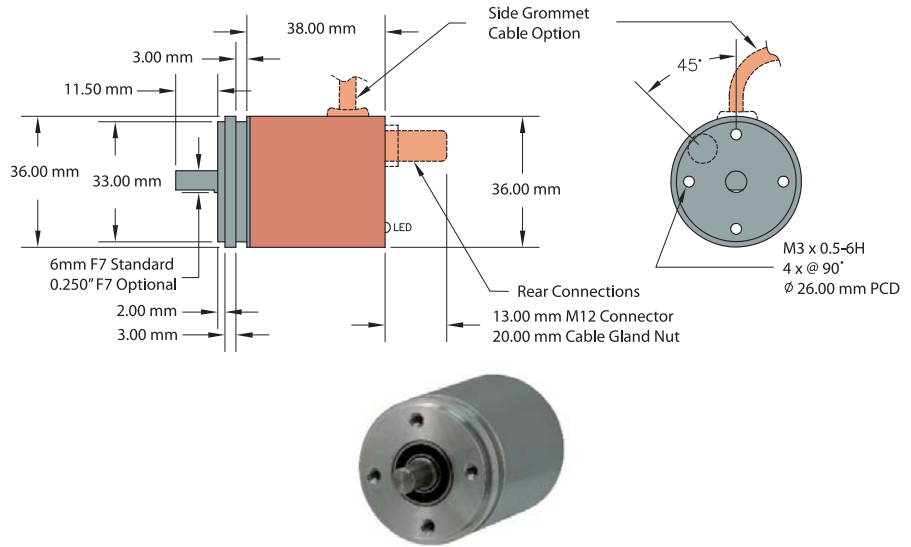
Mechanical

Max Shaft Speed 12,000 RPM
Starting Torque < 0.0032 N-m typical
Radial Shaft Load 17 lb (80 N) = bearing life of 1.4x10⁸ revolutions
Axial Shaft Load 11 lb (50 N) = bearing life of 1.4x10⁸ revolutions
Housing Ferrous chrome-plated magnetic screening
Mounting Hollow shaft with flex mount
Weight 630 grams typical

Environmental

Operating Temp -40° to +80° C
Storage Temp -40° to +100° C
Humidity 95% RH non-condensing
Vibration 5 g @ 10 to 2000 Hz
Shock 100 g @ 6 ms duration
Sealing IP67, shaft sealed to IP65

Model A36SB Solid Shaft



All dimensions are in mm with a tolerance of ± 0.127 or ± 0.254 unless otherwise specified.

Wiring Table

CANopen Encoders

Function	Pin
+VCC	2
Ground (GND)	3
CAN _{High}	4
CAN _{Low}	5
CAN _{GND} / shield	1

SSI Encoders

Function	8-pin M12	Cable
Ground (GND)	1	White
+Vcc	2	Brown
SSI CLK+	3	Green
SSI CLK-	4	Yellow
SSI DATA+	5	Grey
SSI DATA-	6	Pink
PRESET	7	Blue
DIR	8	Red
Shield	housing	Side Exit - Housing End Exit - N/C

Model A58HB - Hollow Bore 58mm Absolute Encoder



Features

- Single Turn/Multi-Turn Absolute Encoder (16 Bit ST / 43 Bit MT)
- SSI or CANopen Communication
- Maintenance-Free and Environmentally Friendly Magnetic Design
- Energy Harvesting Magnetic Multi-Turn Technology
- No Gears or Batteries
- 58mm Diameter Hollow Bore (Blind) Encoder
- Flex Mount Eliminates Couplings and Is Ideal for Motors or Shafts
- Meets CE/EMC Standards for Immunity and Emissions

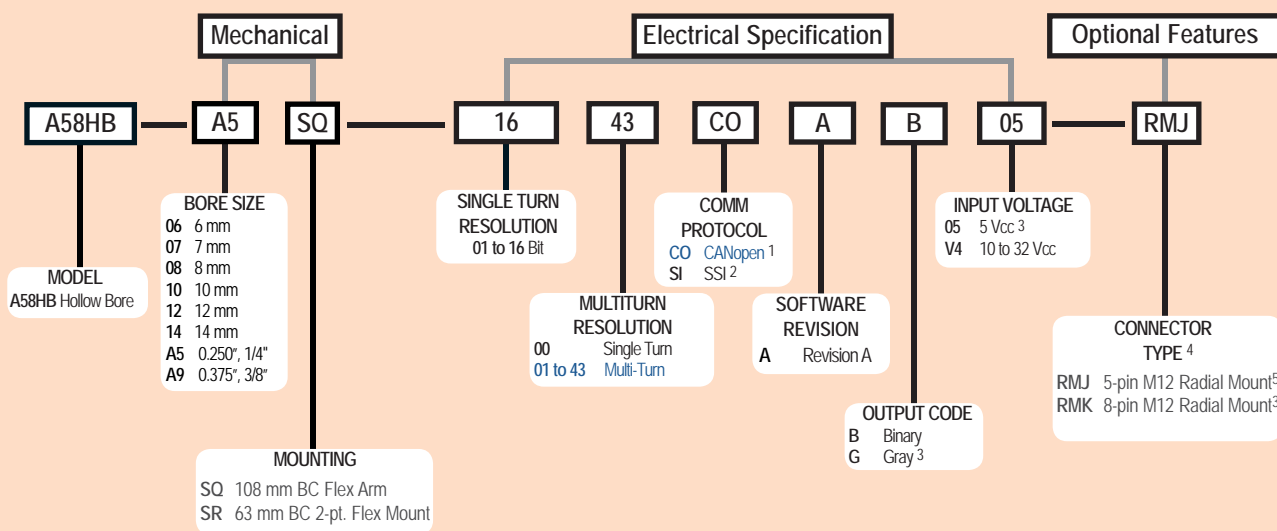
The Model A58HB Absolute Encoder offers a high performance solution for your absolute feedback needs. It provides maintenance-free feedback thanks to its innovative battery-free and gear-free multi-turn technology. This encoder is especially suited for applications where position information must be retained after loss of system power. Its rugged magnetic technology and high IP rating make the Model A58HB an excellent choice, even in tough industrial environments. Available with bores up to 3/8" or 14 mm and two flexible mounting options, the Model A58HB is easily designed into a variety of applications.

Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Model A58HB Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 Please Refer to the [CANOpen Interface Technical Manual](http://www.encoder.co.uk) at www.encoder.co.uk
- 2 Please Refer to Technical Bulletin: [TB-529 Understanding BEPC SSI Encoders](http://www.encoder.co.uk) at www.encoder.co.uk
- 3 Available with SSI Only.
- 4 For Connectors, Cables and Cordsets please visit the [Accessories](http://www.encoder.co.uk) section at www.encoder.co.uk or in our Catalogue.
- 5 Available with CANopen Only.

Model A58HB - Hollow Bore 58mm Absolute Encoder



Model A58HB Specifications

Electrical

Input Voltage 10 to 32 VDC max
5 VDC SSI Only
Input Current 50 mA typical for 10 to 32 VDC
80 mA typical for 5 VDC
Power: Consumption ... 0.5 W max
Resolution (Single)..... 01 to 16 bit
Resolution (Multi) 01 to 43 bit
Accuracy $\pm 0.35^\circ$
Repeatability $\pm 0.2^\circ$
CE/EMC Immunity tested per EN 61000-6-2:2006
Emissions tested per EN 61000-6-3:2011

CANopen Interface

Protocol CANopen:
Communication profile CIA 301
Device profile for encoder CIA 406 V3.2
class C2
Node Number 1 to 127 (default 127)
Baud Rate 10 Kbaud to 1 Mbaud with automatic bit
rate detection

Note: The standard settings, as well as any customization in the software, can be changed via LSS (CIA 305) and the SDO protocol (e.g., PDOs, scaling, heartbeat, node-ID, baud rate, etc.).

Programmable CANopen Transmission Modes

Synchronous When a synchronization telegram (SYNC) is received from another bus node, PDOs are transmitted independently.
Asynchronous A PDO message is triggered by an internal event (e.g., change of measured value, internal timer, etc.).

SSI Interface

Clock Input Via opto-coupler
Clock Frequency 100 kHz to 500 kHz. Higher frequencies may be available. Contact Customer Service.
Data Output RS485 / RS422 compatible
Output Code Gray or binary
SSI Output Angular position value
Parity Bit Optional (even/odd)
Error Bit Optional
Turn On Time < 1.5 sec
Pos. Counting Dir. Connect DIR to GND for CW
Connect DIR to VDC for CCW
(when viewed from shaft end)
Set to Zero Yes, see Technical Bulletin TB529:
Understanding EPC's SSI Encoders
Protection Galvanic Isolation with SSI option

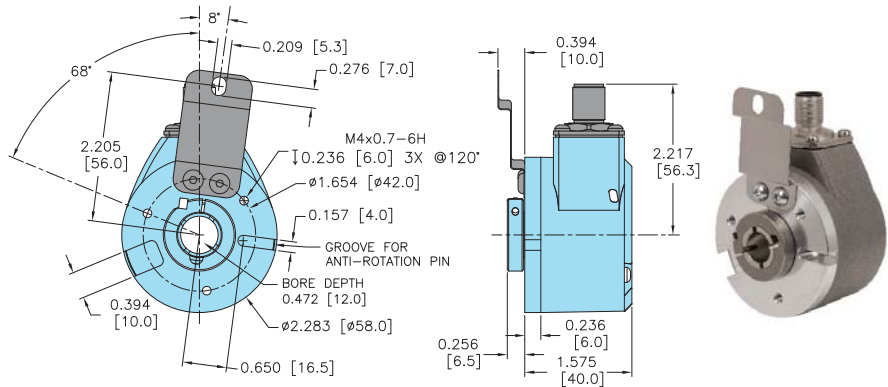
Mechanical

Max Shaft Speed 6,000 RPM
Shaft Rotation Bi-directional
Radial Run-out 0.177mm max
Axial Endplay ± 0.762 mm max
Radial Shaft Load 8.16Kg Max load bearing life of 1×10^9 Revolutions
Axial Shaft Load 4.98Kg Max load bearing life of 1×10^9 Revolutions
Starting Torque 0.0162 N-m typical
Housing All metal with protective finish
Bearings 2 precision ball bearings
Weight 212 grams typical

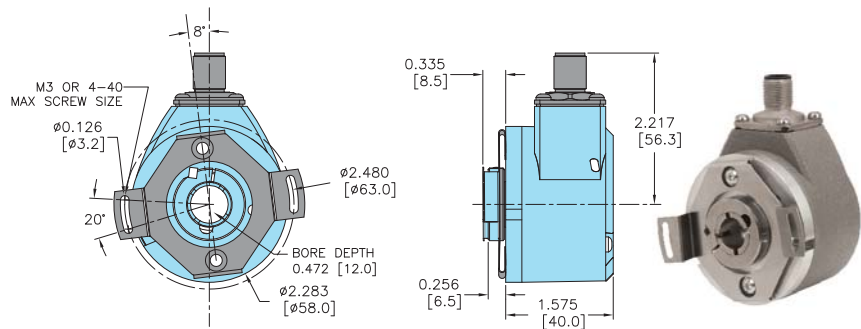
Environmental

Operating Temp -40° to $+85^\circ$ C
Storage Temp -25° to $+100^\circ$ C
Vibration 5.1 g @ 10 Hz to 2000 Hz
Shock 100 g @ 6 ms duration
Sealing IP67, shaft sealed to IP65

Model A58HB 108mm PCD Flex Arm (SQ)



Model A58HB 63mm PCD 2 Pt, Flex Mount (SR)



All dimensions are in inches with a tolerance of $+0.005''$ or $+0.01''$ unless otherwise specified.
Metric dimensions are given in brackets (mm)

Wiring Table

For BEPC-supplied mating cables, refer to wiring table provided with cable.

SSI ENCODERS		CANopen ENCODERS	
Function	8-Pin M12	Function	5-Pin M12
Ground (GND)	1	+VCC	2
+VCC	2	Ground (GND)	3
SSI CLK+	3	CAN _{HIGH}	4
SSI CLK-	4	CAN _{LOW}	5
SSI DATA+	5	CAN _{GND} / Shield*	1
SSI DATA-	6		
PRESET	7		
DIR	8		
Shield	Housing		

*M12 connector is connected to encoder housing.

Model A25SB - Solid Shaft 63.5mm Absolute Encoder



Features

- Single Turn/Multi-Turn Absolute Encoder (16 Bit ST / 43 Bit MT)
- SSI or CANopen Communication
- Maintenance-Free and Environmentally Friendly Magnetic Design
- Energy Harvesting Magnetic Multi-Turn Technology
- No Gears or Batteries
- IP67 Sealing Available
- Servo and Flange Mounting
- Standard Size 25 (63.50mm) Package
- Meets CE/EMC Standards for Immunity and Emissions

The Model A25SB Absolute Encoder offers a high performance solution for your absolute feedback needs. This encoder is especially suited for applications where position information must be retained after loss of system power. It provides maintenance-free feedback thanks to its innovative battery-free and gear-free multi-turn technology. This encoder is the perfect choice for harsh industrial applications thanks to its rugged magnetic technology, available IP67 rating, and proven double bearing design. Available with several shaft sizes and mounting styles, the Model A25SB is easily designed into OEM and aftermarket applications.

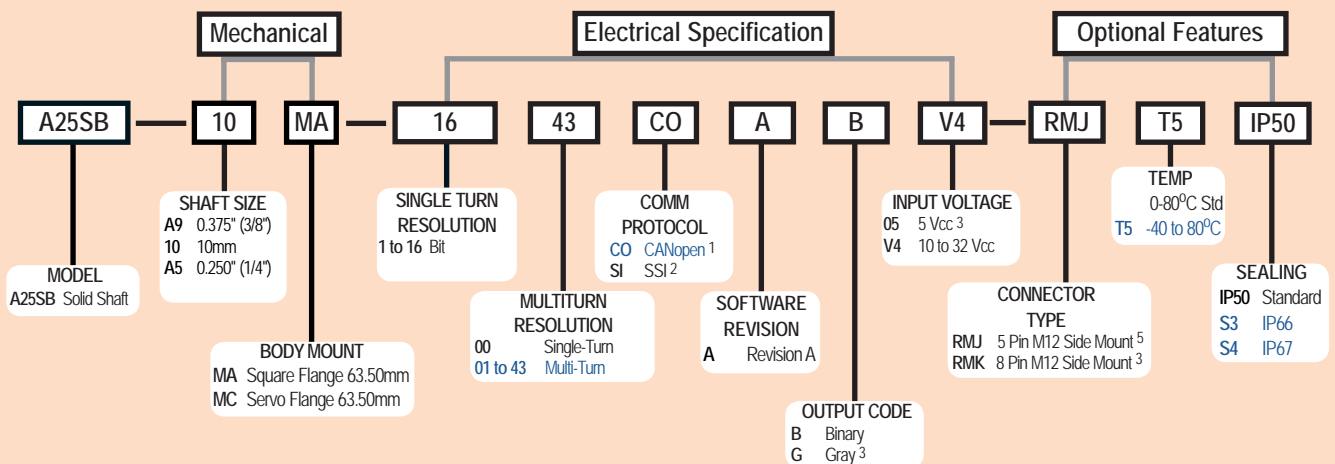
Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Model A25SB Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

Absolute Encoders



For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 Please Refer to the [CANOpen Interface Technical Manual](http://www.encoder.co.uk) at www.encoder.co.uk
- 2 Please Refer to Technical Bulletin: [TB-529 Understanding BEPC SSI Encoders](http://www.encoder.co.uk) at www.encoder.co.uk
- 3 Available with SSI Only.
- 4 For Connectors, Cables and Cordsets please visit the [Accessories](http://www.encoder.co.uk) section at www.encoder.co.uk or in our Catalogue.
- 5 Available with CANopen Only.

Model A25SB - Solid Shaft 63mm Absolute Encoder



Model A25SB Specifications

Electrical

Input Voltage 10 to 32 VDC max SSI or CANopen
5 VDC SSI Only
Input Current 50 mA typical for 10 to 32 VDC
80mA typical for 5 VDC
Power Consumption ... 0.5 W max
Resolution (Single)..... 01 to 16 bit
Resolution (Multi)..... 01 to 43 bit
Accuracy $\pm 0.35^\circ$
Repeatability $\pm 0.2^\circ$
CE/EMC Immunity tested per EN 61000-6-2:2006
Emissions tested per EN 61000-6-3:2011

CANopen Interface

Protocol CANopen:
Communication profile CIA 301
Device profile for encoder CIA 406 V3.2
class C2
Node Number 0 to 127 (default 127)
Baud Rate 10 Kbaud to 1 Mbaud with automatic bit
rate detection

Note: The standard settings, as well as any customization in the software, can be changed via LSS (CIA 305) and the SDO protocol (e.g., PDOs, scaling, heartbeat, node-ID, baud rate, etc.)

Programmable CANopen Transmission Modes

Synchronous When a synchronization telegram (SYNC) is received from another bus node, PDOs are transmitted independently
Asynchronous A PDO message is triggered by an internal event (e.g., change of measured value, internal timer, etc.)

SSI Interface

Clock Input Via opto coupler
Clock Frequency 100KHz to 500KHz. Higher frequencies may be available. Contact Customer Service.
Data Output RS485 / RS422 compatible
Output Code Gray or binary
SSI Output Angular position value
Parity Bit Optional (even/odd)
Error Bit Optional
Turn On Time < 1.5 sec
Pos. Counting Dir. Connect DIR to GND for CW
Connect DIR to VDC for CCW
(when viewed from shaft end)
Set to Zero Yes, see Technical Bulletin TB-529:
Understanding EPC's SSI Encoders
Protection Galvanic Isolation

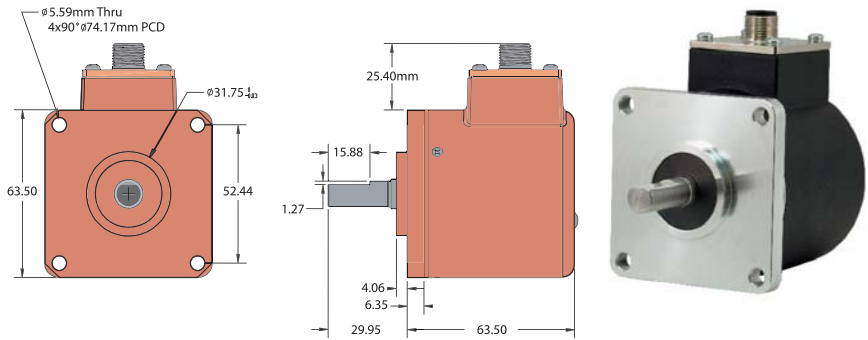
Mechanical

Max Shaft Speed 8,000 RPM
Shaft Material 303 Stainless Steel
Radial Shaft Load 80 lb (355 N) max. Rated load of 20 to 40 lb (88 to 177 N) = bearing life of 1.5 x10⁹ revolutions
Axial Shaft Load 80 lb (355 N) max. Rated load of 20 to 40 lb (88 to 177 N) = bearing life of 1.5 x10⁹ revolutions
Starting Torque 0.00706 Nm typical with no seal
0.02118 Nm typical with IP66 shaft seal
0.04943 Nm typical with IP67 shaft seal
Housing Black non-corrosive finish
Weight 20 oz typical

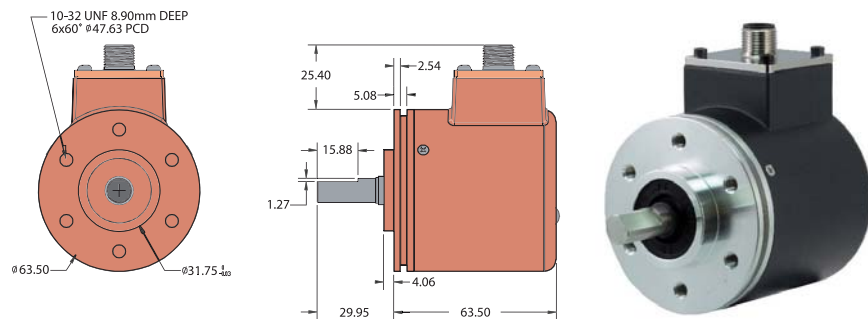
Environmental

Storage Temp. -40° to 100° C
Humidity 95% RH non-condensing
Vibration 5 g @ 10 to 2000 Hz
Shock 100 g @ 6 ms duration
Sealing IP50 standard; IP66 or IP67 optional

Model A25SB Flange Mount (MA)



Model A25SB Servo Mount (MC)



All dimensions are in mm with a tolerance of ± 0.127 or ± 0.254 unless otherwise specified.

Wiring Table

CANopen Encoders

Function	Pin
+VCC	2
Ground (GND)	3
CAN _{High}	4
CAN _{Low}	5
CAN _{GND} / shield	1

5-pin M12

SSI Encoders

Function	Pin
Ground (GND)	1
+VCC	2
SSI CLK+	3
SSI CLK-	4
SSI DATA+	5
SSI DATA-	6
PRESET	7
DIR	8
Shield	housing

8-pin M12

Model A58HE - Hollow Bore Ethernet Absolute Encoder



FEATURES

- EtherCAT Deterministic Communication: CoE, FoE, EoE
- 58 mm Diameter Package
- Hollow Bore Construction
- Durable Magnetic Technology
- Multi-Turn Absolute Encoder (16 Bit ST /43 Bit MT)
- Proven Turns Counting Technology, No Gears or Batteries
- Flex Mount Eliminates Couplings and Is Ideal for Motors or Shafts
- Meets CE/EMC Standards for Immunity and Emissions
- Works in various configurations, including daisy-chaining, and redundant-ring configurations

BEPc Absolute Encoder - now with EtherCAT Connectivity

The Model A58HE is an EtherCAT-ready, multi-turn absolute encoder designed for harsh factory and plant environments. It is particularly suited to applications where Ethernet-based connectivity is required, and the encoder must retain position information after power-off events. Easily designed into a wide variety of system applications, the A58HE plugs directly into your network with minimal provisioning for rapid deployment, facilitating data exchange among myriad networked devices. The Model A58HE retains absolute position information even after a power loss, facilitating speedy system recovery at start-up without the need for system re-homing.

