

SCOPE OF ACCREDITATION

registered under NAH-2-0368/2023 accreditation registration number

- 1) Name and address of the accredited organization:

LightingLab Calibration Laboratory Ltd.
Calibration Laboratory
8200 Veszprém, Diófa u. 13.

- 2) Accreditation standard:

MSZ EN ISO/IEC 17025:2018

Category of accreditation:

calibration laboratory

- 3) Validity of the accredited status:

Start date of accredited state (Y.M.D): **2023 May 11**

End date of accredited state (Y.M.D): **2028 May 11**

- 4) Accredited fields:

I. Accredited laboratory calibration services at LightingLab Calibration Laboratory:

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
Electricity measurement DC and AC				
1.	Multimeters, voltmeters DC voltage	1 mV ... 10 mV 10 mV ... 100 mV 100 mV ... 1 V 1 V ... 280 V 280 V ... 600 V 600 V ... 1050 V	10 μ V ... 11 μ V 11 μ V ... 12 μ V 12 μ V ... 20 μ V 20 μ V ... 9.5 mV 9.5 mV ... 20 mV 20 mV ... 28 mV	LL-VILL-01-2023
2.	Multimeters, current meters, clamp meters DC current	1 μ A ... 10 μ A 10 μ A ... 100 μ A 100 μ A ... 1 mA 1 mA ... 1 A 1 A ... 10 A 10 A ... 30 A With clamp only: 30...1500 A	20 nA ... 22 nA 22 nA ... 41 nA 41 nA ... 0.2 μ A 0.2 μ A ... 0.2 mA 0.2 mA ... 3.2 mA 3.2 mA ... 14 mA 60 mA ... 3.5 A	LL-VILL-01-2023
3.	Multimeters, voltmeters AC voltage	15 Hz...10 kHz 1 mV...1050 V 10 kHz...30 kHz 1 mV...280 V 30 kHz...100 kHz 1 mV...20 V 100 kHz...300 kHz 1 mV...2 V	8.8 μ V ... 0.37 V 8.8 μ V ... 42 mV 8.8 μ V ... 5 mV 8.8 μ V ... 0.3 mV	LL-VILL-01-2023

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4.	Multimeters, current meters, clamp meters AC current	15 Hz...1 kHz 10 μ A ... 30 A 1 kHz...5 kHz 10 μ A ... 2 A 5 kHz...10 kHz 10 μ A ... 200 mA 45 Hz...65 Hz with clamp only 30...1500 A	9.3 nA ... 44.2 mA 9.3 nA ... 0.7 mA 9.3 nA ... 75 μ A 0.3%	LL-VILL-01-2023
5.	Multimeters, resistance meters	2-wire 2 Ω ... 10 Ω 10 Ω ... 100 Ω 0.1 k Ω ... 1 k Ω 1 k Ω ... 10 k Ω 10 k Ω ... 100 k Ω 100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω 100 M Ω ... 1.1 G Ω	32 m Ω ... 3 m Ω 3 m Ω ... 48 m Ω 48 m Ω ... 0.15 Ω 0.15 Ω ... 0.97 Ω 0.97 Ω ... 9.4 Ω 9.4 Ω ... 151 Ω 151 Ω ... 2 k Ω 2 k Ω ... 0.2 M Ω 0.2 M Ω ... 11 M Ω	LL-VILL-01-2023
6.	Multimeters, resistance meters	2-wire, fixed point 75 $\mu\Omega$ 150 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	18.1 n Ω 26.1 n Ω 1.5 $\mu\Omega$ 5.2 $\mu\Omega$ 1.8 $\mu\Omega$ 0.13 m Ω	LL-VILL-01-2023
7.	Multimeters, resistance meters	4-wire 1 Ω ... 10 Ω 10 Ω ... 100 Ω 0.1 k Ω ... 1 k Ω 1 k Ω ... 10 k Ω 10 k Ω ... 100 k Ω 100 k Ω ... 1 M Ω	2.3 m Ω ... 5 m Ω 5 m Ω ... 18 m Ω 18 m Ω ... 0.1 Ω 0.1 Ω ... 0.9 Ω 0.9 Ω ... 9.4 Ω 9.4 Ω ... 151 Ω	LL-VILL-01-2023
8.	Multimeters, resistance meters	4-wire, fixed point 75 $\mu\Omega$ 150 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	18.1 n Ω 26.1 n Ω 1.5 $\mu\Omega$ 5.2 $\mu\Omega$ 1.8 $\mu\Omega$ 0.13 m Ω	LL-VILL-01-2023
9.	Multimeters, other conductance meters	2-wire 0.9 nS ... 10 nS 10 nS ... 100 nS 100 nS ... 1 μ S 1 μ S ... 10 μ S 10 μ S ... 100 μ S 100 μ S ... 1 mS 1 mS ... 10 mS 10 mS ... 100 mS 0.1 S ... 0.5 S	9 pS ... 20 pS 20 pS ... 0.2 nS 0.2 nS 0.2 nS ... 2 nS 2 nS ... 10 nS 10 nS ... 0.1 μ S 0.1 μ S ... 2 μ S 2 μ S ... 50 μ S 50 μ S ... 8 mS	LL-VILL-01-2023

