Innovative Testing Equipment

Torque sensors • Vehicle Applications • Actuators
Custom-made measuring solutions

As a leading drivetrain testing company, ATESTEO specialises in drivetrain and transmission testing combined with additional engineering and testing services. In the equipment sector, we offer products for the measurement, testing and analysis of complete drivetrains. In addition, based on over 30 years of experience and a high level of expertise, we develop custom-made solutions for your measuring tasks.

Broad offer

In an integrated approach, measurement systems, vehicle equipment and actuators are created that are used both on ATESTEO test benches as well as directly at OEMs as well as suppliers of the automotive industry. All test and measurement systems are developed at the highest technological level and can be coupled with the latest automation technology.

ATESTEO Equipment

Whether standardised or individually tailored to your requirements – with a broad technical range of products, we offer ideal torque measurement technology and high-end instruments in the equipment sector.

- **Measurement systems:** High-resolution torque and speed measuring systems with contact-free signal transmission for capturing stationary and highly dynamic processes.
- **Vehicle-installed measuring equipment:** Components for setting up high-quality telemetry systems, measurement technology for rotating transmission parts and complete vehicle equipment kits, and GSA (gearshift analysis systems).
- **Actuators:** From clutch and gas pedal controllers to state-of-the-art gearshift robots to automized test benches.
ATESTEO is the leading specialist for drivetrain testing combined with automotive product validation and drivetrain testing related engineering & equipment. We are among the top partners in the automotive industry and automotive suppliers internationally. With the high professional expertise of the employees in operational testing and pre/post-processing, transmissions and products are reliably verified in custom tests. ATESTEO is everywhere that drivetrain development takes place in the automotive industry. 130 test benches in Germany and China as well as offices in the US and Japan make a smooth solving of measurement, testing as well as analytical problems possible at any time.

**Implementation of highly dynamic tests**

With powerful technology, ATESTEO allows for highly dynamic, realistic testing on the test bench and thus reduces your trips in the test vehicles. A wide range of actuators and robots is available for the implementation of highly dynamic tests.

**Telemetry systems for contact-free energy and data transmission**

The telemetry technology developed by ATESTEO can be used in a variety of ways due to the different design. We can therefore also offer you very complex solutions, especially in the field of vehicle instrumentation.

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**Innovative measurement technology from ATESTEO**

- Gearshift robots, clutch actuation and other functions
- Torque measuring shafts from 1 Nm to 150 kNm
- Metrological equipping of transmissions, drive-trains and vehicles: Torque, speed, acceleration, temperature, pressure, force and other
- Analysis systems for manual transmissions with exact measurement of the shifting paths and forces
Torque sensors

All products and services are characterised by the great engineering expertise at ATESTEO. Created by engineers for engineers, our measurement systems are already comprehensively tested in the development phase under test bench conditions. Customised solutions allow for flexible test bench installations, the implementation of test programmes as well as detailed investigations for pre-engineering projects.

With product enhancements and improvements, additional goals can be achieved that are requested with respect to changing ambient and component temperatures and to the benefit of reliable handling. Special newly developed products for vehicle adaptation complete our product range in the field of vehicle measurement technology for you.
Torquemeter Fx iS

The torque measuring flange Fx iS uses infra-red high-performance LEDs for data transmission. It is completely EMC-safe due to optical data transmission and also does not emit any electromagnetic waves. Designed as a dual-range measuring shaft, it shortens your setup times considerably. In addition, it covers wide measuring ranges with one and the same flange pattern.

Performance features

- Integrated speed measurement
- Optical data transmission
- EMC safe
- Multi-point temperature detection for optimal temperature compensation
- Measuring ranges from 20 Nm to 130,000 Nm
- Standard measurement accuracy 0.05 % in the measuring ranges up to 10 kNm
- Engine-speed strength up to 25,000 rpm possible
- Optional magnetic speed measuring system
- Also available with separate stator electronics
Torquemeter series INLINE DF

With the torquemeter INLINE DF, an innovative measuring member in combination with the digital multi-channel telemetry allows for an extremely large range of installation and measurement arrangements. The two real DMS amplifiers in the rotors electronics are unique. The additional overload channel transmits up to 300% of the nominal torque. The rotor temperature is also transmitted. The flange dimensions of the INLINE DF correspond to the DIN standard and are compatible with existing systems.

