



Český metrologický institut

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Calibration laboratory No. 2202 accredited by the Czech Accreditation Institute according ISO/IEC 17025:2017

Laboratory: Regional Inspectorate Brno, Okružní 31, 638 00 Brno

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CERTIFICATE OF CALIBRATION

6011-KL-L0258-23

This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org).

Date of issue: March 16, 2023

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User:

Measuring instrument: Multifunction calibrator

Manufacturer: MEATEST Brno

Type: 9010+

Serial number: 751131

The results of the calibration have been obtained following the procedures reported in this Certificate and are reported only to the calibrated measuring instrument, the date, place and conditions of the calibration.

Date of calibration: March 6 to March 15, 2023

Calibrated by:

Head of department:

Michal Marek

Jiří Streit



Jiří Streit

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Metrological traceability:	Measurements are traceable to (inter)national standards.
Measurement standards used:	Reference multimeter Fluke 8508A, S/N 328370412, Cert. of Cal. 6011-KL-E0006-23. Current shunt ČMI, S/N CMI/20A/2/14, Cert. of Cal. 6011-KL-E0044-22. LCR meter Keysight E4980A, S/N MY46312534, Cert. of Cal. 6011-KL-E0017-21. Power analyzer Applied Precision 3961E, S/N 1092080151, Cert. of Cal. 6011-KL-E0049-21. AC Measurement Standard Fluke 5790B, S/N 3897901, Cert. of Cal. 6011-KL-E0054-22
Calibration procedure:	Calibrated instrument has been compared with standards listed above. The current ranges 20 A were calibrated by measurement the drop of voltage on current shunt ČMI. The calibration has been made according to the Calibrating Procedure No. 611-MP-C042, 611-MP-C097, 611-MP-C130 and 611-MP-C030.
Place of calibration:	Czech metrology institute, Regional Inspectorate Brno, Okružní 31, 638 00 Brno
Ambient conditions:	<i>The average ambient conditions during the measurement were as follows:</i> Air temperature: $23.0^{\circ}\text{C} \pm 0.7^{\circ}\text{C}$ Relative humidity: $45\% \pm 15\%$
Measurement results:	The measurement results are given in the Tables of results. The instrument has not been adjusted. The results marked "!!!" are out of specification reported by manufacturer. The 1-year specification are reported in the table of results, according to User manual rev. 02. The measurement uncertainty is not included in calculation of % of specification.

The standard uncertainty of measurement has been determined in accordance with JCGM 100:2008 document. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k corresponding to a coverage probability of approximately 95 %, which for normal distribution corresponds to a coverage factor $k = 2$.

The uncertainties reported in the table of results are valid after rounding up to two valid numbers.

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Tables of results:

DC Voltage

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
Passive mode						
20 mV	0.000 00 mV	-0.000 61 mV	-0.61 μ V	$\pm 1.50 \mu$ V	-41%	0.18 μ V
	10.000 00 mV	9.999 63 mV	-0.38 μ V	$\pm 1.80 \mu$ V	-21%	0.29 μ V
	-10.000 00 mV	-10.000 19 mV	-0.19 μ V	$\pm 1.80 \mu$ V	-11%	0.27 μ V
	19.000 00 mV	18.999 53 mV	-0.47 μ V	$\pm 2.07 \mu$ V	-23%	0.44 μ V
	-19.000 00 mV	-18.999 84 mV	0.16 μ V	$\pm 2.07 \mu$ V	8%	0.44 μ V
200 mV	20.000 1 mV	19.999 79 mV	-0.31 μ V	$\pm 1.8 \mu$ V	-17%	0.45 μ V
	-20.000 1 mV	-20.000 38 mV	-0.28 μ V	$\pm 1.8 \mu$ V	-16%	0.45 μ V
	100.000 0 mV	99.999 09 mV	-0.91 μ V	$\pm 3.0 \mu$ V	-30%	0.64 μ V
	-100.000 0 mV	-100.000 33 mV	-0.33 μ V	$\pm 3.0 \mu$ V	-11%	0.64 μ V
	190.000 0 mV	189.998 37 mV	-1.63 μ V	$\pm 4.4 \mu$ V	-37%	1.19 μ V
	-190.000 0 mV	-190.000 17 mV	-0.17 μ V	$\pm 4.4 \mu$ V	-4%	1.19 μ V
Active mode						
20 mV	0.000 00 mV	-0.000 15 mV	-0.15 μ V	$\pm 10.00 \mu$ V	-2%	0.18 μ V
	10.000 00 mV	10.000 31 mV	0.31 μ V	$\pm 11.00 \mu$ V	3%	0.28 μ V
	-10.000 00 mV	-10.000 02 mV	-0.02 μ V	$\pm 11.00 \mu$ V	0%	0.29 μ V
	19.000 00 mV	19.000 09 mV	0.09 μ V	$\pm 11.90 \mu$ V	1%	0.44 μ V
	-19.000 00 mV	-18.999 65 mV	0.35 μ V	$\pm 11.90 \mu$ V	3%	0.47 μ V
200 mV	20.000 1 mV	20.000 02 mV	-0.08 μ V	$\pm 10.3 \mu$ V	-1%	0.46 μ V
	-20.000 1 mV	-19.999 89 mV	0.21 μ V	$\pm 10.3 \mu$ V	2%	0.46 μ V
	100.000 0 mV	99.998 49 mV	-1.51 μ V	$\pm 11.5 \mu$ V	-13%	0.65 μ V
	-100.000 0 mV	-99.998 96 mV	1.04 μ V	$\pm 11.5 \mu$ V	9%	0.64 μ V
	190.000 0 mV	189.997 72 mV	-2.28 μ V	$\pm 12.9 \mu$ V	-18%	1.19 μ V
	-190.000 0 mV	-189.998 47 mV	1.53 μ V	$\pm 12.9 \mu$ V	12%	1.20 μ V
2 V	0.200 001 V	0.200 001 9 V	0.9 μ V	$\pm 7 \mu$ V	12%	1.3 μ V
	-0.200 001 V	-0.199 998 2 V	2.8 μ V	$\pm 7 \mu$ V	38%	1.3 μ V
	1.000 000 V	0.999 993 4 V	-6.6 μ V	$\pm 17 \mu$ V	-39%	4.1 μ V
	-1.000 000 V	-0.999 991 7 V	8.3 μ V	$\pm 17 \mu$ V	49%	4.1 μ V
	1.900 000 V	1.899 987 4 V	-12.6 μ V	$\pm 28 \mu$ V	-45%	7.3 μ V
	-1.900 000 V	-1.899 987 3 V	12.7 μ V	$\pm 28 \mu$ V	46%	7.3 μ V
20 V	2.000 01 V	2.000 015 V	5 μ V	$\pm 55 \mu$ V	9%	13 μ V
	4.000 00 V	4.000 006 V	6 μ V	$\pm 75 \mu$ V	8%	18 μ V
	6.000 00 V	5.999 997 V	-3 μ V	$\pm 95 \mu$ V	-3%	25 μ V
	8.000 00 V	7.999 996 V	-4 μ V	$\pm 115 \mu$ V	-4%	31 μ V
	10.000 00 V	9.999 996 V	-4 μ V	$\pm 135 \mu$ V	-3%	37 μ V
	12.000 00 V	12.000 001 V	1 μ V	$\pm 155 \mu$ V	1%	43 μ V
	14.000 00 V	13.999 997 V	-3 μ V	$\pm 175 \mu$ V	-2%	50 μ V
	16.000 00 V	16.000 027 V	27 μ V	$\pm 195 \mu$ V	14%	56 μ V
	18.000 00 V	18.000 011 V	11 μ V	$\pm 215 \mu$ V	5%	62 μ V
	19.000 00 V	19.000 054 V	53 μ V	$\pm 225 \mu$ V	24%	65 μ V
	-2.000 01 V	-2.000 015 V	-4 μ V	$\pm 55 \mu$ V	-8%	12 μ V
	-4.000 00 V	-4.000 011 V	-11 μ V	$\pm 75 \mu$ V	-14%	18 μ V
	-6.000 00 V	-6.000 012 V	-12 μ V	$\pm 95 \mu$ V	-13%	25 μ V
	-8.000 00 V	-8.000 018 V	-18 μ V	$\pm 115 \mu$ V	-16%	31 μ V
	-10.000 00 V	-10.000 023 V	-23 μ V	$\pm 135 \mu$ V	-17%	37 μ V
	-12.000 00 V	-12.000 039 V	-39 μ V	$\pm 155 \mu$ V	-25%	43 μ V
	-14.000 00 V	-14.000 041 V	-41 μ V	$\pm 175 \mu$ V	-24%	50 μ V
	-16.000 00 V	-16.000 055 V	-55 μ V	$\pm 195 \mu$ V	-28%	56 μ V
	-18.000 00 V	-18.000 076 V	-76 μ V	$\pm 215 \mu$ V	-35%	62 μ V
	-19.000 00 V	-19.000 081 V	-81 μ V	$\pm 225 \mu$ V	-36%	65 μ V