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10.	Multimeters, other conductance meters	2-wire, fixed point 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	LL-VILL-01-2023
11.	Multimeters, other conductance meters	4-wire 1 μ S ... 10 μ S 10 μ S ... 100 μ S 0.1 mS ... 1 mS 1 mS ... 10 mS 10 mS ... 100 mS 0.1 S ... 1 S	0.2 nS ... 4 nS 4 nS ... 10 nS 10 nS ... 0.1 μ S 0.1 μ S ... 2 μ S 2 μ S ... 50 μ S 50 μ S ... 2.9 mS	LL-VILL-01-2023
12.	Multimeters, other conductance meters	4-wire, fixed point 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	LL-VILL-01-2023
13.	Multimeters, capacitance meters	800 pF ... 3 nF 3 nF ... 10 mF 10 mF ... 20 mF 20 mF ... 100 mF	16 pF ... 60 pF 60 pF ... 57 μ F 57 μ F ... 0.15 mF 0.15 mF ... 1.2 mF	LL-VILL-01-2023
14.	Resistance thermometer input temperature display function of multimeters, other resistance thermometer input devices (calibration with electronically simulated resistance thermometer)	Resistance thermometer characteristics, temperature: Pt385 (68): -200°C...850°C Pt385 (90): -200°C...850°C Pt3916: -200°C...850°C Pt3926: -200°C...850°C Ni120: -60°C...300°C	0.10 °C 0.11 °C 0.11 °C 0.11 °C 0.06 °C	LL-VILL-01-2023
15.	Thermocouple input temperature display function of multimeters, other thermocouple input devices (calibration with electronically simulated thermocouple)	Thermocouple type, temperature: R: -50°C...1767.6°C S: -50°C...1767.6°C B: 400°C...1820°C J: -210°C...1200°C T: -200°C...400°C E: -250°C...1000°C K: -200°C...1372°C N: -200°C...1300°C M: -50°C...1410°C C: 0°C...2315°C D: 0°C...2315°C G2: 100°C...2315°C	0.39 °C 0.40 °C 0.41 °C 0.18 °C 0.18 °C 0.19 °C 0.25 °C 0.23 °C 0.20 °C 0.47 °C 0.47 °C 0.39 °C	LL-VILL-01-2023
16.	Frequency measuring mode of multimeters, electrical frequency meters	With sine wave (max. 1.5 V_{pk}) 15 Hz...100 kHz 100 kHz...1 GHz	35·10 ⁻⁴ % 29·10 ⁻⁴ %	LL-VILL-01-2023
17.	Frequency measuring mode of multimeters, electrical frequency meters	With sine wave (max. 1.0 V_{pk}) 1 GHz...1,1 GHz	29·10 ⁻⁴ %	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
18.	Frequency measuring mode of multimeters, electrical frequency meters	<i>With square wave (max. 10.5 V_{pk})</i> 0.1 Hz...1 Hz 1 Hz...100 kHz	0,1% 38·10 ⁻⁴ %	LL-VILL-01-2023
19.	Cycle time measurement function of multimeters, other electrical time interval measuring devices	0.4 μs...10 s	4·10 ⁻⁴ %	LL-VILL-01-2023
20.	Analog oscilloscopes, Vertical deflection calibration	<i>With sine wave</i> 1,4 mV _{PK} ... 1,5 V _{PK}) 15 Hz ... 100 kHz 100 kHz ... 500 kHz 0,5 MHz ... 10 MHz 10 MHz ... 100 MHz 100 MHz ... 400 MHz 400 MHz ... 1 GHz (1,4 mV _{PK} ... 1 V _{PK}) 1 GHz ... 1,1 GHz (1,5 V _{PK} ... 25 V _{PK}) 15 Hz ... 100 kHz (25 V _{PK} ... 280 V _{PK}) 15 Hz ... 30 kHz (280 V _{PK} ... 390 V _{PK}) 15 Hz ... 10 kHz (390 V _{PK} ... 1484 V _{PK}) 15 Hz ... 1 kHz	0.5% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.06% 0.05% 0.03% 0.04%	LL-VILL-02-2023
21.	Analog oscilloscopes, Vertical deflection calibration	<i>With square wave</i> (0 V _{PK} ... 200 V _{PK} . 0.1 Hz ... 1 kHz) (0 V _{PK} ... 10.5 V _{PK} . 0.1 Hz ... 100 kHz)	0.3 % 0.15 %	LL-VILL-02-2023
22.	Analog oscilloscopes, Vertical deflection calibration	<i>Sine wave (current)</i> (15 Hz ... 5 kHz) 0 A _{PK} ... 2,5 A _{PK} sine wave (15 Hz ... 1 kHz) 2,5 A _{PK} ... 42,4 A _{PK} sine wave 0 A _{PK} ... 2120 A _{PK} sine wave 0 A _{PK} ... 2 A _{PK} square wave 0 A _{PK} ... 100 A _{PK} square wave	0.13% 0.07% 0.3% 0.3% 0.42%	LL-VILL-02-2023
23.	Digital oscilloscopes, Vertical deflection calibration	<i>With sine wave</i> (1.4 mV _{PK} ... 1.5 V _{PK}) 15 Hz ... 100 kHz 100 kHz ... 500 kHz 0.5 MHz ... 10 MHz 10 MHz ... 100 MHz 100 MHz ... 400 MHz 400 MHz ... 1 GHz (1.4 mV _{PK} ... 1 V _{PK}) 1 GHz ... 1.1 GHz (1.5 V _{PK} ... 25 V _{PK}) 15 Hz ... 100 kHz (25 V _{PK} ... 280 V _{PK}) 15 Hz ... 30 kHz (280 V _{PK} ... 390 V _{PK}) 15 Hz ... 10 kHz (390 V _{PK} ... 1484 V _{PK}) 15 Hz ... 1 kHz	0.52% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.14% 0.13% 0.13% 0.13%	LL-VILL-02-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
24.	Digital oscilloscopes, Vertical deflection calibration	With square wave (0 V _{PK} ... 200 V _{PK}) 0.1 Hz ... 1 kHz (0 V _{PK} ... 10.5 V _{PK}) 0.1 Hz ... 100 kHz	0.33 % 0.15 %	LL-VILL-02-2023
25.	Digital oscilloscopes, Vertical deflection calibration	Sine wave (current) (15 Hz ... 5 kHz) 0 A _{PK} ... 2,5 A _{PK} sine wave (15 Hz ... 1 kHz) 2,5 A _{PK} ... 42,4 A _{PK} sine wave 0 A _{PK} ... 2120 A _{PK} sine wave 0 A _{PK} ... 2 A _{PK} square wave 0 A _{PK} ... 100 A _{PK} square wave	0.19% 0.16% 0.33% 0.33% 0.44%	LL-VILL-02-2023
26.	Oscilloscopes, Horizontal deflection calibration	0.4 μs ... 10 s square wave period	4·10 ⁻⁴ %	LL-VILL-02-2023
27.	Electric power meters (DC)	40 μW ... 31.5 kW (20 mV ... 1050 V 20 mA ... 30 A)	0.1 %	LL-VILL-03-2023
28.	Electric power meters (DC)	With clamp only 40 μW ... 1575 kW (30 ... 1500 A)	0.2 %	LL-VILL-03-2023
29.	Electric power meters (AC)	40 μW ... 0.1 W 0.1 W ... 10 kW 10 kW ... 31.5 kW (0 ≤ cos φ ≤ 1, 15 Hz ... 1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
30.	Electric power meters (AC)	With clamp current measurement 40 μW ... 5 W 5 W ... 1575 kW (0 ≤ cos φ ≤ 1, 15 Hz ... 100 Hz)	0.4% 0.3%	LL-VILL-03-2023
31.	Phase shift measurement function of electrical power meters	-360° ... +360°	0.19°	LL-VILL-03-2023
32.	Voltage and current harmonics function of electrical power meters	Voltage and current 1st - 50th harmonic (calibration capability is a function of output current): 100 mA ... 1 A 1 A ... 5 A 5 A ... 10 A 10 A ... 20 A 20 A ... 30 A	0.88 % 1.91 % 1.12 % 0.78 % 0.72 %	LL-VILL-03-2023
33.	Power supplies and other voltage sources, calibrators, DC voltage	0.01 μV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V 1000 V ... 10000 V	5.4·10 ⁻⁴ % 4.9·10 ⁻⁴ % 4.7·10 ⁻⁴ % 4.9·10 ⁻⁴ % 5.5·10 ⁻⁴ % 188·10 ⁻⁴ %	LL-VILL-04-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
34.	Power supplies and other current sources, calibrators, DC current	0 nA ... 2 nA 1 2 nA ... 20 nA1 20 nA ... 200 nA 1 200 nA ... 2 μ A 1 2 μ A ... 10 μ A 10 μ A ... 100 μ A 100 μ A ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA... 1 A 1 A ... 3 A 3 A ... 10 A 10 A... 100 A 100 A... 500 A 500 A... 1000 A 1	$315 \cdot 10^{-4} \%$ $255 \cdot 10^{-4} \%$ $250 \cdot 10^{-4} \%$ $80 \cdot 10^{-4} \%$ $25 \cdot 10^{-4} \%$ $16 \cdot 10^{-4} \%$ $8 \cdot 10^{-4} \%$ $8 \cdot 10^{-4} \%$ $11 \cdot 10^{-4} \%$ $34 \cdot 10^{-4} \%$ 0.01% 0.07% 0.15% 0.08% 0.08%	LL-VILL-04-2023
35.	Power supplies and other voltage sources, calibrators, AC voltage	15 Hz ... 20 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V... 10 V 10 V... 100 V 100 V... 700 V 15 Hz ... 600 Hz 500 V ... 1 kV 1 kV ... 5 kV 5 kV ... 10 kV 20 kHz ... 50 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V... 100 V 100 V... 700 V 50 kHz ... 100 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V... 10 V 10 V... 100 V 100 V... 700 V 100 kHz ... 1 MHz 0.1 μ V ... 100 mV 100 mV ... 1 V 1 V ... 10 V	0.049% 0.013% 0.004% 0.001% 0.005% 0.007% $37 \cdot 10^{-4} \%$ $164 \cdot 10^{-4} \%$ $356 \cdot 10^{-4} \%$ 0.054% 0.020% 0.007% 0.007% 0.008% 0.021% 0.074% 0.041% 0.012% 0.012% 0.016% 0.060% 0.28% 0.16% 0.21%	LL-VILL-04-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
36.	Power supplies and other current sources, calibrators, AC current	10 Hz ... 1 kHz 0.1 nA ... 100 μ A 100 μ A ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA ... 1 A 1 A ... 3 A 3 A ... 10 A 10 A ... 100 A 10 Hz ... 100 Hz 100 A ... 500 A 500 A ... 1000 A	$118 \cdot 10^{-4} \%$ $91 \cdot 10^{-4} \%$ $38 \cdot 10^{-4} \%$ $100 \cdot 10^{-4} \%$ $204 \cdot 10^{-4} \%$ $161 \cdot 10^{-4} \%$ 0.069% 0.15% 0.085% 0.085%	LL-VILL-04-2023
37.	ESD test equipment, other high-voltage resistance meters	100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 1 G Ω 1 G Ω ... 10 G Ω 100 G Ω fixed reference value	0.2% 0.3% 0.5% 1% 3 G Ω	LL-VILL-05-2022
38.	Frequency of signal generators, function generators, frequency generators	0.001 Hz ... 1 Hz 1 Hz ... 1 GHz 1 GHz ... 6.5 GHz	$81.65 \cdot 10^{-8} \%$ $5.77 \cdot 10^{-8} \%$ $1.36 \cdot 10^{-8} \%$	LL-VILL-06-2023
39.	Signal power of signal generators, function generators, frequency generators	3 Hz ... 300 kHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +70.51 dBm	14.5 dB 0.012 dB 0.001 dB 0.007 dB 0.002 dB	LL-VILL-06-2023
40.	Signal power of signal generators, function generators, frequency generators	300 kHz ... 1 MHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +69.91 dBm	8.08 dB 0.0021 dB 0.0017 dB 0.0002 dB 0.0004 dB	LL-VILL-06-2023
41.	Signal power of signal generators, function generators, frequency generators	1 MHz ... 10 MHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +33.01 dBm	9.24 dB 0.0032 dB 0.0119 dB 0.0068 dB 0.1047 dB	LL-VILL-06-2023
42.	Signal power of signal generators, function generators, frequency generators	10 MHz ... 6.5 GHz -70 dBm ... -30 dBm -30 dBm ... +5 dBm +5 dBm ... +23 dBm	0.14 dB 0.13 dB 0.12 dB	LL-VILL-06-2023

