

# Installation Instructions for the RTP Series Hall-effect Rotary Position Sensors

**32307666**  
Issue A

## 1.0 GENERAL INFORMATION

The RTP Series Hall-effect Rotary Position Sensors provide non-contact sensing in harsh transportation and industrial applications at a competitive cost.

These products use a magnetically biased, Hall-effect integrated circuit (IC) to sense rotary movement of the actuator over a set operating range. Rotation of the actuator changes the magnet's position relative to the IC. The resulting flux density change is converted to a linear output.

## 2.0 MOUNTING INFORMATION (see Figures 1 and 2)

### 2.1 Housed magnet actuator

1. Locate the sensor and the magnet in the desired position. Ensure the air gap between the sensor and the magnet will not exceed that noted in Table 2.
2. Clamp the sensor on the customer-provided mounting plate and place the magnet on the customer-provided mounting shaft. Ensure the orientation arrow on the magnet points toward the connector end of the sensor.
3. Apply the supply voltage to the sensor and monitor the output voltage. When the output voltage is at the midpoint as shown in Table 4, tighten the set screws on the magnet. The sensor angle is 0°.
5. If needed for harsh applications, apply a suitable thread locking compound to all screw threads.

### 2.2 Bare magnet actuator

1. Locate the sensor and the magnet in the desired position. Ensure the air gap between sensor and magnet will not exceed that noted in Table 2.
2. Clamp the sensor on the customer-provided mounting plate and place the magnet on the desired actuator. Ensure the orientation hole on the magnet points towards the connector end of the sensor.
3. Apply the supply voltage to the sensor and monitor the output voltage. When the output voltage is at the midpoint as shown in Table 4, mount the magnet. The sensor angle is 0°.
5. If needed for harsh applications, apply a suitable thread locking compound to all screw threads.

**Table 1. Electrical Specifications**

| Characteristic   | LV<br>(Low Voltage)                                   | HV<br>(High Voltage)                                  |
|--|---|---|
| Supply voltage:  | 5 ±0.5 Vdc  | 10 Vdc to 30 Vdc                                      |
| Supply current:<br>normal<br>during output to ground short | 20 mA max.<br>25 mA max.                              | 32 mA max.<br>47 mA max.                              |
| Output:<br>standard  | 0.5 Vdc to 4.5 Vdc<br>ratiometric                     | 0.5 Vdc to 4.5 Vdc<br>non-ratiometric                 |
| inverted   | 4.5 Vdc to 0.5 Vdc<br>ratiometric                     | 4.5 Vdc to 0.5 Vdc<br>non-ratiometric                 |
| Output signal delay  | 4 ms typ.   |   |
| Overvoltage protection                                     | 10 Vdc  | —   |
| Reverse polarity protection                                | -10 Vdc   | -30 Vdc   |
| Output to ground short circuit protection                  | continuous  |   |
| Resolution   | 12 bit  |   |
| Output load resistance<br>(pull down to ground)            | 10 kOhm typ.  |   |
| EMI:<br>radiated immunity                                  | 100 V/m per ISO11452-2 from<br>200 MHz to 1000 MHz    |   |
| conducted immunity   | 100 mA BCI per<br>ISO11452-4 from<br>1 MHz to 200 MHz | 100 mA BCI per<br>ISO11452-4 from<br>1 MHz to 400 MHz |
| EMC  | exceeds CE requirements                               |   |

