

Technology for Steering Position, Speed, and Torque Sensing

With products in use in over 7 million vehicles worldwide, BI Technologies is the world leader in steering system torque and position sensors.

BI offers both contacting and non-contacting sensing technology. Our proprietary Composite Polymer Resistor technology, which easily adapts to a wide variety of sensing configurations, meets the demanding needs of automotive position sensing.

Our non-contacting technology combines both Hall effect and our proprietary Broad-Band Energy Transfer technology, which provides absolute position information over 360° of continuous rotation (with rotation capability of up to $\pm 1440^\circ$).

BI's LH3 steering sensor combines torque and position sensing in one compact 82mm diameter package. Both torque and position signals are dual output for easy diagnostic options. The LH3 sensor uses BI's proprietary potentiometric technology.



Typical Special Features:

- Continuous rotation position sensing
- Dual outputs for easy and reliable diagnostic
- Absolute position sensing over $\pm 1440^\circ$ of rotation
- Patented Low Hysteresis coupling allows 0.3mm of customer shaft runout
- Position and torque signals are absolute and accurate at power-on

- Non-contacting technologies provide customer programming of offset and gain that can be used at time of customer assembly to eliminate mechanical tolerances in customer systems
- Analog, PWM and CANBus outputs are available
- Position and torque sensing can be combined in one compact and cost effective package

Technology Descriptions

Potentiometric Torque Sensor

Potentiometric torque sensors for compliant steering systems feature a wide range of compliance angles. Durability exceeds 1 million operating cycles and 12 million dither cycles. Potentiometric sensors are immune to EMI/RFI interference.

Magnetorque Sensor

Non-contacting magnetorque technology is designed around Hall effect sensors, and features outputs that are programmable by the customer at time of assembly. Magnetorque sensors include dual phased outputs for reliable diagnostic calculations.

Potentiometric Position Sensor

Potentiometric position sensors offer high precision and cost effective design solutions, particularly when dual outputs are needed. They can be supplied with an absolute turns counting function that provides position information over $\pm 900^\circ$ of rotation. Durability exceeds 1 million full cycles and 20 million dither cycles.

BI's potentiometric position sensing technology is easily adapted to a multitude of automotive position sensing applications. Features such as dual outputs are easy to accommodate in cost effective designs. Designs requiring 7 degrees of travel up to multi-turn absolute steering sensors are possible.



DAPS (Digital Angular Position) Sensor

The DAPS sensor uses our proprietary Broadband Energy Transfer non-contacting technology to provide very accurate position and speed information. Typical steering applications can achieve 0.40% linearity with a resolution of 0.1°. The DAPS output provides absolute position information over 360° rotation with no gaps in the signal.

Combination Sensors

Any of the above technologies can be combined together to provide torque and position sensing in one compact cost effective package.

BI can package both our Magnetorque torque sensing technology and our DAPS position technology in one combined convenient 65mm diameter package. This package is very well suited to electric power steering systems where sensor space is at a premium.



Resistive Ink Technology

BI's thick film resistor technology can be used to solve a wide variety of automotive position sensing applications. In this example we developed a unique fuel level sensor for diesel fuel applications. This sensor is rated at over 4 million life cycles.





Sensors for Transportation & Industrial Markets

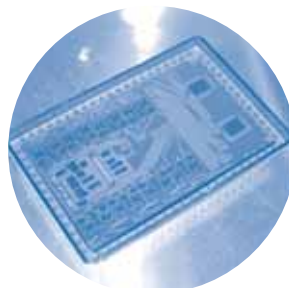
BI Technologies has a 60-year heritage of providing innovative designs and high quality production for transportation and industrial markets. Our original technologies were wirewound precision potentiometers and trimming potentiometers. Today we produce position sensing sensors and temperature sensors for a variety transportation and industrial applications. We are a world leader in steering sensors with over 8,000,000 sensors in the field.

We bring a wide array of technologies to transportation and industrial electronic applications. Our technologies include

potentiometric position sensing and non-contacting position sensing based on our Magnetorque and DAPS Broadband Energy transfer capability. We have extensive experience in hybrid circuit technology based on thick film materials and are perfectly suited to the manufacture of electronic circuit assemblies and modules for many different vehicle applications.

Our technology and products have included many industry firsts over the years including the first resistor network, the first cermet trimming element, and the first integrated thick film resistor capacitor on a chip.

Our automotive products focus is apparent in each of our nine global locations. Currently, BI has manufacturing facilities in Mexico, Scotland, Malaysia, and California. The global design and business development organization operates offices in nine countries with headquarters and primary research facilities in Fullerton, California. Each facility is ISO 9000 and QS9000 certified. Our Fullerton and Mexicali facilities are TS-16949 certified. The skills base in engineering, manufacturing, program management and supply logistics is organized for and tuned to support the challenging transportation business.



Typical Applications
Steering
Memory Seat
Pedal Position
TPS
Height Leveling
Smart Cruise Control
Temperature
Lumbar Support
Brake
EGR

