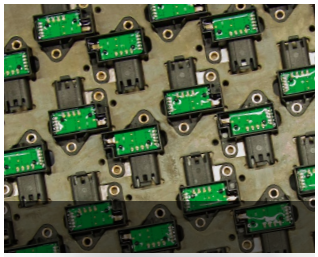


TE Connectivity's

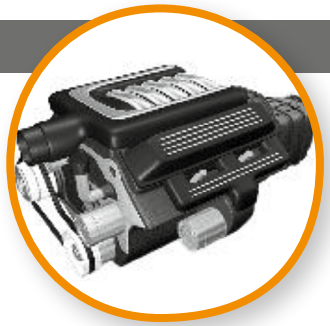
SENSOR TECHNOLOGIES

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

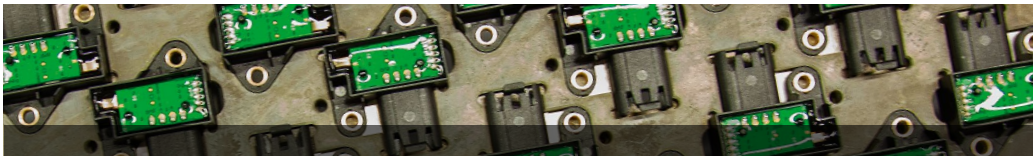
Our engine and e-motor sensors are used in vehicle applications such as travel sensor for turbo charger actuator, pneumatic (EGR) Cylinder, CAM and Crank Shaft Speed sensors and resolvers for e-motor commutation.

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).

Clutch Sensors

INTRODUCTION

Our clutch sensors are used in vehicle applications such as Concentric Slave Cylinder (CSC) and clutch slave cylinder position, rotary clutch pedal and Clutch Master Cylinder (CMC) position, and Dual Clutch Transmission (DCT) travel.

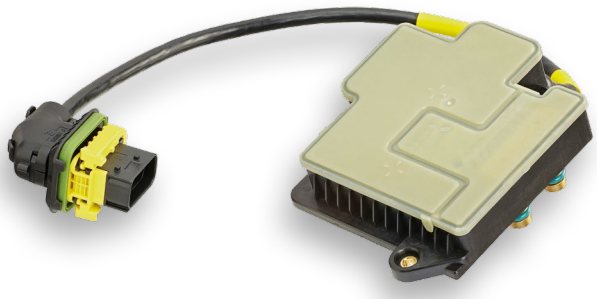
Position

- Clutch Pedal
- Master Cylinder CMC
- Slave Cylinder CSC
- Clutch Actuator

Pressure

- Clutch Fluid

Clutch Position and Pressure Sensor



Industry Industrial & Commercial Transportation

Application Dual Clutch Transmission for Delivery Trucks

Functions Measuring piston position of concentric slave cylinder

Technology 2 PLCD Sensors
2 Pressure Sensors

Features
- Non-contact measurment
- Operating Temperature -40° C ... 140° C
- Integrated module with two position and two pressure sensors
- Travel range: 0 - 42 mm
- Pressure range: 0 - 10 bar (20 bar burst pressure)
- HDSCS sealed connector for harsh environment

Differential Axle Clutch Position Sensor

Industry Automotive
Industrial & Commercial Transportation

Application Position of differential locking clutch

Functions Determine the position of clutch for electronic locking

Technology Hall (moving magnet)

Features
- Non-contact measurement
- Small package and robust design
- Up to 3 output channels (witch or sensor)
- Integrated magnetic shield to minimize external magnetic influences
- 3pos MCON sealed connector interface
- Operating temperature: -40° C ... 150° C

Dual Clutch Position Sensors

Industry Industrial & Commercial Transportation

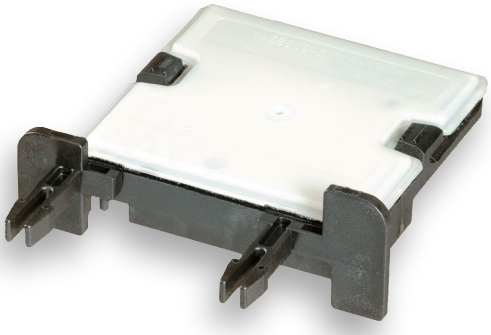
Application Dual Clutch Transmission

Functions Measure position of shift rails/forks (linear) and shift lever selector (angular)

Technology 3D Hall (moving magnet)

Features
- Non-contact linear travel and rotary measurement
- Robust design for truck application
- Pigtail solutions with routing protection and pre-capture fasteners
- Operating temperature: -40° C ... +150° C

Dual Clutch Position Sensor



Industry Automotive

Application Dual Clutch Transmission

Functions Measuring piston position of clutch actuator

Technology Active PLCD (moving magnet)

Features
- Two sensors in one housing
- Small and robust design
- Oil sealed design
- Easy assembly

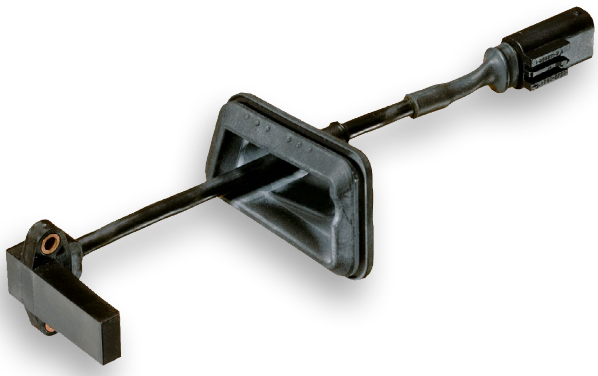
Clutch Position Sensor – Option 1

Industry	Automotive
Application	Cruise control, Engine management, Interlock, Electrical park brake
Functions	Measuring piston position of Clutch Master Cylinder
Technology	Hall (moving magnet)
Features	• Non-contact measurement through cylinder wall • Up to three switching points or travel measurement up to 40mm