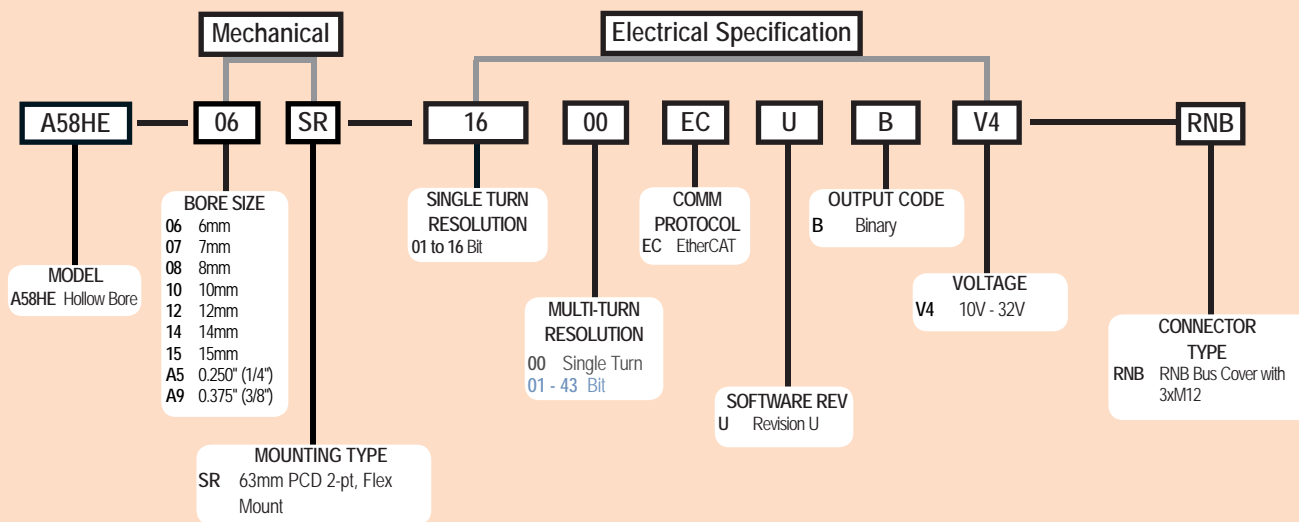
Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Ready for Industry 4.0 and for the Industrial Internet of Things (IIoT), data exchange between the Model A58HE and other applications has no influence on the control loop. The Model A58HE is non-reactive and can work independently from the PLC or master, transferring data through network gateways to other automation networks and sites, and up to the cloud for analysis.

Model A58HE Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

EtherCAT (Ethernet for Control and Automation Technology) is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

NOTES:

1 For mating connectors, cables, and cordsets see [Accessories](#) at [encoder.co.uk](#)

Model A58HE - Hollow Bore Ethernet Absolute Encoder



Model A58HE Specifications

Electrical

Power Supply10 VCC up to 32 VCC
 Current
 Consumption.....typ. 125 mA
 Power
 Consumption.....typ. 3 W

Sensor Specification

Internal Cycle Time...50 µs
 Resolution
 Single Turnup to 65,536 steps/360° (16 bit)
 Multi-Turn.....43 bit

Accuracy

Single Turn± 0.0878° (≤ 12 bit)
 Single Turn, Repeat
 Accuracy.....± 0.0878° (≤ 12 bit)

Technology

Single TurnInnovative Hall-sensor technology
 Multi-Turn.....Patented energy-harvesting technology,
 no battery and no gears

Turn on time< 1.5 s

Interface

InterfaceIndustrial Ethernet
 Protocol.....EtherCAT
 Device ProfileCIA DS-406 V4.0.2, Class 3
 Data Transfer100BASE-TX
 Cycle timeup to 50 µs
 CodeBinary, CW default, programmable
 Programmable.....Steps per revolution; counts of
 Parameter.....revolution; preset; scale; counting
 direction; 2x 8 cam switches; DC-Mode
 Diagnostic LEDTraffic and connection management: L/
 A1: Port 1 (IN) L/A2: Port 2 (OUT)
 Status LED.....STAT, MOD: status of encoder and bus

Mechanical

Flange.....Hollow bore (blind bore)
 Flange Material.....Aluminum
 Shaft MaterialStainless steel
 Shaft Length.....17 mm
 Insertion depth
 min10 mm
 max.....19 mm
 Housing Cap.....Steel case chrome-plated, magnetic
 shielding
 Connection Cover.....Die cast aluminum, powder coated
 Weight410 g approx
 Shaft RotationBi-directional
 Max Radial
 Shaft Load80 N
 Max Axial
 Shaft Load50 N
 Starting TorqueApproximately 1.6 Ncm
 at ambient temperature.
 Max Shaft Speed.....6000 RPM

Bearings

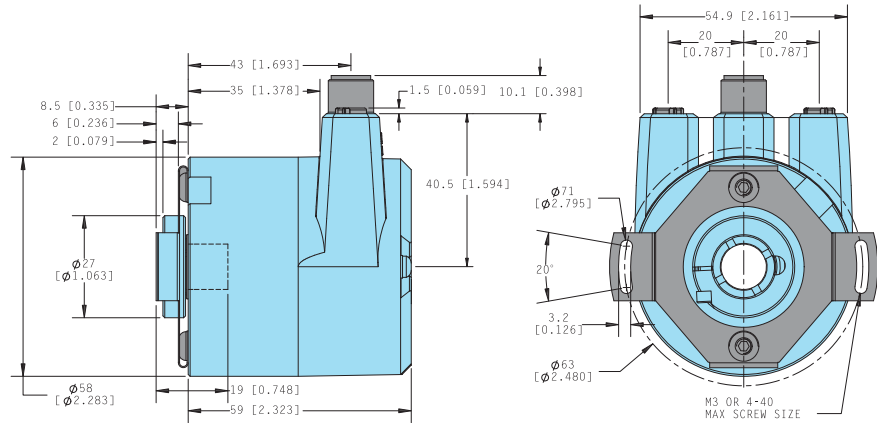
Type2 precision ball bearings
 Nominal Service.....1 x 109 revs. at 100% rated
 Lifeshaft load
 1 x 1010 revs. at 40% rated
 shaft load
 1 x 1011 revs. at 20% rated
 shaft load

Environmental

Operating Temp.....-40° to 85° C
 Storage Temp-40° to 100° C
 Sealing.....IP65 tested per EN 60529
 ESD8 kV tested per EN 61000-4-2
 Burst2 kV tested per 61000-4-4
 EMCEN 61000-6-2; EN 61000-6-3
 Vibration.....200 m/s² (10 Hz up to 1000 Hz)
 (20.3 g [10Hz up to 1000 Hz])
 tested per EN 60068-2-6
 Shock.....5000 m/s² (6 ms)
 509.8 g (6 ms)
 tested per EN 60068-2-27
 DesignAccording DIN VDE 0160



Model A58HE 63 mm 2 pt. Flex mount (SR)



Primary dimensions are in mm, secondary dimensions SI units [inches] in brackets for reference only.

NETWORK BUS CONNECTOR PINOUT

Bus cover with 3x M12x1

For BEPC-supplied mating cables, wiring table is provided with cable. Trim back and insulate unused wires.

Port 1 (In)		Power		Port 2 (Out)	
Assignments	RNB	Assignments	RNB	Assignments	RNB
Female Connector (Port1) IN	M12x1, 4-pin, D-coded	Connector (Power)	M12x1, 4-pin, A-coded	Female Connector (Port2) OUT	M12x1, 4-pin, D-coded
Tx+	1	(+) Vcc	1	Tx+	1
Rx+	2	n. c.	2	Rx+	2
Tx-	3	GND	3	Tx-	3
Rx-	4	n. c.	4	Rx-	4

MATING CABLES/CORDSETS

DC Power Cable A-Code		Signal Cable D-Code, M12 4-Pin to RJ-45		Signal Cable D-Code, M12 4-Pin to M12 4-Pin	
Stock #	Length	Stock #	Length	Stock #	Length
075241	2 m	075245	2 m	075249	2 m
075242	5 m	075246	5 m	075250	5 m
075243	10 m	075247	10 m	075251	10 m
075244	20 m	075248	20 m	075252	20 m

Absolute Encoders
Ethernet Hollow Bore

Model A58SE - Solid Shaft Ethernet Absolute Encoder



FEATURES

- EtherCAT Deterministic Communication: CoE, FoE, EoE
- 58 mm Diameter Package
- Shaft Unit with 2 Mounting Options
- Durable Magnetic Technology
- Multi-Turn Absolute Encoder (16 Bit ST /43 Bit MT)
- Proven Turns Counting Technology, No Gears or Batteries
- Two color LEDs for operating condition and bus status
- Meets CE/EMC Standards for Immunity and Emissions
- Works in various configurations, including daisy-chaining, and redundant-ring configurations

BEPc Absolute Encoder - now with EtherCAT Connectivity

The Model A58SE is an EtherCAT-ready, multi-turn absolute encoder designed for harsh factory and plant environments. It is particularly suited to applications where Ethernet-based connectivity is required, and the encoder must retain position information after power-off events. Easily designed into a wide variety of system applications, the A58SE plugs directly into your network with minimal provisioning for rapid deployment, facilitating data exchange among myriad networked devices. The Model A58SE retains absolute position information even after a power loss, facilitating speedy system recovery at start-up without the need for system re-homing.

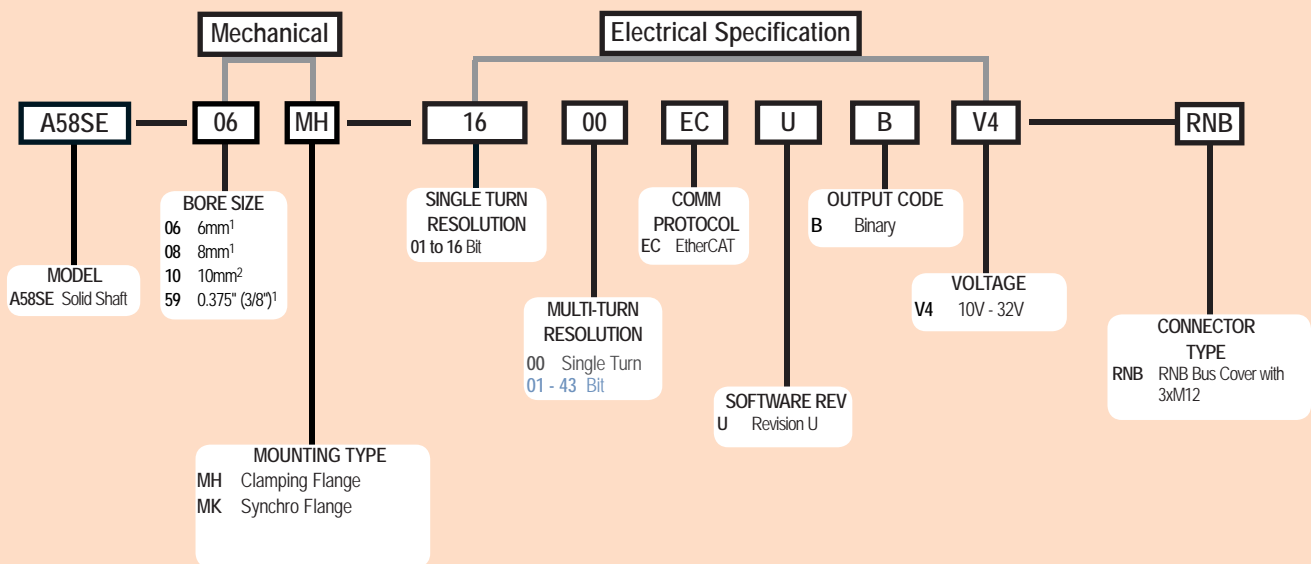
Common Applications

Robotics, Telescopes, Antennas, Medical Scanners, Wind Turbines, Elevators, Lifts, Motors, Automatic Guided Vehicles, Rotary and X/Y Positioning Tables

Ready for Industry 4.0 and for the Industrial Internet of Things (IIoT), data exchange between the Model A58SE and other applications has no influence on the control loop. The Model A58SE is non-reactive and can work independently from the PLC or master, transferring data through network gateways to other automation networks and sites, and up to the cloud for analysis.

Model A58SE Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 Available with IP65 seal only.
- 2 Available with IP67 seal only.
- 3 For mating connectors, cables, and cordsets see [Accessories](#) at [encoder.co.uk](#)

EtherCAT (Ethernet for Control and Automation Technology) is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Model A58SE - Solid Shaft Ethernet Absolute Encoder

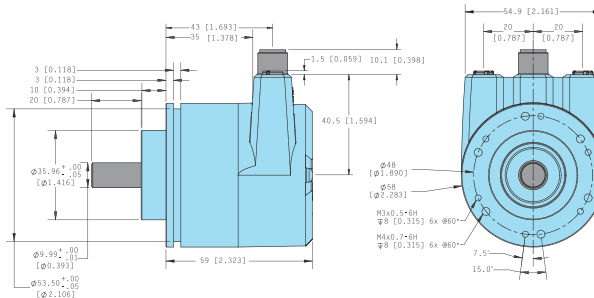


Model A58SE Specifications

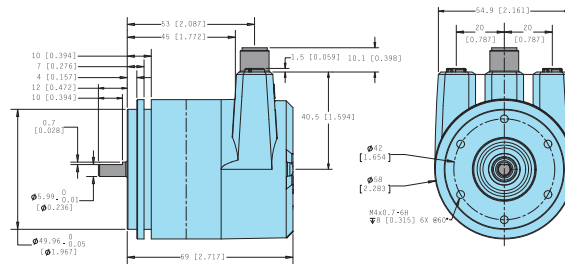
Electrical
 Power Supply10 VCC up to 32 VCC
 Current
 Consumption.....typ. 125 mA
Power
 Consumption.....typ. 3 W
Sensor Specification
 Internal Cycle Time...50 µs
Resolution
 Single Turnup to 65,536 steps/360° (16 bit)
 Multi-Turn.....43 bit
Accuracy
 Single Turn± 0.0878° (≤ 12 bit)
 Single Turn, Repeat
 Accuracy± 0.0878° (≤ 12 bit)
Technology
 Single TurnInnovative Hall-sensor technology
 Multi-Turn.....Patented energy-harvesting technology, no battery and no gears
Turn on time< 1.5 s
Interface
 InterfaceIndustrial Ethernet
 Protocol.....EtherCAT
 Device ProfileCiA DS-406 V4.0.2, Class 3
 Data Transfer100BASE-TX
 Cycle timeup to 50 µs
 CodeBinary, CW default, programmable
 Programmable.....Steps per revolution; counts of
 Parameter.....revolution; preset; scale; counting
 direction; 2x 8 cam switches; DC-Mode
 Diagnostic LEDTraffic and connection management: L/
 A1: Port 1 (IN) L/A2: Port 2 (OUT)
Status LED.....STAT, MOD: status of encoder and bus
Mechanical
Flange.....Synchro or Clamping
 Flange Material.....Aluminum
 Shaft MaterialStainless steel
 Shaft Length17 mm
 Insertion depth
 min10 mm
 max.....19 mm
 Housing Cap.....Steel case chrome-plated, magnetic
 shielding
 Connection Cover.....Die cast aluminum, powder coated
 Weight450 g approx
 Shaft RotationBi-directional
 Max Radial125 N for 6 mm and
 Shaft Load8 mm shafts
 220 N for 10 mm shaft
 220 N for 3/8" shaft
 Max Axial.....120 N for 6 mm, 8 mm
 Shaft Loadand 10 mm shafts
 120 N for 3/8" shaft
 Starting TorqueApproximately 1 Ncm at ambient
 temperature.
 Max Shaft Speed.....6000 RPM
Bearings
 Type2 precision ball bearings
 Nominal Service.....1 x 109 revs. at 100% rated
 Lifeshaft load
 1 x 1010 revs. at 40% rated shaft load
 1 x 1011 revs. at 20% rated shaft load
Environmental
 Operating Temp.....-40° to 85° C
 Storage Temp-40° to 100° C
 Sealing.....IP65 (IP67 on 10 mm shaft)
 tested per EN 60529
 ESD8 kV tested per EN 61000-4-2
 Burst2 kV tested per 61000-4-4
 EMCEN 61000-6-2; EN 61000-6-3
 Vibration.....200 m/s² (10 Hz up to 1000 Hz)
 (20.3 g [10Hz up to 1000 Hz])
 tested per EN 60068-2-6
 Shock.....5000 m/s² (6 ms)
 509.8 g (6 ms)
 tested per EN 60068-2-27
 DesignAccording DIN VDE 0160



Model A58SE Clamping Flange (MH)



Model A58SE Synchro Flange (MK)



Primary dimensions are in mm, secondary dimensions SI units [inches] in brackets for reference only.

NETWORK BUS CONNECTOR PINOUT

Bus cover with 3x M12x1 For BEPC-supplied mating cables, wiring table is provided with cable. Trim back and insulate unused wires.

Port 1 (In)		Power		Port 2 (Out)	
Assignments	RNB	Assignments	RNB	Assignments	RNB
Female Connector (Port1) IN	M12x1, 4-pin, D-coded	Connector (Power)	M12x1, 4-pin, A-coded	Female Connector (Port2) OUT	M12x1, 4-pin, D-coded
Tx+	1	(+) Vcc	1	Tx+	1
Rx+	2	n. c.	2	Rx+	2
Tx-	3	GND	3	Tx-	3
Rx-	4	n. c.	4	Rx-	4

MATING CABLES/CORDSETS

DC Power Cable A-Code		Signal Cable D-Code, M12 4-Pin to RJ-45		Signal Cable D-Code, M12 4-Pin to M12 4-Pin	
Stock #	Length	Stock #	Length	Stock #	Length
075241	2 m	075245	2 m	075249	2 m
075242	5 m	075246	5 m	075250	5 m
075243	10 m	075247	10 m	075251	10 m
075244	20 m	075248	20 m	075252	20 m

Absolute Encoders
Ethernet Solid Shaft

Model 25SP - Programmable Incremental Shaft Encoder



Features

- Industry Standard Size 25 Package (63.5mm x 63.5mm)
- Fully Programmable with Optional USB Module or Factory Configured
- Optical Technology for High Accuracy
- Resolutions from 1 to 65,536 PPR (262,144 quadrature counts)
- Servo and Flange Mounting
- IP67 Sealing Available

The Model 25SP Programmable Size 25 shaft encoder is specifically designed for the challenges of an industrial environment. Contained within the rugged, industrial housing is an advanced set of electronics that allow the encoder to be programmed to your exact application needs. Using BEPC's optional programming module, users may select the output type, 32 different waveforms, and any resolution from 1 to 65,536 PPR – that's 262,144 counts using 4x quadrature counting. These programming features allow a single encoder to be configured for multiple applications, enabling one encoder to replace many different part numbers – and that provides cost savings on inventory and down-time replacement. The 25SP can also be configured and shipped with specs pre-programmed, with no on-site programming needed. The Model 25SP comes standard with dual bearings rated 36Kg axial or radial, and may be specified with up to IP67 sealing.

