

# HEDR-5xxx High Resolution Series

## Three Channel Quick Assembly Encoders



## Data Sheet



### Description

The Avago HEDR-5xxx series encoders are higher resolution replacements for our existing low cost HEDS-5xxx series three channel optical encoders. These upgraded encoders now come with resolution of 1200 cycles per revolution (CPR) to 3600 CPR and are designed for easy assembly. The base-plate and outer diameter of these encoders are also compatible with the legacy HEDS-5xxx series, making them ideal replacements for users who wish to upgrade due to higher CPR requirements.

Each encoder contains a codewheel, LED source, detector and integrated circuitry. As the codewheel rotates, the detector IC generates two square waves in quadrature and an index pulse (high state) of 90° (gated to signal A and B low), once per each full rotation of the codewheel.

The HEDR-5xxx encoders accommodate shaft diameters of 2 mm to 8 mm and can operate in high temperature environments of up to 100 °C.

### Features

- Three channel encoder A,B and I
- Available with ribbon cabling
- Single 5 V supply
- Resolution of 1200 to 3600 CPR
- Available in TTL compatible and line driver options
- Quick assembly
- IP40 rating
- No signal adjustment required
- Compact size: 35 mm (L) × 30 mm (W) × 20 mm (H)
- -40 °C to 100 °C or -20 °C to 85 °C operating temperature option

### Applications

High volume applications such as industrial printers, plotters, tape drives, positioning tables, and automatic handlers

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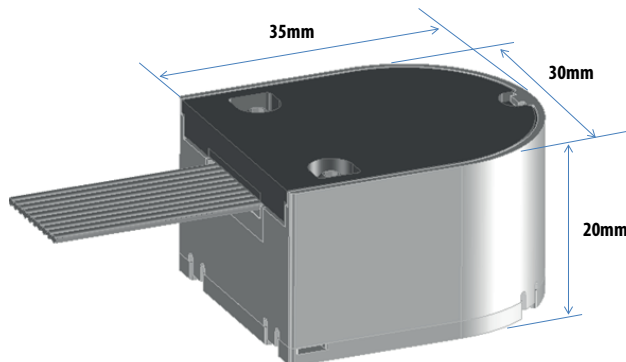
Note: Avago Technologies encoders are not recommended for use in safety critical applications, e.g., ABS braking systems, power steering, life support systems and critical care medical equipment. Avago's products and software are not specifically designed, manufactured or authorized for sale as parts, components or assemblies for the planning, construction, maintenance or direct operation of a nuclear facility or for use in medical devices or applications. Customers are solely responsible, and waive all rights to make claims against Avago or its suppliers, for all losses, damage, expense or liability in connection with such use. Please contact your local sales representative if clarification is needed.

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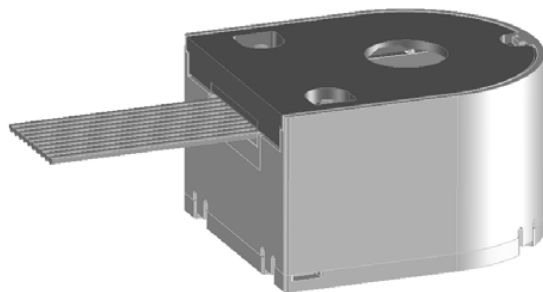
## Package Dimensions

HEDR-5xxx Extension series are available with ribbon cabling:

