

## CLSx - Steering Effort Sensor

Data Sheet Version 1.2



The innovative steering effort sensor CLS<sup>x</sup> 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<sup>x</sup> captures precisely the parameters torque, steering angle and rotational velocity. Optionally, 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  $\pm 100$  Nm or  $\pm 200$  Nm
- Rotational velocity range  $\pm 1000^\circ/\text{sec}$
- Acceleration in x, y, z direction (optional)
- Rotational acceleration (optional)

For data output and parametrization, the receiver and control unit offers both analog and digital interfaces (CAN, Ethernet). At the OLED display integrated in the control unit, all measurement values are displayed in physical dimensions.

### Overview of the available variants

Order Code		article number
H-SEN-CMX-CLSx100-ACC	CLS <sup>x</sup> Steering Effort Sensor 100 Nm with acceleration sensor	1380006
H-SEN-CMX-CLSx200-ACC	CLS <sup>x</sup> Steering Effort Sensor 200 Nm with acceleration sensor	1380007

### Included accessories

Transportation case  
(only with CLS<sup>x</sup>),  
Remote control for autozero  
incl. Remote cable,  
Ethernet cable,  
Receive unit,  
SD card  $\geq 2$  GB,  
Power adapter,  
Mounting of the angle encoder bracket to a fix zero position.



Optional accessories

- H-SEN-CMX-CLS-REF      Reference Mark for zero position      1380003  
 CLS<sup>x</sup> Option Reference Mark for permanent storage of the zero position  
 Only available with new order, no refit possible
- H-ZUB-CMX-CLS-ADP-LR-R      Steering wheel adaptor for CLS<sup>x</sup>; blank without specific tothing; for manufacturing the specific tothing by yourself      1380008
- H-ZUB-CMX-CLS-ADP-LR-ST      Steering wheel adapter for CLS<sup>x</sup>; 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 CLS<sup>x</sup>; 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 Upgrade for steering wheel adapter      1380009
- H-ZUB-CMX-CLS-ADP-LS-R      Steering column adapter for CLS<sup>x</sup>; blank without special tothing; for manufacturing the special tothing by yourself      1380010
- H-ZUB-CMX-CLS-ADP-LS-ST      Steering column adapter for CLS<sup>x</sup>; 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 CLS<sup>x</sup>; 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. adapter to CLS<sup>x</sup>      1380012  
 Only possible after confirmation of an existing adaptor for the car.



Further components

- H-TEL-CMX-DX-FRAME2      Mounting frame for one receiver unit      1350239  
 Mounting frame one receiver unit  
 Optionally with protection cap for thumbwheel.



## Technical Specs - CLSx

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Steering Torque		
Parameter	Value	Remarks
Measuring principle	temperature compensated strain gauge application	
Measurement range	$\pm 100$ Nm or $\pm 200$ Nm	choose when ordering
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	$\pm 1440^\circ$	
Accuracy	0.045°	
Bandwidth	0 to 800 Hz	sampling rate 5 kHz

Rotational velocity		
Parameter	Value	Remarks
Measuring principle	Calculated from angle	
Measurement range	CAN: $\pm 1000^\circ/\text{s}$	
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 5g in x, y and z direction	
Rotational acceleration	measurement range $\pm 10000^\circ/\text{sec}^2$	

General Data		
Parameter	Value	Remarks
Sensor height	approx. 30 mm	w/o adapters
Sensor weight	approx. 0.6 kg	w/o adapters
Overload	>100% of the measurement range	
Mech. breaking torque	>500 Nm	
Adaption	special adaption sets for any car or truck manufacturer available	
Working temperature	-20°C to +80°C	

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