**Table 2. Mechanical Specifications**

| Characteristic  | LV<br>(Low Voltage)   | HV<br>(High Voltage) |
|---|---|----------------------|
| Expected life   | infinite rotation   |                      |
| Air gap:<br>bare magnet actuator<br>housed magnet actuator<br>misalignment                      | 3,00 mm ±0,5 mm [0.12 in ±0.02 in]<br>2,00 mm ±0,5 mm [0.08 in ±0.02 in]<br>2,00 in [0.08 in] |                      |
| Material:<br>magnet<br>sensor housing<br>housed magnet overmold<br>sensor/housed magnet bushing | NdFeB<br>PBT plastic<br>PPS plastic<br>brass  |                      |
| Mating connector  | AMP Superseal 282087-1  |                      |
| Mechanical end stop   | no  |                      |
| Mounting screw sizes:<br>sensor to mounting surface   | non-magnetic, stainless steel M4 X 0,7<br>screws and 8 mm [0.39 in] OD washers                |                      |
| housed magnet actuator<br>to customer-provided<br>mounting pin                                  | non-magnetic, stainless steel, M3 X 0.5<br>plain cup point set screws                         |                      |
| Approvals   | CE  |                      |

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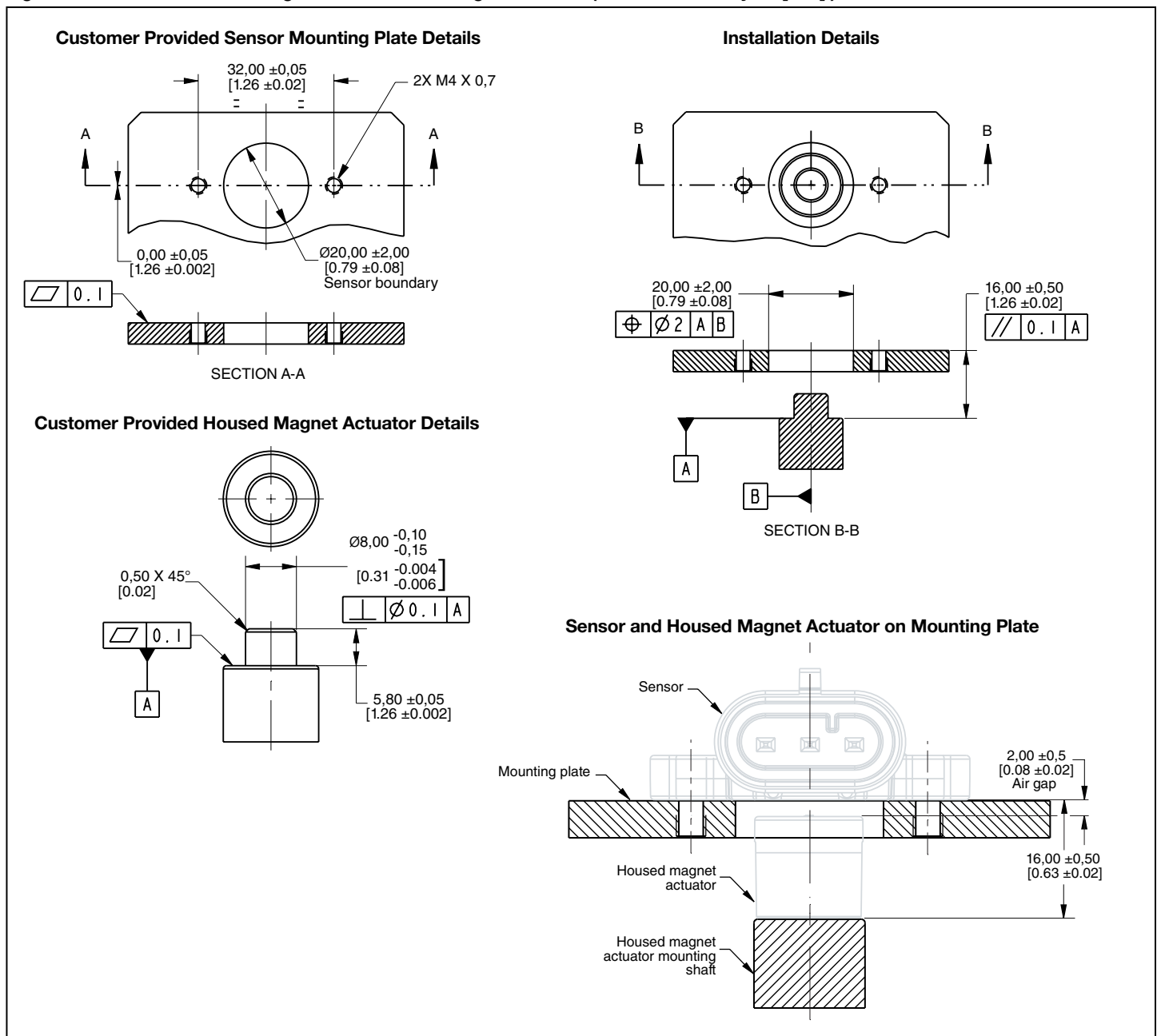
Table 3. Environmental Specifications