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43.	Measurement capabilities of electrical safety test instruments Measuring voltage	10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V	$15 \cdot 10^{-4} \%$ $57 \cdot 10^{-4} \%$ $41 \cdot 10^{-4} \%$ $60 \cdot 10^{-4} \%$ $61 \cdot 10^{-4} \%$	LL-VILL-04-2023
	AC current 50 Hz	15 Hz...1 kHz 10 μ A ... 30 A	9.3 nA ... 44.2 mA	LL-VILL-01-2023
	Alternating current with clamp	30...1500 A	0.3 %	LL-VILL-03-2023
	Power	40 μ W ... 0.1 W 0.1 W ... 10 kW 10 kW ... 31.5 kW ($0 \leq \cos \phi \leq 1$, 15 Hz...1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
	Phase shift	-360° ... +360°	0.19°	LL-VILL-03-2023
	Insulation resistance	100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 1 G Ω 1 G Ω ...10 G Ω	0.2 % 0.3 % 0.5 % 1 %	LL-VILL-05-2023
		100 G Ω fixed reference value	3 G Ω	LL-VILL-05-2023
44.	Direct and alternating voltage hipot testers	DC voltage: 0 kV ... 2kV 2 kV ... 6 kV 6 kV ... 10 kV	80 mV ... 120 mV 120 mV ... 0.58 V 0.58 V ... 1.88 V	LL-VILL-07-2023
45.	Direct and alternating voltage hipot testers	AC voltage: 0 kV ... 2 kV 2 kV ... 6 kV 6 kV ... 10 kV (0.1 Hz – 600 Hz)	80 mV ... 160 mV 160 mV ... 1.2 V 1.2V ... 3.56 V	LL-VILL-07-2023
46.	Resistance standard (resistance)	With power generator, max. 1W Power 0.1 m Ω ... 1 M Ω	$85.73 \cdot 10^{-4} \%$	LL-VILL-08-2023
47.	Resistance standard (resistance)	Direct measurement: 1 m Ω ... 10 m Ω 10 m Ω ... 100 m Ω 100 m Ω ... 1 Ω 1 Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω 100 M Ω ... 1 G Ω	0.1% 0.01% $11 \cdot 10^{-4} \%$ $5 \cdot 10^{-4} \%$ $6 \cdot 10^{-4} \%$ $9 \cdot 10^{-4} \%$ $23 \cdot 10^{-4} \%$	LL-VILL-08-2023
48.	Resistance standard (conductance)	With power generator, max. 1W Power 1 μ S ... 10 kS	$61.10 \cdot 10^{-4} \%$	LL-VILL-08-2023

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49.	Resistance standard (conductance)	With direct measurement: 1 nS ... 10 nS 10 nS ... 100 nS 100 nS ... 1 μ S 1 μ S ... 1 S 1 S ... 10 S 10 S ... 100 S 100 S ... 1 kS	$23 \cdot 10^{-4} \%$ $9 \cdot 10^{-4} \%$ $6 \cdot 10^{-4} \%$ $5 \cdot 10^{-4} \%$ $11 \cdot 10^{-4} \%$ 0.01 % 0.1 %	LL-VILL-08-2023
50.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Resistance 100 m Ω ... 100 k Ω 100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω	0.017 % 0.018 % 0.019 % 0.2 %	LL-VILL-08-2023
51.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Capacitance 100 pF ... 100 μ F 100 μ F ... 500 μ F 500 μ F ... 1000 μ F	0.018 % 0.021 % 0.026 %	LL-VILL-08-2023
52.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Induktivitás 1 μ H ... 10 μ H 10 μ H ... 100 μ H 100 μ H ... 10 H 10 H ... 12 H	0.053 % 0.020 % 0.018 % 0.033 %	LL-VILL-08-2023
53.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Dissipation factor (tg δ) D 10^{-4} ... 10^{-3} 10^{-3} ... 10^{-2} 10^{-2} ... 10^{-1} 10^{-1} ... 10^0 10^0 ... 10^1	0,00001 ... 0,00003 0,00003 ... 0,00006 0,00006 ... 0,00036 0,00036 ... 0,0004 0,0004 ... 0,00177	LL-VILL-08-2023
54.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Quality factor (tg ϕ) Q 10^{-1} ... 10^0 10^0 ... 10^1 10^1 ... 10^2 10^2 ... 10^3 10^3 ... 10^4	0,00816 ... 0,00817 0,00817 ... 0,037 0,037 ... 0,6 0,6 ... 30 30 ... 1000	LL-VILL-08-2023
55.	Decade, calibrator, other source (resistance, inductance, capacitance)	DC resistance: 1 m Ω ... 10 m Ω 10 m Ω ... 100 m Ω 100 m Ω ... 1 Ω 1 Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω 100 M Ω ... 1 G Ω	0.1 % 0.01 % $11 \cdot 10^{-4} \%$ $5 \cdot 10^{-4} \%$ $6 \cdot 10^{-4} \%$ $9 \cdot 10^{-4} \%$ $23 \cdot 10^{-4} \%$	LL-VILL-08-2023
56.	Decade, calibrator, other source (resistance, inductance, capacitance)	Resistance (20 Hz ... 300 kHz measurement frequency) 100 m Ω ... 100 k Ω 100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω	0.017 % 0.018 % 0.019 % 0.2 %	LL-VILL-08-2023
57.	Decade, calibrator, other source (resistance, inductance, capacitance)	Capacitance (20 Hz ... 300 kHz measurement frequency) 100 pF ... 100 μ F 100 μ F ... 500 μ F 500 μ F ... 1 mF	0.018 % 0.021 % 0.026 %	LL-VILL-08-2023

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58.	Decade, calibrator, other source (resistance, inductance, capacitance)	Inductance (20 Hz ... 300 kHz measurement frequency) 1 μ H ... 10 μ H 10 μ H ... 100 μ H 100 μ H ... 10 H 10 H ... 12 H	0.053 % 0.020 % 0.018 % 0.031 %	LL-VILL-08-2023
59.	Calibrator, electronic DC load, other source (DC power)	DC voltage 0,01 μ V ... 100 mV 0,1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V 1000 V ... 10000 V	$5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-08-2023
60.	Calibrator, electronic DC load, other source (DC power)	DC current 0 nA ... 2 nA 2 nA ... 20 nA 20 nA ... 200 nA 200 nA ... 2 μ A 2 μ A ... 10 μ A 10 μ A ... 100 μ A 100 μ A ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA ... 1 A 1 A ... 3 A 3 A ... 10 A 10 A ... 100 A 100 A ... 500 A 500 A ... 1000 A	$315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % $16 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01 % 0.07 % 0.15 % 0.08 % 0.08 %	LL-VILL-08-2023
61.	Calibrator, electronic DC load, other source (DC power)	Resistance 0,1 m Ω ... 1 m Ω 1 m Ω ... 10 m Ω 10 m Ω ... 1 M Ω	0.5 % 0.089 % 0.058 %	LL-VILL-08-2023
62.	Calibrator, electronic DC load, other source (DC power)	DC power 1 mW ... 10 MW	0.06 %	LL-VILL-08-2023

