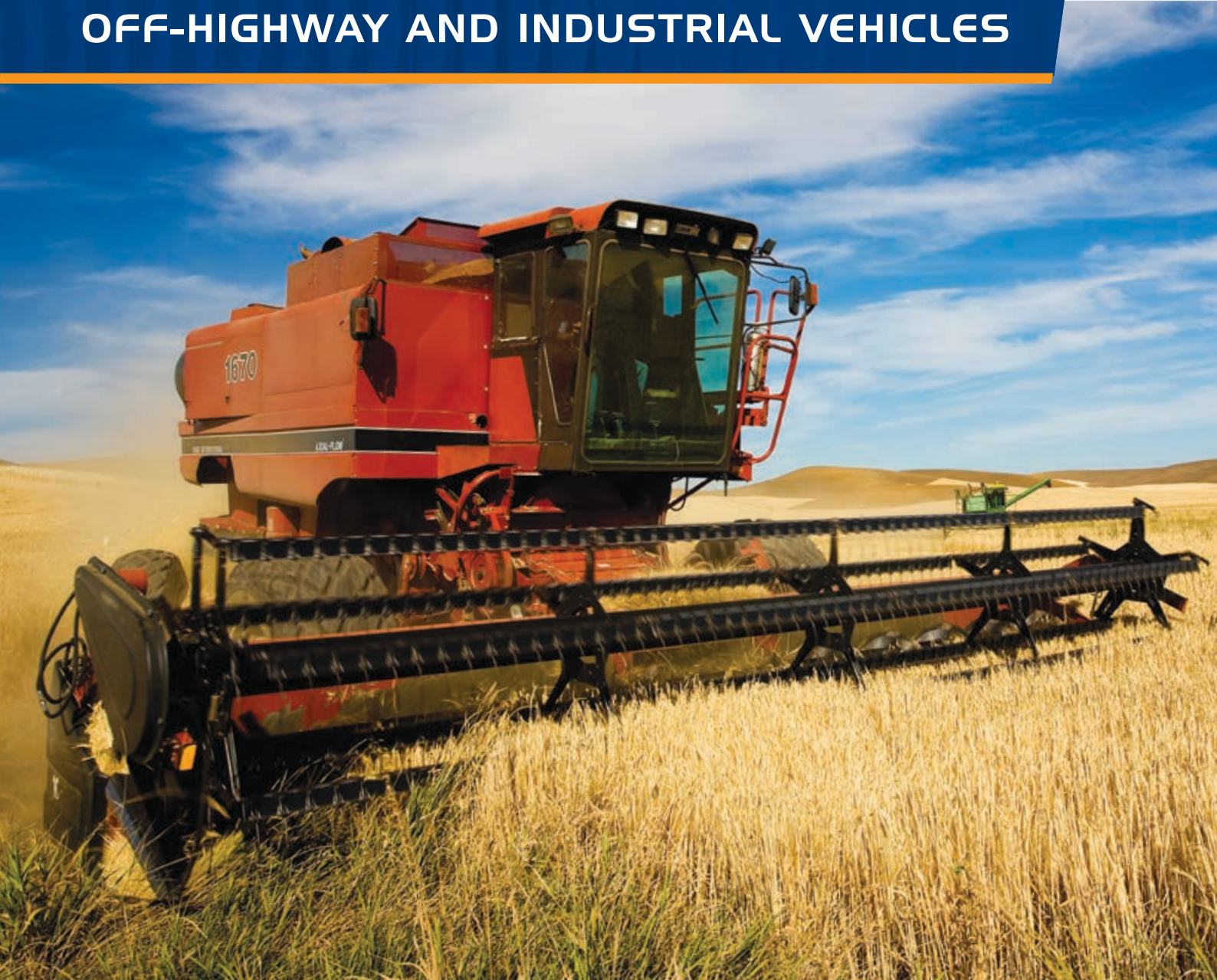




# **BEI**SENSORS

**POSITION SENSING SOLUTIONS FOR  
OFF-HIGHWAY AND INDUSTRIAL VEHICLES**







# BEI SENSORS



## POSITION SENSING SOLUTIONS FOR OFF-HIGHWAY AND INDUSTRIAL VEHICLES

CONSTRUCTION • AGRICULTURE • MINING • MARINE • TRUCKS • ALL-TERRAIN • LIFTS • CRANES

### Building on a Proven Record of Accomplishment

BEI Sensors' products have stood the test of time, providing a high degree of reliability and performance, while withstanding the severe conditions posed by off-road and industrial vehicle applications. At BEI Sensors, our uncompromising focus is on position sensing. We provide a wide variety of rotary and linear sensors that utilize potentiometric (contact) and magnetic Hall-effect (non-contact) technologies, as well as a full line of exceptionally rugged industrial encoders.

### Adapting and Customizing to Meet Your Precise Needs

As opposed to manufacturers that only offer off-the-shelf sensors that may not meet all your needs, we gladly adapt any of our standard products to create custom solutions that fit your requirements exactly. This might entail something as simple as adding a connector, changing a shaft size, or merging parts of two standard products.

Other adaptations require more significant changes, such as modifying a product's size and shape so that it will fit into a particular package application design. Complete customization, where the technology itself is adapted to meet a customer's requirements, is also an option. We have met this challenge many times. Our ability and willingness to make these sorts of modifications ensures that you'll receive a position sensor configured to your exact specifications, allowing drop-in installation and simplifying production and assembly at your facility.

### Utilizing Advanced Position Sensing Technologies

BEI Sensors is often called upon to develop custom position sensing elements that fit directly inside customers' components. This flexible alternative to pre-packaged sensors is typically provided as a joint element and contact assembly. Our proprietary conductive plastic ink formulations meet the most demanding durability requirements—tens of millions of cycles in temperatures as high as 300°C.

