

## Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)



Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty						Comments	NMI Service Identifier
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 sources: single values	Solid state voltage standard	Differential method of comparison	1	10	V	Fixed voltage	1 V, 1.018 V, 10 V	2.0 to 0.8	$\mu\text{V/V}$	2	95%	Yes	<a href="#">DCV_1.1.1</a>	Approved on 06 August 2013	1
DC voltage sources: low values	DC voltage source, multifunction calibrator	Comparison with standard	0.01	10	V			3.6 to 0.9	$\mu\text{V/V}$	2	95%	Yes	<a href="#">DCVcal-1</a>	Approved on 06 August 2013	4
DC voltage sources: intermediate values	DC voltage source, multifunction calibrator	Comparison with standard	10	1100	V			0.9 to 1.7	$\mu\text{V/V}$	2	95%	Yes	<a href="#">DCVcal-2</a>	Approved on 06 August 2013	5
DC voltage meters: intermediate values	DC voltmeter, multimeter, MTS	Direct measurement	0.01	1100	V			43 to 2.1	$\mu\text{V/V}$	2	95%	Yes	<a href="#">DCVmet-1</a>	Uncertainty is not varying linearly within the range Approved on 06 August 2013	8
DC resistance standards and sources: low values	Fixed resistor: $R$	Comparison by means of current comparator bridge	0.0001	1	$\Omega$	$R$	decade values	0.2 to 9	$\mu\Omega/\Omega$	2	95%	Yes	<a href="#">DCR-1</a>	Measurements only at 23 °C in oil bath Approved on 06 August 2013	71
DC resistance standards and sources: low values	Resistance box	Direct measurement	0.01	1	$\Omega$			290 to 41	$\mu\Omega/\Omega$	2	95%	Yes	<a href="#">DCRb-1</a>	Measurements in air Approved on 06 August 2013	72
DC resistance standards and sources: intermediate values	Fixed resistor: $R$	Comparison by means of current comparator bridge and automated high resistance bridge	10	1E+06	$\Omega$	$R$	decade values, 25 $\Omega$	0.3 to 1.8	$\mu\Omega/\Omega$	2	95%	Yes	<a href="#">DCR-2</a>	Measurements only at 23 °C in oil bath up to 10 k $\Omega$ and in air bath for 100 k $\Omega$ and 1 M $\Omega$ Approved on 06 August 2013	73
DC resistance standards and sources: intermediate values	Resistance box	Direct measurement	2	1E+06	$\Omega$			11 to 24	$\mu\Omega/\Omega$	2	95%	Yes	<a href="#">DCRb-2</a>	Measurements in air Approved on 06 August 2013	74

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DC resistance standards and sources: high values	Fixed resistor: <i>R</i>	Comparison by means of automated high resistance bridge	1E+07	1E+09	Ω	<i>R</i>	decade values	3.2 to 110	μΩ/Ω	2	95%	Yes	<a href="#">DCR-3</a>	Measurements only at 23 °C in air bath Approved on 06 August 2013	75
DC resistance standards and sources: high values	Fixed resistor, three terminal resistor: <i>R</i>	Comparison by means of electrometer	1E+10	1E+14	Ω	<i>R</i>	decade values	1000 to 6000	μΩ/Ω	2	95%	Yes	<a href="#">DCR-4</a>	Measurements only at 23 °C in air bath, voltage: 500 V, 1000 V Approved on 06 August 2013	76
DC resistance standards and sources: high values	Resistance box	Direct measurement, method of substitution	2E+06	1E+10	Ω			22 to 600	μΩ/Ω	2	95%	Yes	<a href="#">DCRb-3</a>	Measurements in air Approved on 06 August 2013	77
DC resistance standards and sources: standards for high current	DC shunt	Indirect measurement with current calibrator and voltmeter	10	10	mΩ	Maximum current	10 A	26	μΩ/Ω	2	95%	Yes		Measurements only at 23 °C in oil or air bath Approved on 06 August 2013	78
DC resistance standards and sources: multiple ranges	Multifunction calibrator: <i>R</i>	Comparison by means of current comparator bridge and automated high resistance bridge	1	1E+08	Ω	<i>R</i>	decade values and divisible by 1.9	1 to 55	μΩ/Ω	2	95%	Yes	<a href="#">DCRcal</a>	Approved on 06 August 2013	79
DC resistance meters: low values	Microohmmeter, multimeter: <i>R</i>	Direct measurement	0.0001	1	Ω	<i>R</i>	decade values	120 to 3.0	μΩ/Ω	2	95%	Yes	<a href="#">DCRmet-1</a>	Approved on 06 August 2013	80
DC resistance meters: intermediate values	Ohmmeter, multimeter, multifunction transfer standard: <i>R</i>	Direct measurement	1	1E+09	Ω	<i>R</i>	decade values	0.4 to 400	μΩ/Ω	2	95%	Yes	<a href="#">DCRmet-2</a>	Approved on 06 August 2013	81
DC resistance meters: high values	Teraohmmeter, electrometer: <i>R</i>	Direct measurement	1E+10	1E+14	Ω	<i>R</i>	decade values	1100 to 6300	μΩ/Ω	2	95%	Yes	<a href="#">DCRmet-3</a>	Approved on 06 August 2013	82

