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CLAS Certificate Number 95-02

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Clients served	<ul style="list-style-type: none"> • All interested parties
Fields of calibration	<ul style="list-style-type: none"> • Electrical • Frequency and Time • Pressure • Thermometry • Humidity
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Electrical

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks	
Phase				
± 180°	5 Hz to 10 Hz	0.200°	For the calibration of frequency generating devices using a phasemeter.	
± 180°	10 Hz to 50 kHz	0.05°		
± 180°	10 Hz to 65 Hz	0.1°		
± 180°	65 Hz to 500 Hz	0.25°		
± 180°	500 Hz to 1 kHz	0.5°		
± 180°	1 kHz to 5 kHz	2.5°		
± 180°	5 kHz to 10 kHz	5°		
± 180°	10 kHz to 30 kHz	10°		
Measured Quantity & Range or Instrument		Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks	
Resistance				

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0.001 Ω	30 μΩ/Ω	For the calibration of high accuracy multi-function calibrators, digital multimeters, and standard resistors. Standard resistors are calibrated in air at a nominal temperature of 23 °C and must have a relatively low temperature coefficient to achieve this uncertainty.
0.01 Ω	20 μΩ/Ω	
0.1 Ω	5 μΩ/Ω	
1 Ω	0.8 μΩ/Ω	
10 Ω	2.1 μΩ/Ω	
100 Ω	1.5 μΩ/Ω	
1 kΩ	1.5 μΩ/Ω	
10 kΩ	0.6 μΩ/Ω	
100 kΩ	1.5 μΩ/Ω	
1 MΩ	2.0 μΩ/Ω	
10 MΩ	4.5 μΩ/Ω	
19 MΩ	8 μΩ/Ω	
100 MΩ	22 μΩ/Ω	
1 GΩ	40 μΩ/Ω	
10 GΩ	100 μΩ/Ω	For the calibration of resistors. Ratio method using standard resistor, digital multimeter and direct current voltage calibrator.
Resistance		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
10 Ω	5 μΩ/Ω	
25 Ω	3 μΩ/Ω	
100 Ω	3 μΩ/Ω	
200 Ω	3 μΩ/Ω	
400 Ω	3 μΩ/Ω	
4 kΩ	3 μΩ/Ω	
10 kΩ	3 μΩ/Ω	
40 kΩ	4 μΩ/Ω	
100 kΩ	5 μΩ/Ω	
500 kΩ	20 μΩ/Ω	
Resistance		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0.001 Ω	40 μΩ/Ω	For the calibration of resistance measuring devices over a Wide range of resistance using fixed resistors.
0.01 Ω	23 μΩ/Ω	Can be used to characterize a DMM for enhanced accuracy.
0.1 Ω	6 μΩ/Ω	
1 Ω	2 μΩ/Ω	
1.9 Ω	15 μΩ/Ω	
10 Ω	2.5 μΩ/Ω	
19 Ω	7 μΩ/Ω	
100 Ω	1.8 μΩ/Ω	
190 Ω	4.5 μΩ/Ω	
1 kΩ	1.8 μΩ/Ω	
1.9 kΩ	3.5 μΩ/Ω	
10 kΩ	0.8 μΩ/Ω	
19 kΩ	2 μΩ/Ω	
100 kΩ	1.9 μΩ/Ω	
190 kΩ	3.5 μΩ/Ω	
1 MΩ	2.1 μΩ/Ω	
1.9 MΩ	5 μΩ/Ω	
10 MΩ	5 μΩ/Ω	
19 MΩ	8 μΩ/Ω	
100 MΩ	27 μΩ/Ω	
1 GΩ	70 μΩ/Ω	

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
10 GΩ	150 μΩ/Ω	For the calibration of digital multimeter using direct resistor input.
Resistance		
0 Ω to 2 Ω	2.1 μΩ/Ω + 2 μΩ/Ω	For the calibration of the resistance function of multifunction calibrators and standard resistors using DMM transfer measurement.
1 Ω	2.1 μΩ/Ω + 0 μΩ/Ω	
2 Ω to 20 Ω	2.5 μΩ/Ω + 0.7 μΩ/Ω	
10 Ω	2.5 μΩ/Ω + 0 μΩ/Ω	
20 Ω to 200 Ω	1.8 μΩ/Ω + 0.15 μΩ/Ω	
100 Ω	1.8 μΩ/Ω + 0 μΩ/Ω	
200 Ω to 2 kΩ	1.8 μΩ/Ω + 0.15 μΩ/Ω	
1 kΩ	1.8 μΩ/Ω + 0 μΩ/Ω	
2 kΩ to 20 kΩ	0.8 μΩ/Ω + 0.15 μΩ/Ω	
10 kΩ	0.8 μΩ/Ω + 0 μΩ/Ω	
20 kΩ to 200 kΩ	1.9 μΩ/Ω + 0.15 μΩ/Ω	
100 kΩ	1.9 μΩ/Ω + 0 μΩ/Ω	
200 kΩ to 2 MΩ	2.1 μΩ/Ω + 0.5 μΩ/Ω	
1 MΩ	2.1 μΩ/Ω + 0 μΩ/Ω	
2 MΩ to 20 MΩ	5 μΩ/Ω + 5 μΩ/Ω	
10 MΩ	5 μΩ/Ω + 0 μΩ/Ω	
20 MΩ to 200 MΩ	27 μΩ/Ω + 50 μΩ/Ω	
100 MΩ	27 μΩ/Ω + 0 μΩ/Ω	

