

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-15115-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 15.03.2021

Date of issue: 15.03.2021

Calibration laboratory:

1A CAL GmbH
Falderbaumstraße 23, 34123 Kassel

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage *)
- DC current *)
- DC resistance
- AC voltage *)
- AC current *)
- AC/DC transfer
- Capacitance
- Inductance
- Electrical energy
- Electrical Power

High frequency quantities

- HF voltage
- Oscilloscope quantities *)
- Rise time *)
- Bandwidth *)

Optical quantities

- Radiometry

Time and frequency

- Frequency

*) also on-site calibrations

Abbreviations used: see last page

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

*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>*

Annex to the accreditation certificate D-K-15115-01-00

Permanent Laboratory

Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC Voltage Josephson-Josephson	0.01 V to 10 V		13 nV	Comparison with Josephson voltage standard
DC Voltage Multimeter	0.01 V to 0.2 V		13 nV	U = voltage to be calibrated
	> 0.2 V to 2 V		$13 \text{ nV} + 10 \text{ nV/V} \cdot U$	
	> 2 V to 10 V		$13 \text{ nV} + 100 \text{ nV/V} \cdot U$	
DC Standards	1 V; 1.018 V; 10 V		0.2 μ V	
Linearity of digital voltmeters	0.01 V to 10 V		$\frac{23 \text{ nV}}{U_{\text{JPH}}}$	U_{JPH} = Josephson standard potential
Divider ratio	0.01 V to 10 V		$2 \cdot 10^{-9} \cdot \sqrt{23 + 67 \cdot \left(\frac{1}{k_{\text{UF}}}\right)^2}$	k_{UF} = transmission factor of divider to be calibrated
Measure	10 μ V to 1 V		$0.2 \cdot 10^{-6} \cdot \sqrt{2.4 + \left(\frac{1.1V}{U}\right)^2}$	U = voltage to be calibrated
	> 1 V to 10 V		$0.2 \cdot 10^{-6} \cdot \sqrt{0.3 + \left(\frac{1.1V}{U}\right)^2}$	
	> 10 V to 100 V		$0.34 \cdot 10^{-6}$	
	> 100 V to 1000 V		$0.63 \cdot 10^{-6}$	
Measure, Source	10 μ V to 10 V		$0.2 \cdot 10^{-6} \cdot \sqrt{0.7 + \left(\frac{1.1V}{U}\right)^2}$	U = voltage to be calibrated
	> 10 V to 100 V		$0.3 \cdot 10^{-6}$	
	> 100 V to 1000 V		$0.6 \cdot 10^{-6}$	
High voltage Source and Dividers	> 1000 V to 40 000 V		$0.15 \cdot 10^{-3}$	
DC Current Measure	0.1 μ A		$35 \cdot 10^{-6}$	
	> 0.1 μ A to < 1 μ A		$15 \cdot 10^{-6}$	
	1 μ A to < 10 μ A		$8 \cdot 10^{-6}$	
	10 μ A to 0.2 A		$4.5 \cdot 10^{-6}$	
	> 0.2 A to 2 A		$4.5 \cdot 10^{-6}$	
	> 2 A to 10 A		$15 \cdot 10^{-6}$	
	> 10 A to 20 A		$20 \cdot 10^{-6}$	
DC Current Source	0.1 μ A		$35 \cdot 10^{-6}$	
	> 0.1 μ A to < 1 μ A		$7 \cdot 10^{-6}$	
	1 μ A to < 10 μ A		$6 \cdot 10^{-6}$	
	10 μ A to 0.2 A		$2.8 \cdot 10^{-6}$	
	> 0.2 A to 2 A		$2.8 \cdot 10^{-6}$	
	> 2 A to 10 A		$12 \cdot 10^{-6}$	
	> 10 A to 20 A		$14 \cdot 10^{-6}$	
> 20 A to 100 A		$20 \cdot 10^{-6}$		

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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Current clamps	0.1 mA to 100 A > 100 A to 3000 A		92 · 10 ⁻⁶ 80 · 10 ⁻⁶	/ = Measuring value
DC Resistance Measure	10 μΩ to < 100 μΩ 100 μΩ to < 1 mΩ 1 mΩ to < 10 mΩ 10 mΩ to < 1 Ω 1 Ω to 10 kΩ > 10 kΩ to 1 MΩ > 1 MΩ to 100 MΩ > 100 MΩ to 1 GΩ		22 · 10 ⁻⁶ 4.6 · 10 ⁻⁶ 2.3 · 10 ⁻⁶ 1.2 · 10 ⁻⁶ 50 · 10 ⁻⁹ 0.5 · 10 ⁻⁶ 2 · 10 ⁻⁶ 8 · 10 ⁻⁶	
Measure	> 1 GΩ to 10 GΩ > 10 GΩ to 100 GΩ		0.24 · 10 ⁻³ 0.25 · 10 ⁻³	
Resistance	> 1 GΩ to 100 GΩ		0.4 · 10 ⁻³	
DC Current Power Measure; Source	10 mW to 20 kW > 20 kW to 100 kW		25 · 10 ⁻⁶ 40 · 10 ⁻⁶	
AC Current Power active energy Watt hours Source	0 Wh to 21.3 kWh	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 5 s to 1000 s Testing time 50 Hz to 60 Hz	46 μWh/VAh	RS-703A and RS-933 Calibration system
Blind Energy VAR hours Source	0 VARh to 21.3 kVARh	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 50 Hz to 60 Hz	46 μVARh/VAh	RS-703A and RS-933 Calibration system
Apparent Energy VA hours Source	33.3 mVAh to 21.3 kVAh	120 V to 480 V 0.2 A to 160 A 5 s to 1000 s Testing time 50 Hz to 60 Hz	46 μVAh/VAh	RS-703A and RS-933 Calibration system
Active Energy Watt hours Measure	0 Wh to 21.3 kWh	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 5 s to 1000 s Testing time 50 Hz to 60 Hz	45 μWh/VAh	RD-22
Blind Energy VAR hours Measure	0 VARh to 21.3 kVARh	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 5 s to 1000 s Testing time 50 Hz to 60 Hz	45 μVARh/VAh	RD-22
Apparent Energy VA hours Measure	33.3 mVAh to 21.3 kVAh	120 V to 480 V 0.2 A to 160 A 5 s to 1000 s Testing time 50 Hz to 60 Hz	45 μVAh/VAh	RD-22

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AC Apparent Power W Source	0 W to 76.8 kW	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 50 Hz to 60 Hz	46 μW/VA	RS-703A and RS-933 Calibration system
AC Blind Energy VAR Source	0 VAR to 76.8 kVAR	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 50 Hz to 60 Hz	46 μVAR/VA	RS-703A and RS-933 Calibration system
AC Apparent Output VA Source	24 VA to 76.8 kVA	120 V to 480 V 0.2 A to 160 A 50 Hz to 60 Hz	46 μVA/VA	RS-703A and RS-933 Calibration system
AC Active Power W Measure	0 W to 76.8 kW	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 50 Hz to 60 Hz	45 μWh/VA	RD-22
AC Blind Power VAR Measure	0 VAR to 76.8 kVAR	120 V to 480 V 0.2 A to 160 A -90° to 90° Phase angle 50 Hz to 60 Hz	45 μVAR/VA	RD-22
AC Apparent Output VA Measure	24 VA to 76.8 kVA	120 V to 480 V 0.2 A to 160 A 50 Hz to 60 Hz	45 μVA/VA	RD-22