INLINE DF in numbers

- Max. speed up to 20,000 rpm
- Accuracy class: 0.05 % F.S.
- A/D-converter: 24 Bit
- D/A for analogue output: 16 Bit
- Total sampling rate: 25 kHz
- Operating range temperature: 0...80 °C
- Nominal gap distance < 3 mm
- Limit torque: 300 %
- Custom measuring ranges by request

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<tr>
<th>INLINE DF1</th>
<th>INLINE DF2</th>
<th>INLINE DF3</th>
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<tr>
<td>50 - 500 Nm</td>
<td>200 - 1 kNm</td>
<td>1 kNm - 3 kNm</td>
<td>4 kNm - 5 kNm</td>
<td>5 kNm - 10 kNm</td>
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<td>PCD 84</td>
<td>PCD 101.5</td>
<td>PCD 130</td>
<td>PCD 155.5</td>
<td>PCD 196</td>
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User Interfaces

- Ethernet (10/100 Mbit)
- CAN2.0 (111 Bit, up to 1 kHz)
- Analogue output: 0 - 5 V, 0 - 10 V, ±5 V, ±10 V
- Frequency output: 10±5 kHz, 60±20 kHz, 60±30 kHz, 240±120 kHz
- Optional power output: 4 - 20 mA
- Magnetic speed sensor optional

Your advantage

The unique advantage of the inline torque sensor is its new measuring body. It is produced as a single-sided hollow shaft sensor. This feature allows for the positioning of the entire sensor directly on a cylindrical drive shaft. In this way, critical operating parameters of the dynamometer, such as the radial load and maximum speed, can be greatly improved.
Based on the multi-channel capability of the innovative ATESTEO sensor series, torque and tangential acceleration can be measured simultaneously. Dynamic phenomena can thus be analysed over the entire torque and speed range with high resolution.

**Torque**
- Very high speed ranges
- Accuracy class: 0.05 % F.S.
- A/D-converter: 24 Bit
- D/A for analogue output: 16 Bit
- Total sampling rate: 25 kHz
- Wide operating temperature range (adapted to the requirements of modern electric machines)
- Nominal gap distance < 3 mm
- Limit torque: 300 %
- Custom measuring ranges by request

**Acceleration**
- Input range: ±25 g (other areas available)
- Dynamics (3dB): DC - 1.5 kHz
- Non-linearity: ±0.15 % F.S.
- Shear force compensated
- Max. mechanical impact load 5,000 g
As a manufacturer and operator of torque measuring technology, we also provide the service of torque sensor calibration. Our calibration devices cover the range from 10 N·m to 80,000 N·m. We offer in-plant calibration and calibrations compliant to DIN 51309 from 10 to 10 kN·m. In-plant calibrations are offered from 10 kN·m to 80 kN·m. We are also able to calibrate many special applications. Calibration adaptors can be manufactured in-house, allowing for a quick turnaround.
Vehicle applications

In the vehicle application sector, ATESTEO offers all possibilities for metrological outfitting of your cars and commercial vehicles. Our services range here from vehicle instrumentation to the implementation and evaluation of measurements. Precise measuring equipment is used to record specific data from series or prototype vehicles and provide this data for the development of new vehicle concepts. Depending on the scope of the measuring systems installed in the vehicle, simple components can be characterised more closely and complex relationships can be assessed in detail by using the recorded data sets.
Adaptable telemetry systems

To determine the mechanical performance of rotating components, highly-specified telemetry systems are available to you at ATESTEO, which can be optimally adapted in form and functionality to the conditions, including new types of drive concepts. The optionally available central data recording provides for a time-synchronous processing of the measurement channels, including the measurement variables additionally read in via the vehicle bus (CAN). More extensive installations are supported in their functional reliability by the installation of an additional battery.

General reasons for vehicle tests

• Data validation
• Benchmark
• Performance testing of components
• General vehicle testing
• ECU/TCU calibration
• NVH
• Efficiency
• Component load
• Alignment controls (tumbling)
• RLD (road load data)
With the telemetric RFTS-1 set, ATESTEO implements basic torque and temperature measurements in vehicle drivetrains. It contains all of the components for assembly on site.

