

# MODEL 15S – INCREMENTAL SHAFT ENCODER



Ø1.5"

## FEATURES

- Very High Performance Economical Encoder**
- Low Profile—Less Than 1.0" (25.4 mm) Height and 1.5" (38 mm) Diameter**
- Extended Temperature Operating Ranges Available**
- Up to 12 Pole Commutation Optional (for Brushless Motor Control)**

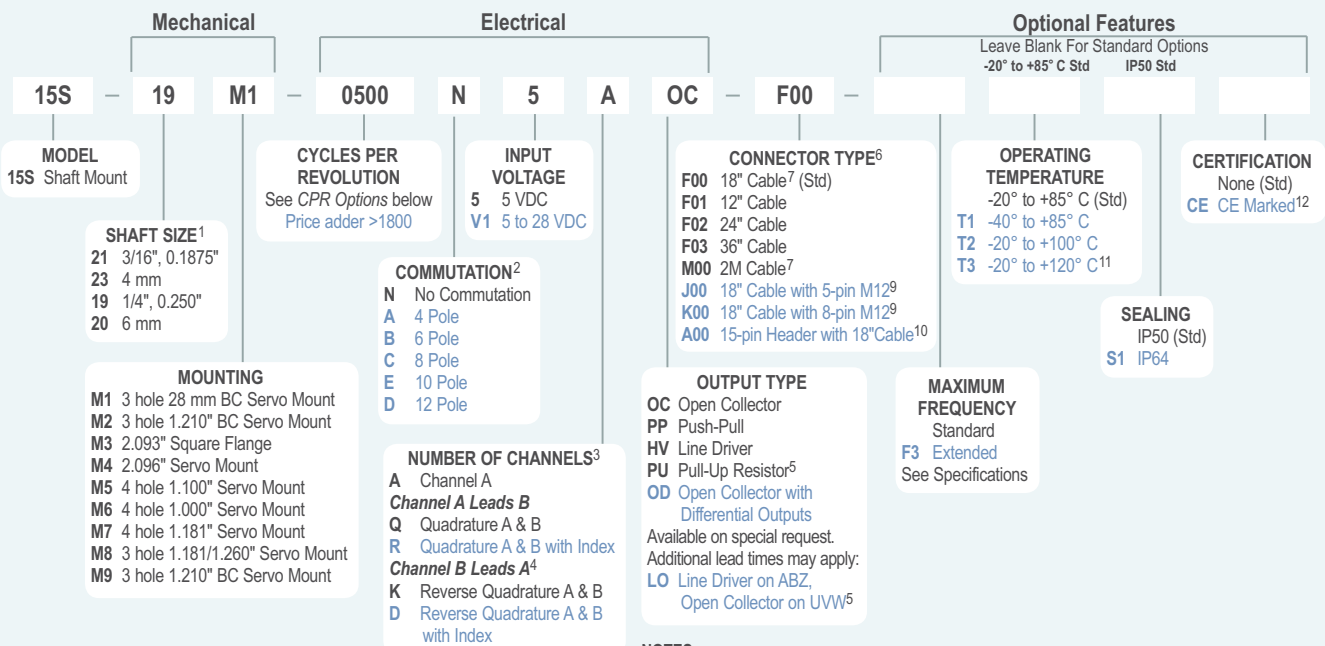
The Model 15S Accu-Coder™ offers a high performance feedback solution in a low profile package, making the Model 15S ideal for commercial and light-duty industrial applications. This industry standard Size 15 (1.5" diameter) encoder features a precision bearing set, sealing available to IP64, a durable 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 -40° C to +120° C, or up to 12 pole commutation for brushless motor control. The Model 15S features EPC's 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, Specialty 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 CPR OPTIONS

0001 thru 0189*	0198	0200	0250	0256	0300
0315	0360	0400	0500	0512	0580
0750	0800	1000	1024	1125	1200
1500	1800	2000	2048	2500	2540
3600	4000	4096	5000	6000	7200
10,000					8192

New CPR 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:

