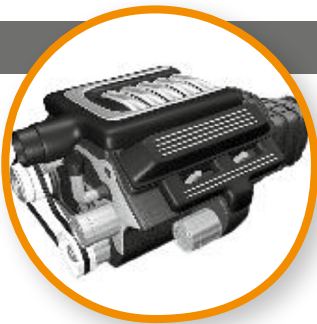


TE Connectivity's
**SENSOR
TECHNOLOGIES**
for the Automotive Industry

SENSOR TECHNOLOGIES FOR THE AUTOMOTIVE INDUSTRY

TE Connectivity (TE) is one of the largest sensor companies in the world, with innovative sensor solutions that help customers transform concepts into smart, connected creations. To transport passengers safely and efficiently, vehicles need data. Today's cars can sense and respond to changing conditions, inside and out.

TE sensors help provide the data for control, adaptation and response of vehicle functions that increase safety, comfort, and efficiency. Our technology is an integral part of many modern nervous systems in vehicles.



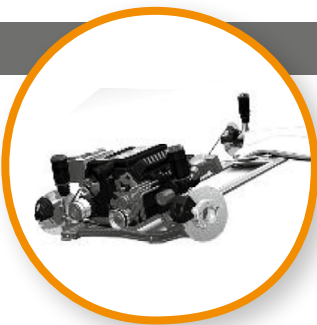
ENGINE/E-MOTOR

Our engine and e-motor sensors are used in vehicle applications such as travel sensor for turbo charger actuator, pneumatic (EGR) Cylinder, CAM and Crank Shaft Speed sensors and resolvers for e-motor commutation.



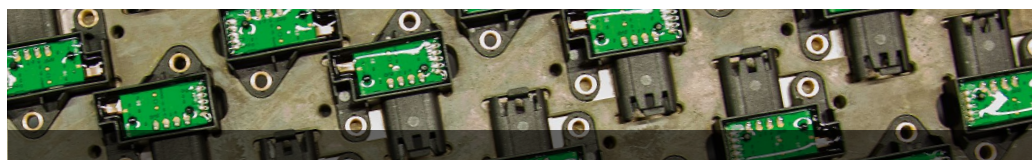
EXHAUST

TE provides a range of sensors for exhaust gas applications, such as urea quality, level and temperature, urea pump pressure and exhaust gas temperature (EGTS). These sensors help the OEM to comply with the latest emission regulations and significant performance improvement of modern aftertreatment systems.



CHASSIS

We provide a range of chassis solutions for roof and convertible switches, actuator and cylinder position, seat position and weight classification. Our humidity and temperature technologies are used in Heating, Ventilation and Air Conditioning (HVAC) systems to prevent wind screen fogging and for energy management.



TE Connectivity is committed to making cars safer, greener and more connected. We support this commitment by integrating innovative sensors in demanding application areas such as automated transmissions, engines, clutch, brake and other mission critical areas.

Our sensors are designed and manufactured to exacting specifications, often on a custom basis. Together with our customers, we are working to solve today's biggest application challenges in new and creative ways.



BRAKE

Our brake sensors are used in vehicle applications such as travel sensor for brake master cylinder position (optional redundancy), travel sensor for rear axle steering, rotary sensor for brake pedal position detection (optional redundancy); contactless brake light switch and wheel speed sensor. We also provide pressure sensors such as the vacuum brake booster sensor and brake line pressure for ABS/ESC modules.



