TE Connectivity’s
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).
Our transmission sensors are used in vehicle applications such as neutral detection sensor for Manual Transmission (MT) to support the start and stop function; drive mode sensor (travel or rotary measurement) for Automatic Transmission (AT), Continuously Variable Transmission (CVT), and Dual Clutch Transmission (DCT).

Transmission Sensors

INTRODUCTION

Position
- All Gear Detection
- Drive Mode (P - R - N - D - L)
- DCT Gear / Shift
- Clutch

Pressure
- Transmission Control Unit (TCU) Hydraulic Oil
- Pneumatic Air
- Transfer Case 4WD

Temperature
- Oil Sump
- Wet Clutch
- Oil Pump

Speed
- Input Speed (TISS)
- Output Speed (TOSS)
- Gear Speed
<table>
<thead>
<tr>
<th>Sensor Technologies for the Automotive Industry</th>
<th>Transmission Sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Sensor Platform</td>
<td>Hall Sensor T40MC2</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td>Automotive</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Transmission, Engine, Clutch, Chassis, Brake</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Measuring gear speed, travel and angle position</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td>Hall (moving magnet)</td>
</tr>
</tbody>
</table>
| **Features**                                  | • 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 |

| AMT Position Sensor                           | Dual Clutch Position Sensor |
| **Industry**                                  | Automotive                |
| **Application**                               | Automated Manual Transmission (AMT) |
| **Functions**                                 | Measure position of shift rails / forks (linear) |
| **Technology**                                | 3D Hall (moving magnet)    |
| **Features**                                  | • Non-contact travel  
|                                              | • Robust design for truck application  
|                                              | • One fastener interface to reduce installation time  
|                                              | • 3D Hall with temperature compensation factor  
|                                              | • 4-way MCON sealed connector interface  
|                                              | • Operating temperature: -40°C ... +150°C |

| **Features**                                  | • Two sensors in one housing  
|                                              | • Small and robust design |

| Hall Sensor T40MC2                            | Dual Clutch Position Sensor |
| **Industry**                                  | Automotive                |
| **Application**                               | Dual Clutch Transmission   |
| **Functions**                                 | Measuring piston position of clutch actuator |
| **Technology**                                | Active PLCD (moving magnet) or Hall |
| **Features**                                  | • Two sensors in one housing  
|                                              | • Small and robust design |
Transmission Sensors

Drive Mode Sensor

Industry: Automotive
Application: Automated Transmission (AT)
Functions: Measuring drive mode position (PRND) inside the gearbox
Technology: Active PLCD (moving magnet) or Hall
Features:
• Non-contact travel measurement
• Robust and oil sealed design
• High measurements accuracy
• No wear and tear

All Gear Detection Sensor

Industry: Automotive
Application: Manual Transmission (MT)
Functions: Measuring gear and shift position
Technology: 3D Hall
Features:
• Non-contact rotary and travel measurement integrated in one housing
• Robust design

Gear Fork Position Sensor

Industry: Automotive
Application: Dual Clutch Transmission
Functions: Measuring gear fork position
Technology: Active PLCD (moving magnet) or Hall
Features:
• Non-contact measurement through transmission wall
• High life time accuracy
• Small magnet design

Neutral Position Sensor

Industry: Automotive
Application: Start-/Stop application
Functions: Measuring gear lever position inside manual transmission
Technology: Active PLCD (moving magnet) or Hall
Features:
• Non-contact measurement through transmission wall
• High life time accuracy
• Small magnet design
• Diagnostics ability due to two-wire interface
**Speed Sensor SP1M**

**Industry**  
Automotive

**Application**  
Transmission

**Functions**  
Measuring gear speed

**Technology**  
Hall (with integrated magnet)

**Features**  
- Triggered by ferromagnetic gear wheel
- Current interface with direction detection
- Sealed connector interface
- Diagnostics ability due to two-wire interface
- IP69K
- Temperature range: \(-40^\circ C ... +150^\circ C\)

