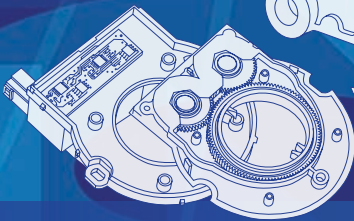
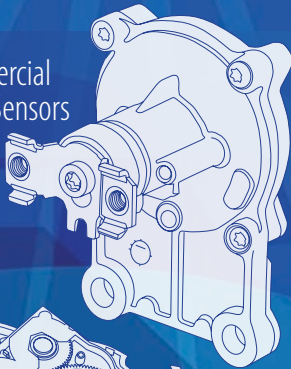


Bourns[®] Automotive Division

Solutions in Sensor Technology

Commercial
Vehicle Sensors



Automotive
Sensors



Circuit Protection
Applications

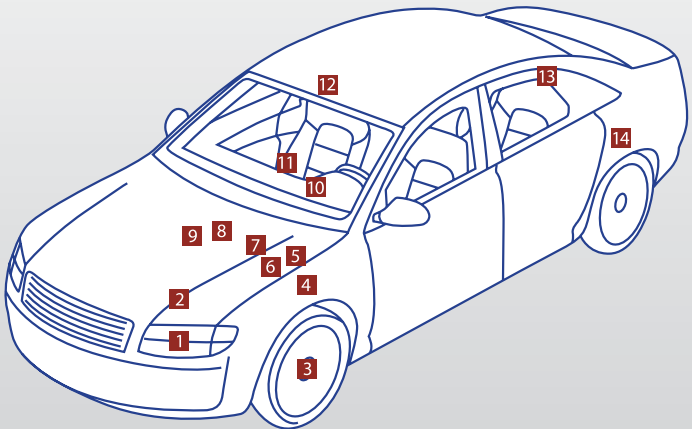



Automotive Sensors

The Bourns® Automotive Division has played a leading role in the design, development and manufacture of potentiometer sensors for over 60 years. At our engineering centers in Riverside/California, Sauerlach/Germany and Janesville/Wisconsin we develop and design a range of customized automotive position, speed and torque sensors. These products are manufactured in Ajka/Hungary, Janesville/Wisconsin, Chihuahua/Mexico and Xiamen/China.

Bourns, Inc. is a privately held company with headquarters in Riverside, California. Currently, there are over 4,500 employees located in 13 different Bourns-owned design and manufacturing locations worldwide.

Our research and development work combined with close collaboration with customers helps to ensure our products meet the highest standards set for the automotive industry. Using state-of-the-art development software and world-class production methods, Bourns can provide innovative and cost-effective solutions for your applications.





Our phenolic paper, high aluminum oxide ceramics, thermosetting plastics and specially developed Bourns® resistor inks are designed to withstand the harshest operating conditions, with many of our sensors used in rigorous on and off highway applications. Our non-contacting sensors are developed with a wide range of magneto resistance-based angular sensor solutions that are supplemented by competitive Hall Effect and 2 Axis Hall Effect technology. Bourns can assist in the selection of the most appropriate technology for your application specifications.

Bourns TS16949 certified quality system and Bourns Production System (BPS) helps ensure uncompromised quality and maximum reliability. Lean production methods are also used during the design and manufacturing phases of a project. Control can be adequately exercised because Bourns offers its own in-house design, tool making, screen-printing, cermet firing and injection molding capabilities, in addition to the development of our own proprietary resistance inks.

The Bourns® Automotive Division operates with its own Automotive Sales team to ensure experienced support is always available at the customer's location. Further specialized technical support is offered by each product line with local Field Applications Engineers to assist with the design process.

- | | |
|---|------------------------------------|
| 1 Headlight Range Sensor | 8 Transmission Speed Sensor |
| 2 Exhaust Gas Recirculation | 9 Throttle Position Sensor |
| 2 Diesel Injection Sensor | 9 Pedal Angle Sensor |
| 3 ABS Wheel Speed Sensor | 10 Dashboard Dimming |
| 4 Accelerator Pedal Sensor | 11 Airflap Position Sensor |
| 5 Motor Position Sensor for EPAS | 12 Sunroof Control |
| 6 Steering Angle Sensor | 13 Chassis Level Sensor |
| 6 Torque Sensor | 14 Fuel Level Sensor |
| 7 Brake Pedal Position Sensor | |

Automotive Sensors



Multiturn Steering Angle Sensor



Chassis Level Sensor



Steering Angle Sensor



Fuel Level Sensor



Angle Sensor for EGR (Exhaust Gas Recirculation)