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Voltage Measure	1 mV	10 Hz 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$0.45 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$ $0.45 \cdot 10^{-3}$ $0.45 \cdot 10^{-3}$ $0.50 \cdot 10^{-3}$ $0.60 \cdot 10^{-3}$	Fluke 5790A Measuring range: 2.2 mV
	2 mV	10 Hz 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$0.22 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$ $0.22 \cdot 10^{-3}$ $0.22 \cdot 10^{-3}$ $0.25 \cdot 10^{-3}$ $0.30 \cdot 10^{-3}$	
	2 mV	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz; 500 kHz 700 kHz; 800 kHz 1 MHz	$0.20 \cdot 10^{-3}$ $0.18 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$ $0.18 \cdot 10^{-3}$ $0.19 \cdot 10^{-3}$ $0.22 \cdot 10^{-3}$ $0.25 \cdot 10^{-3}$	Fluke 5790A Measuring range: 7 mV
	6 mV	10 Hz 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz; 500 kHz 700 kHz; 800 kHz 1 MHz	$0.12 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.10 \cdot 10^{-3}$ $0.12 \cdot 10^{-3}$ $0.14 \cdot 10^{-3}$ $0.17 \cdot 10^{-3}$	

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Voltage Measure	2 mV	10 Hz	$0.19 \cdot 10^{-3}$	Fluke 5790A Measuring range: 22 mV
		20 Hz; 30 Hz	$0.16 \cdot 10^{-3}$	
		40 Hz; 55 Hz; 60 Hz	$0.16 \cdot 10^{-3}$	
		120 Hz; 300 Hz; 400 Hz	$0.16 \cdot 10^{-3}$	
		500 Hz; 1 kHz; 10 kHz	$0.16 \cdot 10^{-3}$	
		20 kHz; 30 kHz	$0.16 \cdot 10^{-3}$	
		50 kHz; 70 kHz; 100 kHz	$0.17 \cdot 10^{-3}$	
		200 kHz; 300 kHz; 500 kHz	$0.18 \cdot 10^{-3}$	
		700 kHz	$0.20 \cdot 10^{-3}$	
		800 kHz	$0.21 \cdot 10^{-3}$	
		1 MHz	$0.25 \cdot 10^{-3}$	
	6 mV	10 Hz	$0.10 \cdot 10^{-3}$	
			20 Hz; 30 Hz; 40 Hz	
			55 Hz; 60 Hz	$80 \cdot 10^{-6}$
			120 Hz; 300 Hz	$80 \cdot 10^{-6}$
			400 Hz; 500 Hz	$80 \cdot 10^{-6}$
			1 kHz; 10 kHz	$80 \cdot 10^{-6}$
			20 kHz; 30 kHz; 50 kHz	$75 \cdot 10^{-6}$
			70 kHz	$75 \cdot 10^{-6}$
			100 kHz	$80 \cdot 10^{-6}$
			200 kHz; 300 kHz	$90 \cdot 10^{-6}$
			500 kHz	$0.10 \cdot 10^{-3}$
			700 kHz; 800 kHz	$0.14 \cdot 10^{-3}$
			1 MHz	$0.16 \cdot 10^{-3}$
	10 mV	10 Hz	$80 \cdot 10^{-6}$	
			20 Hz; 30 Hz; 40 Hz	$60 \cdot 10^{-6}$
			55 Hz; 60 Hz	$60 \cdot 10^{-6}$
			120 Hz; 300 Hz	$60 \cdot 10^{-6}$
			400 Hz; 500 Hz	$60 \cdot 10^{-6}$
			1 kHz; 10 kHz	$60 \cdot 10^{-6}$
			20 kHz; 30 kHz; 50 kHz	$55 \cdot 10^{-6}$
			70 kHz	$55 \cdot 10^{-6}$
			100 kHz	$60 \cdot 10^{-6}$
			200 kHz; 300 kHz	$70 \cdot 10^{-6}$
			500 kHz	$80 \cdot 10^{-6}$
			700 kHz; 800 kHz	$0.10 \cdot 10^{-3}$
			1 MHz	$0.12 \cdot 10^{-3}$
	20 mV	10 Hz	$60 \cdot 10^{-6}$	
			20 Hz; 30 Hz; 40 Hz	$40 \cdot 10^{-6}$
			55 Hz; 60 Hz	$40 \cdot 10^{-6}$
			120 Hz; 300 Hz	$40 \cdot 10^{-6}$
			400 Hz; 500 Hz	$35 \cdot 10^{-6}$
			1 kHz; 10 kHz	$35 \cdot 10^{-6}$
			20 kHz; 30 kHz; 50 kHz	$35 \cdot 10^{-6}$
			70 kHz	$35 \cdot 10^{-6}$
			100 kHz	$35 \cdot 10^{-6}$
			200 kHz; 300 kHz	$45 \cdot 10^{-6}$
			500 kHz	$50 \cdot 10^{-6}$
			700 kHz; 800 kHz	$70 \cdot 10^{-6}$
			1 MHz	$80 \cdot 10^{-6}$

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AC Voltage Measure	20 mV	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	90 · 10 ⁻⁶ 65 · 10 ⁻⁶ 65 · 10 ⁻⁶ 65 · 10 ⁻⁶ 60 · 10 ⁻⁶ 60 · 10 ⁻⁶ 55 · 10 ⁻⁶ 55 · 10 ⁻⁶ 65 · 10 ⁻⁶ 80 · 10 ⁻⁶ 90 · 10 ⁻⁶ 0.12 · 10 ⁻³ 0.14 · 10 ⁻³	Fluke 5790A Measuring range: 70 mV
	40 mV	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	75 · 10 ⁻⁶ 55 · 10 ⁻⁶ 55 · 10 ⁻⁶ 55 · 10 ⁻⁶ 50 · 10 ⁻⁶ 50 · 10 ⁻⁶ 45 · 10 ⁻⁶ 45 · 10 ⁻⁶ 55 · 10 ⁻⁶ 65 · 10 ⁻⁶ 75 · 10 ⁻⁶ 0.10 · 10 ⁻³ 0.12 · 10 ⁻³	
	60 mV	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz 50 kHz; 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	60 · 10 ⁻⁶ 40 · 10 ⁻⁶ 40 · 10 ⁻⁶ 40 · 10 ⁻⁶ 35 · 10 ⁻⁶ 35 · 10 ⁻⁶ 35 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 50 · 10 ⁻⁶ 70 · 10 ⁻⁶ 80 · 10 ⁻⁶	
	60 mV	10 Hz 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	40 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 75 · 10 ⁻⁶ 0.10 · 10 ⁻³ 0.12 · 10 ⁻³	

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AC Voltage Measure	100 mV; 200 mV	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$15 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $20 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $40 \cdot 10^{-6}$ $45 \cdot 10^{-6}$	
	200 mV	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$15 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $20 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $40 \cdot 10^{-6}$ $45 \cdot 10^{-6}$	Fluke 5790A Measuring range:700 mV
	300 mV; 400 mV	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $20 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $40 \cdot 10^{-6}$ $45 \cdot 10^{-6}$	
	500 mV; 600 mV; 700 mV	10 Hz; 20Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 Hz; 800 kHz 1 MHz	$12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $20 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $40 \cdot 10^{-6}$ $45 \cdot 10^{-6}$	

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AC Voltage Measure	600 mV	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 5 · 10 ⁻⁶ 5 · 10 ⁻⁶ 5 · 10 ⁻⁶ 6 · 10 ⁻⁶ 9 · 10 ⁻⁶ 20 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	Fluke 5790A Measuring range: 2.2 V
	1 V; 2 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz; 200 kHz 300 kHz; 500 kHz 700 kHz; 800 kHz 1 MHz	5 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 10 · 10 ⁻⁶ 20 · 10 ⁻⁶	
	2 V; 3 V; 4 V; 5 V; 6 V; 7 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz; 200 kHz 300 kHz; 500 kHz 700 kHz; 800 kHz 1 MHz	5 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 10 · 10 ⁻⁶ 20 · 10 ⁻⁶	Fluke 5790A Measuring range: 7 V
	6 V; 8 V; 10 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz; 200 kHz 300 kHz; 500 kHz 700 kHz; 800 kHz 1 MHz	5 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 10 · 10 ⁻⁶ 20 · 10 ⁻⁶	

