

Clutch driver assistance and clutch control



TRANSMISSION SYSTEMS

Clutch applications

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Context

In today's automotive world, driving comfort, safety and fuel economy are key objectives. Sensor solutions for driving assistance and clutch control systems have been developed to meet these needs.

Modern transmissions use electric or hydraulic actuators to engage or disengage the clutch. These actuators are either controlled automatically in automated manual (AMT) and dual clutch (DCT) transmissions or by a clutch pedal in manual transmissions (MT).

Driving comfort and the service life of the clutch components can be greatly enhanced by electronic driver assistance and clutch control systems. Possible functions include:

- Hill-holder
- Start lock
- Keyless start
- Automatic parking brake release
- Cruise control switch-off
- Peak torque limiter
- Anti-stall function
- Prevention of shifting into wrong gear
- Safe shifting and downshifting on slippery roads
- Clutch-riding alarm
- Clutch position indication

To do all this, the electronic control system requires information - creating a need for sensors.

Electricfil masters all the leading sensor technologies to bring you the right sensing solution for your every need.

Function needs

To implement driver assistance and clutch control functions, sensors are required to monitor the clutch position or status and send the information to the electronic control system.

Depending on the type of transmission, the position or status of the clutch is generally detected via the

position of the master and/or slave cylinder, the clutch release bearing or the clutch pedal.

Sensors needs

The sensors that provide this information must offer:

- High accuracy
- Small size
- Fast response
- Easy integration
- High reliability
- Diagnostic capabilities

Depending on where they are installed, they must also withstand severe environmental conditions:

- High temperatures
- Rapid temperature fluctuations
- Electromagnetic disturbances
- Vibrations
- Corrosive liquids

Integration

To offer more functions with higher reliability and lower cost, the trend is towards higher levels of integration for control systems. Various types of sensors can be combined in **sensor clusters** or in **mechatronic modules** that include processing, actuation and communication functions.

For instance, in today's electronic transmissions, sensors, actuators and the transmission control unit (TCU) can be combined in a single mechatronic module installed inside the gearbox and immersed in oil. Advantages include simplified wiring, connection and sealing, easy assembly and improved quality and process control.

Electricfil solutions

Electricfil Automotive masters **all leading sensor technologies** to produce optimum sensing solutions for every need. The solution path is based on more than 25 years of experience in the field.

- **Analysis of customer needs** to select the most suitable sensor type from our proven core technologies (LVDT, Hall, Eddy-Current, GMR, AMR, VR, etc.)
- **Determination of degree of integration** (single sensor, sensor cluster or mechatronic module)
- **Circuit design and ASIC development** if required
- **Selection of electronic components and assembly technology** (e.g. surface mounted devices, discrete components)
- **Package design**, including the selection of materials (PA, PPS, PBT, etc.), assembly process (laser, thermal or vibration welding), potting, overmolding and encapsulation techniques, sizing, etc.
- **Selection of interconnections** (leadframe, flex foil, cable harness, etc.)
- **Magnetic circuit design** (magnet materials, pole piece dimensions, etc.)
- **FMEA, reliability studies, computer simulations, prototyping, initial samples**, etc.

Electricfil sensing solutions for driver assistance and clutch control

- > [LVDT linear/angular position sensor](#)
- > [Hall linear/angular position sensor](#)
- > [Eddy-current linear position sensor](#)
- > [Hall linear position switch](#)