| Characteristic              | LV<br>(Low Voltage)  | HV<br>(High Voltage) |
|-----------------------------|--|----------------------|
| Operating temperature range | -40 °C to 125 °C [-40 °F to 257 °F]  |                      |
| Ingress protection          | IP69K  |                      |
| Media compatibility         | heavy transportation fluids  |                      |
| Shock                       | 50 G peak  |                      |
| Vibration                   | 20 G peak  |                      |
| Salt fog                    | bare magnet: 96 hr for as per ASTM B117<br>housed magnet: 240 hr per ASTM B117 |                      |



**NOTICE**  
Ferrous material or magnet material more than 300 Gauss within 10 mm [0.39 in] from sensor boundary may impact sensor performance.

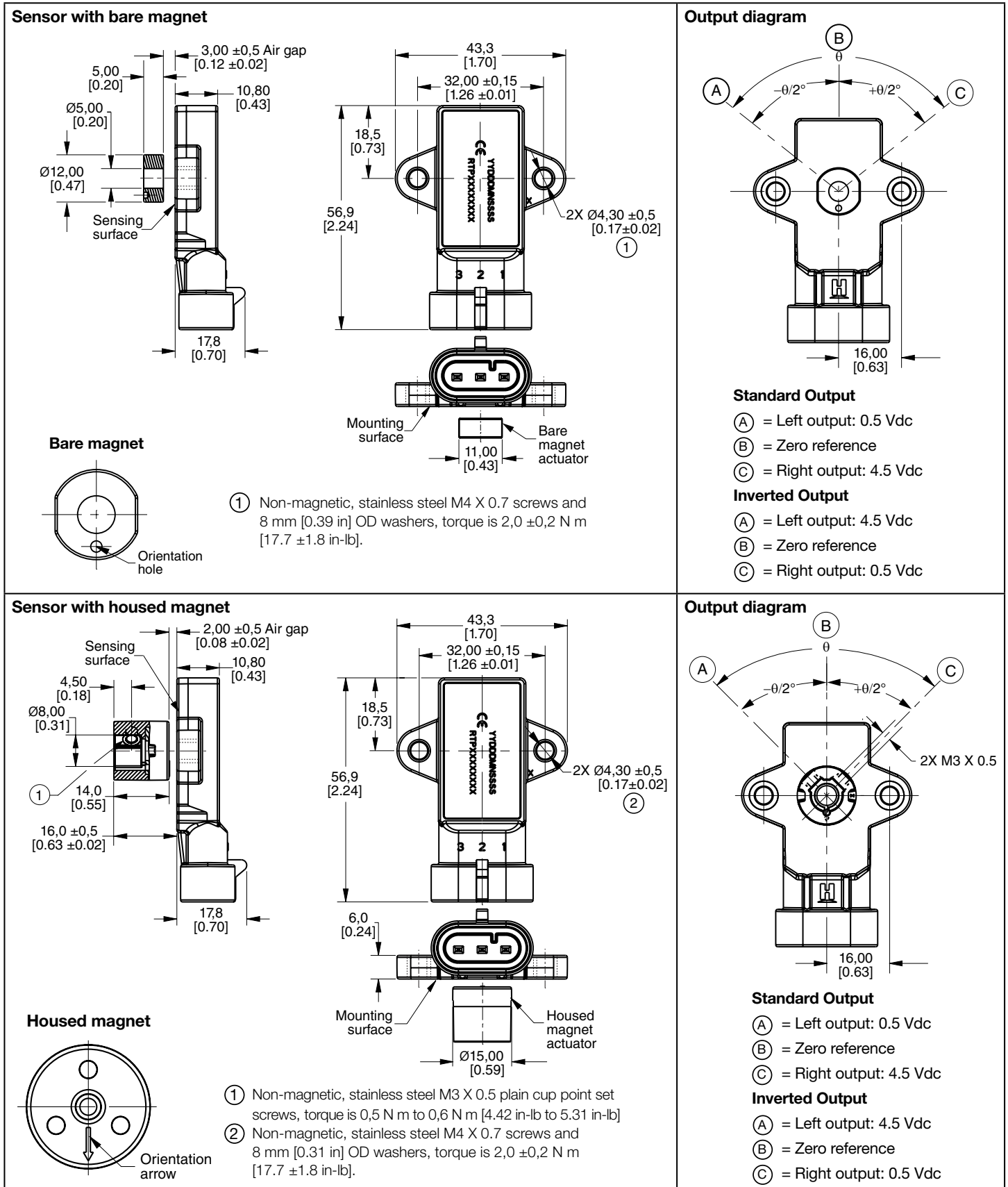
Figure 1. Sensor and Housed Magnet Actuator Mounting Information (For reference only: in/[mm].)