In addition, we have developed an extensive line of rotary encoders. Over the years, more than 17 million variations on our basic encoders have been produced. This huge variety of available configurations allows us to customize products to your requirements, incorporating needed options and eliminating unnecessary cost.

BEI Sensors specializes in other product technologies, including potentiometric conductive plastic, wirewound, hybrid, and magnetic Hall effect position sensors. Further product capabilities include redundant outputs for superior reliability, and the ability to operate in high temperatures while withstanding shock and vibration. Single and multi-turn options, IP sealing, and accuracy rates of better than 0.05% are also available.

BEI's position sensors are found wherever environmental extremes are standard—including use in mobile and rotating cranes, earth movers, excavators, bulldozers, trucks, tractors, combines, mowers, snow groomers, logging equipment, forklifts, and marine vehicles. These demanding applications rely on precise position sensing and redundant safety for steering and wheel systems, steer-by-wire systems, gear sensing, pedal and throttle control, hand acceleration, valve and control logging, cabin controls and more. Whether exposed to dust, mud, extreme temperatures, or moisture, the rugged construction of BEI Sensors products ensures their accurate and reliable operation day after day, year after year.

### Meeting the Demand for Large and Small Volumes

While many sensor manufacturers require high-volume minimum orders, BEI Sensors has the ability to meet flexible volume demands—from tens of pieces to tens of thousands of pieces. This capability has earned us a loyal customer base that knows we can meet their specialized needs, regardless of the quantity ordered.

### Providing Premium Quality and Service

BEI Sensors' application specialists and engineers are always available to help with technical needs—whether it's selecting a standard configuration, designing an adapted or custom product, or troubleshooting an interface issue. Our highly trained order entry staff can also help specify products that will meet your exact requirements. We provide this high level of service to an active customer base of thousands of companies on a daily basis.