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AC Voltage Measure	20 V	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	6 · 10 ⁻⁶ 6 · 10 ⁻⁶ 6 · 10 ⁻⁶ 6 · 10 ⁻⁶ 6 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 9 · 10 ⁻⁶ 10 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 25 · 10 ⁻⁶	Fluke 5790A Measuring range: 22 V	
	20 V	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 8 · 10 ⁻⁶ 10 · 10 ⁻⁶ 12 · 10 ⁻⁶ 25 · 10 ⁻⁶ 35 · 10 ⁻⁶		Fluke 5790A Measuring range: 70 V
	30 V	10 Hz 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz	8 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 12 · 10 ⁻⁶ 15 · 10 ⁻⁶ 25 · 10 ⁻⁶		
	40 V; 50 V; 60 V; 70 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	9 · 10 ⁻⁶ 8 · 10 ⁻⁶ 8 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 12 · 10 ⁻⁶		

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AC Voltage Measure	60 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	9 · 10 ⁻⁶ 8 · 10 ⁻⁶ 8 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 12 · 10 ⁻⁶	Fluke 5790A Measuring range: 220 V
	100 V; 200 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	14 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	
	200 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	14 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	Fluke 5790A Measuring range: 700 V
	300 V; 400 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	16 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	
	500 V; 600 V; 700 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	16 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 25 · 10 ⁻⁶ 35 · 10 ⁻⁶	
	200 V	10 Hz; 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz 70 kHz 100 kHz	14 · 10 ⁻⁶ 14 · 10 ⁻⁶ 14 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	

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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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Voltage Measure	300 V; 500 V	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	16 · 10 ⁻⁶ 14 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	Fluke 5790A Measuring range: 1000 V
	600 V; 800 V; 1000 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz	18 · 10 ⁻⁶ 14 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 25 · 10 ⁻⁶ 35 · 10 ⁻⁶	
AC/DC-Transfer	2 mV	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	0.11 · 10 ⁻³ 90 · 10 ⁻⁶ 85 · 10 ⁻⁶ 85 · 10 ⁻⁶ 85 · 10 ⁻⁶ 85 · 10 ⁻⁶ 85 · 10 ⁻⁶ 90 · 10 ⁻⁶ 0.11 · 10 ⁻³ 0.12 · 10 ⁻³ 0.15 · 10 ⁻³ 0.19 · 10 ⁻³	Fluke 792A Measuring range: 22 mV
	6 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	90 · 10 ⁻⁶ 65 · 10 ⁻⁶ 65 · 10 ⁻⁶ 60 · 10 ⁻⁶ 60 · 10 ⁻⁶ 55 · 10 ⁻⁶ 55 · 10 ⁻⁶ 60 · 10 ⁻⁶ 75 · 10 ⁻⁶ 90 · 10 ⁻⁶ 0.12 · 10 ⁻³ 0.14 · 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.

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC/DC-Transfer	10 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	75 · 10 ⁻⁶ 55 · 10 ⁻⁶ 55 · 10 ⁻⁶ 50 · 10 ⁻⁶ 50 · 10 ⁻⁶ 45 · 10 ⁻⁶ 45 · 10 ⁻⁶ 55 · 10 ⁻⁶ 65 · 10 ⁻⁶ 75 · 10 ⁻⁶ 95 · 10 ⁻⁶ 0.12 · 10 ⁻³	Fluke 792A Measuring range: 22 mV
	20 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	60 · 10 ⁻⁶ 40 · 10 ⁻⁶ 40 · 10 ⁻⁶ 35 · 10 ⁻⁶ 35 · 10 ⁻⁶ 30 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 50 · 10 ⁻⁶ 70 · 10 ⁻⁶ 80 · 10 ⁻⁶	
	60 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz; 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	35 · 10 ⁻⁶ 25 · 10 ⁻⁶ 25 · 10 ⁻⁶ 25 · 10 ⁻⁶ 25 · 10 ⁻⁶ 25 · 10 ⁻⁶ 40 · 10 ⁻⁶ 50 · 10 ⁻⁶ 70 · 10 ⁻⁶ 80 · 10 ⁻⁶	Fluke792A Measuring range: 220 mV
	100 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz; 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	15 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 8 · 10 ⁻⁶ 8 · 10 ⁻⁶ 8 · 10 ⁻⁶ 20 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	

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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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC/DC-Transfer	200 mV	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	15 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 8 · 10 ⁻⁶ 20 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	Fluke792A Measuring range: 220 mV
	200 mV	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 8 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	Fluke 792A Measuring range: 700 mV
	300 mV; 400 mV; 500 mV; 600 mV; 700 mV	10 Hz; 20 Hz; 30 Hz 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 7 · 10 ⁻⁶ 8 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	
	600 mV	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz; 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 4 · 10 ⁻⁶ 4 · 10 ⁻⁶ 5 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶ 40 · 10 ⁻⁶ 45 · 10 ⁻⁶	Fluke 792A Measuring range: 2.2 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.

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC/DC-Transfer	1 V; 2 V	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	4 · 10 ⁻⁶ 3 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 3 · 10 ⁻⁶ 4 · 10 ⁻⁶ 5 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 15 · 10 ⁻⁶	Fluke 792A Measuring range: 2.2 V
	2 V; 3 V; 4 V 5 V; 6 V; 7 V	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz 800 kHz 1 MHz	4 · 10 ⁻⁶ 3 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 4 · 10 ⁻⁶ 5 · 10 ⁻⁶ 6 · 10 ⁻⁶ 8 · 10 ⁻⁶ 9 · 10 ⁻⁶ 15 · 10 ⁻⁶	Fluke 792A Measuring range: 7 V
	6 V; 8 V	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	4 · 10 ⁻⁶ 3 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 2 · 10 ⁻⁶ 4 · 10 ⁻⁶ 5 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 15 · 10 ⁻⁶	Fluke 792A Measuring range: 22 V
	10 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	4 · 10 ⁻⁶ 3 · 10 ⁻⁶ 3 · 10 ⁻⁶ 3 · 10 ⁻⁶ 3 · 10 ⁻⁶ 3 · 10 ⁻⁶ 4 · 10 ⁻⁶ 5 · 10 ⁻⁶ 7 · 10 ⁻⁶ 9 · 10 ⁻⁶ 15 · 10 ⁻⁶	

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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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC/DC-Transfer	20 V	10 Hz; 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $3 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $18 \cdot 10^{-6}$ $25 \cdot 10^{-6}$	Fluke 792A Measuring range: 22 V
	20 V	10 Hz; 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz; 120 Hz 300 Hz; 400 Hz; 500 Hz 1 kHz; 10 kHz; 20 kHz 30 kHz; 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz; 800 kHz 1 MHz	$6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $3 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $9 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $18 \cdot 10^{-6}$ $25 \cdot 10^{-6}$	Fluke 792A Measuring range: 70 V
	30 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz; 30 kHz 50 kHz; 70 kHz 100 kHz 200 kHz; 300 kHz 500 kHz 700 kHz	$7 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $12 \cdot 10^{-6}$ $15 \cdot 10^{-6}$ $25 \cdot 10^{-6}$	
	40 V; 50 V; 60 V; 70 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz	$8 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $12 \cdot 10^{-6}$	
	60 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz	$8 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $6 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $12 \cdot 10^{-6}$	Fluke 792A Measuring range: 220 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.

