Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-17602-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **19.04.2024**

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Holder of accreditation certificate:

Tektronix GmbH
Heinrich-Pesch-Straße 11, 50739 Köln

with the location

Tektronix GmbH
Heinrich-Pesch-Straße 11, 50739 Köln

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.

Calibrations in the following areas:

Electrical quantities

DC and low frequency quantities

- **DC voltage** [a)]
- **DC current** [a)]
- **DC resistance**
- **AC voltage**

Time and frequency

- **Frequency**

High frequency quantities

- **Oscilloscope quantities** [a)]
- **Rise time** [a)]
- **Band width**

[a)] also on-site calibrations

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
DC voltage measurement instruments	10 mV to 220 mV		$4 \cdot 10^{-6} \cdot U + 2\ \mu V$	U = measured value
	> 220 mV to 2.2 V		$5 \cdot 10^{-6} \cdot U + 3\ \mu V$	
	> 2.2 V to 22 V		$5 \cdot 10^{-6} \cdot U + 10\ \mu V$	
	> 22 V to 220 V		$5 \cdot 10^{-6} \cdot U + 0.15\ mV$	
	> 220 V to 1100 V		$6 \cdot 10^{-6} \cdot U + 1\ mV$	
sources	10 mV to 100 mV		$5 \cdot 10^{-6} \cdot U + 3\ \mu V$	
	> 100 mV to 1 V		$4 \cdot 10^{-6} \cdot U + 9\ \mu V$	
	> 1 V to 10 V		$5 \cdot 10^{-6} \cdot U + 15\ \mu V$	
	> 10 V to 100 V		$5 \cdot 10^{-6} \cdot U + 0.15\ mV$	
	> 100 V to 1100 V		$7 \cdot 10^{-6} \cdot U + 1.5\ mV$	
DC current measurement instruments	1 µA to 220 µA		$45 \cdot 10^{-6} \cdot I + 7\ nA$	I = measured value
	> 220 µA to 2.2 mA		$43 \cdot 10^{-6} \cdot I + 70\ nA$	
	> 2.2 mA to 22 mA		$50 \cdot 10^{-6} \cdot I + 0.40\ \mu A$	
	> 22 mA to 220 mA		$65 \cdot 10^{-6} \cdot I + 0.50\ \mu A$	
	> 220 mA to 2.2 A		$0.2 \cdot 10^{-3} \cdot I + 4\ \mu A$	
	>2.2 A to 10 A		$0.21 \cdot 10^{-3} \cdot I + 0.14\ mA$	
current clamps	110 µA to 11 mA		$0.15 \cdot 10^{-3} \cdot I + 30\ nA$	Coil with 5 windings
	> 11 mA to 110 mA		$0.15 \cdot 10^{-3} \cdot I + 200\ nA$	
	> 110 mA to 1.1 A		$0.15 \cdot 10^{-3} \cdot I + 2\ \mu A$	
	> 1.1 A to 11 A		$0.25 \cdot 10^{-3} \cdot I + 50\ \mu A$	
	> 11 A to 55 A		$0.6 \cdot 10^{-3} \cdot I + 0.7\ mA$	
	10 mA to 110 mA		$1.5 \cdot 10^{-3} \cdot I + 0.3\ \mu A$	Coil with 50 windings
	> 110 mA to 1.1 A		$1.5 \cdot 10^{-3} \cdot I + 2\ \mu A$	
	> 1.1 A to 11 A		$1.5 \cdot 10^{-3} \cdot I + 15\ \mu A$	
	> 11 A to 110 A		$2.5 \cdot 10^{-3} \cdot I + 0.4\ mA$	
	> 110 A to 550 A		$6 \cdot 10^{-3} \cdot I + 7\ mA$	
sources	1 µA to 100 µA		$50 \cdot 10^{-6} \cdot I + 9\ nA$	
	> 100 µA to 1 mA		$50 \cdot 10^{-6} \cdot I + 80\ nA$	
	> 1 mA to 10 mA		$60 \cdot 10^{-6} \cdot I + 0.5\ \mu A$	
	> 10 mA to 100 mA		$70 \cdot 10^{-6} \cdot I + 2\ \mu A$	
	> 100 mA to 1 A		$0.24 \cdot 10^{-3} \cdot I + 10\ \mu A$	
	> 1 A to 10 A		$0.25 \cdot 10^{-3} \cdot I + 0.30\ mA$	
DC resistance measurement instruments	1 Ω		$90 \cdot 10^{-6} \cdot R$	R = measured value
	1.9 Ω		$60 \cdot 10^{-6} \cdot R$	
	10 Ω		$20 \cdot 10^{-6} \cdot R$	
	19 Ω		$20 \cdot 10^{-6} \cdot R$	
	100 Ω		$15 \cdot 10^{-6} \cdot R$	