DC Voltage - continue

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
200 V	20.000 1 V	20.000 00 V	-0.10 mV	±0.5 mV	-22%	0.16 mV
	-20.000 1 V	-19.999 89 V	0.21 mV	±0.5 mV	47%	0.15 mV
	90.000 0 V	89.999 50 V	-0.50 mV	±1.5 mV	-33%	0.47 mV
	-90.000 0 V	-89.999 65 V	0.35 mV	±1.5 mV	23%	0.47 mV
	100.000 0 V	99.999 48 V	-0.52 mV	±1.7 mV	-32%	0.51 mV
	-100.000 0 V	-99.999 68 V	0.32 mV	±1.7 mV	19%	0.51 mV
280 V	200.000 0 V	199.998 82 V	-1.18 mV	±3.4 mV	-35%	2.11 mV
	-200.000 0 V	-199.998 90 V	1.10 mV	±3.4 mV	32%	2.09 mV
	280.000 0 V	279.999 6 V	-0.4 mV	±4.6 mV	-9%	2.5 mV
	-280.000 0 V	-279.999 6 V	0.4 mV	±4.6 mV	9%	2.4 mV
1000 V	300.000 V	299.996 8 V	-3.2 mV	±10 mV	-34%	2.5 mV
	-300.000 V	-299.996 7 V	3.3 mV	±10 mV	35%	2.5 mV
	900.000 V	900.002 3 V	2.3 mV	±22 mV	11%	6.6 mV
	-900.000 V	-900.007 1 V	-7.1 mV	±22 mV	-33%	5.4 mV
	1000.000 V	1000.004 4 V	4.4 mV	±24 mV	19%	5.7 mV
	-1000.000 V	-1000.009 0 V	-8.9 mV	±24 mV	-38%	5.7 mV



DC Current

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
200 μ A	0.000 0 μ A	0.003 7 μ A	3.7 nA	± 20.0 nA	18%	0.6 nA
	10.000 0 μ A	10.003 9 μ A	3.9 nA	± 22.0 nA	18%	0.9 nA
	-10.000 0 μ A	-9.996 1 μ A	3.9 nA	± 22.0 nA	18%	0.9 nA
	100.000 0 μ A	100.004 1 μ A	4.1 nA	± 40.0 nA	10%	4.0 nA
	-100.000 0 μ A	-99.996 0 μ A	4.0 nA	± 40.0 nA	10%	4.0 nA
	190.000 0 μ A	190.004 5 μ A	4.5 nA	± 58.0 nA	8%	7.3 nA
	-190.000 0 μ A	-189.995 9 μ A	4.1 nA	± 58.0 nA	7%	7.3 nA
2 mA	0.200 001 mA	0.200 037 mA	36 nA	± 80 nA	45%	5 nA
	-0.200 001 mA	-0.199 960 mA	41 nA	± 80 nA	52%	5 nA
	1.000 000 mA	1.000 036 mA	36 nA	± 200 nA	18%	18 nA
	-1.000 000 mA	-0.999 962 mA	38 nA	± 200 nA	19%	18 nA
	1.900 000 mA	1.900 036 mA	36 nA	± 335 nA	11%	32 nA
	-1.900 000 mA	-1.899 963 mA	37 nA	± 335 nA	11%	32 nA
20 mA	2.000 01 mA	2.000 48 mA	0.47 μ A	± 0.80 μ A	59%	0.05 μ A
	-2.000 01 mA	-1.999 72 mA	0.29 μ A	± 0.80 μ A	36%	0.05 μ A
	10.000 00 mA	10.000 74 mA	0.74 μ A	± 1.60 μ A	46%	0.18 μ A
	-10.000 00 mA	-10.000 01 mA	-0.01 μ A	± 1.60 μ A	0%	0.18 μ A
	19.000 00 mA	19.001 09 mA	1.09 μ A	± 2.50 μ A	43%	0.32 μ A
	-19.000 00 mA	-19.000 41 mA	-0.41 μ A	± 2.50 μ A	-16%	0.32 μ A
200 mA	20.000 1 mA	20.004 1 mA	4.0 μ A	± 7.0 μ A	57%	1.1 μ A
	-20.000 1 mA	-19.997 3 mA	2.8 μ A	± 7.0 μ A	40%	1.1 μ A
	40.000 0 mA	40.003 5 mA	3.5 μ A	± 9.0 μ A	39%	1.7 μ A
	-40.000 0 mA	-39.998 0 mA	2.0 μ A	± 9.0 μ A	22%	1.7 μ A
	60.000 0 mA	60.003 9 mA	3.8 μ A	± 11.0 μ A	35%	2.3 μ A
	-60.000 0 mA	-59.998 6 mA	1.4 μ A	± 11.0 μ A	12%	2.3 μ A
	80.000 0 mA	80.003 9 mA	3.9 μ A	± 13.0 μ A	30%	3.0 μ A
	-80.000 0 mA	-79.999 6 mA	0.4 μ A	± 13.0 μ A	3%	3.0 μ A
	100.000 0 mA	100.004 2 mA	4.2 μ A	± 15.0 μ A	28%	3.6 μ A
	-100.000 0 mA	-100.000 6 mA	-0.6 μ A	± 15.0 μ A	-4%	3.6 μ A
	120.000 0 mA	120.003 9 mA	3.9 μ A	± 17.0 μ A	23%	4.2 μ A
	-120.000 0 mA	-120.001 4 mA	-1.4 μ A	± 17.0 μ A	-8%	4.2 μ A
	140.000 0 mA	140.004 2 mA	4.2 μ A	± 19.0 μ A	22%	4.9 μ A
	-140.000 0 mA	-140.002 7 mA	-2.7 μ A	± 19.0 μ A	-14%	4.9 μ A
	160.000 0 mA	160.004 4 mA	4.4 μ A	± 21.0 μ A	21%	5.5 μ A
	-160.000 0 mA	-160.003 4 mA	-3.4 μ A	± 21.0 μ A	-16%	5.5 μ A
	180.000 0 mA	180.004 4 mA	4.4 μ A	± 23.0 μ A	19%	6.2 μ A
	-180.000 0 mA	-180.004 5 mA	-4.5 μ A	± 23.0 μ A	-20%	6.2 μ A
	190.000 0 mA	190.004 6 mA	4.6 μ A	± 24.0 μ A	19%	6.5 μ A
	-190.000 0 mA	-190.005 1 mA	-5.1 μ A	± 24.0 μ A	-21%	6.5 μ A
2 A	0.200 001 A	0.200 036 A	35 μ A	± 82 μ A	42%	18 μ A
	-0.200 001 A	-0.199 951 A	50 μ A	± 82 μ A	61%	18 μ A
	1.000 000 A	1.000 027 A	27 μ A	± 210 μ A	13%	59 μ A
	-1.000 000 A	-0.999 949 A	51 μ A	± 210 μ A	24%	59 μ A
	1.900 000 A	1.900 074 A	74 μ A	± 354 μ A	21%	105 μ A
	-1.900 000 A	-1.900 008 A	-8 μ A	± 354 μ A	-2%	105 μ A
20 A	2.000 01 A	2.000 41 A	0.40 mA	± 1.00 mA	40%	0.20 mA
	-2.000 01 A	-1.999 86 A	0.15 mA	± 1.00 mA	15%	0.20 mA
	10.000 00 A	10.000 40 A	0.40 mA	± 3.00 mA	13%	0.80 mA
	-10.000 00 A	-10.000 67 A	-0.67 mA	± 3.00 mA	-22%	0.80 mA
	19.000 00 A	19.000 19 A	0.19 mA	± 5.25 mA	4%	1.49 mA
	-19.000 00 A	-19.001 19 A	-1.19 mA	± 5.25 mA	-23%	1.49 mA