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC/DC-Transfer	100 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz	12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	Fluke 792A Measuring range: 220 V
	200 V	10 Hz; 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz; 1 kHz 10 kHz; 20 kHz 30 kHz; 50 kHz 70 kHz 100 kHz	12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	
	200 V	10 Hz 20 Hz 30 Hz; 40 Hz; 55 Hz 60 Hz; 120 Hz; 300 Hz 400 Hz; 500 Hz 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	15 · 10 ⁻⁶ 13 · 10 ⁻⁶ 12 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	Fluke 792A Measuring range: 1000 V
	300 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	15 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 30 · 10 ⁻⁶	
	500 V	10 Hz 20 Hz; 30 Hz; 40 Hz; 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	17 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 35 · 10 ⁻⁶	
	600 V; 800 V; 1000 V	10 Hz 20 Hz; 30 Hz; 40 Hz 55 Hz; 60 Hz 120 Hz; 300 Hz; 400 Hz 500 Hz; 1 kHz; 10 kHz 20 kHz; 30 kHz; 50 kHz 70 kHz 100 kHz	17 · 10 ⁻⁶ 12 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 11 · 10 ⁻⁶ 18 · 10 ⁻⁶ 35 · 10 ⁻⁶	

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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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC voltage High Voltage Source and Dividers	1000 V to 20 000 V	50 Hz; 60 Hz	0.15 %	
AC voltage. Rectangular - and Triangle waveform	1 mV	10 Hz to 40 Hz	$0.50 \cdot 10^{-3}$	Rectangular - and Triangle waveform on 50 Ω- and 1 MΩ- internal impedance
		55 Hz to 10 kHz	$0.50 \cdot 10^{-3}$	
		10 kHz to 100 kHz	$0.50 \cdot 10^{-3}$	
		200 kHz to 700 kHz	$0.70 \cdot 10^{-3}$	
		700 kHz to 1 MHz	$0.90 \cdot 10^{-3}$	
	2 mV	10 Hz to 40 Hz	$0.30 \cdot 10^{-3}$	
		55 Hz to 10 kHz	$0.30 \cdot 10^{-3}$	
	6 mV; 10 mV; 20 mV	10 kHz to 100 kHz	$0.30 \cdot 10^{-3}$	
200 kHz to 700 kHz		$0.50 \cdot 10^{-3}$		
700 kHz to 1 MHz		$0.80 \cdot 10^{-3}$		
10 Hz to 40 Hz		$0.20 \cdot 10^{-3}$		
40 mV	55 Hz to 10 kHz	$0.20 \cdot 10^{-3}$		
	10 kHz to 100 kHz	$0.20 \cdot 10^{-3}$		
	200 kHz to 700 kHz	$0.50 \cdot 10^{-3}$		
	700 kHz to 1 MHz	$0.80 \cdot 10^{-3}$		
60 mV	10 Hz to 40 Hz	$0.15 \cdot 10^{-3}$		
	55 Hz to 10 kHz	$0.15 \cdot 10^{-3}$		
	10 kHz to 100 kHz	$0.15 \cdot 10^{-3}$		
	200 kHz to 700 kHz	$0.50 \cdot 10^{-3}$		
700 kHz to 1 MHz	700 kHz to 1 MHz	$0.80 \cdot 10^{-3}$		
	10 Hz to 40 Hz	$0.10 \cdot 10^{-3}$		
	55 Hz to 10 kHz	$0.10 \cdot 10^{-3}$		
	10 kHz to 100 kHz	$0.10 \cdot 10^{-3}$		
100 mV to 20 V	200 kHz to 700 kHz	$0.45 \cdot 10^{-3}$		
	700 kHz to 1 MHz	$0.80 \cdot 10^{-3}$		
	10 Hz to 40 Hz	$0.10 \cdot 10^{-3}$		
	55 Hz to 10 kHz	$0.10 \cdot 10^{-3}$		
30 V to 100 V	10 kHz to 100 kHz	$0.10 \cdot 10^{-3}$		
	10 Hz to 40 Hz	$0.10 \cdot 10^{-3}$		
AC voltage Measure, Source	> 0.01 V to 100 V	0.01 Hz to 10 Hz	$35 \cdot 10^{-6}$	
	> 100 V to 700 V	0.01 Hz to 10 Hz	$50 \cdot 10^{-6}$	

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current Transfer	100 μ A	10 Hz to 30 kHz > 30 kHz to 70 kHz > 70 kHz to 100 kHz	$33 \cdot 10^{-6}$ $35 \cdot 10^{-6}$ $40 \cdot 10^{-6}$	
	300 μ A	10 Hz to 70 kHz > 70 Hz to 100 kHz	$33 \cdot 10^{-6}$ $35 \cdot 10^{-6}$	
	1 mA	10 Hz to 30 kHz > 30 kHz to 70 kHz > 70 kHz to 100 kHz	$30 \cdot 10^{-6}$ $33 \cdot 10^{-6}$ $35 \cdot 10^{-6}$	
	> 1 mA to 5 mA	10 Hz to 30 Hz > 30 Hz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$6 \cdot 10^{-6}$ $4 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $6 \cdot 10^{-6}$	
	> 5 mA to 100 mA	10 Hz to 30 Hz > 30 Hz to 50 kHz > 50 kHz to 100 kHz	$4 \cdot 10^{-6}$ $3 \cdot 10^{-6}$ $4 \cdot 10^{-6}$	
	> 100 mA to 500 mA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$5 \cdot 10^{-6}$ $3 \cdot 10^{-6}$ $4 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $6 \cdot 10^{-6}$	
	> 500 mA to 1 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$5 \cdot 10^{-6}$ $4 \cdot 10^{-6}$ $5 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $11 \cdot 10^{-6}$	
	> 1 A to 2 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$8 \cdot 10^{-6}$ $7 \cdot 10^{-6}$ $8 \cdot 10^{-6}$ $11 \cdot 10^{-6}$ $16 \cdot 10^{-6}$ $21 \cdot 10^{-6}$	
	> 2 A to 5 A	10 Hz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 100 kHz	$13 \cdot 10^{-6}$ $16 \cdot 10^{-6}$ $25 \cdot 10^{-6}$	
	> 5 A to 10 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$21 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $40 \cdot 10^{-6}$ $60 \cdot 10^{-6}$ $75 \cdot 10^{-6}$	
	> 10 A to 20 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$25 \cdot 10^{-6}$ $30 \cdot 10^{-6}$ $45 \cdot 10^{-6}$ $70 \cdot 10^{-6}$ $90 \cdot 10^{-6}$	

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current Transfer	> 20 A to 50 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$31 \cdot 10^{-6}$ $51 \cdot 10^{-6}$ $70 \cdot 10^{-6}$ $0.10 \cdot 10^{-3}$ $0.13 \cdot 10^{-3}$	
	> 50 A to 100 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$41 \cdot 10^{-6}$ $81 \cdot 10^{-6}$ $0.10 \cdot 10^{-6}$ $0.13 \cdot 10^{-3}$ $0.16 \cdot 10^{-3}$	
AC Current Calibrators	100 μ A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$61 \cdot 10^{-6}$ $59 \cdot 10^{-6}$ $62 \cdot 10^{-6}$ $65 \cdot 10^{-6}$ $70 \cdot 10^{-6}$ $75 \cdot 10^{-6}$	
	300 μ A	10 Hz to 70 kHz > 70 kHz to 100 kHz	$34 \cdot 10^{-6}$ $36 \cdot 10^{-6}$	
	1 mA	10 Hz to 10 kHz > 10 Hz to 70 kHz > 70 kHz to 100 kHz	$31 \cdot 10^{-6}$ $34 \cdot 10^{-6}$ $36 \cdot 10^{-6}$	

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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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current Calibrators	> 1 mA to 5 mA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 50 kHz > 50 kHz to 100 kHz	9 · 10 ⁻⁶ 7 · 10 ⁻⁶ 10 · 10 ⁻⁶ 11 · 10 ⁻⁶	
	> 5 mA to 100 mA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 100 kHz	8 · 10 ⁻⁶ 6 · 10 ⁻⁶ 10 · 10 ⁻⁶	
	> 100 mA to 500 mA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 100 kHz	9 · 10 ⁻⁶ 6 · 10 ⁻⁶ 11 · 10 ⁻⁶	
	> 500 mA to 1 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 100 kHz	9 · 10 ⁻⁶ 7 · 10 ⁻⁶ 11 · 10 ⁻⁶	
	> 1 A to 2 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	10 · 10 ⁻⁶ 8 · 10 ⁻⁶ 11 · 10 ⁻⁶ 12 · 10 ⁻⁶ 13 · 10 ⁻⁶ 14 · 10 ⁻⁶	
	> 2 A to 5 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 100 kHz	11 · 10 ⁻⁶ 13 · 10 ⁻⁶ 15 · 10 ⁻⁶ 23 · 10 ⁻⁶	
	> 5 A to 20 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 100 kHz	19 · 10 ⁻⁶ 20 · 10 ⁻⁶ 22 · 10 ⁻⁶ 30 · 10 ⁻⁶	
	> 20 A to 50 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	25 · 10 ⁻⁶ 34 · 10 ⁻⁶ 43 · 10 ⁻⁶ 62 · 10 ⁻⁶ 77 · 10 ⁻⁶	
	> 50 A to 100 A	10 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	30 · 10 ⁻⁶ 35 · 10 ⁻⁶ 49 · 10 ⁻⁶ 72 · 10 ⁻⁶ 92 · 10 ⁻⁶	
	AC Current Measure	100 µA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	72 · 10 ⁻⁶ 65 · 10 ⁻⁶ 87 · 10 ⁻⁶ 90 · 10 ⁻⁶ 93 · 10 ⁻⁶ 97 · 10 ⁻⁶
300 µA		10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 70 kHz > 70 kHz to 100 kHz	51 · 10 ⁻⁶ 43 · 10 ⁻⁶ 71 · 10 ⁻⁶ 72 · 10 ⁻⁶	