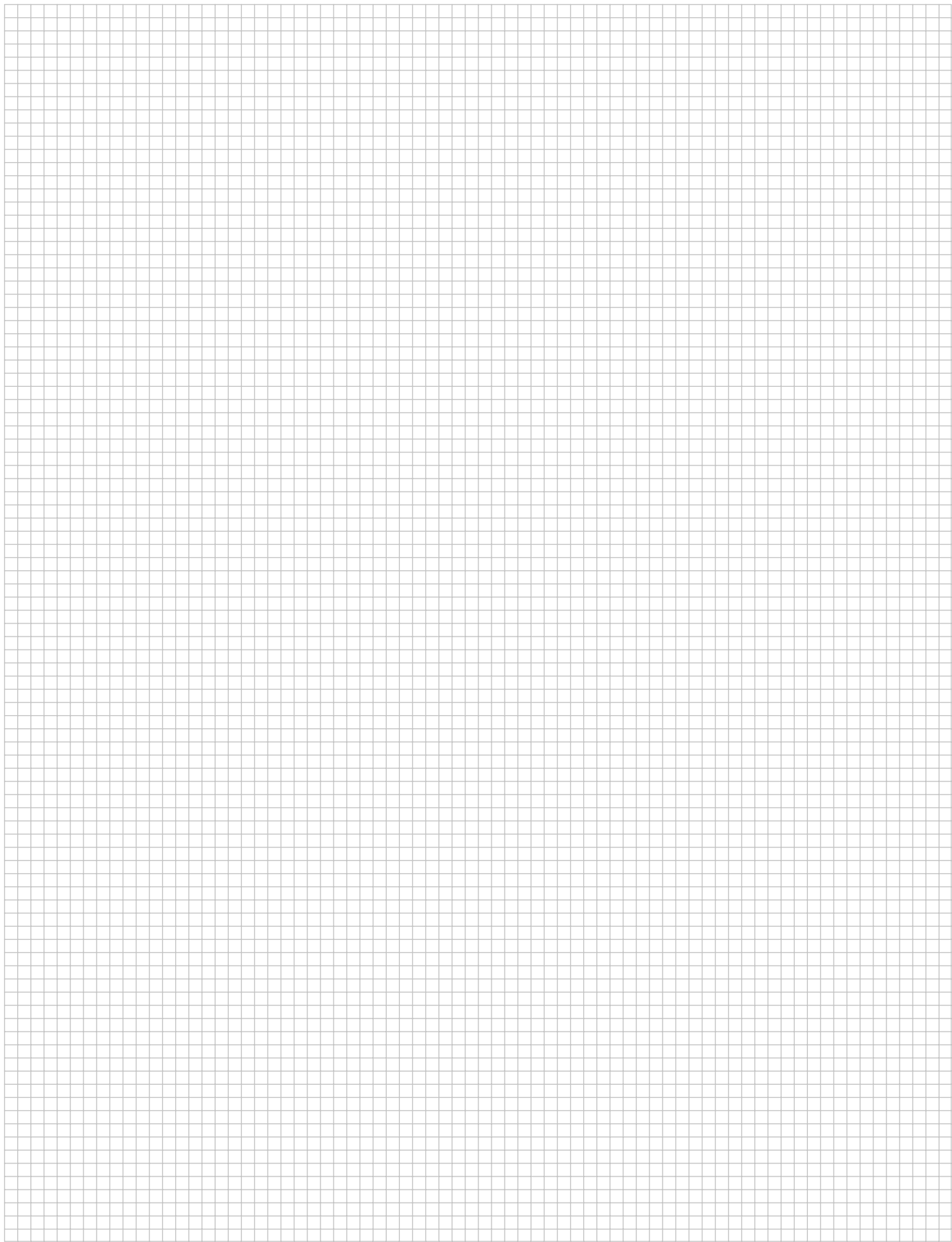
TRANSMISSION

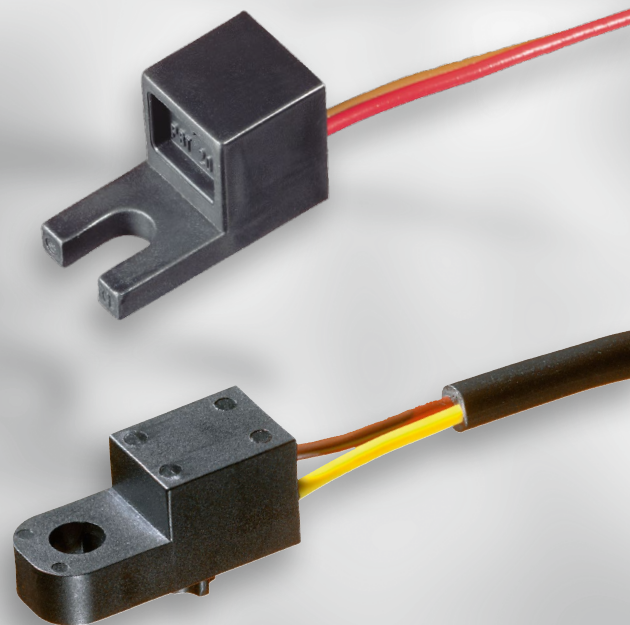
TE's transmission sensors are used in vehicle applications such as all gear / neutral detection for manual transmission (MT) to support start and stop function, drive mode (travel or rotary) for automatic (AT), continuously variable (CVT), or dual clutch (DCT) transmissions. We also provide pressure and temperature solutions.



CLUTCH

The clutch sensors are used in vehicle applications such as Permanent-magnetic Linear Contactless Displacement (PLCD) sensors for concentric slave cylinder and clutch slave cylinder, rotary sensors for clutch pedal position detection; contactless switch for clutch master cylinder and travel sensor for clutch master cylinder and Dual Clutch Transmission (DCT).





Platform Sensors

INTRODUCTION

In the automotive industry, development time is a key factor for successful market positioning. TE Connectivity's answer is a platform strategy for non-contact travel, angle and speed sensors.

Standardized designs and production processes offer short-term availability of fully functional sensors for system testing and low-volume production. Depending on the field of application, different technologies will be used.

The first platform is the PLCD travel sensor for measurement ranges up to 55mm. Thanks to the system's robustness, the possibility of large-scale integration and the high linear performance of PLCD in high-vibration and high-temperature applications, this technology is preferred for harsh environment systems (e.g. transmission, clutch).

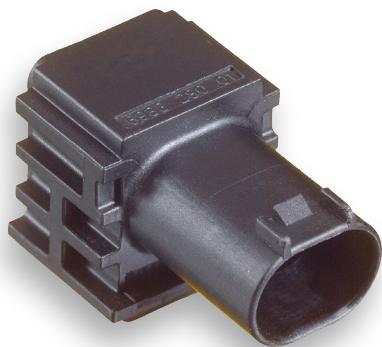
