The 60HA encoder is designed to fit directly on to motor shafts, or any shaft where position, direction, or velocity information is needed. The advanced electronics provides superior performance and high noise immunity. The encoder features a simple clamp mount for easy mounting over a large range of shaft sizes, whilst the universal anti-rotation flex mount maintains housing stability. Alternatively, if body rotation is required, there is the option of rotatable mounting on a fixed radius instead.

Features:
• Factory Set for Same Day Dispatch (1 to 65,536 Pulses Per Rev)
• 100 Degrees Centegrate capability as standard
• Opto-ASIC Technology
• Any bore - up to 15mm bore (Metric) or (Imperial)
Ordering Code

<table>
<thead>
<tr>
<th>Protection:</th>
<th>Supply Voltage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP65 (higher on request)</td>
<td>5 to 32VDC</td>
</tr>
<tr>
<td>User Shaft Runout (max):</td>
<td>Current Consumption (max):</td>
</tr>
<tr>
<td>Up to 10,000 ppr = +/- 0.1mm (radial) +/- 0.2mm (axial)</td>
<td>40mA - without load</td>
</tr>
<tr>
<td>Above 10,000 ppr = +/- 0.05mm (radial) +/- 0.01mm (axial)</td>
<td>Load Current (max):</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>30mA</td>
</tr>
<tr>
<td>-20 to +100°C</td>
<td>Cable:</td>
</tr>
<tr>
<td>Storage Temperature:</td>
<td>Screened, oil and salt water</td>
</tr>
<tr>
<td>-40 to +100°C</td>
<td>Impulse Frequency (max):</td>
</tr>
<tr>
<td>Maximum Speed:</td>
<td>1 to 10,000 ppr = 600KHz</td>
</tr>
<tr>
<td>9000 RPM</td>
<td>10,000 to 65536 ppr = 800KHz</td>
</tr>
<tr>
<td>Vibration:</td>
<td>Noise Immunity:</td>
</tr>
<tr>
<td>20g @ 10...2000Hz</td>
<td>EN 61000-6-2</td>
</tr>
<tr>
<td>Shock:</td>
<td>EN 61000-6-4</td>
</tr>
<tr>
<td>60g @ 6ms</td>
<td>Shaft Loading:</td>
</tr>
<tr>
<td>Humidity:</td>
<td>Flexible Mounted (supplied)</td>
</tr>
<tr>
<td>90% RH (non-condensing)</td>
<td>Torque @ 20°C:</td>
</tr>
</tbody>
</table>

---

### Basic Series

**60HA** - 600Hz (800Hz for resolutions above 10,000 PPR)

#### Shaft Bore Size

- **Metric Bore Sizes:**
  - Specify two digits in mm e.g., for a 6mm bore, specify **06**
  - 6mm = 6mm bore
- **Imperial Bore Sizes:**
  - Specify separately e.g., 1/2'', 3/8'' etc.
  - **SS** = Special Bore (Specify separately)

#### Protection

- **IP65**

#### Shaft Sealing

- **Sealed Bearing**

#### Output Signals

- **A**
- **B**
- **Z**
- **A**
- **B**
- **Z**

#### Operating Temperature Range

- **D**
- **(-20 to +100°C)**

#### Connection

- **C**
  - 5 Meter Cable
- **S**
  - Special Cable Length

#### Exit

- **R**
  - Radial

#### Pulsed Per Revolution (PPR)

- Any Value Per Revolution between 1 to 65,536

#### Output Circuit

- **U**
  - Universal Line Driver
- **S**
  - Special Cable Length
- **D**
  - 5 to 32V Input with Differential 5 to 32V Outputs for TTL, Push / Pull, NPN, PNP Applications
- **E**
  - RS422 Line Driver
- **F**
  - RS422 / TTL Compatible Outputs

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**TEL:** (UK) +44 (0) 1978 664722

**FAX:** (UK) +44 1978 664733

**WEB:** www.industrialencodersdirect.co.uk

**EMAIL:** sales@industrialencodersdirect.co.uk
The 60AA encoder is designed to be directly interchangeable with industry standard servo-mount style encoders, but with that added advantages of the ability to choose any resolution from 1 pulse to 65,536 pulses per revolution and high temperature capability as standard. The advanced electronics provides superior performance and high noise immunity. Its very slim construction allows it to be mounted virtually anywhere, whilst still maintaining good environmental protection.

