

**The Appendix is an integral part of  
Certificate of Accreditation No. 81/2019 of 14/02/2019**

Accredited entity according to ČSN EN ISO/IEC 17025:2018:

**Elektrotechnický zkušební ústav, s.p.**  
Calibration Laboratory  
Pod lisem 129/2, Troja, 171 02 Praha 8

**CMC for the field of measured quantity: Temperature**

Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace		
		min.	unit	max.	unit							
1*	Indicating thermometers and temperature measuring chains	-20 °C	up to	0 °C		0.10 °C	comparison with a standard	MK20				
		0 °C	up to	90 °C		0.05 °C						
		90 °C	up to	420 °C		0.10 %						
2*	Thermometers of thermal chambers	-80 °C	up to	0 °C		0.50 °C	comparison with a standard	MK20				
		0 °C	up to	50 °C		0.30 °C						
		50 °C	up to	250 °C		0.40 °C						
3*	Simulation of a temperature sensor	-200 °C	up to	-100 °C	type K thermocouple	0.33 °C	direct measurement including the effect of CJC	MK8				
				-100 °C		-25 °C				0.18 °C		
				-25 °C		120 °C				0.16 °C		
				120 °C		1,000 °C				0.26 °C		
				1,000 °C		1,372 °C				0.40 °C		
		-210 °C	up to	-100 °C	type J thermocouple	0.27 °C						
				-100 °C		-30 °C				0.16 °C		
				-30 °C		150 °C				0.14 °C		
				150 °C		760 °C				0.17 °C		
		760 °C	up to	1,200 °C		0.23 °C						
				-250 °C		up to				-150 °C	type T thermocouple	0.63 °C
										-150 °C		0 °C
0 °C	120 °C	0.16 °C										
120 °C	up to	400 °C		0.14 °C								

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		min.	unit	max.	unit					
		0 °C	up to	250 °C		type S thermocouple	0.47 °C			
		250 °C	up to	1,000 °C			0.36 °C			
		1,000 °C	up to	1,400 °C			0.37 °C			
		1,400 °C	up to	1,767 °C			0.46 °C			
		600 °C	up to	800 °C		type B thermocouple	0.44 °C			
		800 °C	up to	1,000 °C			0.34 °C			
		1,000 °C	up to	1,550 °C			0.30 °C			
		1,550 °C	up to	1,820 °C			0.33 °C			
		-250 °C	up to	-100 °C		type E thermocouple	0.50 °C			
		-100 °C	up to	-25 °C			0.16 °C			
		-25 °C	up to	350 °C			0.14 °C			
		350 °C	up to	650 °C			0.16 °C			
		650 °C	up to	1,000 °C			0.21 °C			
		-200 °C	up to	0 °C		Pt 100 resistance thermometer	0.05 °C	direct measurement	MK8	
		0 °C	up to	100 °C			0.07 °C			
		100 °C	up to	300 °C			0.09 °C			
		300 °C	up to	400 °C			0.10 °C			
		400 °C	up to	630 °C			0.12 °C			
		630 °C	up to	800 °C			0.14 °C			

<sup>1)</sup> Asterisk at the ordinal number identifies the calibrations, which the Laboratory is qualified to carry out outside the permanent laboratory premises.

<sup>2)</sup> The expanded measurement uncertainty is in accordance with ILAC-P14 and EA-4/02, part of CMC, and it is the lowest value of the respective uncertainty. If not stated otherwise, its coverage probability is approx. 95 %. If not stated otherwise, the uncertainty values stated without a unit are relative to the value measured. If the calibration is carried out outside the laboratory premises, the measurement uncertainty may be affected.

<sup>3)</sup> If the document identifying the calibration procedure is dated, only these specific procedures are used. If the document identifying the calibration procedure is not dated, the latest edition of the specified procedure is used (including any changes).

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**CMC for the field of measured quantity: Electrical quantities**

Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace
		Min	unit	Max	unit					
1*	Direct-current voltage	0 mV	up to	200 mV	generation and measurement	0.00086 % + 0.3 μV	comparison with a standard or direct measurement	MK4, MK8, MK9		
		0.2 V	up to	0.5 V		0.00095 %				
		0.5 V	up to	20 V		0.00075 %				
		20 V	up to	1,100 V		0.0012 %				
		1.1 kV	up to	15 kV	generation and measurement	0.50 %	comparison with a standard or direct measurement	MK10		
		15 kV	up to	100 kV		0.80 %				
2*	Alternating-current voltage	0.1 mV	up to	15 mV	generation and measurement	10 Hz to 40 Hz	0.031 % + 4 μV	comparison with a standard or direct measurement	MK4, MK8, MK9	
						40 Hz to 10 kHz	0.028 % + 4 μV			
						10 kHz to 20 kHz	0.020 % + 6 μV			
						20 kHz to 30 kHz	0.041 % + 8 μV			
						30 kHz to 50 kHz	0.10 % + 6 μV			
						50 kHz to 100 kHz	0.078 % + 22 μV			
						100 kHz to 300 kHz	0.21 % + 60 μV			
						300 kHz to 500 kHz	0.80 % + 50 μV			
						500 kHz to 1 MHz	0.61 % + 0.4 mV			
				15 mV		up to	33 mV			
					40 Hz to 10 kHz	0.015 % + 6 μV				
					10 kHz to 20 kHz	0.020 % + 6 μV				
					20 kHz to 30 kHz	0.041 % + 8 μV				