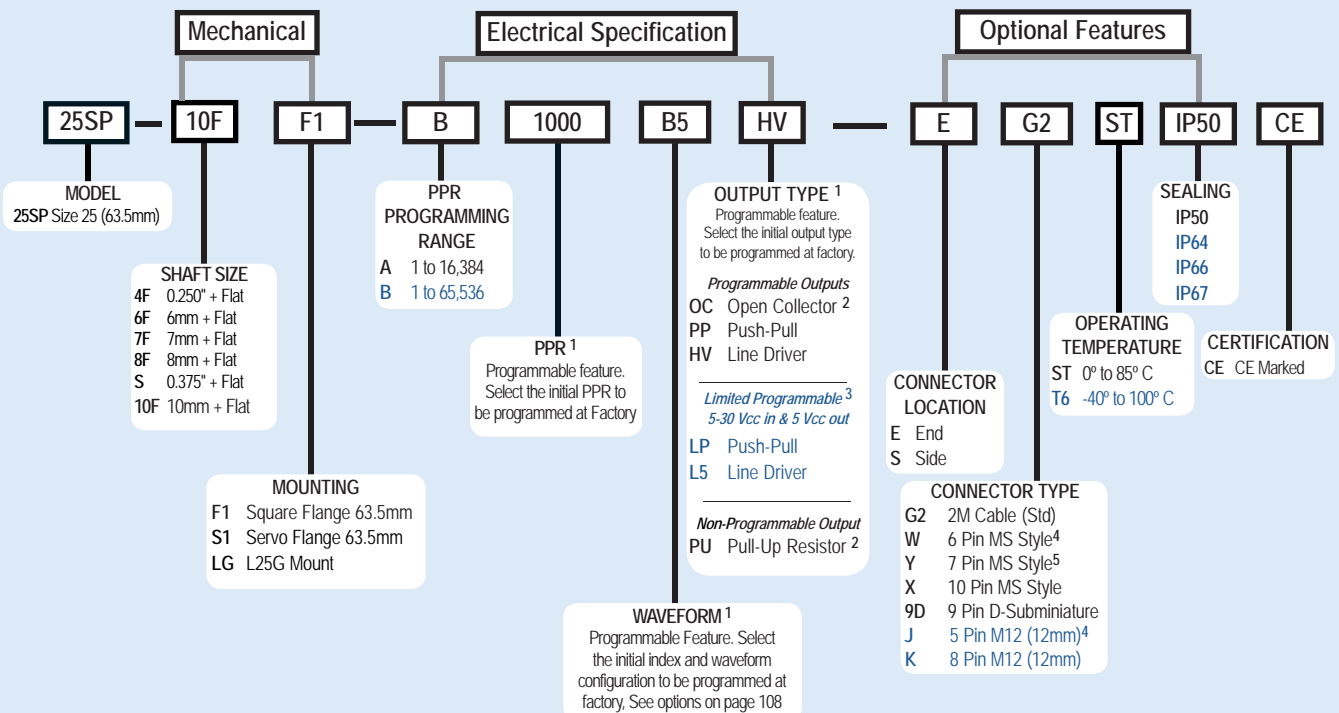
Common Applications

Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Ø2.5" (63.5mm)

Model 25SP Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call Customer Service at +44 (0)1978 262100

NOTES:

- 1 Programmable feature using Field Programming Software, USB Programming Module, and Interface Cable (Page 109)
- 2 Open Collector (OC) and Pull-Up Resistor (PU) outputs not recommended for PPR > 8192 and/or frequencies > 150 KHz.
- 3 If ordered with initial output type of either H5 or P5, encoder cannot be programmed to OC, PP or HV output types.
- 4 6-Pin MS and 5-Pin M12 Connectors only available with Pull-Up, Open Collector and Push-Pull output types.
- 5 7-Pin MS Connector does not provide Marker Pulse Z when selected output is Line Driver (HV or L5)

Model 25SP - Programmable Incremental Shaft Encoder



Model 25SP Specifications

Electrical

Input Voltage.....	4.75 to 30 Vcc max. See Output Types for limitations
Input Current.....	100 mA max with no output load (65 mA typical)
Output Format.....	Incremental, Programmable. See Waveforms on page 3 for options.
Output Types.....	Line Driver* (HV) – 20 mA max per channel, max freq 1.0 MHz, 5 Vcc max at 100° C or 24 VDC max at 85° C. Line Driver* (L5) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max freq 2.7 MHz, 5 VDC max at 100° C. Push-Pull (PP) – 20 mA max per channel, max frequency 1.0 MHz, 5 Vcc max at 100° C or 24 Vcc max at 85° C. Push-Pull (LP) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max frequency 2.7 MHz, 5 Vcc max at 100° C. Open Collector (OC) – 100 mA max per channel, 200 KHz max freq recommended Pull-Up (PU) – 2.2K ohm internal resistors, 100 mA max per channel, 150 KHz max freq recommended, max temp 85° C at > 24 Vcc *Meets RS 422 at 5 Vcc supply
Index.....	Once per revolution, programmable. BEPC standard is 180° gated to output A (waveform B5). See Waveform Diagrams for additional options.
Index Teach.....	Index location adjustable via programming interface.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
Min Edge Sep.....	1 to 16384 PPR: 36° electrical min, 63° or better typical 16385 to 65536 PPR: 20° electrical min, 36° or better typical
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

Index Teach.....	Index location adjustable via programming interface.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
Min Edge Sep.....	1 to 16384 PPR: 36° electrical min, 63° or better typical 16385 to 65536 PPR: 20° electrical min, 36° or better typical
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

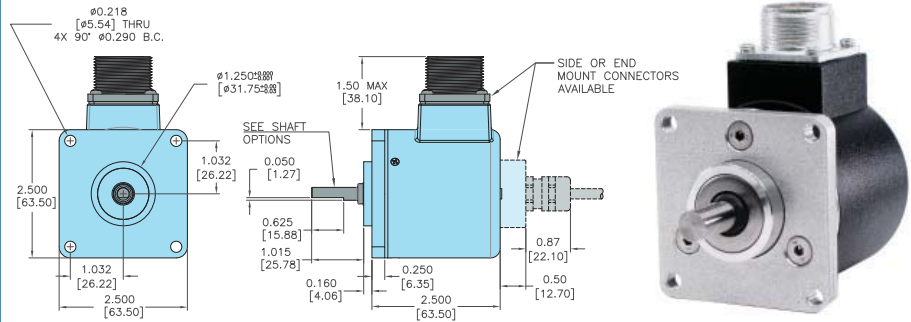
Mechanical

Max Shaft Speed.....	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Material.....	303 Stainless Steel
Shaft Rotation.....	Bi-directional
Radial Shaft Load.....	36 Kg max. Rated load of 9 to 18 Kg for rated life of 1.5x10 ⁹ revs
Axial Shaft Load.....	36 Kg max. Rated load of 9 to 18 Kg for rated life of 1.5x10 ⁹ revs
Starting Torque.....	7.0615 X 10 ⁻³ Nm typical with IP64 seal or no seal 2.118 X 10 ⁻² Nm typical with IP66 shaft seal 4.943 X 10 ⁻² Nm typical with IP67 shaft seal
Housing.....	Black non-corrosive finish
Bearings.....	Precision ABEC ball bearings
Weight.....	566 grams typical

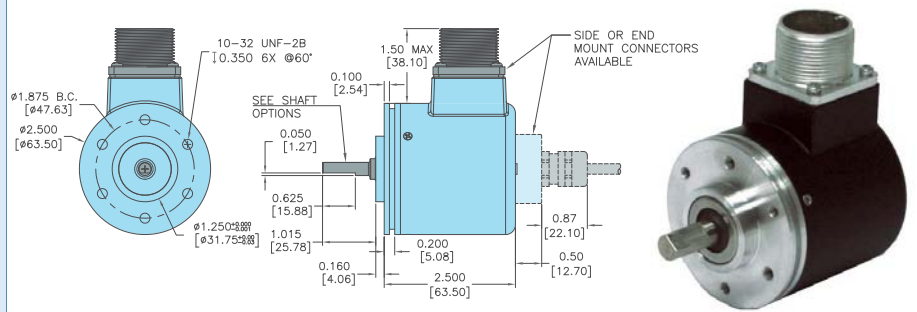
Environmental

Operating Temp.....	-20° to 85° C for standard models -40° to 100° C for extended temp option
Humidity.....	95% RH non-condensing
Vibration.....	20 g @ 5 to 2000 Hz
Shock.....	80 g @ 11 ms duration
Sealing.....	IP50 standard; IP64, IP66 or IP67 optional

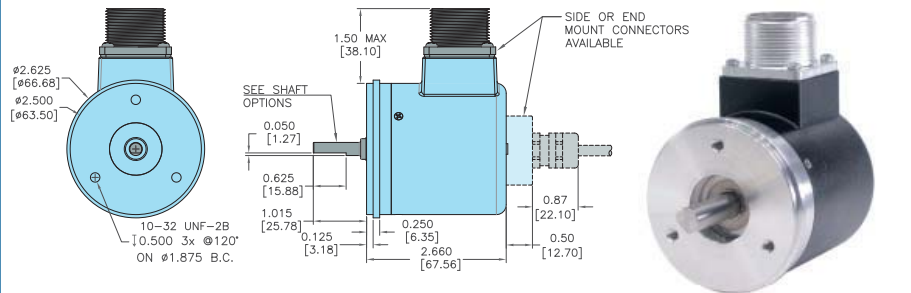
Model 25SP Flange Mount (F1)



Model 25SP 63.5mm Servo Mount (S1)



Model 25SP 66.54mm Servo Mount (LG)



All dimensions are in Imperial & Metric with a tolerance of 0.005" (±0.127mm) or 0.01" (±0.254) unless otherwise specified

ENCODER WIRING TABLE

(For BEPC-supplied mating cables, wiring table is provided with cable.)

Function	Gland Cable† Wire Color	5-pin M12**	8-pin M12**	10-pin MS	7-pin MS HV,L5	7-pin MS PU,PP, OC,LP	6-pin MS PU,PP, OC,LP	9-pin D-sub
Com	Black	3	7	F	F	F	A	9
+VDC	Red	1	2	D	D	D	B	1
A	White	4	1	A	A	A	D	2
A'	Brown	--	3	H	C	--	--	3
B	Blue	2	4	B	B	B	E	4
B'	Violet	--	5	I	E	--	--	5
Z	Orange	5	6	C	--	C	C	6
Z'	Yellow	--	8	J	--	--	--	7
Case	Green	--	--	G	G	G	F	8
Shield	Bare*	--	--	--	--	--	--	--

*CE : Cable shield (bare wire) is connected to internal case.

†Standard cable is 24 AWG conductors with foil and braid shield.

**CE : Use cable cordset with shield connected to M12 connector coupling nut.

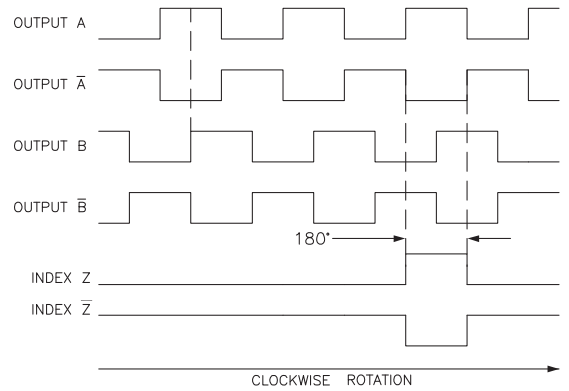
Programmable Incremental Shaft Encoders

Model 25SP - Programmable Incremental Shaft Encoder



An BEPc Size 25 Encoder in a common application.

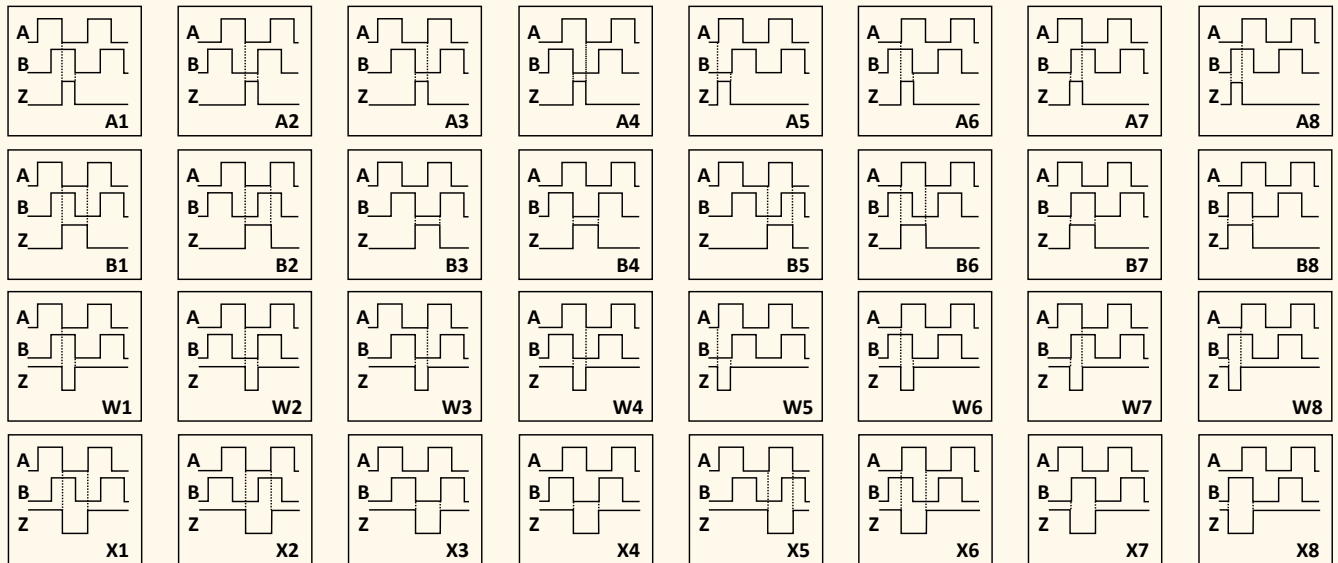
BEPc Standard Waveform (B5)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.
NOTE: COMPLEMENTARY SIGNALS (A, B & Z) APPLY TO LINE DRIVER (HV & L5) OUTPUTS ONLY.

WAVEFORMS

Choose any of these waveforms using the Field Programming Software, USB programming module, and interface cable (see previous page)



Odd numbers - A leads B
Even numbers - B leads A

A and B - High Going Index
W and X - Low Going Index

A and W - 90 Degree Index
B and X - 180 Degree Index

Field Programming Software USB Stick and Cables.



FIELD PROGRAMMING SOFTWARE

With the easy to use, point-and-click interface, programming is quick and straight-forward. The number of possible configurations makes this Size 25 programmable shaft encoder incredibly versatile. Anywhere a Size 25 encoder goes, the Model 25SP can get the job done.

✓ **PPR – any resolution from 1 to 65,536**

That's 262,144 counts using 4x quadrature counting

✓ **Waveform – choose from 32 options**

See previous page for waveform choices

✓ **Output type – 6 different output types**

All output types are 5V to 30V in/out except L5 Line Driver and LP Push-Pull output types, which are 5-30Vcc in and 5Vcc out.

Available on USB drive or by download.

System requirements:

Windows 7 or higher operating systems

USB 2.0 port required for USB Programming Module (see below)



Programmable
Incremental Shaft Encoders

USB PROGRAMMING KIT

Kit includes software, USB Programming Module, and 2-meter Interface Cable with specified connector. See Accessories for individual Interface Cables.

CONNECTOR TYPE	ITEM #
6-pin MS	PR1-001-06
7-pin MS	PR1-001-07
10-pin MS	PR1-001-10
5-pin M12	PR1-001-J
8-pin M12	PR1-001-K
9-pin D-Sub	PR1-001-09
Gland Cable	PR1-001-G



USB Programming
Module



Interface Cable



Model 25SP assembled with
programming accessories

For specification assistance call Customer Service at +44 (0)1978 262100



World Headquarters Americas Division

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464276 Highway 95
PO Box 249
Sagle, Idaho 83860
USA

Phone: 800.366.5412
208.263.8541

Fax: 208.263.0541

Email: sales@encoder.com

Web: www.encoder.com

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British Encoder Products Company
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Wales LL138UG
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Email: sales@encoder.co.uk

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Asia Division

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Ji Da District, Zhuhai City

Guangdong Province, PRC

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Fax: +86.756.3363573

Email: EPC-Asia@163.com

Web: www.asiaencoder.com

Model 58TP - Programmable Incremental Thru-Bore Encoder



Ø58mm

FEATURES

- Programmable with USB Module or Factory Configured when Ordered
- Programmable Resolution from 1 to 65,536 PPR
- Programmable Output Type and Wave Form
- 58 mm Thru-Bore or Hollow Bore Encoder
- Standard and Metric Thru-Bore Sizes up to 5/8" and 15 mm
- Several Flexible Mounting Options
- Sealing Options up to IP67

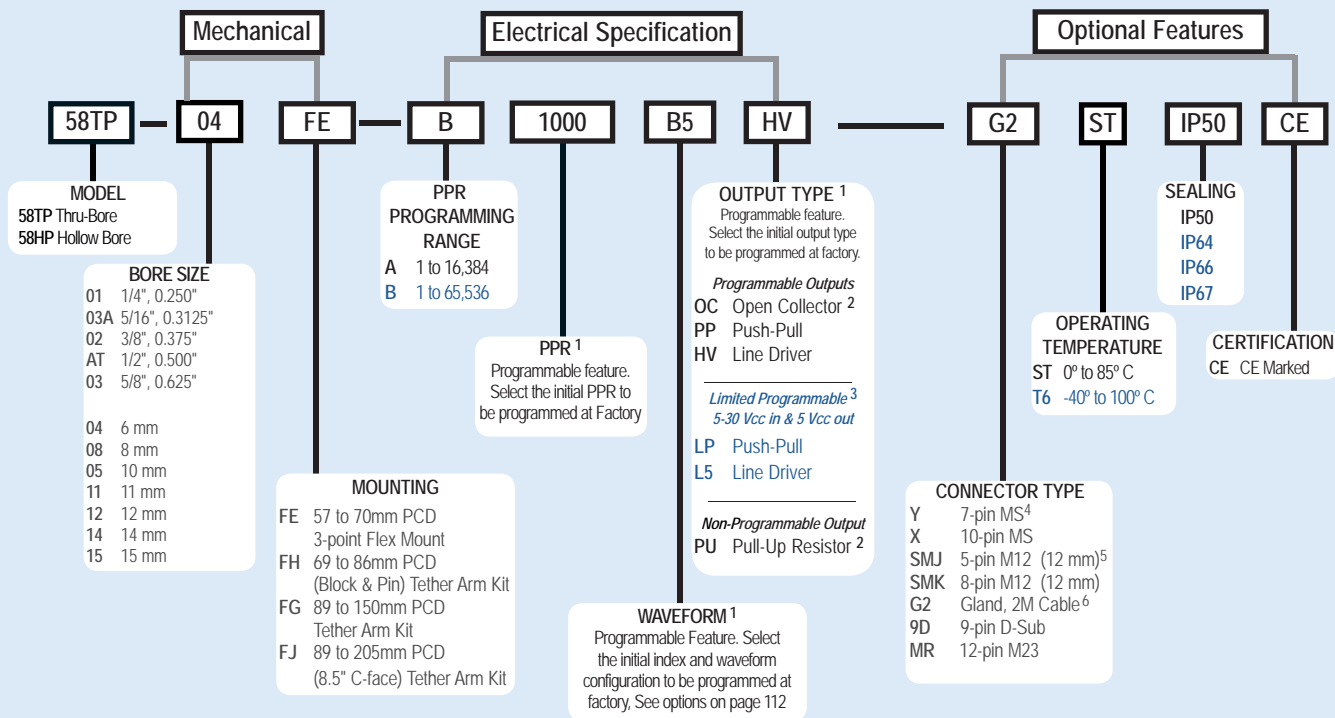
The Model 58TP Programmable 58 mm thru-bore encoder is specifically designed for the challenges of an industrial environment. Its advanced set of electronics allow the encoder to be programmed to meet your exact application needs. Using BEPC's optional programming module, users may select the output type, 32 different waveforms, and any resolution from 1 to 65,536 PPR – that's 262,144 counts using 4x quadrature counting. These programming features allow a single encoder to be configured for multiple applications, enabling one encoder to replace many different part numbers – and that provides cost savings on inventory and downtime replacement. The 58TP can also be configured and shipped with specs pre-programmed, with no on-site programming needed.

Common Applications

Motor Control, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines and all types of Motion Control Feedback

Model 58TP Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

NOTES:

- 1 Programmable feature using Field Programming Software, USB Programming Module, and Interface Cable. (See page 113).
- 2 Open Collector (OC) and Pull-Up Resistor (PU) outputs not recommended for PPR > 8192 and/or frequencies > 150 kHz.
- 3 If ordered with initial output type of either L5 or LP, encoder cannot be programmed to OC, PP, or HV output types.
- 4 7-pin MS Connector does not provide Index Pulse Z when selected output is Line Driver (HV or L5).
- 5 5-pin M12 Connectors only available with Pull-Up, Open Collector, and Push-Pull output types.
- 6 For non-standard metric cable lengths enter 'G' plus cable length expressed in meters. Example: G6 = 6 meters of cable. Frequency above 300 kHz standard cable length only.

Model 58TP - Programmable Incremental Thru-Bore Encoder



Model 58TP Specifications

Electrical

Input Voltage.....	4.75 to 30 Vcc max. See Output Types for limitations
Input Current.....	100 mA max with no output load (65 mA typical)
Output Format.....	Incremental, Programmable. See Waveforms on page 3 for options.
Output Types.....	Line Driver* (HV) – 20 mA max per channel, max freq 1.0 MHz, 5 Vcc max at 100° C or 24 VDC max at 85° C. Line Driver* (L5) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max freq 2.7 MHz, 5 VDC max at 100° C. Push-Pull (PP) – 20 mA max per channel, max frequency 1.0 MHz, 5 Vcc max at 100° C or 24 Vcc max at 85° C. Push-Pull (LP) – 5-30 Vcc in/5 Vcc out, 20 mA max per channel, max frequency 2.7 MHz, 5 Vcc max at 100° C. Open Collector (OC) – 100 mA max per channel, 200 KHz max freq recommended Pull-Up (PU) – 2.2K ohm internal resistors, 100 mA max per channel, 150 KHz max freq recommended, max temp 85° C at > 24 Vcc *Meets RS 422 at 5 Vcc supply
Index.....	Once per revolution, programmable. BEPC standard is 180° gated to output A (waveform B5). See Waveform Diagrams for additional options.
Index Teach.....	Index location adjustable via programming interface.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
CE/EMC.....	Immunity tested per EN 61000-6-2:2005 Emission tested per EN 61000-6-4:2007 + A1: 2011
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

Index Teach.....	Index location adjustable via programming interface.
Max Frequency.....	2.7 MHz subject to RPM restrictions for high resolution (PPR): 5000 RPM max for PPR 16385 to 32768 and 2500 RPM max for PPR 32769 to 65536 NOTE: Use 5 Vcc Line Driver (L5 or HV output type) to obtain high frequencies.
Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
CE/EMC.....	Immunity tested per EN 61000-6-2:2005 Emission tested per EN 61000-6-4:2007 + A1: 2011
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

Electrical Protection.....	Overvoltage, reverse voltage, and output short circuit protected. NOTE: Sustained over or reverse voltage may result in permanent damage.
CE/EMC.....	Immunity tested per EN 61000-6-2:2005 Emission tested per EN 61000-6-4:2007 + A1: 2011
Rise Time.....	Less than 1 microsecond
Accuracy.....	Better than 0.013° or 47 arc-sec from true position
Diagnostic.....	LED located on encoder housing and error report available via programming Interface.