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty						Comments	NMI Service Identifier
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 current sources: low values	Current generator, multifunction calibrator	Voltage drop across standard resistor	1E-05	1E-04	A			11 to 7	μA/A	2	95%	Yes		Approved on 06 August 2013	10
DC current sources: intermediate values	Current generator, multifunction calibrator	Voltage drop across standard resistor	1E-04	10	A			6 to 10	μA/A	2	95%	Yes	<a href="#">DCIcal</a>	Approved on 06 August 2013	11
DC current meters: low values	Multimeter, multifunction transfer standard	Direct measurement with calibrator	1E-05	1E-04	A			28 to 8	μA/A	2	95%	Yes		Approved on 06 August 2013	15
DC current meters: intermediate values	Multimeter, multifunction transfer standard	Direct measurement with calibrator	1E-04	2	A			8 to 53	μA/A	2	95%	Yes	<a href="#">DCImet</a>	Approved on 06 August 2013	16
AC resistance, resistors for high current	AC current shunt	Indirect measurement with current calibrator and voltmeter	10	10	mΩ	Frequency	50 Hz, 1 kHz	250 to 760	μΩ/Ω	2	95%	Yes	<a href="#">ACR-shunt</a>	Approved on 06 August 2013	83
						Current	2 A to 10 A								
Capacitance: low loss capacitors	Standard capacitors	Comparison with capacitance bridge	0.001	4	nF	Frequency	1 kHz	3E-06 to 5E-04	F/F	2	95%	Yes	<a href="#">C_low loss</a>	Uncertainty is not varying linearly within the range. Approved on 06 August 2013	24
Capacitance: dielectric capacitors	Fixed capacitors	Comparison with capacitance bridge	0.01	1	μF	Frequency	1 kHz	3E-04 to 5E-04	F/F	2	95%	Yes		Uncertainty is not varying linearly within the range. Approved on 06 August 2013	25
Inductance: self inductance, low values	Fixed inductors	Comparison with inductance bridge	0.01	1	mH	Frequency	1 kHz	2E-02 to 3E-04	H/H	2	95%	Yes		Uncertainty is not varying linearly within the range. Approved on 06 August 2013	26

