SHAFT ENCODER

MODEL 702 ORDERING GUIDE

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

<table>
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<tr>
<th>MODEL 702 Size 20 (2&quot;)</th>
<th>OPERATION TEMPERATURE</th>
<th>CYCLES PER REVOLUTION</th>
<th>NUMBER OF CHANNELS</th>
<th>MOUNTING</th>
<th>SEALING</th>
<th>CONNECTOR</th>
<th>MATING CONNECTOR</th>
<th>CERTIFICATION</th>
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<td>PER REVOLUTION</td>
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**FEATURES**

Standard Size 20 Package (2x2)
Flange and Servo Mounting
Up to 30,000 CPR

80 lb Maximum Axial and Radial Shaft Loading
IP67 Sealing Available

The Model 702 Size 20 Accu-Coder™ is a heavy duty, extremely rugged, reliable, yet compact industry standard 2" diameter encoder, designed for harsh factory and plant floor environments. The double shielded ball bearings are rated at 80 lb 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 CPR OPTIONS**

- **SHAFT SIZE**
  - 07: 1/4", 0.250”
  - 20: 3/8", 0.375”
  - 21: 10 mm
  - 30: 3/8", 0.375”
  - 24: 1/4", 0.250” No Flat

- **OUTPUT TYPE**
  - 5 - 28V In/Out
  - OC Open Collector
  - PU Pull-Up Resistor
  - PP Push-Pull
  - HV Line Driver
  - 8 - 28V In/5V Out
  - H5 Line Driver
  - P5 Push-Pull

- **NUMBER OF CHANNELS**
  - Channel A
  - Channel A Leads B
  - Quadrature A & B
  - Quadrature A & B with Index
  - Channel B Leads A
  - Reverse Quadrature A & B
  - Reverse Quadrature A & B with Index

- **MAXIMUM FREQUENCY**
  - 1 kHz (Standard)
  - 200 kHz ≤ 3000 CPR
  - 250 kHz, > 3000 CPR
  - 300 kHz, > 6000 CPR
  - 1 MHz, > 10,000 CPR

- **CONNECTOR SIZE**
  - 5-pin M12 (12 mm)
  - 8-pin M12 (12 mm)
  - 10-pin M12 (12 mm)
  - 9-pin mini DIN
  - 5-pin M12 (12 mm)
  - 6-pin MS
  - 9-pin D-subminiature
  - 10-pin M12 (12 mm) Standard Wiring
  - 8-pin M12 (12 mm) Optional Wiring
  - 10-pin Bayonet

- **CONNECTOR TYPE**
  - W 6-pin MS
  - Y 7-pin MS
  - X 10-pin MS
  - H 10-pin Bayonet

- **CABLE LENGTHS**
  - 0 to 85° C maximum for these CPR options.
  - New CPR values are periodically added to those listed. Contact Encoder Customer Service to determine if encoder supports available CPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

- **NOTES**
  - 1 Contact Customer Service for additional options.
  - 2 Shaft with Size 25 Mounting Adapter. J or K mounting only.
  - 3 Low temperature option not available with resolutions of 3000 CPR or higher.
  - 4 0° to 95° C or 0° to 100° C for certain resolutions, see CPR Options.
  - 5 Contact Customer Service for non-standard index gating options.
  - 6 24 VDC max for high temperature options.
  - 7 Line Driver not available with 5-pin M12 or 6-pin MS connector. Available with 7-pin MS connector only without Index Z.
  - 8 Standard temperature, 60 to 3000 CPR only. Not available with 2540 CPR.
  - 9 H5 and P5 outputs are not available with CE option, or any End Mount MS Connector.
  - 11 For mating connectors, cables, and cordsets see Accessories at encoder.com.
  - 11a For Connector Pin Configuration Diagrams, see Technical Information or see Connector Pin Configuration Diagrams at encoder.com.
  - 11b For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet.
  - Example: G/6 = 6 feet of cable.
  - 12 Please refer to Technical Bulletin TB100: When to Choose the CE Mark at encoder.com.
MODEL 702 SPECIFICATIONS