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (\pm) (See <u>supplementary notes</u>)	Remarks
Resistance		
0 Ω to 10.9999 Ω	35 $\mu\Omega/\Omega + 0.001 \Omega$	For the calibration of resistance measuring devices over a wide range of resistance using multi-function calibrators.
11 Ω to 32.9999 Ω	25 $\mu\Omega/\Omega + 0.0015 \Omega$	
33 Ω to 109.9999 Ω	22 $\mu\Omega/\Omega + 0.0014 \Omega$	
110 Ω to 1.099999 $k\Omega$	22 $\mu\Omega/\Omega + 0.002 \Omega$	
1.1 $k\Omega$ to 10.99999 $k\Omega$	22 $\mu\Omega/\Omega + 0.02 \Omega$	
11 $k\Omega$ to 109.9999 $k\Omega$	22 $\mu\Omega/\Omega + 0.2 \Omega$	
110 $k\Omega$ to 1.099999 $M\Omega$	25 $\mu\Omega/\Omega + 2 \Omega$	
1.1 $M\Omega$ to 3.299999 $M\Omega$	40 $\mu\Omega/\Omega + 30 \Omega$	
3.3 $M\Omega$ to 10.99999 $M\Omega$	110 $\mu\Omega/\Omega + 50 \Omega$	
11 $M\Omega$ to 32.99999 $M\Omega$	200 $\mu\Omega/\Omega + 2.5 k\Omega$	
33 $M\Omega$ to 109.9999 $M\Omega$	400 $\mu\Omega/\Omega + 3 k\Omega$	
110 $M\Omega$ to 329.9999 $M\Omega$	2500 $\mu\Omega/\Omega + 100 k\Omega$	
330 $M\Omega$ to 1100 $M\Omega$	12000 $\mu\Omega/\Omega + 500 k\Omega$	
Resistance		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0 Ω to 11.9999 Ω	15 $\mu\Omega/\Omega$ + 0.00005 Ω	For the calibration of resistors and resistance devices over a wide range of resistance and conditions using a DMM.
12 Ω to 119.9999 Ω	10 $\mu\Omega/\Omega$ + 0.0005 Ω	
120 Ω to 1.199999 kΩ	8 $\mu\Omega/\Omega$ + 0.0005 Ω	
1.2 kΩ to 11.99999 kΩ	8 $\mu\Omega/\Omega$ + 0.005 Ω	
12 kΩ to 119.9999 kΩ	8 $\mu\Omega/\Omega$ + 0.05 Ω	
120 kΩ to 1.199999 MΩ	12 $\mu\Omega/\Omega$ + 2 Ω	
1.2 MΩ to 11.99999 MΩ	50 $\mu\Omega/\Omega$ + 100 Ω	
12 MΩ to 119.9999 MΩ	500 $\mu\Omega/\Omega$ + 1 kΩ	
120 MΩ to 1199 MΩ	0.5% + 10 kΩ	
Voltage, DC		
100 mV	4 $\mu\text{V}/\text{V}$	For the calibration of high accuracy digital meters, multi-function calibrators, high accuracy solid-state voltage standards and similar devices including solid-state devices using a combination of multi-function calibrators, voltage reference standards, and voltage ratio standards.
1 V	0.7 $\mu\text{V}/\text{V}$	
10 V	0.25 $\mu\text{V}/\text{V}$	
1.018 V	0.7 $\mu\text{V}/\text{V}$	
100 V	0.7 $\mu\text{V}/\text{V}$	
1000 V	1 $\mu\text{V}/\text{V}$	
Voltage, DC		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0 mV to 220 mV	6 $\mu\text{V}/\text{V}$ + 0.4 μV	For the calibration of voltage measuring devices using multi-function calibrators.
220 mV to 2.2 V	3.5 $\mu\text{V}/\text{V}$ + 0.7 μV	
2.2 V to 11 V	2.5 $\mu\text{V}/\text{V}$ + 2.5 μV	
11 V to 22 V	2.5 $\mu\text{V}/\text{V}$ + 4 μV	
22 V to 220 V	3.5 $\mu\text{V}/\text{V}$ + 40 μV	
220 V to 1100 V	4.5 $\mu\text{V}/\text{V}$ + 400 μV	
Voltage, DC		
0 mV to 120 mV	3.5 $\mu\text{V}/\text{V}$ + 0.3 μV	For the calibration of voltage sources using a DMM.
120 mV to 1.2 V	3.1 $\mu\text{V}/\text{V}$ + 0.3 μV	
1.2 V to 12 V	2.6 $\mu\text{V}/\text{V}$ + 0.5 μV	
12 V to 120 V	4.5 $\mu\text{V}/\text{V}$ + 30 μV	
120 V to 1050 V	4.5 to 16.5 $\mu\text{V}/\text{V}$ + 100 μV	
Voltage, DC Transfer		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0 V to 0.2 V	4.4 μ V/V + 0.3 μ V	
0.1 V	4.4 μ V/V + 0 μ V	
0.2 V to 2 V	0.7 μ V/V + 0.1 μ V	
1 V	0.7 μ V/V + 0 μ V	
2 V to 20 V	0.3 μ V/V + 0.1 μ V	
10 V	0.3 μ V/V + 0 μ V	
20 V to 200 V	0.7 μ V/V + 0.1 μ V	
100 V	0.7 μ V/V + 0 μ V	
200 V to 1050 V	1 μ V/V + 0.3 μ V	
1000 V	1 μ V/V + 0 μ V	Short term transfer between UUT and characterized 5720A DCV standard using 8508A DCV function.

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Current, DC		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
10 µA	34 µA/A	For the calibration of current sources using a DMM and shunts, and for characterizing DC current sources.
1 mA	4 µA/A	
0.3 mA, 2 mA, 300 mA	4.5 µA/A	
0.2 mA, 200 mA	5 µA/A	
20 mA	5.5 µA/A	
3 mA	6 µA/A	
0.1 mA, 10 mA, 100 mA	7 µA/A	
30 mA	7.5 µA/A	
1 A, 2 A	9 µA/A	
3 A	29 µA/A	
10 A, 20 A	26 µA/A	
100 A	50 µA/A	
0 µA to 120 µA	15 µA/A + 0.8 nA	For the calibration of current sources using a DMM.
120 µA to 1.2 mA	15 µA/A + 5 nA	
1.2 mA to 12 mA	15 µA/A + 50 nA	
12 mA to 120 mA	30 µA/A + 0.5 µA	
120 mA to 1.2 A	100 µA/A + 10 µA	

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0 µA to 220 µA	35 µA/A + 6 nA	For the calibration of current measuring devices. using multi-function calibrators.
220 µA to 2.2 mA	30 µA/A + 7 nA	
2.2 mA to 22 mA	30 µA/A + 40 nA	
22 mA to 220 mA	40 µA/A + 0.7 µA	
220 mA to 2.2 A	60 µA/A + 12 µA	
2.2 A to 11 A	340 µA/A + 480 µA	
11 A to 20.5 A	800 µA/A + 750 µA	

Measured Quantity and Range or Instrument	Calibration and Measurement Capability expressed as an uncertainty (±) (See <u>supplementary notes</u>)	Type of Service	Remarks
Current, AC			
100 µA to 20 A	10 Hz to 30 kHz	21 µA/A to 180 µA/A	For the calibration of AC current sources using an AC/DC transfer standard with current shunts. See <u>Annex E</u> for uncertainty details.