AC Voltage

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
20 mV	10.000 00 mV; 45 Hz	9.984 7 mV	-15.3 μ V	$\pm 40.0 \mu$ V	-38%	9.0 μ V
	10.000 00 mV; 400 Hz	9.985 5 mV	-14.5 μ V	$\pm 40.0 \mu$ V	-36%	8.7 μ V
	10.000 00 mV; 1 kHz	9.986 1 mV	-13.9 μ V	$\pm 40.0 \mu$ V	-35%	8.7 μ V
	10.000 00 mV; 10 kHz	9.988 1 mV	-11.9 μ V	$\pm 40.0 \mu$ V	-30%	8.7 μ V
	10.000 00 mV; 50 kHz	9.991 5 mV	-8.5 μ V	$\pm 60.0 \mu$ V	-14%	11.3 μ V
	10.000 00 mV; 100 kHz	9.990 0 mV	-10.0 μ V	$\pm 60.0 \mu$ V	-17%	14.1 μ V
	19.000 00 mV; 45 Hz	18.999 4 mV	-0.6 μ V	$\pm 53.5 \mu$ V	-1%	13.3 μ V
	19.000 00 mV; 400 Hz	18.999 9 mV	-0.1 μ V	$\pm 53.5 \mu$ V	0%	13.3 μ V
	19.000 00 mV; 1 kHz	19.000 1 mV	0.1 μ V	$\pm 53.5 \mu$ V	0%	13.3 μ V
	19.000 00 mV; 10 kHz	19.003 7 mV	3.7 μ V	$\pm 53.5 \mu$ V	7%	13.3 μ V
	19.000 00 mV; 50 kHz	19.006 7 mV	6.7 μ V	$\pm 82.5 \mu$ V	8%	15.6 μ V
	19.000 00 mV; 100 kHz	19.002 2 mV	2.2 μ V	$\pm 82.5 \mu$ V	3%	19.6 μ V
200 mV	20.000 1 mV; 45 Hz	19.986 7 mV	-13.4 μ V	$\pm 47 \mu$ V	-29%	9.5 μ V
	100.000 0 mV; 45 Hz	99.989 3 mV	-10.7 μ V	$\pm 75 \mu$ V	-14%	26.7 μ V
	100.000 0 mV; 400 Hz	99.991 0 mV	-9.0 μ V	$\pm 75 \mu$ V	-12%	26.6 μ V
	100.000 0 mV; 1 kHz	99.990 8 mV	-9.2 μ V	$\pm 75 \mu$ V	-12%	26.6 μ V
	100.000 0 mV; 10 kHz	100.010 8 mV	10.8 μ V	$\pm 75 \mu$ V	14%	26.6 μ V
	100.000 0 mV; 50 kHz	100.030 4 mV	30.3 μ V	$\pm 180 \mu$ V	17%	33.3 μ V
	100.000 0 mV; 100 kHz	99.980 5 mV	-19.5 μ V	$\pm 180 \mu$ V	-11%	59.6 μ V
	190.000 0 mV; 45 Hz	189.990 5 mV	-9.5 μ V	$\pm 107 \mu$ V	-9%	50.6 μ V
	190.000 0 mV; 400 Hz	189.993 3 mV	-6.8 μ V	$\pm 107 \mu$ V	-6%	50.5 μ V
	190.000 0 mV; 1 kHz	189.991 8 mV	-8.2 μ V	$\pm 107 \mu$ V	-8%	50.5 μ V
	190.000 0 mV; 10 kHz	190.020 2 mV	20.2 μ V	$\pm 107 \mu$ V	19%	50.5 μ V
	190.000 0 mV; 50 kHz	190.026 7 mV	26.7 μ V	$\pm 252 \mu$ V	11%	63.2 μ V
	190.000 0 mV; 100 kHz	189.904 4 mV	-95.6 μ V	$\pm 252 \mu$ V	-38%	113.1 μ V
2 V	0.200 001 V; 45 Hz	0.199 970 V	-31 μ V	$\pm 123 \mu$ V	-25%	22 μ V
	1.000 000 V; 45 Hz	0.999 956 V	-44 μ V	$\pm 255 \mu$ V	-17%	61 μ V
	1.000 000 V; 400 Hz	0.999 964 V	-36 μ V	$\pm 255 \mu$ V	-14%	60 μ V
	1.000 000 V; 1 kHz	0.999 964 V	-36 μ V	$\pm 255 \mu$ V	-14%	60 μ V
	1.000 000 V; 10 kHz	1.000 032 V	32 μ V	$\pm 255 \mu$ V	12%	60 μ V
	1.000 000 V; 50 kHz	1.000 190 V	190 μ V	$\pm 800 \mu$ V	24%	102 μ V
	1.000 000 V; 100 kHz	1.000 210 V	210 μ V	$\pm 800 \mu$ V	26%	205 μ V
	1.900 000 V; 45 Hz	1.899 913 V	-87 μ V	$\pm 404 \mu$ V	-22%	115 μ V
	1.900 000 V; 400 Hz	1.899 943 V	-57 μ V	$\pm 404 \mu$ V	-14%	115 μ V
	1.900 000 V; 1 kHz	1.899 933 V	-67 μ V	$\pm 404 \mu$ V	-17%	115 μ V
	1.900 000 V; 10 kHz	1.899 994 V	-6 μ V	$\pm 404 \mu$ V	-2%	115 μ V
	1.900 000 V; 50 kHz	1.900 113 V	113 μ V	$\pm 1340 \mu$ V	8%	194 μ V
	1.900 000 V; 100 kHz	1.899 898 V	-102 μ V	$\pm 1340 \mu$ V	-8%	389 μ V
20 V	2.000 01 V; 45 Hz	1.999 37 V	-0.64 mV	± 1.02 mV	-62%	0.19 mV
	2.000 01 V; 400 Hz	1.999 40 V	-0.61 mV	± 1.02 mV	-60%	0.19 mV
	2.000 01 V; 1 kHz	1.999 44 V	-0.57 mV	± 1.02 mV	-55%	0.19 mV
	2.000 01 V; 10 kHz	1.999 97 V	-0.04 mV	± 1.02 mV	-4%	0.19 mV
	2.000 01 V; 50 kHz	2.000 64 V	0.63 mV	± 5.00 mV	13%	0.51 mV
	2.000 01 V; 100 kHz	2.000 48 V	0.47 mV	± 5.00 mV	9%	1.02 mV
	5.000 00 V; 45 Hz	4.999 39 V	-0.61 mV	± 1.50 mV	-41%	0.28 mV
	5.000 00 V; 400 Hz	4.999 42 V	-0.58 mV	± 1.50 mV	-39%	0.28 mV
	5.000 00 V; 1 kHz	4.999 45 V	-0.55 mV	± 1.50 mV	-37%	0.28 mV
	5.000 00 V; 10 kHz	5.000 08 V	0.08 mV	± 1.50 mV	5%	0.28 mV
	5.000 00 V; 50 kHz	5.000 82 V	0.82 mV	± 6.50 mV	13%	0.78 mV
	5.000 00 V; 100 kHz	5.000 35 V	0.35 mV	± 6.50 mV	5%	1.66 mV