	190 Ω		$15 \cdot 10^{-6} \cdot R$	
	1 kΩ		$15 \cdot 10^{-6} \cdot R$	
	1.9 kΩ		$15 \cdot 10^{-6} \cdot R$	
	10 kΩ		$15 \cdot 10^{-6} \cdot R$	
	19 kΩ		$15 \cdot 10^{-6} \cdot R$	
	100 kΩ		$15 \cdot 10^{-6} \cdot R$	
	190 kΩ		$15 \cdot 10^{-6} \cdot R$	
	1 MΩ		$75 \cdot 10^{-6} \cdot R$	
	1.9 MΩ		$75 \cdot 10^{-6} \cdot R$	
	10 MΩ		$75 \cdot 10^{-6} \cdot R$	
	19 MΩ		$75 \cdot 10^{-6} \cdot R$	
	100 MΩ		$0.1 \cdot 10^{-3} \cdot R$	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
DC resistance resistance	1 Ω to 10 Ω > 10 Ω to 100 Ω > 100 Ω to 1 MΩ > 1 MΩ to 10 MΩ > 10 MΩ to 100 MΩ		$20 \cdot 10^{-6} \cdot R$ $15 \cdot 10^{-6} \cdot R$ $25 \cdot 10^{-6} \cdot R$ $40 \cdot 10^{-6} \cdot R$ $0.1 \cdot 10^{-3} \cdot R$	R = measured value
frequency sources and measuring devices	1 MHz to 10 MHz 0.1 Hz to 20 GHz		$1 \cdot 10^{-11} \cdot f$ $1 \cdot 10^{-8} \cdot f + u_{Tf}$	f = measured value 1 MH step size u_{Tf} = trigger uncertainty
AC voltage measuring devices and probes	1 mV to 33 mV	10 Hz to 45 Hz > 45 Hz to 10 kHz > 10 kHz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz > 100 kHz to 500 kHz	$0.80 \cdot 10^{-3} \cdot U + 7\ \mu V$ $0.15 \cdot 10^{-3} \cdot U + 7\ \mu V$ $0.2 \cdot 10^{-3} \cdot U + 7\ \mu V$ $1 \cdot 10^{-3} \cdot U + 7.5\ \mu V$ $3.5 \cdot 10^{-3} \cdot U + 14\ \mu V$ $8 \cdot 10^{-3} \cdot U + 54\ \mu V$	Fluke 5522A Uncertainties excluding standard deviation and repeatability, which are determined at the time of measurement. In the case of probes, additional measurement uncertainties are caused by the display unit, unless this is part of a measuring chain.
	> 33 mV to 330 mV	10 Hz to 45 Hz > 45 Hz to 10 kHz > 10 kHz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz > 100 kHz to 500 kHz	$0.3 \cdot 10^{-3} \cdot U + 12\ \mu V$ $0.15 \cdot 10^{-3} \cdot U + 11\ \mu V$ $0.17 \cdot 10^{-3} \cdot U + 11\ \mu V$ $0.35 \cdot 10^{-3} \cdot U + 13\ \mu V$ $0.85 \cdot 10^{-3} \cdot U + 0.8\ mV$ $2 \cdot 10^{-3} \cdot U + 2\ mV$	
	> 330 mV to 3.3 V	10 Hz to 45 Hz > 45 Hz to 10 kHz > 10 kHz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz > 100 kHz to 500 kHz	$0.3 \cdot 10^{-3} \cdot U + 0.2\ mV$ $0.16 \cdot 10^{-3} \cdot U + 75\ \mu V$ $0.2 \cdot 10^{-3} \cdot U + 75\ \mu V$ $0.3 \cdot 10^{-3} \cdot U + 90\ \mu V$ $0.7 \cdot 10^{-3} \cdot U + 180\ \mu V$ $2.3 \cdot 10^{-3} \cdot U + 0.9\ mV$	
	> 3.3 V to 33 V	10 Hz To 45 Hz > 45 Hz to 10 kHz > 10 kHz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz	$0.3 \cdot 10^{-3} \cdot U + 0.9\ mV$ $0.16 \cdot 10^{-3} \cdot U + 0.9\ mV$ $0.25 \cdot 10^{-3} \cdot U + 0.9\ mV$ $0.35 \cdot 10^{-3} \cdot U + 1.1\ mV$ $0.9 \cdot 10^{-3} \cdot U + 2.1\ mV$	
	> 33 V to 330 V	45 Hz to 1 kHz > 1 kHz to 10 kHz > 10 kHz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz	$0.2 \cdot 10^{-3} \cdot U + 6.5\ mV$ $0.2 \cdot 10^{-3} \cdot U + 10\ mV$ $0.25 \cdot 10^{-3} \cdot U + 10\ mV$ $0.26 \cdot 10^{-3} \cdot U + 24\ mV$ $1.9 \cdot 10^{-3} \cdot U + 0.11\ V$	