Measured Quantity and Range or Instrument	Calibration and Measurement Capability expressed as an uncertainty (\pm) (See <u>supplementary notes</u>)	Type of Service	Remarks
Current, AC			
9 μ A to 11 A	10 Hz to 10 kHz	110 μ A/A to 3300 μ A/A	For the calibration of current measuring devices using multi-function calibrators.
29 μ A to 329.99 mA	10 kHz to 30 kHz	0.32 % to 1.2 %	See <u>Annex E</u> for uncertainty details.
11 A to 20.5 A	45 Hz to 5 kHz	0.1 % to 2.5 %	
5 μ A to 120 μ A	10 Hz to 1 kHz	0.06 % to 0.4 % +0.03 %rng	For the calibration of current generating devices and equipment using a DMM.
120 μ A to 0.12 A	10 Hz to 20 kHz	0.03 % to 0.4 % +0.02 %rng	See <u>Annex I</u> for uncertainty details.
0.12A to 1.2 A	10 Hz to 20 kHz	0.08 % to 0.4 % +0.02 %rng	

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (\pm) (See <u>supplementary notes</u>)	Remarks
Current clamp calibration		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Effective DC current output		
10 A Turns to 16.4999 A Turns	0.5 % + 0.02 A	Source using a multifunction calibrator and a 50 turn coil. For the calibration of clamp meters and current clamps. Non-Toroidal clamps.
16.5 A Turns to 149.999 A Turns	0.5 % + 0.14 A	
150 A Turns to 1025 A Turns	0.5 % + 0.5 A	

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Current clamp calibration			
Effective AC current output			
10 A Turns to 16.4999 A Turns	45 Hz to 65 Hz	0.28 % + 3 mA	Source using a multifunction calibrator and a 50 turn coil. For the calibration of clamp meters and current clamps. Toroidal clamps.
16.5 A Turns to 149.999 A Turns	45 Hz to 65 Hz	0.28 % + 25 mA	
150 A Turns to 1025 A Turns	45 Hz to 65 Hz	0.28 % + 90 mA	
10 A Turns to 16.4999 A Turns	65 Hz to 440 Hz	0.79 % + 3 mA	
16.5 A Turns to 149.999 A Turns	65 Hz to 440 Hz	0.79 % + 27 mA	
150 A Turns to 1025 A Turns	65 Hz to 440 Hz	0.79% + 0.1 A	

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
10 A Turns to 16.4999 A Turns	45 Hz to 65 Hz	0.56 % + 0.03 A	
16.5 A Turns to 149.999 A Turns	45 Hz to 65 Hz	0.56 % + 0.25 A	
150 A Turns to 1025 A Turns	45 Hz to 65 Hz	0.56 % + 0.9 A	
10 A Turns to 16.4999 A Turns	65 Hz to 440 Hz	1.0 % + 0.03 A	
16.5 A Turns to 149.999 A Turns	65 Hz to 440 Hz	1.0 % + 0.25 A	
150 A Turns to 1025 A Turns	65 Hz to 440 Hz	1.0 % + 0.9 A	Source using a multifunction calibrator and a 50 turn coil. For the calibration of clamp meters and current clamps. Non-Toroidal clamps.

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Voltage, AC			

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
2 mV	10 Hz to 1 MHz	407 µV/V to 852 µV/V	
6 mV	10 Hz to 1 MHz	202 µV/V to 713 µV/V	
10 mV to 20 mV	10 Hz to 1 MHz	75 µV/V to 440 µV/V	
60 mV	10 Hz to 1 MHz	38 µV/V to 331 µV/V	
0.1 V to 0.2 V	10 Hz to 1 MHz	13 µV/V to 213 µV/V	
0.6 V	10 Hz to 1 MHz	7 µV/V to 71 µV/V	
1 V to 20 V	10 Hz to 1 MHz	7 µV/V to 48 µV/V	
60 V	10 Hz to 300 kHz	9 µV/V to 36 µV/V	
100 V to 200 V	10 Hz to 100 kHz	9 µV/V to 48 µV/V	
600 V to 1000 V	40 Hz to 100 kHz	19 µV/V to 49 µV/V	
Voltage, AC			
0.3 mV to 22 V	10 Hz to 1 MHz	40 µV/V to 8.6%	
22 V to 220 V (max 2.2E7 volt*Hz)	10 Hz to 1 MHz	75 µV/V to 1%	
220 V to 1100 V	40 Hz to 30 kHz	60 µV/V to 0.04%	
220 V to 750 V	30 kHz to 100 kHz	360 µV/V to 0.13%	

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0.03 V to 30 V	9.5 Hz	1000 μ V/V	
0.3 mV to 70 V	10 Hz to 1 MHz	24 μ V/V to 3.0%	
70 V to 220 V	10 Hz to 500 kHz	31 μ V/V to 500 μ V/V	
220 V to 1000 V	10 Hz to 100 kHz	38 μ V/V to 500 μ V/V	For the calibration of voltage sources using an AC measurement standard. See <u>Annex H</u> for uncertainty details.

Voltage, Triangular Waveform

5 mVpp to 60 Vpp	10 Hz to 100 kHz	20 μ V/V RSS'd with Sine uncertainty from <u>Annex H</u> .	For the calibration of voltage sources using an AC measurement stand
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Voltage, Square Waveform

5 mVpp to 60 Vpp	10 Hz to 10 kHz	20 μ V/V RSS'd with Sine uncertainty from <u>Annex H</u> .	For the calibration of voltage sources using an AC measurement stand
5 mVpp to 60 Vpp	10 kHz to 100 kHz	200 μ V/V RSS'd with Sine uncertainty from <u>Annex H</u> .	For the calibration of voltage sources using an AC measurement stand.