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current Measure	1 mA	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 70 kHz > 70 kHz to 100 kHz	49 · 10 ⁻⁶ 41 · 10 ⁻⁶ 71 · 10 ⁻⁶ 72 · 10 ⁻⁶	
	> 300 µA to 1 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 100 kHz	39 · 10 ⁻⁶ 29 · 10 ⁻⁶ 63 · 10 ⁻⁶	
	> 1 A to 5 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 70 kHz > 70 kHz to 100 kHz	43 · 10 ⁻⁶ 33 · 10 ⁻⁶ 65 · 10 ⁻⁶ 66 · 10 ⁻⁶ 69 · 10 ⁻⁶	
	> 5 A to 20 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	48 · 10 ⁻⁶ 41 · 10 ⁻⁶ 71 · 10 ⁻⁶ 79 · 10 ⁻⁶ 96 · 10 ⁻⁶ 0.11 · 10 ⁻³	

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current Measure	> 20 A to 50 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$54 \cdot 10^{-6}$ $48 \cdot 10^{-6}$ $84 \cdot 10^{-6}$ $99 \cdot 10^{-6}$ $0.13 \cdot 10^{-3}$ $0.15 \cdot 10^{-3}$	
	> 50 A to 100 A	10 Hz to 30 Hz > 30 Hz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 50 kHz > 50 kHz to 70 kHz > 70 kHz to 100 kHz	$62 \cdot 10^{-6}$ $56 \cdot 10^{-6}$ $0.11 \cdot 10^{-3}$ $0.12 \cdot 10^{-3}$ $0.15 \cdot 10^{-3}$ $0.18 \cdot 10^{-3}$	
Current clamps	0.1 mA to 100 A	10 Hz to 5 kHz	$1 \cdot 10^{-3}$	
	0.1 mA to 80 A	> 5 kHz to 10 kHz	$0.9 \cdot 10^{-3}$	
	> 100 A to 3000 A	10 Hz to 100 Hz	$1.9 \cdot 10^{-3}$	
Inductance Measure	100 μ H	120 Hz	$2 \cdot 10^{-3}$	For other frequencies the smallest measurable uncertainty is greater.
		200 Hz	$0.61 \cdot 10^{-3}$	
		400 Hz; 1 kHz; 4 kHz	$0.51 \cdot 10^{-3}$	
		10 kHz	$0.71 \cdot 10^{-3}$	
	1 mH to 10 mH	120 Hz; 200 Hz; 400 Hz; 1 kHz; 4 kHz. 10 kHz	$0.32 \cdot 10^{-3}$	
	100 mH	120 Hz; 200 Hz; 400 Hz; 1 kHz; 4 kHz	$0.41 \cdot 10^{-3}$	
		10 kHz	$0.61 \cdot 10^{-3}$	
1 H	60 Hz; 120 Hz; 200 Hz; 400 Hz; 1 kHz	$0.32 \cdot 10^{-3}$		
Capacitance Measure	1 pF	100 Hz; 120 Hz 1 kHz 10 kHz	$1.6 \cdot 10^{-3}$ $0.41 \cdot 10^{-3}$ $0.47 \cdot 10^{-3}$	
		10 pF	100 Hz; 120 Hz 1 kHz; 10 kHz	$0.47 \cdot 10^{-3}$ $0.37 \cdot 10^{-3}$
			100 pF	100 Hz; 120 Hz; 1 kHz; 10 kHz
	1 nF; 10 nF	100 Hz; 120 Hz 1 kHz 10 kHz	$0.16 \cdot 10^{-3}$ $0.13 \cdot 10^{-3}$ $0.16 \cdot 10^{-3}$	
		100 nF	100 Hz; 120 Hz 1 kHz 10 kHz	$0.20 \cdot 10^{-3}$ $0.13 \cdot 10^{-3}$ $0.42 \cdot 10^{-3}$
	1 μ F		100 Hz; 120 Hz; 1 kHz 10 kHz	$0.20 \cdot 10^{-3}$ $2.0 \cdot 10^{-3}$

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Capacitance Standards	100 pF	1 kHz; 10 kHz	$0.38 \cdot 10^{-3}$	
	1 nF	100 Hz; 120 Hz 1 kHz 10 kHz	$0.20 \cdot 10^{-3}$ $0.15 \cdot 10^{-3}$ $0.18 \cdot 10^{-3}$	
	10 nF	100 Hz; 120 Hz 1 kHz 10 kHz	$0.20 \cdot 10^{-3}$ $0.14 \cdot 10^{-3}$ $0.20 \cdot 10^{-3}$	
	100 nF	100 Hz; 120 Hz 1 kHz 10 kHz	$0.20 \cdot 10^{-3}$ $0.15 \cdot 10^{-3}$ $0.43 \cdot 10^{-3}$	
	1 μ F	100 Hz; 120 Hz; 1 kHz 10 kHz	$0.21 \cdot 10^{-3}$ $2.0 \cdot 10^{-3}$	
	10 μ F	100 Hz; 120 Hz; 1 kHz; 10 kHz	$0.39 \cdot 10^{-3}$	
	100 μ F	100 Hz; 120 Hz; 1 kHz	$0.25 \cdot 10^{-3}$	
Calibrators	500 pF to < 30 nF 30 nF to < 600 nF 600 nF to 110 mF	DC-Methode	$0.70 \cdot 10^{-3}$	
			$0.40 \cdot 10^{-3}$	
			$0.31 \cdot 10^{-3}$	
Frequency	1 MHz. 5 MHz. 10 MHz	Sinus. $U_{eff} > 0.5$ V Measuring time > 24 h	$9 \cdot 10^{-12}$	Analogue measurement of phase time difference U_{tr} = digital frequency measurement based on counting
	0.01 Hz to 300 MHz 300 MHz to 20 GHz	Sinus. $U_{eff} > 0.5$ V Measuring time > 1000 s	$1 \cdot 10^{-11} + U_{tr}$ $1 \cdot 10^{-11}$	
Rotation frequency	0.016 s ⁻¹ to 1700 s ⁻¹		$1 \cdot 10^{-6}$	
Oscilloscope				
Vertical deflection	5 mV to 200 V	Square voltage 10 Hz to 10 kHz	0.03 %	
Horizontal deflection	> 500 ps to 5 s	Time mark amplitude < 1 V	$0.015 \cdot 10^{-2} \cdot t_0 + 2$ ps	t_0 = time mark amplitude
Rise Time	≥ 6.5 ps to < 15 ps		3.6 ps	
	≥ 15 ps to < 180 ps		1.9 ps	
	≥ 180 ps to 10 ms		0.6 % + 0.6 ps	