**DCT Transmission Sensor Module**

**Industry**  
Automotive

**Application**  
Dual Clutch Transmission

**Functions**  
Measuring drive mode position and gear speed inside transmission

**Technology**  
Active PLCD or Hall

**Features**  
- Sensor module with integrated position and speed sensors
- Oil sealed pass through connector system
- Highly robust design

**DCT Transmission Sensor Module**

**Industry**  
Automotive

**Application**  
Dual Clutch Transmission

**Functions**  
Measuring shift fork position, gear speed and temperature inside transmission

**Technology**  
Hall and NTC

**Features**  
- Sensor module with integrated speed (2x), position (4x) and temperature sensors
- Oil sealed 12 pin pass through connector system
- Highly insensitive against vibration, temperature and pollution inside the transmission
Transmission Sensors

Gear-Shift-Split Detection Sensor

Industry: Industrial & Commercial Transportation
Application: Automated Manual Transmission (AMT)
Functions: Measuring gear-shift and split position
Technology: Active PLCD (moving magnet)
Features:
- Non-contact measurement
- High life time accuracy
- Small magnet design

Neutral Position Sensor

Industry: Automotive
Application: Start-/Stop application
Functions: Measuring gear lever position inside manual transmission
Technology: Hall (moving magnet)
Features:
- Non-contact measurement
- Oil tight connector interface
- High life time accuracy
- Small magnet design
- Diagnostics ability due to three-wire interface

Water in Fuel Detection Sensor

Industry: Automotive
Application: Fuel Filter
Functions: Water detection
Technology: Resistance measurement
Features:
- Flexible electrical interface (AC or DC, 12 V or 24 V)
- Different measurement levels
- Bayonet or thread interface
- Optional header or pigtail interface

Gear Detection Sensor

Industry: Industrial & Commercial Transportation
Application: Automated Manual Transmission
Functions: Measuring gear position
Technology: Active PLCD (moving magnet)
Features:
- Non-contact measurement
- High life time accuracy
- Small magnet design
- Highly insensitive to vibration, temperature and pollution inside the transmission
Transmission Sensors

Redundant Neutral Position Sensor

- **Industry**: Automotive
- **Application**: Start-/Stop application
- **Functions**: Measuring gear lever position inside manual transmission
- **Technology**: Active PLCD (moving magnet) or Hall
- **Features**:
  - Non-contact measurement through transmission wall
  - High lifetime accuracy
  - Small magnet design
  - Diagnostics ability due to two-wire interface

Shift Detection Sensor

- **Industry**: Industrial & Commercial Transportation
- **Application**: Automated Manual Transmission
- **Functions**: Measuring shift position
- **Technology**: Active PLCD (moving magnet)
- **Features**: Non-contact measurement, High lifetime accuracy, Small magnet design, Highly insensitive to vibration, temperature and pollution inside the transmission

Drive Mode / Transmission Rotary Sensor (TRS)

- **Industry**: Automotive
- **Application**: Transmission
- **Functions**: Drive mode and shift drum detection
- **Technology**: Hall 3D with integrated magnet
- **Features**:
  - Operating voltage: 5 ±0.5 V
  - Operating temperature: -40°C to -140°C
  - Operating travel range: 360°
  - Analog and digital (SENT) output
  - Accuracy over lifetime 1%
  - Compliance with ASIL “C”

Pressure Sensor Transmission

- **Industry**: Automotive
- **Application**: Transmission CVT, DCT, AT & others
- **Functions**: Measuring transmission oil pressure
- **Technology**: Semiconductor Strain Gage (SemSG)
- **Features**: Lightweight: <18 grams, Operating pressure: 1 - 80 / 20 bar (gauge), Proof pressure: >2x or more to operating range, Burst pressure: >500 bar or more to operating range, Operating temperature: -40°C to +140°C, Interface: Analog or SENT, Compliance with ASIL “B”, optional ASIL “C”