



# Hall-effect Rotary Position Sensors

## HRS Series



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# 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

**Table 1. Electrical Specifications**

| Characteristic         | Parameter   |   |  |   |
|------------------------|---|---|--|---|
|                        | HRS100SSAB090   | HRS100SSAB180   | HRS100SWAB090  | HRSRES05A090  |
|                        | Solder Lugs, Unformed   |   | Flying Wire Leads  | Solder Lugs, Formed 90° Down  |
|                        |  |   |  |  |
| Electrical angle       | 90° ±2° CW  | 180° ±2° CW   | 90° ±2° CW   |   |
| Output voltage         | CW: 4.750 V min.,<br>4.850 V max.<br>CCW: 0.150 V min.,<br>0.250 V max.           | CW: 4.750 V min.,<br>4.850 V max.<br>CCW: 0.050 V min.,<br>0.150 V max. | CW: 4.750 V min.,<br>4.850 V max.<br>CCW: 0.150 V min.,<br>0.250 V max.            | CW: 2.095 V min.,<br>2.205 V max.<br>CCW: 0.245 V min.,<br>0.294 V max.             |
| Linearity (% of span)  | ±2% typ.  | ±4% typ.  | ±2% typ.   |   |
| Output current         | 2 mA max.   |   |  |   |
| Output type            | sink/source   |   |  |   |
| Overvoltage protection | 18 Vdc. max.  |   |  |   |
| Supply voltage         | 5 Vdc   |   |  |   |
| Supply current         | 5 mA typ.   |   |  |   |

**Table 2. Mechanical Specifications**

| Characteristic               | Parameter                                   |               |                               |                                     |
|------------------------------|---|---------------|-------------------------------|-------------------------------------|
|                              | HRS100SSAB090                               | HRS100SSAB180 | HRS100SWAB090                 | HRSRES05A090                        |
| Mechanical angle of rotation | 90° ±2°                                     | 180° ±2°      | 90° ±2°                       |                                     |
| Rotational cycles            | 10 million typ.                             |               |                               |                                     |
| Rotational torque            | 0.014 N m [2.0 in-oz] max. at 25 °C [77 °F] |               |                               |                                     |
| Stop torque                  | 0,56 N m [5 in-lb] min.                     |               |                               |                                     |
| Push out                     | 89 N m [20 in lb] min.                      |               |                               |                                     |
| Pull out                     | 44 N m [10 in lb] min.                      |               |                               |                                     |
| Shaft:                       |   |               |                               |                                     |
| diameter                     | 6,35 mm [0.25 in]                           |               |                               |                                     |
| material                     | stainless steel                             |               |                               |                                     |
| Bushing:                     |   |               |                               |                                     |
| diameter                     | 9,5 mm [0.375 in]                           |               |                               |                                     |
| material                     | nickel-plated brass                         |               |                               |                                     |
| Housing material             | stainless steel                             |               |                               |                                     |
| Terminal material:           |   |               |                               |                                     |
| solder lug terminals         | tin-plated brass, SAC305 solder dip         |               | —                             | tin-plated brass, SAC305 solder dip |
| flying wire leads            | —   |               | XL insulated, 20 AWG stranded | —                                   |
| Terminal support material    | thermoplastic                               |               |                               |                                     |
| Mounting hardware material:  |   |               |                               |                                     |
| mounting nut                 | nickel-plated brass                         |               |                               |                                     |
| lock washer                  | nickel-plated brass                         |               |                               |                                     |

# Hall-Effect Rotary Position Sensors, HRS Series

Table 3. Environmental Specifications

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

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.

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]:  
Flatted

Round

Slotted

Shaft Length

22,23 mm [0.875 in]

23,62 mm [0.930 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  
CCW

90°/90°:  
CW  
CCW  
Special

Anti-Rotation  
(AR)  
Locating Pin

One locating pin:  
Unformed

Formed 90° up

Two locating pins:  
Formed 90° up

Termination Type

Solder lugs:  
Unformed

Formed:  
90° Up

90° Down

Flying wire leads

Cable and connector  
(AMP CAP 1-480701-0)

