Hall-effect Rotary Position Sensors
HRS Series
HRS Series Hall-Effect Rotary Position Sensors

The HRS Series uses Hall-effect technology to supply reliable and repeatable angular position information. The use of this magnetically coupled information, in place of a mechanical wiper assembly, provides long life and a cost-effective solution for harsh environments that include temperature, vibration, shock, dither, moisture and dirt.

The HRS Series is packaged in a stainless steel metal housing with a 9.5 mm [0.375 in] diameter unthreaded or threaded bushing and a 6.35 mm [0.25 in] diameter stainless steel shaft. A variety of termination types are available. Mounting hardware is available on some catalog listings.

Key Features and Benefits

- **Solid state Hall-effect technology provides non-contact operation for:**
  - Long service life
  - Low torque actuation
  - Enhanced performance in harsh environments, especially those with vibration, shock and extreme temperatures
  - Reduces mechanical wear concerns

- **10 M cycle product life (typical):** Promotes extended life in the application

- **Choice of termination types:** Contributes to design flexibility in the application

- **Voltage output allows direct connection to the control system:** Can reduce external circuitry and overall system complexity, lowering overall installation cost to the customer

- **Choice of anti-rotation locating pins:** Limits rotation of the device in the application, preventing over-travel on levers and throttles

- **Rotary potentiometer package form factor:** Designed to provide direct replacement for potentiometers, often allowing drop-in conversion to Hall-effect technology

Potential Applications

**TRANSPORTATION**

Position and movement detection in off-road vehicles and construction/agricultural vehicles/equipment:

- Gear shifter, joystick, and throttle position
- Pedal position
- Hitch location
- Bucket/loader position
- Steering position
- Auto-pilot/drive-by-wire system feedback

**INDUSTRIAL**

Position and movement detection in material handling equipment:

- Industrial vehicle attachment position (e. g. forklift truck forks)
- Machine control joystick position
- Robotic arm position
- Valve actuator position
# Hall-Effect Rotary Position Sensors, HRS Series

## Table 1. Electrical Specifications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
<th>HRS100SSAB090</th>
<th>HRS100SSAB180</th>
<th>HRS100SWAB090</th>
<th>HRSRES05A090</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solder Lugs, Unformed</td>
<td>Flying Wire Leads</td>
<td>Solder Lugs, Formed 90° Down</td>
<td></td>
</tr>
<tr>
<td>Electrical angle</td>
<td>90° ±2° CW</td>
<td>180° ±2° CW</td>
<td>90° ±2° CW</td>
<td>90° ±2° CW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCW: 0.150 V min., 0.250 V max.</td>
<td>CCW: 0.050 V min., 0.150 V max.</td>
<td>CCW: 0.150 V min., 0.250 V max.</td>
<td>CCW: 0.245 V min., 0.294 V max.</td>
<td></td>
</tr>
<tr>
<td>Linearity (% of span)</td>
<td>±2% typ.</td>
<td>±4% typ.</td>
<td>±2% typ.</td>
<td>±2% typ.</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>2 mA max.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output type</td>
<td>sink/source</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>18 Vdc. max.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>5 Vdc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply current</td>
<td>5 mA typ.</td>
<td></td>
<td></td>
<td></td>
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</table>

## Table 2. Mechanical Specifications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
<th>HRS100SSAB090</th>
<th>HRS100SSAB180</th>
<th>HRS100SWAB090</th>
<th>HRSRES05A090</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solder Lugs, Unformed</td>
<td>Flying Wire Leads</td>
<td>Solder Lugs, Formed 90° Down</td>
<td></td>
</tr>
<tr>
<td>Mechanical angle of rotation</td>
<td>90° ±2°</td>
<td>180° ±2°</td>
<td>90° ±2°</td>
<td>90° ±2°</td>
<td></td>
</tr>
<tr>
<td>Rotational cycles</td>
<td>10 million typ.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotational torque</td>
<td>0.014 N m [2.0 in-oz] max. at 25 °C [77 °F]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop torque</td>
<td>0.56 N m [5 in-lb] min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push out</td>
<td>89 N m [20 in lb] min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pull out</td>
<td>44 N m [10 in lb] min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaft:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>diameter</td>
<td>6.35 mm [0.25 in]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>material</td>
<td>stainless steel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bushing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>diameter</td>
<td>9.5 mm [0.375 in]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>material</td>
<td>nickel-plated brass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal material:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>solder lug terminals</td>
<td>tin-plated brass, SAC305 solder dip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>flying wire leads</td>
<td>—</td>
<td></td>
<td>XL insulated, 20 AWG stranded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal support material</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mounting hardware material:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mounting nut</td>
<td>nickel-plated brass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lock washer</td>
<td>nickel-plated brass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting hardware material:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