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Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace
		Min	unit	Max	unit					
						30 kHz to 50 kHz	0.10 % + 6 μV			
						50 kHz to 100 kHz	0.078 % + 22 μV			
						100 kHz to 300 kHz	0.21 % + 60 μV			
						300 kHz to 500 kHz	0.80 % + 50 μV			
						500 kHz to 1 MHz	0.61 % + 0.4 mV			
		33 mV	up to	100 mV		10 Hz to 40 Hz	0.031 % + 4 μV			
						40 Hz to 10 kHz	0.028 % + 4 μV			
						10 kHz to 20 kHz	0.040 %			
						20 kHz to 30 kHz	0.041 % + 8 μV			
						30 kHz to 50 kHz	0.059 %			
						50 kHz to 100 kHz	0.078 % + 22 μV			
						100 kHz to 300 kHz	0.21 % + 60 μV			
						300 kHz to 500 kHz	0.41 %			
						500 kHz to 1 MHz	0.61 % + 0.4 mV			
		100 mV	up to	200 mV		10 Hz to 40 Hz	0.031 % + 4 μV			
						40 Hz to 20 kHz	0.024 %			
						20 kHz to 50 kHz	0.043 %			
						50 kHz to 100 kHz	0.078 % + 22 μV			
						100 kHz to 300 kHz	0.21 % + 60 μV			
						300 kHz to 500 kHz	0.27 %			
						500 kHz to 1 MHz	0.61 % + 0.4 mV			
		200 mV	up to	330 mV		10 Hz to 40 Hz	0.028 %			
						40 Hz to 20 kHz	0.024 %			
						20 kHz to 50 kHz	0.043 %			
						50 kHz to 100 kHz	0.058 %			
						100 kHz to 300 kHz	0.23 %			

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		Min	unit	Max	unit					
						300 kHz to 500 kHz	0.27 %			
						500 kHz to 1 MHz	1.4 %			
		330 mV	up to	500 mV		10 Hz to 40 Hz	0.028 %			
						40 Hz to 10 kHz	0.025 %			
						10 kHz to 20 kHz	0.037 %			
						20 kHz to 30 kHz	0.043 %			
						30 kHz to 50 kHz	0.045 %			
						50 kHz to 100 kHz	0.058 %			
						100 kHz to 300 kHz	0.23 %			
						300 kHz to 500 kHz	0.42 %			
						500 kHz to 1 MHz	1.4 %			
		0.5 V	up to	1 V		10 Hz to 40 Hz	0.023 %			
						40 Hz to 10 kHz	0.019 %			
						10 kHz to 30 kHz	0.033 %			
						30 kHz to 100 kHz	0.046 %			
						100 kHz to 300 kHz	0.18 %			
						300 kHz to 500 kHz	0.42 %			
						500 kHz to 1 MHz	1.2 %			
		1 V	up to	2 V		10 Hz to 40 Hz	0.021 %			
						40 Hz to 10 kHz	0.017 %			
						10 kHz to 20 kHz	0.025 %			
						20 kHz to 30 kHz	0.026 %			
						30 kHz to 50 kHz	0.035 %			
						50 kHz to 100 kHz	0.038 %			

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		Min	unit	Max	unit					
						100 kHz to 300 kHz	0.14 %			
						300 kHz to 500 kHz	0.30 %			
						500 kHz to 1 MHz	0.90 %			
		2 V	up to	3.3 V		10 Hz to 40 Hz	0.028 %			
						40 Hz to 10 kHz	0.021 %			
						10 kHz to 20 kHz	0.025 %			
						20 kHz to 50 kHz	0.035 %			
						50 kHz to 100 kHz	0.058 %			
						100 kHz to 300 kHz	0.23 %			
						300 kHz to 500 kHz	0.30 %			
						500 kHz to 1 MHz	1.4 %			
		3.3 V	up to	5 V		10 Hz to 40 Hz	0.028 %			
						40 Hz to 10 kHz	0.025 %			
						10 kHz to 20 kHz	0.042 %			
						20 kHz to 30 kHz	0.043 %			
						30 kHz to 50 kHz	0.053 %			
						50 kHz to 100 kHz	0.058 %			
						100 kHz to 300 kHz	0.23 %			
						300 kHz to 1 MHz	1.4 %			
		5 V	up to	10 V		10 Hz to 40 Hz	0.023 %			
						40 Hz to 10 kHz	0.019 %			
						10 kHz to 30 kHz	0.033 %			
						30 kHz to 100 kHz	0.046 %			
						100 kHz to 300 kHz	0.18 %			
						300 kHz to 1 MHz	1.2 %			