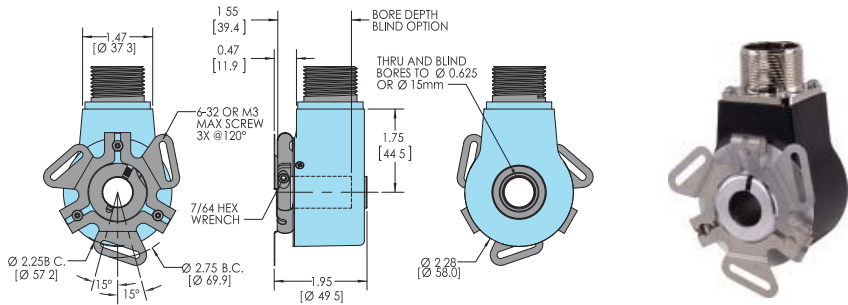
Mechanical

Max Shaft Speed.....	6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Material.....	303 Stainless Steel
Shaft Rotation.....	Bi-directional
Bore Tolerance.....	-0.0000/+0.0254 mm
User Shaft Tolerances	
Radial Runout.....	0.012 max
Axial Endplay.....	±0.762 max
Starting Torque.....	IP50 sealing: 2.118 X 10 ⁻² Nm typical IP64 sealing: 2.824 X 10 ⁻² Nm typical IP66 or IP67 sealing: 4.943 X 10 ⁻² Nm typical
Housing.....	Black non-corrosive finish
Weight.....	283 grams typical

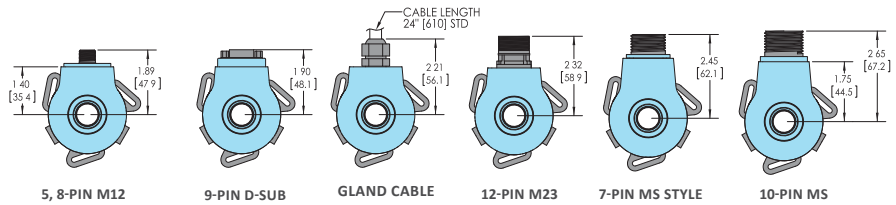
Environmental

Operating Temp.....	-20° to 85° C for standard models -40° to 100° C for extended temp option
NOTE:	For IP66 or IP67 sealing derate max temperature of 100° C by 4° C for every 1000 RPM above 2000 RPM.
Humidity.....	95% RH non-condensing
Vibration.....	10 to 2000 Hz A 20g (International Standard IEC 60068-2-6)
Shock.....	80g @ 6 ms Duration (International Standard IEC 60068-2-27)
Sealing.....	IP50 standard; IP64, IP66 or IP67 optional

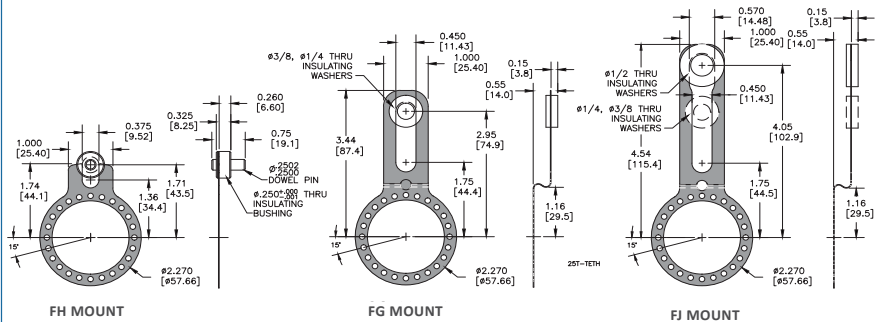
Model 58TP / 58HP 3 Point Flex Mount (FE)



Model 58TP / 58HP Connector Options



Model 58TP / 58HP Mounting Options



All dimensions are in Imperial & Metric with a tolerance of 0.005" (±0.127mm) or 0.01" (±0.254) unless otherwise specified
 Metric dimensions are in brackets (mm)

ENCODER WIRING TABLE

(For BEPC-supplied mating cables, wiring table is provided with cable.)

Function	Gland Cable ¹ Wire Color	5-pin M12**	8-pin M12**	10-pin MS	7-pin MS HV,L5	7-pin MS PU,PP,OC,LP	9-pin D-sub	12-pin M23
0 Volts	Black	3	7	F	F	F	9	10
+VCC	Red	1	2	D	D	D	1	12
A	White	4	1	A	A	A	2	5
A'	Brown	--	3	H	C	--	3	6
B	Blue	2	4	B	B	B	4	8
B'	Violet	--	5	I	E	--	5	1
Z	Orange	5	6	C	--	C	6	3
Z'	Yellow	--	8	J	--	--	7	4
Case	Green	--	--	G	G	G	8	9
Shield	Bare*	--	--	--	--	--	--	--
+VCC Sense	--	--	--	--	--	--	--	2
0 Volts Sense	--	--	--	--	--	--	--	11

*CE: Cable shield (bare wire) is connected to internal case.

¹Standard cable is 24 AWG conductors with foil and braid shield.

**CE: Use cable cordset with shield connected to M12 connector coupling nut.

Programmable Incremental Thru-Bore Encoders

Model 58TP - Programmable Incremental Thru-Bore Encoder

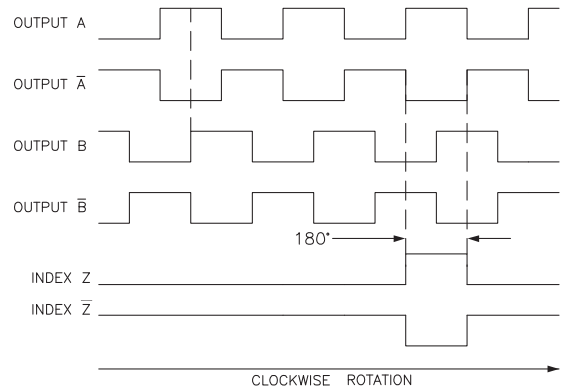


Programmable Incremental Thru-Bore Encoders



An BEPC Thru-Bore Encoder in a common application, mounted on a motor with an FJ Flex Mount

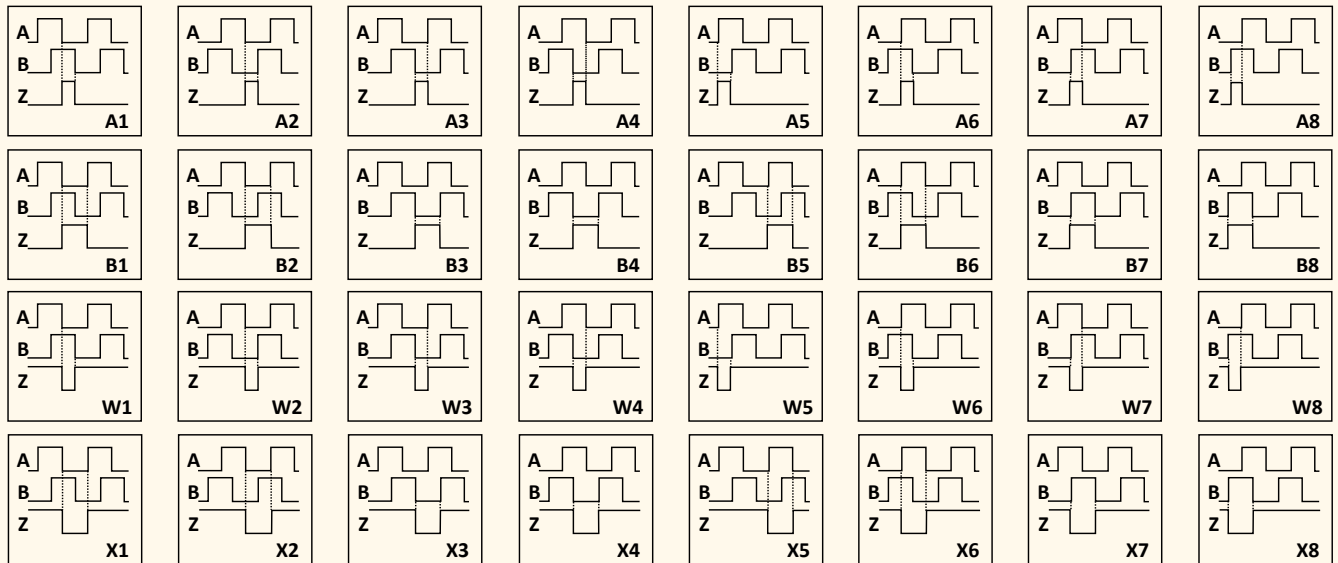
BEPC Standard Waveform (B5)



NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.
NOTE: COMPLEMENTARY SIGNALS (A, B & Z) APPLY TO LINE DRIVER (HV & L5) OUTPUTS ONLY.

WAVEFORMS

Choose any of these waveforms using the Field Programming Software, USB programming module, and interface cable (see previous page)



Odd numbers - A leads B
Even numbers - B leads A

A and B - High Going Index
W and X - Low Going Index

A and W - 90 Degree Index
B and X - 180 Degree Index

Field Programming Software USB Stick and Cables.



FIELD PROGRAMMING SOFTWARE

Available on USB drive or by download.

System requirements:

Windows 7 or higher operating systems

USB 2.0 port required for USB Programming Module (see below)

With the easy to use, point-and-click interface, programming is quick and straight-forward. The number of possible configurations makes this Size 58 programmable thru-bore or hollow bore encoder incredibly versatile. Anywhere a Size 58 thru-bore or hollow bore encoder goes, the Model 58TP can get the job done.

✓ **PPR – any resolution from 1 to 65,536**

That's 262,144 counts using 4x quadrature counting

✓ **Waveform – choose from 32 options**

See previous page for waveform choices

✓ **Output type – 6 different output types**

All output types are 5V to 30V in/out except L5 Line Driver and LP Push-Pull output types, which are 5-30Vcc in and 5Vcc out.



Programmable
Incremental Thru-Bore Encoders

USB PROGRAMMING KIT

Kit includes software, USB Programming Module, and 2-meter Interface Cable with specified connector.

See Accessories for individual Interface Cables.

CONNECTOR TYPE	ITEM #
7-pin MS	PR1-001-07
10-pin MS	PR1-001-10
5-pin M12	PR1-001-J
8-pin M12	PR1-001-K
9-pin D-Sub	PR1-001-09
Gland Cable	PR1-001-G
12-pin M23	PR1-001-R



USB Programming
Module



Interface Cable



Model 58TP with SE Flex Mount
assembled with programming
accessories

For specification assistance call Customer Service at +44
(0)1978 262100



World Headquarters Americas Division

Encoder Products Company
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Sagle, Idaho 83860
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Phone: 800.366.5412
208.263.8541

Fax: 208.263.0541

Email: sales@encoder.com

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Email: sales@encoder.co.uk

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Asia Division

Zhuhai Precision Encoder Co., LTD
RM. 308C, 3/F
Zhongdian Building
No. 1082 JiuZhou Ave.
Ji Da District, Zhuhai City

Guangdong Province, PRC

Phone: +86.756.3363470

Fax: +86.756.3363573

Email: EPC-Asia@163.com

Web: www.asiaencoder.com

RXTX/D Receiver-Transmitter Unit Versatile Encoder Interface



Features

- DIN Rail Mount.
- Level Changes from Vcc to 5V.
- Signal Conditioner, or Repeater for Distance Transmission.
- 2 or 3 Way Splitter/Level Changer.
- Encoder Tester/Verifier.

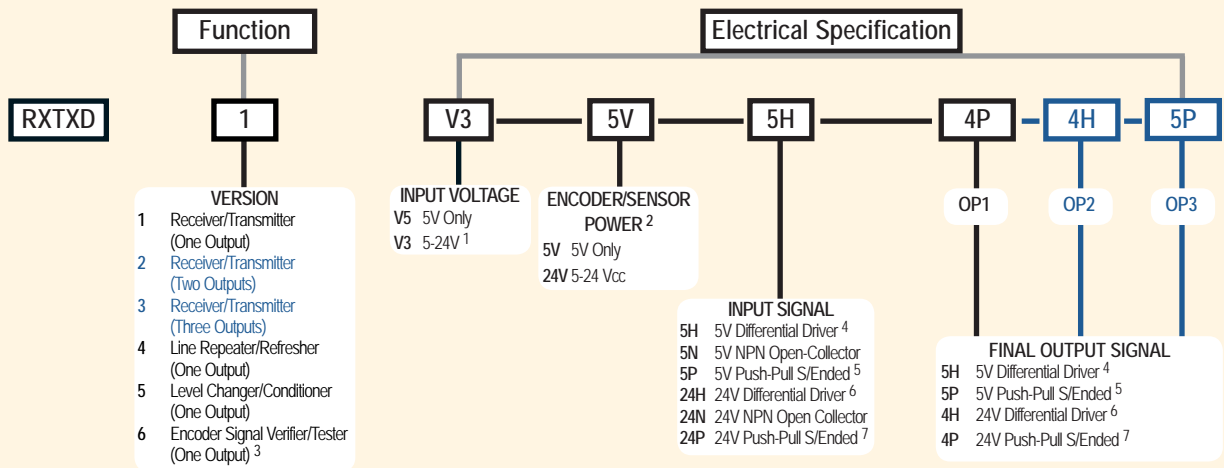
This lightweight DIN rail mountable unit, Line Driver and Line Receiver, comes in a stylish green PC/ABS self-extinguishing material blend. Configurable as a level changer, line repeater, splitter or encoder tester. The RXTXD will accept TTL, RS422, RS485, PP, NPN, NPN OC, or, PNP encoder inputs at 5V, or HTL, PP, NPN, NPN OC & PNP at 6-28V. It will provide up to 3 outputs in any combination of TTL, RS422, RS485, PP, NPN or PNP, at 5V, or, HTL, PP, NPN or PNP, at 6-28V. A series of LEDs on the front panel indicates power and signal presence. Connections are made via the easily accessible screw terminals as standard. This device may be used as both a Line Driver and Line Receiver.

Specifications

Input Voltage6V to 28V Max
 Current Consumption250 mA Typical
 Repeater Output Voltage.....5V or Vcc
 Frequency ResponseUp to 800 KHz
 Weight250g
 Enclosure.....PC/ABS, IP20
 Terminal.....Screw Type 30/12 AWG

RXTXD Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call
Customer Service at
+44 (0)1978 262100

- NOTES:
- 1 28V Maximum Voltage.
 - 2 Encoder/Sensor and output signal voltages are limited to the input voltage supplied.
 - 3 To be used in series with encoder.
 - 4 TTL, RS422 & RS485 Compatible.
 - 5 TTL, NPN (Sink), PNP (Source), PP.
 - 6 HTL Compatible
 - 7 NPN (Sink), PNP (Source), PP

Accessories

RXTX/D Receiver-Transmitter Unit Versatile Encoder Interface



RXTXD Specifications

Electrical

Input Voltage.....5V to 24V Max
Current Consumption.....250 mA Typical
Repeater Output Voltage.....5V or Vcc
Frequency Response.....Up to 800 KHz

Mechanical

Weight.....250 grams
Enclosure.....PC/ABS, IP20
Terminal.....Screw Type 30/12 AWG

Definitions

Version.....Number of complete sets of output channels
Input Voltage.....The voltage supplied to the RX/TXD. The input voltage sets the maximum voltage the RX/TXD can supply the Encoder/sensor and maximum voltage of the output signals.
Encoder/Sensor Power.....The voltage supplied by the RX/TXD to the encoder/sensor.
Input Signal.....The signal voltage level from the encoder/sensor to the RX/TXD.
Final Output Signal.....The Signal voltage level from the RX/TXD to the receiving device.

Example: If the input voltage is V3, Encoder/sensors power is 24V. Output 1 is 4H, Output 2 is 5H.

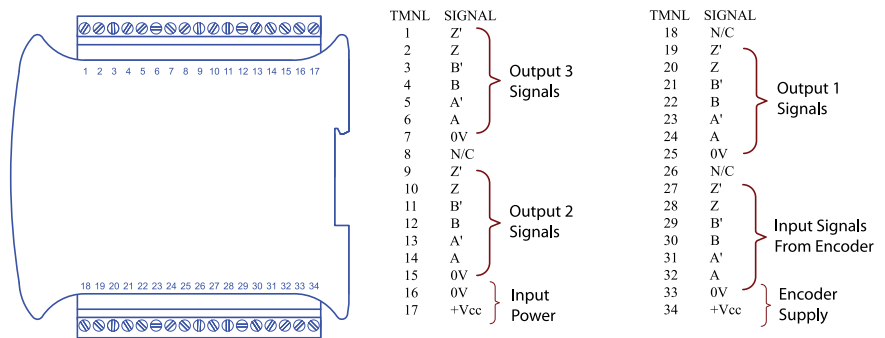
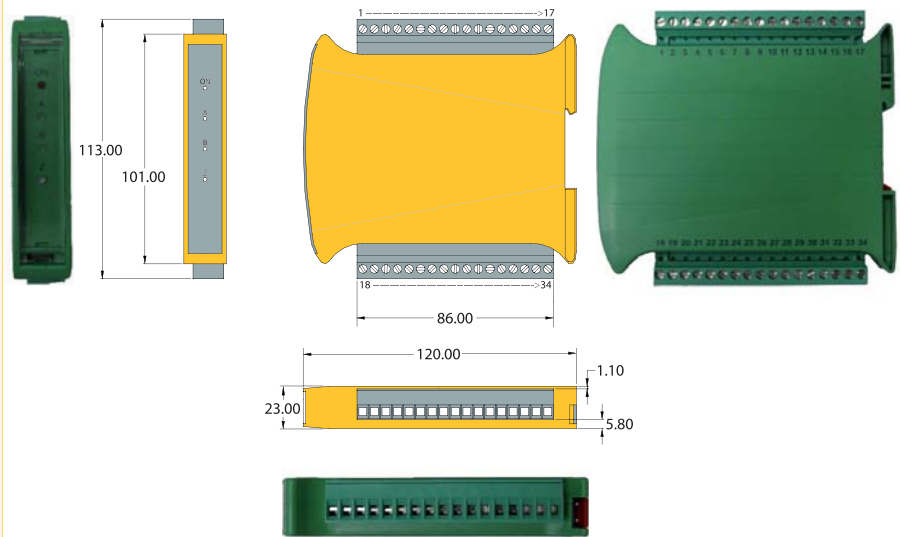
Set input voltage to 24V

Encoder/sensor power = 24V
Output 1 = 24V
Output 2 = 5V

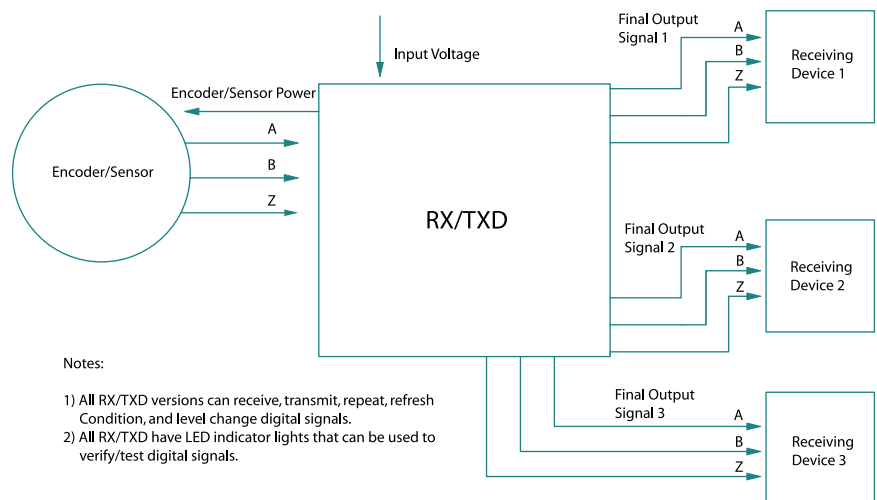
Set input voltage to 12V

Encoder/sensor power = 12V
Output 1 = 12V
Output 2 = 5V

RX/TXD Receiver-Transmitter



All inputs and outputs may not be present, depending on the RX/TXD version.



Notes:

- 1) All RX/TXD versions can receive, transmit, repeat, refresh Condition, and level change digital signals.
- 2) All RX/TXD have LED indicator lights that can be used to verify/test digital signals.

Accessories

Accessories: Measuring Wheels



Features

Measuring wheels are a very cost-effective way to use rotary encoders to measure linear motion such as cut to length applications. Measuring wheels are also useful when it is inconvenient to mount the encoder directly onto the motion device. It is common to have one or two measuring wheels mounted on an encoder shaft. The two most important factors in selecting the best measuring wheel for a given application are the circumference and the surface material. The surface material must be chosen to give optimal traction without unduly compromising wear, while the circumference should be selected to give the best accuracy within the mounting constraints available.