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty						Comments	NMI Service Identifier
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		
Inductance: self inductance, intermediate values	Fixed inductors	Comparison with inductance bridge	0.001	1	H	Frequency	1 kHz	5E-05 to 4E-04	H/H	2	95%	Yes	<a href="#">L intermediate</a>	Only for standards with shielded coils. Uncertainty is not varying linearly within the range. Approved on 06 August 2013	29
AC voltage: AC-DC transfer difference at medium voltages	AC-DC transfer standard	Comparison	0.5	2	V	Frequency	10 Hz to 100 kHz	17 to 42	µV/V	2	95%	Yes	<a href="#">AC-DC difference at voltage</a>	Approved on 06 August 2013	30
AC voltage: AC-DC transfer difference at higher voltages	AC-DC transfer standard	Comparison	10	50	V	Frequency	10 Hz to 100 kHz	15 to 54	µV/V	2	95%	Yes	<a href="#">AC-DC difference at voltage</a>	Approved on 06 August 2013	31
AC voltage up to 1000 V: sources	Multifunction calibrator	Comparison to reference standard with inductive divider	2	200	mV	Frequency	45 Hz to 1 kHz	45 to 270	µV/V	2	95%	Yes	<a href="#">ACV calibrator</a>	Approved on 06 August 2013	32
AC voltage up to 1000 V: sources	Multifunction calibrator	AC-DC transfer	0.25	1000	V	Frequency	10 Hz to 100 kHz	20 to 70	µV/V	2	95%	Yes	<a href="#">ACV calibrator</a>	Approved on 06 August 2013	34
AC voltage up to 1000 V: meters	AC voltmeter, multimeter, multifunction transfer standard	Direct with calibrator	0.01	1000	V	Frequency	10 Hz to 100 kHz	30 to 560	µV/V	2	95%	Yes	<a href="#">ACV multimeter</a>	Approved on 06 August 2013	39
AC current: AC-DC transfer difference	AC-DC transfer standard plus shunt	Comparison	0.0025	1	A	Frequency	55 Hz to 5 kHz	25 to 120	µA/A	2	95%	Yes	<a href="#">AC-DC difference at current</a>	Approved on 06 August 2013	47
AC current: AC-DC transfer difference	AC-DC transfer standard plus shunt	Comparison	2	10	A	Frequency	55 Hz to 20 kHz	64 to 150	µA/A	2	95%	Yes	<a href="#">AC-DC difference at current</a>	Approved on 06 August 2013	48
AC current up to 100 A: sources	Multifunction calibrator, transconductance amplifier	AC-DC transfer	0.002	10	A	Frequency	10 Hz to 20 kHz	30 to 190	µA/A	2	95%	Yes	<a href="#">ACI calibrator</a>	Approved on 06 August 2013	49

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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		
AC current up to 100 A: sources	Multifunction calibrator, transconductance amplifier	AC-DC transfer	10	20	A	Frequency	55 Hz to 1 kHz	360 to 390	μA/A	2	95%	Yes	<a href="#">ACI calibrator</a>	Approved on 06 August 2013	50
AC current up to 100 A: meters	AC ammeter, multimeter, multifunction transfer standard	Direct with calibrator	0.002	2	A	Frequency	10 Hz to 5 kHz	80 to 650	μA/A	2	95%	Yes	<a href="#">ACI multimeter</a>	Approved on 06 August 2013	51
AC power and energy: single phase (frequencies below or equal to 400 Hz): active power	Power meter, power converter, power comparator, wattmeter, power calibrator	Direct comparison	0	48000	W	Voltage	10 V to 480 V	16 to 150	μW/VA	2	95%	Yes	<a href="#">2W-a</a>	Approved on 06 August 2013	52
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
AC power and energy: single phase (frequencies below or equal to 400 Hz): reactive power	Power meter, power converter, power comparator	Direct comparison	0	48000	var	Voltage	10 V to 480 V	16 to 60	μvar/VA	2	95%	Yes	<a href="#">2W-r</a>	Approved on 06 August 2013	84
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
AC power and energy: single phase (frequencies below or equal to 400 Hz): apparent power	Power meter, power converter, power comparator, power calibrator	Direct comparison	0.02	48000	VA	Voltage	10 V to 480 V	16 to 150	μVA/VA	2	95%	Yes	<a href="#">2W-app</a>	Approved on 06 August 2013	85
						Current	0.002 A to 100 A								
						Frequency	46 Hz to 65 Hz								

