

Deutsche Akkreditierungsstelle

Annex to the Partial Accreditation Certificate D-K-15219-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: 12.01.2024

Date of issue: 12.01.2024

This annex is a part of the accreditation certificate D-K-15219-01-00.

Holder of partial accreditation certificate:

imetrologie GmbH
Institut für Metrologie und Prozesstechnologie
Luitpoldstraße 3, 97264 Helmstadt

with the location

imetrologie GmbH
Institut für Metrologie und Prozesstechnologie
Luitpoldstraße 3, 97264 Helmstadt

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 they conform to the principles of DIN EN ISO 9001.

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage
- DC current
- DC resistance
- AC voltage
- AC current

Time and frequency

- Frequency

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>.

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
DC voltage	0 V to 100 mV		$0.4 \mu\text{V} + 3.4 \cdot 10^{-6} \cdot U$	U = measured value
	> 100 mV to 220 mV		$0.3 \mu\text{V} + 1.7 \cdot 10^{-6} \cdot U$	
	> 0.22 V to 2.2 V		$1.0 \mu\text{V} + 1.4 \cdot 10^{-6} \cdot U$	
	> 2.2 V to 22 V		$6.0 \mu\text{V} + 1.7 \cdot 10^{-6} \cdot U$	
	> 22 V to 220 V		$42 \mu\text{V} + 2.4 \cdot 10^{-6} \cdot U$	
	> 220 V to 1100 V		$43 \mu\text{V} + 5.9 \cdot 10^{-6} \cdot U$	
DC current	0 A to 220 μA		$50 \text{ nA} + 15 \cdot 10^{-6} \cdot I$	I = measured value
	> 220 μA to 22 mA		$0.1 \mu\text{A} + 13 \cdot 10^{-6} \cdot I$	
	> 22 mA to 220 mA		$1.0 \mu\text{A} + 20 \cdot 10^{-6} \cdot I$	
	> 220 mA to 2.2 A		$10 \mu\text{A} + 35 \cdot 10^{-6} \cdot I$	
DC resistance Resistors	1 Ω	standard resistors in liquid baths 23 °C \pm 0.01 K	$3 \cdot 10^{-7} \cdot R$	R = measured value resistors as reference standards
	10 Ω		$3 \cdot 10^{-7} \cdot R$	
	25 Ω		$3 \cdot 10^{-7} \cdot R$	
	100 Ω		$3 \cdot 10^{-7} \cdot R$	
	400 Ω		$3 \cdot 10^{-7} \cdot R$	
	1 k Ω		$5 \cdot 10^{-7} \cdot R$	
	10 k Ω		$3 \cdot 10^{-7} \cdot R$	
Fixed values	0 Ω		2 $\mu\Omega$	4-wire-short
	1 Ω ; 1.9 Ω		$30 \cdot 10^{-6} \cdot R$	R = measured value
	10 Ω ; 19 Ω		$13 \cdot 10^{-6} \cdot R$	
	100 Ω ; 190 Ω ; 1 k Ω ; 1.9 k Ω		$5 \cdot 10^{-6} \cdot R$	
	10 k Ω ; 19 k Ω ; 100 k Ω ; 190 k Ω		$5 \cdot 10^{-6} \cdot R$	
	1 M Ω ; 1.9 M Ω		$9 \cdot 10^{-6} \cdot R$	
	10 M Ω		$15 \cdot 10^{-6} \cdot R$	
	19 M Ω ; 100 M Ω		$50 \cdot 10^{-6} \cdot R$	
Ranges	1 Ω to < 20 Ω		$15 \cdot 10^{-6} \cdot R$	
	20 Ω to < 200 k Ω		$8 \cdot 10^{-6} \cdot R$	
	200 k Ω to < 20 M Ω		$12 \cdot 10^{-6} \cdot R$	
	20 M Ω to < 200 M Ω		$60 \cdot 10^{-6} \cdot R$	
	200 M Ω to < 2 G Ω		$10 \text{ k}\Omega + 1.7 \cdot 10^{-4} \cdot R$	
	2 G Ω to 20 G Ω		$1.0 \text{ M}\Omega + 1.3 \cdot 10^{-3} \cdot R$	

