

## TRANSPORTATION, INDUSTRIAL, MILITARY, AEROSPACE AND MEDICAL APPLICATIONS

## Application Note

### SMART Position Sensor, 100° and 180° Arc Configurations

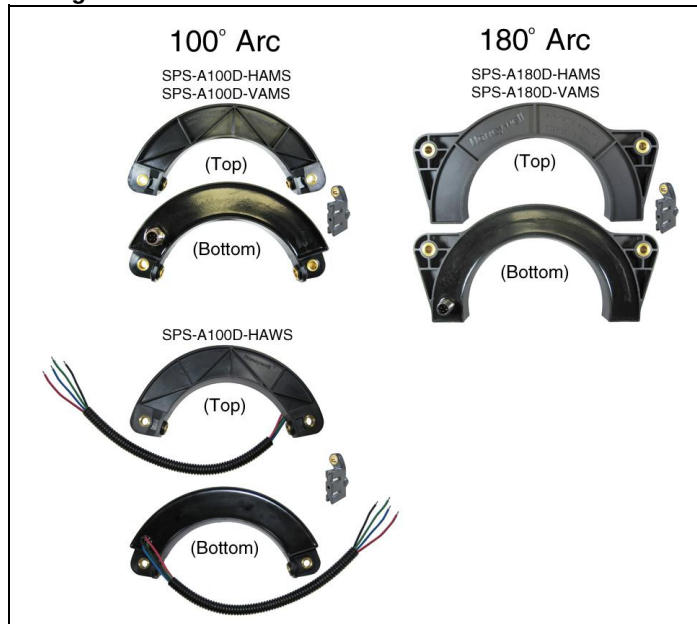
Superior Measurement. Accurate. Reliable. Thinking.

#### SOLUTION

Honeywell's SMART Position Sensor product portfolio includes the most accurate and durable non-contact positioning devices available in the industry. The Arc Configurations sense the position of a magnet relative to a sensor in the following sensing ranges (see Figure 1):

- 0° to 100°
- 0° to 180°

**Figure 1. SMART Position Sensor, 100° and 180° Arc Configurations**



#### BACKGROUND

These devices enable highly accurate motion control and improve operation efficiency and safety. Simple, non-contact design eliminates mechanical failure mechanisms, reducing wear and tear, improving reliability and durability, and minimizing downtime. They are available with 0.5 Vdc to 4.5 Vdc analog output.

#### VALUE PROPOSITIONS (★ = competitive differentiator)

- ★ **Reliable, durable:** Non-contact design reduces wear and tear, improving reliability and durability, minimizing downtime
- ★ **Easy to install:** Installation takes 4 steps (1: position device; 2: drill holes; 3: mount sensor; 4: locate magnet/connect sensor) vs. up to 14 steps some competitive products require, simplifying installation and reducing set-up costs
- **Rugged:** As there are no moving parts within sensor, Honeywell utilizes unique packaging materials that make it resistant to vibration, shock, and extreme temperatures
- ★ **Flexible:** Air gap tolerance of  $7,8 \pm 2,5 \text{ mm}$  [ $0.307 \pm 0.098 \text{ in}$ ] (100°) and  $8,5 \pm 2,5 \text{ mm}$  [ $0.338 \pm 0.098 \text{ in}$ ] (180°) between sensor and magnet expands application use
- ★ **Cost effective:** Adaptable, non-contacting design allows customers to eliminate unnecessary connections for installation, thereby reducing installation steps/time and components
- **Accurate:** 100° configuration accurately measures values down to  $0.06^\circ$  while the 180° configuration accurately measures values down to  $0.11^\circ$
- ★ **Adaptable:** Electronics on board allow for flexible packaging and component compatibility with existing systems
- ★ **Lightweight:** Lighter in weight than optical encoders
- ★ **Self-diagnostics feature** can reduce equipment downtime by providing predictive maintenance input
- **Combined patented MR sensor and ASIC technology** provides enhanced differentiation and performance
- **IP67, IP69K sealing** allow use in many harsh applications
- **RoHS-compliant** materials meet Directive 2002/95/EC

#### POTENTIAL APPLICATIONS

Figures 2 through 20 show a variety of potential applications where the SMART Position Sensor, 100° and 180° Arc Configurations, may be used.

# SMART Position Sensor, 100° and 180° Arc Configurations

## TRANSPORTATION

**Figure 2. Aerial Work Lift Platforms**



May be used to provide boom angle position which helps to prevent tipping on inclines and keeps the equipment within a safe extension range (envelope control), enhancing operator and bystander safety.

**Figure 3. Front End Loaders**



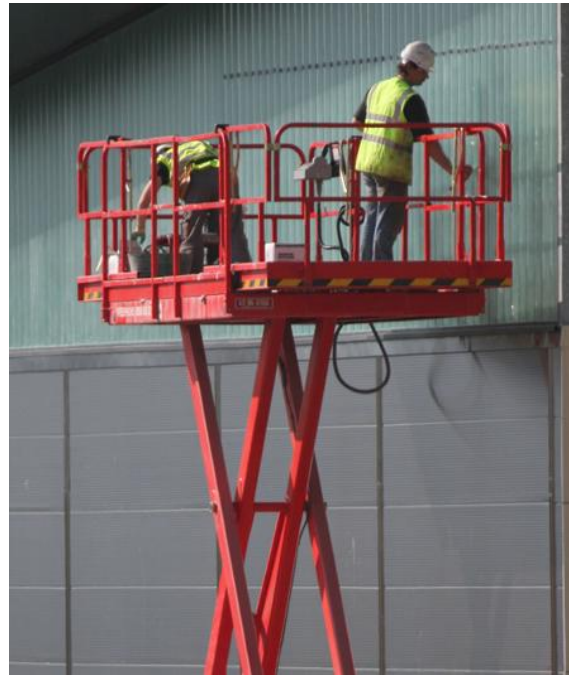
May be used to automate repetitive motion sequences, such as dig-dump-dig, which then require only a single hit of a joy stick to repeat, improving efficiency and reducing operator stress. May also be used to provide bucket height position restriction which helps to avoid overhead power lines or other obstacles in the area (envelope control), enhancing operator safety