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		Min	unit	Max	unit					
		10 V	up to	20 V	10 Hz to 40 Hz	0.021 %				
					40 Hz to 10 kHz	0.017 %				
					10 kHz to 30 kHz	0.026 %				
					30 kHz to 100 kHz	0.038 %				
					100 kHz to 300 kHz	0.14 %				
					300 kHz to 1 MHz	0.90 %				
		20 V	up to	33 V	10 Hz to 40 Hz	0.028 %				
					40 Hz to 10 kHz	0.021 %				
					10 kHz to 20 kHz	0.030 %				
					20 kHz to 50 kHz	0.041 %				
					50 kHz to 100 kHz	0.060 %				
		33 V	up to	50 V	10 Hz to 40 Hz	0.028 %				
					40 Hz to 10 kHz	0.025 %				
					10 kHz to 30 kHz	0.043 %				
					30 kHz to 50 kHz	0.048 %				
					50 kHz to 100 kHz	0.060 %				
		50 V	up to	100 V	10 Hz to 40 Hz	0.023 %				
					40 Hz to 10 kHz	0.019 %				
					10 kHz to 30 kHz	0.033 %				
					30 kHz to 100 kHz	0.048 %				
		100 V	up to	200 V	10 Hz to 40 Hz	0.021 %				
					40 Hz to 10 kHz	0.017 %				
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		Min	unit	Max	unit					
		200 V	up to	330 V		45 Hz to 1 kHz	0.021 %			
						1 kHz to 10 kHz	0.026 %			
						10 kHz to 20 kHz	0.031 %			
						20 kHz to 50 kHz	0.036 %			
						50 kHz to 100 kHz	0.25 %			
		330 V	up to	500 V		45 Hz to 1 kHz	0.032 %			
						1 kHz to 5 kHz	0.028 %			
						5 kHz to 10 kHz	0.032 %			
						10 kHz to 30 kHz	0.050 %			
		500 V	up to	1,100 V		45 Hz to 1 kHz	0.033 %			
						1 kHz to 5 kHz	0.028 %			
						5 kHz to 10 kHz	0.033 %			
				10 kHz to 30 kHz	0.046 %					
		1.1 kV	up to	15 kV	generation and measurement	45 Hz to 65 Hz	0.10 %	comparison with a standard or direct measurement	MK10	
		15 kV	up to	30 kV		45 Hz to 65 Hz	0.50 %			
		30 kV	up to	100 kV		45 Hz to 65 Hz	0.80 %			
3*	Voltage harmonics	0.1 %	up to	100 % <sup>6</sup>	generation and measurement	3.3 V to 33 V <sup>5</sup> 45 Hz to 5 kHz	0.10 % <sup>6</sup> + 4 mV	direct measurement	MK9, MK11	
		0.1 %	up to	100 % <sup>6</sup>	generation and measurement	33 V to 330 V <sup>5</sup> 45 Hz to 440 Hz	0.20 % <sup>6</sup> + 20 mV			
		0.1 %	up to	30 % <sup>6</sup>		440 Hz to 660 Hz	0.25 % <sup>6</sup> + 20 mV			



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		Min	unit	Max	unit					
		0.1 %	up to	10 % <sup>6</sup>		660 Hz to 1.2 kHz	0.35 % <sup>6</sup> + 25 mV			
		0.1 %	up to	5 % <sup>6</sup>		1.2 kHz to 2.0 kHz	0.50 % <sup>6</sup> + 40 mV			
		0.1 %	up to	100 % <sup>6</sup>		330 V to 720 V <sup>5</sup>				
		0.1 %	up to	30 % <sup>6</sup>		45 Hz to 440 Hz	0.25 % <sup>6</sup> + 0.10 V			
		0.1 %	up to	30 % <sup>6</sup>		440 Hz to 660 Hz	0.25 % <sup>6</sup> + 0.10 V			
		0.1 %	up to	10 % <sup>6</sup>		660 Hz to 1.2 kHz	0.40 % <sup>6</sup> + 0.10 V			
		0.1 %	up to	5 % <sup>6</sup>		1.2 kHz to 2.0 kHz	0.60 % <sup>6</sup> + 0.16 V			
4*	HF Voltage	3.5 mV	up to	3.2 V	generation	1 kHz to 50 MHz	1.5 % + 35 μV	direct measurement (using a standard) of HF power on a 50 Ω coax. wire terminal	MK16	
		2.0 mV	up to	2.0 V		50 MHz to 100 MHz	1.5 % + 35 μV			
		2.0 mV	up to	1.0 V		100 MHz to 250 MHz	2.0 % + 35 μV			
		2.0 mV	up to	1.0 V		250 MHz to 300 MHz	2.0 % + 35 μV			
		2.0 mV	up to	0.50 V		300 MHz to 2 GHz	2.0 % + 35 μV			
		3.5 mV	up to	3.2 V	measurement	1 kHz to 50 MHz	2.0 % + 50 μV	direct measurement using an oscilloscope with a voltage probe	MK16	
		3.5 mV	up to	2.0 V		50 MHz to 300 MHz	3.0 % + 50 μV			
5*	Pulse voltage	1.8 mV	up to	2.2 V	generation and measurement	peak-to-peak value, rectangle, 50 Ω, width 50 μs to 50 ms	0.050 % + 20 μV	comparison using a digitizer or direct measurement using a digitizer	MK9, MK16	

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		Min	unit	Max	unit					
		2.2 V	up to	10 V	generation and measurement	peak-to-peak value, rectangle, 50 Ω, width 50 μs to 50 ms	0.050 %			
		1.8 mV	up to	55 V	generation and measurement	peak-to-peak value, rectangle, width 50 μs to 50 ms	0.050 % + 20 μV			
		95 V	up to	105 V	generation and measurement	peak-to-peak value, rectangle, width 0.5 ms to 5 ms	0.10 %			
		1 V	up to	1 kV	Measurement	peak value sine, half-sine, width > 5 ms	0.10 %	direct measurement using a digitizer	MK9	
		1 kV	up to	15 kV	Measurement	peak value sine, half-sine, width > 5 ms	0.50 %	direct measurement using a digitizer with a VN probe	MK10	
		10 V	up to	4 kV	Measurement	EFT pulse, 50 Ω rise time > 4 ns	3.0 %	direct measurement using an oscilloscope with a resistance divider	MK16	
		20 V	up to	8 kV	Measurement	EFT pulse, 1 kΩ rise time > 4 ns	4.0 %			
		10 V	up to	30 kV	Measurement	surge rise time > 50 ns	3.0 %	direct measurement using an oscilloscope with a voltage probe		

