

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-15127-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 19.05.2020

Date of issue: 10.08.2020

Holder of certificate:

**Kistler Instrumente Gesellschaft mit beschränkter Haftung
Umberto-Nobile-Str. 14, 71063 Sindelfingen**

with further calibration laboratories

**Hatschekstraße 5/2, 69126 Heidelberg
Maierhofstraße 35, 73547 Lorch**

Calibration in the fields:

Mechanical quantities

- **Force***
- **Pressure***
- **Acceleration***
- **Torque***

Within the measurands / calibration items marked 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.

Abbreviations used: see last page

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

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Permanent Laboratory, Sindelfingen

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Acceleration Accelerometer, acceleration measurement chains (reference frequencies), vibration calibrators	1 m/s ² to 80 m/s ²	DKD-R 3-1:2018 Sinusoidal excitation 40 Hz, 80 Hz (APS)	0.8 %	Calibration result: magnitude of the charge transfer coefficient magnitude of the voltage transfer coefficient
	10 m/s ² to 200 m/s ²	DKD-R 3-1:2018 Sinusoidal excitation 159.2 Hz, 160 Hz (TIRA)	0.8 %	
Acceleration sensors, acceleration measurement chains (mid-frequency), vibration calibrators	5 m/s ² to 200 m/s ²	DKD-R 3-1:2018 Sinusoidal excitation 40 Hz to 1.25 kHz	1 %	
		DKD-R 3-1:2018 Sinusoidal excitation > 1.25 kHz to 5 kHz	2 %	
		DKD-R 3-1:2018 Sinusoidal excitation > 5 kHz to 10 kHz	5 %	
Accelerometer, acceleration measurement chains (low frequency), vibration calibrators	0.1 m/s ² to 80 m/s ²	DKD-R 3-1:2018 Sinusoidal excitation 0.5 Hz to 20 Hz	0.5 % / 0.9°	Calibration result: Complex charge transfer coefficient Complex voltage transfer coefficient (magnitude / Phase), acceleration
		DKD-R 3-1:2018 Sinusoidal excitation > 20 Hz to 100 Hz	0.8 % / 1.2°	
Voltage Voltage amplifier with grounded input, with differential input, ICP-Amplifier with constant current	70 mV to 30 V	CD30035:2020-02 Sinusoidal excitation 0.1 Hz to < 1 Hz	0.4 % / 0.6°	Calibration result: Transfer coefficient magnitude / phase
		CD30035:2020-02 Sinusoidal excitation 1 Hz to 650 Hz	0.2 % / 0.6°	
		CD30035:2020-02 Sinusoidal excitation > 650 Hz to 6.5 kHz	0.3 % / 0.7°	
		CD30035:2020-02 Sinusoidal excitation > 6.5 kHz to 15 kHz	0.4 % / 1.0°	
		CD30035:2020-02 Sinusoidal excitation > 15 kHz to 50 kHz	0.6 % / 5°	

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.

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Charge Charge amplifier with grounded input, with differential input	7 pC to 10 nC	CD30035:2020-02 Sinusoidal excitation 0.1 Hz to < 1 Hz	0.4 % / 0.6°	Calibration result: Transfer coefficient magnitude / phase shift
		CD30035:2020-02 Sinusoidal excitation 1 Hz to 650 Hz	0.2 % / 0.6°	
		CD30035:2020-02 Sinusoidal excitation > 650 Hz to 6.5 kHz	0.3 % / 0.7°	
		CD30035:2020-02 Sinusoidal excitation > 6.5 kHz to 15 kHz	0.4 % / 1.0°	
		CD30035:2020-02 Sinusoidal excitation > 15 kHz to 50 kHz	0.6 % / 5°	
Pressure Absolute pressure ρ_{abs}	1 bar	DKD-R 6-1:2014	$7 \cdot 10^{-5} \cdot \rho_{abs}$; but not < 2.2 mbar	Pressure medium: Oil Consider the measurement uncertainty of the barometer
	3 bar to 401 bar		$8 \cdot 10^{-5} \cdot \rho_{abs}$	
	> 401 bar to 1401 bar		$1 \cdot 10^{-4} \cdot \rho_{abs}$; but not < 0.8 mbar	Pressure medium: Gas (Nitrogen)
	0 bar to 20 bar		$7 \cdot 10^{-5} \cdot \rho_e$; but not < 2.2 mbar	Pressure medium: Oil
Positive pressure ρ_e	0 bar	DKD-R 3-3:2018	$8 \cdot 10^{-5} \cdot \rho_e$	Pressure medium: Gas (Nitrogen)
	2 bar to 400 bar		$1 \cdot 10^{-4} \cdot \rho_e$; but not < 0.8 mbar	
	> 400 bar to 1400 bar			
	0 bar to 20 bar			
Force Force transducer	2 kN to 20 kN		0.2 %	Force reference standard measuring device with reference force transducer in compressive force

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Permanent Laboratory, Heidelberg

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Acceleration Accelerometer, acceleration measurement chains	200 m/s ² to 2000 m/s ²	Shock excitation DKD-R 3-1 Sheet 2: 2019	1.2 %	Analog sensors
Force Force transducer	0.5 kN to 50 kN	DKD-R 3-3: 2018	0.5 %	Compressive force reference standard measuring device with reference transducer
Multi-component force and torque Multi-component transducer (ATD)	0.5 kN to 50 kN 2 N·m to 1400 N·m	CD30030-DE:2020-02	0.5 % 0.5 %	

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Permanent Laboratory, Lorch

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Torque Torque transducer and torque measurement chains	0.004 N·m to 0.01 N·m	DIN 51309:2005	$2 \cdot 10^{-3}$	20 N·m DM-BNME Range 1
	> 0.01 N·m to 0.1 N·m		$4 \cdot 10^{-4}$	20 N·m DM-BNME Range 2
	0.1 N·m to 20 N·m		$2 \cdot 10^{-4}$	20 N·m DM-BNME Range 3
	1 N·m to 10 N·m		$1 \cdot 10^{-3}$	3 kN·m DM-BNME
	> 10 N·m to 3 kN·m		$2 \cdot 10^{-4}$	
	1 N·m to 5 N·m		$1 \cdot 10^{-3}$	5 kN·m DM-BNME
	> 5 N·m to 10 N·m		$5 \cdot 10^{-4}$	
	> 10 N·m to 20 N·m		$2 \cdot 10^{-4}$	
	> 20 N·m to 5 kN·m		$1 \cdot 10^{-4}$	
	1 kN·m to 20 kN·m		$5 \cdot 10^{-4}$	100 kN·m DM-BNME
> 20 kN·m to 100 kN·m	$2 \cdot 10^{-3}$			

Abbreviations used:

- ATD Antropomorphic Test Device (Dummy)
- CD300xxx calibration procedure of Kistler Instrumente GmbH
- CMC Calibration and measurement capabilities
- DKD-R Guideline of German Calibration Service (DKD), published by Physikalisch-Technische Bundesanstalt

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