The second platform TE Connectivity can offer is the hall technology based travel and angular sensor for measurement ranges up to 40mm or angle up to 360°. Travel and angle measurement can be realized within one sensor package. The hall technology used is a 2D/3D measurement principle that results in a significant measurement performance increase compared to existing hall sensors.

This sensor exhibits high performance related to linearity error and temperature drift. It also enables the opportunity to incorporate 12V board net supply, safety level B according ISO 26262 and up to three outputs, which can operate as programmable linear or switch outputs.

Compared to inductive systems, TE Connectivity's hall sensor platform needs a minimum of space and makes more cost-effective production possible. Our platform sensors are all suitable for IP class applications of 69K, which makes them suitable for harsh automotive environments. At the same time, the hall platform sensors can be programmed to suit customer specifications regarding measurement range and electrical interface (PWM or analog).

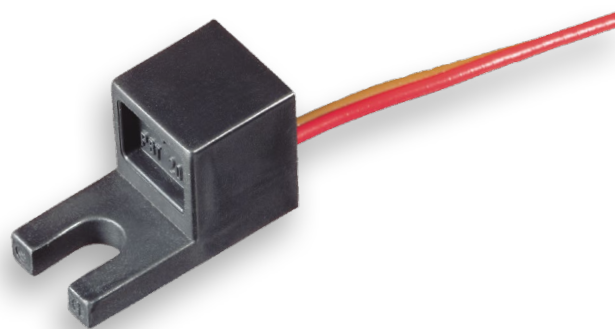
Our third platform is the speed sensor for gear speed measurement. This back-biased hall sensor is triggered by ferromagnetic gear or tone wheel. Thanks to its compact and robust packaging with integrated sealed connector interface (IP69K), it can be used for all kinds of application (e.g. transmission). The sensor also provides diagnostic functionality, thanks to two-wire technology, and is validated for a temperature range from -40°C to +150°C.