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Temperature				
63.	Digital contact thermometers (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.066°C ... 0.065°C 0.065°C ... 0.066°C 0.066°C ... 0.067°C 0.067°C ... 0.073°C 0.073°C ... 0.11°C 0.11°C ... 0.22°C 0.22 °C ... 0.31°C	LL-HÖM-01-2022
64.	Resistance thermometers (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.09°C 0.09°C 0.09°C ... 0.091°C 0.091°C ... 0.095°C 0.095°C ... 0.13°C 0.13°C ... 0.22°C 0.22 °C ... 0.32°C	LL-HÖM-01-2022
65.	Thermocouples (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.09°C ... 0.089°C 0.089°C ... 0.09°C 0.09°C ... 0.091°C 0.091°C ... 0.095°C 0.095°C ... 0.13°C 0.13°C ... 0.22°C 0.22 °C ... 0.32°C	LL-HÖM-01-2022
66.	Digital contact thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.035°C ... 0.033°C 0.033°C ... 0.034°C 0.035°C ... 0.07°C 0.07°C ... 0.1°C	LL-HÖM-02-2022
67.	Resistance thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.071°C ... 0.07°C 0.07°C 0.07°C ... 0.09°C 0.09°C ... 0.12°C	LL-HÖM-02-2022
68.	Thermocouples (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.07°C ... 0.069°C 0.069°C 0.069°C ... 0.09°C 0.09°C ... 0.12°C	LL-HÖM-02-2022
69.	Glass thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.035°C ... 0.033°C 0.033°C ... 0.034°C 0.034°C ... 0.07 °C 0.07°C ... 0.1°C	LL-HÖM-03-2022
70.	Infrared thermometer (surface type black body radiator $\epsilon=0,95$)	25°C ... 150°C 150°C ... 200°C 200°C ... 300°C 300°C ... 500°C	0.7°C ... 1.1°C 1.1°C ... 1.2°C 1.2°C ... 1.5°C 1.5°C ... 2.6°C	LL-HÖM-04-2022
71.	Infrared thermometer (cavity type black body radiator $\epsilon=0,995$)	300°C ... 400°C 400°C ... 500°C 500°C ... 600°C 600°C ... 700°C 700°C ... 800°C 800°C ... 900°C 900°C ... 1000 °C	1.4°C ... 1.9°C 1.9°C ... 2.5°C 2.5°C ... 2.7°C 2.7°C ... 2.5°C 2.5°C ... 2.3°C 2.3°C ... 2.4°C 2.4°C ... 4.0°C	LL-HÖM-04-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
72.	Air temperature measuring instruments with own display, temperature data loggers	-40°C ... 150°C	0.27 °C	LL-HÖM-05-2022
Humidity				
73.	Hygrometers, relative humidity meters and transmitters, data loggers	10 %RH ... 25 %RH 25 %RH ... 49.8 %RH 49.8 %RH ... 75 %RH 75 %RH ... 98 %RH	0.73 %RH-0.88 %RH 0.88 %RH 0.88 %RH-1.13 %RH 1.13 %RH	LL-NED-01-2022
Mass				
74.	Non-automatic digital scales, where $\text{Max}/d \geq 5\,000\,000$ $d \leq 1\,\mu\text{g}$	1 mg – 411.111 g	1.53 μg – 7.12 mg	LL-TÖM-01-2022
75.	Non-automatic digital scales, where $\text{Max}/d > 220\,000$ $d < 1\,\text{mg}$	1 mg – 411.111 g	2.31 μg – 7.12 mg	LL-TÖM-01-2022
76.	Non-automatic digital scales, where $220\,000 \geq \text{Max}/d > 34\,000$ $1\,\text{g} > d \geq 0,001\,\text{g}$	1 mg – 2522.222 g	0.86 mg – 44 mg	LL-TÖM-01-2022
77.	Non-automatic digital scales, where $34\,000 \geq \text{Max}/d > 15\,000$ $d \geq 1\,\text{g}$	1 g – 41522 g	0.86 g – 1.29 g	LL-TÖM-01-2022
78.	Non-automatic digital scales, where $15\,000 \geq \text{Max}/d$ $d \geq 0,5\,\text{g}$	1 g – 141.522 kg	0.43 g – 2.65 g	LL-TÖM-01-2022
79.	Non-automatic digital scales, where $10\,000 \geq \text{Max}/d$ $d \geq 100\,\text{g}$	100 g – 2600 kg	86.6 g – 450 g	LL-TÖM-01-2022
Torque				
80.	Torque wrenches, torque screwdrivers, clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	0.66 % - 0.14 % 1.75 % - 0.2 % 0.52 % - 0.18 % 0.84 % - 0.16 %	LL-ERO-01-2022
81.	Torque wrenches, torque screwdrivers, counter clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	1.31 % - 0.16 % 1.21 % - 0.21 % 0.62 % - 0.17 % 1.24 % - 0.15 %	LL-ERO-01-2022
Optics				
82.	Spectral radiant flux, total luminous flux using integrating sphere	0.1 lm – 20 000 lm 0.01 W – 100W	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
83.	Spectral radiant flux, total luminous flux using goniometer	1 lm – 100 000 lm 1 W – 1600 W	3.8 %	LL-OPT-01-2022
84.	Spectral radiant flux, total luminous flux	integrating sphere measuring system	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
85.	Spectral radiant flux, total luminous flux	goniophotometer measuring system	3.8 %	LL-OPT-01-2022
86.	Illuminance meter	illuminance 1 lx – 4000 lx	1.6 %	LL-OPT-02-2024
87.	Illuminance meter	illuminance 1 lx – 200 klx	1.7 %	LL-OPT-02-2024
88.	Spectral reflectance standard	relative spectral reflectance factor, 0.001...2R 380 nm – 740 nm	1.17 %	LL-OPT-03-2022
89.	Reflection measurement capability of spectrophotometer	relative spectral reflectance factor, 0.001...1R 380 nm – 760 nm	0.9 %	LL-OPT-03-2022
90.	Wavelength accuracy of spectrophotometer	380 nm – 760 nm	0.16 nm	LL-OPT-03-2022
91.	Focimeter	dioptré, - 25D...0...25D	0.44 %	LL-OPT-04-2022
92.	Display	luminance, 0 cd/m ² – 4000 cd/m ²	2.8 %	LL-OPT-05-2022
93.	Display	spectral power distribution, W/nm	3.9 %	LL-OPT-05-2022
94.	Spectral irradiance surface power	spectral irradiance surface power, 250 nm – 2500 nm	2.3 %	LL-OPT-06-2022
95.	Irradiance surface power	irradiance surface power, 250 nm – 2500 nm	2.3%	LL-OPT-06-2022
96.	Spectroradiometer	spectroradiometer: 250 nm – 2500 nm	2.3%	LL-OPT-06-2022
97.	UV power meter	UV power: 0...15000 µW/cm ²	2.3%	LL-OPT-06-2022
98.	Spectral responsivity	spectral responsivity, A/W, V/W, 220nm – 399nm	2.12-1.42%	LL-OPT-07-2022
99.	Spectral responsivity	spectral responsivity, A/W, V/W, 400nm – 899nm	0.66%	LL-OPT-07-2022
100.	Spectral responsivity	spectral responsivity, A/W, V/W, 900nm – 990nm	0.76-1.04%	LL-OPT-07-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
101.	Luminance meter, luminance standard	luminance, 0 cd/m ² – 5000 cd/m ²	3.0%	LL-OPT-08-2022
102.	Spectral transmission standard	relative spectral transmission factor, 0.01T-0.1T 360 nm – 740 nm	0.0006T-0.0012T	LL-OPT-09-2022
103.	Spectral transmission standard	relative spectral transmission factor, 0.1T-1T 360 nm – 740 nm	0.0012T-0.008T	LL-OPT-09-2022
104.	Spectral transmission Car glass tint meter	relative spectral transmission factor, 0.01T-0.1T 175 nm – 900 nm	0.0005T-0.0011T	LL-OPT-09-2023
105.	Spectral transmission Car glass tint meter	relative spectral transmission factor, 0.1T-1T 175 nm – 900 nm	0.0011T- 0.007T	LL-OPT-09-2023
106.	Spectrophotometer transmission measurement capability	relative spectral transmission factor, 0.01T-0.1T 175 nm – 900 nm	0.0005T-0.0011T	LL-OPT-09-2023
107.	Spectrophotometer transmission measurement capability	relative spectral transmission factor, 0.1T-1T 175 nm – 900 nm	0.0011T- 0.007T	LL-OPT-09-2023
108.	Wavelength accuracy of spectrophotometer	175 nm – 900 nm	0.16 nm	LL-OPT-09-2023
109.	Visual investigation booth, test room, ageing chamber	spectral/integral irradiance surface power	0.6...2.1 %	LL-OPT-10-2022
110.	Visual investigation booth, test room, ageing chamber	spectral power distribution, W/nm	3.6 %	LL-OPT-10-2022
111.	Visual investigation booth, test room, ageing chamber	illuminance 1-200 klx	2.0 %	LL-OPT-10-2024
112.	Gloss meter	Gloss Measurement geometry: 20°, 60°, 85°	1.0 %	LL-OPT-11-2022