AC Voltage - continue

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
20 V	10.000 00 V; 45 Hz	9.999 34 V	-0.66 mV	±2.30 mV	-29%	0.59 mV
	10.000 00 V; 400 Hz	9.999 42 V	-0.58 mV	±2.30 mV	-25%	0.60 mV
	10.000 00 V; 1 kHz	9.999 34 V	-0.66 mV	±2.30 mV	-29%	0.59 mV
	10.000 00 V; 10 kHz	9.999 98 V	-0.02 mV	±2.30 mV	-1%	0.60 mV
	10.000 00 V; 50 kHz	10.000 18 V	0.18 mV	±9.00 mV	2%	1.64 mV
	10.000 00 V; 100 kHz	9.998 29 V	-1.71 mV	±9.00 mV	-19%	3.35 mV
	15.000 00 V; 45 Hz	14.999 23 V	-0.77 mV	±3.10 mV	-25%	0.89 mV
	15.000 00 V; 400 Hz	14.999 39 V	-0.61 mV	±3.10 mV	-20%	0.89 mV
	15.000 00 V; 1 kHz	14.999 24 V	-0.76 mV	±3.10 mV	-24%	0.89 mV
	15.000 00 V; 10 kHz	14.999 82 V	-0.18 mV	±3.10 mV	-6%	0.89 mV
	15.000 00 V; 50 kHz	14.999 09 V	-0.91 mV	±11.50 mV	-8%	2.46 mV
	15.000 00 V; 100 kHz	14.994 65 V	-5.35 mV	±11.50 mV	-47%	5.03 mV
	19.000 00 V; 45 Hz	18.999 17 V	-0.83 mV	±3.74 mV	-22%	1.13 mV
	19.000 00 V; 400 Hz	18.999 36 V	-0.64 mV	±3.74 mV	-17%	1.13 mV
	19.000 00 V; 1 kHz	18.999 13 V	-0.87 mV	±3.74 mV	-23%	1.13 mV
	19.000 00 V; 10 kHz	18.999 62 V	-0.38 mV	±3.74 mV	-10%	1.13 mV
	19.000 00 V; 50 kHz	18.998 06 V	-1.94 mV	±13.50 mV	-14%	3.12 mV
	19.000 00 V; 100 kHz	18.991 43 V	-8.57 mV	±13.50 mV	-63%	6.37 mV
200 V	20.000 1 V; 45 Hz	19.997 1 V	-3.0 mV	±8.6 mV	-35%	1.2 mV
	90.000 0 V; 45 Hz	89.995 9 V	-4.1 mV	±21.2 mV	-19%	6.0 mV
	90.000 0 V; 400 Hz	89.997 0 V	-3.0 mV	±21.2 mV	-14%	6.0 mV
	90.000 0 V; 1 kHz	89.996 1 V	-3.9 mV	±21.2 mV	-18%	6.0 mV
	90.000 0 V; 10 kHz	89.993 2 V	-6.8 mV	±21.2 mV	-32%	6.0 mV
	100.000 0 V; 45 Hz	99.995 5 V	-4.5 mV	±23.0 mV	-20%	6.7 mV
	100.000 0 V; 400 Hz	99.996 9 V	-3.1 mV	±23.0 mV	-14%	6.7 mV
	100.000 0 V; 1 kHz	99.995 6 V	-4.4 mV	±23.0 mV	-19%	6.7 mV
	100.000 0 V; 10 kHz	99.992 0 V	-8.0 mV	±23.0 mV	-35%	6.7 mV
	190.000 0 V; 45 Hz	189.989 7 V	-10.3 mV	±44.2 mV	-23%	12.7 mV
	190.000 0 V; 400 Hz	189.991 3 V	-8.7 mV	±44.2 mV	-20%	12.7 mV
	190.000 0 V; 1 kHz	189.990 3 V	-9.7 mV	±44.2 mV	-22%	12.7 mV
280 V	190.000 0 V; 10 kHz	189.990 1 V	-9.9 mV	±44.2 mV	-22%	12.7 mV
	200.000 0 V; 45 Hz	199.990 3 V	-9.7 mV	±46.0 mV	-21%	13.3 mV
	200.000 0 V; 400 Hz	199.992 2 V	-7.8 mV	±46.0 mV	-17%	13.3 mV
	200.000 0 V; 1 kHz	199.990 1 V	-9.9 mV	±46.0 mV	-22%	13.3 mV
	200.000 0 V; 10 kHz	199.989 7 V	-10.3 mV	±46.0 mV	-22%	13.3 mV
	240.000 0 V; 45 Hz	239.988 V	-11.6 mV	±53.2 mV	-22%	19 mV
	240.000 0 V; 400 Hz	239.991 V	-8.5 mV	±53.2 mV	-16%	19 mV
	240.000 0 V; 1 kHz	239.989 V	-11.3 mV	±53.2 mV	-21%	19 mV
1000 V	250.000 V; 45 Hz	249.988 V	-12 mV	±55.0 mV	-21%	45 mV
	750.000 V; 45 Hz	749.950 V	-50 mV	±255 mV	-19%	91 mV
	750.000 V; 400 Hz	749.983 V	-17 mV	±255 mV	-7%	73 mV
	750.000 V; 1 kHz	749.922 V	-78 mV	±255 mV	-31%	73 mV
	1000.000 V; 45 Hz	999.958 V	-42 mV	±330 mV	-13%	122 mV
	1000.000 V; 400 Hz	1000.000 V	0 mV	±330 mV	0%	98 mV
	1000.000 V; 1 kHz	999.922 V	-78 mV	±330 mV	-24%	98 mV

