



Český metrologický institut

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

**Laboratory:** Regional Inspectorate Brno, Okružní 31, 638 00 Brno  
Department of Primary Metrology of DC/LF Electrical Quantities  
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## CERTIFICATE OF CALIBRATION

6011-KL-L0007-24

**Date of issue:** 5th January, 2024

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**User:**

**Measuring instrument:** High Resistance Decade  
**Manufacturer:** Meatest  
**Type:** M194  
**Serial number:** 590421

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

**Date of calibration:** 4th January - 5th January, 2024

**Calibrated by:**

**Head of the Department:**

Ing. Pavel Bednář



Ing. Jiří Streit

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**Metrological****traceability:** Measurement are traceable to (inter)national standards.**Measurement standards used:**

Electrometer Keithley 6517B, s.n. 1272999, Cert. of Cal. 6011-KL-E0033-23  
Multimeter Fluke 8508A, s.n. 328370412, Cert. of Cal. 6011-KL-E0006-23  
Multifunction calibrator Fluke 5720A, s.n. 7465206, Cert. of Cal. 6011-KL-E0004-23  
DC High Voltage Power Supplies Heinzinger EVO 1000-200 rev. s.n. 374713950  
Cert. of Cal. 8017-KL-T0169-20  
VN voltmeter Vitrek 4700 s.n. 35673, Cert. of Cal. 9946E3BC, day of calibration 27.7.2023

**Calibration procedure:****High resistance source mode:**

The Values of resistance 10 k $\Omega$  to 100 k $\Omega$  were measured by multimeter Fluke 8508A set in normal mode.  
The Values of resistance 200 k $\Omega$  to 10 G $\Omega$  were measured by multimeter Fluke 8508A set in HiV $\Omega$  mode.  
The Values of resistance 20 G $\Omega$  to 100 G $\Omega$  were measured by voltampere method.  
The Resistance decade was connected with voltage source Fluke 5720A or with DC High Voltage Power Supplies Heinzinger EVO 1000-200 rev. and with Electrometer Keithley 6517B.  
The value of resistance was calculated using by Ohm's law  $R = U/I$ .

**DC High voltage meter:**

The values up to 1000 V - the decade was connected to multifunction calibrator Fluke 5720A set in voltage function.  
The value over 1000 V - the decade was connected to DC High Voltage Power Supplies Heinzinger EVO 1000-200 rev.

**DC current meter:**

The decade was connected to multifunction calibrator Fluke 5720A set in current function.  
High voltage from DC High Voltage Power Supplies Heinzinger EVO 1000-200 rev. was measured by VN Voltmeter Vitrek 4700.

Calibration was carried out according to internal procedure 131-MP-C003, 131-MP-C006 611-MP-C098.

**Place of calibration:** Czech Metrology Institute, Regional Inspectorate Brno, Okružní 31, 638 00 Brno**Ambient conditions:** air temperature: (23.2 $\pm$  0.5)  $^{\circ}$ C  
relative humidity: (54  $\pm$  20) %**Results of calibration:** The measurement results are given in the Tables of results.**Uncertainty:** 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  $k = 2$ .

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Results of the calibration:

High Resistance Decade mode

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC current
kΩ	kΩ	kΩ	kΩ	%	kΩ	μA
10	10.000 81	0.000 81	0.01	8	0.000 14	100
20	20.001 70	0.001 70	0.02	9	0.000 21	100
30	30.002 41	0.002 41	0.03	8	0.000 29	100
40	40.000 66	0.000 66	0.04	2	0.000 38	100
50	50.002 05	0.002 05	0.05	4	0.000 46	100
60	60.001 62	0.001 62	0.06	3	0.000 54	100
70	70.002 23	0.002 23	0.07	3	0.000 62	100
80	80.001 80	0.001 80	0.08	2	0.000 71	100
90	90.000 53	0.000 53	0.09	1	0.000 79	100
100	100.002 26	0.002 26	0.10	2	0.000 88	100
200	200.010 5	0.010 5	0.20	5	0.003 3	10
300	300.028 8	0.028 8	0.30	10	0.004 8	10
400	399.986 3	-0.013 7	0.40	-3	0.006 3	10
500	500.007 3	0.007 3	0.50	1	0.007 8	10
600	600.007 3	0.007 3	0.60	1	0.009 4	10
700	700.027	0.027	0.70	4	0.011	10
800	800.022	0.022	0.80	3	0.012	10
900	900.039	0.039	0.90	4	0.014	10