	> 330 V to 1020 V	45 Hz to 1 kHz > 1 kHz to 5 kHz > 5 kHz to 10 kHz	$0.3 \cdot 10^{-3} \cdot U + 20\ mV$ $0.25 \cdot 10^{-3} \cdot U + 20\ mV$ $0.18 \cdot 10^{-3} \cdot U + 0.22\ V$	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
sources	1 mV to 10 mV	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz > 100 kHz to 300 kHz > 300 kHz to 1 MHz	$0.23 \cdot 10^{-3} \cdot U$ + 3 µV $0.3 \cdot 10^{-3} \cdot U$ + 3 µV $0.31 \cdot 10^{-3} \cdot U$ + 3 µV $3 \cdot 10^{-3} \cdot U$ + 3 µV $10 \cdot 10^{-3} \cdot U$ + 6 µV $20 \cdot 10^{-3} \cdot U$ + 15 µV	Fluke 8588A 1 year absolut specification ± 5°C Tcal Characteristic impedance of the device under test: 50 Ω, 1 MΩ, 10 MΩ
	> 10 mV to 100 mV	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz > 100 kHz to 300 kHz > 300 kHz to 1 MHz	$85 \cdot 10^{-6} \cdot U$ + 3.5 µV $0.13 \cdot 10^{-3} \cdot U$ + 3 µV $0.24 \cdot 10^{-3} \cdot U$ + 3 µV $0.48 \cdot 10^{-3} \cdot U$ + 12 µV $2 \cdot 10^{-3} \cdot U$ + 65 µV $10 \cdot 10^{-3} \cdot U$ + 220 µV	
	> 100 mV to 1 V	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz > 100 kHz to 300 kHz > 300 kHz to 1 MHz	$85 \cdot 10^{-6} \cdot U$ + 18 µV $0.13 \cdot 10^{-3} \cdot U$ + 18 µV $0.24 \cdot 10^{-3} \cdot U$ + 18 µV $0.48 \cdot 10^{-3} \cdot U$ + 120 µV $2 \cdot 10^{-3} \cdot U$ + 630 µV $10 \cdot 10^{-3} \cdot U$ + 2 mV	
	> 1 V to 10 V	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz > 100 kHz to 300 kHz > 300 kHz to 1 MHz	$90 \cdot 10^{-6} \cdot U$ + 160 µV $0.13 \cdot 10^{-3} \cdot U$ + 120 µV $0.24 \cdot 10^{-3} \cdot U$ + 150 µV $0.49 \cdot 10^{-3} \cdot U$ + 1.1 mV $2 \cdot 10^{-3} \cdot U$ + 6 mV $10 \cdot 10^{-3} \cdot U$ + 14 mV	
	> 10 V to 100 V	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz > 100 kHz to 300 kHz > 300 kHz to 1 MHz	$0.1 \cdot 10^{-3} \cdot U$ + 1.5 mV $0.12 \cdot 10^{-3} \cdot U$ + 1.5 mV $0.19 \cdot 10^{-3} \cdot U$ + 8 mV $0.51 \cdot 10^{-3} \cdot U$ + 16 mV $3.7 \cdot 10^{-3} \cdot U$ + 62 mV $11 \cdot 10^{-3} \cdot U$ + 0.53 V	
	100 V to 1000 V	1 Hz to 2 kHz > 2 kHz to 10 kHz > 10 kHz to 30 kHz > 30 kHz to 100 kHz	$0.12 \cdot 10^{-3} \cdot U$ + 32 mV $0.12 \cdot 10^{-3} \cdot U$ + 32 mV $0.2 \cdot 10^{-3} \cdot U$ + 80 mV $0.55 \cdot 10^{-3} \cdot U$ + 0.16 V	
Rise time sources	7 ps to 35 ps* 10 ps to 40ps** > 40 ps to 25ns** 18 ps to 1 ms***	50 mV to 500 mV 50 mV to 50 V 50 mV to 50 V 10 mV to 250 V	$2 \cdot 10^{-2} \cdot t_R + 0.8$ ps 2.3 ps $5.5 \cdot 10^{-2} \cdot t_R$ $3 \cdot 10^{-2} \cdot t_R + 4$ ps	* Derived size of waveform (sources) ** Correction factor method *** Gauss correction ** & ***: To 4% Pulse roof distortion, worse above.
measuring devices and probes	18 ps to 1 ns* 16 ps to 1 ns** 500 ps to 3 ns* 1.5 ns to 25 ns*	10 mV to 250 mV 10 mV to 250 mV 0.25 V to 3 V 25 V und 50 V	$3 \cdot 10^{-2} \cdot t_R + 8$ ps $4 \cdot 10^{-2} \cdot t_R + 4$ ps $2 \cdot 10^{-2} \cdot t_R + 65$ ps $2 \cdot 10^{-2}$ v $t_R + 120$ ps	* Gauss correction ** Correction factor method Periodic signals, pulse amplitudes
current clamps	1.5 ns to 20 ns 50 ns to 300 ns	0.5 A und 1A 5A	$3 \cdot 10^{-2}$ v $t_R + 200$ ps $1.5 \cdot 10^{-2} \cdot t_R + 250$ ps	t_R = rise time