BEPC offers two types of measuring wheels, the first type, Faced Measuring Wheels, has a wide contact surface with a variety of faced coatings (Knurled, Urethane), one of which will be suitable for nearly every specialised application. The second, Rubber Tyre Measuring Wheels uses a replaceable rubber insert or "Tyre" that is easier to set up and maintain and fits most general purpose requirements.

6mm Bore

10mm Bore

Wheel Type	Circumference	Order Code	Wheel Type	Circumference	Order Code
Rubber Tyre	200mm Circumference	MWB2RU-06	Rubber Tyre	200mm Circumference	MWB2RU-10
Rubber Tyre	300mm Circumference	MWB3RU-06	Rubber Tyre	300mm Circumference	MWB3RU-10
Rubber Tyre	400mm Circumference	MWB4RU-06	Rubber Tyre	400mm Circumference	MWB4RU-10
Rubber Tyre	500mm Circumference	MWB5RU-06	Rubber Tyre	500mm Circumference	MWB5RU-10
Rubber Tyre	6" Circumference	MWB06RU-06	Rubber Tyre	6" Circumference	MWB06RU-10
Rubber Tyre	12" Circumference	MWB12RU-06	Rubber Tyre	12" Circumference	MWB12RU-10
Rubber Tyre	333.3mm Circumference	MWB33RU-06	Rubber Tyre	333.3mm Circumference	MWB33RU-10
Knurled Aluminium	200mm Circumference	MWB2KN-06	Knurled Aluminium	200mm Circumference	MWB2KN-10
Knurled Aluminium	300mm Circumference	MWB3KN-06	Knurled Aluminium	300mm Circumference	MWB3KN-10
Knurled Aluminium	400mm Circumference	MWB4KN-06	Knurled Aluminium	400mm Circumference	MWB4KN-10
Knurled Aluminium	500mm Circumference	MWB5KN-06	Knurled Aluminium	500mm Circumference	MWB5KN-10
Knurled Aluminium	6" Circumference	MWB06KN-06	Knurled Aluminium	6" Circumference	MWB06KN-10
Knurled Aluminium	12" Circumference	MWB12KN-06	Knurled Aluminium	12" Circumference	MWB12KN-10
Knurled Aluminium	333.3mm Circumference	MWB33KN-06	Knurled Aluminium	333.3mm Circumference	MWB33KN-10

We also stock other sizes & types of wheels, and can customise bore sizes.
Please call the sales office for Price and delivery.

Urethane Wheels - 0.250" Bore		
Wheel Type	Circumference	Order Code
80 Urethane	200mm Circumference	161399
80 Urethane	6" Circumference	161360

Measuring Wheel Application Guide

Recommended Use For Measuring Wheels

Knurled Faced
Coarse Fabric Cloth Tape Rough Wood
Rubber Carpet Foam
Insulation

80 Urethane Faced
Soft Materials
Smooth Materials

Rubber Insert
Fine Fabric Paper Cable
Hard Plastic Film Foil
Metal (crease-free)



Temperature Specifications

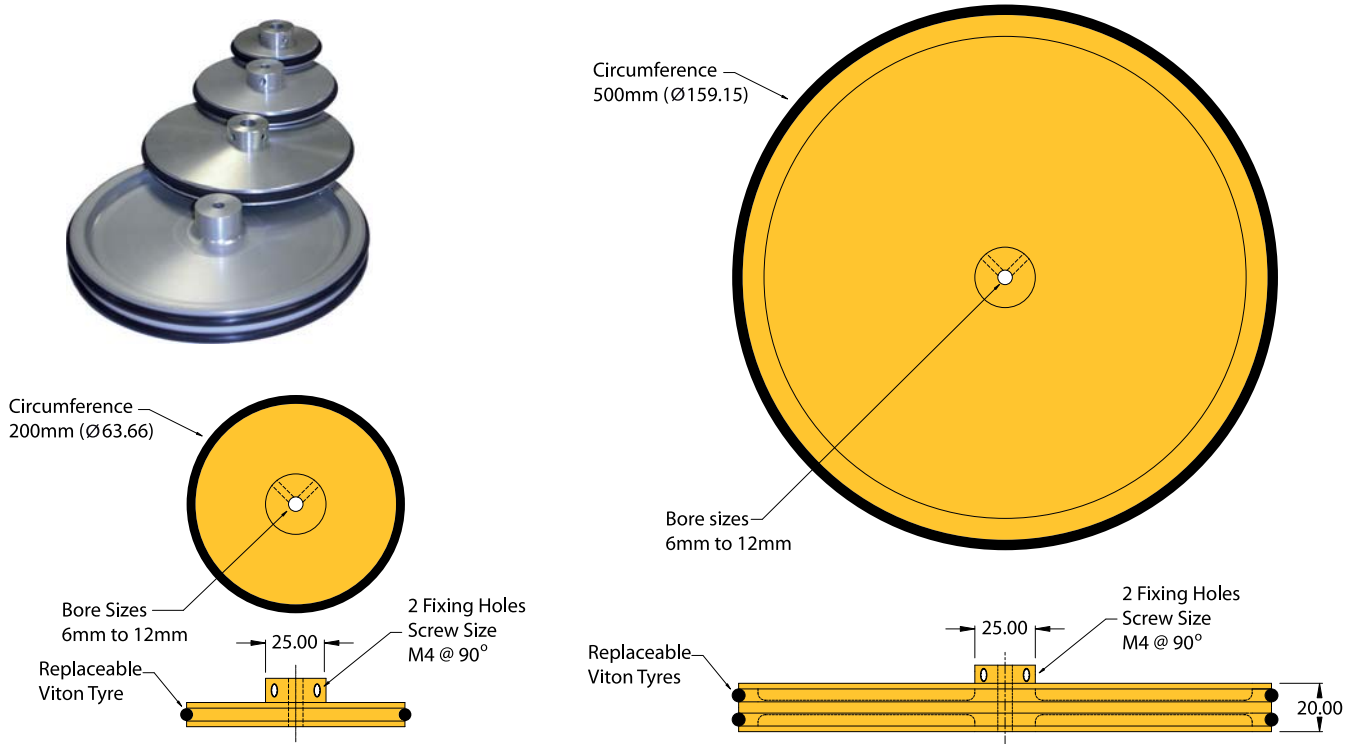
Rubber Faced **Urethane Faced**
-40° F to +275° F -40° F to +155° F

The below recommendations are only guidelines.
Performance may vary depending on your application.
Contact Customer Service for specification assistance.

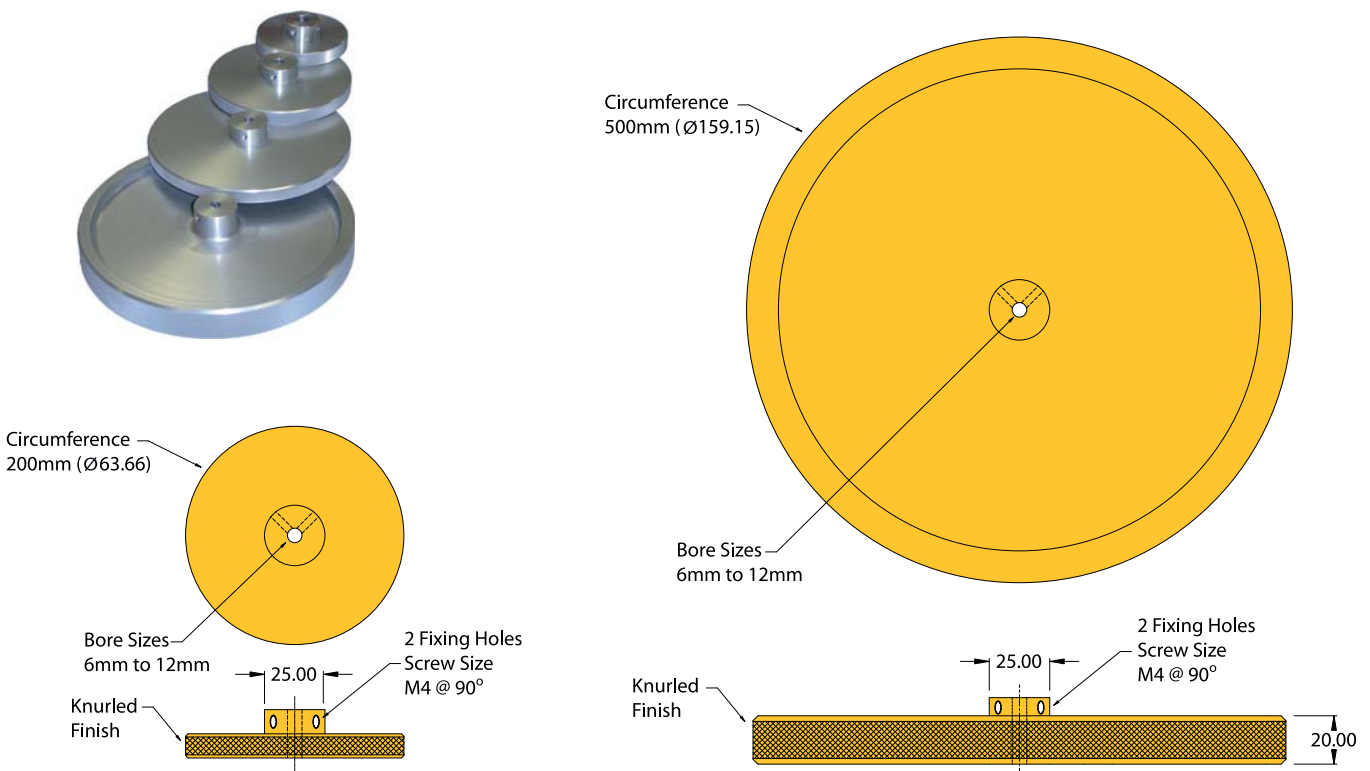
Accessories: Measuring Wheels



200mm (MWB2RU) and 500mm (MWB5RU) Rubber Tyre Wheels - Diagram Illustration



200mm (MWB2KN) and 500mm (MWB5KN) Knurled Finish Wheels - Diagram Illustration



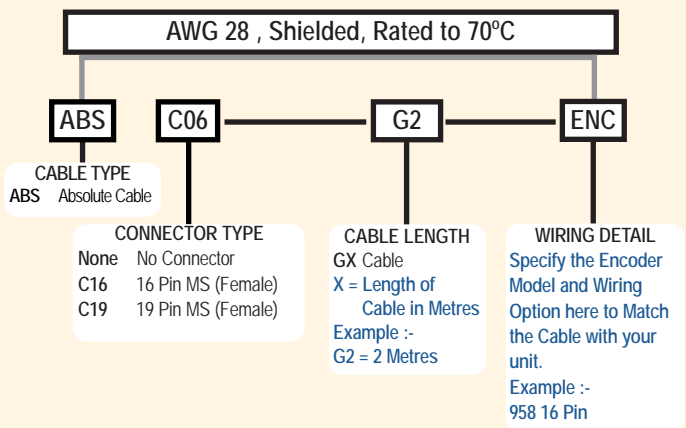
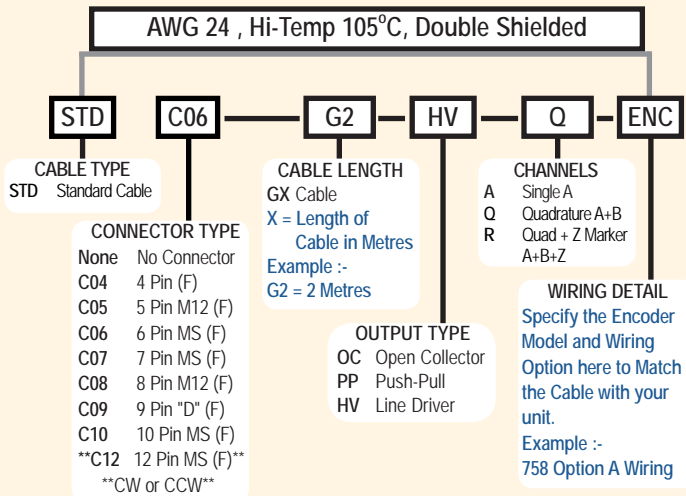
Accessories

Accessories - Connectors and Cable Assemblies

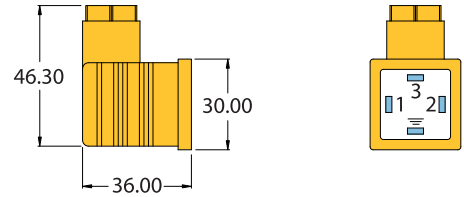


Cable & Connectors Ordering Guide

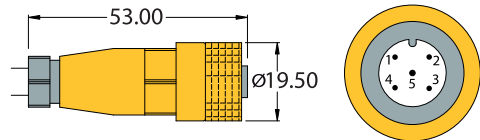
To order just a connector - quote the code in the second box only. Contact Customer Service for details.
 12 Pin Connector available in Clockwise (CW) and Counter-Clockwise (CCW) Configurations.



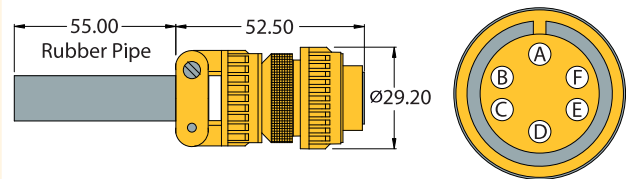
C04 - 4 Pin Hirschmann Connector & Pins



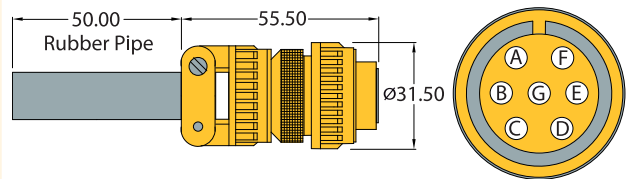
C05 5 Pin M12 Connector & Pins



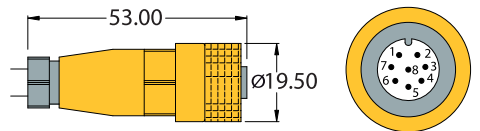
C06 6 Pin MS Connector & Pins



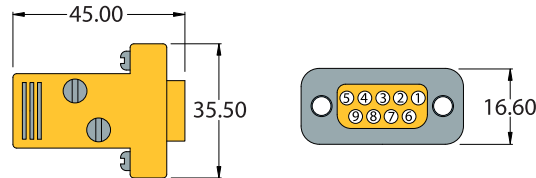
C07 7 Pin MS Connector & Pins



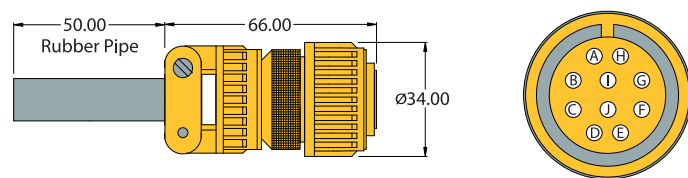
C08 8 Pin M12 Connector & Pins



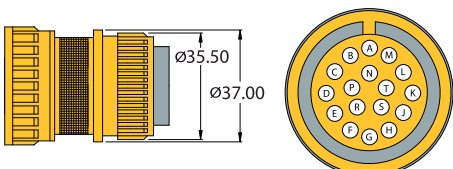
C09 9 Pin "D" Connector & Pins



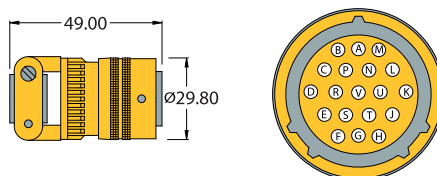
C10 10 Pin MS Connector & Pins



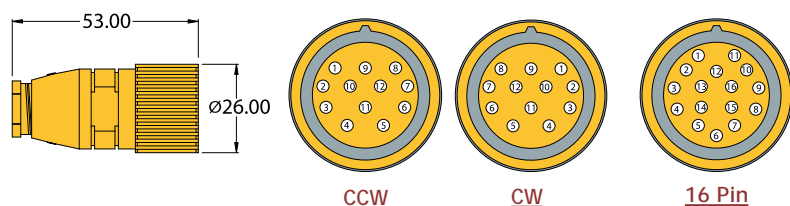
C17 17 Pin MS Connector & Pins



C19 19 Pin MS Connector & Pins



C12 & C16 12/16 Pin MS Connectors & Pins



Accessories

Accessories - Flexible and Magnetic Couplings



Features

The Primary job of couplings is to join together two pieces of rotating equipment while permitting some degree of misalignment or end movement or even both. By careful selection, installation and maintenance of couplings, substantial savings can be made in reduced maintenance costs and downtime and will help prolong your equipment's life. BEPC offers a variety of different couplings and sizes to accommodate your encoder. We also have a brand new selection of PUFLEX couplings available. Please contact Sales for more information on the new PUFLEX options and availability.

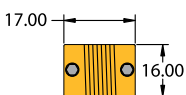
Flexible Coupling Ordering Information (Specify Order Code when ordering)

O.D.	Bore Sizes	Order Code
32.00mm	12mm x 12mm	CPA/12/12
25.00mm	10mm x 10mm	CPA/10/10
25.00mm	10mm x 6mm	CPA/10/6
20.00mm	6mm x 6mm	CPA/6/6
20.00mm	0.375" x 0.375"	CPA/S/S
20.00mm	0.375" x 0.250"	CPA/S/4
20.00mm	0.375" x 6mm	CPA/S/6
20.00mm	0.250" x 0.250"	CPA/4/4
25.00mm	6mm x 6mm	CCF/6/6
25.00mm	10mm x 10mm	CCF/10/10
48.00mm	10mm x 10mm	CDL/10/10
16.00mm	6mm x 6mm	HEL/6/6

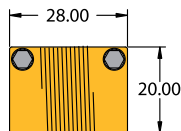
Non-Stock Bore sizes can be manufactured to customer requirements. call the sales office for price and delivery.

Flexible Coupling Dimensions

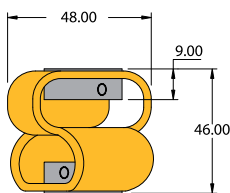
eg: HEL 16mm OD



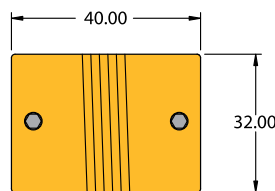
eg: CPA 20mm OD



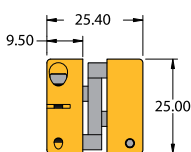
eg: CDL 10/10



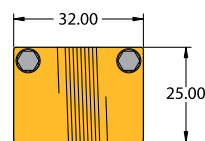
eg: CPA 32mm OD



eg: CCF 25mm OD



eg: CPA 25mm OD

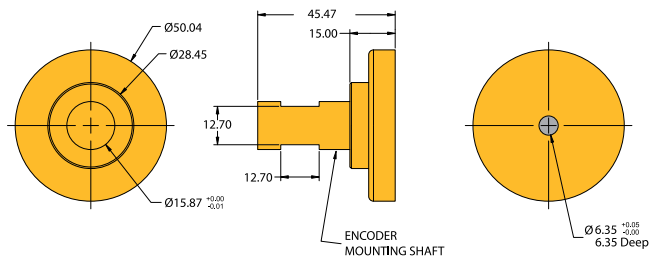


Magnetic Couplings

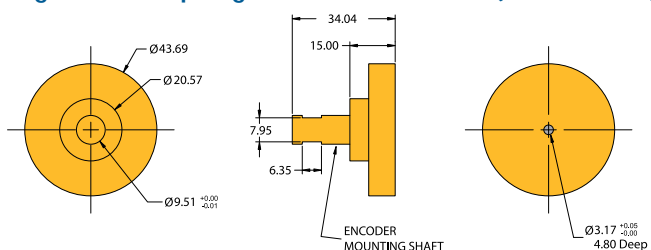
these magnetic couplings are a perfect match for both the Model 260 and Model 25T. For easier centering on a shaft, a pilot hole is located in the center of the coupling



Magnetic Coupling for 0.625" Bores (176282-01)



Magnetic Coupling for 0.375" Bores (176409-01)



Accessories: Mountings, Flanges, Brackets & Misc Items



Features

Here at British Encoder Products we offer a wide range of standard Flanges and Brackets. We also offer a range of Flanges or Brackets that will allow you to substitute a competitor's product with one of our models. The next few pages contain diagrams and photographs of a selection of these available offerings

We also have a number of alternative Flanges and Brackets not shown, that may meet your exact requirements, or could even be modified to suit your application or specific requirements.

Please call our sales team for further information.

Flanges, Brackets, Mountings and Misc Information

The Following pages contain diagrams for the listed Flanges, Brackets and Mountings - However any item marked with * has the information about that item located on the related Encoder's page.

