MODEL 15S - INCREMENTAL SHAFT ENCODER

FEATURES
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, and 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.

SHFT SIZE
21 3/16", 0.1875”
23 4 mm
19 1/4", 0.250”
20 6 mm

MOUNTING
M1 3 hole 28 mm BC Servo Mount
M2 3 hole 1.21” BC Servo Mount
M3 2.06” Square Flange
M4 2.06” Servo Mount
M5 4 hole 1.10” Servo Mount
M6 4 hole 1.00” Servo Mount
M7 4 hole 1.181” Servo Mount
M8 3 hole 1.181/1.260” Servo Mount
M9 3 hole 1.210” BC Servo Mount

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.
3 Contact Customer Service for non-standard index gating or phase relationship options, or see Quadrature Phasing and Index Gating Options at encoder.com.
4 Reverse Quadrature not available with PU output type.
5 With Input Voltage above 16 VDC, operating temperature is limited to 85°C.
6 For mating connectors, cables, and cordsets see Accessories at encoder.com. For Connector Pin Configuration Diagrams, see Technical Information or see Connector Pin Configuration Diagrams at encoder.com.
7 For non-standard English cable lengths enter ‘F’ plus cable length expressed in feet. Example: F06 = 6 feet of cable. For non-standard metric cable lengths enter ‘M’ plus cable length expressed in meters. Example: M06 = 6 meters of cable. Frequency above 300 kHz standard cable lengths only.
8 Not available with commutation. 5-pin not available with Line Driver (HV, OD, LO) outputs. Additional cable lengths available. Please contact Customer Service.
9 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.
10 Only available with 5 VDC Input Voltage.
11 Please refer to Technical Bulletin TB100: When to Choose the CE Mark at encoder.com.

Example: M06 = 6 meters of cable. Frequency above 300 kHz standard cable lengths only.

Example: F06 = 6 feet of cable. For non-standard metric cable lengths enter ‘M’ plus cable length expressed in meters. Example: M06 = 6 meters of cable. Frequency above 300 kHz standard cable lengths only.

Model 15S — Shaft Mount

15S — 19
M1 — 0500
N — 5
A — OC
F00

Shaft Mount

Cycles Per Revolution
See CPR Options below
Input Voltage
5 V DC

Commuation
N No Commutation
A 4 Pole
B 6 Pole
C 8 Pole
E 10 Pole
D 12 Pole

Number of Channels
A Channel A
B Channel B Leads A
Q Quadrature A & B
R Quadrature A & B with Index
L Leads A4
K Reverse Quadrature A & B
D Reverse Quadrature A & B with Index

Connector Type
F00 18” Cable
F01 12” Cable
F02 24” Cable
F03 36” Cable
M002M Cable
J00 18” Cable with 5-pin M12
K00 18” Cable with 8-pin M12
A00 15-pin Header with 18” Cable

Operating Temperature
T1 -40° to 85° C
T2 -20° to 100° C
T3 -20° to 120° C
T7 -40° to 120° C

Output Type
OC Open Collector
PP Push-Pull
HV Line Driver
PU Pull-Up Resistor
OD Open Collector with Differential Outputs

Maximum Frequency
Standard
Extended
See Specifications
### MODEL 15S SPECIFICATIONS

**Electrical**

- **Input Voltage:** 5 VDC ±10% Fixed Voltage
  
  - 4.75 to 28 VDC max for temperatures up to 85°C
  
  - 4.75 to 24 VDC for temperatures between 85°C to 100°C

- **Input Current:** 140 mA max (65 mA typical for most configurations) 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.

- **Output Types:**
  
  - Open Collector – 20 mA max per channel
  
  - Push-Pull – 20 mA max per channel

- **Index:** Once per revolution.

- **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):** 300 kHz for CPR 2000, 2048, 2500, and 2540.

- **Electrical Protection:** Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.

- **Noise Immunity:** Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6; BS EN50081-1

- **Quadrature:** 67.5° electrical or better is typical.

- **Waveform Symmetry:** 180° (±18°) 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.