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC current
MΩ	MΩ	MΩ	MΩ	%	MΩ	μA
1	1.000 037	0.000 037	0.001	4	0.000 040	10
2	2.000 058	0.000 058	0.002	3	0.000 060	10
3	3.000 008	0.000 008	0.003	0	0.000 090	10
4	3.999 98	-0.000 02	0.004	-1	0.000 12	10
5	5.000 04	0.000 04	0.005	1	0.000 15	10
6	5.999 78	-0.000 22	0.006	-4	0.000 18	10
7	6.999 83	-0.000 17	0.007	-2	0.000 21	10
8	7.999 80	-0.000 20	0.008	-3	0.000 23	10
9	8.999 76	-0.000 24	0.009	-3	0.000 26	10
10	9.999 82	-0.000 18	0.010	-2	0.000 29	10
20	20.000 2	0.000 2	0.020	1	0.004 0	1
30	30.002 5	0.002 5	0.030	8	0.006 1	1
40	40.002 0	0.002 0	0.040	5	0.008 1	1
50	49.997	-0.003	0.050	-6	0.010	1
60	59.997	-0.003	0.060	-5	0.012	1
70	69.999	-0.001	0.070	-1	0.014	1
80	80.010	0.010	0.080	13	0.016	1
90	90.010	0.010	0.090	11	0.018	1
99.99	100.002	0.012	0.100	12	0.020	1

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High Resistance Decade mode

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC current
MΩ	MΩ	MΩ	MΩ	%	MΩ	μA
200	200.030	0.030	0.4	8	0.040	0.1
300	300.12	0.12	0.6	20	0.11	0.1
400	400.16	0.16	0.8	20	0.12	0.1
500	500.16	0.16	1.0	16	0.12	0.1
600	600.08	0.08	1.2	7	0.13	0.1
700	700.09	0.09	1.4	6	0.13	0.1
800	800.17	0.17	1.6	11	0.14	0.1
900	899.76	-0.24	1.8	-13	0.14	0.1
999.9	999.68	-0.22	2.0	-11	0.15	0.1

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC current
GΩ	GΩ	GΩ	GΩ	%	GΩ	nA
2	2.002 09	0.002 09	0.010	21	0.000 60	10
3	3.002 0	0.002 0	0.015	13	0.002 3	10
4	4.002 9	0.002 9	0.020	15	0.002 4	10
5	5.004 4	0.004 4	0.025	18	0.005 2	10
6	6.009 9	0.009 9	0.030	33	0.006 0	10
9.999	10.013	0.014	0.050	28	0.011	10

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC voltage
GΩ	GΩ	GΩ	GΩ	%	GΩ	V
20	20.026	0.026	0.2	13	0.010	1000
40	40.020	0.020	0.4	5	0.021	1000
100	100.346	0.346	1	35	0.052	1000

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC voltage
MΩ	MΩ	MΩ	MΩ	%	MΩ	V
10	10.002 3	0.002 3	0.010	23	0.003 6	5000
99.99	100.001	0.011	0.100	11	0.036	5000
999.9	999.61	-0.29	2.00	-15	0.36	5000

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Measurement DC voltage
GΩ	GΩ	GΩ	GΩ	%	GΩ	V
9.999	10.002 2	0.003 2	0.050 0	6	0.005 3	5000
100	100.400	0.400	1.0	40	0.062	5000

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**DC High voltage meter**

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty	Set resistance
V	V	V	V	%	V	
300.00	300.0	0.0	3.5	0	0.1	800 kΩ
1000.00	1000	0	20	0	1	100 MΩ
2000	2000	0	25	0	11	100 MΩ
5000	5001	1	35	3	20	100 MΩ

**DC current meter**

Set Value	Measured Value	Difference	Specification	% of spec.	Expanded uncertainty
mA	mA	mA	mA	%	mA
2.000	2.00	0.00	0.03	0	0.01
8.000	8.00	0.00	0.04	0	0.01

End of Certificate of Calibration.

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