Popular Fixed Brackets and Flanges

Description	To Fit Encoder :-	Order Code
725/925 "L" Bracket	730, 725, 925	M-3
740 STD "L" Bracket	745 STD	M-4
758/958-20 "L" Bracket	758-20, 958-20	M-B
758/958-26 "L" Bracket	758-26, 958-26	M-M
725 "L" Bracket	730, 725, 925	M-G
725/758-20 "L" Bracket	730, 725, 925, 758-20	M-J
TR1 Mounting Bracket	TR1, Tru Trac	140104
Uni-Bracket	260, 702	175997-1
725 Square Flange	730, 725, 925	175123
L25G Flange	730, 725, 925	M-7
L+B,MR Universal Flange	730, 725, 925	W0123
"Gaebridge Style" 60L Flange	730, 725, 925	W0791
"Gaebridge Style" 30L Flange	730, 725, 925	W0224
"Gaebridge Style" 35L Flange	730, 725, 925	W0239
"Gaebridge Style" 33L Flange	730, 725, 925	W0224-1
ETS Flange	730, 725, 925	W0392
Gelma Flange	730, 725, 925	W0517
58 Type Square Flange S/Steel	758-20 type	W0166-2
M-2 Flange	730, 725, 925	M-2

Hinged 700 Series Brackets

Description	To Fit Encoder :-	Order Code
Single Pivot Bracket	711, 716	176430-01
Double Pivot Bracket	711, 716	176431-01
*Spring Loaded Single Pivot *	711, 716	176430-02
Spring Loaded Double Pivot	711, 716	176431-02

Tru-Trac 3 Series Brackets

Description	To Fit Encoder :-	Order Code
TR3 Mounting Bracket	Tru-Trac 3	176389-01
TR3 Double Wheel Pivot	Tru-Trac 3	176391-01

Pivot Arm's and Blocks

Description	To Fit Encoder :-	Order Code
Pivot Block	758-26, 958-26	M-F
Bracket Arm Assembly	730, 725, 925	M-H

755 Series Flanges

Description	To Fit Encoder :-	Order Code
MHH Flange	755-RG	M-1
Parvex Flange	755-HS	M-4
Square Flange	755-RG	M-A

MISC. ACCESSORIES

FLEX-MOUNT KITS

Flex-Mount kits are available for any Encoder that we supply with a Flex-Mount fixing - Please see the correct Encoder page then contact the sales office to order the kit for the Flex-Mount number you are interested in buying (i.e. a kit for the 260 SF mount)

PROTECTIVE COVERS

Order No:

- 175996-01..... Uni-Cover Kit (Includes bolts and washers). Compatible with models 121, 260, 755A, 702, 775, 776 and 960
- 770-000-02..... 770 Protective Cover Kit (includes mounting hardware) IP65 Sealing
- 865-000-02..... 865T Protective Cover Kit (includes mounting hardware) IP65 Sealing
- 176301-01..... 56C Cage Style Cover Kit for Model 25T and Model 260 (Includes bolts and washers.)

C-FACE GASKET KITS

Order No:

- 770-Gasket-Kit..... C-Face Gasket Kit for Model 770
- 121-Gasket-Kit..... 121 Base Dust Seal (IP50)

SERVO CLAMPS

Order No:

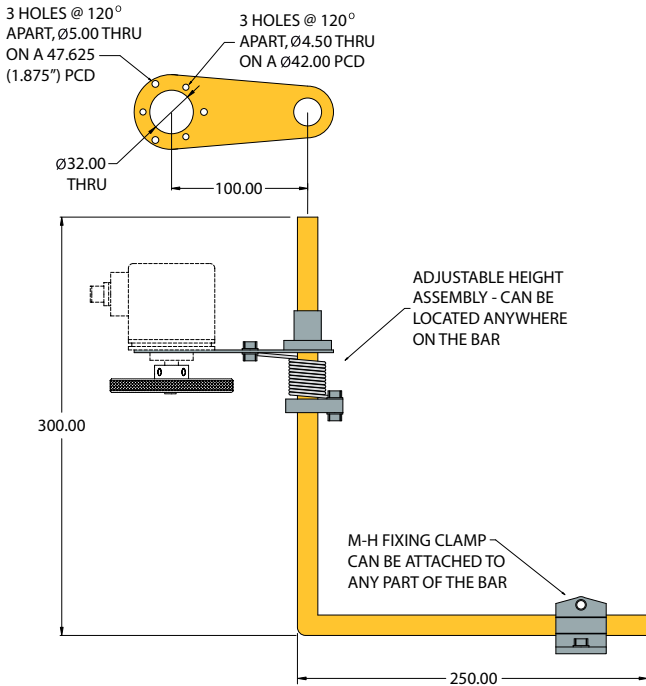
- 140083..... Servo Clamp - Top Mount (one clamp w/ one 4-40 screw) for models 755A,702, 725, 758-26, 925 and 958-26 Servo Hubs.



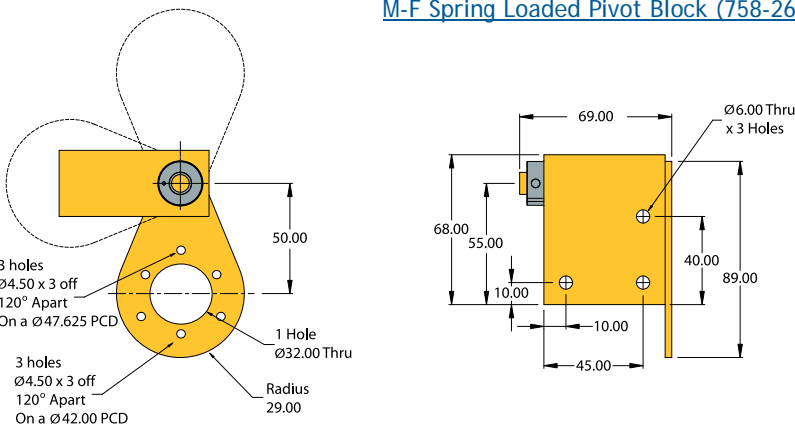
Accessories: Mountings, Flanges, Brackets & Misc Items



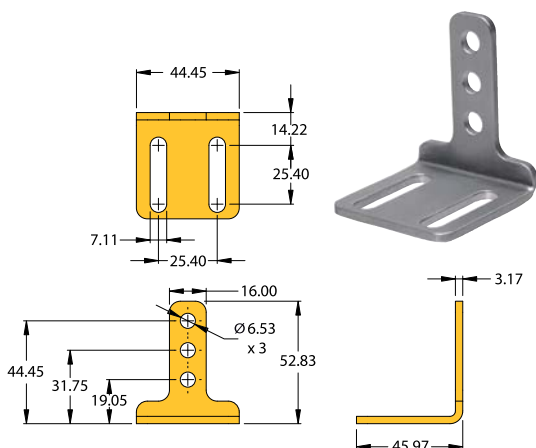
M-H Spring Loaded Bracket Arm (730, 725, 925)



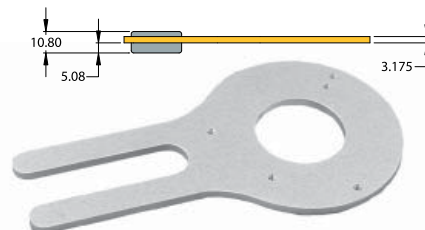
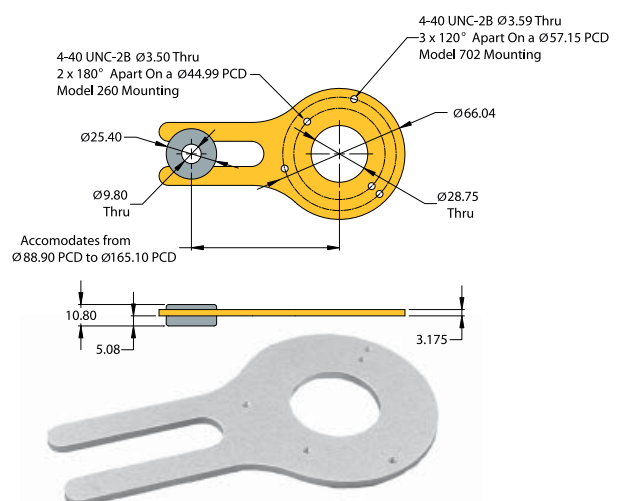
M-F Spring Loaded Pivot Block (758-26, 958-26)



140104 - TR1 Mounting Bracket



175997-1 Uni-Bracket (260, 702)

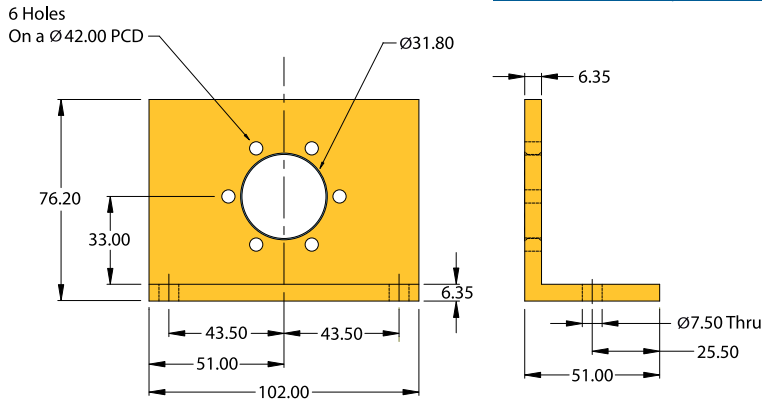


Accessories

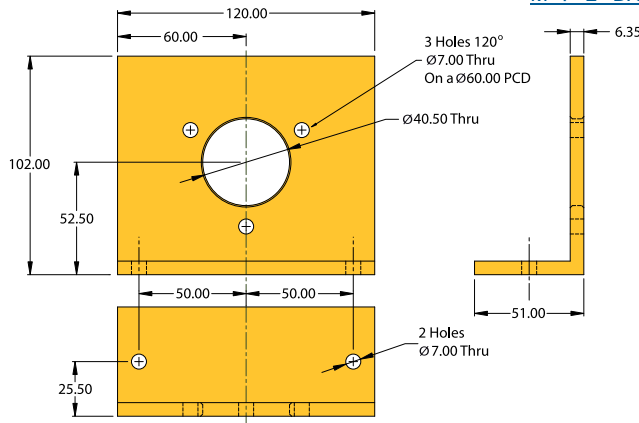
Accessories: Mountings, Flanges, Brackets & Misc Items



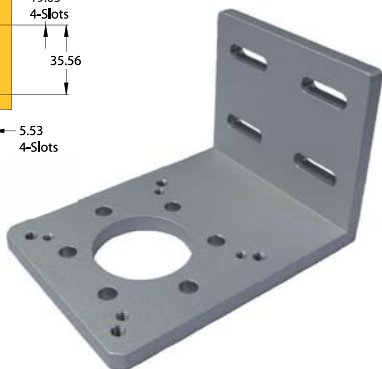
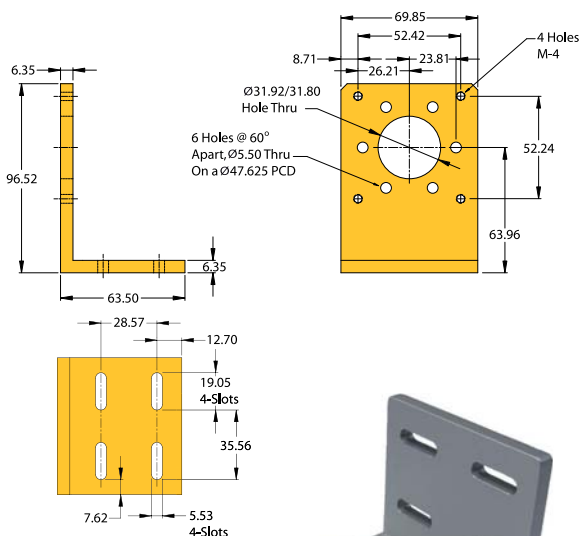
M-3 "L" Bracket (730, 725, 925)



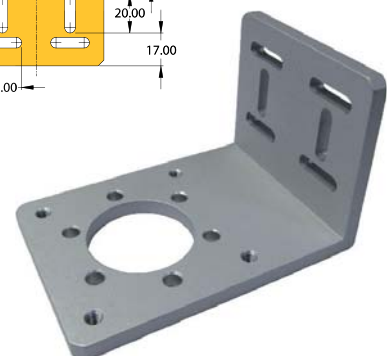
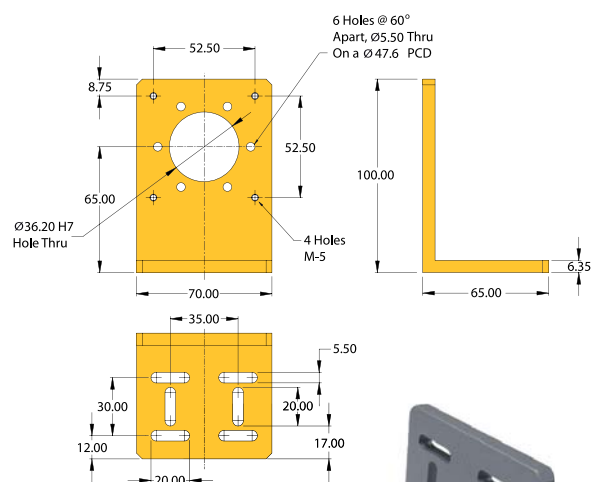
M-4 "L" Bracket (745)



M-G "L" Bracket (730, 725, 925)



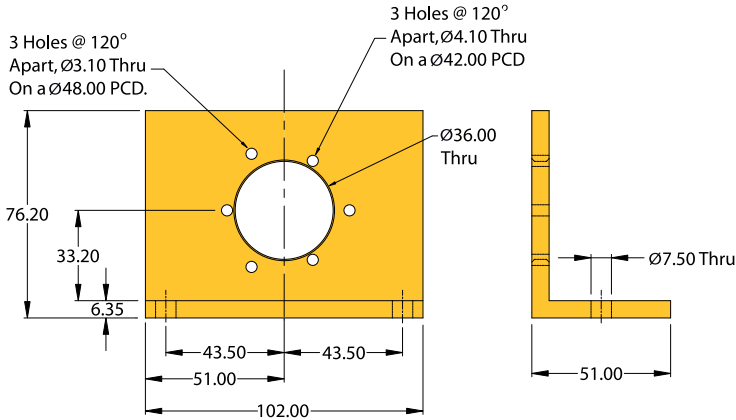
M-J "L" Bracket (730, 725, 925, 958-20, 758-20)



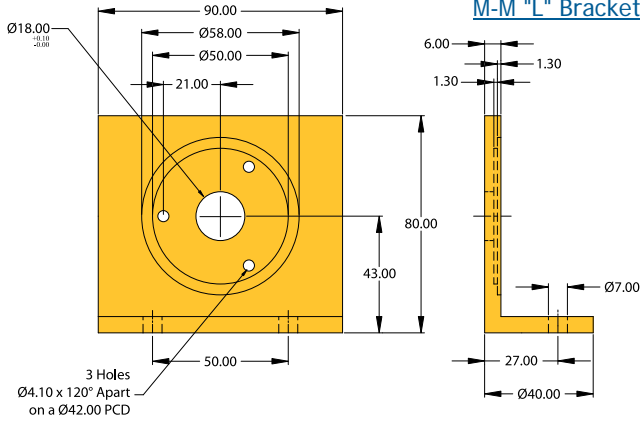
Accessories: Mountings, Flanges, Brackets & Misc Items



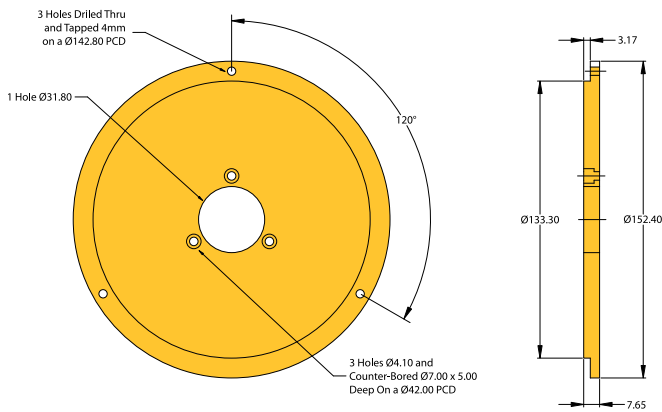
M-B "L" Bracket (758-20, 958-20)



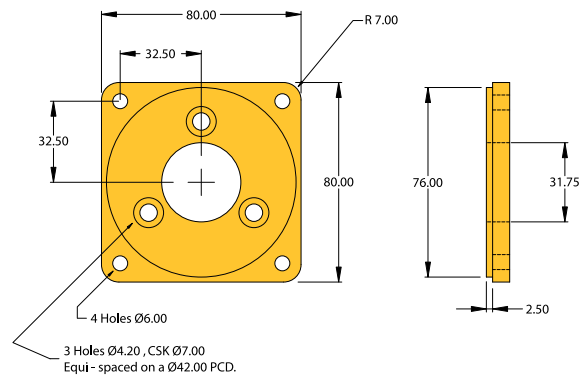
M-M "L" Bracket (758-26, 958-26)



W0791 - 60L "Gaebridge" Style Flange (730, 725, 925)



W0517 - "Gelma" Style Flange (730, 725, 925)

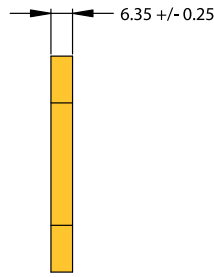
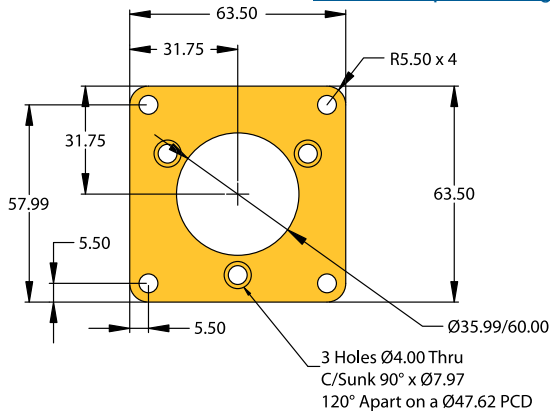


Accessories

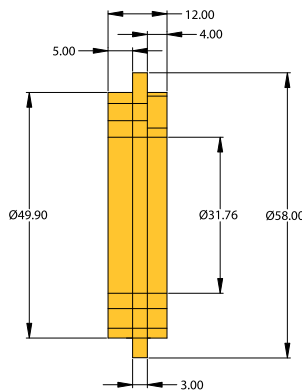
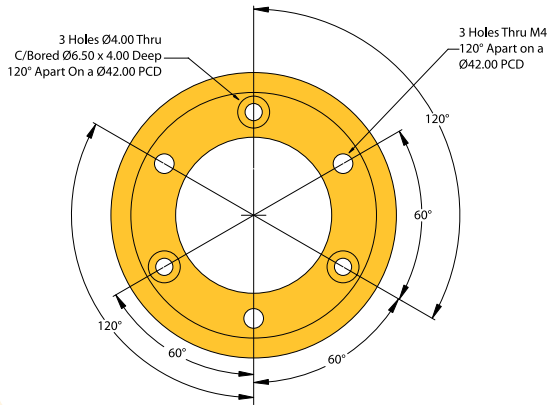
Accessories: Mountings, Flanges, Brackets & Misc Items



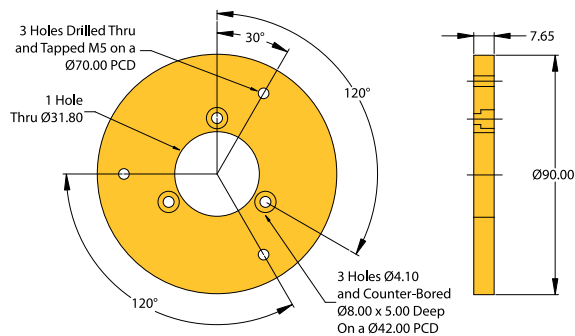
W0166-2 Square Flange (S/Steel) (858-20, 958-20, 758-20)



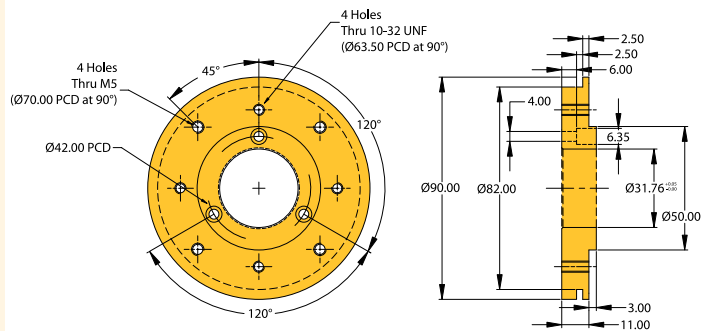
M-2 Flange (730, 725, 925)



W0239 - "Gaebridge" Style 35L Flange (730, 725, 925)



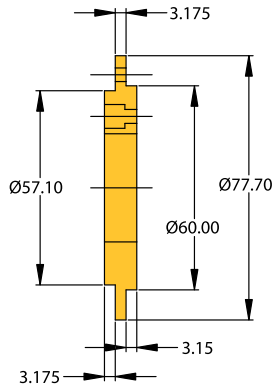
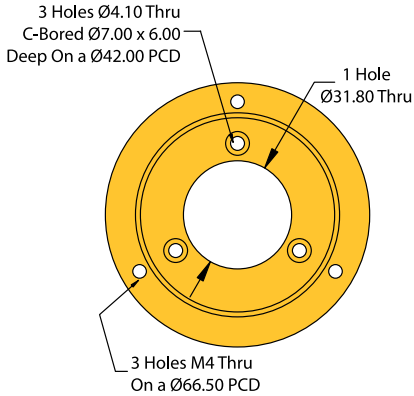
W0123 L+B Flange (730, 725, 925)