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32307666

Figure 2. Mounting Dimensions (For reference only: mm [in].)



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Table 4. Functional Characteristics<sup>1</sup>

| Characteristic |                              |                | Standard Output   | Inverted Output   |
|----------------|------------------------------|----------------|---|---|
| Sensing Angle  | Linearity Error <sup>2</sup> | Accuracy Error |   |   |
| 50° (±25°)     | ±2.0%                        | —              | <p>Clamp High 4.5</p> <p>Output Voltage (Vdc)</p> <p>Clamp Low 0.0</p> <p>(A) (B) (C)</p> <p>-25 0 +25<br/>-30 0 +30<br/>-35 0 +35<br/>-45 0 +45<br/>-60 0 +60<br/>-90 0 +90<br/>-135 0 +135<br/>-175 0 +175</p> <p>Actuator Position (°)</p> | <p>Clamp High 4.5</p> <p>Output Voltage (Vdc)</p> <p>Clamp Low 0.0</p> <p>(A) (B) (C)</p> <p>-25 0 +25<br/>-30 0 +30<br/>-35 0 +35<br/>-45 0 +45<br/>-60 0 +60<br/>-90 0 +90<br/>-135 0 +135<br/>-175 0 +175</p> <p>Actuator Position (°)</p> |
| 60° (±35°)     |                              |                |   |   |
| 70° (±35°)     |                              |                |   |   |
| 90° (±45°)     |                              |                |   |   |
| 120° (±60°)    |                              |                |   |   |
| 180° (±90°)    |                              |                |   |   |
| 270° (±135°)   |                              |                |   |   |
| 350° (±175°)   |                              |                |   |   |
| 360° (±180°)   |                              |                | <p>Output Voltage (Vdc)</p> <p>(A) (B) (C)</p> <p>-180 0 +180</p> <p>Actuator Position (°)</p>  | <p>Output Voltage (Vdc)</p> <p>(A) (B) (C)</p> <p>-180 0 +180</p> <p>Actuator Position (°)</p>  |

**Notes:**

1. See Figure 2 for references to (A) (B) (C).
2. Linearity error is the deviation of the measured value from the best fit line and is the quotient of the measured output ratio deviation from the best fit line at the measured temperature to the best fit line output ratio span at the measured temperature.

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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.**

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E-mail: [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

Internet: [sensing.honeywell.com](http://sensing.honeywell.com)

Phone and Fax:

USA/Canada +1-800-537-6945

International +1-815-235-6847; +1-815-235-6545 Fax

Sensing and Control

**Honeywell**

1985 Douglas Drive North

Golden Valley, MN 55422

[honeywell.com](http://honeywell.com)

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