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AC voltage	2 mV	10 Hz	$2.4 \cdot 10^{-3} \cdot U$	$U =$ measured value
		20 Hz; 40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz	$2.2 \cdot 10^{-3} \cdot U$	
		50 kHz; 70 kHz; 100 kHz	$3.1 \cdot 10^{-3} \cdot U$	
		200 kHz	$6.1 \cdot 10^{-3} \cdot U$	
		500 kHz; 1 MHz	$13 \cdot 10^{-3} \cdot U$	
	10 mV	10 Hz	$0.67 \cdot 10^{-3} \cdot U$	
		20 Hz; 40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz	$0.52 \cdot 10^{-3} \cdot U$	
		50 kHz; 70 kHz; 100 kHz	$1.1 \cdot 10^{-3} \cdot U$	
		200 kHz	$2.1 \cdot 10^{-3} \cdot U$	
		500 kHz; 1 MHz	$4.8 \cdot 10^{-3} \cdot U$	
	100 mV	10 Hz	$0.37 \cdot 10^{-3} \cdot U$	
		20 Hz; 40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz	$0.17 \cdot 10^{-3} \cdot U$	
		50 kHz; 70 kHz; 100 kHz	$0.49 \cdot 10^{-3} \cdot U$	
		200 kHz	$0.9 \cdot 10^{-3} \cdot U$	
		500 kHz; 1 MHz	$3.2 \cdot 10^{-3} \cdot U$	
	1 V	10 Hz	$0.29 \cdot 10^{-3} \cdot U$	
		20 Hz	$0.11 \cdot 10^{-3} \cdot U$	
		40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz	$60 \cdot 10^{-6} \cdot U$	
		50 kHz; 70 kHz; 100 kHz	$0.12 \cdot 10^{-3} \cdot U$	
		200 kHz	$0.42 \cdot 10^{-3} \cdot U$	
	4 V; 6 V; 8 V; 12 V; 15 V; 19 V	1 kHz; 10 kHz	$60 \cdot 10^{-6} \cdot U$	
		100 kHz	$0.14 \cdot 10^{-3} \cdot U$	
	10 V	10 Hz	$0.29 \cdot 10^{-3} \cdot U$	
		20 Hz	$0.11 \cdot 10^{-3} \cdot U$	
		40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz	$50 \cdot 10^{-6} \cdot U$	
		50 kHz; 70 kHz; 100 kHz	$0.11 \cdot 10^{-3} \cdot U$	
		200 kHz	$0.32 \cdot 10^{-3} \cdot U$	
	100 V	500 kHz; 1 MHz	$1.9 \cdot 10^{-3} \cdot U$	
10 Hz		$0.29 \cdot 10^{-3} \cdot U$		
20 Hz		$0.11 \cdot 10^{-3} \cdot U$		
40 Hz; 100 Hz; 1 kHz; 10 kHz; 20 kHz		$70 \cdot 10^{-6} \cdot U$		
1000 V	50 kHz; 70 kHz; 100 kHz	$0.19 \cdot 10^{-3} \cdot U$		
	55 Hz; 500 Hz; 1 KHz	$80 \cdot 10^{-6} \cdot U$		

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
AC current	100 μ A; 200 μ A	10 Hz; 20 Hz	$0.42 \cdot 10^{-3} \cdot I$	I = measured value
		40 Hz; 500 Hz; 1 kHz	$0.20 \cdot 10^{-3} \cdot I$	
		5 kHz	$0.42 \cdot 10^{-3} \cdot I$	
		10 kHz	$1.8 \cdot 10^{-3} \cdot I$	
	0.5 mA; 1 mA; 2 mA; 5 mA; 10 mA; 15 mA; 20 mA	10 Hz; 20 Hz	$0.34 \cdot 10^{-3} \cdot I$	
		40 Hz; 500 Hz; 1 kHz	$0.18 \cdot 10^{-3} \cdot I$	
		5 kHz	$0.43 \cdot 10^{-3} \cdot I$	
		10 kHz	$2.5 \cdot 10^{-3} \cdot I$	
	0.5 A; 1 A; 2 A	20 Hz; 40 Hz; 500 Hz; 1 kHz	$0.32 \cdot 10^{-3} \cdot I$	
		5 kHz	$0.62 \cdot 10^{-3} \cdot I$	
		10 kHz	$7.4 \cdot 10^{-3} \cdot I$	
	Frequency Sources	1 Hz to < 40 Hz		
40 Hz to < 1 MHz			$0.11 \cdot 10^{-3} \cdot f$	
1 MHz to 300 MHz			$8.0 \cdot 10^{-6} \cdot f$	
Measuring instruments	1 Hz to < 10 Hz		$0.52 \cdot 10^{-3} \cdot f$	
	10 Hz to 1.2 MHz		$0.12 \cdot 10^{-3} \cdot f$	

Abbreviations used:

- CMC Calibration and measurement capabilities
- DIN Deutsches Institut für Normung e.V. (German Institute for Standardization)
- EN Europäische Norm (European Standard)
- IEC International Electrotechnical Commission
- ISO International Organization for Standardization

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