II. Accredited on-site calibration services of LightingLab Calibration Laboratory:

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
Electricity measurement DC and AC				
1.	Multimeters, voltmeters DC voltage	1 mV ... 10 mV 10 mV ... 100 mV 100 mV ... 1 V 1 V ... 280 V 280 V ... 600 V 600 V ... 1050 V	10 μ V ... 11 μ V 11 μ V ... 12 μ V 12 μ V ... 20 μ V 20 μ V ... 9.5 mV 9.5 mV ... 20 mV 20 mV ... 28 mV	LL-VILL-01-2023
2.	Multimeters, current meters, clamp meters DC current	1 μ A ... 10 μ A 10 μ A ... 100 μ A 100 μ A ... 1 mA 1 mA ... 1 A 1 A ... 10 A 10 A ... 30 A <i>With clamp only:</i> 30...1500 A	20 nA ... 22 nA 22 nA ... 41 nA 41 nA ... 0.2 μ A 0.2 μ A ... 0.2 mA 0.2 mA ... 3.2 mA 3.2 mA ... 14 mA 60 mA ... 3.5 A	LL-VILL-01-2023
3.	Multimeters, voltmeters AC voltage	15 Hz...10 kHz 1 mV...1050 V 10 kHz...30 kHz 1 mV...280 V 30 kHz...100 kHz 1 mV...20 V 100 kHz...300 kHz 1 mV...2 V	8.8 μ V ... 0.37 V 8.8 μ V ... 42 mV 8.8 μ V ... 5 mV 8.8 μ V ... 0.3 mV	LL-VILL-01-2023
4.	Multimeters, current meters, clamp meters AC current	15 Hz...1 kHz 10 μ A ... 30 A 1 kHz...5 kHz 10 μ A ... 2 A 5 kHz...10 kHz 10 μ A ... 200 mA 45 Hz...65 Hz with clamp only 30...1500 A	9.3 nA ... 44.2 mA 9.3 nA ... 0.7 mA 9.3 nA ... 75 μ A 0.3%	LL-VILL-01-2023
5.	Multimeters, resistance meters	<i>2-wire</i> 2 Ω ... 10 Ω 10 Ω ... 100 Ω 0.1 k Ω ... 1 k Ω 1 k Ω ... 10 k Ω 10 k Ω ... 100 k Ω 100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 100 M Ω 100 M Ω ... 1.1 G Ω	32 m Ω ... 3 m Ω 3 m Ω ... 48 m Ω 48 m Ω ... 0.15 Ω 0.15 Ω ... 0.97 Ω 0.97 Ω ... 9.4 Ω 9.4 Ω ... 151 Ω 151 Ω ... 2 k Ω 2 k Ω ... 0.2 M Ω 0.2 M Ω ... 11 M Ω	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
6.	Multimeters, resistance meters	2-wire, fixed point 75 $\mu\Omega$ 150 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	18.1 n Ω 26.1 n Ω 1.5 $\mu\Omega$ 5.2 $\mu\Omega$ 1.8 $\mu\Omega$ 0.13 m Ω	LL-VILL-01-2023
7.	Multimeters, resistance meters	4-wire 1 Ω ... 10 Ω 10 Ω ... 100 Ω 0.1 k Ω ... 1 k Ω 1 k Ω ... 10 k Ω 10 k Ω ... 100 k Ω 100 k Ω ... 1 M Ω	2.3 m Ω ... 5 m Ω 5 m Ω ... 18 m Ω 18 m Ω ... 0.1 Ω 0.1 Ω ... 0.9 Ω 0.9 Ω ... 9.4 Ω 9.4 Ω ... 151 Ω	LL-VILL-01-2023
8.	Multimeters, resistance meters	4-wire, fixed point 75 $\mu\Omega$ 150 $\mu\Omega$ 1 m Ω 10 m Ω 100 m Ω 1 Ω	18.1 n Ω 26.1 n Ω 1.5 $\mu\Omega$ 5.2 $\mu\Omega$ 1.8 $\mu\Omega$ 0.13 m Ω	LL-VILL-01-2023
9.	Multimeters, other conductance meters	2-wire 0.9 nS ... 10 nS 10 nS ... 100 nS 100 nS ... 1 μ S 1 μ S ... 10 μ S 10 μ S ... 100 μ S 100 μ S ... 1 mS 1 mS ... 10 mS 10 mS ... 100 mS 0.1 S ... 0.5 S	9 pS ... 20 pS 20 pS ... 0.2 nS 0.2 nS 0.2 nS ... 2 nS 2 nS ... 10 nS 10 nS ... 0.1 μ S 0.1 μ S ... 2 μ S 2 μ S ... 50 μ S 50 μ S ... 8 mS	LL-VILL-01-2023
10.	Multimeters, other conductance meters	2-wire, fixed point 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	LL-VILL-01-2023
11.	Multimeters, other conductance meters	4-wire 1 μ S ... 10 μ S 10 μ S ... 100 μ S 0.1 mS ... 1 mS 1 mS ... 10 mS 10 mS ... 100 mS 0.1 S ... 1 S	0.2 nS ... 4 nS 4 nS ... 10 nS 10 nS ... 0.1 μ S 0.1 μ S ... 2 μ S 2 μ S ... 50 μ S 50 μ S ... 2.9 mS	LL-VILL-01-2023
12.	Multimeters, other conductance meters	4-wire, fixed point 1 S 10 S 100 S 1 kS 6.667 kS 13.33 kS	0.13 mS 0.2 mS 52 mS 1.5 S 1.1 S 3.2 S	LL-VILL-01-2023
13.	Multimeters, capacitance meters	800 pF ... 3 nF 3 nF ... 10 mF 10 mF ... 20 mF 20 mF ... 100 mF	16 pF ... 60 pF 60 pF ... 57 μ F 57 μ F ... 0.15 mF 0.15 mF ... 1.2 mF	LL-VILL-01-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
14.	Resistance thermometer input temperature display function of multimeters, other resistance thermometer input devices (calibration with electronically simulated resistance thermometer)	<i>Resistance thermometer characteristics, temperature:</i> Pt385 (68): -200°C...850°C Pt385 (90): -200°C...850°C Pt3916: -200°C...850°C Pt3926: -200°C...850°C Ni120: -60°C...300°C	0.10 °C 0.11 °C 0.11 °C 0.11 °C 0.06 °C	LL-VILL-01-2023
15.	Thermocouple input temperature display function of multimeters, other thermocouple input devices (calibration with electronically simulated thermocouple)	<i>Thermocouple type, temperature:</i> R: -50°C...1767.6°C S: -50°C...1767.6°C B: 400°C...1820°C J: -210°C...1200°C T: -200°C...400°C E: -250°C...1000°C K: -200°C...1372°C N: -200°C...1300°C M: -50°C...1410°C C: 0°C...2315°C D: 0°C...2315°C G2: 100°C...2315°C	0.39 °C 0.40 °C 0.41 °C 0.18 °C 0.18 °C 0.19 °C 0.25 °C 0.23 °C 0.20 °C 0.47 °C 0.47 °C 0.39 °C	LL-VILL-01-2023
16.	Frequency measuring mode of multimeters, electrical frequency meters	<i>With sine wave (max. 1.5 V_{pk})</i> 15 Hz...100 kHz 100 kHz...1 GHz	35·10 ⁻⁴ % 29·10 ⁻⁴ %	LL-VILL-01-2023
17.	Frequency measuring mode of multimeters, electrical frequency meters	<i>With sine wave (max. 1.0 V_{pk})</i> 1 GHz...1,1 GHz	29·10 ⁻⁴ %	LL-VILL-01-2023
18.	Frequency measuring mode of multimeters, electrical frequency meters	<i>With square wave (max. 10.5 V_{pk})</i> 0.1 Hz...1 Hz 1 Hz...100 kHz	0,1% 38·10 ⁻⁴ %	LL-VILL-01-2023
19.	Cycle time measurement function of multimeters, other electrical time interval measuring devices	0.4 μs...10 s	4·10 ⁻⁴ %	LL-VILL-01-2023
20.	Analog oscilloscopes, Vertical deflection calibration	<i>With sine wave</i> (1,4 mV _{PK} ... 1,5 V _{PK}) 15 Hz ... 100 kHz 100 kHz ... 500 kHz 0,5 MHz ... 10 MHz 10 MHz ... 100 MHz 100 MHz ... 400 MHz 400 MHz ... 1 GHz (1,4 mV _{PK} ... 1 V _{PK}) 1 GHz ... 1,1 GHz (1,5 V _{PK} ... 25 V _{PK}) 15 Hz ... 100 kHz (25 V _{PK} ... 280 V _{PK}) 15 Hz ... 30 kHz (280 V _{PK} ... 390 V _{PK}) 15 Hz ... 10 kHz (390 V _{PK} ... 1484 V _{PK}) 15 Hz ... 1 kHz	0.5% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.06% 0.05% 0.03% 0.04%	LL-VILL-02-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
21.	Analog oscilloscopes, Vertical deflection calibration	<i>With square wave</i> (0 V _{PK} ... 200 V _{PK} . 0.1 Hz ... 1 kHz) (0 V _{PK} ... 10.5 V _{PK} . 0.1 Hz ... 100 kHz)	0.3 % 0.15 %	LL-VILL-02-2023
22.	Analog oscilloscopes, Vertical deflection calibration	<i>Sine wave (current)</i> (15 Hz ... 5 kHz) 0 A _{PK} ... 2,5 A _{PK} sine wave (15 Hz ... 1 kHz) 2,5 A _{PK} ... 42,4 A _{PK} sine wave 0 A _{PK} ... 2120 A _{PK} sine wave 0 A _{PK} ... 2 A _{PK} square wave 0 A _{PK} ... 100 A _{PK} square wave	0.13% 0.07% 0.3% 0.3% 0.42%	LL-VILL-02-2023
23.	Digital oscilloscopes, Vertical deflection calibration	<i>With sine wave</i> (1.4 mV _{PK} ... 1.5 V _{PK}) 15 Hz ... 100 kHz 100 kHz ... 500 kHz 0.5 MHz ... 10 MHz 10 MHz ... 100 MHz 100 MHz ... 400 MHz 400 MHz ... 1 GHz 1 (1.4 mV _{PK} ... 1 V _{PK}) 1 GHz ... 1.1 GHz 1 (1.5 V _{PK} ... 25 V _{PK}) 15 Hz ... 100 kHz (25 V _{PK} ... 280 V _{PK}) 15 Hz ... 30 kHz (280 V _{PK} ... 390 V _{PK}) 15 Hz ... 10 kHz (390 V _{PK} ... 1484 V _{PK}) 15 Hz ... 1 kHz	0.52% 2.0% 2.5% 3.3% 3.7% 4.0% 4.3% 0.14% 0.13% 0.13% 0.13%	LL-VILL-02-2023
24.	Digital oscilloscopes, Vertical deflection calibration	<i>With square wave</i> (0 V _{PK} ... 200 V _{PK} . 0.1 Hz ... 1 kHz) (0 V _{PK} ... 10.5 V _{PK} . 0.1 Hz ... 100 kHz)	0.33 % 0.15 %	LL-VILL-02-2023
25.	Digital oscilloscopes, Vertical deflection calibration	<i>Sine wave (current)</i> (15 Hz ... 5 kHz) 0 A _{PK} ... 2,5 A _{PK} sine wave (15 Hz ... 1 kHz) 2,5 A _{PK} ... 42,4 A _{PK} sine wave 0 A _{PK} ... 2120 A _{PK} sine wave 0 A _{PK} ... 2 A _{PK} square wave 0 A _{PK} ... 100 A _{PK} square wave	0.19% 0.16% 0.33% 0.33% 0.44%	LL-VILL-02-2023