AC Current

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
200 μ A	100.000 0 μ A; 45 Hz	99.982 6 μ A	-17.4 nA	± 205.0 nA	-9%	41.2 nA
	100.000 0 μ A; 400 Hz	99.988 2 μ A	-11.8 nA	± 205.0 nA	-6%	41.2 nA
	100.000 0 μ A; 1 kHz	99.986 8 μ A	-13.2 nA	± 205.0 nA	-6%	41.2 nA
	100.000 0 μ A; 5 kHz	99.987 3 μ A	-12.7 nA	± 450.0 nA	-3%	46.8 nA
	190.000 0 μ A; 45 Hz	189.981 6 μ A	-18.4 nA	± 317.5 nA	-6%	62.5 nA
	190.000 0 μ A; 400 Hz	189.991 6 μ A	-8.4 nA	± 317.5 nA	-3%	62.5 nA
	190.000 0 μ A; 1 kHz	189.990 2 μ A	-9.9 nA	± 317.5 nA	-3%	62.5 nA
	190.000 0 μ A; 5 kHz	189.984 8 μ A	-15.2 nA	± 720.0 nA	-2%	71.8 nA
2 mA	0.200 001 mA; 45 Hz	0.199 946 mA	-55 nA	± 370 nA	-15%	125 nA
	1.000 000 mA; 45 Hz	1.000 222 mA	222 nA	± 1050 nA	21%	229 nA
	1.000 000 mA; 400 Hz	1.000 287 mA	287 nA	± 1050 nA	27%	229 nA
	1.000 000 mA; 1 kHz	1.000 309 mA	309 nA	± 1050 nA	29%	229 nA
	1.000 000 mA; 5 kHz	1.000 424 mA	424 nA	± 2000 nA	21%	467 nA
	1.900 000 mA; 45 Hz	1.900 524 mA	524 nA	± 1815 nA	29%	346 nA
	1.900 000 mA; 400 Hz	1.900 648 mA	648 nA	± 1815 nA	36%	346 nA
	1.900 000 mA; 1 kHz	1.900 681 mA	681 nA	± 1815 nA	38%	346 nA
20 mA	1.900 000 mA; 5 kHz	1.900 843 mA	843 nA	± 3350 nA	25%	714 nA
	2.000 01 mA; 45 Hz	1.999 58 mA	-0.43 μ A	± 2.80 μ A	-15%	1.00 μ A
	2.000 01 mA; 400 Hz	1.999 82 mA	-0.19 μ A	± 2.80 μ A	-7%	1.00 μ A
	2.000 01 mA; 1 kHz	2.000 12 mA	0.11 μ A	± 2.80 μ A	4%	1.00 μ A
	2.000 01 mA; 5 kHz	2.000 73 mA	0.72 μ A	± 6.00 μ A	12%	2.51 μ A
	5.000 00 mA; 45 Hz	4.998 75 mA	-1.25 μ A	± 4.00 μ A	-31%	1.31 μ A
	5.000 00 mA; 400 Hz	4.999 41 mA	-0.59 μ A	± 4.00 μ A	-15%	1.31 μ A
	5.000 00 mA; 1 kHz	5.000 32 mA	0.31 μ A	± 4.00 μ A	8%	1.31 μ A
	5.000 00 mA; 5 kHz	5.001 25 mA	1.25 μ A	± 9.00 μ A	14%	3.30 μ A
	10.000 00 mA; 45 Hz	9.997 41 mA	-2.59 μ A	± 6.00 μ A	-43%	1.82 μ A
	10.000 00 mA; 400 Hz	9.998 90 mA	-1.10 μ A	± 6.00 μ A	-18%	1.82 μ A
	10.000 00 mA; 1 kHz	10.000 54 mA	0.54 μ A	± 6.00 μ A	9%	1.82 μ A
	10.000 00 mA; 5 kHz	10.001 81 mA	1.81 μ A	± 14.00 μ A	13%	4.64 μ A
	15.000 00 mA; 45 Hz	14.995 99 mA	-4.01 μ A	± 8.00 μ A	-50%	2.34 μ A
	15.000 00 mA; 400 Hz	14.998 22 mA	-1.78 μ A	± 8.00 μ A	-22%	2.34 μ A
	15.000 00 mA; 1 kHz	15.000 69 mA	0.69 μ A	± 8.00 μ A	9%	2.34 μ A
	15.000 00 mA; 5 kHz	15.001 93 mA	1.93 μ A	± 19.00 μ A	10%	6.00 μ A
	19.000 00 mA; 45 Hz	18.994 90 mA	-5.10 μ A	± 9.60 μ A	-53%	2.76 μ A
	19.000 00 mA; 400 Hz	18.997 59 mA	-2.41 μ A	± 9.60 μ A	-25%	2.76 μ A
	19.000 00 mA; 1 kHz	19.000 70 mA	0.70 μ A	± 9.60 μ A	7%	2.76 μ A
	19.000 00 mA; 5 kHz	19.001 68 mA	1.68 μ A	± 23.00 μ A	7%	7.09 μ A
200 mA	20.000 1 mA; 45 Hz	19.997 8 mA	-2.3 μ A	± 28.0 μ A	-8%	10.0 μ A
	100.000 0 mA; 45 Hz	100.000 8 mA	0.8 μ A	± 60.0 μ A	1%	18.2 μ A
	100.000 0 mA; 400 Hz	100.006 8 mA	6.8 μ A	± 60.0 μ A	11%	18.2 μ A
	100.000 0 mA; 1 kHz	100.005 9 mA	5.9 μ A	± 60.0 μ A	10%	18.2 μ A
	100.000 0 mA; 5 kHz	100.011 5 mA	11.5 μ A	± 150.0 μ A	8%	46.4 μ A
	190.000 0 mA; 45 Hz	190.003 2 mA	3.2 μ A	± 96.0 μ A	3%	27.6 μ A
	190.000 0 mA; 400 Hz	190.014 8 mA	14.8 μ A	± 96.0 μ A	15%	27.6 μ A
	190.000 0 mA; 1 kHz	190.012 9 mA	12.9 μ A	± 96.0 μ A	13%	27.6 μ A
	190.000 0 mA; 5 kHz	190.017 1 mA	17.1 μ A	± 240.0 μ A	7%	70.9 μ A

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AC Current - continue

Range	Set value		Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
2 A	0.200 001 A;	45 Hz	0.199 932 A	-69 μ A	$\pm 196 \mu$ A	-35%	96 μ A
	1.000 000 A;	45 Hz	0.999 752 A	-248 μ A	$\pm 580 \mu$ A	-43%	242 μ A
	1.000 000 A;	400 Hz	0.999 821 A	-179 μ A	$\pm 580 \mu$ A	-31%	242 μ A
	1.000 000 A;	1 kHz	0.999 860 A	-140 μ A	$\pm 580 \mu$ A	-24%	242 μ A
	1.900 000 A;	45 Hz	1.899 624 A	-376 μ A	$\pm 1012 \mu$ A	-37%	407 μ A
	1.900 000 A;	400 Hz	1.899 743 A	-257 μ A	$\pm 1012 \mu$ A	-25%	407 μ A
	1.900 000 A;	1 kHz	1.899 818 A	-182 μ A	$\pm 1012 \mu$ A	-18%	407 μ A
20 A	2.000 01 A;	45 Hz	1.999 81 A	-0.20 mA	± 5.50 mA	-4%	1.45 mA
	10.000 00 A;	45 Hz	9.999 77 A	-0.23 mA	± 11.50 mA	-2%	4.08 mA
	10.000 00 A;	120 Hz	9.999 44 A	-0.56 mA	± 11.50 mA	-5%	4.08 mA
	10.000 00 A;	400 Hz	9.996 49 A	-3.51 mA	± 11.50 mA	-31%	4.08 mA
	19.000 00 A;	45 Hz	18.999 48 A	-0.52 mA	± 18.25 mA	-3%	7.04 mA
	19.000 00 A;	120 Hz	18.998 89 A	-1.11 mA	± 18.25 mA	-6%	7.04 mA
	19.000 00 A;	400 Hz	18.993 23 A	-6.77 mA	± 18.25 mA	-37%	7.04 mA



Resistance (4-wire)