Voltage, Square Waveform

1 mVpp to 100 Vpp	10 Hz to 1 kHz	25 μ V/V +1 μ V	For the calibration of voltage sources using a sampling technique.
0.1 Vpp to 100 Vpp	1 kHz to 10 kHz	125 μ V/V +5 μ V	

Voltage, AC Wideband

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0.6 mV to 2.2 mV	10 Hz to 30 MHz	0.6 % at 1 kHz flatness 0.05 % to 0.7 % + 2 µV	For the calibration of voltage sources using an AC measurement standard.
2.2 mV to 7 mV	10 Hz to 30 MHz	0.5 % at 1 kHz flatness 0.05 % to 0.37% + 2 µV	
7 mV to 7 V	10 Hz to 30 MHz	0.35 % at 1 kHz flatness 0.03 % to 0.37 %	See <u>Annex B</u> for uncertainty details.
0.3 mV to 3.5 V	30 Hz to 500 kHz	0.21 % to 0.63 %	For the calibration of voltage
0.3 mV to 3 mV	10 Hz to 30 MHz	flatness 0.1 % to 1.5 % + 15 µV	measuring devices using multi-function calibrators.
3 mV to 3.5 V	10 Hz to 30 MHz	flatness 0.1 % to 1 % + 3 µV	See <u>Annex C</u> for uncertainty details.
Capacitance			

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
100 pF to 2 mF	50 Hz , 100 Hz, 1 kHz	0.05 % to 1 %	Measure using an LCR meter. Suitable for the calibration of capacitors and the capacitance function of multifunction calibrators (such as the Fluke 5500 series of calibrators). See <u>Annex D</u> for uncertainty details.
200 µF to 110 mF	DC	0.05 %	Measure using a constant current source and a DMM. Suitable for the calibration of the capacitance function of multifunction calibrators (such as the Fluke 5500 series of calibrators).

Measured Quantity & Range or Instrument	Frequency	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
0.19 to 1.09999 nF	10 Hz to 10 kHz	0.38 % + 0.01 nF	
1.1 to 3.29999 nF	10 Hz to 3 kHz	0.38 % + 0.01 nF	
3.3 to 10.9999 nF	10 Hz to 1 kHz	0.19 % + 0.01 nF	
11 to 109.9999 nF	10 Hz to 1 kHz	0.19 % + 0.1 nF	
110 to 329.999 nF	10 Hz to 1 kHz	0.19 % + 0.3 nF	
0.33 to 1.09999 µF	10 Hz to 600 Hz	0.19 % + 1 nF	
1.1 to 3.29999 µF	10 Hz to 300 Hz	0.19 % + 3 nF	
3.3 to 10.9999 µF	10 Hz to 150 Hz	0.19 % + 10 nF	
11 to 32.9999 µF	10 Hz to 120 Hz	0.30 % + 30 nF	
33 to 109.999 µF	10 Hz to 80 Hz	0.34 % + 0.1 µF	
110 to 329.999 µF	DC to 50 Hz	0.34 % + 0.3 µF	
0.33 to 1.09999 mF	DC to 20 Hz	0.34 % + 1 µF	
1.1 to 3.29999 mF	DC to 6 Hz	0.34 % + 3 µF	
3.3 to 10.9999 mF	DC to 2 Hz	0.34 % + 10 µF	
11 to 32.9999 mF	DC to 0.6 Hz	0.7 % + 30 µF	
33 to 110 mF	DC to 0.2 Hz	1 % + 100 µF	

Electrical Calibration of Temperature Indicators and Simulators

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Thermocouple simulation		
Type B		
600 °C to 800 °C	0.42 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
800 °C to 1000 °C	0.34 °C	
1000 °C to 1550 °C	0.30 °C	
1550 °C to 1820 °C	0.26 °C	
Type C		
0 °C to 150 °C	0.23 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
150 °C to 650 °C	0.19 °C	
650 °C to 1000 °C	0.23 °C	
1000 °C to 1800 °C	0.38 °C	
1800 °C to 2316 °C	0.63 °C	
Type E		
-250 °C to -100 °C	0.38 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-100 °C to -25 °C	0.12 °C	
-25 °C to 350 °C	0.10 °C	
350 °C to 650 °C	0.12 °C	
650 °C to 1000 °C	0.16 °C	
Type J		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
-210 °C to -100 °C	0.20 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-100 °C to -30 °C	0.12 °C	
-30 °C to 150 °C	0.10 °C	
150 °C to 760 °C	0.13 °C	
760 °C to 1200 °C	0.18 °C	
Type K		
-200 °C to -100 °C	0.25 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-100 °C to -25 °C	0.14 °C	
-25 °C to 120 °C	0.12 °C	
120 °C to 1000 °C	0.19 °C	
1000 °C to 1372 °C	0.30 °C	
Type L		
-200 °C to -100 °C	0.37 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-100 °C to 800 °C	0.26 °C	
800 °C to 900 °C	0.17 °C	
Type N		
-200 °C to -100 °C	0.30 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-100 °C to -25 °C	0.17 °C	
-25 °C to 120 °C	0.15 °C	
120 °C to 410 °C	0.14 °C	
410 °C to 1300 °C	0.21 °C	

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Type R		
0 °C to 250 °C	0.48 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
250 °C to 400 °C	0.28 °C	
400 °C to 1000 °C	0.26 °C	
1000 °C to 1767 °C	0.30 °C	
Type S		
0 °C to 250 °C	0.47 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
250 °C to 1000 °C	0.30 °C	
1000 °C to 1400 °C	0.28 °C	
1400 °C to 1767 °C	0.34 °C	
Type T		
-250 °C to -150 °C	0.48 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
-150 °C to 0 °C	0.18 °C	
0 °C to 120 °C	0.12 °C	
120 °C to 400 °C	0.10 °C	
Type U		
-200 °C to 0 °C	0.56 °C	For the calibration of temperature indicators and process calibrators by electrical simulation of temperature.
0 °C to 600 °C	0.27 °C	