26.	Oscilloscopes, Horizontal deflection calibration	0.4 μs ... 10 s square wave period	4·10 ⁻⁴ %	LL-VILL-02-2023
27.	Electric power meters (DC)	40 μW ... 31.5 kW (20 mV...1050 V 20 mA...30 A)	0.1 %	LL-VILL-03-2023
28.	Electric power meters (DC)	<i>With clamp only</i> 40 μW ... 1575 kW (30...1500 A)	0.2 %	LL-VILL-03-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
29.	Electric power meters (AC)	40 μ W ... 0.1 W 0.1 W ... 10 kW 10 kW ... 31.5 kW ($0 \leq \cos\phi \leq 1$, 15 Hz...1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
30.	Electric power meters (AC)	<i>With clamp current measurement</i> 40 μ W ... 5 W 5 W ... 1575 kW ($0 \leq \cos\phi \leq 1$, 15 Hz...100 Hz)	0.4 % 0.3 %	LL-VILL-03-2023
31.	Phase shift measurement function of electrical power meters	-360° ... +360°	0.19°	LL-VILL-03-2023
32.	Voltage and current harmonics function of electrical power meters	Voltage and current 1st - 50th harmonic (calibration capability is a function of output current): 100 mA ... 1 A 1 A ... 5 A 5 A ... 10 A 10 A ... 20 A 20 A ... 30 A	0.88 % 1.91 % 1.12 % 0.78 % 0.72 %	LL-VILL-03-2023
33.	Power supplies and other voltage sources, calibrators, DC voltage	0.01 μ V ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V 1000 V ... 10000 V	$5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-04-2023
34.	Power supplies and other current sources, calibrators, DC current	0 nA ... 2 nA 2 nA ... 20 nA 20 nA ... 200 nA 200 nA ... 2 μ A 2 μ A ... 10 μ A 10 μ A ... 100 μ A 100 μ A ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA ... 1 A 1 A ... 3 A 3 A ... 10 A 10 A ... 100 A 100 A ... 500 A 500 A ... 1000 A	$315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % $16 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01 % 0.07 % 0.15 % 0.08 % 0.08 %	LL-VILL-04-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
35.	Power supplies and other voltage sources, calibrators, AC voltage	15 Hz ... 20 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 700 V 15 Hz ... 600 Hz 500 V ... 1 kV 1 kV ... 5 kV 5 kV ... 10 kV 20 kHz ... 50 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 700 V 50 kHz ... 100 kHz 0.1 μ V ... 10 mV 10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 700 V 100 kHz ... 1 MHz 0.1 μ V ... 100 mV 100 mV ... 1 V 1 V ... 10 V	0.049% 0.013% 0.004% 0.001% 0.005% 0.007% 37 $\cdot$ 10 ⁻⁴ % 164 $\cdot$ 10 ⁻⁴ % 356 $\cdot$ 10 ⁻⁴ % 0.054% 0.020% 0.007% 0.007% 0.008% 0.021% 0.074% 0.041% 0.012% 0.012% 0.016% 0.060% 0.28% 0.16% 0.21%	LL-VILL-04-2023
36.	Power supplies and other current sources, calibrators, AC current	10 Hz ... 1 kHz 0.1 nA ... 100 μ A 100 μ A ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA ... 1 A 1 A ... 3 A 3 A ... 10 A 10 A ... 100 A 10 Hz ... 100 Hz 100 A ... 500 A 500 A ... 1000 A	118 $\cdot$ 10 ⁻⁴ % 91 $\cdot$ 10 ⁻⁴ % 38 $\cdot$ 10 ⁻⁴ % 100 $\cdot$ 10 ⁻⁴ % 204 $\cdot$ 10 ⁻⁴ % 161 $\cdot$ 10 ⁻⁴ % 0.069% 0.15% 0.085% 0.085%	LL-VILL-04-2023
37.	ESD test equipment, other high-voltage resistance meters	100 k Ω ... 1 M Ω 1 M Ω ... 10 M Ω 10 M Ω ... 1 G Ω 1 G Ω ... 10 G Ω 100 G Ω fixed reference value	0.2% 0.3% 0.5% 1% 3 G Ω	LL-VILL-05-2022
38.	Frequency of signal generators, function generators, frequency generators	0.001 Hz ... 1 Hz 1 Hz ... 1 GHz 1 GHz ... 6.5 GHz	81.65 $\cdot$ 10 ⁻⁸ % 5.77 $\cdot$ 10 ⁻⁸ % 1.36 $\cdot$ 10 ⁻⁸ %	LL-VILL-06-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
39.	Signal power of signal generators, function generators, frequency generators	3 Hz ... 300 kHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +70.51 dBm	14.5 dB 0.012 dB 0.001 dB 0.007 dB 0.002 dB	LL-VILL-06-2023
40.	Signal power of signal generators, function generators, frequency generators	300 kHz ... 1 MHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +69.91 dBm	8.08 dB 0.0021 dB 0.0017 dB 0.0002 dB 0.0004 dB	LL-VILL-06-2023
41.	Signal power of signal generators, function generators, frequency generators	1 MHz ... 10 MHz -100 dBm ... -20 dBm -20 dBm ... -10 dBm -10 dBm ... 0 dBm 0 dBm ... +10 dBm +10 dBm ... +33.01 dBm	9.24 dB 0.0032 dB 0.0119 dB 0.0068 dB 0.1047 dB	LL-VILL-06-2023
42.	Signal power of signal generators, function generators, frequency generators	10 MHz ... 6.5 GHz -70 dBm ... -30 dBm -30 dBm ... +5 dBm +5 dBm ... +23 dBm	0.14 dB 0.13 dB 0.12 dB	LL-VILL-06-2023
43.	Measurement capabilities of electrical safety test instruments Measuring voltage	10 mV ... 100 mV 0.1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V	15·10 ⁻⁴ % 57·10 ⁻⁴ % 41·10 ⁻⁴ % 60·10 ⁻⁴ % 61·10 ⁻⁴ %	LL-VILL-04-2023
	AC current 50 Hz	15 Hz ... 1 kHz 10 µA ... 30 A	9.3 nA ... 44.2 mA	LL-VILL-01-2023
	Alternating current with clamp	30 ... 1500 A	0.3 %	LL-VILL-03-2023
	Power	40 µW ... 0.1 W 0.1 W ... 10 kW 10 kW ... 31.5 kW (0 ≤ cos φ ≤ 1. 15 Hz ... 1 kHz)	0.2 % 0.1 % 0.2 %	LL-VILL-03-2023
	Phase shift	-360° ... +360°	0.19°	LL-VILL-03-2023
	Insulation resistance	100 kΩ ... 1 MΩ 1 MΩ ... 10 MΩ 10 MΩ ... 1 GΩ 1 GΩ ... 10 GΩ	0.2 % 0.3 % 0.5 % 1 %	LL-VILL-05-2023
		100 GΩ fixed reference value	3 GΩ	LL-VILL-05-2023
44.	Direct and alternating voltage hipot testers	DC voltage: 0 kV ... 2 kV 2 kV ... 6 kV 6 kV ... 10 kV	80 mV ... 120 mV 120 mV ... 0.58 V 0.58 V ... 1.88 V	LL-VILL-07-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
45.	Direct and alternating voltage hipot testers	AC voltage: 0 kV ... 2 kV 2 kV ... 6 kV 6 kV ... 10 kV (0.1 Hz – 600 Hz)	80 mV ... 160 mV 160 mV ... 1.2 V 1.2V ... 3.56 V	LL-VILL-07-2023
46.	Resistance standard (resistance)	With power generator, max. 1W Power 0.1 mΩ ... 1 MΩ	85.73·10 ⁻⁴ %	LL-VILL-08-2023
47.	Resistance standard (resistance)	Direct measurement: 1 mΩ ... 10 mΩ 10 mΩ ... 100 mΩ 100 mΩ ... 1 Ω 1 Ω ... 1 MΩ 1 MΩ ... 10 MΩ 10 MΩ ... 100 MΩ 100 MΩ ... 1 GΩ	0.1% 0.01% 11·10 ⁻⁴ % 5·10 ⁻⁴ % 6·10 ⁻⁴ % 9·10 ⁻⁴ % 23·10 ⁻⁴ %	LL-VILL-08-2023
48.	Resistance standard (conductance)	With power generator, max. 1W Power 1 μS ... 10 kS	61.10·10 ⁻⁴ %	LL-VILL-08-2023
49.	Resistance standard (conductance)	With direct measurement: 1 nS ... 10 nS 10 nS ... 100 nS 100 nS ... 1 μS 1 μS ... 1 S 1 S ... 10 S 10 S ... 100 S 100 S ... 1 kS	23·10 ⁻⁴ % 9·10 ⁻⁴ % 6·10 ⁻⁴ % 5·10 ⁻⁴ % 11·10 ⁻⁴ % 0.01 % 0.1 %	LL-VILL-08-2023
50.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Resistance 100 mΩ ... 100 kΩ 100 kΩ ... 1 MΩ 1 MΩ ... 10 MΩ 10 MΩ ... 100 MΩ	0.017 % 0.018 % 0.019 % 0.2 %	LL-VILL-08-2023
51.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Capacitance 100 pF ... 100 μF 100 μF ... 500 μF 500 μF ... 1000 μF	0.018 % 0.021 % 0.026 %	LL-VILL-08-2023
52.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Induktivitás 1 μH ... 10 μH 10 μH ... 100 μH 100 μH ... 10 H 10 H ... 12 H	0.053 % 0.020 % 0.018 % 0.033 %	LL-VILL-08-2023
53.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Dissipation factor (tg δ) D 10 ⁻⁴ ... 10 ⁻³ 10 ⁻³ ... 10 ⁻² 10 ⁻² ... 10 ⁻¹ 10 ⁻¹ ... 10 ⁰ 10 ⁰ ... 10 ¹	0,00001 ... 0,00003 0,00003 ... 0,00006 0,00006 ... 0,00036 0,00036 ... 0,0004 0,0004 ... 0,00177	LL-VILL-08-2023
54.	RLC / LCR meter (AC resistance, capacitance, inductance, dissipation factor, quality factor) with a measuring frequency of 20Hz-300kHz	Quality factor (tg φ) Q 10 ⁻¹ ... 100 100 ... 101 101 ... 102 102 ... 103 103 ... 104	0,00816 ... 0,00817 0,00817 ... 0,037 0,037 ... 0,6 0,6 ... 30 30 ... 1000	LL-VILL-08-2023