- Contact Customer Service for additional options not shown.
- Not available in all configurations, and not available with V1 Input Voltage. Contact Customer Service for availability.
- Contact Customer Service for non-standard index gating or phase relationship options.
- Reverse Quadrature not available with PU output type.
- With Input Voltage above 16 VDC, operating temperature is limited to 85° C.
- For mating connectors, cables, and cordsets see Encoder Accessories on page 102 or visit [www.encoder.com](http://www.encoder.com). For Pin Configuration Diagrams, see page 107 or visit [www.encoder.com](http://www.encoder.com).
- For non-standard English cable lengths enter 'F' plus cable length expressed in feet. Example: F06 = 6 feet of cable. Frequency above 300 kHz standard cable lengths only.
- For non-standard metric cable lengths enter 'M' plus cable length expressed in meters. Example: M06 = 6 meters of cable.
- Not available with commutation. 5-pin not available with Line Driver (HV, OD, LO) outputs. Additional cable lengths available. Please contact Customer Service.
- 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.
- Only available with 5 VDC Input Voltage.
- Please refer to **Technical Bulletin TB100: When to Choose the CE Option** at [www.encoder.com](http://www.encoder.com).

## MODEL 15S SPECIFICATIONS

### Electrical

Input Voltage..... 5 VDC  $\pm 10\%$  Fixed Voltage  
 4.75 to 28 VDC max for temperatures up to 85° C  
 4.75 to 24 VDC 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 20mA max per channel  
 Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply.)

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

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

Quadrature..... 67.5° electrical or better is typical,  
 Edge Separation 54° electrical minimum at temperatures > 99° C

Waveform Symmetry.. 180° ( $\pm 18^\circ$ ) electrical (single channel encoder)

Accuracy ..... Within 0.017° mechanical or 1 arc-minute from true position. (for CPR > 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 .... 5 lb max. Rated load of 2 to 3 lb for bearing life of  $1.2 \times 10^{10}$  revolutions

Axial Shaft Load ..... 5 lb max. Rated load of 2 to 3 lb for bearing life of  $1.2 \times 10^{10}$  revolutions

Starting Torque ..... IP50- 0.05 oz-in  
 IP64- 0.4 oz-in

Moment of Inertia ...  $6.7 \times 10^{-5}$  oz-in-sec<sup>2</sup> (4.8 gm-cm<sup>2</sup>)

Max Acceleration .....  $1 \times 10^5$  rad/sec<sup>2</sup>

Weight..... 3 oz typical

### Environmental

Storage Temp ..... -25° to +85° C

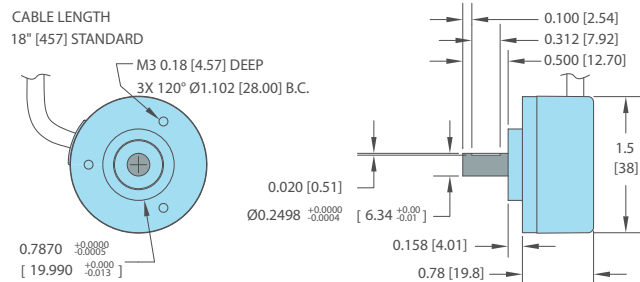
Humidity..... 98% RH non-condensing

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

Shock ..... 80 g @ 11 ms duration

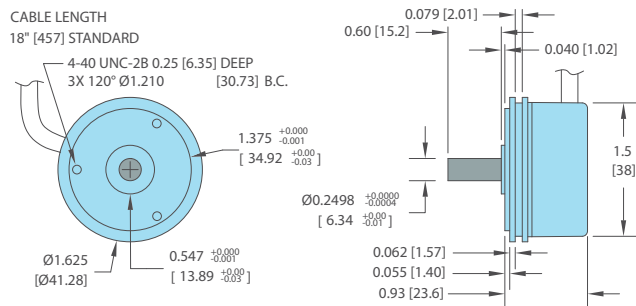
Sealing..... IP50 standard; IP64 available