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Frequency and Time

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Frequency		
0.01 Hz to 10 MHz	5.0×10^{-11}	By phase comparison to GPS receiver. Measure and source capabilities. For suitably stable sources with amplitudes between 0.1 V to 5 V rms.
0.1 mHz to 2.1 GHz	1×10^{-9}	For the calibration of frequency measuring devices using sources phase locked to frequency standard.
1 μHz to 2.7 GHz	1×10^{-9}	For the calibration of frequency generating devices using counters phase locked to frequency standard.
Rise Time		
>150 ps	9 ps	Measured rise time with digital sampling oscilloscope using external trigger. Suitable for the calibration of pulse generators.
>200 ps	14 ps	Measured rise time with digital sampling oscilloscope using external splitter and delay line to provide trigger. Suitable for the calibration of pulse generators.
<300 ps 1 kHz to 1 MHz	+0 ps -100 ps	Calibration of oscilloscope rise time using multifunction calibrator scope option fast edge pulse.
<350 ps 1 MHz to 10 MHz	+0 ps -100 ps	

Pressure

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Gauge		
-15 psi to 100 psi	0.008 % of reading or 0.0007 psi whichever is greater.	
0 psi to 1500 psi	0.008 % of reading or 0.0104 psi whichever is greater.	For the calibration of pressure measuring devices utilizing direct connection to DHI standards.
Absolute		
0 psi to 9 psi	0.0057 psi	
9 psi to 30 psi	0.008 % of reading plus 0.005 psi	
0 psi to 30 psi	0.0074 psi	
30 psi to 100 psi	0.008 % of reading plus 0.005 psi	For the calibration of pressure measuring devices utilizing direct connection to DHI standards.

Thermometry

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Resistance Temperature Devices		

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
-196 °C to 0 °C	0.013 °C	For the calibration of temperature Sources.
0 °C to 50 °C	0.015 °C	Stability of the source Will be added to this Value.
50 °C to 100 °C	0.018 °C	
100 °C to 200 °C	0.023 °C	
200 °C to 300 °C	0.029 °C	
300 °C to 400 °C	0.035 °C	
400 °C to 500 °C	0.041 °C	
500 °C to 600 °C	0.048 °C	
600 °C to 660 °C	0.052 °C	
-90 °C to 120 °C	0.031 °C	For calibration of temperature readouts using a dry Well or stirred bath.
120 °C to 200 °C	0.054 °C	Individual probes are calibrated using the laboratory's measuring devices. It is the client's responsibility to evaluate any additional
200 °C to 300 °C	0.057 °C	uncertainties introduced by the client's measurement system. Probes and readouts can be calibrated as a system.
300 °C to 400 °C	0.082 °C	
400 °C to 500 °C	0.085 °C	
500 °C to 660 °C	0.139 °C	

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Humidity

Measured Quantity & Range or Instrument	Calibration Measurement Capability expressed as an Uncertainty (±) (See <u>supplementary notes</u>)	Remarks
Relative humidity		
10 % to 90 % RH	0.5 %	For the calibration of relative humidity measuring devices using a benchtop two pressure generator.

Annex A: Uncertainty ($\mu\text{V}/\text{V}$) of AC/DC Transfer of Voltage

Voltage Range	Voltage Input	Frequency												
		10 Hz	20 Hz	40 Hz	100 Hz	1 kHz	10 kHz	20 kHz	50 kHz	100 kHz	300 kHz	500 kHz	800 kHz	1 MHz
22 mV	0.002 V	407	407	407	407	407	407	407	407	514	624	737	852	852
	0.006 V	258	258	213	202	202	202	202	258	338	478	549	666	713
	0.01 V	104	93	93	93	93	93	93	104	171	252	334	393	440
	0.02 V	92	75	75	75	75	75	75	98	167	261	356	438	438
220 mV	0.02 V	103	92	92	75	75	75	75	98	167	250	332	379	427
	0.06 V	72	44	38	38	38	42	39	44	89	166	249	331	331
	0.1 V	48	31	16	16	16	16	16	30	48	95	142	213	213
	0.2 V	30	24	13	13	13	13	13	24	48	89	130	189	213
700 mV	0.2 V	30	24	13	13	13	13	13	24	48	89	130	189	213
	0.6 V	30	22	9	9	9	9	9	9	15	30	36	59	71

Voltage Range	Voltage Input	Frequency												
		10 Hz	20 Hz	40 Hz	100 Hz	1 kHz	10 kHz	20 kHz	50 kHz	100 kHz	300 kHz	500 kHz	800 kHz	1 MHz
2.2 V	0.6 V	30	18	7	7	7	7	8	9	13	25	30	36	48
	1 V	30	18	7	7	7	7	7	9	13	24	30	36	48
	2 V	30	18	7	7	7	7	7	7	12	24	30	36	47
7 V	2 V	30	18	10	7	7	7	7	8	12	24	30	36	47
	6 V	30	18	7	7	7	7	7	8	9	24	30	36	47
22 V	6 V	30	18	7	7	7	7	7	8	9	24	30	36	47
	10 V	30	18	7	7	7	7	7	8	10	24	30	36	47
	20 V	30	19	10	10	10	10	10	11	14	25	30	36	48
70 V	20 V	30	19	10	10	10	10	10	11	14	30			
	60 V	30	19	9	9	9	9	9	9	11	13	30		
220 V	60 V	30	19	9	9	9	9	10	11	13	36			
	100 V	30	19	9	9	9	9	9	9	11	19			
	200 V	43	20	13	13	13	13	13	15	20				
1000 V	200 V	48	20	13	13	13	13	13	9	37				
	600 V			19	19	19	19	19	24	49				
	1000 V			24	24	24	24	24	24	24				

Annex B: Wideband Measurement Uncertainty

Voltage Range (Min input 25% of range)	Frequency Range	Flatness Relative to 1kHz ± (% of Reading +µV)	Absolute Uncertainty ± (% of Reading +µV)
2.2 mV	10 Hz to 30 Hz	0.10	0.6 + 1.5
	30 Hz to 120 kHz	0.05	0.6 + 1.5
	120 kHz to 500 kHz	0.07 + 1	0.6 + 1.5
	500 kHz to 2 MHz	0.07 + 1	
	2 MHz to 10 MHz	0.17 + 1	
	10 MHz to 20 MHz	0.30 + 1	
	20 MHz to 30 MHz	0.70 + 2	
7 mV	10 Hz to 30 Hz	0.10	0.5 + 7
	30 Hz to 120 kHz	0.05	0.5 + 7
	120 kHz to 500 kHz	0.07 + 1	0.5 + 7
	500 kHz to 2 MHz	0.07 + 1	
	2 MHz to 10 MHz	0.10 + 1	
	10 MHz to 20 MHz	0.17 + 1	
	20 MHz to 30 MHz	0.37 + 2	
22 mV	10 Hz to 30 Hz	0.10	0.5 + 13
	30 Hz to 120 kHz	0.05	0.5 + 13
	120 kHz to 500 kHz	0.07	0.5 + 13
	500 kHz to 2 MHz	0.07	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.17	
	20 MHz to 30 MHz	0.37	

