CLSx - Steering Effort Sensor

The innovative steering effort sensor CLS^x sets new standards in size of the housing as well as in resolution and accuracy of measurement values. The sensor is placed between steering column and original steering wheel of the vehicle, preserving all steering wheel functions.

The CLS^x captures precisely the parameters torque, steering angle and steering velocity. Additionally, it also acquires acceleration in the center of the steering column (x, y and z direction) as well as rotational acceleration.

Measurement data are digitized for a highly fail-safe data transfer, with a resolution of 16 bits (internally: 24 bits). Together with its innovative, ultra slim sensor body design, this leads to an unprecedented precision of torque measurement of 0.1% FS.

Highlights

- Ultra slim sensor body design for seamless integration with minimal extension of steering column
- All functions of the steering wheel are preserved
- Steering torque range ±100 Nm
- Measuring angle range ±1440 °
- Steering velocity range ±2048 °/sec
- Acceleration in x, y, z direction
- Rotational acceleration

For data output and parametrization, the receiver and control unit offers both analog and digital interfaces (CAN, Ethernet). At the 7.2 cm (2.83") color display (320 x 240 px) integrated in the control unit, all measurement values are displayed in physical dimensions.

The CLS^x steering sensor is particularly suitable for use in driving dynamics tests such as:

- ISO 4148 Steady-state skidpad
- ISO 7975 Circular braking
- ISO 7401 Steering angle jump or steer reverse
- ISO 3888 ISO lane change test (Moose-Test)
- ISO 7401 Sinus Wedel test
- ISO 17288 Steering pendulums
- ECE-R 79 Steering systems
- NHTSA Fishhook-Test (Rollover Resistance)

Overview of the available variants

Order Code		article number
H-SEN-CMX-CLSx100-ACC	CLS^x Steering Effort Sensor 100 Nm with acceleration sensor	1380006

For more information, contact:
Berlin: +49 - 30 - 46 70 90 - 0 Munich: +49 - 89 - 61 30 49 - 0

Included accessories

- Transportation case,
- Calibration certificate with test equipment,
- Remote control for autozero including remote cable,
- Ethernet cable,
- Receive unit,
- SD card ≥2 GB,
- Power adaptor,
- 8 screws for each: steering wheel adaptor and the
- steering column adaptor,
- Steering wheel puller,
- CD with manual,
- Mounting unit for the angle encoder bracket to a fix zero position.

Optional accessories

• H-SEN-CMX-CLS-REF	Reference Mark for zero position CLS^x Option Reference Mark for permanent storage of the zero position Only available with new order, no refit possible	1380003
• H-ZUB-CMX-CLS-ADP-LR-R	Steering wheel adaptor for CLS^x; blank without specific toothing; for manufacturing the specific toothing by yourself	1380008
• H-ZUB-CMX-CLS-ADP-LR-ST	Steering wheel adaptor for CLS^x; with matched toothing for known vehicles, only possible after confirmation of an existing adaptor for the car	1380016
• H-ZUB-CMX-CLS-ADP-LR-SP	Steering wheel adaptor for CLS^x; with new adaption for a matched toothing; technical specification of your steering wheel (drawings, example etc.) is to be provided by the customer for the development	1380004
• H-ZUB-CMX-CLS-ESP	ESP Upgrade for steering wheel adaptor	1380009
• H-ZUB-CMX-CLS-ADP-LS-R	Steering column adaptor for CLS^x; blank without special toothing; for manufacturing the special toothing by yourself	1380010
• H-ZUB-CMX-CLS-ADP-LS-ST	Steering column adaptor for CLS^x; with matched toothing for known vehicles, only possible after confirmation of an existing adaptor for the car	1380011
• H-ZUB-CMX-CLS-ADP-LS-SP	Steering column adaptor for CLS^x; with new adaption for a matched toothing; technical specification of your steering column (drawings, example etc.) is to be provided by the customer for the development	1380005
• H-ZUB-CMX-CLS-Momo	Momo steering wheel incl. adaptor to CLS^x	1380012

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Optional accessories

- H-ZUB-CMX-CLS-Momo Momo steering wheel incl. adaptor to CLS^x 1380012

Only possible after confirmation of an existing adaptor for the car.

Further components

- H-TEL-CMX-DX-FRAME Mounting frame for one receiver unit 1350239

Mounting frame for one receiver unit.
Optionally with protection cap for thumbwheel.

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Technical Specs - CLSx

Steering Torque		
Parameter	**Value**	**Remarks**
Measuring principle	temperature compensated strain gauge application	
Measurement range	±100 Nm	others upon request
Accuracy	0.1% FS	
Bandwidth	0 to 800 Hz	sampling rate 5 kHz

Steering Angle		
Parameter	**Value**	**Remarks**
Measuring principle	incremental angle encoder	
Measurement range	±1440 °	
Accuracy	0.045 °	
Bandwidth	0 to 800 Hz	sampling rate 5 kHz

Steering velocity range (angular velocity)		
Parameter	**Value**	**Remarks**
Measuring principle	Calculated from angle	
Measurement range	±2048 °/s	
Bandwidth	0 to 800 Hz	sampling rate 5 kHz

Acceleration		
Acceleration x, y and z	in the center of the steering column, measurement range up to 5 g in x, y and z direction	
Rotational acceleration	measurement range ±10000 °/sec^2	

General Data		
Sensor height	approx. 30 mm	w/o adaptors
Sensor weight	approx. 0.6 kg	w/o adaptors
Overload	>100% of the measurement range	
Mech. breaking torque	>500 Nm	
Adaption	special adaption sets for any car or truck manufacturer available	individual adaptor for steering wheel and steering column
Moment of inertia sensor steering wheel or column adaptor	 approx. 3000 g cm^2 typ. approx. 500 g cm^2	
Working temperature steering effort sensor control unit	 -20 °C to +80 °C -20 °C to +65 °C	

Control Unit		
Power supply	9 to 36 V DC	
CAN-Output	freely configurable	
Analog output	freely configurable, output range max. ±10 V	
Auto zero	with push-button for torque and angle at the panel or by remote control	

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