## MODEL 15S STANDARD SERVO MOUNT M1

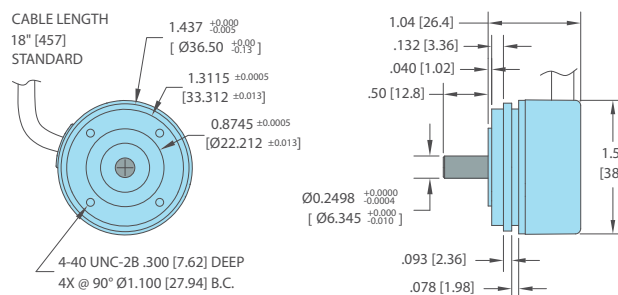


## MODEL 15S SERVO MOUNT M2 & M9\*

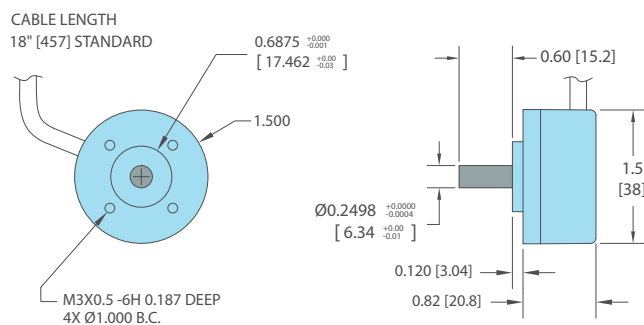
\*M9 mount includes a 0.750" boss



## MODEL 15S SERVO MOUNT M5

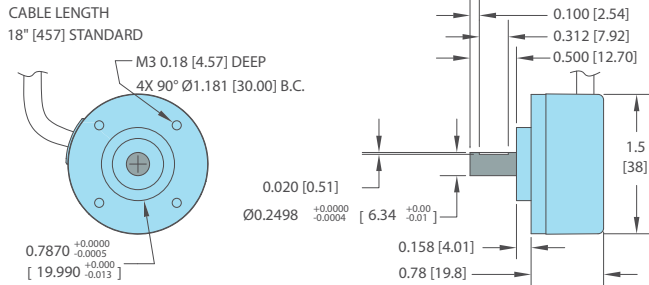


## MODEL 15S SERVO MOUNT M6

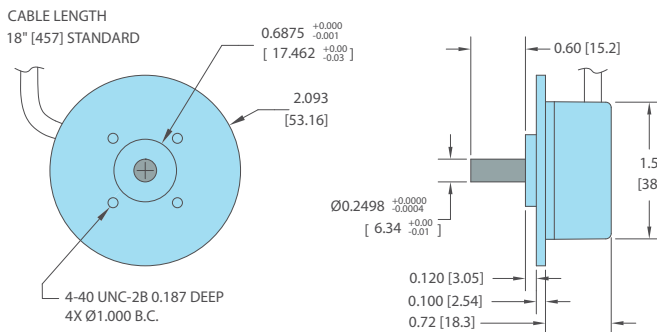


All dimensions are in inches with a tolerance of  $\pm 0.005$ " or  $\pm 0.01$ " unless otherwise specified.  
 Metric dimensions are given in brackets [mm].