Our custom-designed factories in Strasbourg, France, Thousand Oaks, California, and Otay, Mexico ensure an efficient flow of production in which all critical manufacturing processes are tightly controlled. Our high manufacturing and operating standards have earned us ISO Certifications at all facilities.

We are proud to have been designated a Preferred Supplier by many of our customers, after consistently providing them with high-quality products, on-time delivery, and superior customer service. Many BEI sensor products are also listed on the U.S. Government's Qualified Product List.

Contact BEI Sensors at +33 (0)3 88 20 80 80 or visit [www.beisensors.com](http://www.beisensors.com) to see how we can provide a solution for your unique position sensing requirements.





**Design engineers for agriculture and forestry equipment** are well aware of the demanding environments their equipment will encounter. Fine grain dust, debris, high-pressure wash, vibration, rain, ice, heat, and cold are just a few extremes these machines endure. To operate properly, they rely on precise position sensing and redundant safety measures for steering and wheel systems, steer-by-wire systems, gear sensing, pedal and throttle control, hand acceleration, valve and control logging, cabin controls, and much more.

The rugged construction of BEI Sensors products assures their accurate and reliable operation day after day, year after year. Sensor construction techniques include sealing up to IP69K with epoxied electronics and o-ring sealing. Non-contacting Hall technology that utilizes rare earth magnets ensures long service life and higher linearity performance. BEI Sensors also has a wealth of experience designing and tooling specific packages for unique applications. We can work with you to create extremely reliable sensors to your exact specifications.

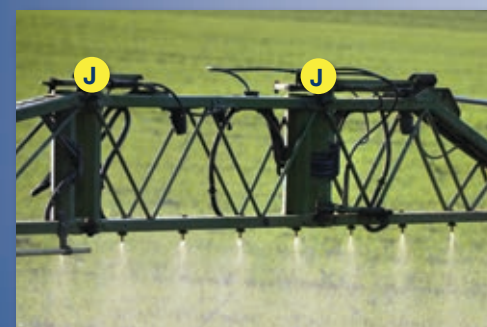
### APPLICATIONS

- A - Hitch Position
- B - Ground Speed
- C - Concave Position
- D - Folding Auger
- E - Implement Header Height Control
- F - Steering Wheel Position and Steer-by-wire
- G - Brake and Clutch Pedal Assembly Position Feedback
- H - Hand Throttle Position
- I - Arm Rest Controls
- J - Sprayer Boom Arm Position



### FEATURES

- Low Profile Packages
- Single or Dual Outputs
- Single and Multi-Turn Configurations
- Sealing Up to IP69K
- Long Service Life
- High Accuracy/Linearity
- Harsh Environment Testing



### 9960 Series IP69K Hall Effect Position Sensor

This sensor is available with 7 termination configuration options (including flying leads and integral connectors), single or dual outputs and 24 active electrical angles. With 360° turn capability and a range of electrical options, the 9960 is extremely versatile. The IP69K rating allows the 9960 to operate in a variety of wet applications and remain dust-tight for dirty environments.

**APPLICATIONS:** Implement header height control, folding auger, concave position, hitch position, pedal position feedback, steering wheel position, hand throttle position, sprayer boom arm position.



### 9800 Series Rotary Potentiometer

This rugged design utilizes high temperature stable materials and insert molded integral connector/body design to eliminate stress points or leaks during wash-down or water exposure. Fourteen

standard models are available to meet a variety of mounting area needs and interconnection requirements.

**APPLICATIONS:** Implement header height control, folding auger, concave position, hitch position, pedal position feedback, steering wheel position, hand throttle position, sprayer boom arm position.



### 9900 Series Rotary Hall Effect Position Sensor

The 9900 provides the full redundancy of two independent Hall detectors in one durable package. Rotating rare earth magnets enable the stationary detectors to perform with improved accuracy and reliability, including excellent temperature stability and corrosion resistance. Fully sealed (IP66/IP67), the 9900 is impervious to contamination and moisture. An integrally molded, 6-pin connector makes a sealed connection with industry standard Packard Electric connectors.