- **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 x 10^10 revolutions

  - **Axial Shaft Load:** 5 lb max. Rated load of 2 to 3 lb for bearing life of 1.2 x 10^10 revolutions

  - **Starting Torque:** IP50- 0.05 oz-in

  - **IP64- 0.4 oz-in

  - **Moment of Inertia:** 6.7 x 10^-5 oz-in-sec^2 (4.8 gm-cm^2)

  - **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

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**MODEL 15S STANDARD SERVO MOUNT M1**

- **CABLE LENGTH:** 18” [457] STANDARD

- **1.437 Ø [Ø36.50] DEEP 1.500 [38] Ø0.2498 [Ø6.34]

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

- **CABLE LENGTH:** 18” [457] STANDARD

- **1.437 Ø [Ø36.50] DEEP 1.500 [38] Ø0.2498 [Ø6.34]

**MODEL 15S SERVO MOUNT M5**

- **CABLE LENGTH:** 18” [457] STANDARD

- **1.437 Ø [Ø36.50] DEEP 1.500 [38] Ø0.2498 [Ø6.34]

**MODEL 15S SERVO MOUNT M6**

- **CABLE LENGTH:** 18” [457] STANDARD

- **1.437 Ø [Ø36.50] DEEP 1.500 [38] Ø0.2498 [Ø6.34]

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

Metric dimensions are given in brackets [mm].

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1-800-366-5412 • www.encoder.com • sales@encoder.com
MODEL 15S SERVO MOUNT M7

CABLE LENGTH
18" [457] STANDARD

M3 0.18 [4.57] DEEP
4X 90° Ø1.181 [30.00] B.C.

0.020 [0.51]
Ø0.2498

0.7870 [19.990]
[ 19.990 0.01]

0.100 [2.54]
0.312 [7.92]
0.500 [12.70]

1.5 [38]

MODEL 15S SERVO MOUNT M4

CABLE LENGTH
18" [457] STANDARD

4-40 UNC-2B 0.187 DEEP
4X Ø1.000 B.C.

0.6875 +0.0000-0.001
[ 17.463 +0.00-0.03]

2.093 [53.16]

Ø0.2498

0.60 [15.2]

0.120 [3.05]
0.100 [2.54]
0.72 [18.3]

1.5 [38]

MODEL 15S SQUARE FLANGE M3

CABLE LENGTH
18" [457] STANDARD

Ø0.125 [3.18] 4X

Ø0.2498

0.6875 [17.463]

0.875 [22.23]
1.750 [44.45]
2.093 [53.16]

1.5 [38]

MODEL 15S SERVO MOUNT M8

CABLE LENGTH
18" [457] STANDARD

M3 0.18 [4.57] DEEP
3X 120° Ø1.260 [32.00] B.C.

0.7870 [19.990]
[ 19.990 0.01]

0.020 [0.51]
Ø0.2498

0.60 [15.2]

0.100 [2.54]
0.312 [7.92]
0.500 [12.70]

1.5 [38]

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

Incremental Signals

Com

+VDC

A

A'

B

B'

Z

Z'

U

U'

V

V'

W

W'

Shield

Gland Cable†

5-pin M12**

8-pin M12**

15-pin Header

Black

White

Brown

Yellow

Red

Green

Orange

Blue

Violet

Gray

Pink

Tan

Red/Green

Red/Yellow

Bare*

1

2

4

3

6

5

7

8

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10

9

14

13

12

11

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NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES.

COMMUTATION SIGNALS

OUTPUT A

OUTPUT B

OUTPUT T

INDEX Z

INDEX Z

OUTPUT U

OUTPUT V

OUTPUT W

OUTPUT W

CLOCKWISE ROTATION AS VIEWED FROM THE MOUNTING FACE.

NOTE: FISING EDGE OF CHN. U OCCURS WITHIN ±1° MECHANICAL TO CENTER OF INDEX Z.

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†</th>
<th>5-pin M12**</th>
<th>8-pin M12**</th>
<th>15-pin Header</th>
</tr>
</thead>
<tbody>
<tr>
<td>Com</td>
<td>Black</td>
<td>3</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>+VDC</td>
<td>White</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>A</td>
<td>Brown</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>A'</td>
<td>Yellow</td>
<td>--</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>Red</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>B'</td>
<td>Green</td>
<td>--</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Z</td>
<td>Orange</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Z'</td>
<td>Blue</td>
<td>--</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>U</td>
<td>Violet</td>
<td>--</td>
<td>--</td>
<td>10</td>
</tr>
<tr>
<td>U'</td>
<td>Gray</td>
<td>--</td>
<td>--</td>
<td>9</td>
</tr>
<tr>
<td>V</td>
<td>Pink</td>
<td>--</td>
<td>--</td>
<td>14</td>
</tr>
<tr>
<td>V'</td>
<td>Tan</td>
<td>--</td>
<td>--</td>
<td>13</td>
</tr>
<tr>
<td>W</td>
<td>Red/Green</td>
<td>--</td>
<td>--</td>
<td>12</td>
</tr>
<tr>
<td>W'</td>
<td>Red/Yellow</td>
<td>--</td>
<td>--</td>
<td>11</td>
</tr>
<tr>
<td>Shield</td>
<td>Bare*</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

†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.

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