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Waveform sources	5 GHz to 70 GHz*	10 mV to 1V	$5 \cdot 10^{-2} \cdot + \delta_r(t)$ [1] $1 \cdot 10^{-4} \cdot \Delta t + 0.5$ ps [2]	Sample to sample uncertainty for coherent, periodic signals. Derived step or impulse functions. * spectral range of the FFT [1] Amplitude in the time domain [2] in the time domain $\delta_r(t)$ = Influence of the source reflection of the test specimen on partial areas of the measuring points
Oscilloscopes DC voltage measuring devices	0.0 V	Range ± 200 mV	25 µV	*U* = measured value 50 Ω Terminating resistor
	1 mV to ±5 V	in 50 Ω	$0.19 \cdot 10^{-3} \cdot U + 19$ µV	with Fluke-9500(B) + Fluke-9530
	1 mV to ±200 V	in 1 MΩ	$0.20 \cdot 10^{-3} \cdot U + 19$ µV	
frequency response	4.4 mV[4] to 5.6 V[4]	10 MHz to 100 MHz	0.22 dB	with Fluke 9500/9530 Reference frequency f_{ref}: 50 kHz to 10 MHz $\lvert\Gamma\rvert \leq 0.23$ (VSWR ≤ 1.6) Peak-to-peak voltage of the incident wave set on the calibrator. The measured variable is the ratio of the RMS values of the input voltage measured by the DUT at the measuring frequency and the reference frequency. Reflection factor of the connected test specimen with $\lvert\Gamma\rvert = \frac{VSWR-1}{VSWR+1}$ with VSWR = Standing wave ratio. Reference impedance: 50 Ω
	4.4 mV[4] to 5.6 V[4]	> 100 MHz to 550 MHz	0.27 dB	
	4.4 mV[4] to 3.4 V[4]	> 550 MHz to 1.1 GHz	0.35 dB	
	4.4 mV[4] to 3.4 V[4]	> 1.1 GHz to 2.5 GHz	0.39 dB	
	4.4 mV[4] to 2.2 V[4]	> 2.5 GHz to 3.2 GHz	0.48 dB	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
frequency response	< 0.8 V	1.0 GHz	0.22 dB	with Power Meter + Power Splitter
	< 0.8 V	2.0 GHz	0.27 dB	
	< 0.8 V	2.5 GHz	0.34 dB	
	< 0.3 V	3.2 GHz to 8 GHz	0.30 dB	Coaxial connection technology PC-2.92 / Typ-K
	0.3 V <	3.2 GHz to 8 GHz	0.31 dB	
	< 0.3 V	8 GHz to 12.5 GHz	0.37 dB	
	0.3 V <	8 GHz to 12.5 GHz	0.38 dB	
	< 0.3 V	12.5 GHz to 16 GHz	0.46 dB	
	0.3 V <	12.5 GHz to 16 GHz	0.42 dB	
	< 0.3 V	16 GHz to 18 GHz	0.39 dB	
	0.3 V <	16 GHz to 18 GHz	0.42 dB	
	< 0.3 V	18 GHz to 20 GHz	0.39 dB	
	0.3 V <	18 GHz to 20 GHz	0.40 dB	
	< 0.12 V	20 GHz to 23 GHz	0.55 dB	
	0.12 V <	20 GHz to 23 GHz	0.58 dB	
	< 0.12 V	23 GHz to 25 GHz	0.57 dB	
	0.12 V <	23 GHz to 25 GHz	0.61 dB	
	< 0.12 V	25 GHz to 33 GHz	0.87 dB	
	0.12 V <	25 GHz to 33 GHz	0.84 dB	
AC voltage (sine) in 50 Ω				*U* = measured value
	4.4 mV to 5.6 V	1 Hz to 550 MHz	$3.3 \cdot 10^{-2} \cdot U$	Fluke 9500(B)+9530 (1 Hz to 3.2 GHz)
	4.4 mV to 3.4 V	550 MHz to 2.5 GHz	$6.3 \cdot 10^{-2} \cdot U$	
	4.4 mV to 2.2 V	2.5 GHz to 3.2 GHz	$1.1 \cdot 10^{-1} \cdot U$	
	4.4 mV to 2.2 V	3.2 GHz to 6 GHz	$1.4 \cdot 10^{-1} \cdot U$	Fluke 9500(B)+9560
time marker – measuring devices	80 ms		$21 \cdot 10^{-9} \cdot t$	Fluke 9500(B)+9530 with Fluke 910R
	400 ms		$3.4 \cdot 10^{-9} \cdot t$	
DC resistance	50 Ω		44 mΩ	with Fluke-9500(B)+9530
	75 Ω		0.12 Ω	
	250 kΩ		0.98 kΩ	
	1 MΩ		0.92 kΩ	
DC voltage sources	0 V to ±5 V		$0.14 \cdot 10^{-3} \cdot U + 90$ µV	with Keithley 2000 *U* = measured value
	0 V to ±0.2 V		33 µV	Self-measurement of the test specimen, smallest uncertainty related to MSO series, HiRes mode
Noise RMS				BW= Bandwidth limitation Self-measurement of the test specimen
	20 MHz BW		0.18 µV	
	175 MHz BW		2.2 µV	
	0.2 GHz BW to 10 GHz		1.1 µV	
frequency measuring devices	12 kHz to 3.2 GHz		$0.27 \cdot 10^{-6} \cdot f$	with Fluke 9500 opt.100 f = frequency
time difference (Delta Time Acc)	to 1 GHz		49 fs	Anritsu MG3694C
	> 1 GHz to 2 GHz		43 fs	
	> 2 GHz to 16 GHz		30 fs	