**RFTS-1 TELEMETRY**

- Easy to assemble and user-friendly
- Can be used for strain gauges or thermocouples
- Wireless data and energy transmission with only one coil
- Up to 70 mm distance between the transmitting coils
- Signal bandwidth 0...1 kHz (-3 dB)
- Power supply 9 - 36 V DC
- Low power consumption

**General data**
Temperature

Clutch wet friction elements

Clutch dry elements

Planetary gear pinion

MT synchroniser

Gear wheel temperature

Flywheel surface
GSA gearshift analysis

The gearshift analysis system GSA was developed by ATESTEO to objectively analyse the shifting mechanism of manual transmissions. The system is used in the vehicle and on the test bench and provides support for the following tasks:

• Vehicle comparison
• Concept comparison (competition, design, supplier products)
• Comparison of development phases (design iterations)
• Comparison of production variances
• Comparison of service life or temperature-dependent influences
• Comparison of subjective evaluations with objective characteristics
• Analysis of inner and outer shifting
• Improvement of the shifting quality

Performance features

• Quick and easy installation of the measurement equipment
• Measurement data are independent of the installation position of the sensor system
• Accurate measurement data for paths and forces
• Low measuring influence due to the low friction and minimal inertia
• The typical shifting zones are analysed and visualised – pre-synchronisation, synchronisation, double bump (zone of the 2nd pressure point), excess pressure range
• Calculation of characteristic variables, such as synchronisation force peak, shifting impulse, double bump
• Various functions for sorting for comparison and export of the parameters
• Independent of other licenced software

Customised analysis

The GSA system from ATESTEO is not only used for the objective evaluation of the gear change in the vehicle. It is also essential as an important tool for new transmission developments and integrations, tests of transmission components, comparison of lubricants and for quality assurance. It can be used to measure and analyse the influencing factors of the shifting quality. The system matured through many applications allows for an analysis that is optimally tailored to your needs.
Our actuators are specifically designed for use on test benches for transmissions and drivetrains. Originally designed only for use on ATESTEO’s own test benches, products were developed that can also be used at your location. The user’s requirements are thus directly incorporated into the development. All systems are therefore precisely tailored to your needs.

**GSE4 transmission shifting unit**

With GSE4 and GSE4HDC, ATESTEO offers you shifting units for use on drivetrain and transmission test benches. By retaining the vehicle’s specific shifting gate, it can quickly and easily be adapted to different types of transmissions. The separate parametrisation of shifting power and shifting speed as well as releasing the shift lever after completing the process allows for a realistic picture of shifting.

**Shifting robot with wide range of application**

The GSE4HDC shifting robot consists of two linear units for shifting and selecting direction driven by servo motors. A user-friendly user interface provides all necessary setup functions through a touchscreen. Among other things, the range of applications includes the graphic representation of shift forces and paths. This allows for a fast analysis of the typical sections within the shifting process.

Speeds and positions are recorded on the transmission shifting unit GSE4HDC using multi-turn encoders, which are embedded in the motors. The shifting forces are registered by a force measuring member integrated in the Z-axis. The dynamic recording and regulation of force, position and speed allow for a fully automatic and realistic shifting of all kinds of vehicle transmissions.

**Properties**

- Quick adaptation with the original shifting gate (MT, AMT, AT, DCT, CVT)
- Realistic simulation of human shifting behaviour (GSE4HDC)
- Dynamic shifting force control (GSE4HDC)
- Reproducible shifting behaviour (GSE4HDC)
- Relief of the shifting lever after shifting
- Simple intuitive touchscreen operation
- Interface for superordinate host system via CAN and digital input (optional)
- Integrated force measurement device, shifting and selection direction (GSE4HDC or optional)
Would you like to learn more about our products, solutions and services from the areas of measurement systems, vehicle applications and actuators? Then simply give us a call at +49 (0) 2404 9870 570 or e-mail us at equipment@atesteo.com. Your personal ATESTEO contact partner is happy to help you.

ATESTEO GmbH
Konrad-Zuse-Strasse 3
52477 Alsdorf
Germany
Telephone +49 (0) 2404 9870 0
Fax +49 (0) 2404 9870 109
E-mail info@atesteo.com