

## Application Note

### Hall-Effect Rotary Position Sensors

#### HRS Series

#### Background

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 with some catalog listings.

#### Solutions

These sensors may potentially be used in a variety of Transportation and Industrial applications to detect position and movement of vital control components to provide control/feedback information. The HRS Series provides long life in the application, low torque actuation for the user, and enhanced performance in the harsh environments in which this equipment operates.

\* Focus applications

#### Potential Applications

##### TRANSPORTATION

##### Off-road vehicles and construction/agriculture vehicles/equipment (See Figure 1.)

**Gear shifter, joystick and throttle position\*:** The sensor is placed on the joint to measure how far forward (maximum) or backward (to zero) the operator has moved the lever (i.e., gear shifter, joystick or throttle) to the controller.

**Customer benefit:** Allows user to have tighter control on the lever, thereby enhancing speed control.

**Pedal position\*:** May be used to replace the mechanical cable connection between the foot pedal and the engine in heavy duty equipment and other vehicles. For example, a potentiometer may be mounted adjacent to the pedal to measure how far down the pedal is depressed/released by the operator. The sensor senses the change in pedal position and sends a signal to the engine to either increase/reduce the flow of gasoline and air across the throttle plate, as needed.

**Customer benefit:** May eliminate the mechanical cable, which can stretch and rust, can improve engine control system response that benefits the vehicle's emission, as well as improve reliability, and reduce excess weight in the vehicle. This type of drive-by-wire system can be safer and less expensive than cable-connected systems. Also provides more speed control when the pedal is pushed down.



Figure 1. Potential HRS Series Transportation applications shown on a front loader

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**Hitch location:** When an operator in a vehicle is towing a boat, another vehicle, etc., that is on a trailer, a potentiometer may be used to detect trailer position when the operator is backing the trailer into a space (such as, parking area, boat slip, etc.). The sensor provides feedback to an item (such as a back-up camera in the cab that provides trailer positioning data) as to when the operator is steering too far in one direction, too far to one side, whether what is being pulled is drifting too far, or when the operator is turning so sharply that the trailer will be pulled to the side.

**Customer benefit:** Helps to prevent jack-knifing, which can occur when the tow vehicle bends abruptly; simplifies operation

**Bucket/loader position:** Depending on use, may be used to detect position of an accessory (such as a shovel or fork) that is attached to a piece of heavy duty equipment and other vehicles.

**Customer benefit:** Enhances load leveling; ensures that the operator doesn't have the bucket too low or too high, improving operation efficiency and safety; improves equipment life because it prevents damage to the accessory.

**Steering position:** May be used to determine the position of a steering wheel that doesn't have a wide turning radius, or the actual position of the steering mechanism that is under the steering column.

**Customer benefit:** Helps to prevent over-steering; informs the controller in the cab or engine of when the wheels are accurately positioned, potentially notifying the operator via an alarm enhancing operator safety.

**Auto-pilot/drive-by-wire system feedback:** May be placed on the handlebar to control the throttle for speed control. Controls the operator's speed by maintaining a certain position.

**Customer benefit:** Improves response time and operator control.

## INDUSTRIAL

**Industrial vehicle attachment position (i.e., forklift truck fork tilt detection)** (See Figure 2.)

**Machine control joystick position** (See Figure 3.)

**Robotic arm position** (See Figure 4.)


**Valve actuator position** (See Figure 5.)



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HRS Series	Key Features and Benefits
	<ul style="list-style-type: none"><li>• <b>Solid state Hall-effect technology provides non-contact operation for:</b><ul style="list-style-type: none"><li>- Long service life</li><li>- Low torque actuation</li><li>- Enhanced performance in harsh environments, especially those with vibration, shock and extreme temperatures</li><li>- Reduces mechanical wear concerns</li></ul></li><li>• <b>10 M cycle product life (typical):</b> Promotes extended life in the application</li><li>• <b>Choice of termination types:</b> Contributes to design flexibility in the application</li><li>• <b>Voltage output allows direct connection to the control system:</b> Can reduce external circuitry and overall system complexity, lowering overall installation cost to the customer</li><li>• <b>Choice of anti-rotation locating pins:</b> Limits rotation of the device in the application, preventing over-travel on levers and throttles</li><li>• <b>Rotary potentiometer package form factor:</b> Designed to provide direct replacement for potentiometers, often allowing drop-in conversion to Hall-effect technology</li></ul>

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#### Find out more

To learn more about Honeywell's sensing and control products, call **1-800-537-6945**, visit **sensing.honeywell.com**, or e-mail inquiries to **info.sc@honeywell.com**

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