Clutch Position Sensor – Option 2

Industry	Automotive
Application	Cruise control, Engine management, Interlock
Functions	Measuring piston position of Clutch Master Cylinder
Technology	Hall (moving magnet)
Features	• Non-contact measurement through cylinder wall • Up to three switching points • Small and flat design

Clutch Position Sensor – Option 3

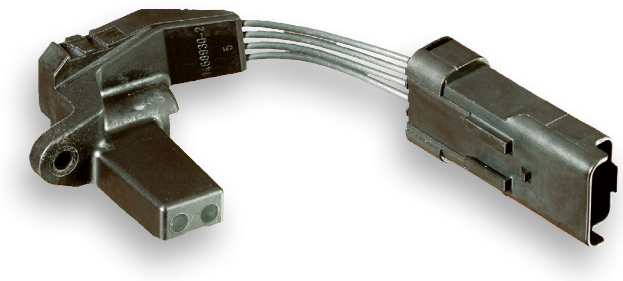


Industry	Automotive
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder inside the gearbox
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Robust design (temperatures up to +160° C) • Signal processing in transmission controller

Clutch Position Sensor – Option 4

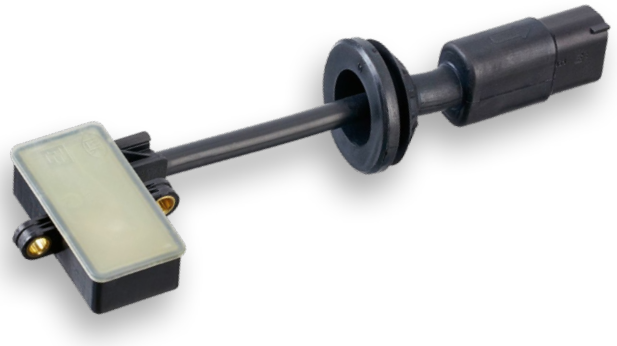
Industry	Automotive
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Short term peak temperature up to +150° C

Clutch Position Sensor – Option 5



Industry	Automotive
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder inside the gearbox
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Robust design (temperatures up to +160° C) • Signal processing in transmission controller

Clutch Position Sensor – Option 5

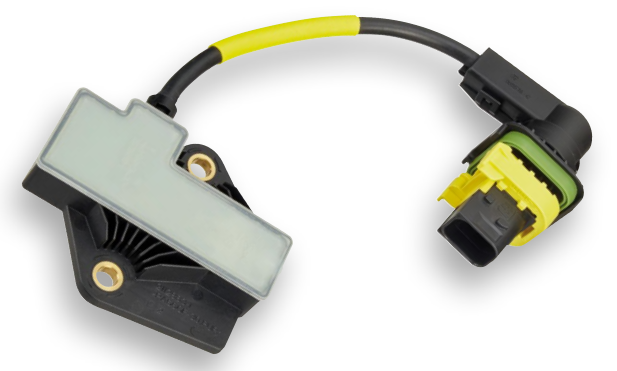


Industry	Automotive
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Short term peak temperature up to +150° C

Clutch Position Sensor – Option 1

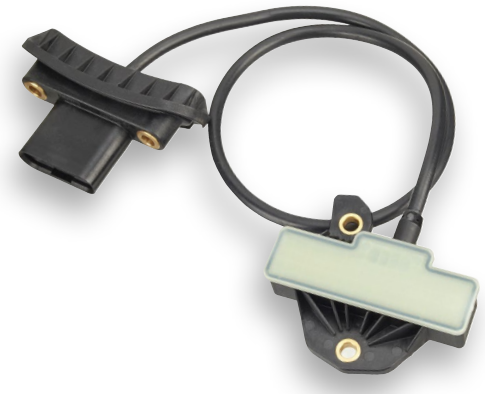
Industry	Industrial & Commercial Transportation
Application	Automated Manual Transmission (AMT) for truck
Functions	Measuring piston position of Clutch Slave Cylinder
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement through cylinder wall • Robust design for truck application

Clutch Position Sensor – Option 2



Industry	Industrial & Commercial Transportation
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Highly insensitive against vibration and temperature (up to +150° C) • Pigtail interface with truck compatible connector

Clutch Position Sensor – Option 3



Industry	Industrial & Commercial Transportation
Application	Automated Manual Transmission (AMT)
Functions	Measuring piston position of Concentric Slave Cylinder
Technology	Passive PLCD (moving magnet)
Features	• Non-contact travel measurement • Highly insensitive against vibration and temperature (up to +150° C) • Pigtail interface with truck compatible connector

Hall Sensor T40MC2

Industry	Industrial & Commercial Transportation
Application	Clutch, Engine, Transmission, Chassis, Brake
Functions	Measuring travel position
Technology	Hall (moving magnet)
Features	• Non-contact measurement up to 40mm • Highly insensitive to vibration • Temperature up to +150° C • Analog or PWM interface • Small geometry • Optional redundancy • Supply 5 V (optional 12 V) • 4-way MCON connector interface

Platform Sensor Clutch Master Cylinder (CMC)

Industry	Automotive
Application	Start-/Stop System
Functions	Travel sensor for Clutch Master Cylinder (CMC)
Technology	Hall Array
Features	• Operating voltage: 12 V (6-16 V) • Operating temperature: -40° C ... +80° C • Operating travel range: 33.5mm • Analog and digital (SENT) output: Analog output (2 switch signals and 1 PWM output) • Accuracy over lifetime: Accuracy of switch signal: ±3mm; accuracy of PWM output: ±5 % • Compliance with ASIL “C”