## General HRS Series Terminology

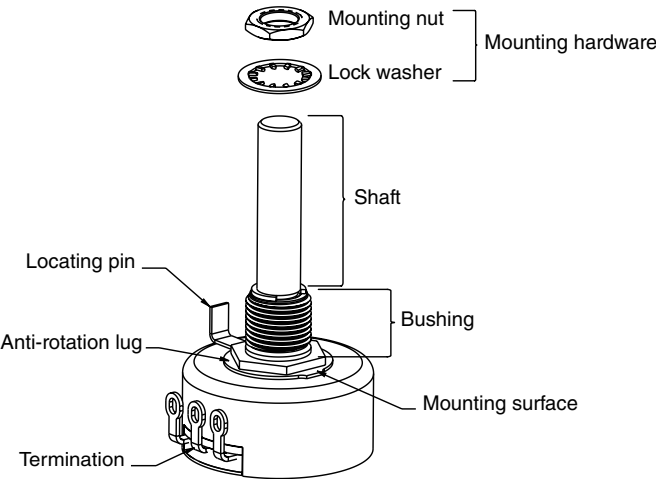
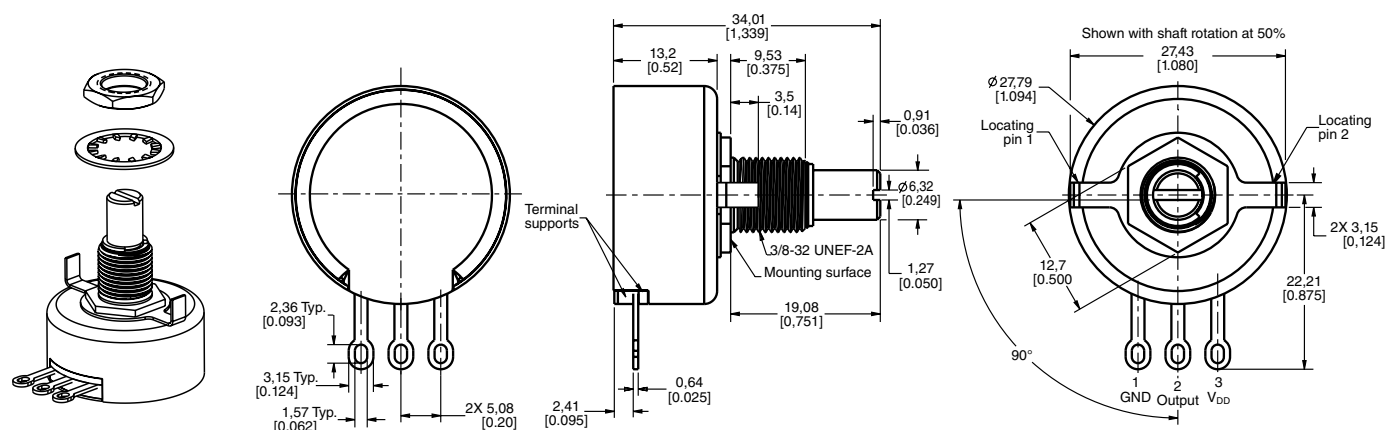
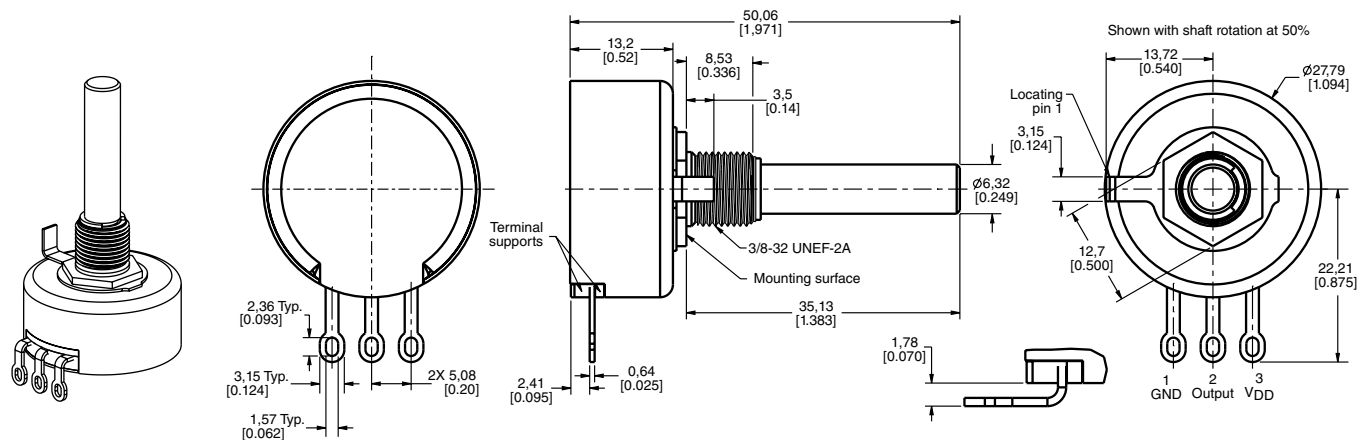