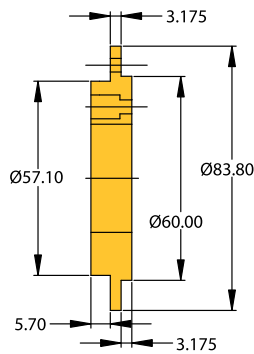
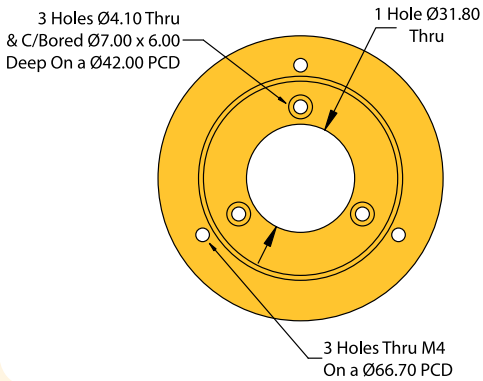
Accessories

Accessories: Mountings, Flanges, Brackets & Misc Items

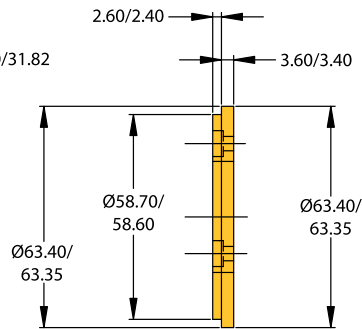
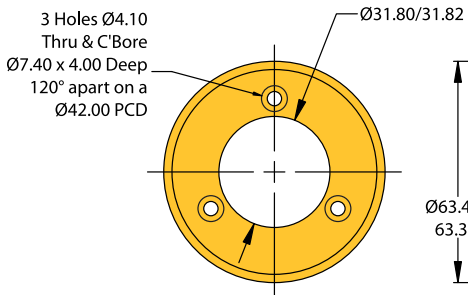
W0224 "Gaebridge" Style 30L Flange (730, 725, 925)



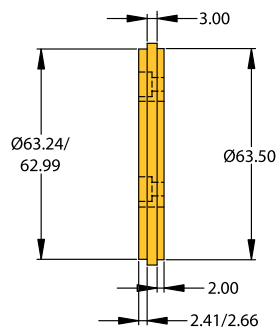
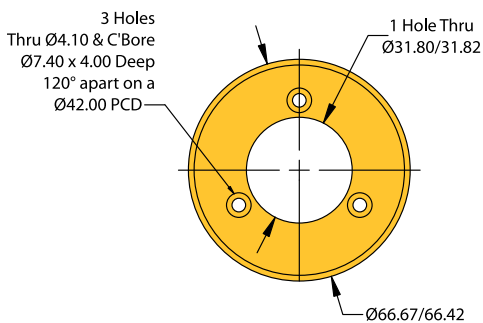
W0224-1 "Gaebridge" Style 33L Flange (730, 725, 925)



W0392 - ETS Flange (730, 725, 925)



M-7 L25G Flange (730, 725, 925)



Accessories - Encoder Power Supply



Features

A clean source of dedicated power for your encoder is an important factor when designing a reliable system. Now available from British Encoder are small, easily mounted Din Rail power supplies specifically chosen to power encoders. Designed for space efficiency, these compact power supplies are available in 5, 12, or 24 Vcc.

Easy to see LED indicators show the power supply is working properly. Screw type terminals easily accommodate wires from SWG 24 to 14. The shock proof housing is both UL and CE approved.

These supplies have been tested to work with all our Encoders. Save yourself time and money, call British Encoder today and order a power supply that you *know* will work with your encoder!

Ordering Information (Specify Order Code when ordering)

EPS-5V	100043
EPS-12V	100044
EPS-24V	100045

Specifications

Electrical

Nominal Input Voltage	100 to 240 Vac / 47 to 63 Hz
Input Voltage Range.....	90 to 265 Vac / 47 to 63 Hz or 120 to 370 Vcc
Frequency.....	100 kHz min
Inrush Surge Current.....	< 10 A @ 115Vac, < 18A @ 230 Vac
Input Fuse	T2A / 250 Vac

	EPS-5V	EPS-12V	EPS-24V
Nominal Output Voltage	5 Vcc	12 Vcc	24 Vcc
Tolerance	± 1 %	± 1 %	± 1 %
Nominal Output Current	3 A	1.5 A	0.75 A
Efficiency	> 75%	> 77 %	> 77 %
Ripple and Noise	50 mV	50 mV	50 mV

Mechanical

Dimensions.....	3.54" L x 0.89" W x 4.5" D (90 mm L x 22.5 mm W x 115 mm D)
Connection Type.....	Screw Clamp Connection

Environmental

Operating Temperature.....	-10° C to +50° C
Storage Temperature.....	-25° C to +85° C
Relative Humidity.....	95 % RH

Approvals and Standards

UL / cUL.....	UL508 / UL 1310 Listed, Class 2
TUV	EN 60950
CE	EN 50081-1 / EN 55022 Class B EN 61000-3-2 / EN 61000-3-3 EN 50082-1 / EN 55024
FCC.....	Class B

Cable Considerations



When the electrical signals are generated by an BEPC Encoder, they are electrically "clean" in the sense of being noise free. However, due to a number of factors, these signals can be degraded by the time they reach their intended destination. Environmental factors, such as radiated and induced electrical noise, can introduce signal distortions. In addition, system design factors, such as cable capacitance (especially over long cable runs), impedance mismatches, poor cable quality, inadequate shielding, poor grounding and poor cable termination can all contribute to signal loss and distortion.

Cable Considerations

All cables have small amounts of capacitance between adjacent conductors. The amount of capacitance present is a direct function of the cable's length. As capacitance increases, it tends to round off the leading edge of the square wave signal, decreasing rise times. It can also distort the signal to the extent that errors are caused in the system. Signal distortion is not usually significant for lengths less than 9.14 metres (or 1000 picofarads). To minimize the distortion, a low capacitance cable (less than 35 picofarads per 0.3 metre) is recommended. Cable lengths should also be as short as possible.

If it is necessary for the cable length to exceed 9 metres, the use of a Line Driver output (output option HV or L5 in the Ordering Guide) along with differential type receiver circuitry is strongly recommended. A low capacitance twisted-shielded pair cable should be used whenever using differential signals with cable lengths in excess of 9 metres. Contact Customer Service for additional information. For high frequency applications (>200kHz), this type of cable may be needed for all lengths. BEPC's standard cable has a braided and foil shield, but it is not twisted-shielded pair cable. Therefore, for high frequency applications, it is highly recommended that the user terminate the standard cable just outside the encoder, and then run a low capacitance twisted-shielded pair cable the remaining distance.

Proper cable termination is also extremely important with differential signals. You can try a simple, non-terminated configuration first. However, keep in mind that signal reflections may occur, resulting in severely distorted waveforms.

For this type of signal distortion, parallel termination is recommended, which involves placing a resistor across the differential lines at the far (receiver) end of the line. This resistor should be approximately equivalent to, or up to 10% greater than, the characteristic impedance of the cable (Z_0) [usually between 70-150 ohms]. This permits higher frequencies to be transmitted without significant distortion. Unfortunately, low valued resistors can increase the power dissipated by the Line Driver, and reduce the output signal level. In this case, a capacitor should be placed in series with the resistor. The capacitor value should be equal to the round trip delay of the cable divided by the cables Z_0 . Round trip delay is equal to the cable length multiplied by 1.7 ns/ft. (Note that the RC time constant of this type of termination can reduce the system frequency response.)

A parallel termination resistor of a larger value than given above can often provide adequate reduction of signal reflections, and still maintain adequate frequency response with low power dissipation. Experimentation in an application consisting of long cable runs will usually result in the best balance of all of these factors.

Grounding Considerations

A common cause of signal distortion in systems is poor grounding. The following tips will help eliminate distortions due to grounding:

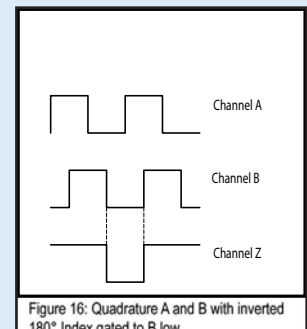
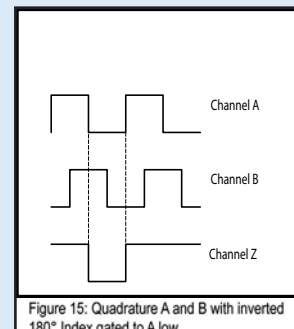
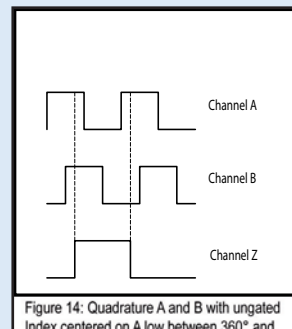
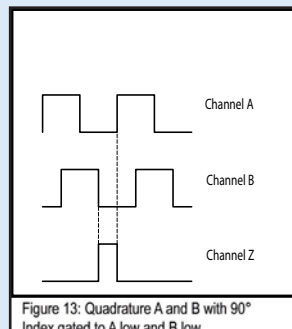
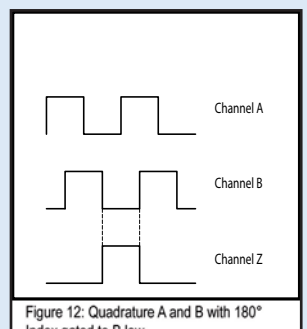
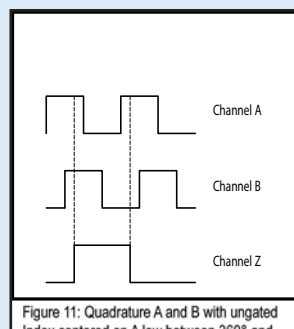
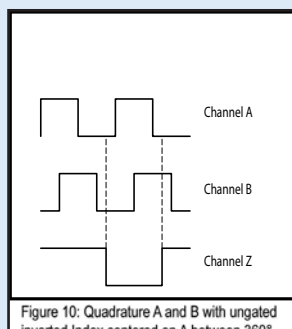
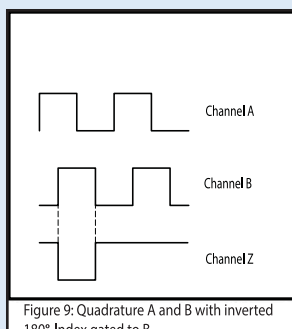
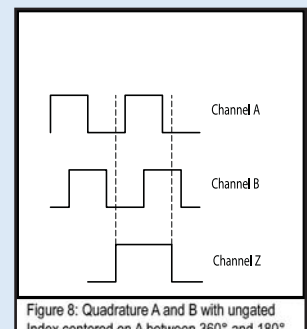
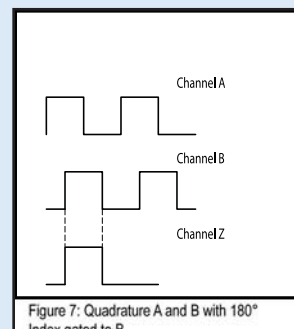
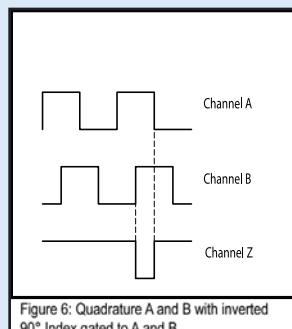
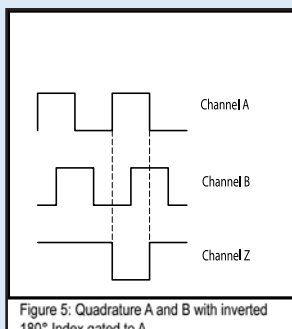
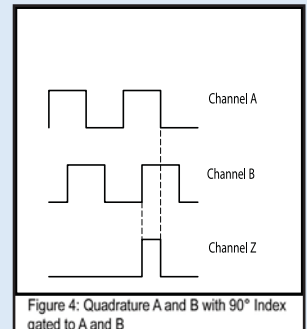
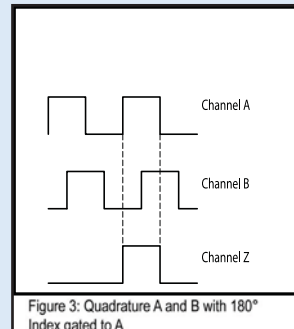
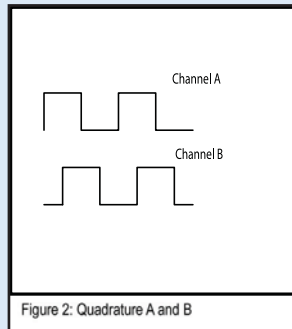
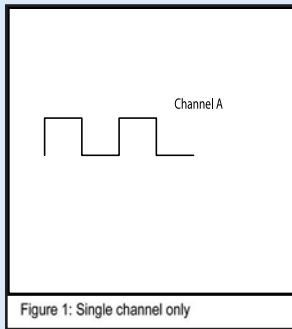
- 1. It is extremely important that cable shields are connected to the receiver/instrument (counter, PLC, etc.) ground.*
- 2. Always make sure the motor/machine to which the encoder is mounted is properly grounded.*
- 3. The encoder case should also be grounded with the following conditions:*
 - a. DO NOT ground the encoder case through both the motor/machine and the cable wiring.*
 - b. DO NOT allow the encoder cable wiring to ground the motor/machine exclusively. High motor/machine ground currents could flow through the encoder wiring, potentially damaging the encoder and associated equipment.*

Quadrature Phasing and Marker Gating Diagrams

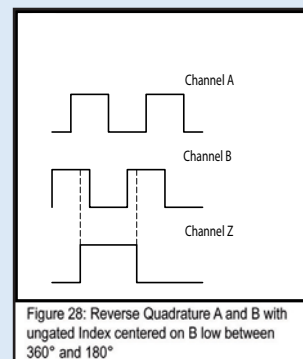
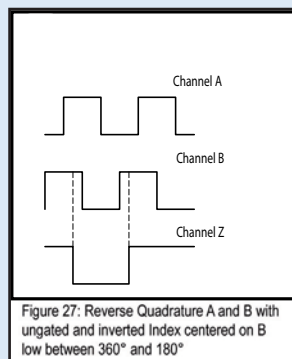
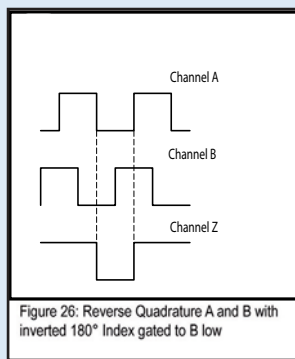
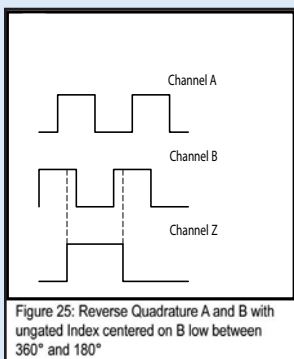
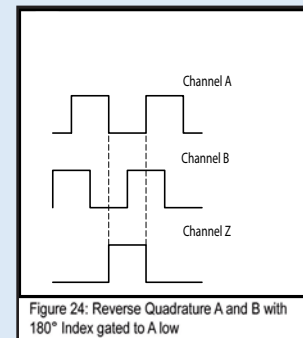
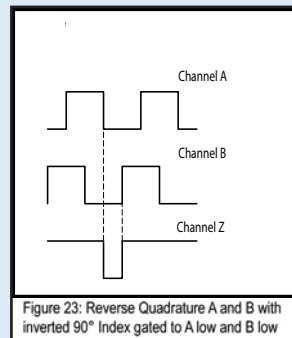
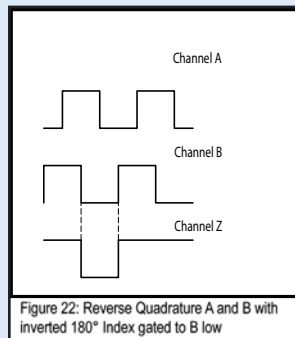
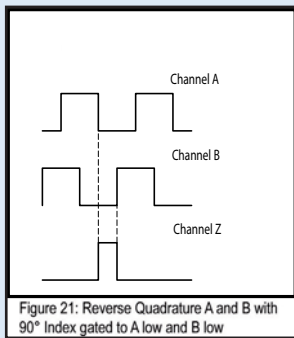
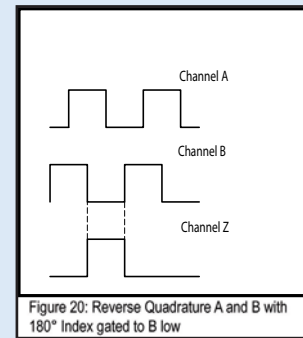
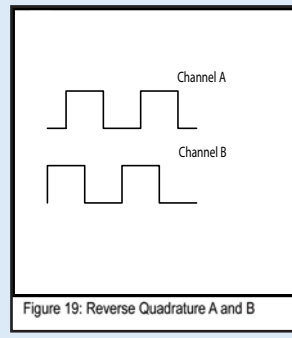
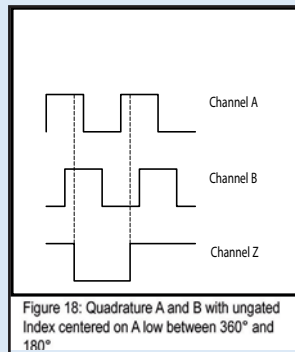
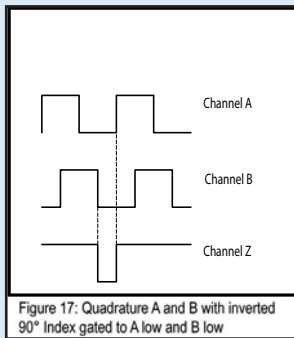


Diagram Examples of Various Quadrature Phasing and Marker Gating Options.

Standard Quadrature Phasing = A Lead's B during clockwise rotation when viewed from the shaft end or mounting face.
 Below are various examples of the different A, B, Z configurations that are possible when ordering your Encoder.



Quadrature Phasing and Marker Gating Diagrams



Marker (Index Pulse) Gating Options.

The Index pulse is also referred to as the reference, marker pulse or home pulse. This pulse is an individual output channel provided by the encoder that provides a single pulse once per revolution. It simply notes some discrete and fixed position in the mechanical rotation of the unit. Sometimes it is used with a counter to indicate the total number of revolutions the shaft has rotated, counting one pulse per revolution. Sometimes it is used to reset a counter if the counter needs to be reset to zero at the end of each encoder shaft revolution. Quite often it is used in servo applications where total system synchronism is required. Once every revolution, if everything agrees with the position feedback, the system knows it is still operating correctly. Or a system can return to a known physical position aligned with the marker pulse.

BEPC defines the Marker pulse as follows: "Once per revolution centered over channel "A". For the HV output option, it can be gated to channel "A" and is 180 electrical degrees wide, or known as "half-cycle gating". We also have the ability to gate the marker pulse to the "B" channel, or do both "A" and "B" channels if required. If it is gated to both channels - it results in what is called "quarter cycle gating", which is 90 electrical degrees wide. This option allows more precise positioning of the marker point. However, keep it in mind that with a narrower marker pulse, comes the possibility of the device the encoder is connected to not seeing the narrow pulse because it happens so quickly. Please note that these comments regarding the Marker pulse ONLY apply to units with the "R" in the order code - which is A,B and Z channels. With single channel "A" or Quadrature "A&B" (Q) in the number of channels spot, there is no Marker pulse provided. Non-Standard gating options must be requested by the customer at the time of ordering.

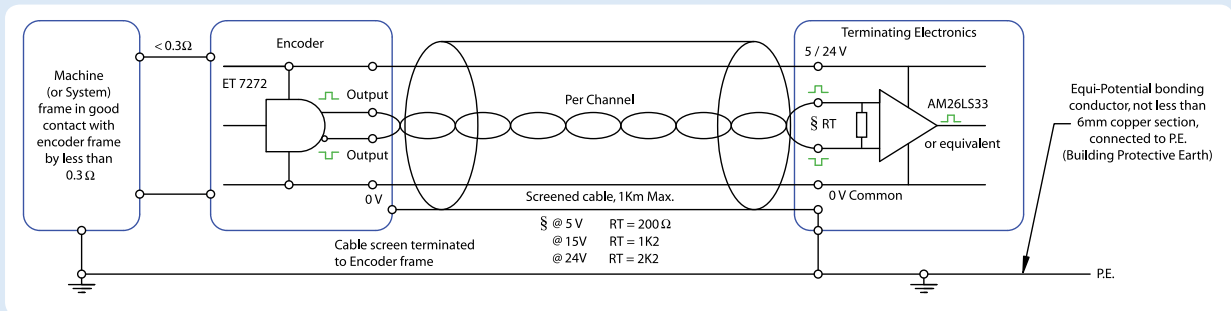
Output Circuits



HV Including RS422, RS485, TTL, HTL, NPN, PNP (A, \bar{A} , B, \bar{B} , Z, \bar{Z})

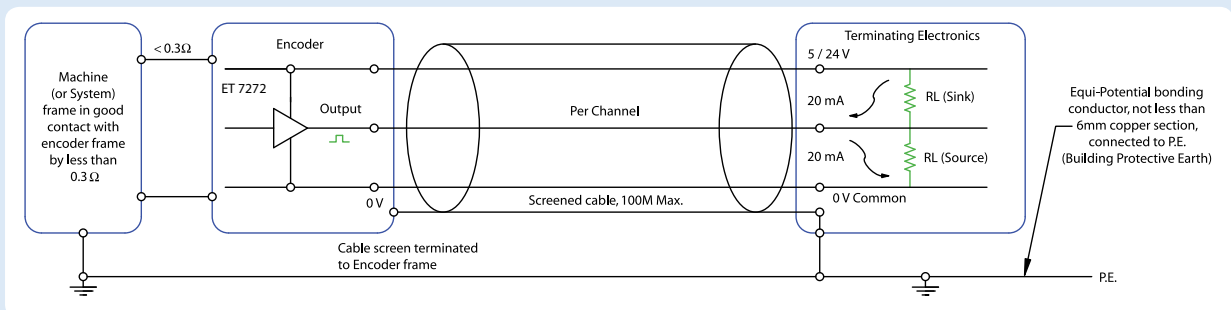
This UNIVERSAL HIGH VOLTAGE OUTPUT DRIVER may be used in either single ended or differential mode. In differential mode, the HV driver will function as an RS422 driver, a TTL driver, or an HTL driver. In single ended mode (i.e. without the complement signals), it will function as a current sink driver (NPN), a current source driver (PNP), or as a Push-Pull driver.