**Figure 4. Diggers/Excavators**



May be used to provide digging arm position in order to provide real-time survey information along with the GPS (Global Positioning System) mounted on the digging equipment. A SMART Position Sensor Arc Configuration sensor is mounted on the digging arm. This position information is sent to an electronic control unit which uses this input, along with the location input from the GPS, to provide data on the equipment position and location, as well as hole width and depth, eliminating surveyor costs. The control unit can also calculate and convey cab/digger alignment to the operator in the cab, eliminating the need for the operator to twist his/her head to see the digger, especially in uneven environments, enhancing operator safety.

**Figure 5. Scissor Lifts**



May be used to provide lift angle, helping to ensure the platform is in an optimal position, enhancing operator and bystander safety.

# SMART Position Sensor, 100° and 180° Arc Configurations

**Figure 6. Refuse Trucks**



May be used to monitor the angle of a truck's twin dumpster lifting arms. May also be used to provide position to the operator inside the cab who uses a joystick to manipulate automated reach arms to accurately pick up and empty smaller trash cans. One sensor can replace at least three proximity sensors, providing absolute position versus approximate position. The sensor's non-contact technology increases product reliability and life in these dirty, tough environments.

**Figure 7. Mobile Cranes**



May be used to provide wheel angle on the mechanically-linked axes to help ensure equal tire wear, extending expensive tire life and saving replacement costs. Information may also be used to provide optimized, restriction-free wheel turning, especially in muddy construction sites, helping to prevent stuck equipment. The non-contact technology on this equipment provided by this sensor is preferred by equipment renters.

**Figure 8. Timber Harvester/Processor Equipment**



May be used to provide continuous cutter arm angle to the on-board computer as the equipment processes the decreasing tree length, allowing the tree diameter and lumber volume to be immediately determined. Information also helps to ensure the floating cab is aligned with the cutter head, eliminating the need for the operator to twist his/her head, improving efficiency, enhancing operator safety and reducing operator stress.

**Figure 9. On-board Loader Weighing Systems**



May be used to provide loader bucket angle in order to help determine on-the-spot content weight which eliminates wasteful and time-consuming dumping onto a separate weighing site before loading into the truck bed, helping to prevent overloads, and saving fuel and labor costs.

## INDUSTRIAL

**Figure 10. Telescoping Conveyor Systems**



May be used to provide conveyor elevation which helps to ensure the conveyor is at the optimal height to provide the correct mix of falling material containing uneven particles (i.e., dirt, gravel, ore) as it is processed off the conveyor into piles. This sensor's durable and reliable non-contacting technology increases product life in these harsh environments.

# SMART Position Sensor, 100° and 180° Arc Configurations

**Figure 11. Automated Touchless Vehicle Wash Systems**



May be used to provide position of the water spray arm that runs the length of the vehicle during the wash cycle, allowing the system to know when the arm has reached the end of the vehicle. This durable, IP67-sealed sensor replaces the proximity sensors that are currently used in this harsh environment, providing greater reliability and longer product life.

**Figure 12. Power Generation**



May be used to provide switching contact angle, ensuring contact has moved to the correct position through its 0° to 90° range. Information may also be used to determine contact speed, helping to identify slower contacts that may be wearing out, preventing possible catastrophic power failures.

**Figure 13. Rail-Road Crossing Arms**



May be used to provide crossing arm position, enhancing traffic safety. This sensor's non-contact technology increases reliability and product life in this harsh environment.

## MILITARY

**Figure 14. Remote Weapon Systems**



May be used to provide weapon elevation for a variety of targeting functions (i.e., 180° gun turret positioning, no-fire above a specified elevation) that may be controlled through a remote joy stick, helping to ensure firing accuracy.

**Figure 15. Chassis Suspension Systems**



Photo Courtesy of U.S. Army

May be used to provide chassis position height which helps to ensure a level platform for the mounted equipment (i.e., gun/anti-aircraft missile system, mobile hospital), helping to ensure proper operation. This sensor's non-contact technology provides long product life in these rugged operating environments.

# SMART Position Sensor, 100° and 180° Arc Configurations

**Figure 16. Military Vehicle Door Position**



Photo Courtesy of U.S. Army

May be used to provide position (open/close) of heavy, hydraulically-controlled doors. One sensor can replace the four limit switches currently used, significantly reducing set-up time, especially among different vehicle configurations.

## AEROSPACE

**Figure 17. Ground-Based Solar Panels**



May be used to provide elevation and azimuth, enhancing control and operation.

**Figure 18. Ground-Based Satellite Dishes**



May be used to provide elevation and azimuth, enhancing control and operation.

## MEDICAL

**Figure 19. Robotically-Assisted Surgery Equipment**



May be used to provide position of the robotic arms that hold the articulated instrument tips, allowing the precise control that enables revolutionary minimally invasive surgical procedures.

**Figure 20. Patient Bed Elevation**



May be used to monitor backrest elevation which helps to ensure proper angle, as well as automatic notification in the event the elevation exceeds or falls below a set value, helping to ensure optimal backrest position as prescribed by individual patient's medical condition.

# SMART Position Sensor, 100° and 180° Arc Configurations

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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.**

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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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