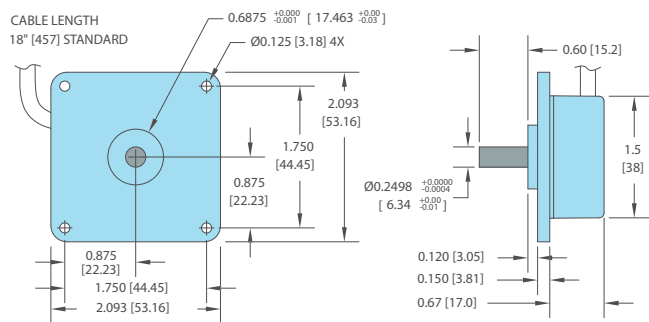
### MODEL 15S SERVO MOUNT M7



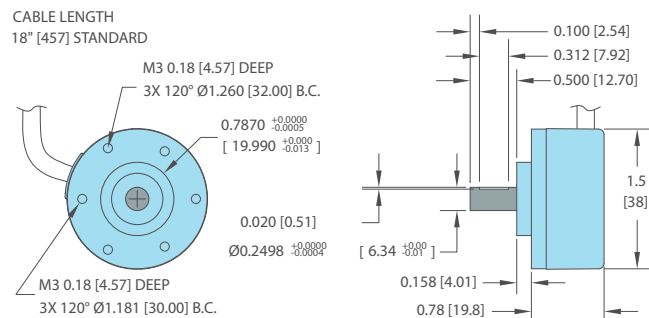
### MODEL 15S SERVO MOUNT M4



### MODEL 15S SQUARE FLANGE M3



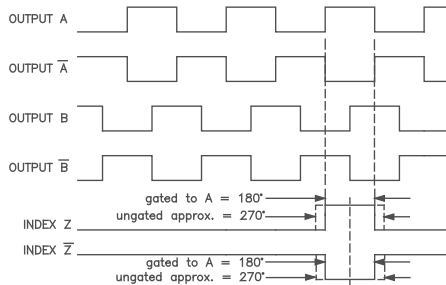
### MODEL 15S SERVO MOUNT M8



All dimensions are in inches with a tolerance of  $\pm 0.005"$  or  $\pm 0.01"$  unless otherwise specified. Metric dimensions are given in brackets [mm].

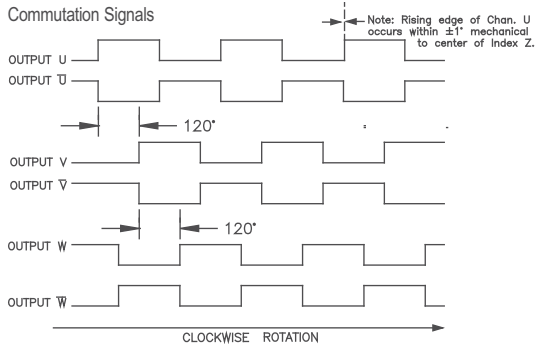
## WAVEFORM DIAGRAMS

### Incremental Signals



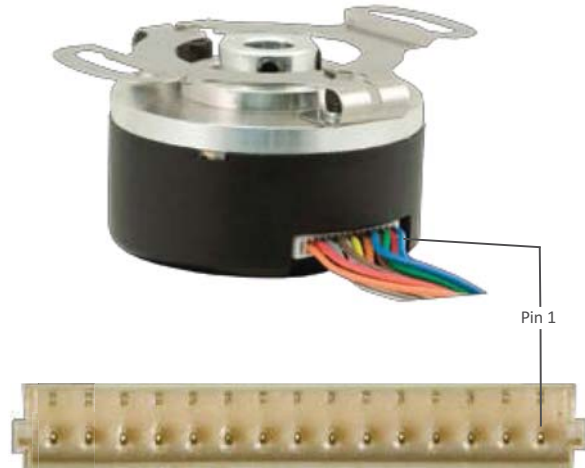
NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.  
 WAVEFORM SHOWN WITH OPTIONAL COMPLEMENTARY  
 SIGNALS  $\bar{A}$ ,  $\bar{B}$ ,  $\bar{Z}$  FOR HV AND OD OUTPUTS ONLY.

### Commutation Signals



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

## 15-PIN HEADER



## WIRING TABLE

Function	Cable† Wire Color	5-pin M12**	8-pin M12**	15-pin Header
Com	Black	3	7	1
+VDC	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'	Tan	--	--	13
W	Red/Green	--	--	12
W'	Red/Yellow	--	--	11
Shield	Bare*	--	--	--

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

\*\*Non-CE Option: Cable shield is connected to M12 connector body. CE Option: Cable shield and M12 connector body is connected to internal case.

†Standard cable for non-commutated models is 24 AWG. For commutated units, conductors are 28 AWG.