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		Min	unit	Max	unit					
6*	Direct current	0 nA	up to	20 nA		generation and measurement	0.60 % + 0.5 pA 0.25 %	Ohm method or direct measurement	MK4, MK8, MK9	
		20 nA	up to	1 µA						
		1 µA	up to	200 µA		generation and measurement	0.010 % + 2 nA 0.011 % 0.013 % 0.015 % 0.012 % 0.013 % 0.031 % 0.024 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
		200 µA	up to	20 mA						
	20 mA	up to	33 mA							
	33 mA	up to	50 mA							
50 mA	up to	200 mA								
200 mA	up to	330 mA								
330 mA	up to	500 mA								
0.5 A	up to	2 A								
		2.0 A	up to	3 A		generation and measurement	0.042 % 0.050 %	comparison or measurement with a shunt	MK4, MK8, MK9	
		3.0 A	up to	105 A						
		105 A	up to	5,000 A		Measurement	1.5 %	measurement using a current clamp	MK9	
	Clamp multimeters	1 A	up to	105 A		generation	0.50 %	direct measurement	MK4, MK8	
			105 A	up to	1,050 A			1.5 %		simulation using a coil 10 z.
7*	Alternating current	1 µA	up to	200 µA		generation and measurement	10 Hz to 5 kHz 0.042 % + 20 nA	comparison with a standard or direct measurement	MK4, MK8, MK9, MK11	
		29 µA	up to	330 µA						

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		Min	unit	Max	unit					
		200 µA	up to	500 µA	generation and measurement	10 Hz to 5 kHz	0.10 %	comparison with a standard or direct measurement	MK4, MK8, MK9, MK11	
		0.5 mA	up to	1 mA		10 Hz to 5 kHz	0.073 %			
		0.33 mA	up to	1 mA	generation	5 kHz to 10 kHz	0.59 %	direct measurement	MK4, MK8	
		1 mA	up to	2 mA	generation and measurement	10 Hz to 5 kHz	0.054 %	comparison with a standard or direct measurement	MK4, MK8, MK9, MK11	
		1 mA	up to	3.3 mA		generation	5 kHz to 10 kHz			0.53 %
		2 mA	up to	5 mA	generation and measurement	10 Hz to 5 kHz	0.10 %	comparison with a standard	MK4, MK8,	
		5 mA	up to	10 mA		10 Hz to 5 kHz	0.073 %			direct measurement
		3.3 mA	up to	10 mA	generation	5 kHz to 10 kHz	0.29 %	direct measurement	MK4, MK8	
		10 mA	up to	20 mA	generation and measurement	10 Hz to 5 kHz	0.054 %	comparison with a standard or direct measurement	MK4, MK8, MK9, MK11	
		20 mA	up to	33 mA		10 Hz to 45 Hz	0.10 %			
						45 Hz to 1 kHz	0.060 %			
						1 kHz to 5 kHz	0.10 %			
		10 mA	up to	33 mA	generation	5 kHz to 10 kHz	0.23 %	direct measurement	MK4, MK8	
		33 mA	up to	50 mA	generation and measurement	10 Hz to 5 kHz	0.10 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
			generation	5 kHz to 10 kHz		0.50 %	direct measurement			MK4, MK8

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		Min	unit	Max	unit					
		50 mA	up to	100 mA	generation and measurement	10 Hz to 5 kHz	0.073 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
					generation	5 kHz to 10 kHz	0.50 %	direct measurement	MK4, MK8	
		100 mA	up to	200 mA	generation and measurement	10 Hz to 5 kHz	0.054 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
					generation	5 kHz to 10 kHz	0.30 %	direct measurement	MK4, MK8	
		200 mA	up to	330 mA	generation and measurement	10 Hz to 45 Hz	0.12 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						45 Hz to 1 kHz	0.060 %			
						1 kHz to 5 kHz	0.15 %			
					generation	5 kHz to 10 kHz	0.30 %	direct measurement	MK4, MK8	
		330 mA	up to	500 mA	generation and measurement	10 Hz to 45 Hz	0.12 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						45 Hz to 1 kHz	0.080 %			
						1 kHz to 5 kHz	0.17 %			
					generation	5 kHz to 10 kHz	4.0 %	direct measurement	MK4, MK8	
		0.5 A	up to	1 A	generation and measurement	10 Hz to 1 kHz	0.070 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						1 kHz to 5 kHz	0.13 %			
generation	5 kHz to 10 kHz				4.0 %	direct measurement	MK4, MK8			

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		Min	unit	Max	unit					
		1 A	up to	2 A	generation and measurement	10 Hz to 45 Hz	0.10 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						45 Hz to 1 kHz	0.069 %			
						1 kHz to 5 kHz	0.10 %			
				generation		5 kHz to 10 kHz	3.0 %	direct measurement	MK4, MK8	
		2 A	up to	3 A	generation and measurement	10 Hz to 1 kHz	0.060 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						1 kHz to 5 kHz	0.10 %			
				generation		5 kHz to 10 kHz	3.0 %	direct measurement	MK4, MK8	
		3 A	up to	11 A	generation and measurement	45 Hz to 1 kHz	0.050 %	comparison with a standard or direct measurement	MK4, MK8, MK9	
						1 kHz to 5 kHz	0.10 %			
		11 A	up to	20.5 A	generation	65 Hz to 100 Hz	0.14 %	direct measurement	MK4, MK8	
				100 Hz to 1 kHz	0.20 %					
				1 kHz to 5 kHz	3.0 %					
		11 A	up to	105 A	generation and measurement	45 Hz to 65 Hz	0.070 %	measurement using a current transformer	MK4, MK8, MK9	
		105 A	up to	4,000 A	Measurement	45 Hz to 65 Hz	1.5 %	measurement using a current clamp	MK9	
Clamp multimeters		1 A	up to	105 A	generation	45 Hz to 65 Hz	0.25 %	direct measurement	MK4, MK8	
					generation	45 Hz to 65 Hz	1.5 %	simulation using a coil 10 z.		