<table>
<thead>
<tr>
<th>PIN, 12-pin M23 Connector</th>
<th>Colour of wires</th>
<th>Signal TTL, HTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Brown</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>White</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>Black</td>
<td>B</td>
</tr>
<tr>
<td>8</td>
<td>Pink</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
<td>Z</td>
</tr>
<tr>
<td>3</td>
<td>Lilac</td>
<td>Z</td>
</tr>
<tr>
<td>10</td>
<td>Blue</td>
<td>GND</td>
</tr>
<tr>
<td>12</td>
<td>Red</td>
<td>+Uo</td>
</tr>
<tr>
<td>9</td>
<td>Screen</td>
<td>Screen</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>N. C.</td>
</tr>
<tr>
<td>11</td>
<td>-</td>
<td>N. C.</td>
</tr>
</tbody>
</table>
60AA Series

Solid Shaft Encoder

Ordering Code

60AA - 0 6 - [ ] [ ] [ ] [ ] [ ] - Resolution

Basic Series 60AA
Shaft Size (6mm Diameter x 10mm)
Protection 0 - IP65
Shaft Sealing 0 - Sealed Bearing
Output Signals A - A + B + Z + A' + B' + Z'
Operating Temperature Range D - (-20 to +100°C)

Pulses Per Revolution (PPR)
Any Value Per Revolution between 1 to 65,536

Output Circuit
U - Universal Line Driver
5 to 32V Input with Differential 5 to 32V Outputs for HTL, Push / Pull, NPN, PNP Applications
3 - RS422 Line Driver
5 to 32V Input but with Differential 5V RS422 / TTL Compatible Outputs

Exit R - Radial
Connection C - 6 Meter Cable
P - M23 - 12 pin plug (as shown) fitted to very short cable

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60MA Series

Solid Shaft Encoder

Features
• Factory Set for Same Day Dispatch (1 to 65,536 Pulses Per Rev)
• 100 Degrees Centegrate capability as standard
• Industry Standard Mounting
• IP65 Protection
• Same Day Dispatch

The 60MA encoder is designed to be directly interchangeable with industry standard clamping flange style encoders, but with that added advantages of the ability to choose any resolution from 1 pulse to 65,536 pulses per revolution and high temperature capability as standard. The advanced electronics provides superior performance and high noise immunity. Its very slim construction allows it to be mounted virtually anywhere, whilst still maintaining good environmental protection.

PIN, 12-pin M23 Connector | Colour of wires | Signal TTL, HTL
--- | --- | ---
6 | Brown | A
5 | White | A
1 | Black | B
8 | Pink | B
4 | Yellow | Z
3 | Lilac | Z
10 | Blue | GND
12 | Red | +Uo
9 | Screen | Screen
2 | – | N. C.
11 | – | N. C.

12 pin (M23) Connector Option (below)

Cable Option shown above

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Supply Voltage: 5 to 32VDC
Current Consumption (max): 40mA - without load
Load Current (max): 30mA
Cable: Screened, oil and salt water
Impulse Frequency (max):
1 to 10,000ppr = 600KHz
10,000 to 65536ppr = 820KHz
Noise Immunity:
EN 61000-6-2
EN 61000-6-4
Torque @ 20°C:
0.5Ncm (Start)
0.3Nm

Protection:
IP65 (higher on request)
Shaft Loading:
80N (radial) 40N (axial)
Use with suitable flexible coupling
Operating Temperature:
-20 to +100°C
Storage Temperature:
-40 to +100°C
Maximum Speed:
10,000 RPM
Vibration:
20g @ 10...2000Hz
Shock:
60g @ 8ms
Humidity:
90% RH (non-condensing)

Output Signals:
6 - 600kHz
(600kHz for resolutions above 10,000 PPR)

Output Signals
8 - A + B + Z + A/ + B/ + Z/

Operating Temperature Range
D - (-20 to +100°C)

Connection
C - M23 - 12 pin plug (as shown) fitted to very short cable

Exit
R - Radial

Output Circuit
U - Universal Line Driver
5 to 33V Input with Differential 5 to 33V Outputs for HTL, Push / Pull, NPN, PNP Applications
3 - RS422 Line Driver
5 to 33V Input but with Differential 5V RS422 / TTL Compatible Outputs

Pulses Per Revolution (PPR)
Any Value Per Revolution between 1 to 65,536

Ordering Code
60MA - 1 0 - Resolution

Basic Series 60MA
Shaft Size
(10mm Diameter x 19mm)
Protection
0 - IP65
Shaft Sealing
0 - Sealed Bearing
Output Signals
8 - A + B + Z + A/ + B/ + Z/
Operating Temperature Range
D - (-20 to +100°C)

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