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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			
						Power factor	1 to 0 inductive or capacitive									
						Frequency	46 Hz to 65 Hz									
AC power and energy: single phase (frequencies below or equal to 400 Hz): active energy	Energy meter	Direct comparison	0	4800000	Ws	Voltage	10 V to 480 V	16 to 60	μWs/VAs	2	95%	Yes	<a href="#">2W-a</a>	Approved on 06 August 2013	56	
						Current	0.002 A to 100 A									
						Power factor	1 to 0 inductive or capacitive									
						Measuring time	1 s to 100 s									
						Frequency	46 Hz to 65 Hz									
AC power and energy: single phase (frequencies below or equal to 400 Hz): reactive energy	Energy meter	Direct comparison	0	4800000	vars	Voltage	10 V to 480 V	16 to 60	μvars/VAs	2	95%	Yes	<a href="#">2W-r</a>	Approved on 06 August 2013	86	
						Current	0.002 A to 100 A									
						Power factor	1 to 0 inductive or capacitive									
						Measuring time	1 s to 100 s									
						Frequency	46 Hz to 65 Hz									
AC power and energy: three phase: active power	Power meter, power converter, power comparator, wattmeter, power calibrator	Direct comparison	0	144000	W	Voltage	10 V to 480 V	16 to 170	μW/VA	2	95%	Yes	<a href="#">3phase</a>	Approved on 06 August 2013	87	
						Current	0.002 A to 100 A									
						Power factor	1 to 0 inductive or capacitive									
						Frequency	46 Hz to 65 Hz									

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AC power and energy: three phase: reactive power	Power meter, power converter, power comparator	Direct comparison	0	144000	var	Voltage	10 V to 480 V	16 to 140	μvar/VA	2	95%	Yes	<a href="#">3phase</a>	Approved on 06 August 2013	88
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
						Frequency	46 Hz to 65 Hz								
AC power and energy: three phase: apparent power	Power meter, power converter, power comparator, power calibrator	Direct comparison	0.06	144000	VA	Voltage	10 V to 480 V	16 to 170	μVA/VA	2	95%	Yes	<a href="#">3phase</a>	Approved on 06 August 2013	89
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
						Frequency	46 Hz to 65 Hz								
AC power and energy: three phase: active energy	Energy meter	Direct comparison	0	14400000	Ws	Voltage	10 V to 480 V	16 to 140	μWs/VAs	2	95%	Yes	<a href="#">3phase</a>	Approved on 06 August 2013	60
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
						Measuring time	1 s to 100 s								
AC power and energy: three phase: reactive energy	Energy meter	Direct comparison	0	14400000	vars	Voltage	10 V to 480 V	16 to 140	μvars/VAs	2	95%	Yes	<a href="#">3phase</a>	Approved on 06 August 2013	62
						Current	0.002 A to 100 A								
						Power factor	1 to 0 inductive or capacitive								
						Measuring time	1 s to 100 s								
						Frequency	46 Hz to 65 Hz								

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High DC voltage: high voltage sources	DC kilovolt source	Direct measurement with reference kilovoltmeter	1	200	kV			12 to 40	mV/V	2	95%	Yes	<a href="#">DC HVs</a>	Approved on 06 August 2013	90
High DC voltage: meters	DC kilovoltmeters	Comparison	0.2	100	kV			0.1 to 0,7	kV	2	95%	No	<a href="#">DC kVms</a>	Approved on 06 August 2013	63
High DC voltage: ratios	High voltage resistive divider, DC high voltage probe	Comparison with reference divider	1E-05	1		Input voltage	-100 kV to 200 kV	2E-04		2	95%	Yes		Approved on 06 August 2013	91
AC high voltage: sources	High voltage AC source	Direct measurement with reference kilovoltmeter	1	200	kV	Frequency	20 Hz to 1 kHz	13 to 40	mV/V	2	95%	Yes	<a href="#">AC HVs</a>	Approved on 06 August 2013	92
AC high voltage: meters	AC high voltage meter: rms value	Comparison with reference kilovoltmeter	2	100	kV	Frequency	50 Hz	12	mV/V	2	95%	Yes		Sine wave only Approved on 06 August 2013	93
AC high voltage: meters	AC high voltage measuring system: rms value	Comparison with reference measuring system	2	100	kV	Frequency	50 Hz	0.3	mV/V	2	95%	Yes		Sine wave only Approved on 06 August 2013	94
AC high voltage: ratio error	Voltage transformer	Comparison with reference standard	-0.2	0.2	%	Primary voltage	2 kV to 100 kV	0.009	%	2	95%	No		Approved on 06 August 2013	95
						Secondary voltage	15 V to 120 V								
						Frequency	50 Hz								
AC high voltage: ratio: phase displacement	Voltage transformer	Comparison with reference standard	-20	20	mrad	Primary voltage	2 kV to 100 kV	0.09	mrad	2	95%	No		Approved on 06 August 2013	96
						Secondary voltage	15 V to 120 V								
						Frequency	50 Hz								
High AC current and current transformers: current transformers: ratio error	Current transformer	Comparison with standard current transformer	-0.2	0.2	%	Primary	0.1 A to 5 A	0.005	%	2	95%	No		Approved on 06 August 2013	66