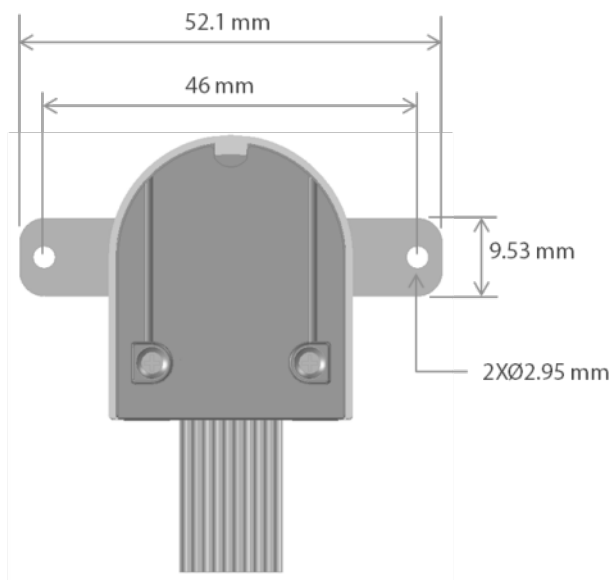
### Ribbon Cable



**Standard**

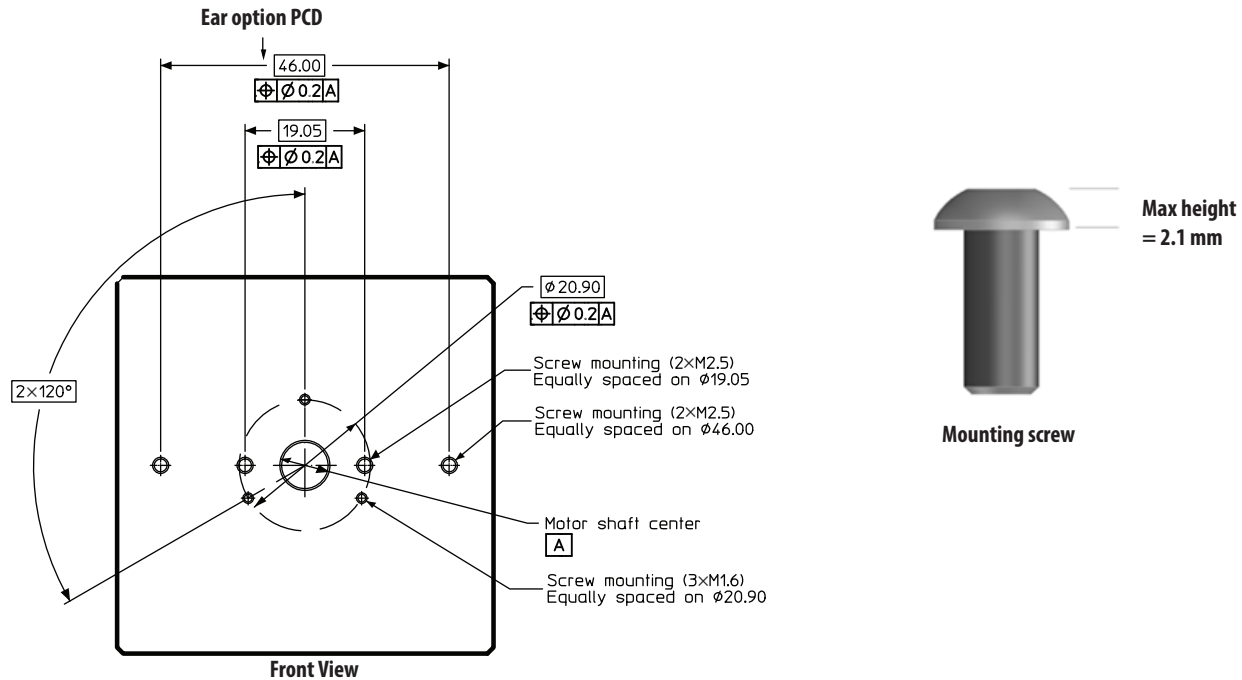


**Through hole**



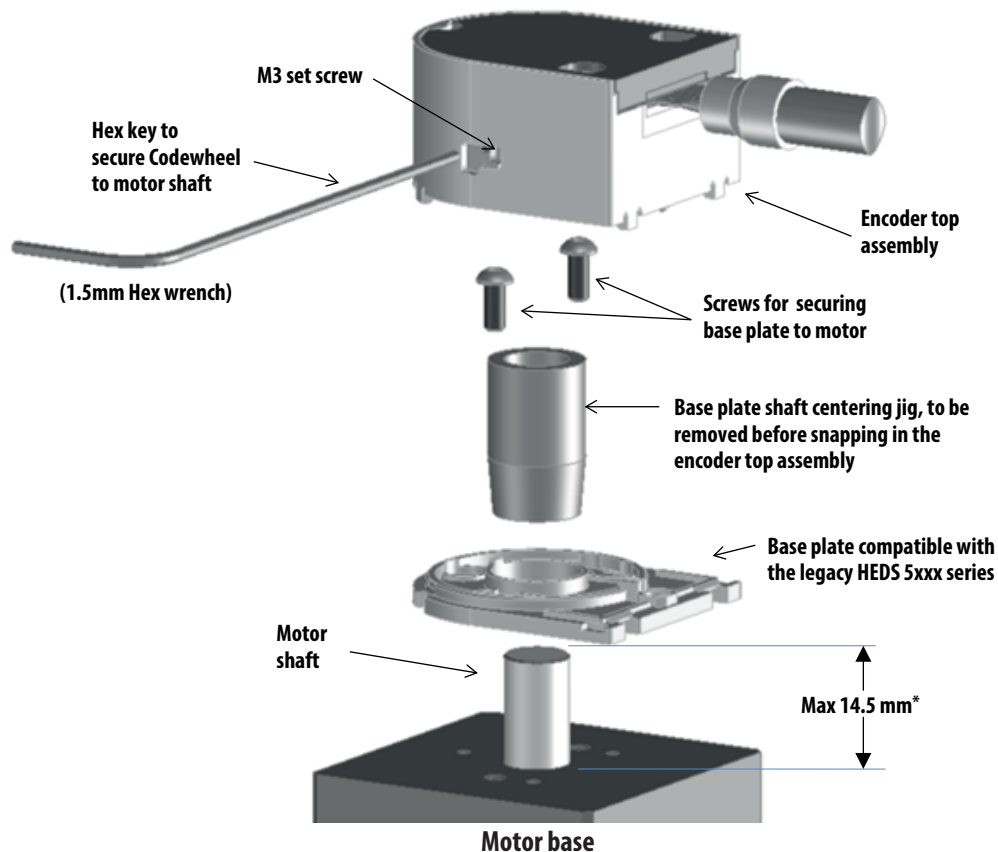
**With external ear option**

## Mounting Considerations



## Recommended motor's mounting dimension

## Easy mounting and installation



\* - Not applicable for 2048 cpr option. For 2048 cpr option, the recommend range is 11.5 to 13.5 mm.

It is recommended that adhesives (Heron - Tuffbond™ 317) be applied to the screw-base plate interface to prevent screw loosening due to CTE effect between screw and plastic at operating temperature..

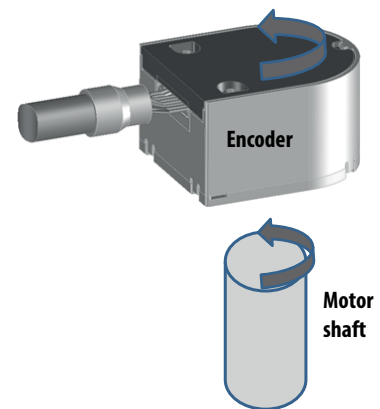
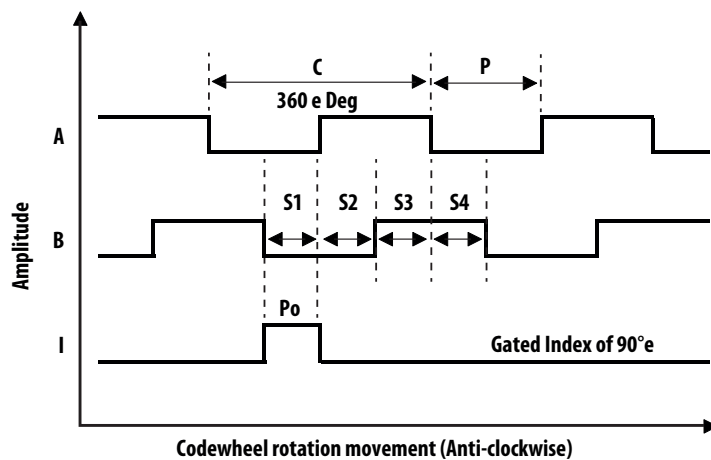
## Absolute Maximum Rating

| Parameter                             | Value                   | Units | Notes                                             |
|---------------------------------------|-------------------------|-------|---------------------------------------------------|
| Storage Temperature, $T_S$            | -40 to 100<br>-20 to 85 | °C    | High temperature option<br>Low temperature option |
| Operating Temperature, $T_A$          | -40 to 100<br>-20 to 85 | °C    | High temperature option<br>Low temperature option |
| Supply Voltage, $V_{CC}$              | -0.5 to 7               | V     |                                                   |
| Output Current per Channel, $I_{OUT}$ |                         |       |                                                   |
| Voltage                               | 5                       | mA    |                                                   |
| Line Driver                           | 20                      | mA    |                                                   |
| Vibration                             | 10G, 55 to 1000         | Hz    |                                                   |
| Shaft Axial Play                      | $\pm 0.175$             | mm    |                                                   |
| Shaft TIR (max.)                      | 0.05                    | mm    |                                                   |