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		Min	unit	Max	unit					
8*	Current harmonics	0.1 %	up to	100 % <sup>6</sup>	generation and measurement	33 mA to 330 mA <sup>5</sup> and: 45 Hz to 900 Hz	0.10% <sup>6</sup> + 0.1 mA	direct measurement	MK9, MK11	
				50 % <sup>6</sup>		900 Hz to 2 kHz	0.10% <sup>6</sup> + 0.1 mA			
				30 % <sup>6</sup>		2 kHz to 5 kHz	0.10% <sup>6</sup> + 0.1 mA			
		0.1 %	up to	100 % <sup>6</sup>	generation and measurement	330 mA to 3 A <sup>5</sup> and: 45 Hz to 900 Hz	0.10% <sup>6</sup> + 1.0 mA			
				20 % <sup>6</sup>		900 Hz to 2 kHz	0.10% <sup>6</sup> + 1.0 mA			
				20 % <sup>6</sup>		2 kHz to 5 kHz	0.20% <sup>6</sup> + 1.3 mA			
		0.1 %	up to	100 % <sup>6</sup>	generation and measurement	3 A to 20.5 A <sup>5</sup> and: 45 Hz to 900 Hz	0.10 % <sup>6</sup> + 10 mA			
				20 % <sup>6</sup>		900 Hz to 2 kHz	0.10 % <sup>6</sup> + 10 mA			
				20 % <sup>6</sup>		2 kHz to 5 kHz	0.20 % <sup>6</sup> + 10 mA			
9*	HF current	0.1 mA	up to	64 mA	generation	1 kHz to 50 MHz	1.5 % + 0.7 μA	indirect current measurement by a 50 Ω coax wire terminal	MK16	
				40 mA		50 MHz to 100 MHz	1.5 % + 0.7 μA			
		0.1 mA	up to	20 mA		100 MHz to 250 MHz	2.0 % + 0.7 μA			
				20 mA		250 MHz to 2 GHz	3.0 % + 0.7 μA			

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		Min	unit	Max	unit					
10*	Pulse current					generation and measurement	peak value rectangle or sine width > 5 ms	0.50 %	comparison using a digitizer or direct measurement using a digitizer	MK9, MK11
		1 mA	up to	10 A		Measurement	ESD pulse	5.0 %	direct measurement using an oscilloscope with ESD target	MK16
		0.2 A	up to	60 A		Measurement	surge rise time > 50 ns	3.0 % + 2 mA	measurement using an oscilloscope with a current probe	
		0.4 A	up to	500 A		Measurement	surge rise time > 1 μs	3.0 %	measurement using an oscilloscope with a shunt	
		50 A	up to	5 kA		measurement	rectangle pulse width > 5 ms	2.0 %	measurement using an oscilloscope with a current clamp	
11*	DC resistance	0.1 mΩ		± 5 %		generation		0.050 %	direct measurement	MK12
		1 mΩ		± 5 %		generation and measurement		0.0035 %	comparison with a standard or direct measurement	MK12, MK13
		10 mΩ		± 5 %			0.0018 %			
		100 mΩ		± 5 %			0.0022 %			
1 Ω		± 5 %		0.0018 %						
		0 mΩ	up to	20 Ω		generation and measurement		0.0019 % + 30 μΩ 0.0015 %	comparison with a standard or direct measurement	MK4, MK8, MK11, MK12, MK13
		20 Ω	up to	200 Ω						



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		Min	unit	Max	unit					
		200 Ω	up to	20 kΩ		0.0012 %				
		20 kΩ	up to	200 kΩ		0.0015 %				
		200 kΩ	up to	500 kΩ	generation and measurement	0.0028 %	comparison with a standard or direct measurement	MK4, MK8, MK11, MK13, MK14		
		500 kΩ	up to	2 MΩ		0.0025 %				
		2 MΩ	up to	5 MΩ		0.0078 %				
		5 MΩ	up to	20 MΩ		0.0058 %				
		20 MΩ	up to	33 MΩ		0.048 %				
		33 MΩ	up to	50 MΩ		0.059 %				
		50 MΩ	up to	200 MΩ		0.047 %				
		200 MΩ	up to	1 GΩ	generation and measurement	0.25 %	Ohm method or direct measurement	MK13, MK14		
		1 GΩ		± 5 %	generation and measurement	100 V to 1 kV	0.030 %	comparison with a standard or direct measurement	MK13, MK14	
		10 GΩ		± 5 %		100 V to 1 kV	0.20 %			
		100 GΩ		± 5 %		100 V to 1 kV	0.40 %			
		1 TΩ		± 5 %		100 V to 1 kV	0.50 %			
		10 TΩ		± 5 %	generation	100 V to 1 kV	1.5 %	direct measurement using a standard	MK14	
		100 TΩ		± 20 %		100 V to 1 kV	3.0 %			