Transmission Speed Sensor



Pedal Angle Sensor



Torque Sensor for EPS Steering Gear

Vehicle Dynamics Sensors

Product	Contacting	Non-Contacting	NC Technology	Rotary	Linear
Steering					
SAS Sensor for Power Assisted Steering		•	AMR	•	
SAS Sensor for Active Steering		•	AMR	•	
SAS Sensor for Integrated Torque Sensing		•	AMR	•	
Non-Contacting Torque Sensor		•	AMR	•	
NC Torque Sensor with Angle Index Feature		•	AMR	•	
Non-Clock Spring NC Torque Sensor		•	AMR	•	
BLDC Motor Position Sensor		•	AMR	•	
Differential Torque Sensor	•				•
Chassis					
Chassis Level Sensor	•			•	
Non-Contact Chassis Level Sensor		•	2 Axis/AMR	•	
Electronic Controlled Air Suspension Sensor		•	2 Axis		
Braking					
Rotary Brake Pedal Sensor		•	2 Axis/AMR	•	
ABS Wheel Speed Sensors		•	VR/HE/Induc.		

Engine & Powertrain Sensors

Product	Contacting	Non-Contacting	NC Technology	Rotary	Linear
Exhaust Gas Recirculation	•			•	
Exhaust Gas Recirculation (Nugget)		•	2 Axis Hall		•
Exhaust Gas Recirculation		•	2 Axis Hall	•	
Turbo Wastegate Sensor		•	AMR		•
Manifold Intake Sensor		•	2 Axis Hall		
ETC Pedal Sensor	•				•
Non-Contacting ETC Pedal Sensor		•	2 Axis Hall	•	
Diesel Injection Pump Sensor	•				•
Non-Contacting ETC Pedal Sensor		•	Hall Effect	•	
Non-Contacting Gear Shift Sensor		•	2 Axis Hall	•	
Contacting PRNDL Sensor	•			•	
Non-Contacting PRNDL Sensor	•		2 Axis Hall	•	
Non-Contact Linear DCT Sensor (to 25 mm)		•	AMR		•
Throttle Position Sensor		•	2 Axis	•	
Small Engine TPS Sensor (10 - 130 HP)	•			•	
Motorbike Gear-by-Wire Sensor	•			•	
Transmission Speed Sensor		•	VR/HE/Induc.		

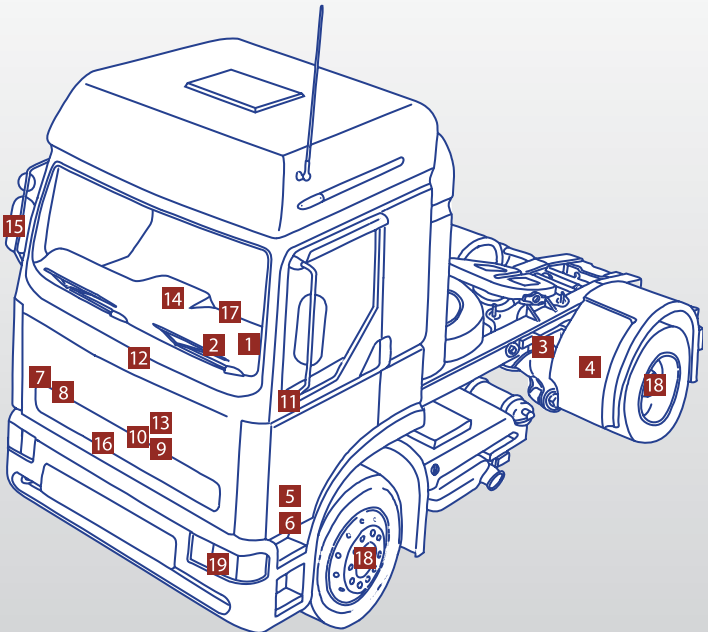
Comfort Sensors


Product	Contacting	Non-Contacting	NC Technology	Rotary	Linear
HVAC Air Flap Sensor	•			•	
HVAC Temperature Control	•			•	
Steering Reach & Rake Position Sensor	•				•
External Mirror Position Sensor	•			•	
External Mirror Position Sensor	•			•	
External Mirror Position Sensor with Memory	•			•	
4 Position Sensor - Door/Sunroof Control	•			•	
Linear Motion Seat Position Sensor	•				•
Linear Position Sensor - Headlamp Leveling	•				•
Linear Position Sensor - Headlamp Leveling	•				•
Non-Contacting Rear Door Position Sensor		•	2 Axis Hall	•	
Seat Position Sensor	•			•	

Commercial Vehicle Sensors

Active steering, electronically controlled suspension, anti-lock disc braking and exhaust gas recirculation are some examples of the increased presence of electronics in commercial vehicles. You probably know OEMs which supply these modules, but did you know that Bourns supplies the heart?

