KISTLER

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MSW Sensors

Type CMSWA...

Universal Measurement Steering Wheels

For non-contact measurement of steering moment, steering angle and steering speed.

- Non-contact optical steering angle sensor with incorporated electronics
- 50 N·m version for passenger cars, 250 N·m version for utility vehicles
- Resolution up to 7 200 pulses/rotation (with MSW Processor)
- Low fitting depth
- 100 % overload protection on nominal range
- Low mass moment of inertia

Description

MSW sensors are measuring steering wheels designed especially for use with passenger cars and utility vehicles.

MSW sensors mount between the steering wheel and the steering shaft. A central aperture makes mounting easy and also allows to feed cables, eg. for airbag or multifunction steering wheel, through it. To permit universal application, the sensors are equipped with an exchangeable adapter for connection to the steering shaft gearing.
For optimum safety, MSW sensors have a high breaking moment. As an additional safety measure, four driving pins ensure steerability in the event of breakage.

Electronics are incorporated into the sensor. Power supply and signal output are provided via a 15 pin D-Sub plug.
Kistler MSW sensors have a TTL/BOX selector switch, which enables operation with or without the MSW processor.

Application

Universal measurement steering wheel for non-contact measurement of steering moment, steering angle and steering speed; for vehicle driving dynamics tests like ISO 4148, steady-state circular course drive.

Technical Data MSW Sensor

Performance Specifications

Power supply	V	10 ... 28
Power consumption at 12 V	W	5
Temperature range		
Nominal temperature	°C	0 ... 70
Operating temperature (compensated)	°C	–20 ... 80
Mass moment of inertia (without steering wheel)	kg·cm²	60
Weight (without steering wheel)		
Passenger car version[1]	kg	2,55
Utility vehicle version[1]	kg	3,60

Steering Moment (When Operated Without Processor)

Steering moment passenger car version[2]		
Range output M1, 1 V = 5 N·m	N·m	±50
Range output M2, 1 V = 1 N·m	N·m	±10
Steering moment utility vehicle version[2]		
Range output M1, 1 V = 25 N·m	N·m	±250
Range output M2, 1 V = 5 N·m	N·m	±50
Linearity deviation		
of measurement range M1	%	±0,5
including Hysteresis (typical)	%	±0,2
Low pass filter (standard)	Hz	100
Nominal index		
nominal signal interval between torque = 0 and measuring range final value M1 or M2	V	10
Index tolerance for M1	%	±0,15

[1] with standard steering wheel flange, without steering wheel and steering shaft adapter
[2] see next page

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Technical Data MSW Sensor (Continuation)

Steering Moment (continued)

Zero point balance		
via potentiometer with load-free steering		
wheel, separate for M1 und M2 up to about	mV	±100
Temperature influence on the zero signal		
(in the nominal temperature range)		
M1 relative to the nominal index M1	%	<±0,8
M2 relative to the nominal index M2	%	<±4,0
Overload protection		
on measuring range final value	%	100
Braking moment		
Passenger car version	N·m	250
Utility vehicle version	N·m	600

Steering Angle

Steering angle[2]		
Output L1 – 1 V = 125°	°	±1 250
Output L2 – 1 V = 20°	°	±200
Angle resolution	°	0,1
Nominal index		
nominal signal interval between angle = 0	V	10
and measuring range final value L1 or L2		
Index tolerance for L1	%	±0,1
Zero-point balance		
with caliper at the steering wheel,		yes
possible at any steering wheel position		
Temperature influence in the nominal		
temperature range to the zero signal		
L1 relative to the nominal index L1	%	<±0,3
L2 relative to the nominal index L2	%	<±1,4

Steering Speed[3]

Output TTL 0°	pulses/R	3 600
Output TTL 90°	pulses/R	3 600
Maximum steering speed	°/sec	1 000

[2] Both outputs are available in parallel. The analog output of the smaller measuring range will reach the point of saturation when the specified range is exceeded.

[3] The steering speed must be calculated externally by differentiating the angle signal. The angle signal is output as two TTL signals, phase-shifted 90°.

Technical Data MSW Processor (optional)

Performance/System Specifications

Power supply	VDC	10 ... 36
Angle resolution	°	0,05
DA Converter resolution	N·m	≤0,008
	°	0,04
	°/sec	0,04
Adjustable Filtertime	ms	8 ... 512
		(or unfiltered)
Data update rate	Hz	250

Signal Inputs

Sensor input		direct connection to MSW

Signal Outputs[4]

Analog outputs		
steering moment M1 (±50/250 N·m)	V	–10 ... 10
steering moment M2 (±10/50 N·m)	V	–10 ... 10
steering angle L1 (±1 250 °)	V	–10 ... 10
steering angle L2 (±200 °)	V	–10 ... 10
steering speed (±1 000 °/sec)	V	–10 ... 10
Digital outputs		
steering moment		yes
steering angle		yes
steering speed		yes

Interfaces

CAN (Motorola/Intel)		2.0B
USB (Full Speed)		1.1
RS-232C		yes

[4] All outputs are protected against overvoltage and short-circuit.

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Included Accessories

	Type/Art. No.
• Signal and power cable, l = 3 m	KCD16905
• Multimedia CD incl. software & manuals	KCD11343
• Sensor calibration for MSW sensors	KCD11434
• Transport case, complete	KCD17214

Additional for MSWA1

• Steering wheel 360 mm	KCD11042

Additional for MSWA2

• Steering wheel 390 mm	KCD15391

Optional Accessories

	Type/Art. No.
• Steering wheel 450 mm	KCD17184
• MSW processor	KCD14075
• Signal and power cable, l = 1,5 m	KCD17720
• Custom adapter for steering shaft gearing	KCD11439
• Adaptation of customer-supplied steering wheel (passenger car)	KCD15767
• Adaptation of customer-supplied steering wheel (utility vehicle)	KCD15947
• Adapter passenger car 280 ... 420 mm	KCD16188
• Adapter utility vehicle 400 ... 560 mm	KCD16458
• 1-point suction holder for mounting at the windshield	KCD15747

Transport cases for custom adaptations on request.

Ordering Key

Type CMSWA ☐ ☐ ☐ ☐

Sensor Element

50 N·m	1
250 N·m	2

Sensor Cable

3 m	1
5 m	2

Electronics

Without processor	0
With processor	1

Interface

±10 V	1
±5 V	2
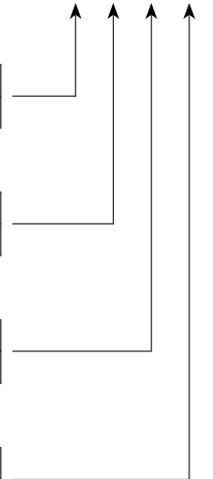
Ordering Example

Type CMSWA1111

MSW 50 N·m measurement range, 3 m cable, with processor, ±10 V