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		Min	unit	Max	unit						
		1 GΩ	up to	5 GΩ		generation and measurement	100 V to 1 kV	0.25 %	Ohm method or direct measurement	MK13, MK14	
		5 GΩ	up to	11 GΩ			100 V to 500 V	0.60 %			
		1 GΩ	up to	11 GΩ			500 V to 1 kV	0.25 %			
		11 GΩ	up to	100 GΩ			1 kV to 5 kV	0.56 %			
						measurement	100 V to 5 kV	0.60 %	Ohm method	MK13	
12*	A.C. resistance					generation and measurement			comparison with a standard, direct measurement	MK15	
		0.1 Ω		± 5 %			1 kHz	0.50 %			
		1 Ω		± 5 %			1 kHz to 1 MHz	0.10 %			
		10 Ω		± 5 %			1 kHz to 1 MHz	0.050 %			
		100 Ω		± 5 %			1 kHz to 1 MHz	0.050 %			
		1 kΩ		± 5 %			1 kHz to 1 MHz	0.050 %			
		10 kΩ		± 5 %			1 kHz	0.050 %			
		100 kΩ		± 5 %			1 kHz to 1 MHz	0.10 %			
							1 kHz	0.050 %			
							1 kHz to 100 kHz	0.10 %			
13*	Capacity					generation and measurement			comparison with a standard, direct measurement	MK15	
		1 pF		± 5 %			1 kHz	0.050 %			
							1 kHz to 1 MHz	0.10 %			
		10 pF		± 5 %			1 kHz	0.030 %			
							1 kHz to 1 MHz	0.10 %			
		1 pF	up to	10 pF		measurement	1 kHz to 1 MHz	0.30 %	direct measurement using a RLC bridge		

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		Min	unit	Max	unit						
		100 pF		± 5 %		generation and measurement 1 kHz 1 kHz to 1 MHz	0.030 % 0.10 %	comparison with a standard or direct measurement			
		10 pF	up to	1 nF		measurement 1 kHz to 1 MHz	0.20 %				direct measurement using a RLC bridge
		1 nF		± 5 %		generation and measurement 1 kHz 1 kHz to 1 MHz	0.030 % 0.10 %				comparison with a standard or direct measurement
10 nF		± 5 %		1 kHz	0.030 %						
100 nF		± 5 %		1 kHz	0.030 %						
1 μF		± 5 %		100 Hz to 1 kHz	0.030 %						
1 nF	up to	1 μF		1 kHz	0.10 %						
		1 μF	up to	100 μF		100 Hz to 1 kHz	0.10 %				
14*	Capacity loss factor	0.00 up to 0.01				generation and measurement 10 kHz to 1 MHz 1 pF to 100 pF, 1 kHz	2.0 % + 0.0010	direct measurement of capacity and AC resistance combination	MK15		
		0.00 up to 1.6				1 pF, 10 kHz to 1 MHz 1 nF, 1 kHz	0.60 % + 0.0017 1.0 % + 0.0010				
						10 nF to 1 μF, 1 kHz 10 pF to 1 nF,	0.50 % + 0.0005 0.40 % + 0.0010				

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		Min	unit	Max	unit							
15*	Inductance					generation and measurement		comparison with a standard or direct measurement	MK15			
			2 mH		± 5 %						1 kHz	0.10 %
			5 mH		± 5 %						1 kHz	0.10 %
			10 mH		± 5 %						1 kHz	0.10 %
			20 mH		± 5 %						1 kHz	0.10 %
			50 mH		± 5 %						1 kHz	0.050 %
			100 mH		± 5 %						1 kHz	0.050 %
			200 mH		± 5 %						1 kHz	0.050 %
			500 mH		± 5 %						1 kHz	0.050 %
			1 H		± 5 %						1 kHz	0.050 %
			2 H		± 5 %						1 kHz	0.10 %
			5 H		± 5 %						1 kHz	0.10 %
			10 H		± 5 %						1 kHz	0.10 %
						generation		direct measurement of simulated inductors				
		100 μH		± 5 %	10 kHz to 1 MHz	0.50 %						
		100 mH		± 5 %	1 kHz to 100 kHz	0.20 %						
						measurement		direct measurement using a RLC bridge				
		1 mH	up to 10 mH		1 kHz	0.20 %						
		10 mH	up to 500 mH		1 kHz	0.10 %						
		500 mH	up to 5 H		1 kHz	0.20 %						
		5 H	up to 10 H		1 kHz	0.50 %						
16*	Network impedance meters	0.5 Ω	up to	20 kΩ	generation	50 Hz	0.10 % + 50 mΩ	direct measurement	MK11			

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		Min	unit	Max	unit					
17*	Meters of transition resistance					generation		direct measurement	MK11	
		1 mΩ		± 5 %		50 Hz	0.10 %			
		10 mΩ		± 5 %		50 Hz	0.10 %			
		100 mΩ		± 5 %		50 Hz	0.10 %			
18*	Impedance	0.1 Ω	up to	1 Ω		1 kHz	module 0.50 % phase 0.50°	direct measurement using a RLC bridge	MK15	
		1 Ω	up to	10 Ω		1 kHz	module 0.30 % phase 0.30°			
		10 Ω	up to	10 kΩ		1 kHz	module 0.10 % phase 0.20°			
		10 kΩ	up to	100 kΩ		1 kHz	module 0.20 % phase 0.20°			
		1 Ω	up to	10 Ω		1 kHz to 1 MHz	module 0.50 % phase 1.0°			
		10 Ω	up to	1 kΩ		1 kHz to 1 MHz	module 0.30 % phase 0.50°			
								measurement by a vector analyzer in the reference plane of a coax connector	MK16	
		40 Ω	up to	60 Ω		1 MHz to 2 GHz	module 2.0 % phase 2.0°			
								measurement by a vector analyzer on the terminals of an impedance element		
		20 Ω	up to	200 Ω		1 MHz to 400 MHz	module 6.0 % phase 5.0°			