Voltage Range (Min input 25% of range)	Frequency Range	Flatness Relative to 1kHz ± (% of Reading +µV)	Absolute Uncertainty ± (% of Reading +µV)
70 mV	10 Hz to 30 Hz	0.10	0.5 + 30
	30 Hz to 120 kHz	0.05	0.5 + 30
	120 kHz to 500 kHz	0.05	0.5 + 30
	500 kHz to 2 MHz	0.05	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.15	
	20 MHz to 30 MHz	0.35	
220 mV	10 Hz to 30 Hz	0.10	0.4 + 80
	30 Hz to 500 kHz	0.04	0.4 + 80
	500 kHz to 2 MHz	0.05	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.15	
	20 MHz to 30 MHz	0.35	
700 mV	10 Hz to 30 Hz	0.10	0.4 + 300
	30 Hz to 500 kHz	0.03	0.4 + 300
	500 kHz to 2 MHz	0.05	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.15	
	20MHz to 30MHz	0.35	

Voltage Range (Min input 25% of range)	Frequency Range	Flatness Relative to 1kHz ± (% of Reading +µV)	Absolute Uncertainty ± (% of Reading +µV)
2.2 V	10 Hz to 30 Hz	0.10	0.35 + 400
	30 Hz to 500 kHz	0.03	0.35 + 400
	500 kHz to 2 MHz	0.05	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.15	
	20 MHz to 30 MHz	0.35	
7 V	10 Hz to 30 Hz	0.10	0.35 + 800
	30 Hz to 500 kHz	0.03	0.35 + 800
	500 kHz to 2 MHz	0.05	
	2 MHz to 10 MHz	0.10	
	10 MHz to 20 MHz	0.15	
	20 MHz to 30 MHz	0.35	

Annex C: Wideband Source Uncertainty

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Voltage Range	Absolute Uncertainty, 30 Hz to 500 kHz ±(% of Output +µV)
1.1 mV	0.5 + 0.4
3 mV	0.45 + 1
11 mV	0.35 + 4
33 mV	0.3 + 10
110 mV	0.3 + 40
330 mV	0.25 + 100
1.1 V	0.25 + 400

Voltage Range	Absolute Uncertainty, 30 Hz to 500 kHz ±(% of Output +μV)
3.5 V	0.2 + 500

Frequency	Amplitude Flatness, 1 kHz reference ±(% of Output +μV)		
	1.1 mV range	3 mV range	>3 mV range
10 Hz to 30 Hz	0.3	0.3	0.3
30 Hz to 120 kHz	0.1	0.1	0.1
120 kHz to 2 MHz	0.2 + 3	0.1 + 3	0.1 + 3
2 MHz to 10 MHz	0.4 + 3	0.3 + 3	0.2 + 3
10 MHz to 20 MHz	0.6 + 3	0.5 + 3	0.4 + 3
20 MHz to 30 MHz	1.5 + 15	1.5 + 3	1 + 3

Annex D: Capacitance measure Uncertainty

±(% of reading +0.01% range) full scale 99999		
Capacitance	Frequency	Uncertainty %
100 pF to 8 nF	1 kHz	0.1 +2 pF
8 nF to 15 μF	1 kHz	0.05
15 μF to 150 μF	1 kHz	0.1
150 μF to 1.5 mF	1 kHz	1
250 pF to 2.5 nF	100 Hz	1
2.5 nF to 250 nF	100 Hz	0.1
250 nF to 60 μF	100 Hz	0.05
60 μF to 600 μF	100 Hz	0.1
600 μF to 2 mF	100 Hz	1

\pm (% of reading +0.01% range) full scale 99999

Capacitance	Frequency	Uncertainty %
1 nF to 10 nF	50 Hz	1
10 nF to 1 μ F	50 Hz	0.1
1 μ F to 60 μ F	50 Hz	0.05
60 μ F to 600 μ F	50 Hz	0.1
600 μ F to 2 mF	50 Hz	1
200 μ F to 110 mF	DC charge	0.05

Annex E: Uncertainty (μ A/A) of AC/DC Transfer of Current

Current	Frequency									
	10 Hz	20 Hz	40 Hz	55 Hz to 500 Hz	1 kHz	3 kHz	5 kHz	10 kHz	20 kHz	30 kHz
0.1 mA, 0.2 mA, 0.3 mA	50	60	50	50	50	55	65	75	95	120
1 mA, 2 mA, 3 mA	31	21	21	21	21	21	21	21	26	31
10 mA, 20 mA, 30 mA	41	37	27	37	27	37	27	27	27	57
0.1 A, 0.2 A, 0.3 A	45	40	26	35	26	35	26	26	30	67
1 A	51	42	32	44	32	44	32	32	47	111
2 A	56	46	32	43	32	43	32	32	46	111
3 A	88	66	62	80	62	80	62	62	66	128
10 A	106	83	70	92	70	92	70	70	88	148
20 A	144	116	83	112	83	112	83	83	106	180

Annex F: Uncertainty ($\mu\text{A}/\text{A}$) + A of AC Current sourced

AC Current	Frequency	Uncertainty ($\mu\text{A}/\text{A} + \text{A}$)
9 μA to 219.99 μA	10 Hz to 20 Hz	230 + 16 nA
	20 Hz to 40 Hz	140 + 10 nA
	40 Hz to 1kHz	110 + 8 nA
	1kHz to 5kHz	250 + 12 nA
	5kHz to 10kHz	900 + 65 nA
29 μA to 329.99 μA	10 kHz to 30kHz	12000 + 400 nA
220 μA to 2.1999 mA	10 Hz to 20 Hz	230 + 40 nA
	20 Hz to 40 Hz	140 + 35 nA
	40 Hz to 1 kHz	110 + 35 nA
	1 kHz to 5 kHz	180 + 110 nA
	5 kHz to 10 kHz	900 + 650 nA
0.33 mA to 3.2999 mA	10 kHz to 30 kHz	8000 + 600 nA
2.2 mA to 21.999 mA	10 Hz to 20 Hz	230 + 400 nA
	20 Hz to 40 Hz	140 + 350 nA
	40 to 1kHz	110 + 350 nA
	1 kHz to 5 kHz	180 + 550 nA
	5 kHz to 10 kHz	900 + 5 μA
3.3 A to 32.999 mA	10 kHz to 30 kHz	3200 + 4 μA