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
55.	Decade, calibrator, other source (resistance, inductance, capacitance)	DC resistance: 1 mΩ ... 10 mΩ 10 mΩ ... 100 mΩ 100 mΩ ... 1 Ω 1 Ω ... 1 MΩ 1 MΩ ... 10 MΩ 10 MΩ ... 100 MΩ 100 MΩ ... 1 GΩ	0.1% 0.01 % $11 \cdot 10^{-4}$ % $5 \cdot 10^{-4}$ % $6 \cdot 10^{-4}$ % $9 \cdot 10^{-4}$ % $23 \cdot 10^{-4}$ %	LL-VILL-08-2023
56.	Decade, calibrator, other source (resistance, inductance, capacitance)	Resistance (20 Hz ... 300 kHz measurement frequency) 100 mΩ ... 100 kΩ 100 kΩ ... 1 MΩ 1 MΩ ... 10 MΩ 10 MΩ ... 100 MΩ	0.017% 0.018% 0.019% 0.2%	LL-VILL-08-2023
57.	Decade, calibrator, other source (resistance, inductance, capacitance)	Capacitance (20 Hz ... 300 kHz measurement frequency) 100 pF ... 100 μF 100 μF ... 500 μF 500 μF ... 1 mF	0.018 % 0.021 % 0.026 %	LL-VILL-08-2023
58.	Decade, calibrator, other source (resistance, inductance, capacitance)	Inductance (20 Hz ... 300 kHz measurement frequency) 1 μH ... 10 μH 10 μH ... 100 μH 100 μH ... 10 H 10 H ... 12 H	0.053 % 0.020 % 0.018 % 0.031 %	LL-VILL-08-2023
59.	Calibrator, electronic DC load, other source (DC power)	DC voltage 0,01 μV ... 100 mV 0,1 V ... 1 V 1 V ... 10 V 10 V ... 100 V 100 V ... 1000 V 1000 V ... 10000 V	$5.4 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $4.7 \cdot 10^{-4}$ % $4.9 \cdot 10^{-4}$ % $5.5 \cdot 10^{-4}$ % $188 \cdot 10^{-4}$ %	LL-VILL-08-2023
60.	Calibrator, electronic DC load, other source (DC power)	DC current 0 nA ... 2 nA 2 nA ... 20 nA 20 nA ... 200 nA 200 nA ... 2 μA 2 μA ... 10 μA 10 μA ... 100 μA 100 μA ... 1 mA 1 mA ... 10 mA 10 mA ... 100 mA 100 mA ... 1 A 1 A ... 3 A 3 A ... 10 A 10 A ... 100 A 100 A ... 500 A 500 A ... 1000 A	$315 \cdot 10^{-4}$ % $255 \cdot 10^{-4}$ % $250 \cdot 10^{-4}$ % $80 \cdot 10^{-4}$ % $25 \cdot 10^{-4}$ % $16 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $8 \cdot 10^{-4}$ % $11 \cdot 10^{-4}$ % $34 \cdot 10^{-4}$ % 0.01 % 0.07 % 0.15 % 0.08 % 0.08 %	LL-VILL-08-2023
61.	Calibrator, electronic DC load, other source (DC power)	Resistance 0,1 mΩ ... 1 mΩ 1 mΩ ... 10 mΩ 10 mΩ ... 1 MΩ	0.5 % 0.089 % 0.058 %	LL-VILL-08-2023
62.	Calibrator, electronic DC load, other source (DC power)	DC power 1 mW ... 10 MW	0.06 %	LL-VILL-08-2023
Temperature				