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						Secondary	1 A or 5 A								
						Frequency	50 Hz								
High AC current and current transformers: current transformers: ratio error	Current transformer	Comparison with standard current transformer	-0.2	0.2	%	Primary	5 A to 5000 A	0.003 to 0.005	%	2	95%	No		Approved on 06 August 2013	67
						Secondary	1 A or 5 A								
						Frequency	50 Hz								
High AC current and current transformers: current transformers: phase displacement	Current transformer	Comparison with standard current transformer	-20	20	mrad	Primary	0.1 A to 5 A	0.09	mrad	2	95%	No		Approved on 06 August 2013	68
						Secondary	1 A or 5 A								
						Frequency	50 Hz								
High AC current and current transformers: current transformers: phase displacement	Current transformer	Comparison with standard current transformer	-20	20	mrad	Primary	5 A to 5000 A	0.04 to 0.07	mrad	2	95%	No		Approved on 06 August 2013	69
						Secondary	1 A or 5 A								
						Frequency	50 Hz								
Magnetic fields below 50 kHz: DC magnetic flux density	Magnetic flux density meter, magnetic field strength meter	Nuclear magnetic resonance: free precession	0.05	1.2	T	Field inhomogeneity, $x = (0 \pm 1) \text{ cm}$	0.01 %	5E-05 to 1E-04	T	2	95%	No		Approved on 06 August 2013	70
						Electro magnet current	0.5 A to 25 A								
						NMR frequency	2 MHz to 25 MHz								
						Maximum current	10 A								

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**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCV\_1.1.1**

	Expanded uncertainty
1 V	2
1.018 V	2
10 V	0.8

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$ .

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCVcal-1**

	Expanded uncertainty
10 mV to 100 mV	3.6 to 2.0
0.1 V to 10 V	2.0 to 0.9

The expanded uncertainties given in this table are expressed in  $\mu\text{V}/\text{V}$ .

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCVcal-2**

	Expanded uncertainty
10 V to 200 V	0.9 to 1.2
200 V to 1100 V	1.7

The expanded uncertainties given in this table are expressed in  $\mu\text{V}/\text{V}$ .

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCVmet-1**

	Expanded uncertainty	Reference standard used in calibration
10 mV to 1 V	43 to 3.4	Calibrator
1 V to 1100 V	2.1 to 7	Calibrator
1 V	2.9	Solid state voltage standard
10 V	2.1	Solid state voltage standard

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$ .