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks		
Frequency response Peak to peak value	10 Hz to 10 MHz	5 mV to 3 V	2.7 % (0.23 dB)	PC-3.5. PC-2.92 and N50		
	> 10 MHz to 2.4 GHz		1.1 % (0.095 dB)			
	> 2.4 GHz to 4 GHz		1.4 % (0.12 dB)			
	> 4 GHz to 8 GHz		2.6 % (0.22 dB)			
	> 8 GHz to 18 GHz		3.4 % (0.28 dB)			
	Bandwidth Peak to peak value		10 Hz to 10 MHz	5 mV to 3 V	3 % (0.26 dB)	BNC
			> 10 MHz to 2.4 GHz		1.2 % (0.10 dB)	
			> 2.4 GHz to 4 GHz		1.6 % (0.14 dB)	
			> 4 GHz to 8 GHz		2.9 % (0.25 dB)	
			> 8 GHz to 10 GHz		3.7 % (0.32 dB)	
Bandwidth Peak to peak value	10 Hz to 10 MHz	5 mV to 3 V	5.5 % (0.47 dB)	PC-3.5. PC-2.92 and N50		
	> 10 MHz to 2.4 GHz		2.4 % (0.21 dB)			
	> 2.4 GHz to 4 GHz		3 % (0.26 dB)			
	> 4 GHz to 8 GHz		5.2 % (0.44 dB)			
	> 8 GHz to 18 GHz		7 % (0.59 dB)			
	Bandwidth Peak to peak value		10 Hz to 10 MHz	5 mV to 3 V	6.1 % (0.51 dB)	BNC
			> 10 MHz to 2.4 GHz		2.5 % (0.21 dB)	
			> 2.4 GHz to 4 GHz		3.3 % (0.28 dB)	
			> 4 GHz to 8 GHz		5.9 % (0.50 dB)	
			> 8 GHz to 10 GHz		7.5 % (0.63 dB)	
Oscilloscope calibrator		Rechteckvoltage				
Vertical deflection	5 mV to 30 mV	10 Hz to 10 kHz	$0.23 \cdot 10^{-3}$			
	30 mV to 300 mV		$0.12 \cdot 10^{-3}$			
	300 mV to 200 V		$40 \cdot 10^{-6}$			
Horizontal deflection	> 1 s to 5 s	> 0.5 V	$3 \cdot 10^{-11} + W_{tf}$	$W_{tf} = t$ over 1000 s		
	> 10 ns to 1 s		$2 \cdot 10^{-11} + W_{tf}$			
	> 500 ps to 10 ns		$2 \cdot 10^{-11} + W_{tf}$			
Rise Time	≥ 5.5 ps to < 8.5 ps		2.1 ps			
	≥ 8.5 ps to 90 ps		1.6 ps			
	> 90 ps to 10 ms		0.6 % + 1 ps			

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
HF Voltage Frequency response Effective value, Quasi-peak to peak value	10 Hz to 100 MHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.55% (0.048 dB) 0.50% (0.043 dB) 0.61% (0.053 dB)	PC-3.5. PC-2.92 and N50
	> 100 MHz to 2 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.60% (0.052 dB) 0.55% (0.048 dB) 0.66% (0.057 dB)	
	> 2 GHz to 2.25 Hz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.61% (0.053 dB) 0.57% (0.049 dB) 0.66% (0.057 dB)	
	> 2.25 GHz to 3 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.65% (0.056 dB) 0.61% (0.053 dB) 0.70% (0.061 dB)	
	> 3 GHz to 4 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.72% (0.062 dB) 0.68% (0.059 dB) 0.76% (0.066 dB)	
	> 4 GHz to 6 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.85% (0.074 dB) 0.81% (0.070 dB) 0.88% (0.076 dB)	
	10 Hz to 100 MHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.63% (0.055 dB) 0.58% (0.050 dB) 0.68% (0.059 dB)	BNC <i>f</i> = Frequency in Hz
	> 100 MHz to 1.6 GHz	1.5 mV to 7 mV	$(0.177/\text{GHz} \cdot f + 0.645) \%$ $((15/\text{THz} \cdot f + 0.056) \text{ dB})$	
		> 7 mV to 390 mV	$(0.21\text{GHz} \cdot f + 0.563) \%$ $((18/\text{THz} \cdot f + 0.049) \text{ dB})$	
		> 390 mV to 2 V	$(0.192/\text{GHz} \cdot f + 0.662) \%$ $((16.6/\text{THz} \cdot f + 0.057) \text{ dB})$	
> 1.6 GHz to 4 GHz	1.5 mV to 2 V	$(0.10/\text{GHz} \cdot f + 0.81) \%$ $((8.5/\text{THz} \cdot f + 0.07) \text{ dB})$		
	10 Hz to 100 MHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.62% (0.054 dB) 0.57% (0.049 dB) 0.67% (0.058 dB)	PC-3.5. PC-2.92 and N50
	> 100 MHz to 2 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.67% (0.058 dB) 0.62% (0.054 dB) 0.72% (0.062 dB)	
	> 2 GHz to 2.25 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.67% (0.058 dB) 0.63% (0.055 dB) 0.72% (0.062 dB)	
	> 2.25 GHz to 3 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.72% (0.062 dB) 0.67% (0.058 dB) 0.76% (0.066 dB)	

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Frequency response Peak to peak value	> 3 GHz to 4 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.88% (0.076 dB) 0.85% (0.074 dB) 0.92% (0.080 dB)	PC-3.5. PC-2.92 and N50
	> 4 GHz to 6 GHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.99% (0.086 dB) 0.96% (0.083 dB) 1.0% (0.086 dB)	
	10 Hz to 100 MHz	1.5 mV to 7 mV > 7 mV to 390 mV > 390 mV to 2 V	0.69% (0.060 dB) 0.65% (0.056 dB) 0.74% (0.064 dB)	BNC
	> 100 MHz to 1.6 GHz	1.5 mV to 7 mV	$(0.174/\text{GHz} \cdot f + 0.70) \%$ $((15.5/\text{THz} \cdot f + 0.06) \text{ dB})$	$f = \text{Frequency in Hz}$
		> 7 mV to 390 mV	$(0.18\text{GHz} \cdot f + 0.66) \%$ $((16/\text{THz} \cdot f + 0.057) \text{ dB})$	
> 390 mV to 2 V		$(0.16/\text{GHz} \cdot f + 0.75) \%$ $((13/\text{THz} \cdot f + 0.0655) \text{ dB})$		
> 1.6 GHz to 4 GHz	1.5 mV to 2 V	$(0.122/\text{GHz} \cdot f + 0.8) \%$ $((11/\text{THz} \cdot f + 0.068) \text{ dB})$		

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
HF Voltage Frequency response of input voltage of HF mV meters with 50 Ω input impedance of the incident voltage relative to 1 kHz	2 V to 3.5 V	10 Hz to 30 Hz	$0.12 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.010$
		> 30 Hz to 1 MHz	$0.12 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.010$
		> 1 MHz to 2 MHz	$0.31 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.016$
		> 2 MHz to 4 MHz	$0.33 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.018$
		> 4 MHz to 10 MHz	$0.54 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.022$
		> 10 MHz to 20 MHz	$0.84 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.016$
		> 20 MHz to 30 MHz	$1.0 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.016$
		> 30 MHz to 40 MHz	$1.6 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.015$
	> 40 MHz to 50 MHz	$1.7 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.026$	
	200 mV to 2 V	10 Hz to 30 Hz	$0.33 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.010$
		> 30 Hz to 1 MHz	$0.22 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.010$
		> 1 MHz to 2 MHz	$0.54 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.015$
		> 2 MHz to 4 MHz	$0.58 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$
		> 4 MHz to 10 MHz	$0.88 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$
		> 10 MHz to 20 MHz	$1.2 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$
		> 20 MHz to 30 MHz	$1.3 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$
> 30 MHz to 40 MHz		$2.2 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$	
> 40 MHz to 50 MHz	$2.3 \cdot 10^{-3}$	$ T_{\text{rel}} \leq 0.020$		

