

Electricity and Magnetism, Panama, CENAMEP AIP (Centro Nacional de Metrología de Panamá AIP)



Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							NMI service identifier	Comments
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one ?	Uncertainty matrix			
DC voltage meters: intermediate values	Multimeter	Direct comparison	0.1	1000	V			10 to 14	μV/V	2	95%	Yes	<a href="#">Matrix 1a</a>	CMP-E4-S001	Approved on 04 April 2017	
DC resistance meters: intermediate values	Multimeter	Direct comparison	1	1E+08	Ω	Resistance	1 Ω, 10 Ω, 19 Ω, 100 Ω, 190 Ω, 1 kΩ, 1.9 kΩ, 10 kΩ, 19 kΩ, 100 kΩ, 190 kΩ, 1 MΩ, 1.9 MΩ, 10 MΩ, 19 MΩ, 100 MΩ	15 to 210	μΩ/Ω	2	95%	Yes	<a href="#">Matrix 2a</a>	CMP-E4-S001	Approved on 04 April 2017	
DC current meters : intermediate values	Multimeter	Direct comparison	1E-04	2	A			55 to 120	μA/A	2	95%	Yes	<a href="#">Matrix 3a</a>	CMP-E4-S001	Approved on 04 April 2017	
AC voltage up to 1100 V: meters	Multimeter	Direct comparison	0.1	700	V	Frequency	60 Hz to 10 kHz	70 to 185	μV/V	2	95%	Yes	<a href="#">Matrix 5a</a>	CMP-E4-S001	Approved on 04 April 2017	
AC current up to 100 A: meters	Multimeter	Direct comparison	0.1	2	A	Frequency	60 Hz to 5 kHz	200 to 325	μA/A	2	95%	Yes	<a href="#">Matrix 6a</a>	CMP-E4-S001	Approved on 04 April 2017	
AC power and energy: single phase (f <= 400 Hz), active energy	Energy meter	Direct comparison	0.5	400	Wh	Voltage	120 V to 240 V	95	μWh/VAh	2	95%	Yes		CMP-E2-S001; CMP-E2-S002; CMP-E2-S003; CMP-E0-S012; CMP-E0-S013	Approved on 04 April 2017	
						Current	0.5 A to 100 A									
						Frequency	50 Hz to 60 Hz									
						Power Factor	1, 0.5 inductive, 0.5 capacitive									
						Measuring time	60 s									
AC power and energy: three phase, active energy	Energy meter	Direct comparison	1.5	1200	Wh	Voltage	120 V to 240 V	100	μWh/VAh	2	95%	Yes		CMP-E2-S001; CMP-E2-S002; CMP-E2-S003; CMP-E0-S012; CMP-E0-S013	Approved on 04 April 2017	
						Current	0.5 A to 100 A									
						Frequency	50 Hz to 60 Hz									
						Power Factor	1, 0.5 inductive, 0.5 capacitive									
						Measuring time	60 s									

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**Matrix 1a**

	Expanded uncertainty in $\mu\text{V/V}$
0.1 V to 1 V	14
> 1 V to 1000 V	10

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**Matrix 2a**

	Expanded uncertainty in $\mu\Omega/\Omega$
1 $\Omega$	210
1.9 $\Omega$	175
10 $\Omega$	45
19 $\Omega$	35
100 $\Omega$	15
190 $\Omega$	15
1 k $\Omega$	15
1.9 k $\Omega$	15
10 k $\Omega$	15
19 k $\Omega$	25
100 k $\Omega$	15
190 k $\Omega$	20
1 M $\Omega$	25
1.9 M $\Omega$	65
10 M $\Omega$	130
19 M $\Omega$	155
100 M $\Omega$	140

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**Matrix 3a**

	Expanded uncertainty in $\mu\text{A}/\text{A}$
100 $\mu\text{A}$ to 200 $\mu\text{A}$	120
> 0.2 mA to 1 mA	80
> 1 mA to 100 mA	55
> 100 mA to 200 mA	70
> 0.2 A to 2 A	100

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**Matrix 5a**

	60 Hz	1 kHz	10 kHz
100 mV	185	185	185
500 mV	85	85	85
1 V	70	70	70
3 V	-	85	-
5 V	85	85	85
7 V	-	70	-
10 V	100	70	70
50 V	85	85	85
100 V	80	80	80
300 V	110	110	-
500 V	100	100	-
700 V	100	100	-

The expanded uncertainty given in this table is expressed in  $\mu\text{V/V}$

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**Matrix 6a**

	60 Hz	1 kHz	5 kHz
100 mA	300	225	300
200 mA	225	200	275
1 A	325	325	-
2 A	315	315	-

The expanded uncertainty given in this table is expressed in  $\mu\text{A/A}$