**APPLICATIONS:** Pedal position feedback, steering wheel position, hand throttle position.



### Model H20® Rotary Optical Incremental Encoder

The H20 is an extremely rugged and compact 2.0" rotary encoder designed with a shock resistant

disc, heavy duty bearings, and EMI shielding. The H20 features a resolution range up to 4096 cycles per turn and a maximum mechanical speed of 8,000 RPM.

**APPLICATION:** Ground speed.

## CUSTOMIZED POSITION SENSORS



### Adapted Sensor

This custom sensor is an example of an adapted product. BEI Sensors has created thousands of customer-requested modifications to our standard products. From adding a connector, changing a shaft size or merging parts of two standard products, simply tell us what you need and we can make it happen. If space constraint is an issue, BEI Sensors' design engineers excel at custom packaging. This ensures you will receive a product to

exact specifications, allowing drop-in installation to simplify production and assembly.

**APPLICATION:** Brake Switch for arm rest controls



### Complete Customization

For this custom solution, both the sensing technology and mechanical packaging were designed to meet exact customer specifications for an extreme environment. A triple-redundant sensor eliminated many mechanical parts that were potentially subject to failure. The need for fewer mechanical parts significantly lowered manufacturing costs, as well as reducing the overall weight of the equipment and increasing fuel efficiency.

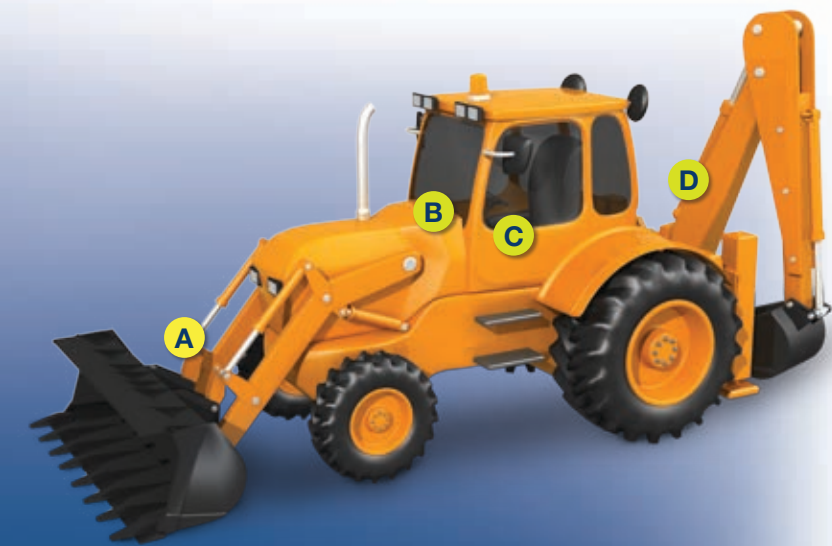
**APPLICATION:** Steer-by-wire



## EARTH MOVING AND CONSTRUCTION

BEI position sensors provide crucial motion control feedback that assists with control of heavy equipment such as excavators and earthmovers. Sensors in this environment have to withstand high shock and vibration, along with extremely dusty and wet conditions.

By implementing the latest Hall cell technology, BEI rotary sensors provide the best linearity available on the market (less than 1%), offering superior feedback on large equipment such as boom arms and ladders. In addition, BEI's non-contacting technology provides longer cycle life on machinery with excessive vibration.



### APPLICATIONS

- A - Scoop/ Bucket Position
- B - Dash Board Implement Motion Control
- C - Steering Wheel Angle
- D - Swing Arm/ Bucket Position

### FEATURES

- Long Service Life
- High Level of Sealing
- Consistent Rotational Torque
- Resistance to High Operation Temperature and Pressure
- Resistance to High Shock and Vibration

## FEATURED PRODUCTS

### 6300-6400 Series Linear Potentiometer



Ideal for high-velocity cylinder

applications exceeding 2000mm/second (hydraulic) or 5000mm/second (pneumatic). The 6300 Series potentiometer has a wide operating temperature range of -40° to +125° C and long mechanical service life.