Hall Flap Switch SW01M



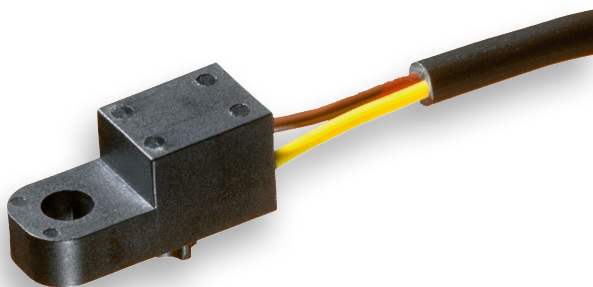
Industry	Automotive
Application	Powertrain, Chassis, Brake
Functions	Digital position detection
Technology	Hall Switch (magnet integrated in sensor)
Features	<ul style="list-style-type: none"> • Triggered by ferromagnetic part (no moving magnet) • Current interface • Sealed connector interface • Diagnostics ability due to two-wire interface • IP69K • Temperature range -40°C ... 105°C

Hall Switch SW01P



Industry	Automotive
Application	Body and Chassis
Functions	Digital position detection
Technology	Hall Switch (magnet integrated in sensor)
Features	<ul style="list-style-type: none"> • Triggered by ferromagnetic part (no moving magnet) • Current interface • Diagnostics ability due to two-wire interface • Temperature range -40°C ... 105°C

Hall Switch SW02P



Industry	Automotive
Application	Body and Chassis
Functions	Digital position detection
Technology	Hall Switch (magnet integrated in sensor)
Features	<ul style="list-style-type: none"> • Triggered by ferromagnetic part (no moving magnet) • Current interface • Diagnostics ability due to two-wire interface • Temperature range -40°C up to 105°C

Hall Sensor T40MC2



Industry	Automotive Industrial & Commercial Transportation
Application	Engine, Transmission, Clutch, Chassis, Brake
Functions	Measuring travel position
Technology	Hall (moving magnet)
Features	<ul style="list-style-type: none"> • Non-contact measurement up to 40mm • Highly insensitive to vibration • Temperature up to +150°C • Analog or PWM interface • Small geometry • Optional redundancy • Supply 5V (optional 12V) • 4-way MCON connector interface

PLCD-15M



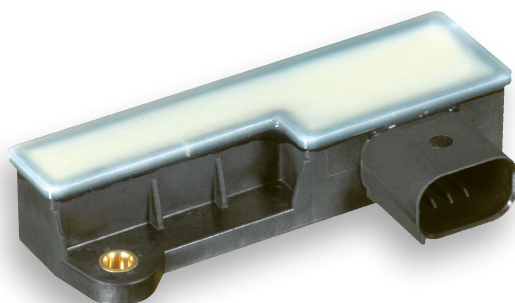
Industry	Automotive
Application	Transmission, Chassis, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none"> • Measurement range 5-18mm • Highly insensitive to vibration • Temperature up to 150°C • Redundancy possible • Analog or PWM interface • Supply 5V (optional 12V) • 4-way MQS sealed contact • Wide range of magnet design

PLCD-25M



Industry	Automotive
Application	Transmission, Brake, Clutch, Steering, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none"> • Measurement range 15-28mm • Highly insensitive to vibration • Temperature up to 150°C • Redundancy possible • Analog or PWM interface • Supply 5V (optional 12V) • 4-way MQS sealed contact • Wide range of magnet design

PLCD-50M



Industry	Automotive
Application	Transmission, Brake, Clutch, Steering, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none"> • Measurement range 25-53mm • Highly insensitive to vibration • Temperature up to 150°C • Redundancy possible • Analog or PWM interface • Supply 5V (optional 12V) • 4-way MQS sealed contact • Wide range of magnet design