AC Current	Frequency	Uncertainty ($\mu\text{A}/\text{A} + \text{A}$)
22 mA to 219.99 mA	10 Hz to 20 Hz	230 +4 μA
	20 Hz to 40 Hz	140 +3.5 μA
	40 Hz to 1 kHz	110 +2.5 μA
	1 kHz to 5 kHz	180 + 3.5 μA
	5 kHz to 10 kHz	900 + 10 μA
33 mA to 329.99 mA	10 kHz to 30 kHz	3200 +200 μA
0.22 A to 2.1999 A	20 Hz to 1kHz	240 + 35 μA
	1 kHz to 5 kHz	390 + 80 μA
	5 kHz to 10 kHz	6000 + 160 μA
0.3 A to 2.999 A	5 kHz to 10 kHz	20000 + 5 mA
2.2 A to 11 A	40 Hz to 1 kHz	400 + 170 μA
	1 kHz to 5 kHz	850 + 380 μA
	5 kHz to 10 kHz	3300 + 750 μA
11 A to 20.5 A	45 Hz to 100 Hz	1000 + 5 mA
	100 Hz to 1 kHz	1300 + 5 mA
	1 kHz to 5 kHz	25000 + 5 mA

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Annex G: Uncertainty of AC Voltage sourced

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
0.3 mV to 2.1999 mV	10 Hz to 20 Hz	$220 + 4 \mu\text{V}$
	20 Hz to 40 Hz	$85 + 4 \mu\text{V}$
	40 Hz to 20 kHz	$75 + 4 \mu\text{V}$
	20 kHz to 50 kHz	$180 + 4 \mu\text{V}$
	50 kHz to 100 kHz	$460 + 5 \mu\text{V}$
	100 kHz to 300 kHz	$900 + 10 \mu\text{V}$
	300 kHz to 500 kHz	$1200 + 20 \mu\text{V}$
	500 kHz to 1MHz	$2500 + 20 \mu\text{V}$
2.2 mV to 21.999 mV	10 Hz to 20 Hz	$220 + 4 \mu\text{V}$
	20 Hz to 40 Hz	$85 + 4 \mu\text{V}$
	40 Hz to 20 kHz	$75 + 4 \mu\text{V}$
	20 kHz to 50 kHz	$180 + 4 \mu\text{V}$
	50 kHz to 100 kHz	$460 + 5 \mu\text{V}$
	100 kHz to 300 kHz	$900 + 10 \mu\text{V}$
	300 kHz to 500 kHz	$1200 + 20 \mu\text{V}$
	500 kHz to 1MHz	$2500 + 20 \mu\text{V}$

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
22 mV to 219.99 mV	10 Hz to 20 Hz	$220 + 12 \mu\text{V}$
	20 Hz to 40 Hz	$85 + 7 \mu\text{V}$
	40 Hz to 20 kHz	$75 + 7 \mu\text{V}$
	20 kHz to 50 kHz	$180 + 7 \mu\text{V}$
	50 kHz to 100 kHz	$420 + 17 \mu\text{V}$
	100 kHz to 300 kHz	$750 + 20 \mu\text{V}$
	300 kHz to 500 kHz	$1200 + 25 \mu\text{V}$
	500 kHz to 1MHz	$2500 + 45 \mu\text{V}$
220 mV to 2.1999 V	10 Hz to 20 Hz	$220 + 40 \mu\text{V}$
	20 Hz to 40 Hz	$80 + 15 \mu\text{V}$
	40 Hz to 20 kHz	$40 + 8 \mu\text{V}$
	20 kHz to 50 kHz	$70 + 10 \mu\text{V}$
	50 kHz to 100 kHz	$105 + 30 \mu\text{V}$
	100 kHz to 300 kHz	$340 + 80 \mu\text{V}$
	300 kHz to 500 kHz	$900 + 200 \mu\text{V}$
	500 kHz to 1MHz	$1500 + 300 \mu\text{V}$
2.2 V to 21.999 V	10 Hz to 20 Hz	$220 + 400 \mu\text{V}$
	20 Hz to 40 Hz	$80 + 150 \mu\text{V}$
	40 Hz to 20 kHz	$40 + 50 \mu\text{V}$
	20 kHz to 50 kHz	$70 + 100 \mu\text{V}$
	50 kHz to 100 kHz	$95 + 200 \mu\text{V}$
	100 kHz to 300 kHz	$260 + 600 \mu\text{V}$
	300 kHz to 500 kHz	$900 + 2 \text{ mV}$
	500 kHz to 1MHz	$1300 + 3.2 \text{ mV}$

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
22 V to 219.99 V (max 2.2E7 volt*Hz)	10 Hz to 20 Hz	220 + 4 mV
	20 Hz to 40 Hz	80 + 1.5 mV
	40 Hz to 20 kHz	47 + 0.6 mV
	20 kHz to 50 kHz	75 + 1 mV
	50 kHz to 100 kHz	130 + 2.5 mV
	100 kHz to 300 kHz	800 + 1.6 mV
	300 kHz to 500 kHz	4200 + 40 mV
	500 kHz to 1MHz	7000 + 80 mV
220 V to 250 V	15 Hz to 50 Hz	260 + 16 mV
220 V to 1100 V	50 Hz to 1 kHz	60 + 3.5 mV
220 V to 750 V (with 5725a)	30 kHz to 50 kHz	360 + 11 mV
	50 kHz to 100 kHz	1300 + 45 mV
220 V to 1000 V (with 5725a)	40 Hz to 1 kHz	80 + 4 mV
	1 kHz to 20 kHz	125 + 6 mV
	20 kHz to 30 kHz	360 + 11 mV