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCR-1**

	Expanded uncertainty
0.0001 $\Omega$	9.0
0.001 $\Omega$	4.5
0.01 $\Omega$	1.5
0.1 $\Omega$	0.5
1 $\Omega$	0.2

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRb-1**

	Expanded uncertainty
0.01 $\Omega$ to 0.1 $\Omega$	120 to 93
0.2 $\Omega$ to 1 $\Omega$	290 to 41

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$



**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCR-2**

	Expanded uncertainty
10 $\Omega$	0.3
25 $\Omega$	0.3
100 $\Omega$	0.3
1 k $\Omega$	0.3
10 k $\Omega$	0.41
100 k $\Omega$	1.0
1 M $\Omega$	1.8

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRb-2**

	Expanded uncertainty
2 $\Omega$ to 10 $\Omega$	24 to 20
20 $\Omega$ to 100 $\Omega$	16 to 13
0.2 k $\Omega$ to 1 k $\Omega$	13 to 11
2 k $\Omega$ to 10 k $\Omega$	12 to 11
20 k $\Omega$ to 100 k $\Omega$	14 to 11
0.2 M $\Omega$ to 1 M $\Omega$	21 to 13

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCR-3**

	Expanded uncertainty
10 M $\Omega$	3.2
100 M $\Omega$	50
1 G $\Omega$	110

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCR-4**

	Expanded uncertainty
10 G $\Omega$	1000
100 G $\Omega$	1200
1 T $\Omega$	1600
10 T $\Omega$	2500
100 T $\Omega$	6000

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRb-3**

	Expanded uncertainty
2 M $\Omega$ to 10 M $\Omega$	69 to 44
20 M $\Omega$ to 100 M $\Omega$	27
0.2 G $\Omega$ to 1 G $\Omega$	22 to 62
2 G $\Omega$ to 10 G $\Omega$	600 to 590

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRcal**

	Expanded uncertainty
1 $\Omega$	1
1.9 $\Omega$	1
10 $\Omega$	1
19 $\Omega$	1
100 $\Omega$	1
190 $\Omega$	1
1 k $\Omega$	1.5
1.9 k $\Omega$	1.5
10 k $\Omega$	2.1
19 k $\Omega$	2.1
100 k $\Omega$	2.4
190 k $\Omega$	2.4
1 M $\Omega$	4.5
19 M $\Omega$	4.5
10 M $\Omega$	6.0
19 M $\Omega$	6.0
100 M $\Omega$	55

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRmet-1**

	Expanded uncertainty
0.0001 $\Omega$	120
0.001 $\Omega$	70
0.01 $\Omega$	70
0.1 $\Omega$	70
1 $\Omega$	3.0

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRmet-2**

	Expanded uncertainty
10 $\Omega$	0.40
100 $\Omega$	0.43
1 k $\Omega$	0.65
10 k $\Omega$	0.65
100 k $\Omega$	1.2
1 M $\Omega$	2.2
10 M $\Omega$	12
100 M $\Omega$	80
1 G $\Omega$	400

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$



**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCRmet-3**

	Expanded uncertainty
10 G $\Omega$	1100
100 G $\Omega$	1300
1 T $\Omega$	1700
10 T $\Omega$	2800
100 T $\Omega$	6300

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCIcal**

	Expanded uncertainty
100 $\mu$ A to 20 mA	7
20 mA to 200 mA	10 to 6
200 mA to 2 A	10 to 6
2 A to 10 A	10 to 6

The expanded uncertainties given in this table are expressed in  $\mu$ A/A

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DCImet**

	Expanded uncertainty
100 $\mu$ A to 200 $\mu$ A	8
200 $\mu$ A to 2 mA	13 to 11
2 mA to 20 mA	13 to 8
20 mA to 200 mA	16 to 10
200 mA to 2 A	25 to 53

The expanded uncertainties given in this table are expressed in  $\mu$ A/A

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**ACR-shunt**

	50 Hz	1 kHz
2 A	760	600
5 A	400	350
10 A	300	250

The expanded uncertainties given in this table are expressed in  $\mu\Omega/\Omega$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**C low loss**

	Expanded uncertainty
1 pF to 10 pF	5.00E-04
10 pF	3.00E-06
100 pF	1.30E-05
0.01 nF to 4 nF	2E-4 to 3E-4

The expanded uncertainties given in this table are expressed in F/F

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**L intermediate**

	Expanded uncertainty
10 mH	5.0E-05
100 mH	1.5E-04
0.001 H to 1 H	3E-04 to 4E-04

The expanded uncertainties given in this table are expressed in H/H

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**AC-DC difference at voltage**