## Output waveform

**Direction of Rotation:** When the encoder rotates in the counter-clockwise direction (as viewed from the top of the encoder), channel A will lead channel B. If it rotates in the clockwise direction, channel B will lead channel A.

**Index Pulse Width ( $P_0$ ):** The number of electrical degrees that an index output is high during one full shaft rotation. This value is nominally 90°e (1/4 cycle) gated to signals A and B, both at low state.



## Recommended Operating Conditions

| Parameter                      | Symbol   | Min.       | Typ. | Max.               | Units | Notes                                             |
|--------------------------------|----------|------------|------|--------------------|-------|---------------------------------------------------|
| Temperature                    | $T_A$    | -40<br>-20 |      | 100<br>85          | °C    | High temperature option<br>Low temperature option |
| Supply Voltage                 | $V_{CC}$ | 4.5        | 5.0  | 5.5                | V     | Ripple < 100 mV <sub>p-p</sub>                    |
| Current Consumption            |          |            | 38   |                    | mA    | No load                                           |
| Count Frequency <sup>[1]</sup> | $f$      |            |      | 320 <sup>[2]</sup> | kHz   | Velocity (rpm) x N/60                             |

Notes:

1. Applicable for line driver output.
2. Valid for 2400 CPR and above.

## Encoding Characteristics

Encoding characteristics over recommended operating range and recommended mounting tolerances, unless otherwise specified.

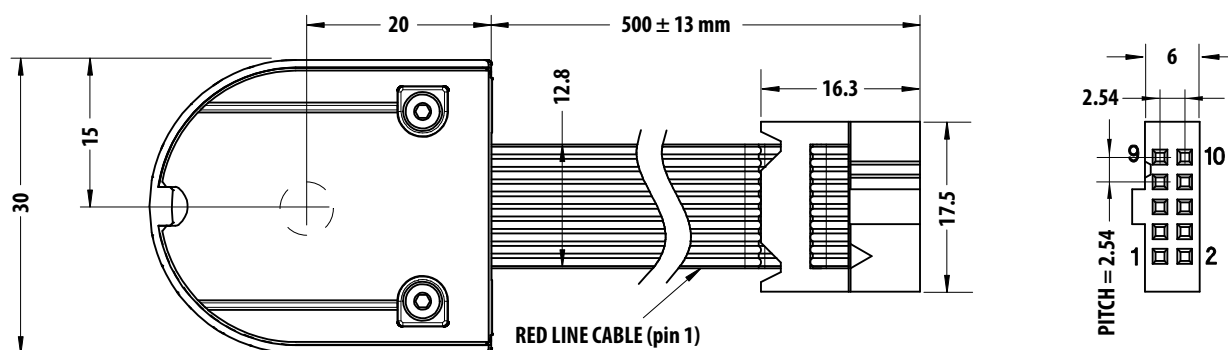
| Part No.                     | Description       | Symbol         | Typ.   | Max.        | Notes |
|------------------------------|-------------------|----------------|--------|-------------|-------|
| HEDR-5xxx<br>(Three Channel) | Pulse Width       | P              |        | $P \pm P/4$ |       |
|                              | Logic State Width | S              |        | $S \pm S/2$ |       |
|                              | Index Pulse Width | P <sub>o</sub> | 90°    |             |       |
| Voltage Output               |                   |                |        |             |       |
| Rise time                    |                   | t <sub>r</sub> |        | 1 μs        |       |
| Fall time                    |                   | t <sub>f</sub> |        |             |       |
| Line Driver                  |                   |                |        |             |       |
| Rise time                    |                   | t <sub>r</sub> | 200 ns |             |       |
| Fall time                    |                   | t <sub>f</sub> |        |             |       |