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
Fixed mode						
100 Ω	-0.0004 Ω	-0.000 4 Ω	-0.01 m Ω	± 0.50 m Ω	-2%	0.1 m Ω
	0.1015 Ω	0.101 5 Ω	0.02 m Ω	± 0.50 m Ω	3%	0.1 m Ω
	1.0032 Ω	1.003 1 Ω	-0.04 m Ω	± 0.50 m Ω	-7%	0.1 m Ω
	10.1040 Ω	10.1037 7 Ω	-0.19 m Ω	± 1.00 m Ω	-19%	0.2 m Ω
100 Ω	101.0005 Ω	100.999 7 Ω	-0.8 m Ω	± 3.0 m Ω	-27%	0.8 m Ω
1 k Ω	1.000040 k Ω	1.000 038 k Ω	-2 m Ω	± 15 m Ω	-13%	8 m Ω
10 k Ω	9.99907 k Ω	9.999 07 k Ω	0.00 Ω	± 0.15 Ω	3%	0.08 Ω
100 k Ω	100.15530 k Ω	100.155 4 k Ω	0.09 Ω	± 1.50 Ω	6%	0.8 Ω
Variable mode						
100 Ω	0.0000 Ω	-0.000 8 Ω	-0.8 m Ω	± 2 m Ω	-41%	0.1 m Ω
	1.0000 Ω	0.999 4 Ω	-0.6 m Ω	± 2 m Ω	-27%	0.1 m Ω
	10.0000 Ω	10.001 3 Ω	1.3 m Ω	± 5 m Ω	26%	0.2 m Ω
33 Ω	30.0000 Ω	30.001 4 Ω	1.4 m Ω	± 10 m Ω	15%	0.3 m Ω
100 Ω	100.00 Ω	100.000 5 Ω	0.5 m Ω	± 18 m Ω	3%	0.8 m Ω
330 Ω	190.00 Ω	189.991 Ω	-9 m Ω	± 22 m Ω	-41%	2 m Ω
	300.00 Ω	299.996 Ω	-4 m Ω	± 33 m Ω	-13%	3 m Ω
1 k Ω	1.000 0 k Ω	1.000 001 k Ω	1 m Ω	± 103 m Ω	1%	8 m Ω
3.3 k Ω	1.900 0 k Ω	1.899 911 k Ω	-89 m Ω	± 201 m Ω	-44%	14 m Ω
	3.000 0 k Ω	2.999 95 k Ω	-0.05 Ω	± 0.30 Ω	-16%	0.03 Ω
10 k Ω	10.000 k Ω	9.999 82 k Ω	-0.18 Ω	± 0.93 Ω	-19%	0.08 Ω
33 k Ω	19.000 k Ω	18.999 77 k Ω	-0.23 Ω	± 2.01 Ω	-11%	0.15 Ω
	30.000 k Ω	29.999 9 k Ω	-0.1 Ω	± 3.00 Ω	-4%	0.3 Ω
100 k Ω	100.00 k Ω	100.000 4 k Ω	0.4 Ω	± 9.30 Ω	4%	0.8 Ω
330 k Ω	190.00 k Ω	189.999 6 k Ω	-0.4 Ω	± 22.00 Ω	-2%	1.5 Ω
	300.00 k Ω	299.997 8 k Ω	-2 Ω	± 33.00 Ω	-7%	3 Ω
1 M Ω	1.000 0 M Ω	1.000 03 M Ω	0.03 k Ω	± 0.15 k Ω	17%	0.01 k Ω

Simulation of RTD - type Pt385 (ITS 90, $R_0 = 100 \Omega$)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 $^{\circ}\text{C}$	-199.99 $^{\circ}\text{C}$	0.01 $^{\circ}\text{C}$	± 0.05 $^{\circ}\text{C}$	27%	0.02 $^{\circ}\text{C}$
-25.0 $^{\circ}\text{C}$	-24.98 $^{\circ}\text{C}$	0.02 $^{\circ}\text{C}$	± 0.08 $^{\circ}\text{C}$	29%	0.02 $^{\circ}\text{C}$
0.0 $^{\circ}\text{C}$	0.03 $^{\circ}\text{C}$	0.03 $^{\circ}\text{C}$	± 0.08 $^{\circ}\text{C}$	40%	0.02 $^{\circ}\text{C}$
25.0 $^{\circ}\text{C}$	24.98 $^{\circ}\text{C}$	-0.02 $^{\circ}\text{C}$	± 0.10 $^{\circ}\text{C}$	-17%	0.02 $^{\circ}\text{C}$
50.0 $^{\circ}\text{C}$	49.98 $^{\circ}\text{C}$	-0.02 $^{\circ}\text{C}$	± 0.10 $^{\circ}\text{C}$	-18%	0.02 $^{\circ}\text{C}$
100.0 $^{\circ}\text{C}$	99.98 $^{\circ}\text{C}$	-0.02 $^{\circ}\text{C}$	± 0.10 $^{\circ}\text{C}$	-16%	0.03 $^{\circ}\text{C}$
500.0 $^{\circ}\text{C}$	499.99 $^{\circ}\text{C}$	-0.01 $^{\circ}\text{C}$	± 0.15 $^{\circ}\text{C}$	-8%	0.07 $^{\circ}\text{C}$
800.0 $^{\circ}\text{C}$	799.99 $^{\circ}\text{C}$	-0.01 $^{\circ}\text{C}$	± 0.18 $^{\circ}\text{C}$	-7%	0.10 $^{\circ}\text{C}$

Resistance (2-wire - output Hi and Lo)