Annex H: Uncertainty ($\mu\text{V}/\text{V} + \text{V}$) of AC Voltage measured

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AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
0.03 V to 30 V	9.5 Hz to 10 Hz	1000

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
0.3 mV to 2.1999 mV	10 Hz to 20 Hz	$1700 + 1.3 \mu\text{V}$
	20 Hz to 40 Hz	$740 + 1.3 \mu\text{V}$
	40 Hz to 20kHz	$420 + 1.3 \mu\text{V}$
	20 kHz to 50 kHz	$810 + 2 \mu\text{V}$
	50 kHz to 100 kHz	$1200 + 2.5 \mu\text{V}$
	100 kHz to 300 kHz	$2300 + 4 \mu\text{V}$
	300 kHz to 500 kHz	$2400 + 8 \mu\text{V}$
	500 kHz to 1MHz	$3500 + 8 \mu\text{V}$
2.2 mV to 6.9999 mV	10 Hz to 20 Hz	$850 + 1.3 \mu\text{V}$
	20 Hz to 40 Hz	$370 + 1.3 \mu\text{V}$
	40 Hz to 20 kHz	$210 + 1.3 \mu\text{V}$
	20 kHz to 50 kHz	$400 + 2 \mu\text{V}$
	50 kHz to 100 kHz	$600 + 2.5 \mu\text{V}$
	100 kHz to 300 kHz	$1200 + 4 \mu\text{V}$
	300 kHz to 500 kHz	$1300 + 8 \mu\text{V}$
	500 kHz to 1MHz	$2300 + 8 \mu\text{V}$
7 mV to 21.999 mV	10 Hz to 20 Hz	$290 + 1.3 \mu\text{V}$
	20 Hz to 40 Hz	$190 + 1.3 \mu\text{V}$
	40 Hz to 20 kHz	$110 + 1.3 \mu\text{V}$
	20 kHz to 50 kHz	$210 + 2 \mu\text{V}$
	50 kHz to 100 kHz	$310 + 2.5 \mu\text{V}$
	100 kHz to 300 kHz	$810 + 4 \mu\text{V}$
	300 kHz to 500 kHz	$890 + 8 \mu\text{V}$
	500 kHz to 1MHz	$1700 + 8 \mu\text{V}$

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
22 mV to 69.99 mV	10 Hz to 20 Hz	240 + 1.5 μV
	20 Hz to 40 Hz	120 + 1.5 μV
	40 Hz to 20 kHz	65 + 1.5 μV
	20 kHz to 50 kHz	130 + 2 μV
	50 kHz to 100 kHz	260 + 2.5 μV
	100 kHz to 300 kHz	510 + 4 μV
	300 kHz to 500 kHz	670 + 8 μV
	500 kHz to 1MHz	1100 + 8 μV
70 mV to 219.99 mV	10 Hz to 20 Hz	210 + 1.5 μV
	20 Hz to 40 Hz	85 + 1.5 μV
	40 Hz to 20 kHz	38 + 1.5 μV
	20 kHz to 50 kHz	69 + 2 μV
	50 kHz to 100 kHz	160 + 2.5 μV
	100 kHz to 300 kHz	250 + 4 μV
	300 kHz to 500 kHz	380 + 8 μV
	500 kHz to 1M Hz	1000 + 8 μV
220 mV to 699.9 mV	10 Hz to 20 Hz	210 + 1.5 μV
	20 Hz to 40 Hz	76 + 1.5 μV
	40 Hz to 20 kHz	33 + 1.5 μV
	20 kHz to 50 kHz	51 + 2 μV
	50 kHz to 100 kHz	79 + 2.5 μV
	100 kHz to 300 kHz	180 + 4 μV
	300 kHz to 500 kHz	300 + 8 μV
	500 kHz to 1MHz	960 + 8 μV

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
700 mV to 2.1999 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	66
	40 Hz to 20 kHz	24
	20 kHz to 50 kHz	46
	50 kHz to 100 kHz	71
	100 kHz to 300 kHz	160
	300 kHz to 500 kHz	260
	500 kHz to 1MHz	900
2.2 V to 6.999 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	67
	40 Hz to 20 kHz	24
	20 kHz to 50 kHz	48
	50 kHz to 100 kHz	81
	100 kHz to 300 kHz	190
	300 kHz to 500 kHz	400
	500 kHz to 1 MHz	1200
7 V to 21.999 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	67
	40 Hz to 20 kHz	27
	20 kHz to 50 kHz	48
	50 kHz to 100 kHz	81
	100 kHz to 300 kHz	190
	300 kHz to 500 kHz	400
	500 kHz to 1MHz	1200

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
22 V to 69.99 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	68
	40 Hz to 20 kHz	32
	20 kHz to 50 kHz	57
	50 kHz to 100 kHz	94
	100 kHz to 300 kHz	200
	300 kHz to 500 kHz	410
	500 kHz to 1 MHz	1200
70 V to 219.99 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	68
	40 Hz to 20 kHz	31
	20 kHz to 50 kHz	69
	50 kHz to 100 kHz	98
	100 kHz to 300 kHz	210
	300 kHz to 500 kHz	500
220 V to 699.9 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	99
	40 Hz to 20 kHz	41
	20 kHz to 50 kHz	130
	50 kHz to 100 kHz	500

AC Voltage	Frequency	Uncertainty ($\mu\text{V}/\text{V} + \text{V}$)
700 V to 1000 V	10 Hz to 20 Hz	200
	20 Hz to 40 Hz	99
	40 Hz to 20 kHz	38
	20 kHz to 50 kHz	130
	50 kHz to 100 kHz	500

Annex I: Uncertainty of Measured AC current

100 μA range 1 kHz max.
% of reading + % of Range
Input >5% of scale

Range	Frequency				
	10 Hz to 20 Hz	20 Hz to 45 Hz	45 Hz to 100 Hz	100 Hz to 5 kHz	5 kHz to 20 kHz
100 μA (1 kHz max)	0.4 + 0.03	0.15 + 0.03	0.06 + 0.03	0.06 + 0.03	-
1 A, 10mA, 100 mA	0.4 + 0.02	0.15 + 0.02	0.06 + 0.02	0.03 + 0.02	0.06 + 0.02
1 A	0.4 + 0.02	0.16 + 0.02	0.08 + 0.02	0.1 + 0.02	0.3 + 0.02

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