**APPLICATION:** Scoop/ Bucket Position



### 5320 Panel Potentiometer

Suited for tight packaging constraints while providing

superior durability, long service life and repeatable accuracy. This potentiometer is fully sealed and impervious to contamination and moisture.

**APPLICATION:** Dash board controls



### 8360 Series Through-Hole Hall Effect Sensor

With its low profile and through hole package, the 8360 is ideal for tight installations. Utilizing non-contacting technology, this position sensor is highly tolerant to shock and vibration.

**APPLICATION:** Swing arm/ bucket position, Steering wheel angle measurement, Steer-by-wire, Turntable feedback



### Custom Position Sensor

This return to dig assembly was a completely customized solution where the sensing technology was adapted to meet exact customer specifications for this extreme environment.

**APPLICATION:** Swing arm/ bucket position

## MATERIAL HANDLING

BEI Sensors offers a variety of rotary encoders and position sensors designed for the toughest environmental conditions. They deliver precise and accurate speed and position feedback for hoists, cranes, forklifts, conveyers, automated warehousing, and AWP's.

Superior sealing up to IP69K, with epoxied electronics and o-rings protects BEI products from dust, debris, and condensation. BEI Sensors offers exceptional flexibility, with multiple termination and output options and an experienced engineering team that is ready to design custom solutions.



### APPLICATIONS

- A - Electric Motor Feedback
- B - Fork Position/ Mast Tilt
- C - Fork Height Position
- D - Steering Wheel Angle

### FEATURES

- Resistance to High Shock and Vibration
- Single and Dual Outputs
- Many Mounting and Termination Options
- High Level of Sealing
- Numerous Output Types (Analog, PWM, and CANopen)
- Wide Operating Temperatures

## FEATURED PRODUCTS



### Industrial Duty Inclinometer

BEI inclination sensors are internally temperature compensated with angle measurements up to ±30°

and single and dual axis digital outputs. They offer high resolution, and excellent sealing against harsh environments. Output options include analog, CANopen, DeviceNet, and SSI.

**APPLICATION:** Mast Tilt



### 8360 Rotary Hall Effect Hollow Shaft Position Sensor

This low profile, through-hole design is ideal for steering applications where space is limited and the sensor mounts around a shaft. Dual output

is capable of 360° of motion with high accuracy and 12 bit resolution. Options include multi-turn configurations, and analog, PWM, and CANopen outputs.

**APPLICATION:** Steering wheel angle measurement



### PMX Rotary Optical Encoder

This non-contact encoder offers continuous 360° rotation for excellent repeatability, line drivers with incremental

quadrature outputs, and an available index. A metal bushing provides greater support than conventional non-contact sensors. Strain reliefs and wire harnesses are available.

**APPLICATION:** Fork Height Position



### GHU9 Hollow-Shaft Incremental Encoder

This encoder features redundant outputs for

critical applications, high resolution, and wide operating temperatures for installation in a variety of environmental conditions. Optional overspeed switch function is available to help protect equipment in case of sudden loss of load or other overspeed conditions.

**APPLICATION:** Wire Drum Load Position

## Backed by Extensive International Resources

BEI Sensors is a brand of Sensata Technologies.

Sensata Technologies is one of the world's leading suppliers of sensing, electrical protection, control and power management solutions with operations and business centers in 16 countries. Sensata's products improve safety, efficiency and comfort for millions of people every day in automotive, appliance, aircraft, industrial, military, heavy vehicle, heating, air-conditioning and ventilation, data, telecommunications, recreational vehicle and marine applications.

For more information please visit Sensata's website at [www.sensata.com](http://www.sensata.com).

# BEI SENSORS

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