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Table 3. Environmental Specifications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40 °C to 85 °C (-40 °F to 185 °F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>105 °C (221 °F) max.</td>
</tr>
<tr>
<td>Shock</td>
<td>50 g, 11 ms</td>
</tr>
<tr>
<td>Vibration</td>
<td>15 G, 10 Hz to 2000 Hz</td>
</tr>
<tr>
<td>ESD sensitivity</td>
<td>±7 kV max. (human body model)</td>
</tr>
<tr>
<td>EMI</td>
<td>30 V/m, 10 kHz to 1000 MHz at 3 m</td>
</tr>
</tbody>
</table>

Figure 1. General HRS Series Configuration Guide
This figure shows possible HRS Series configurations. Not all combinations may be available, please contact Honeywell. See the Order Guide (Figure 4) for currently available catalog listings.

General HRS Series Terminology

**Product Series**

HRS Series
Hall-Effect Rotary Position Sensors

**Bushing Type**

- Threaded (3/8-32 UNEF-2A)
- Unthreaded (ø9.5 mm [0.375 in])

**Shaft Type**

- Ø6.32 mm [0.25 in]: Flattened
- Round
- Slotted

**Shaft Length**

- 22.23 mm [0.875 in]
- 23.62 mm [0.931 in]
- 24.21 mm [0.953 in]
- 25.40 mm [1.000 in]
- 30.48 mm [1.200 in]
- 32.89 mm [1.295 in]
- 35.10 mm [1.382 in]
- 36.35 mm [1.431 in]

**Mechanical Rotation/Electrical Rotation**

- 80°/80°: CW
- 80°/80°: CCW
- 90°/90°: CW
- 90°/90°: CCW
- Special

**Anti-Rotation (AR) Locating Pin**

- One locating pin: Unformed
- Two locating pins: Formed 90° up

**Termination Type**

- Solder lugs: Unformed
- Formed: 90° Up
- Formed: 90° Down
- Flying wire leads
- Cable and connector (AMP CAP 1-480701-0)

**Mounting Hardware**

- Mounting nut
- Lock washer
- Shaft
- Bushing
- Mounting surface
- Locating pin
- Anti-rotation lug
- Termination
Hall-Effect Rotary Position Sensors, HRS Series

Figure 2. Dimensional Drawings (For reference only: mm [in.])

HRS100SSAB090, HRS100SSAB180: Solder lugs, unformed

HRSRES05A090C: Solder lugs, formed 90° down (formed per detail; unformed dimensions for reference only)

HRS100SWAB09: Flying wire leads
Figure 3. Mounting Hardware

**Mounting Nut**
- 9.5 mm [0.375 in], 3/8-32 UNEF-2A

**Lock Washer**
- 17.8 mm [0.70 in] internal diameter
- 1.59 mm [0.0625 in] thick

Figure 4. Order Guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRS100SSAB090</td>
<td>HRS Series Hall-effect rotary position sensor, slotted shaft, solder lug terminals unformed, 90° electrical angle, unassembled mounting hardware included</td>
</tr>
<tr>
<td>HRS100SSAB180</td>
<td>HRS Series Hall-effect rotary position sensor, slotted shaft, solder lug terminals unformed, 180° electrical angle, unassembled mounting hardware included</td>
</tr>
<tr>
<td>HRS100SWAB090</td>
<td>HRS Series Hall-effect rotary position sensor, slotted shaft, flying wire leads, 90° electrical angle, unassembled mounting hardware included</td>
</tr>
<tr>
<td>HRSRES05A090C</td>
<td>HRS Series Hall-effect rotary position sensor, round shaft, solder lug terminals formed 90° down, 90° electrical angle, mounting hardware not included</td>
</tr>
</tbody>
</table>
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ADDITIONAL INFORMATION

The following associated literature is available at sensing.honeywell.com:
• Product Line Guide
• Product Range Guide
• Installation Instructions

⚠️ WARNING
PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

⚠️ WARNING
MISUSE OF DOCUMENTATION

• The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
• Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective.
The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

While we provide application assistance personally, through our literature and the Honeywell website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

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visit sensing.honeywell.com,
or e-mail inquiries to info.sc@honeywell.com

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