

TRANSPORTATION, INDUSTRIAL, MILITARY AND AEROSPACE APPLICATIONS

Application Note

SMART Position Sensor, 100° and 180° Arc Configurations

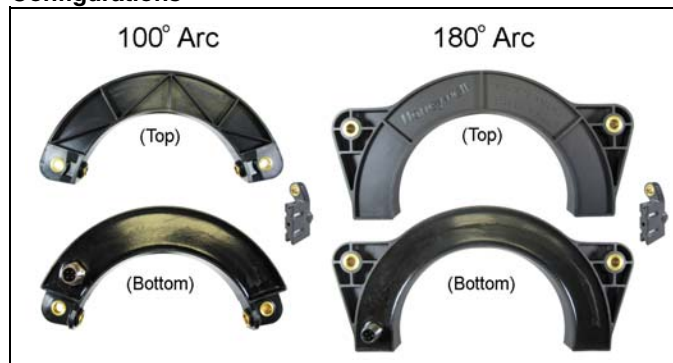
Superior Measurement. Accurate. Reliable. Thinking.

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 $7,8 \pm 2,5$ mm [0.307 ± 0.098 in] (100°) and $8,5 \pm 2,5$ mm [0.338 ± 0.098 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° while the 180° configuration accurately measures values down to 0.11°
- ★ **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.

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.

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Figure 3. Front End Loaders



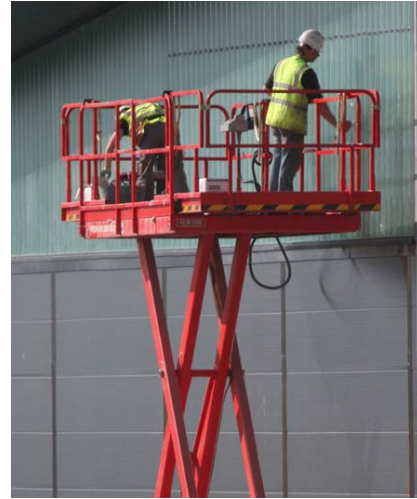
May be used to automate repetitive motion sequences, such as dig-dump-dig, which then require only a single hit of a joystick to repeat, improving efficiency and reducing operator stress. May also be used to provide bucket height position restriction which helps to avoid overhead power lines or other 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.

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.

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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.

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.

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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.

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.

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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.

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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.

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 web site, 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.

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.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

Sensing and Control
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422
www.honeywell.com/sensing

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