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
HF Voltage Frequency response of input voltage of HF mV meters with 50 Ω input impedance of the incident voltage relative to 1 kHz	20 mV to 200 mV	10 Hz to 30 Hz	$0.42 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 30 Hz to 1 MHz	$0.33 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 1 MHz to 2 MHz	$0.90 \cdot 10^{-3}$	$ T_{rel} \leq 0.015$
		> 2 MHz to 4 MHz	$0.98 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 4 MHz to 10 MHz	$1.4 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 10 MHz to 20 MHz	$1.9 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 20 MHz to 30 MHz	$2.1 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 30 MHz to 40 MHz	$3.4 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
	2 mV to 20 mV	10 Hz to 30 Hz	$0.53 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 30 Hz to 1 MHz	$0.47 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 1 MHz to 2 MHz	$1.2 \cdot 10^{-3}$	$ T_{rel} \leq 0.015$
		> 2 MHz to 4 MHz	$1.4 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 4 MHz to 10 MHz	$2.1 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 10 MHz to 20 MHz	$2.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 20 MHz to 30 MHz	$2.9 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 30 MHz to 40 MHz	$4.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
	600 μV to 2 mV	10 Hz to 30 Hz	$0.66 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 30 Hz to 1 MHz	$0.62 \cdot 10^{-3}$	$ T_{rel} \leq 0.010$
		> 1 MHz to 2 MHz	$1.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.015$
		> 2 MHz to 4 MHz	$1.8 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 4 MHz to 10 MHz	$2.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 10 MHz to 20 MHz	$3.5 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 20 MHz to 30 MHz	$3.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
		> 30 MHz to 40 MHz	$6.1 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$
> 40 MHz to 50 MHz	$6.7 \cdot 10^{-3}$	$ T_{rel} \leq 0.020$		

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Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
HF Voltage input voltage of HF mV meters with 50 Ω input impedance of the incident voltage relative to 1 kHz	2 V to 3.5 V	10 Hz to 30 Hz	$0.23 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.003$
		> 30 Hz to 1 MHz	$0.16 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.003$
		> 1 MHz to 2 MHz	$0.33 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.004$
		> 2 MHz to 4 MHz	$0.36 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.004$
		> 4 MHz to 10 MHz	$0.57 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.005$
		> 10 MHz to 20 MHz	$0.86 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.006$
		> 20 MHz to 30 MHz	$1.0 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.007$
		> 30 MHz to 40 MHz	$1.6 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.012$
		> 40 MHz to 50 MHz	$1.8 \cdot 10^{-3}$	$ T_{\bar{x}} \leq 0.014$

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Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
HF Voltage input voltage of HF mV meters with 50 Ω input impedance of the incident voltage relative to 1 kHz	200 mV to 2 V	10 Hz to 30 Hz	$0.27 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.003$
		> 30 Hz to 1 MHz	$0.21 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.003$
		> 1 MHz to 2 MHz	$0.53 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.004$
		> 2 MHz to 4 MHz	$0.56 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.004$
		> 4 MHz to 10 MHz	$0.86 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$
		> 10 MHz to 20 MHz	$1.2 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.006$
		> 20 MHz to 30 MHz	$1.3 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$
		> 30 MHz to 40 MHz	$2.2 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.012$
	20 mV to 200 mV	10 Hz to 30 Hz	$0.37 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$
		> 30 Hz to 1 MHz	$0.32 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$
		> 1 MHz to 2 MHz	$0.89 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$
		> 2 MHz to 4 MHz	$0.96 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.006$
		> 4 MHz to 10 MHz	$1.4 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$
		> 10 MHz to 20 MHz	$1.9 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$
		> 20 MHz to 30 MHz	$2.1 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$
		> 30 MHz to 40 MHz	$3.4 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.012$
2 mV to 20 mV	10 Hz to 30 Hz	$0.49 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 30 Hz to 1 MHz	$0.46 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 1 MHz to 2 MHz	$1.2 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 2 MHz to 10 MHz	$1.4 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.006$	
	> 4 MHz to 10 MHz	$2.1 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 10 MHz to 20 MHz	$2.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 20 MHz to 30 MHz	$2.9 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 30 MHz to 40 MHz	$4.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
600 μV to 2 mV	10 Hz to 30 Hz	$0.63 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 30 Hz to 1 MHz	$0.61 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 1 MHz to 2 MHz	$1.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.005$	
	> 2 MHz to 10 MHz	$1.8 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.006$	
	> 4 MHz to 10 MHz	$2.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 10 MHz to 20 MHz	$3.5 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 20 MHz to 30 MHz	$3.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 30 MHz to 40 MHz	$6.1 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.007$	
	> 40 MHz to 50 MHz	$6.7 \cdot 10^{-3}$	$ U_{\vec{x}} \leq 0.010$	

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Annex to the accreditation certificate D-K-15115-01-00
Permanent Laboratory
Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Optical radiation power	100 pW to 10 nW	Wavelength 830 nm to 870 nm	5.0 %	
	> 10 nW to 1 mW		1.5 %	
	> 1 mW to 3 mW		3.5 %	
	100 pW to 10 nW	Wavelength 1280 nm to 1320 nm	5.0 %	
	> 10 nW to 1 mW		1.0 %	
	> 1 mW to 3 mW		3.5 %	
	100 pW to 10 nW	Wavelength 1530 nm to 1570 nm	6.0 %	
	> 10 nW to 1 mW		1.2 %	
	> 1 mW to 3 mW		4.5 %	
	10 nW to 1 mW	Wavelength 488 nm. 633 nm. 656 nm. 775 nm. 850 nm	2.0 %	
Nonlinearity of susceptibility and of signal.	100 pW to < 10 nW	Wavelength 450 nm to 1020 nm	1.5 %	Si standard
	≥ 10 nW to 3 mW		1.2 %	
Amplification and attenuation of faser optical components. Optical density in transmission	100 pW to 3 mW	Wavelength 830 nm to 1570 nm	0.2 % bei 1300 nm	Ge standard For other wavelengths. the smallest measurable uncertainty is greater.
Wave length Measure	400 nm to 1700 nm	Wavelength in Vakuum	0.06 nm bei 633 nm	Diskrete Wave length For other wavelengths. the smallest measurable uncertainty is greater.
Source		Wavelength in air	0.11 nm bei 1523 nm	
		Wavelength im vacuum	0.5 nm	
Monomode laser	600 nm to 1600 nm	Wavelength in vacuum	0.004 nm bei 633 nm	Diskrete Wave length For other wavelengths. the smallest measurable uncertainty is greater.

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Annex to the accreditation certificate D-K-15115-01-00

On-site calibration

Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions	Expanded uncertainty of measurement ¹⁾	Remarks
DC Voltage	0.01 V to 0.22 V		$2 \mu\text{V} + 8 \cdot 10^{-6} \cdot U$	U = Measuring value
	> 0.22 V to 2.2 V		$2 \mu\text{V} + 5 \cdot 10^{-6} \cdot U$	
	> 2.2 V to 11 V		$8 \mu\text{V} + 4 \cdot 10^{-6} \cdot U$	
	> 11 V to 22 V		$5 \mu\text{V} + 4 \cdot 10^{-6} \cdot U$	
	> 22 V to 220 V		$60 \mu\text{V} + 7 \cdot 10^{-6} \cdot U$	
	> 220 V to 1000 V		$0.7 \text{ mV} + 8 \cdot 10^{-6} \cdot U$	
DC Current	10 μA to 220 μA		$60 \cdot 10^{-6}$	I = Measuring value
	> 220 μA to 2.2 mA		$60 \cdot 10^{-6}$	
	> 2.2 mA to 22 mA		$60 \cdot 10^{-6}$	
	> 22 mA to 220 mA		$1 \mu\text{A} + 70 \cdot 10^{-6} \cdot I$	
	> 0.22 A to 2.2 A		$25 \mu\text{A} + 70 \cdot 10^{-6} \cdot I$	
	> 2.2 A to 10 A		$0.48 \text{ mA} + 0.4 \cdot 10^{-3} \cdot I$	
Current clamps	0 A to 100 A		$0.5 \text{ mA} + 5 \cdot 10^{-3} \cdot I$	
	> 100 A to 1000 A		$5 \cdot 10^{-3}$	
DC Resistance	0.1 Ω to 1.9 Ω		$85 \cdot 10^{-6}$	
	> 1.9 Ω to 10 Ω		$30 \cdot 10^{-6}$	
	> 10 Ω to 19 Ω		$25 \cdot 10^{-6}$	
	> 19 Ω to 190 Ω		$20 \cdot 10^{-6}$	
	> 190 Ω to 1.9 k Ω		$15 \cdot 10^{-6}$	
	> 1.9 k Ω to 19 k Ω		$12 \cdot 10^{-6}$	
	> 19 k Ω to 190 k Ω		$15 \cdot 10^{-6}$	
	> 190 k Ω to 1.9 M Ω		$20 \cdot 10^{-6}$	
	> 1.9 M Ω to 10 M Ω		$35 \cdot 10^{-6}$	
	> 10 M Ω to 19 M Ω		$70 \cdot 10^{-6}$	
	> 19 M Ω to 100 M Ω		$0.12 \cdot 10^{-3}$	

