Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-18446-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **02.02.2022**

Date of issue 02.02.2022

Holder of certificate:

mg-sensor GmbH
Airport Boulevard B 210, 77836 Rheinmünster

with the further location:

Knorrstraße 147, EG-351, 80788 München

Calibration in the fields:

Mechanical quantities
- **Force**
- **Torque**
- **Acceleration**

Thermodynamic quantities
Temperature quantities
- **Resistance thermometers**
- **Direct reading thermometers**
- **Temperature transmitters, transducers, data loggers**

Humidity quantities
- **Devices for relative humidity**

Electrical quantities
DC and low frequency quantities
- **DC voltage**
- **DC current**

Dimensional quantities
Length
- **Length measuring instruments**

Angle
- **Angle of rotation**
- **Inclination**

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories. Laboratories that conform to the requirements of this standard, operate generally in accordance with the principles of DIN EN ISO 9001.

The certificate together with the annex reflects the status as indicated by the date of issue.
The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at https://www.dakks.de/en/accredited-bodies-search.html.

Abbreviations used: see last page

Within the measurands/calibration items marked with with *, the calibration laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use calibration standards or equivalent calibration procedures listed here with different issue dates.
The calibration laboratory maintains a current list of all calibration standards / equivalent calibration procedures within the flexible scope of accreditation.

[1)] The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of k = 2 unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

Permanent laboratory, Rheinmünster location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
Force* Force sensors (safety-belt)	500 N to 25 kN	ISO/TS 17242:2014-05	$1 \cdot 10^{-2}$	Traction force reference standard measuring device with reference transducer Analogue and digital sensors
Force sensors	2 kN to 20 kN	DKD-R 3-3:2018	$2 \cdot 10^{-3}$	Compressive force reference standard measuring device with reference transducer Analogue and digital sensors
Multi-component force and moment Multi-component transducer (ATD)	0.05 kN to < 0.5 kN	KW-F05000:2021	$2 \cdot 10^{-2}$	
	0.5 kN to 25 kN		$5 \cdot 10^{-3}$	
	3 N·m to < 30 N·m		$2 \cdot 10^{-2}$	
	30 N·m to 1200 N·m		$5 \cdot 10^{-3}$	
Force transducer	0.5 kN to 600 kN		$5 \cdot 10^{-3}$	
Angular velocity Angular velocity sensors	150°/s to 3500°/s	KW-AV0002:2014	0.5 %	Rotational via incremental encoder for left and right rotation Analogue and digital sensors
secondary, dynamic	8°/s to 5000°/s	1 Hz to 200 Hz	1.5 % / 1.5°	Analogue and digital sensors Calibration result: complex transfer coefficient (analogue: amplitude/phase, digital: amplitude) and indication deviation

[1)] The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

DAkkS Deutsche Akkreditierungsstelle

Permanent laboratory, Rheinmünster location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
Acceleration* Acceleration sensors	200 m/s² to 20000 m/s²	Shock excitation DKD-R 3-1 page 2:2018	1.2 %	Analogue and digital sensors
	5 m/s² to 200 m/s²	Sinusoidal excitation DKD-R 3-1 page 3:2018 10 Hz to 5 kHz > 5 kHz to 10 kHz	 1.2 % / 1.0 ° 2.5 % / 1.5 °	Analogue and digital sensors Calibration result: complex transfer coefficient (analogue: amplitude/phase, digital: amplitude) and indication deviation
Length Displacement sensor (ATD))	0 mm to 200 mm	KW-DS0001:05-2021	20 µm	Analogue and digital sensors
Angle* Angle of rotation Direct rotary encoder systems	0° to 360°	VDI/VDE 2648 page 1:2009* KW-AN0002:2018	0.2°	Rotation angle sensors Analogue and digital sensors
Inclinometers	-90° to 90°	KW-AN0001:2018	0.2°	Inclination angle sensors Analogue and digital sensors
Temperature* Resistance thermometers, direct reading thermometers, temperature transmitters, transducers and data loggers with resistance sensor (also PTC/NTC)	10 °C to 50 °C	In the temperature / humidity generator DKD-R 5-1:2018* KW-TE0002:2017	0.15 K	Comparative measurement against display of the temperature / humidity generator
Temperature display devices and simulators, temperature transmitters, transducers and data loggers for base thermocouples (K, N, J)	-50 °C to 500 °C	DKD-R 5-5:2018* KW-TE0001:2018	0.2 K	Using electrical simulation of the sensor signal Characteristic curve according to DIN EN 60584:2014

[1)] The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

Date of issue: 02.02.2022
Valid from: 02.02.2022

DAkkS Deutsche Akkreditierungsstelle

Permanent laboratory, Rheinmünster location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
Relative humidity Direct reading electric hygrometers (also data loggers) No psychrometers	10 % to 80 %	In the temperature / humidity generator Measurement medium air Air temperature: 20 °C to 25 °C KW-HU0001:2017	3 %	Comparative measurement against display of the temperature / humidity generator Measurement uncertainty expressed in relative humidity
Electrical quantities DC voltage	0 V	KW-VO0001:2017	2 µV	*U*: measured value Analogue and digital sensors
	10 mV to 1000 V		$1.0 \cdot 10^{-4}$ *U*	
DC current	0 A to 10 A	KW-CU0001:2017	$2.0 \cdot 10^{-4}$ *I* + 5 nA	*I*: measured value Analogue and digital sensors
DC current current clamps	0 A to 1000 A	KW-CU0002:2017 1 to *N* windings	$1.0 \cdot 10^{-2}$ *I* + 5 nA	

Permanent laboratory, München location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement [1)]	Remarks
Acceleration* Acceleration sensors, accelerometer measurement chains	200 m/s² to 2000 m/s²	Shock excitation DKD-R 3-1 page 2: 2018	1.5 %	Analogue and digital sensors
Force* Force sensors	2 kN to 20 kN	DKD-R 3-3:2018	$2 \cdot 10^{-3}$	Analogue and digital sensors
Multi-component force and moment Multi-component transducer (ATD)	0.05 kN to < 0.5 kN	KW-FO5000:2021	$2 \cdot 10^{-2}$	Compressive force reference standard measuring device with reference transducer Analogue and digital sensors
	0.5 kN to 25 kN		$5 \cdot 10^{-3}$	
	3 N·m to < 30 N·m		$2 \cdot 10^{-2}$	
	30 N·m to 1200 N·m		$5 \cdot 10^{-3}$	

[1)] The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

Abbreviations used:

CMC	Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DKD-R	Richtlinie des Deutschen Kalibrierdienstes (DKD), herausgegeben von der Physikalisch-Technischen Bundesanstalt
KW-	calibration procedure of the mg-sensor GmbH
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V.
VDI	Verein Deutscher Ingenieure e.V.

[1)] The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of k = 2 unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.