# MODEL 121– THRU–BORE MODULAR ENCODER

Ø2.1"
Patent #6,608,300B2

## FEATURES

**Simple, Hassle Free Mounting**
**Accepts Larger Shafts up to 5/8" (or 15 mm)**
**Up to 12 Pole Commutation Available**
**0° to 100° C Operating Temperature Available**
**Patented Design**
**Includes IP50 Dust Seal Kit**

EPC has taken the performance of modular encoders to a new level with the Model 121 Auto-Aligning Modular Encoder. This new and innovative design requires no calibration, gapping or special tools for hassle-free installation. The Model 121 incorporates the latest Opto-ASIC technology for 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, Specialty 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.

| 121 | – | N | – | A | – | 5 | – | 01 | – | S | – | 0256 | – | Q | – | OC | – | 1 | – | S | – | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**MODEL**
**121** Auto-Aligning Modular Thru-Bore

**COMMUTATION**[1]
**N** No Commutation
**C4** 4 Pole
**C6** 6 Pole
**C8** 8 Pole
**C12** 12 Pole

**MOUNTING & HOUSING STYLE**
**A** Mounting Style A

**INPUT VOLTAGE**
**5** 5 VDC

**BORE SIZE**[2]
**01** 1/4", 0.250"
**03** 5/16", 0.3125"
**02** 3/8", 0.375"
**10** 1/2", 0.500"
**11** 5/8", 0.625"
**06** 5 mm
**04** 6 mm
**14** 8 mm
**05** 10 mm
**12** 12 mm
**13** 14 mm
**15** 15 mm

**OPERATING TEMPERATURE**
**S** 0° to 70° C
**H** 0° to 100° C

**CYCLES PER REVOLUTION**
See *CPR Options* below
Price adder >1999

**NUMBER OF CHANNELS**[3]
***Channel A Leads B***
Q Quadrature A & B
**R** Quadrature A & B with Index
***Channel B Leads A***
**K** Reverse Quadrature A & B
**D** Reverse Quadrature A & B with Index
See http://www.encoder.com/literature/index-phasing.pdf for additional options, and waveforms.

**OUTPUT TYPE**
**OC** Open Collector
**PP** Push-Pull
**HV** Line Driver

**MAXIMUM FREQUENCY**
**1** 100 kHz
**2** 200 kHz
**3** 300 kHz[4]

**CONNECTOR TYPE**
**S** 18" Cable[5]

**CERTIFICATION**
**N** None
**CE** CE Marked[6]

### MODEL 121 CPR OPTIONS

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

*Contact Customer service for application analysis.

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:**

1. Not available in all configurations. Contact Customer Service for availability.
2. Contact Customer Service for additional options not shown.
3. Contact Customer Service for non-standard index gating options.
4. Standard 0° to 70° C operating temperature only.
5. For Non-Standard Cable Lengths add a forward slash (/) plus cable length expressed in feet. Example: S/6 = 6 feet of cable.
6. Please refer to Technical Bulletin ***TB100: When to Choose the CE Mark*** at encoder.com.

## MODEL 121 SPECIFICATIONS

### Electrical

Input Voltage..... 5 VDC +10% Fixed Voltage
Input Current..... 130 mA max (< 100 mA typical) with no output loadwith 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.
Max Frequency ..... 100 kHz standard, 200 kHz, and 300 kHz optional
Electrical Protection .. Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.
Quadrature Edge Separation..... 67.5° electrical or better is typical, 54° electrical minimum at temperatures > 99° C
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

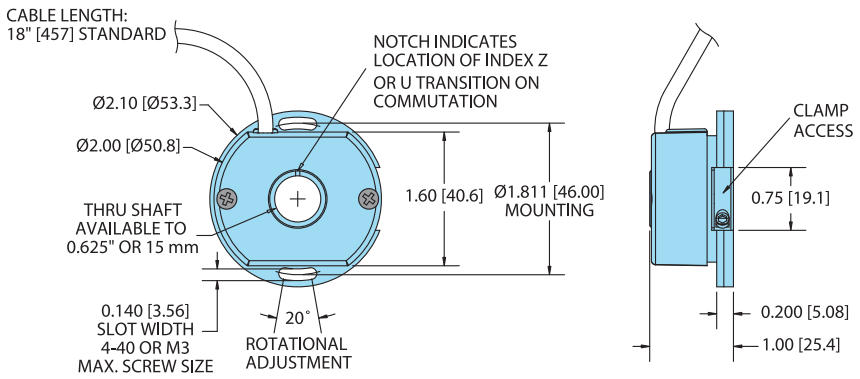
### Mechanical

Max. Shaft Speed..... Determined by maximum frequency response
Bore Tolerance..... +0.0007" (max) -0.0000" (Based on H7 bore fit for g6 shaft Class LC5 per ANSI B-4.1 standard)
User Shaft Tolerance
Radial Runout ..... 0.002" max
Axial End Play..... ±0.015" for CPR <= 512
±0.010" for CPR 513 to 1250
±0.005" for CPR > 1250
Moment of Inertia ... 2.5 x $10^{-4}$ oz-in-sec$^2$
Max. Acceleration ... 5 x $10^5$ rad/sec$^2$
Housing ..... All Metal Aluminum and Zinc Alloy
Weight..... 4 oz typical

### Environmental

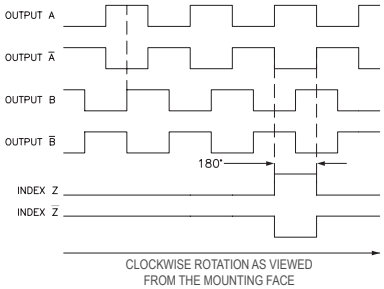
Storage Temp ..... -25° to 100° C
Humidity..... 98% RH non-condensing
Vibration..... 10 g @ 58 to 500 Hz
Shock..... 50 g @ 11 ms duration

## MODEL 121 AUTO-ALIGNING MODULAR (A)

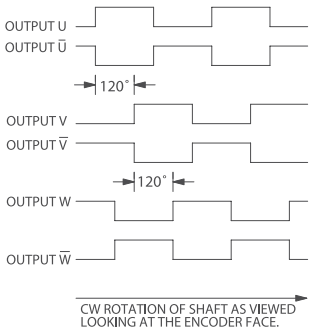



All dimensions are in inches with a tolerance of +0.005" or +0.01" unless otherwise specified.
Metric dimensions are given in brackets [mm].

## WAVEFORM DIAGRAMS




NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES. WAVEFORM SHOWN WITH OPTIONAL COMPLEMENTARY SIGNALS Ā, B̄, Z̄ FOR HV OUTPUT ONLY.

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## WIRING TABLE

For EPC-supplied mating cables, refer to wiring table provided with cable.
Trim back and insulate unused wires.

| Function | Flying Leads Cable† Wire Color |
|---|---|
| Com | Black |
| +VDC | White |
| A | Brown |
| A' | Yellow |
| B | Red |
| B' | Green |
| Z | Orange |
| Z' | Blue |
| U | Violet |
| U' | Gray |
| V | Pink |
| V' | Tan |
| W | Red/Green |
| W' | Red/Yellow |
| Shield | Bare* |

*CE Option: Cable shield (bare wire) is connected to internal case.
†Standard cable for non-commutated models is 24 AWG For commutated units, conductors are 28 AWG.