

CLSx Measuring Wheel

The innovative steering effort sensor CLSx 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 CLSx 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.



CLSx Measuring Wheel

- Ultra slim sensor body design for seamless integration with minimal extension of steering column
- All functions of the steering wheel are preserved
- Measurement ranges:
 - Torque ± 100 Nm
 - Angle of measurement $\pm 1440^\circ$
 - Steering velocity $\pm 2048^\circ/\text{sec}$
- 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.



CLSx Control unit

Applications

- 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)

Delivery scope

- Description: CLSx Measuring Wheel 100 Nm
- Designation: H-SEN-CMX-CLSx100-ACC
- Art.-No.: **1380006**

Included accessories on page 2

CLSx Measuring Wheel

Included accessories

- Calibration certificate • CD with manual
- Remote control for autozero including remote cable
- Receive unit • SD-card ≥ 2GB
- Transportation case • Power adaptor • Ethernet cable
- Steering wheel puller
- Mounting unit to a fix zero position
- Mounting screws for steering wheel adaptor and steering column adaptor



CLSx Measuring Wheel with transport case

Optional accessories

Order code	Description	Art.-No.
H-SEN-CMX-CLS-REF	Reference mark for zero position, only available with new order, no refit possible	1380003
H-ZUB-CMX-CLS-ADP-LR-R	Steering wheel adaptor for CLSx without specific tothing, for manufacturing specific tothing by yourself	1380008
H-ZUB-CMX-CLS-ADP-LR-ST	Steering wheel adaptor for CLSx; with matched tothing 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 CLSx; with new adaption for a matched tothing; 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	ESP Upgrade for steering wheel adaptor	1380009
H-ZUB-CMX-CLS-ADP-LS-R	Steering column adaptor for CLSx; blank without special tothing; for manufacturing the special tothing by yourself	1380010
H-ZUB-CMX-CLS-ADP-LS-ST	Steering column adaptor for CLSx; with matched tothing 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 CLSx; with new adaption for a matched tothing; 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 CLSx, only possible after confirmation of an existing adaptor for the car	1380012
H-TEL-CMX-DX-FRAME	Mounting frame for one receiver unit, optionally with protection cap for thumbwheel	1350239

CLSx Measuring Wheel

Technical data

Steering torque

Measuring principle:	Temperature compensated strain gauge application
Measuring range:	±100 Nm, others on request
Accuracy:	0,1% f.s.
Bandwidth:	0 - 800 Hz, sampling rate 5 kHz

Steering angle

Measuring principle:	Incremental angle encoder
Measuring range:	±1440 °
Accuracy:	0,045 °
Bandwidth:	0 - 800 Hz, sampling rate 5 kHz

Steering velocity range (angular velocity)

Measuring principle:	Calculated from angle
Measuring range:	±2048 °/s
Bandwidth:	0 - 800 Hz, sampling rate 5 kHz

Acceleration

Acceleration x,y,z:	In the center of the steering column
Measuring range:	Up to ±5 g in x, y and z direction
Rotational acceleration:	±10000 °/s ²

General data

Sensor height:	Approx. 30 mm without adaptor
Sensor weight:	Approx. 600 g without adaptor
Overload:	>100% of the measuring range
Mech. breaking torque:	>500 Nm
Adaption:	Special adaption sets for any car or truck available, individual adaptors for steering wheel and steering column
Moment of inertia	
• Sensor:	Approx. 3000 g cm ²
• Steering wheel / column adaptor:	Typ. approx. 500 g cm ²
Temperatures	
• Steering effort sensor:	-20 - +80 °C
• RCI (control unit):	-20 - +65 °C

Control unit

Power supply:	9 - 36 VDC
CAN-Output:	Freely configurable
Analogue output:	Freely configurable, max. ±10 V
Auto zero:	With push-button for torque and angle at the panel or by remote control