Hall Sensor R360MC2



Industry	Automotive Industrial & Commercial Transportation
Application	Transmission, Chassis, Engine, Steering, Clutch, Brake
Functions	Measuring angle position
Technology	Hall (moving magnet)
Features	<ul style="list-style-type: none"> • Non-contact measurement up to 360° • Highly insensitive to vibration • Temperature up to +150°C • Analog or PWM interface • Small geometry • Redundancy possible • Supply 5V (optional 12V) • 4-way MCON connector interface

Multi-Coil Resolver (MCR)



Industry	Automotive
Application	E-Motor for hybrid and electrical vehicles
Functions	Measuring rotor position of E-Motor
Technology	MCR (Multi-Coil Resolver)
Features	<ul style="list-style-type: none"> • Non-contact measurement of rotor position • Analog output • High accuracy • Temperature up to +150°C • Rotational speed up to 20.000 rpm • Adaptable to pole pairs of E-Motor

Single Coil Resolver (SCR)



Industry	Automotive
Application	E-Motor for hybrid and electrical vehicles
Functions	Measuring rotor position of E-Motor
Technology	SCR (Single Coil Resolver)
Features	<ul style="list-style-type: none"> • Non-contact measurement of rotor position • Analog output • High accuracy for high temperature applications • Slim design for IMG applications in combination with oil • Rotational speed up to 20.000 rpm • Adaptable to pole pairs of E-Motor

Speed Sensor



Industry	Automotive
Application	Transmission
Functions	Measuring gear speed
Technology	Hall (with integrated magnet)
Features	<ul style="list-style-type: none"> • Triggered by ferromagnetic gear wheel • Current interface with direction detection • Sealed connector interface • Diagnostics ability due to two-wire interface • IP6K9 • Temperature range -40°C up to +150°C

H2TG/D Defogging Sensor



Industry	Automotive
Application	Cabin energy management and defogging (HVAC)
Functions	Measuring dew point and windshield temperature measurement
Technology	Capacitive
Features	<ul style="list-style-type: none"> • Humidity range: 0% RH to 100% RH • Temperature range: -40°C to +125°C • Calibration: ± 1.5° DP at 10°C, ± 0.8°C at 25°C • Operating voltage: 12V • Analog and digital (LIN) output

PLCD-15M



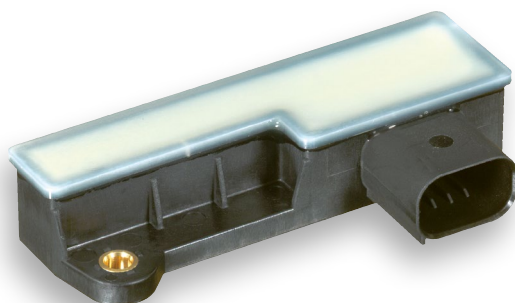
Industry	Automotive
Application	Transmission, Chassis, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none">• Measurement range 5-18mm• Highly insensitive to vibration• Temperature up to 150°C• Redundancy possible• Analog or PWM interface• Supply 5V (optional 12V)• 4-way MQS sealed contact• Wide range of magnet design

PLCD-25M



Industry	Automotive
Application	Transmission, Brake, Clutch, Steering, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none">• Measurement range 15-28mm• Highly insensitive to vibration• Temperature up to 150°C• Redundancy possible• Analog or PWM interface• Supply 5V (optional 12V)• 4-way MQS sealed contact• Wide range of magnet design

PLCD-50M



Industry	Automotive
Application	Transmission, Brake, Clutch, Steering, Engine
Functions	Measuring travel or angle position
Technology	Active PLCD (moving magnet)
Features	<ul style="list-style-type: none">• Measurement range 25-53mm• Highly insensitive to vibration• Temperature up to 150°C• Redundancy possible• Analog or PWM interface• Supply 5V (optional 12V)• 4-way MQS sealed contact• Wide range of magnet design