On-site calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
DC voltage				
sources	1 mV to 100 mV		$60 \cdot 10^{-6} \cdot U + 5.5\ \mu V$	U = measured value
	> 100 mV to 1 V		$35 \cdot 10^{-6} \cdot U + 20\ \mu V$	
	> 1 V to 10 V		$35 \cdot 10^{-6} \cdot U + 30\ \mu V$	
	> 10 V to 100 V		$54 \cdot 10^{-6} \cdot U + 0.3$ mV	
	> 100 V to 1000 V		$55 \cdot 10^{-6} \cdot U + 3$ mV	
measuring devices	1 mV to 330 mV		$21 \cdot 10^{-6} \cdot U + 3.0\ \mu V$	U = measured value
	> 330 mV to 3.3 V		$11 \cdot 10^{-6} \cdot U + 16\ \mu V$	
	> 3.3 V to 33 V		$12 \cdot 10^{-6} \cdot U + 0.16$ mV	
	> 33 V to 330 V		$18 \cdot 10^{-6} \cdot U + 2.0$ mV	
	> 330 V to 1000 V		$20 \cdot 10^{-6} \cdot U + 5.0$ mV	
DC current				
measured value	1 µA to 330 µA		$0.17 \cdot 10^{-3} \cdot I + 30\ \mu A$	I = measured value
	> 330 µA to 3.3 mA		$0.12 \cdot 10^{-3} \cdot I + 0.1\ \mu A$	
	> 3.3 mA to 33 mA		$0.12 \cdot 10^{-3} \cdot I + 0.5\ \mu A$	
	> 33 mA to 330 mA		$0.12 \cdot 10^{-3} \cdot I + 6.0\ \mu A$	
	> 330 mA to 1.1 A		$0.24 \cdot 10^{-3} \cdot I + 70\ \mu A$	
	> 1.1 A to 3.0 A		$0.45 \cdot 10^{-3} \cdot I + 0.2$ mA	
	> 3.0 A to 11 A		$0.58 \cdot 10^{-3} \cdot I + 1.0$ mA	
current clamps	10 µA to 165 mA		$0.4 \cdot 10^{-3} \cdot I + 1.5\ \mu A$	coil with 5 windings
	> 165 mA to 1.65 A		$0.4 \cdot 10^{-3} \cdot I + 20\ \mu A$	
	> 1.65 A to 5.5 A		$0.8 \cdot 10^{-3} \cdot I + 0.25$ mA	
	> 5.5 A to 15 A		$1.5 \cdot 10^{-3} \cdot I + 0.35$ mA	
	> 15 A to 55 A		$2 \cdot 10^{-3} \cdot I + 3$ mA	
	10 mA to 165 mA		$4 \cdot 10^{-3} \cdot I + 3\ \mu A$	coil with 5 windings
	> 165 mA to 1.65 A		$4 \cdot 10^{-3} \cdot I + 15\ \mu A$	
	> 1.65 A to 16.5 A		$4 \cdot 10^{-3} \cdot I + 0.2$ mA	
	> 16.5 A to 55 A		$8 \cdot 10^{-3} \cdot I + 2.5$ mA	
	> 55 A to 150 A		$15 \cdot 10^{-3} \cdot I + 5$ mA	
	> 150 A to 550 A		$20 \cdot 10^{-3} \cdot I + 30$ mA	
Rise time				Periodic signals, pulse amplitudes
sources	40 ps to 25 ns	50 mV to 50 V	$4 \cdot 10^{-2} \cdot t_R + 4$ ps	t_R = rise time
measuring devices and probes	40 ps to 1 ns	10 mV to 250 mV	$4 \cdot 10^{-2} \cdot t_R + 8$ ps	
	500 ps to 3 ns	0.25 V to 3 V	$2 \cdot 10^{-2} \cdot t_R + 65$ ps	
	1.5 ns to 25 ns	25 V und 50 V	$2 \cdot 10^{-2} \cdot t_R + 120$ ps	
current clamps	1.5 ns to 20 ns	0.5 A und 1A	$3 \cdot 10^{-2} \cdot t_R + 200$ ps	
	50 ns to 300 ns	5A	$3 \cdot 10^{-2} \cdot t_R$	