Figure 2. Dimensional Drawings (For reference only: mm [in].)

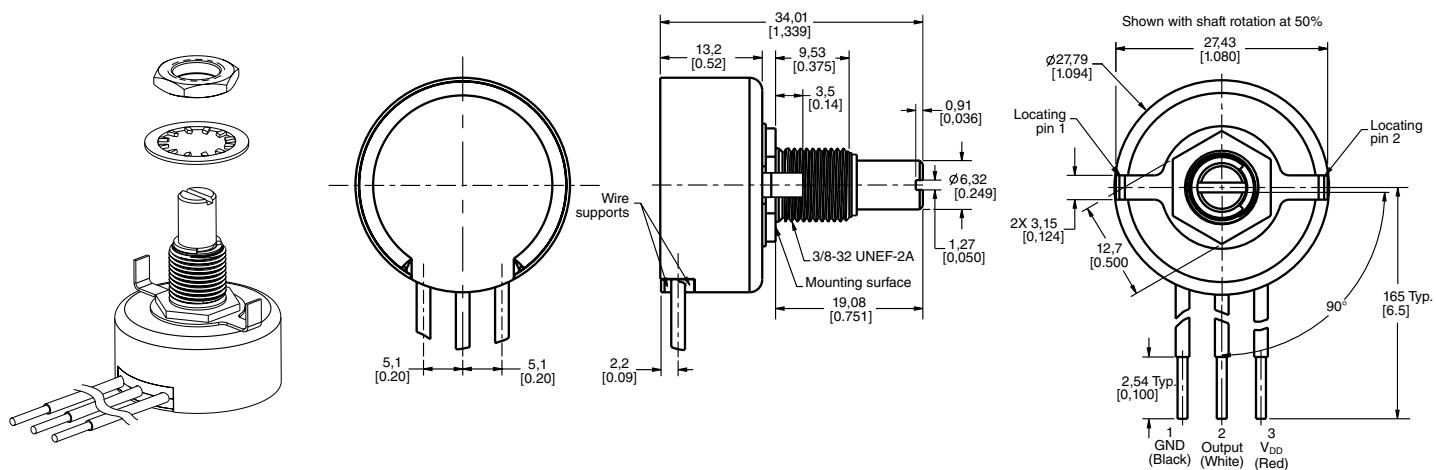
**HRS100SSAB090, HRS100SSAB180: Solder lugs, unformed**



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



**HRS100SWAB09: Flying wire leads**



# Hall-Effect Rotary Position Sensors, HRS Series

Figure 3. Mounting Hardware



|   |  |
|---|--|
| <b>Mounting Nut</b><br>9,5 mm [0.375 in], 3/8-32 UNEF-2A                          | <b>Lock Washer</b><br>17,8 mm [0.70 in] internal diameter<br>1,59 mm [0.0625 in] thick |
|  |     |

Figure 4. Order Guide

| Catalog Listing | Description  |
|-----------------|--|
| HRS100SSAB090   | HRS Series Hall-effect rotary position sensor, slotted shaft, solder lug terminals unformed, 90° electrical angle, unassembled mounting hardware included  |
| HRS100SSAB180   | HRS Series Hall-effect rotary position sensor, slotted shaft, solder lug terminals unformed, 180° electrical angle, unassembled mounting hardware included |
| HRS100SWAB090   | HRS Series Hall-effect rotary position sensor, slotted shaft, flying wire leads, 90° electrical angle, unassembled mounting hardware included              |
| HRSRES05A090C   | HRS Series Hall-effect rotary position sensor, round shaft, solder lug terminals formed 90° down, 90° electrical angle, mounting hardware not included     |

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## **⚠ 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.**

### **ARRANTY/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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