Bourns has provided custom position sensing solutions for over 15 years, beginning with the delivery of our custom linear brake wear sensor for commercial vehicle applications. This sensor operates each time the brake pedal is depressed to determine disc pad wear; the sensor sends a signal to the brake ECU, which evenly distributes brake application to ensure even wear takes place. For fleet users this increases the interval between pad changes and enhances the safety of the vehicle by identifying the level of pad wear.





Bourns was one of the first independent sensor companies to supply Exhaust Gas Recirculation sensors for Euro II regulation truck engines; we are now supplying sensors for Euro 4 applications. These EGR sensors are based on either Bourns® proprietary ink or wiper system or alternatively our 2 Axis Hall Effect non-contacting technology, depending on the temperature profiles required. For high temperature, +180 °C operation, Bourns developed a contacting sensor ink system to perform within the constant 220 °C exposures while maintaining a 30 million full stroke life cycle demand. This capability is also suited to turbocharger position sensing applications.

As advancements in the reliability of commercial vehicles increase, Bourns invests in a continuous process of technical innovation. As existing technologies mature, it is fundamental to maintain our position as a dependable sensor supplier. As an example of our commitment to the progression of commercial vehicle design, we offer four different types of non-contacting sensors. We are focused on finding the most suitable technology for our customers' specific application requirements. Our non-contacting sensors are intended for applications with dither profiles extending above 200 million cycles and a duration measured in excess of 50 million full strokes. Solutions employing these technologies include the R117 2 Axis HE chassis level sensor, the J1843 R078 rotary sensor and the SAS6000 AMR based active steering sensor. Bourns automotive portfolio also includes sensors for wheel and transmission speed sensing and one of the few market proven non-contacting torque sensors. To date, Bourns has shipped over 4 million non-contacting torque sensors to the market.

- | | |
|---|---|
| 1 Steering Angle Sensor | 10 Throttle Position Sensor |
| 2 Differential Torque Sensor | 11 Pedal Position Sensor |
| 2 Non-contact Torque Sensor | 12 Gear Position Sensor |
| 3 Chassis Level Sensor | 13 Diesel Injection Pump Sensor |
| 4 Brake Wear Sensor | 14 HVAC Air Flap Sensor |
| 5 Master Cylinder Brake Sensor | 15 External Mirror Position Sensor |
| 6 Brake Pad Distance Sensor | 16 Transmission Speed Sensor |
| 7 Exhaust Gas Recirculation Sensor | 17 Steering Reach and Rake Sensor |
| 8 Turbo Waste Gate Sensor | 18 Wheel Speed (front & rear) |
| 9 Manifold Intake Sensor | 19 Headlamp Leveling Sensor |

Commercial Vehicle Sensors



Hall Effect Based Linear Position Sensor



Magneto Resistance Based Angular Position Sensor



Chassis Level Sensor



Non-contact Throttle Position Sensor



Torque Sensor for EPS Steering Gear



Brake Wear Sensor



ABS Wheel Speed Sensor



Transmission Speed Sensor

Vehicle Dynamics Sensors

Product	Contacting	Non-Contacting	Rotary	Linear
Steering				
SAS Sensor for Power Assisted Steering		AMR	•	
SAS Sensor for Active Steering		AMR	•	
SAS Sensor for Integrated Torque Sensing		AMR	•	
Differential Torque Sensor	•		•	
Chassis				
Chassis Level Sensor	•		•	
Non-Contact Chassis Level Sensor		2 Axis	•	
Electronic Controlled Air Suspension Sensor		2 Axis		•
Braking				
Brake Wear Sensor	•			•
Non-Contact Brake Wear Sensor		2 Axis		•
Brake Piston Valve Sensor	•		•	
Rotary Brake Wear	•		•	
Brake Pad Distance		AMR	•	

Engine & Powertrain Sensors

Product	Contacting	Non-Contacting	Rotary	Linear
Exhaust Gas Recirculation	•		•	
Exhaust Gas Recirculation (Nugget)		2 Axis Hall	•	
Exhaust Gas Recirculation		2 Axis Hall	•	
Turbo Wastegate Sensor		Hall Effect		•
Manifold Intake Sensor		2 Axis Hall	•	
ETC Pedal Sensor	•		•	
ETC Pedal Sensor	•			•
Diesel Injection Pump Sensor	•			•
ETC Pedal Sensor	•		•	
Diesel Injection Pump Sensor	•		•	
ETC Pedal Sensor		Hall Effect		•