On-site calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Oscilloscopes with Oscilloscope calibrator DC voltage	0.0 V to 0.2 V 1 mV to 5 V 1 mV to 200 V	in 1 MΩ oder 50 Ω in 50 Ω In 1 MΩ	25 µV $0.19 \cdot 10^{-3} \cdot U + 19$ µV $0.20 \cdot 10^{-3} \cdot U + 19$ µV	with Fluke 9500 U = measured value
Time Marker – measuring devices	 80 ms 400 ms		 $21 \cdot 10^{-9} \cdot t$ $3.4 \cdot 10^{-9} \cdot t$	t = Messwert Fluke 9500/9530 with Fluke 910R
AC voltage (sine) in 50 Ω	 4.4 mV to 5.6 V 4.4 mV to 3.4 V 4.4 mV to 2.2 V 4.4 mV to 2.2 V	 1 Hz to 550 MHz 550 MHz to 2.5 GHz 2.5 GHz to 3.2 GHz 3.2 GHz to 6 GHz	 $3.3 \cdot 10^{-2} \cdot U$ $6.3 \cdot 10^{-2} \cdot U$ $1.1 \cdot 10^{-1} \cdot U$ $1.4 \cdot 10^{-1} \cdot U$	U = measured value Fluke 9500/9530 (1 Hz to 3.2 GHz) Fluke 9500/9560
DC resistance	50 Ω 75 Ω 250 kΩ 1 MΩ		44 mΩ 0.12 Ω 0.98 kΩ 0.92 kΩ	with Fluke 9500/9530
DC voltage sources	0 V to ±5 V 0 V to ±0.2 V		$0.14 \cdot 10^{-3} \cdot U + 90$ µV 33 µV	with Keithley 2000 U = measured value Self-measurement of the test specimen, smallest uncertainty related to MSO series, HiRes mode