## Mechanical Characteristics

| Parameter                   | Symbol | Dimension                     | Tolerance | Units |
|-----------------------------|--------|-------------------------------|-----------|-------|
| Blind Hollow Shaft diameter |        | Refer to ordering information | g6        | mm    |
| Shaft Length                |        | 11.5 to 14.5*                 |           | mm    |
| Height                      |        | 20                            | ± 0.5     | mm    |
| Width                       |        | 30                            | ± 0.5     | mm    |
| Length                      |        | 35                            | ± 0.5     | mm    |
| Hub Set Screw               |        | M3                            |           |       |

\* - Not applicable for 2048 cpr option. For 2048 cpr option, the recommend range is 11.5 to 13.5 mm.

## Ribbon cable



### Line Driver option

| Pin No. | Pin Assignment |
|---------|----------------|
| 1       | NC             |
| 2       | VCC            |
| 3       | GND            |
| 4       | NC             |
| 5       | A -            |
| 6       | A +            |
| 7       | B -            |
| 8       | B +            |
| 9       | I -            |
| 10      | I +            |

### Single-ended option

| Pin No. | Pin Assignment |
|---------|----------------|
| 1       | NC             |
| 2       | VCC            |
| 3       | GND            |
| 4       | NC             |
| 5       | NC             |
| 6       | A +            |
| 7       | NC             |
| 8       | B +            |
| 9       | NC             |
| 10      | I +            |

## Ordering Information

Available options for HEDR-5xxx-xxxx

| HEDR-5 | x                              | x                 | x                        | — | xx        | x                                                   | x              |
|--------|--------------------------------|-------------------|--------------------------|---|-----------|-----------------------------------------------------|----------------|
|        |                                |                   |                          |   |           |                                                     |                |
|        | Mounting Type                  | Output Type       | Output Wire Cabling Type |   | CPR       | Temperature Rating/ Index Gating                    | Shaft Diameter |
|        | 5 – Standard                   | E – Voltage (TTL) | 2 – Ribbon               |   | B2 – 1200 | 0 – High / 90°                                      | 0 – 2 mm       |
|        | 6 – External Ears              | L – Line Driver   |                          |   | B4 – 1250 | 1 – High / 180°                                     | 1 – 3 mm       |
|        | 7 – Standard Through Hole      |                   |                          |   | B8 – 1500 | L – Std / 90°                                       | 3 – 5/32"      |
|        | 8 – External Ears Through Hole |                   |                          |   | BB – 1800 | M – Std / 180°                                      | 4 – 3/16"      |
|        |                                |                   |                          |   | BH – 2048 | Note:<br>High → -40 to 100 °C<br>Std → -20 to 85 °C | 5 – 1/4 "      |
|        |                                |                   |                          |   | BL – 2400 |                                                     | 6 – 4 mm       |
|        |                                |                   |                          |   | BP – 2500 |                                                     | 7 – 5 mm       |
|        |                                |                   |                          |   | BS – 2880 |                                                     | 8 – 6 mm       |
|        |                                |                   |                          |   | BV – 3000 |                                                     | 9 – 8 mm       |
|        |                                |                   |                          |   | BY – 3600 |                                                     |                |

## Currently available options

|     | High temperature |     | Standard temperature |
|-----|------------------|-----|----------------------|
| 1.  | HEDR-55L2-BH07   | 11. | HEDR-55L2-BHL7       |
| 2.  | HEDR-55L2-BH09   | 12. | HEDR-55L2-BHL9       |
| 3.  | HEDR-55L2-BL07   | 13. | HEDR-55L2-BPL7       |
| 4.  | HEDR-55L2-BL09   | 14. | HEDR-55L2-BPL9       |
| 5.  | HEDR-55L2-BV07   | 15. | HEDR-55L2-BYL8       |
| 6.  | HEDR-55L2-BV09   |     |                      |
| 7.  | HEDR-55L2-BY07   |     |                      |
| 8.  | HEDR-55L2-BY09   |     |                      |
| 9.  | HEDR-55L2-BP07   |     |                      |
| 10. | HEDR-55L2-BP09   |     |                      |

Note: For other options, please refer to factory.

For product information and a complete list of distributors, please go to our web site: [www.avagotech.com](http://www.avagotech.com)

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