Range	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
Fixed mode						
10 Ω	0.60489 Ω	0.606 9 Ω	2.0 m Ω	± 25 m Ω	8%	0.2 m Ω
	1.60846 Ω	1.609 9 Ω	1.5 m Ω	± 25 m Ω	6%	0.2 m Ω
	10.70926 Ω	10.712 1 Ω	2.8 m Ω	± 30 m Ω	9%	0.2 m Ω
100 Ω	101.60580 Ω	101.609 9 Ω	4.1 m Ω	± 30 m Ω	14%	0.8 m Ω
1 k Ω	1.00065 k Ω	1.000 643 k Ω	-2 m Ω	± 40 m Ω	-4%	8 m Ω
10 k Ω	9.99968 k Ω	9.999 60 k Ω	-0.07 Ω	± 0.2 Ω	-36%	0.08 Ω
100 k Ω	100.15590 k Ω	100.156 1 k Ω	0.2 Ω	± 1.5 Ω	11%	0.8 Ω
1 M Ω	1.00090 M Ω	1.000 89 M Ω	-0.01 k Ω	± 0.03 k Ω	-33%	0.01 k Ω
10 M Ω	9.97359 M Ω	9.97422 0 M Ω	0.63 k Ω	± 1.3 k Ω	49%	0.2 k Ω
100 M Ω	99.99201 M Ω	99.984 0 M Ω	-8.0 k Ω	± 100 k Ω	-8%	13.8 k Ω
1000 M Ω	1000.496 M Ω	1000.046 3 M Ω	-449.7 k Ω	± 2501 k Ω	-18%	501.3 k Ω
Variable mode						
10 Ω	2.00000 Ω	2.002 6 Ω	2.6 m Ω	± 33 m Ω	8%	0.2 m Ω
	5.00000 Ω	5.003 3 Ω	3.3 m Ω	± 34 m Ω	10%	0.2 m Ω
	10.00 Ω	10.003 9 Ω	3.9 m Ω	± 35 m Ω	11%	0.2 m Ω
33 Ω	30.00 Ω	30.004 1 Ω	4.1 m Ω	± 40 m Ω	10%	0.3 m Ω
100 Ω	100.00 Ω	100.004 2 Ω	4.2 m Ω	± 47 m Ω	9%	0.8 m Ω
300 Ω	190.00 Ω	189.997 Ω	-3 m Ω	± 52 m Ω	-7%	2 m Ω
	300.00 Ω	299.998 Ω	-2 m Ω	± 63 m Ω	-3%	2 m Ω
1 k Ω	1.000 0 k Ω	1.000 005 k Ω	5 m Ω	± 133 m Ω	4%	8 m Ω
3.3 k Ω	1.900 0 k Ω	1.899 913 k Ω	-87 m Ω	± 231 m Ω	-38%	14 m Ω
	3.000 0 k Ω	2.999 91 k Ω	-0.09 Ω	± 0.33 Ω	-28%	0.03 Ω
10 k Ω	10.000 k Ω	9.999 76 k Ω	-0.24 Ω	± 0.96 Ω	-25%	0.08 Ω
33 k Ω	19.000 k Ω	18.999 78 k Ω	-0.22 Ω	± 2.04 Ω	-11%	0.15 Ω
	30.000 k Ω	29.999 8 k Ω	-0.2 Ω	± 3.03 Ω	-6%	0.3 Ω
100 k Ω	100.00 k Ω	100.000 5 k Ω	0.5 Ω	± 9.33 Ω	5%	0.8 Ω
330 k Ω	190.00 k Ω	189.997 5 k Ω	-2.5 Ω	± 22.00 Ω	-11%	1.5 Ω
	300.00 k Ω	299.997 k Ω	-3 Ω	± 33.00 Ω	-9%	3 Ω
1 M Ω	1.000 0 M Ω	1.000 02 M Ω	0.02 k Ω	± 0.15 k Ω	14%	0.01 k Ω
3.3 M Ω	1.900 0 M Ω	1.899 97 M Ω	-0.03 k Ω	± 0.32 k Ω	-8%	0.02 k Ω
	3.000 0 M Ω	3.000 0 M Ω	0.0 k Ω	± 0.48 k Ω	-9%	0.1 k Ω
10 M Ω	10.000 M Ω	10.000 0 M Ω	0.0 k Ω	± 2.03 k Ω	-2%	0.2 k Ω
33 M Ω	19.000 M Ω	19.001 6 M Ω	1.6 k Ω	± 38.30 k Ω	4%	0.3 k Ω
	30.000 M Ω	30.002 1 M Ω	2.1 k Ω	± 60.30 k Ω	3%	11.0 k Ω
100 M Ω	100.00 M Ω	99.993 0 M Ω	-7.0 k Ω	± 200.30 k Ω	-3%	13.7 k Ω
1000 M Ω	190.00 M Ω	190.090 5 M Ω	90.5 k Ω	± 573.00 k Ω	16%	17.9 k Ω
	300.00 M Ω	299.957 6 M Ω	-42.4 k Ω	± 903.00 k Ω	-5%	151.0 k Ω
	1000.00 M Ω	1001.645 6 M Ω	1645.6 k Ω	± 10010 k Ω	16%	501.0 k Ω

Capacitance (Cs-D, Variable mode, $U_{meas} = 1.00\text{ V}$, 2-wire, GND OFF)

Test frequenc	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
1 kHz	1.000 0 nF	0.998 4 nF	-1.6 pF	$\pm 20.0\text{ pF}$	-8%	2.0 pF
1 kHz	3.000 nF	2.995 6 nF	-4.4 pF	$\pm 30.0\text{ pF}$	-15%	3.0 pF
1 kHz	10.00 nF	9.995 nF	-4.592 pF	$\pm 50.00\text{ pF}$	-9%	10.000 pF
1 kHz	30.00 nF	30.015 nF	0.015 nF	$\pm 0.15\text{ nF}$	10%	0.030 nF
1 kHz	100.00 nF	100.029 nF	0.029 nF	$\pm 0.50\text{ nF}$	6%	0.100 nF
100 Hz	300.00 nF	300.179 nF	0.179 nF	$\pm 1.50\text{ nF}$	12%	0.300 nF
100 Hz	1.000 0 μF	1.000 29 μF	0.29 nF	$\pm 5.00\text{ nF}$	6%	1.00 nF
100 Hz	3.000 μF	3.000 2 μF	0.2 nF	$\pm 15.00\text{ nF}$	1%	3.0 nF
100 Hz	10.00 μF	10.002 μF	0.002 μF	$\pm 0.05\text{ }\mu\text{F}$	3%	0.010 μF
100 Hz	30.000 0 μF	30.002 24 μF	0.00 μF	$\pm 0.15\text{ }\mu\text{F}$	1%	0.07 μF
100 Hz	100.000 μF	100.009 0 μF	0.0 μF	$\pm 0.50\text{ }\mu\text{F}$	2%	0.4 μF
ramp	300.000 μF	299.88 μF	-118 nF	$\pm 1500\text{ nF}$	-8%	4.11 nF
ramp	1000.000 μF	1000.04 μF	35 nF	$\pm 5000\text{ nF}$	1%	13.1 nF
ramp	10.000 00 mF	10.0016 mF	1.5 μF	$\pm 50.0\text{ }\mu\text{F}$	3%	0.050 μF
ramp	100.000 0 mF	99.982 mF	-18 μF	$\pm 1000\text{ }\mu\text{F}$	-2%	0.050 μF

Capacitance (Cs-D, Fixed mode, $U_{meas} = 1.00\text{ V}$, 2-wire, GND OFF)

Test frequenc	Set value	Measured value	Difference	Spec.	Percent of spec.	Expanded uncertainty
1 kHz	0.754 6 nF	0.750 2 nF	-4.4 pF	$\pm 12.5\text{ pF}$	-36%	2.0 pF
1 kHz	10.25 nF	10.244 nF	-3.810 pF	$\pm 35.00\text{ pF}$	-11%	10.000 pF
1 kHz	103.14 nF	103.212 nF	76 pF	$\pm 250\text{ pF}$	30%	100 pF
100 Hz	1.019 9 μF	1.020 25 μF	0.33 nF	$\pm 2.5\text{ nF}$	13%	1.00 nF
100 Hz	9.98 μF	9.982 μF	2.034 nF	$\pm 35.00\text{ nF}$	6%	10.028 nF
100 Hz	103.5868 μF	103.597 4 μF	10.6 nF	$\pm 450\text{ nF}$	2%	350.0 nF

DC Power

	Set value	Measured value	Difference	Spec.	% of spec.	Expanded uncertainty
1.00 V; 10.00 mA;	10.000 00 mW	10.000 56 mW	0.56 μ W	$\pm 1.9 \mu$ W	29%	0.28 μ W
1.00 V; 100.00 mA;	100.00 00 mW	100.00 21 mW	2.14 μ W	$\pm 18.1 \mu$ W	12%	4.15 μ W
1.00 V; 1.00 A;	1.000 00 W	1.000 01 W	0.01 mW	± 0.2 mW	4%	0.12 mW
1.00 V; 10.00 A;	10.000 00 W	10.001 11 W	1.11 mW	± 3.2 mW	35%	1.24 mW
240.00 V; 10.00 mA;	2.400 000 W	2.400 137 W	0.137 mW	± 0.455 mW	30%	0.068 mW
240.00 V; 10.00 A;	2400.000 W	2400.237 W	0.237 W	± 0.760 W	31%	0.291 W

AC Power

$f_{\text{SET}} = 50.0 \text{ Hz}$

Power factor		Set value	Measured value	Difference	Spec.	% of spec.	Expanded uncertainty
$\cos \varphi = 1$	100V/2A;	200.00 W	200.017 7 W	17.7 mW	± 132.00 mW	13%	40.6 mW
	200V/20A;	4000.0 W	4000.237 W	237 mW	± 3030 mW	8%	802 mW
$\cos \varphi = 0.5 \text{ LA}$	100V/2 A;	100.00 W	100.012 8 W	12.8 mW	± 458.00 mW	3%	40.3 mW
	200V/20 A;	2000.0 W	2001.403 W	1403 mW	± 9190 mW	15%	856 mW