On-site calibration

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
frequency response	4.4 mV[4] to 5.6 V[4] 4.4 mV[4] to 3.4 V[4] 4.4 mV[4] to 3.4 V[4] 4.4 mV[4] to 2.2 V[4] 4.4 mV[4] to 2.2 V[4]	10 MHz to 100 MHz > 100 MHz to 550 MHz > 550 MHz to 1.1 GHz > 1.1 GHz to 2.5 GHz > 2.5 GHz to 3.2 GHz	0.22 dB 0.27 dB 0.35 dB 0.39 dB 0.48 dB	with Fluke 9500/9530 reference frequency f_{ref}: 50 kHz to 10 MHz $\lvert\Gamma\rvert \leq 0.23$ (VSWR ≤ 1.6) Peak-to-peak voltage of the incident wave set on the calibrator. The measured variable is the ratio of the RMS values of the input voltage measured by the DUT at the measuring frequency and the reference frequency. Reflection factor of the connected test specimen with $\lvert\Gamma\rvert = \frac{VSWR-1}{VSWR+1}$ with VSWR = standing wave ratio. reference impedance: 50 Ω
noise RMS	20 MHz BW 175 MHz BW 0.2 GHz to 10 GHz		0.18 µV 2.2 µV 1.1 µV	BW= Bandwidth limitation Self-measurement of the test specimen
frequency sources	12 kHz 3.2 GHz		$0.27 \cdot 10^{-6} \cdot f$	with Fluke 9500 opt.100 f = frequency

Abbreviations used:

DIN Deutsches Institut für Normung e.V.
EN Europäische Norm
IEC International Electrotechnical Commission
ISO International Organization for Standardization