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		Min	unit	Max	unit							
19*	A.C. power					generation	power factor 0 - 1 45 Hz to 65 Hz 30 V to 1020 V 3.3 mA to 0.15 A	0.12 % <sup>4</sup>	direct measurement	MK3, MK7		
		0 W	up to	153 W			3.3 V to 30 V 3.3 mA to 20.5 A	0.12 % <sup>4</sup>				
		0 W	up to	615 W			720 V to 1020 V 3.3 mA to 20.5 A	0.12 % <sup>4</sup>				
		0 W	up to	20.91 kW			generation and measurement	power factor 0 - 1, 45 Hz to 65 Hz, 30 V to 60 V a: 0.15 A to 0.30 A 0.30 A to 0.60 A 0.60 A to 1.3 A 1.3 A to 2.6 A 2.6 A to 5.2 A 5.2 A to 10 A 10 A to 20.5 A	7.4 mW 15 mW 30 mW 61 mW 0.12 W 0.24 W 0.49 W			comparison with a standard or direct measurement
		0 W	up to	1,230 W			generation and measurement	power factor 0 - 1, 45 Hz to 65 Hz, 60 V to 130 V a: 0.15 A to 0.30 A 0.30 A to 0.60 A 0.60 A to 1.3 A 1.3 A to 2.6 A 2.6 A to 5.2 A	15 mW 30 mW 63 mW 0.13 W 0.25 W			
		0 W	up to	2,665 W								

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		Min	unit	Max	unit					
						5.2 A to 10 A 10 A to 20.5 A	0.50 W 1.0 W			
		0 W	up to	5,535 W	generation and measurement	power factor 0 - 1, 45 Hz to 65 Hz, 130 V to 270 V a: 0.15 A to 0.30 A 0.30 A to 0.60 A 0.60 A to 1.3 A 1.3 A to 2.6 A 2.6 A to 5.2 A 5.2 A to 10 A 10 A to 20.5 A	31 mW 62 mW 0.13 W 0.26 W 0.51 W 1.0 W 2.1 W			
		0 W	up to	11.48 kW	generation and measurement	power factor 0 - 1, 45 Hz to 65 Hz, 270 V to 560 V a: 0.15 A to 0.30 A 0.30 A to 0.60 A 0.60 A to 1.3 A 1.3 A to 2.6 A 2.6 A to 5.2 A 5.2 A to 10 A 10 A to 20.5 A	63 mW 0.13 W 0.26 W 0.52 W 1.0 W 2.0 W 4.2 W			
		0 W	up to	14.76 kW	generation and measurement	power factor 0 - 1, 45 Hz to 65 Hz, 560 V to 720 V a: 0.15 A to 0.30 A	0.11 W			

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		Min	unit	Max	unit					
						0.30 A to 0.60 A 0.60 A to 1.3 A 1.3 A to 2.6 A 2.6 A to 5.2 A 5.2 A to 10 A 10 A to 20.5 A	0.21 W 0.44 W 0.88 W 1.8 W 3.5 W 7.1 W			
		0 W	up to	86.4 kW	measurement	power factor 0 - 1, 45 Hz to 65 Hz, 6 V to 720 V a: 20.5 A to 120 A	0.18 % <sup>4</sup>	measurement by a wattmeter with a current transformer		
20*	Power factor	0.0	up to	0.8	generation and measurement	45 Hz to 65 Hz 45 Hz to 65 Hz	0.0012 0.0007	direct measurement	MK3, MK7	
21*	Flicker	1 Pst	up to	5 Pst	generation	carrier voltage: 30 V to 300 V/50 Hz or 60 Hz CPM <sup>7</sup> : 1, 2, 7, 39, 110, 1620 and 4000 rectangle modulating signal, $\Delta V/V$ : max. 7.295 %	1.0 %	direct measurement	MK11	
22*	HF power	0.2 nW	up to	200 mW	measurement	9 kHz to 100 MHz 100 MHz to 4 GHz 4 GHz to 6 GHz, ref. plane of N connector <sup>8</sup> 50 $\Omega$	1.3 % + 0.1 nW 1.5 % + 0.1 nW 1.9 % + 0.1 nW	direct measurement	MK16, MK17	



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		Min	unit	Max	unit					
		20 pW	up to	20 nW		generation 9 kHz to 100 MHz 100 MHz to 4 GHz 4 GHz to 6 GHz, ref. plane of N connector <sup>8</sup> 50 Ω	1.8 % + 10 pW 2.1 % + 10 pW 2.5 % + 10 pW	comparison with a standard using a symmetrical divider with an attenuator		
		20 nW	up to	5 mW		generation 9 kHz to 100 MHz 100 MHz to 4 GHz 4 GHz to 6 GHz ref. plane of N connector <sup>8</sup> 50 Ω	1.3 % + 0.1 nW 1.5 % + 0.1 nW 2.0 % + 0.1 nW	comparison with a standard using a symmetrical divider		
		5 mW	up to	200 mW		generation 9 kHz to 50 MHz 50 MHz to 100 MHz 100 MHz to 250 MHz 250 MHz to 300 MHz impedance 50 Ω	1.5 % 1.3 % 1.5 % 1.5 %	comparison with a standard		
23*	Reflection coefficient module r			0		generation 300 kHz to 6 GHz ref. plane of N connector <sup>8</sup> 50 Ω	0.008	direct measurement	MK16	