Simulation of TC - type J (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 °C	-199.91 °C	0.09 °C	±0.30 °C	28%	0.04 °C
-25.0 °C	-24.97 °C	0.03 °C	±0.25 °C	12%	0.04 °C
0.0 °C	0.02 °C	0.02 °C	±0.25 °C	8%	0.04 °C
25.0 °C	25.03 °C	0.03 °C	±0.25 °C	11%	0.04 °C
50.0 °C	50.00 °C	0.00 °C	±0.25 °C	1%	0.04 °C
100.0 °C	100.01 °C	0.01 °C	±0.25 °C	2%	0.04 °C
500.0 °C	500.01 °C	0.01 °C	±0.18 °C	5%	0.04 °C
1000.0 °C	999.99 °C	-0.01 °C	±0.18 °C	-5%	0.04 °C
1200.0 °C	1199.99 °C	-0.01 °C	±0.18 °C	-5%	0.04 °C

Simulation of TC - type K (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 °C	-199.97 °C	0.03 °C	±0.35 °C	7%	0.06 °C
-25.0 °C	-24.98 °C	0.02 °C	±0.25 °C	6%	0.05 °C
0.0 °C	-0.01 °C	-0.01 °C	±0.25 °C	-2%	0.05 °C
25.0 °C	25.00 °C	0.00 °C	±0.25 °C	2%	0.05 °C
50.0 °C	49.99 °C	-0.01 °C	±0.25 °C	-2%	0.05 °C
100.0 °C	99.99 °C	-0.01 °C	±0.25 °C	-4%	0.05 °C
500.0 °C	499.99 °C	-0.01 °C	±0.23 °C	-6%	0.06 °C
1000.0 °C	1000.00 °C	0.00 °C	±0.23 °C	-2%	0.06 °C
1370.0 °C	1369.99 °C	-0.01 °C	±0.24 °C	-5%	0.06 °C

Simulation of TC - type S (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-50.0 °C	-50.31 °C	-0.31 °C	±0.90 °C	-35%	0.16 °C
-25.0 °C	-25.05 °C	-0.05 °C	±0.90 °C	-5%	0.16 °C
0.0 °C	-0.07 °C	-0.07 °C	±0.90 °C	-8%	0.16 °C
25.0 °C	24.99 °C	-0.01 °C	±0.90 °C	-1%	0.16 °C
50.0 °C	49.95 °C	-0.05 °C	±0.90 °C	-5%	0.16 °C
100.0 °C	99.95 °C	-0.05 °C	±0.90 °C	-5%	0.16 °C
500.0 °C	499.94 °C	-0.06 °C	±0.49 °C	-12%	0.16 °C
1000.0 °C	999.96 °C	-0.04 °C	±0.49 °C	-9%	0.16 °C
1200.0 °C	1200.00 °C	0.00 °C	±0.49 °C	1%	0.16 °C
1500.0 °C	1499.99 °C	-0.01 °C	±0.40 °C	-2%	0.16 °C
1750.0 °C	1749.94 °C	-0.06 °C	±0.40 °C	-15%	0.16 °C

Simulation of TC - type B (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
400.0 °C	400.09 °C	0.09 °C	±0.90 °C	9%	0.14 °C
600.0 °C	600.02 °C	0.02 °C	±0.90 °C	3%	0.14 °C
800.0 °C	800.03 °C	0.03 °C	±0.90 °C	3%	0.14 °C
1000.0 °C	999.95 °C	-0.05 °C	±0.54 °C	-10%	0.14 °C
1200.0 °C	1199.93 °C	-0.07 °C	±0.48 °C	-15%	0.14 °C
1500.0 °C	1499.95 °C	-0.05 °C	±0.48 °C	-11%	0.14 °C
1800.0 °C	1799.92 °C	-0.08 °C	±0.41 °C	-19%	0.14 °C

Simulation of TC - type R (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-50.0 °C	-50.06 °C	-0.06 °C	±0.96 °C	-7%	0.16 °C
-25.0 °C	-24.98 °C	0.02 °C	±0.96 °C	2%	0.16 °C
0.0 °C	-0.07 °C	-0.07 °C	±0.96 °C	-8%	0.16 °C
25.0 °C	25.03 °C	0.03 °C	±0.96 °C	3%	0.16 °C
50.0 °C	49.86 °C	-0.14 °C	±0.96 °C	-14%	0.16 °C
100.0 °C	99.91 °C	-0.09 °C	±0.96 °C	-10%	0.16 °C
500.0 °C	499.94 °C	-0.06 °C	±0.44 °C	-13%	0.16 °C
1000.0 °C	999.98 °C	-0.02 °C	±0.44 °C	-4%	0.16 °C
1200.0 °C	1199.98 °C	-0.02 °C	±0.39 °C	-5%	0.16 °C
1500.0 °C	1500.01 °C	0.01 °C	±0.39 °C	2%	0.16 °C
1750.0 °C	1750.00 °C	0.00 °C	±0.39 °C	0%	0.16 °C

Simulation of TC - type T (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 °C	-200.00 °C	0.00 °C	±0.30 °C	1%	0.05 °C
-25.0 °C	-24.97 °C	0.03 °C	±0.26 °C	11%	0.05 °C
0.0 °C	0.00 °C	0.00 °C	±0.26 °C	0%	0.05 °C
25.0 °C	25.02 °C	0.02 °C	±0.21 °C	12%	0.05 °C
50.0 °C	50.00 °C	0.00 °C	±0.21 °C	1%	0.05 °C
100.0 °C	100.00 °C	0.00 °C	±0.21 °C	2%	0.05 °C
400.0 °C	400.00 °C	0.00 °C	±0.18 °C	-3%	0.05 °C

Simulation of TC - type E (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 °C	-200.02 °C	-0.02 °C	±0.45 °C	-4%	0.05 °C
-25.0 °C	-24.98 °C	0.02 °C	±0.23 °C	10%	0.05 °C
0.0 °C	-0.01 °C	-0.01 °C	±0.23 °C	-3%	0.05 °C
25.0 °C	25.02 °C	0.02 °C	±0.23 °C	8%	0.05 °C
50.0 °C	50.00 °C	0.00 °C	±0.23 °C	1%	0.05 °C
100.0 °C	100.00 °C	0.00 °C	±0.23 °C	-2%	0.05 °C
500.0 °C	499.99 °C	-0.01 °C	±0.19 °C	-4%	0.05 °C
1000.0 °C	1000.00 °C	0.00 °C	±0.19 °C	-2%	0.05 °C

Simulation of TC - type N (ITS 90, RJ = 0°C)

Applied value	Indicated value	Difference	Spec.	Percent of spec.	Expanded uncertainty
-200.0 °C	-199.97 °C	0.03 °C	±0.45 °C	6%	0.05 °C
-25.0 °C	-24.98 °C	0.02 °C	±0.30 °C	7%	0.05 °C
0.0 °C	0.00 °C	0.00 °C	±0.30 °C	1%	0.05 °C
25.0 °C	25.02 °C	0.02 °C	±0.26 °C	7%	0.05 °C
50.0 °C	50.01 °C	0.00 °C	±0.26 °C	2%	0.05 °C
100.0 °C	99.99 °C	-0.01 °C	±0.26 °C	-2%	0.05 °C
500.0 °C	499.99 °C	-0.01 °C	±0.26 °C	-3%	0.05 °C
1000.0 °C	1000.00 °C	0.00 °C	±0.23 °C	1%	0.05 °C
1300.0 °C	1299.99 °C	-0.01 °C	±0.23 °C	-5%	0.05 °C

End of Certificate of Calibration.