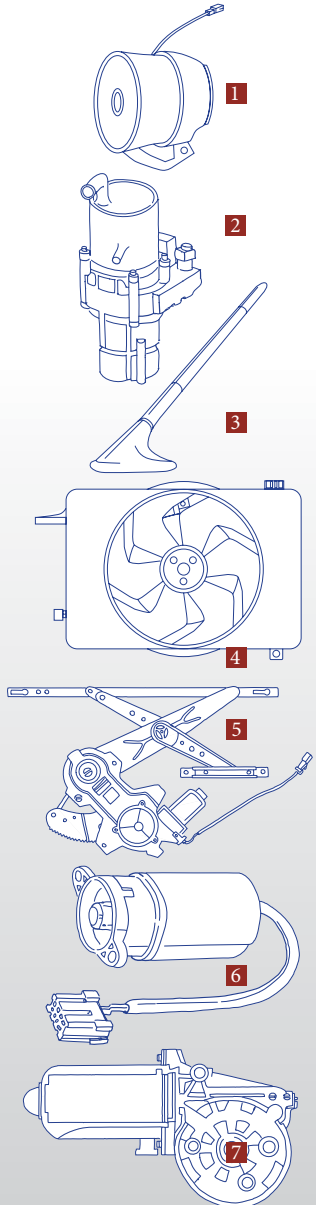
Comfort Sensors

Product	Contacting	Non-Contacting	Rotary	Linear
HVAC Air Flap Sensor	•		•	
HVAC Temperature Control	•		•	
Steering Reach & Rake Position Sensor	•			•
External Mirror Position Sensor	•		•	
External Mirror Position Sensor	•		•	
External Mirror Position Sensor with Memory	•		•	
4 Position Sensor - Door/Sunroof Control	•		•	
Linear Motion Seat Position Sensor	•			•
Seat Position Sensor	•		•	

Circuit Protection Applications

Passive electronic components constitute a major portion of growth in today's advanced automotive electronic systems. From electronic control units (ECUs) to zonal climate control, the demand for passive electronics technologies in the automotive industry continues to expand.

Bourns® Multifuse® Polymer PTC products offer solid state protection against over-temperature and/or overcurrent conditions. Designed specifically for automotive applications, the PTCs provide protection for application temperatures up to 125 °C. The resettable feature of the product allows the fuses to be located close to the load being protected instead of in a traditional fuse box. The product family operates under the TS16949 quality system to ensure all components are designed, developed, manufactured and installed to the highest automotive standards. In addition, the majority of the Multifuse® product line has been certified to AEC-Q200-Rev C. This specification defines the stress test requirements and reference test conditions for qualification of passive electrical devices in automotive applications as defined by a committee of automotive companies.



Typical examples of the electronic circuits in which Bourns® Multifuse® products are used are:

- Under the hood applications with new high temperature polymer PTC resettable fuses
- Steering column control modules
- Alarm modules
- Instrument panel/cluster protection
- Power Bus (e.g. AS System) - node protection
- Climate control units
- DC motor protection

Various types of Multifuse® PTC resettable fuses



Various motor applications



- | | |
|------------------------------|-------------------------------------|
| 1 Car Alarm Systems: | TVS Diodes, Multifuse® PTCs |
| 2 Power Steering Motors: | Metal Alloy Shunts, Multifuse® PTCs |
| 3 GPS Shark Fin Antennae: | ChipGuard® MLVs, Multifuse® PTCs |
| 4 Cooling & HVAC Systems: | ChipGuard® MLVs, Multifuse® PTCs |
| 5 Window Regulators: | Metal Alloy Shunts, Multifuse® PTCs |
| 6 Seat Adjustment Motors: | Metal Alloy Shunts, Multifuse® PTCs |
| 7 Sunroof Activation Motors: | Metal Alloy Shunts, Multifuse® PTCs |



Bourns, Inc.
Riverside, California
U.S. Headquarters

Our engineering and production centers

www.bourns.com

Engineering Centers



Bourns Sensors GmbH
Sauerlach, Germany



Bourns, Inc.
Janesville, Wisconsin
USA

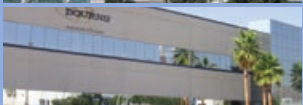


Bourns Kft.
Ajka, Hungary

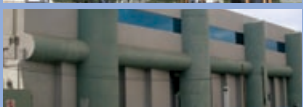
Production Centers



Bourns Ltd.
Xiamen, China



Bourns de Mexico
Chihuahua, Mexico



Bourns de Mexico
Tijuana, Mexico

Bourns Sensors GmbH

Robert-Bosch-Strasse 14 D-82054 Sauerlach

Phone: +49 (0) 8104 646-0

Fax: +49 (0) 8104 646-803

http: www.bourns.com

E-mail: automotive@bourns.com

Copyright © 2008 Bourns, Inc.
Litho in Germany • 04/08 • ASC0804