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
63.	Digital contact thermometers (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.066°C ... 0.065°C 0.065°C ... 0.066°C 0.066°C ... 0.067°C 0.067°C ... 0.073°C 0.073°C ... 0.11°C 0.11°C ... 0.22°C 0.22 °C ... 0.31°C	LL-HŐM-01-2022
64.	Resistance thermometers (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.09°C 0.09°C 0.09°C ... 0.091°C 0.091°C ... 0.095°C 0.095°C ... 0.13°C 0.13°C ... 0.22°C 0.22 °C ... 0.32°C	LL-HŐM-01-2022
65.	Thermocouples (calibrated with dry block calibrator)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 250°C 250°C ... 450°C 450°C ... 600 °C	0.09°C ... 0.089°C 0.089°C ... 0.09°C 0.09°C ... 0.091°C 0.091°C ... 0.095°C 0.095°C ... 0.13°C 0.13°C ... 0.22°C 0.22 °C ... 0.32°C	LL-HŐM-01-2022
66.	Digital contact thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.035°C ... 0.033°C 0.033°C ... 0.034°C 0.035°C ... 0.07°C 0.07°C ... 0.1°C	LL-HŐM-02-2022
67.	Resistance thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.071°C ... 0.07°C 0.07°C 0.07°C ... 0.09°C 0.09°C ... 0.12°C	LL-HŐM-02-2022
68.	Thermocouples (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.07°C ... 0.069°C 0.069°C 0.069°C ... 0.09°C 0.09°C ... 0.12°C	LL-HŐM-02-2022
69.	Glass thermometers (calibrated with liquid bath)	-30°C ... 0°C 0°C ... 90°C 90°C ... 150°C 150°C ... 300°C	0.035°C ... 0.033°C 0.033°C ... 0.034°C 0.034°C ... 0.07 °C 0.07°C ... 0.1°C	LL-HŐM-03-2022
70.	Infrared thermometer (surface type black body radiator $\varepsilon=0,95$)	25°C ... 150°C 150°C ... 200°C 200°C ... 300°C 300°C ... 500°C	0.7°C ... 1.1°C 1.1°C ... 1.2°C 1.2°C ... 1.5°C 1.5°C ... 2.6°C	LL-HŐM-04-2022
71.	Infrared thermometer (cavity type black body radiator $\varepsilon=0,995$)	300°C ... 400°C 400°C ... 500°C 500°C ... 600°C 600°C ... 700°C 700°C ... 800°C 800°C ... 900°C 900°C ... 1000 °C	1.4°C ... 1.9°C 1.9°C ... 2.5°C 2.5°C ... 2.7°C 2.7°C ... 2.5°C 2.5°C ... 2.3°C 2.3°C ... 2.4°C 2.4°C ... 4.0°C	LL-HŐM-04-2022
72.	Climate chambers, thermostat cabinets (temperature)	-30°C ... 0°C 0°C ... 70°C 70°C ... 100°C 100°C ... 150°C 150°C ... 200°C	0,65°C ... 1,72°C 1,72°C ... 2,45°C 2,45°C ... 2,51°C 2,51°C ... 2,50°C 2,50°C ... 2,91°C	LL-HŐM-04-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
73.	Climate chambers, thermostat cabinets (relative humidity)	5 RH% ... 25 RH% 25 RH% ... 50 RH% 50 RH% ... 75 RH% 75 RH% ... 98 RH%	0,51RH%–0,75RH% 0,75 RH%–0,86RH% 0,86RH%–1,25RH% 1,25RH%–1,38RH%	LL-HÖM-04-2022
Mass				
74.	Non-automatic digital scales, where $\text{Max}/d \geq 5\,000\,000$ $d \leq 1\,\mu\text{g}$	1 mg – 411.111 g	1.53 μg – 7.12 mg	LL-TÖM-01-2022
75.	Non-automatic digital scales, where $\text{Max}/d > 220\,000$ $d < 1\,\text{mg}$	1 mg – 411.111 g	2.31 μg – 7.12 mg	LL-TÖM-01-2022
76.	Non-automatic digital scales, where $220\,000 \geq \text{Max}/d > 34\,000$ $1\,\text{g} > d \geq 0,001\,\text{g}$	1 mg – 2522.222 g	0.86 mg – 44 mg	LL-TÖM-01-2022
77.	Non-automatic digital scales, where $34\,000 \geq \text{Max}/d > 15\,000$ $d \geq 1\,\text{g}$	1 g – 41522 g	0.86 g – 1.29 g	LL-TÖM-01-2022
78.	Non-automatic digital scales, where $15\,000 \geq \text{Max}/d$ $d \geq 0,5\,\text{g}$	1 g – 141.522 kg	0.43 g – 2.65 g	LL-TÖM-01-2022
79.	Non-automatic digital scales, where $10\,000 \geq \text{Max}/d$ $d \geq 100\,\text{g}$	100 g – 2600 kg	86.6 g – 450 g	LL-TÖM-01-2022
Torque				
80.	Torque wrenches, torque screwdrivers, clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	0.66 % - 0.14 % 1.75 % - 0.2 % 0.52 % - 0.18 % 0.84 % - 0.16 %	LL-ERO-01-2022
81.	Torque wrenches, torque screwdrivers, counter clockwise	0.2 Nm – 2 Nm 2 Nm – 20 Nm 20 Nm – 200 Nm 200 Nm – 2000 Nm	1.31 % - 0.16 % 1.21 % - 0.21 % 0.62 % - 0.17 % 1.24 % - 0.15 %	LL-ERO-01-2022
Optics				
82.	Spectral radiant flux, total luminous flux using integrating sphere	0.1 lm – 20 000 lm, 0.01 W – 100W	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
83.	Spectral radiant flux, total luminous flux using goniometer	1 lm – 100 000 lm, 1 W – 1600 W	3.8 %	LL-OPT-01-2022
84.	Spectral radiant flux, total luminous flux	integrating sphere measuring system	with reference standard: 1.8 % with working standard: 2.2 %	LL-OPT-01-2022
85.	Spectral radiant flux, total luminous flux	goniophotometer measuring system	3.8 %	LL-OPT-01-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
86.	Illuminance meter	illuminance 1 lx – 4000 lx	1.6 %	LL-OPT-02-2024
87.	Illuminance meter	illuminance 1 lx – 200 klx	1.7 %	LL-OPT-02-2024
88.	Spectral reflectance standard	relative spectral reflectance factor, 0.001...2R 380 nm – 740 nm	1.17 %	LL-OPT-03-2022
89.	Reflection measurement capability of spectrophotometer	relative spectral reflectance factor, 0.001...1R 380 nm – 760 nm	0.9 %	LL-OPT-03-2022
90.	Wavelength accuracy of spectrophotometer	380 nm – 760 nm	0.16 nm	LL-OPT-03-2022
91.	Focimeter	dioptré, - 25D...0....25D	0.44 %	LL-OPT-04-2022
92.	Display	luminance, 0 cd/m ² – 4000 cd/m ²	2.8 %	LL-OPT-05-2022
93.	Display	spectral power distribution, W/nm	3.9 %	LL-OPT-05-2022
94.	Spectral irradiance surface power	spectral irradiance surface power, 250 nm – 2500 nm	2.3 %	LL-OPT-06-2022
95.	Irradiance surface power	irradiance surface power, 250 nm – 2500 nm	2.3%	LL-OPT-06-2022
96.	Spectroradiometer	spectroradiometer: 250 nm – 2500 nm	2.3%	LL-OPT-06-2022
97.	UV power meter	UV power: 0...15000 µW/cm ²	2.3%	LL-OPT-06-2022
98.	Spectral responsivity	spectral responsivity, A/W, V/W, 220nm – 399nm	2.12-1.42%	LL-OPT-07-2022
99.	Spectral responsivity	spectral responsivity, A/W, V/W, 400nm – 899nm	0.66%	LL-OPT-07-2022
100.	Spectral responsivity	spectral responsivity, A/W, V/W, 900nm – 990nm	0.76-1.04%	LL-OPT-07-2022
101.	Luminance meter, luminance standard	luminance, 0 cd/m ² – 5000 cd/m ²	3.0%	LL-OPT-08-2022

Item	Name of the measuring instrument to be calibrated (or the quantity to be measured)	Value or range measured by standard or reproduced	Calibration and measurement capability $k=2$	Calibration process reference
102.	Spectral transmission standard	relative spectral transmission factor, 0.01T-0.1T 360 nm – 740 nm	0.0006T-0.0012T	LL-OPT-09-2023
103.	Spectral transmission standard	relative spectral transmission factor, 0.1T-1T 360 nm – 740 nm	0.0012T-0.008T	LL-OPT-09-2023
104.	Spectral transmission Car glass tint meter	relative spectral transmission factor, 0.01T-0.1T 175 nm – 900 nm	0.0005T-0.0011T	LL-OPT-09-2023
105.	Spectral transmission Car glass tint meter	relative spectral transmission factor, 0.1T-1T 175 nm – 900 nm	0.0011T- 0.007T	LL-OPT-09-2023
106.	Spectrophotometer transmission measurement capability	relative spectral transmission factor, 0.01T-0.1T 175 nm – 900 nm	0.0005T-0.0011T	LL-OPT-09-2023
107.	Spectrophotometer transmission measurement capability	relative spectral transmission factor, 0.1T-1T 175 nm – 900 nm	0.0011T- 0.007T	LL-OPT-09-2023
108.	Wavelength accuracy of spectrophotometer	175 nm – 900 nm	0.16 nm	LL-OPT-09-2023
109.	Visual investigation booth, test room, ageing chamber	spectral/integral irradiance surface power	0.6...2.1 %	LL-OPT-10-2022
110.	Visual investigation booth, test room, ageing chamber	spectral power distribution, W/nm	3.6 %	LL-OPT-10-2022
111.	Visual investigation booth, test room, ageing chamber	illuminance 1-200 klx	2.0 %	LL-OPT-10-2024
112.	Gloss meter	Gloss Measurement geometry: 20°, 60°, 85°	1.0 %	LL-OPT-11-2022