Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15139-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **07.03.2023**

Date of issue: 07.03.2023

Holder of accreditation certificate:

NATEC Sensors Gesellschaft mit beschränkter Haftung

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of calibration laboratories and confirm generally with the principles of DIN EN ISO 9001.

Calibrations at the locations:

Niels-Bohr-Straße 9-11, 85748 Garching
Zeppelinstraße 15, 85748 Garching

Calibrations in the fields:

Mechanical Quantities

- **Pressure**

Fluid Quantities

- **Liquid flow rate**

This certificate annex is only valid together with the written accreditation certificate and 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.

Permanent Laboratory
Location Niels-Bohr-Straße 9-11, 85748 Garching

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Liquid flow rate DC voltage *U* (simulation of the signal of a flow sensor by means of a frequency generator) Measuring instruments with voltage output	0 V to 60 V	Comparison measurement of the output signal of a frequency generator to the input signal of a voltmeter DIN IEC 60381-2:1980:06	0.3 %	Output value *U* corresponds to the flow values of the flow sensor
DC current *I* (simulation of the signal of a flow sensor by means of a frequency generator) Measuring instruments with current output	0 mA to 52 mA	Comparison measurement of the output signal of a frequency generator to the input signal of an ammeter DIN IEC 60381-1:1985-11	0.2 %	Output value *I* corresponds to the flow values of the flow sensor
Frequency *f* (simulation of the signal of a flow sensor by means of a frequency generator) Measuring instruments with frequency output	0.1 Hz to 10000 Hz	Comparison measurement of the output signal of a frequency generator to the input signal of the frequency counter	0.002 %	Output value *f* corresponds to the flow values of the flow sensor

Permanent Laboratory
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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Liquid flow rate Volume flow rate *dV / dt* Measuring instruments with frequency or analog output	0.0005 L/min to 800 L/min	Volumetric measurement (Piston Prover) DIN EN ISO 7278-1:1996-12 VA-014:2022-10	0.1 %	Medium: Liquids with a density of 770 kg/m³ to 1,200 kg/m³ and viscosity up to 10,000 mm²/s
Mass flow rate *dm / dt* Measuring instruments with frequency or analog output	0.000385 kg/min to 800 kg/min	Volumetric measurement (Piston Prover) DIN EN ISO 7278-1:1996-12 VA-014:2022-10	0.1 %	
Volume flow rate *dV / dt* Display devices of flowmeters	0 L/min to 10000 L/min	Comparison measurement of the output signal of a frequency generator to display VA-014:2022-10	0.002 %	Calibration of volume flow rate or simulation of the relevant values of the input variable

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range			Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Pressure Absolute pressure	1 bar			DKD-R 6-1:2014	$2.6 \cdot 10^{-2} \cdot p_{abs} + 5.4$ mbar	Pressure medium: Oil Principle of the measurement: $p_{abs} = p_e + p_{amb}$ p_{abs}: Absolute pressure p_{amb}: Atmospheric pressure p_e: Gauge pressure The measurement uncertainty of the barometer must be considered
	1.2 bar	to	11 bar		$2.6 \cdot 10^{-2} \cdot p_{abs} + 5.4$ mbar	
	> 11 bar	to	36 bar		$6.0 \cdot 10^{-4} \cdot p_{abs} + 5.6$ mbar	
	> 36 bar	to	701 bar		$5.0 \cdot 10^{-4} \cdot p_{abs} + 17$ mbar	
Gauge pressure	−0.9 bar	to	0 bar		$1.3 \cdot 10^{-2} \cdot \lvert p_e \rvert + 1.2$ mbar	Pressure medium: Gas p_e: Gauge pressure
	0 bar				$2.6 \cdot 10^{-2} \cdot p_e + 5.4$ mbar	Pressure medium: Oil p_e: Gauge pressure
	0.2 bar	to	10 bar		$2.6 \cdot 10^{-2} \cdot p_e + 5.4$ mbar	
	> 10 bar	to	35 bar		$6.0 \cdot 10^{-4} \cdot p_e + 5.6$ mbar	
	> 35 bar	to	700 bar		$5.0 \cdot 10^{-4} \cdot p_e + 17$ mbar	

Abbreviations used:

CMC	Calibration and Measurement Capabilities
DIN	Deutsches Institut für Normung e.V.
DKD-R	Guideline of the German Calibration Service „Deutscher Kalibrierdienst“ (DKD), published by Physikalisch-Technische Bundesanstalt
VA	internal calibration procedure of NATEC Sensors Gesellschaft mit beschränkter Haftung