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		Min	unit	Max	unit					
		0	up to	1		measurement				
						300 kHz to 1 MHz	$0.015 + 0.03 \cdot r^2$	indirect measurement on a ref. connector of a directional coupler		
						1 MHz to 2 GHz	$0.009 + 0.03 \cdot r^2$			
						2 GHz to 3 GHz	$0.009 + 0.06 \cdot r^2$			
						3 GHz to 4 GHz				
						ref. plane of N connector <sup>8</sup> 50 Ω	$0.030 + 0.06 \cdot r^2$			

<sup>1</sup>) Asterisk at the ordinal number identifies the calibrations, which the Laboratory is qualified to carry out outside the permanent laboratory premises.

<sup>2</sup>) The expanded measurement uncertainty is in accordance with ILAC-P14 and EA-4/02, part of CMC, and it is the lowest value of the respective uncertainty. If not stated otherwise, its coverage probability is approx. 95 %. If not stated otherwise, the uncertainty values stated without a unit are relative to the value measured. If the calibration is carried out outside the laboratory premises, the measurement uncertainty may be affected.

<sup>3</sup>) If the document identifying the calibration procedure is dated, only these specific procedures are used. If the document identifying the calibration procedure is not dated, the latest edition of the specified procedure is used (including any changes).

<sup>4</sup>) Apparent power percentage.

<sup>5</sup>) Signal composed of basic harmonics 45 Hz to 65 Hz and defined harmonics.

<sup>6</sup>) Basic harmonics percentage.

<sup>7</sup>) CPM: number of changes per minute (ČSN EN 61000-4-15).

<sup>8</sup>) For other than N connector, the measurement uncertainty is higher.

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**CMC for the field of measured quantity: Optical quantities**

Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace
		min.	unit	max.	unit					
1	Luminous intensity	1 cd	up to	10,000 cd		1.3 %	comparison with standards on a photometric bench	MK22		
2	Luminous flux	50 lm	up to	20,000 lm		1.3 %	comparison with standards in a ball integrator	MK23		
3	Chromatic temperature	2,000 K	up to	2,900 K		40 K	comparison with standards using filters	MK24		
4	Illuminance	1 lx	up to	300 lx		1.2 %	measurement of standards on a photometric bench	MK25		
		300 lx 10 klx	up to	10,000 lx 50 klx		1.5 % 2.0 %	comparison with a standard on a photometric bench			
5	Brightness	5 cd/m <sup>2</sup>	up to	500 cd/m <sup>2</sup>		2.0 %	measurement of illuminance – brightness transducer	MK26		
		500 cd/m <sup>2</sup>	up to	700 cd/m <sup>2</sup>		3.0 %				
		900 cd/m <sup>2</sup>		± 10 %		2.5 %	measurement of brightness standard			

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<sup>3)</sup> If the document identifying the calibration procedure is dated, only these specific procedures are used. If the document identifying the calibration procedure is not dated, the latest edition of the specified procedure is used (including any changes).

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**CMC for the field of measured quantity: Time and frequency quantities**

Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace
		min.	unit	Max	unit					
1*	Frequency	0.1 Hz	up to	6 GHz	generation and measurement time interval 10 s	$1 \cdot 10^{-7}$	comparison with a standard or direct measurement	MK8, MK17		
	Functional test of a counter	0.1 Hz 225 MHz 3 GHz	up to up to up to	225 MHz 3 GHz 6 GHz	time interval 10 s	$2 \cdot 10^{-9}$ $4 \cdot 10^{-9}$ $5 \cdot 10^{-9}$	comparison with a standard, with external reference connected	MK17		
	Bandwidth	100 Hz 100 MHz 300 MHz 2 GHz	up to up to up to up to	100 MHz 300 MHz 2 GHz 6 GHz	for drop -3 dB	3 % 4 % 6 % 8 %	comparison with a voltage or power standard	MK16		
2*	Time interval T	5 ns	up to	$10^5$ s	generation and measurement actuation by voltage manual actuation	$(0.9 + 100 \cdot T)$ ns	comparison with a standard or direct measurement	MK18		
		5 s	up to	$10^5$ s		0.05 s				
	Time interval T	0.6 ns	up to	100 s	generation and measurement impulse parameters	0.20 % + 0.07 ns	comparison with an oscilloscope or direct measurement	MK11, MK16		
		2 ns	up to	100 s	generation time stamps	0.0025 %	direct measurement	MK16		

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Ord. number <sup>1</sup>	Calibrated quantity / Subject of calibration	Nominal range				Parameter(s) of the meas. quantity	Lowest expanded measurement uncertainty specified <sup>2</sup>	Calibration principle	Calibration procedure identification <sup>3</sup>	Workplace
		min.	unit	Max	unit					
3*	Rotational speed	30 min <sup>-1</sup>	up to	500 min <sup>-1</sup>	generation and measurement	optical or mechanical sensor time interval 10 s	0.10 %	comparison with a standard or direct measurement	MK19	
				500 min <sup>-1</sup>			up to			
		5 min <sup>-1</sup>	up to	100,000 min <sup>-1</sup>	electrical input	0.0020 %	electrical simulation			

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