**Electrical**

- **Input Voltage**........... 4.75 to 28 VDC max for temperatures up to 70° C
- **Input Current**............ 100 mA max for temperatures between 70° C and 100° C
- **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.
- **Output Types**............. Open Collector – 100 mA max per channel
- **Line Driver**.............. 20 mA max per channel
- **Max Frequency**........... Up to 1 MHz
- **Electrical Protection**.... Reverse voltage and output short circuit protected.
- **Noise Immunity**.......... Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50081-2; BS EN55022 (with European compliance option); BS EN61000-4-4; DDENV 50141; BS EN61000-6-2; BS EN50081-2
- **Symmetry**................. 1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output
- **Quad Phasing**............. 1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output
- **Min Edge Sep**............. 1 to 6000 CPR: 67.5° electrical at 100 kHz output
- **Rise Time**................. Less than 1 microsecond
- **Accuracy**................. Instrument and Quadrature Error: For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.02° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units >3000 CPR) is 90° gated to Outputs A and B. See Waveform Diagrams.

**Mechanical**

- **Max Shaft Speed**........ 8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
- **Shaft Rotation**.......... Bi-directional
- **Radial Shaft Load**...... 80 lb max. Rated load of 20 to 40 lb for bearing life of 1.5 x 10⁶ revolutions
- **Axial Shaft Load**........ 80 lb max. Rated load of 20 to 40 lb for bearing life of 1.5 x 10⁶ revolutions
- **Starting Torque**........ 1.0 oz-in typical with IP64 seal or no seal
- **Moment of Inertia**........ 5.2 x 10⁻⁴ oz-in·sec²
- **Housing**.................. Black non-corrosive finish
- **Bearings**.................. Precision ABEC ball bearings
- **Weight**.................... 11 oz typical

**Environmental**

- **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 (G, T, D, R)
- **OPTIONAL PILOT FOR FLANGE AND SERVO MOUNTS** (L, U, E, Q)

*All dimensions are in inches with a tolerance of ±0.005” or ±0.01” unless otherwise specified.*
**MODEL 702 - INCREMENTAL SHAFT ENCODER**

**MODEL 702 2.0" FLANGE MOUNT (F)**

**MODEL 702 WITH 2.5" FLANGE MOUNT (K)**

**MODEL 702 WITH 2.5" SERVO MOUNT (J)**

All dimensions are in inches with a tolerance of ±0.005" or ±0.01" unless otherwise specified.

**WAVEFORM DIAGRAMS**

**Line Driver and Push-Pull**

OUTPUT A

OUTPUT A

OUTPUT B

OUTPUT B

INDEX Z

INDEX Z

CLOCKWISE ROTATION AS VIEWED FROM THE MOUNTING FACE

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES. WAVEFORM SHOWN WITH OPTIONAL COMPLEMENTARY SIGNALS X, E, T FOR HV AND H5 OUTPUTS ONLY.

**Open Collector and Pull-Up**

OUTPUT A

OUTPUT B

INDEX Z

INDEX Z

180° MINIMUM

CLOCKWISE ROTATION AS VIEWED FROM THE MOUNTING FACE

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

**WIRING TABLE**

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Gland Cable† Wire Color</th>
<th>5-pin M12** Standard Wiring</th>
<th>8-pin M12** Optional Wiring</th>
<th>10-Pin MS</th>
<th>7-pin MS HV/PS</th>
<th>7-pin MS P/L</th>
<th>P/P</th>
<th>OC/PS</th>
<th>6-pin MS P/L</th>
<th>P/P</th>
<th>OC/PS</th>
<th>9-pin D-sub</th>
<th>10-pin Bayonet</th>
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<tr>
<td>Com</td>
<td>Black</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>F</td>
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<td>9</td>
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<td>2</td>
<td>D</td>
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<td>D</td>
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<td>D</td>
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<tr>
<td>A'</td>
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<td>3</td>
<td>4</td>
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<td>C</td>
<td>–</td>
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†CE Option: Cable shield (bare wire) is connected to internal case.
†Standard cable is 24 AWG conductors with foil and braid shield.
**CE option: Use cable cordset with shield connected to M12 connector coupling nut.