The driver will operate throughout a wide voltage range, from 4.75V through 28V, and has internal over-current protection. Each leg of each channel is also protected by a Schottky Diode. All screens should be terminated to P.E. (building protective earth) at each end. It may also be necessary to provide an equi-potential bonding conductor between all parts of the machine or system in order to maintain a 0V potential difference to P.E.



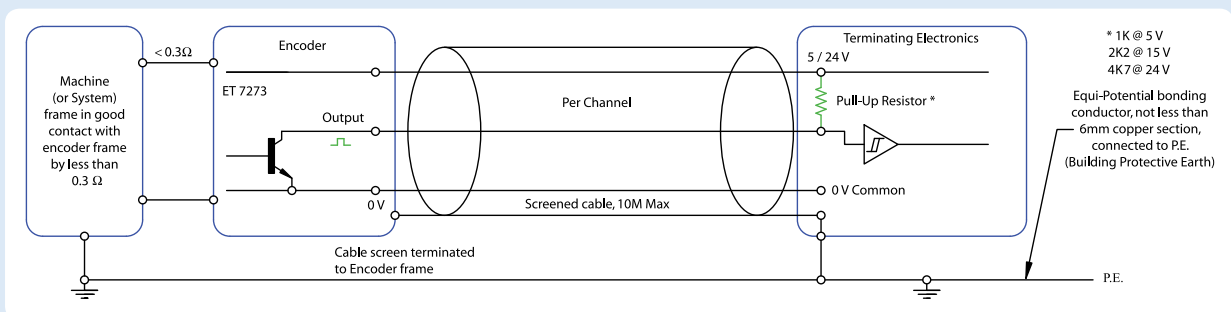
PP Push-Pull (A, B, Z)

The output driver is simply the HV UNIVERSAL HIGH VOLTAGE OUTPUT DRIVER configured without the complement signals. It will equally Sink or Source up to 20 mA per channel. All screens should be terminated to P.E. (building protective earth) at each end. It may also be necessary to provide an equi-potential bonding conductor between all parts of a machine or system in order to maintain a 0V potential difference to P.E.



OC open collector (A, B, Z)

This NPN Open Collector driver is capable of sinking up to 50 mA per channel and (in MOST models) is also capable of providing a complement signal which may be employed as an extra or redundant circuit. All screens should be terminated to P.E. (building protective earth) at each end. It may also be necessary to provide an equi-potential bonding conductor between all parts of a machine or system in order to maintain a 0V potential difference to P.E.



EMC Directive 89/336/EC Waveform Timing



Electro Magnetic Compatibility, EC Directive 89/336/EC

All of our products have been CERTIFIED by an INDEPENDENT TEST HOUSE to ensure that each type will fully integrate into systems or machines requiring EMC certification.

Since JAN 1996, Encoders fitted with a flying lead HAVE THE CABLE SCREEN IN CONTACT WITH THE ENCODER FRAME. The purpose of this is to ensure total shielding of the encoder electronics by virtue of its metallic body and cover, all of which will be bonded together and terminated to the screen.

The user should ensure that the component parts of the machine, or system frame, are at the SAME POTENTIAL (FRAME/GROUND/EARTH/SIGNAL GROUND/PE), if necessary, by bonding together by means of a copper "EQUI-POTENTIAL BONDING CONDUCTOR" of at least 6mm section to the P.E. (building protective earth).

For Encoders fitted with a connector, WHEREVER POSSIBLE, we will fit a "case ground" to one of the connector pins; this will be in contact with THE ENCODER FRAME.

RS422 differential drive should be employed wherever possible. Always use sensible cabling practice by separating encoder signal cable routing from other devices, if necessary, by use of grounded separators or trunking. Use twisted pair cables with an overall BRAIDED screen, e.g. BELDEN 9807 or equivalent.

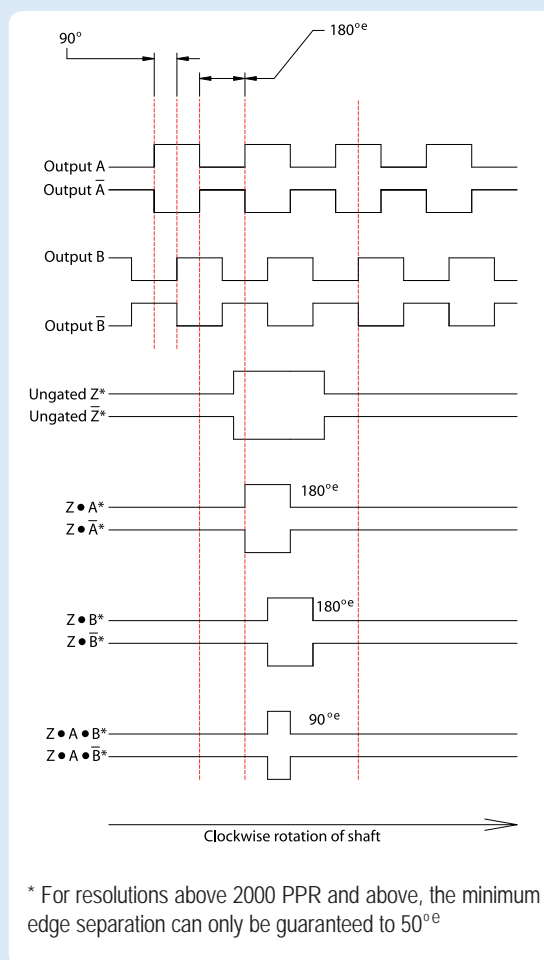
The RXTX module can help to solve most problems when transmitting encoder signals over long lengths of cable.

Waveform Timing

These output waveform timing diagrams illustrate the relationship of output A, B, and index. Quadrature separation (right) is typically 90 electrical degrees with a tolerance of 10%, giving minimum edge separation of 72°^e. Output A leads B for clockwise rotation of the encoder shaft. For NPN output A, B, and Z will not be present. For some types the marker pulse can be gated Z•A, Z•B, Z•A•B.

Note:-

These Signal configurations were obtained from a clockwise turning shaft (viewed from the shaft end) with the oscilloscope triggering on the negative edge of Output A with scope channel 1, and Output B or Output Z on scope channel 2



Technical Information

Warranty, Terms and Policy



Three Year Warranty.

BEPC warrants their products to be free from defects in material and workmanship for a period of three years from the date of shipment. This warranty does not apply to any product which has been subject to misuse, negligence or accidental damage, or if the unit has been subjected to any unauthorised access/modification. This applies to new products only. There is no provision for warranty on other Encoder Manufacturers repairs.

Satisfaction of this warranty, consistent with other provisions herein, will be limited to the replacement, repair or modification of, or issuance of credit for, the goods involved, at BEPC's option, only after the return of such goods and subsequent inspection confirming validation of warranty, and with consent in accordance with the return policy and with shipping charges prepaid. Goods may only be returned for credit by BEPC's agreement in writing. There will be a re-stocking charge equal to 50% of the price paid on the original invoice - modified, or special-build items, are excluded.

This warranty is in lieu of all other warranties whether expressed, implied or statutory including implied warranties of merchantability or fitness.

Terms and Conditions.

General

BEPC and Customer agree that the terms and conditions identified in this document shall govern exclusively the sale by BEPC of all hardware and services (collectively referred to as "Goods") within the United Kingdom. No addition or any modification to any of the terms and conditions as they appear in this document shall be binding upon BEPC unless in writing and signed by an authorised representative of BEPC.

Terms

Terms to customers with satisfactory credit are net thirty (30) days from day of invoice. A 1.5% monthly service charge (18% annually) will be added to accounts not paid within 30 days from date of invoice at the discretion of BEPC.

Shipment

All prices quoted (including repairs, parts, and goods sold separately) are EX-WORKS. Any shortages should be notified in writing within 7 days of receipt of goods, otherwise we can accept no responsibility.

Packing

All shipping prices listed provide for standard packing for domestic shipping in accordance with BEPC's standard specifications. If special packaging is required for domestic shipment or for export shipment, refer to factory for additional charges.

Title and Responsibility

Title to hardware shall remain with BEPC as security only and until full payment is received. Risk of loss or damage shall pass to customer upon shipment from our Wrexham factory.

Penalty Clauses

No contracts or quotations showing penalty clause for failure to meet shipment are acceptable to BEPC.

Product Changes

Changes in design and improvements in manufacture are constantly being made by BEPC whenever the company believes that the product will be improved. No obligations to incorporate these changes in units prior to the change will be assumed.

Shipping Weights and Dimensions

Published weights are careful estimates but are not warranted. Dimensions shown in catalogue are approximate.

Quotations

All written quotations automatically expire unless accepted within sixty (60) days from the date quoted. All Verbal quotations must be confirmed via Fax or Email - Verbal quotations expire on the same day that they are made.

Lead Times

Standard lead time is 4-5 working days. Expedite service is available upon request. Accessories are generally in stock and available for quick delivery. Contact customer service to confirm lead times.

Expedite Service

Express and Expedite service are available for most product configurations should you need a product faster than the standard lead times allow - this will incur an additional cost. Please see [Page 112](#) for detailed information.

Taxes

The customer shall pay all excise or similar taxes to the appropriate agency where and when applicable.

Delay

BEPC shall not be liable for damage as a result of any delay due to any cause beyond BEPC's reasonable control including, without limitation, act of God, act of war, riot, delay in transportation or inability to obtain necessary labour, materials, or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to a time lost by reason of delay.

Limitation of Liability

In no event shall BEPC be liable for consequential or incidental damages or any expense incurred by the customer attributed to any product sold hereunder.

E.&O.E.

Warranty, Terms and Policy



Returns Policy

Only products currently stocked by BEPC may be returned for restocking. Products that have been manufactured or configured to customer specifications are not stocked and may not be returned. Returned products are subject to a restocking fee of £25 or 25% of the purchase price, whichever is greater, and must be returned within 30 days of the date shipped from BEPC.

All products being returned must be 100% complete and must be packaged in ORIGINAL PACKAGING. All packaging materials, manuals, other accessories and documentation must be included in the original packaging. In the event that a return shipment received by us is improperly packaged, altered, or physically damaged, items sent for return consideration will be denied, and BEPC's return policy will not be honored. All items will be inspected and tested upon receipt.

A Return Materials Authorization (RMA) number is required for any item returned for credit. RMA numbers may be obtained by contacting Customer Service in advance. RMA numbers will be issued to original purchaser only.

This policy supersedes all previous policy's as from 5th November 2015.

Repairs Policy

We have increased our repair capacity, and now offer a wider range of repair possibilities, with very short lead times.

- 1) Priority is given to warranty repairs. These are free of charge with UK return shipping charges paid, providing that the reason for failure is not found to be application related, and can be positively identified as a BEPC quality issue. Warranty repairs should be completed within five working days.
- 2) All inspections, (of products manufactured either by "British Encoder", or any other manufacturer), will be subject to a standard charge, and the cost of return shipping, (details available from the Sales Office). Should a repair be agreed, this inspection charge will be waived, and the appropriate repair charge, and return shipping charges, will be applied. Inspections and repair evaluations should normally be completed within ten working days.
- 3) BEPC non-warranty repairs are subject to standard charges and the cost of return shipping, (details available from the Sales Office). Non warranty repairs should normally be completed within ten working days.
- 4) OEM repairs, (i.e. encoder NOT of our own manufacture), are subject to standard charges, and the cost of return shipping, (details available from the Sales Office), OEM repairs should normally be completed within ten working days.
- 5) We now offer a priority repair service, for which a surcharge, (of 50% over the normal repair charge, per unit), will apply. This service is subject to the condition of our receipt of the suspect device, together with a confirmed purchase order, by no later than 10:00 HRS of the first working day. This facility may be withdrawn in the event of unexpected production demands, or by the occurrence of factors beyond our control.
- 6) Any returns should be accompanied by a valid RMA number, (Return Material Authorisation), which will be issued by the Sales Office, and which should be signed, giving us authority to proceed with any inspection or repair.
- 7) Any returns, (other than BEPC Warranty Repairs), for which we do not receive specific instruction and a valid purchase order, will only be retained for a maximum of 30 days. Should we not receive specific instructions within the 30-day period, any material in our possession will be considered as being unwanted, and will be scrapped.

Each Encoder manufactured by British Encoder Products Company is backed by our best-in-the-industry three year warranty. If you experience a problem, call our trained professionals. We can often troubleshoot a problem over the phone and determine if a repair is needed. If it is necessary to return the encoder for repair, our technicians will perform a complete evaluation and recommend a course of action. In an emergency situation our technicians can often have your evaluation and repair completed, and ready for return shipment, within a matter of hours after receiving your encoder.

Expedite Options



On occasion, you may find that your time requirement for an encoder exceeds our industry-leading standard lead delivery terms. Fortunately, British Encoder Products Company is committed to doing everything in our power to ensure our products arrive in the shortest time possible. We have developed the following Expedite options for your benefit.

See COMMENTS below for important considerations before placing your order.

Options	Service	Cut Off (UK Time)	Cost
Expedite	24 Hour Same Day Ex-Works	09.30	£60.00
Express	Ships Within 48 Hours Ex-Works	13.00	£40.00

Expedite :- 24 Hour build = £60.00 Ex-Works - providing we receive your order before 09:30 (UK Time).

Express :- 48 Hour build = £40.00 Ex-Works - providing we receive your order before 13:00 (UK Time).

Provisions

- 1) The above charges apply to 1 Unit orders only, and any additional encoders will incur an additional £50 charge per unit for Expedite and £25 charge per unit for Express.
- 2) **Expedite availability is limited** and is provided on a first-come-first-served basis. Earlier is better.
- 3) **Orders must be received via FAX** at +44(0)1978262101 or **EMAIL** at sales@encoder.co.uk by the stated cut-off time.
- 4) **Certain configurations are not eligible** for same day Expedite due to minimum build time. These include disc resolutions above 3000 PPR, certain SPEC offerings and other products. These configurations may be available on the Express 24/48 Hours Service. Always confirm at the time of order.
- 5) **Always confirm Expedite** requests at the time of order with BEPC customer service.
- 6) **Hours of operation: Monday to Thursday 08:00 to 16.30 UK Time, Friday 08:00 to 14:00 UK Time.**

Accuracy

Related to the incremental encoding disc. It is the difference between the theoretical position of one increment or bit edge and the actual position of the edge.

Axial Loading

The force applied to a shaft end surface directed along the axis of the rotation.

Axial Load (maximum)

Maximum axial load is the maximum force that may be applied to the shaft without it reducing the rated operating life or causing deviation from the rated performance.

Bi-Directional

Bi-directional refers to an encoder output code format from which direction of travel can be determined.

CE (Conformity European or European Compliance)

Sets essential electromagnetic compatibility within the European markets for all electrical and electronic equipment that may interfere with other equipment, or that may be interfered with by other equipment.

Channel

Each channel is a unique incremental output of the encoder.

Current Sinking Output

A logic form that requires current flow out of the input of the PLC or counter and back to the output of the encoder. The encoder "sinks" this current which is "sourced" by the input circuitry. This is the most common output circuit configuration. It uses an NPN transistor in the encoder.

Current Sourcing Output

A logic form that requires current flow from the output of the encoder to the input of the counter or PLC. The encoder "sources" the current and the input circuitry of the counter or PLC "sinks" this current. This output circuit is seldom used. It usually requires a PNP output transistor in the encoder.

Pulses Per Revolution (Also known as Cycles Per Revolution)

Called PPR or CPR. The number of increments on the disc of an incremental encoder. A one thousand increment encoder has a PPR/CPR of 1000.

Differential Output

Differential output refers to the complementary outputs from a feedback device when the signals are excited by a Line Driver. Optimum performance is achieved when the receiver input impedance is matched to the line receiver output and transmission line.

Disc

Typically made of glass, metal or plastic with precise position incremental lines. These lines are also known as Increments. The number of increments determines the resolution or PPR of the encoder.

Encoder (Shaft Type)

An encoder is an electro-mechanical device that translates mechanical motion (such as position, velocity, acceleration, speed, direction) into electrical signals.

Frequency Response

The maximum frequency in cycles per second.

Marker/Index Reference

The Marker is a separate output generated by a single track which produces a single cycle/pulse (or transition change) at a unique position or positions such as centre, home, zero or reset point. Marker pulse is sometimes referred to as an Index.

IP50

Protected against dust. Limited ingress (no harmful deposit)

IP64

Totally protected against dust. Protected against water sprayed from all directions. Limited ingress permitted.

IP65

Totally protected against dust. Protected against low pressure jets of water from all directions. Limited ingress permitted.

IP66

Totally protected against dust. Protected against strong jets of water from all directions. Limited ingress permitted.

Line Driver

A circuit that provides error-free output pulses in electrically noisy environments or over long transmission lines when used with a line receiver.

Negative Going Pulse.

When activated, the pulse goes low (logic 0) or in a negative direction. Do not be confused by "negative going" meaning the pulse goes negative in relationship to the signal common or reference level. These statements are for "Positive logic" only. All shaft encoders are based on positive logic.

NEMA 4

Enclosure rating intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure.

NEMA 13

Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil and non-corrosive coolants.

Open Collector

When the signal is taken directly off the collector element of the output transistor, no Pull-Up is used. This is the electronic equivalent of a mechanical switch closure to common. The input device of the PLC or counter is effectively placed in a series circuit that includes the output transistor and input device, which is often an opto isolator and the positive voltage supply. When the output transistor turns on, the circuit is completed and current will flow. The output signal cannot be observed unless the circuit is completed externally.

Positive Going Pulse

In the low or logic 0 state, it is in the quiescent state. It goes high or logic 1 when activated. This is a transition in the "positive going" direction.

Pulse Polarity

Either positive going or negative going. A pulse has two logic states: activated or inactivated. These two states are opposite. When the pulse is in its quiescent state (high or low), it is at one particular logic level (1 or 0). When the pulse hits or is in the activated state, this logic level reverses itself for the duration of the pulse.

Pulse Width

The actual real time between the leading and trailing edge of a pulse. The pulse width of the output signal of most encoders is a 50% duty cycle on the clock outputs. Some models utilize a timed or "one shot" output. This provides a constant pulse width irrespective of the pulse repetition rate or shaft speed. The factors to be considered when determining pulse width specifications are (1.) What is the minimum pulse width requirement of the PLC or counter? This information is available in the counter or PLC specifications (2.) Pulse repetition rate versus pulse width. With a constant pulse width, the individual pulses become closer together as the pulse repetition rate or shaft speed increases. At some point the pulses will overlap and the output signal as a series of well defined pulses ceases. The pulse repetition rate varies inversely with the pulse width and vice versa.

Pull-Up Resistor

When added inside the encoder between the positive voltage and the collector element of the output transistor, it becomes a "Pull-Up" circuit. This is also known as a pulse output.

Push-Pull Output

An output circuit that will both sink and source current.

Quadrature

A dual output encoder used for bi-directional motion control. One channel leads the other by 90° electrical. By monitoring the phase shift of both channel A and B, direction can be determined. Another benefit of a quadrature encoder is count multiplication. With an appropriate counter, resolution can be multiplied up to four times. For instance using this technique an encoder with a PPR of 1000 can provide a resolution of up to 4000 pulses per revolution.

Quadrature Error

Quadrature error is the phase error when the specified phase relationship between two channels is normally 90° electrical.

Radial Load

The force applied to a specific point to the encoder shaft perpendicular to the axis of rotation.

Radial Load (Maximum)

The maximum force that may be applied perpendicularly to the shaft without reducing the rated operating life or causing deviation from the rated performance.

Resolution

The number of increments on the encoder disc. For incremental encoders, resolution is defined as cycles or pulses per revolution.

Shaft Runout

Amount of shaft movement while spinning.

Single Channel

A single channel encoder produces one incremental output. They are often used for tachometry applications.

Torque (Running)

Running torque is the rotary force required to keep an encoder shaft turning. It is typically expressed in Nm (Newton-Meters)

Torque, Starting (breakaway)

Starting (breakaway) torque is the rotary force required to overcome static friction and cause the encoder shaft to begin rotating.

Unidirectional

Unidirectional refers to an encoder output code format from which direction of travel cannot be determined by the receiver.



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