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Annex to the accreditation certificate D-K-15115-01-00

On-site calibration

Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions	Expanded uncertainty of measurement ¹⁾	Remarks
AC Voltage	60 mV to 220 mV	10 Hz to 20 Hz	$0.84 \cdot 10^{-3}$	
		20 Hz to 40 Hz	$0.38 \cdot 10^{-3}$	
		40 Hz to 20 kHz	$0.27 \cdot 10^{-3}$	
		20 kHz to 50 kHz	$0.48 \cdot 10^{-3}$	
		50 kHz to 100 kHz	$1.3 \cdot 10^{-3}$	
		100 kHz to 300 kHz	$1.7 \cdot 10^{-3}$	
		300 kHz to 500 kHz	$2.5 \cdot 10^{-3}$	
		500 kHz to 1 MHz	$5.2 \cdot 10^{-3}$	
	> 220 mV to 2.2 V	10 Hz to 20 Hz	$0.95 \cdot 10^{-3}$	
		20 Hz to 40 Hz	$0.3 \cdot 10^{-3}$	
		40 Hz to 20 kHz	$0.11 \cdot 10^{-3}$	
		20 kHz to 50 kHz	$0.22 \cdot 10^{-3}$	
		50 kHz to 100 kHz	$0.62 \cdot 10^{-3}$	
		100 kHz to 300 kHz	$1.2 \cdot 10^{-3}$	
		300 kHz to 500 kHz	$3.0 \cdot 10^{-3}$	
		500 kHz to 1 MHz	$6.7 \cdot 10^{-3}$	
	> 2.2 V to 22 V	10 Hz to 20 Hz	$0.95 \cdot 10^{-3}$	
		20 Hz to 40 Hz	$0.30 \cdot 10^{-3}$	
		40 Hz to 20 kHz	$0.11 \cdot 10^{-3}$	
		20 kHz to 50 kHz	$0.22 \cdot 10^{-3}$	
		50 kHz to 100 kHz	$0.43 \cdot 10^{-3}$	
		100 kHz to 300 kHz	$1.4 \cdot 10^{-3}$	
		300 kHz to 500 kHz	$3.6 \cdot 10^{-3}$	
		500 kHz to 1 MHz	$7.4 \cdot 10^{-3}$	
	> 22 V to 220 V	10 Hz to 20 Hz	$0.95 \cdot 10^{-3}$	
		20 Hz to 40 Hz	$0.30 \cdot 10^{-3}$	
		40 Hz to 20 kHz	$0.13 \cdot 10^{-3}$	
		20 kHz to 50 kHz	$0.41 \cdot 10^{-3}$	
		50 kHz to 100 kHz	$0.95 \cdot 10^{-3}$	
	> 220 V to 1100 V	15 Hz to 50 Hz	$0.50 \cdot 10^{-3}$	
		50 Hz to 1 kHz	$0.15 \cdot 10^{-3}$	
		1 kHz to 20 kHz	$0.20 \cdot 10^{-3}$	
		20 kHz to 30 kHz	$0.50 \cdot 10^{-3}$	
	> 220 V to 750 V	30 kHz to 50 kHz	$0.50 \cdot 10^{-3}$	
		50 kHz to 100 kHz	$1.80 \cdot 10^{-3}$	

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Annex to the accreditation certificate D-K-15115-01-00

On-site calibration

Calibration- and measuring capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions	Expanded uncertainty of measurement ¹⁾	Remarks
AC Current	10 μ A to 220 μ A	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$0.70 \cdot 10^{-3}$ $0.36 \cdot 10^{-3}$ $0.14 \cdot 10^{-3}$ $0.59 \cdot 10^{-3}$ $1.70 \cdot 10^{-3}$	/ = Measuring value
	> 220 μ A to 2.2 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$0.70 \cdot 10^{-3}$ $0.36 \cdot 10^{-3}$ $0.14 \cdot 10^{-3}$ $1 \mu\text{A} + 0.59 \cdot 10^{-3} \cdot /$ $10 \mu\text{A} + 1.70 \cdot 10^{-3} \cdot /$	
	> 2.2 mA to 22 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$1 \mu\text{A} + 0.70 \cdot 10^{-3} \cdot /$ $1 \mu\text{A} + 0.36 \cdot 10^{-3} \cdot /$ $1 \mu\text{A} + 0.14 \cdot 10^{-3} \cdot /$ $5 \mu\text{A} + 0.59 \cdot 10^{-3} \cdot /$ $10 \mu\text{A} + 1.70 \cdot 10^{-3} \cdot /$	
	> 22 mA to 220 mA	10 Hz to 20 Hz 20 Hz to 40 Hz 40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$5 \mu\text{A} + 0.70 \cdot 10^{-3} \cdot /$ $5 \mu\text{A} + 0.36 \cdot 10^{-3} \cdot /$ $5 \mu\text{A} + 0.14 \cdot 10^{-3} \cdot /$ $50 \mu\text{A} + 0.59 \cdot 10^{-3} \cdot /$ $0.1 \text{ mA} + 1.7 \cdot 10^{-3} \cdot /$	
	> 220 mA to 2.2 A	20 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$50 \mu\text{A} + 0.64 \cdot 10^{-3} \cdot /$ $0.1 \text{ mA} + 0.76 \cdot 10^{-3} \cdot /$ $0.2 \text{ mA} + 8.7 \cdot 10^{-3} \cdot /$	
	> 2.2 A to 11 A	40 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	$0.2 \text{ mA} + 0.47 \cdot 10^{-3} \cdot /$ $0.5 \text{ mA} + 1 \cdot 10^{-3} \cdot /$ $0.9 \text{ mA} + 3.8 \cdot 10^{-3} \cdot /$	
AC Current Current clamps	0 A to 100 A	10 Hz to 100 Hz > 100 Hz to 1 kHz	$0.5 \text{ mA} + 7 \cdot 10^{-3} \cdot /$ $0.5 \text{ mA} + 18 \cdot 10^{-3} \cdot /$	
	> 100 A to 1000 A	10 Hz to 100 Hz > 100 Hz to 1 kHz	$7 \cdot 10^{-3}$ $18 \cdot 10^{-3}$	
Oscilloscope quantities Vertical deflection	5 mV to 30 mV	Square wave	0.03 %	
	> 30 mV to 200 V	10 kHz to 10 kHz	0.02 %	
Horizontal deflection	> 500 ps to 5 s	Amplitude time mark < 1 V	$2 \text{ ps} + 1.5 \cdot 10^{-4} \cdot t$	t = Measuring value
Rise Time	> 50 ps to 100 ps	Amplitude < 1 V	5 ps	
	> 100 ps to 10 ms		$5 \text{ ps} + 2 \cdot 10^{-2} \cdot t$	t = Rise time
Frequency response	10 Hz to 6 GHz	5 mV to 3 V	3.5 % (0.3 dB)	For $ T^- > 0.02$ the uncertainty is greater $ T^- $: Complex reflection factor
AC Voltage Measure, Source	> 0.01 V to 100 V	0.01 Hz to 10 Hz	$35 \cdot 10^{-6}$	
	> 100 V to 700 V	0.01 Hz to 10 Hz	$50 \cdot 10^{-6}$	

Abbreviations used:

CMC Calibration and measurement capabilities

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