	10 Hz	20 Hz	45 Hz	110 Hz	1 kHz	10 kHz	20 kHz	50 kHz	100 kHz
0.5 V	40	38	23	22	27	23	24	21	26
1 V	37	32	26	17	22	28	24	40	42
2 V	39	34	20	24	24	19	23	17	21
10 V	17	19	18	15	15	17	23	23	26
20 V	27	28	35	47	48	54	53	54	54
50 V	36	35	23	40	39	25	23	26	26

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)****ACV calibrator**

	10 Hz to 20 Hz	45 Hz to 300 Hz	1 kHz	10 kHz to 20 kHz	50 kHz	100 kHz
2 mV	-	270	250	-	-	-
10 mV	-	130	90	-	-	-
19 mV	-	120	80	-	-	-
20 mV	-	150	90	-	-	-
100 mV	-	70	50	-	-	-
190 mV	-	65	45	-	-	-
200 mV	-	110	60	-	-	-
0.25 V	35	30	30	30	30	50
1 V	30	20	20	20	20	50
1.9 V	30	20	20	20	22	36
2 V	35	20	20	26	26	36
10 V	30	20	20	32	34	36
19 V	35	24	26	32	32	36
20 V	35	26	32	28	30	50
100 V	40	28	30	30	30	50
190 V	40	26	28	30	30	60
200 V	50	30	40	30	38	60
1000 V	-	50	40	70	-	-

The expanded uncertainties given in this table are expressed in  $\mu\text{V}/\text{V}$



**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)****ACV multimeter**

	10 Hz to 20 Hz	45 Hz to 300 Hz	1 kHz	10 kHz to 20 kHz	50 kHz	100 kHz
10 mV	-	560	540	-	-	-
19 mV	-	330	310	-	-	-
20 mV	-	485	460	-	-	-
100 mV	-	140	120	-	-	-
190 mV	-	110	85	-	-	-
200 mV	-	155	130	-	-	-
0.25 V	195	140	110	100	145	150
1 V	100	60	50	50	70	80
1.9 V	85	55	35	50	265	310
2 V	205	105	60	75	275	315
10 V	95	40	30	30	65	75
19 V	85	45	35	40	60	90
20 V	210	120	70	75	190	190
100 V	100	55	45	50	100	100
190 V	90	50	40	50	80	95
200 V	170	170	130	270	550	550
1000 V	-	110	85	190	-	-

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**AC-DC difference at current**

	55 Hz	300 Hz	1 kHz	5 kHz	20 kHz
2.5 mA	41	40	47	75	-
5 mA	30	28	27	50	-
10 mA	25	26	26	49	-
20 mA	27	30	32	47	-
30 mA	35	36	36	67	-
50 mA	39	36	39	75	-
100 mA	43	44	45	81	-
0.2 A	48	48	49	93	-
0.3 A	53	54	53	100	-
0.5 A	56	56	56	110	-
1 A	59	59	61	120	-
2 A	65	64	66	120	120
3 A	67	68	69	130	130
5 A	69	69	69	140	150
10 A	72	72	72	140	140

The expanded uncertainties given in this table are expressed in  $\mu\text{A}/\text{A}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**ACI calibrator**

	10 Hz	55 Hz	1 kHz	5 kHz	10 kHz	20 kHz
2 mA	50	50	50	50	-	-
5 mA	40	40	40	40	-	-
10 mA to 19 mA	30	30	30	30	-	-
20 mA	50	50	50	50	-	-
30 mA to 190 mA	35	35	35	35	-	-
0.2 A	100	100	100	100	-	-
0.3 A	60	60	60	60	-	-
0.5 A	55	55	55	55	-	-
1 A to 1.9 A	50	50	50	50	-	-
2 A	160	160	160	160	190	190
3 A	130	130	130	130	130	180
5 A	120	120	120	120	120	180
10 A	100	100	100	100	100	190
12 A	-	390	390	-	-	-
20 A	-	360	360	-	-	-

The expanded uncertainties given in this table are expressed in  $\mu A/A$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**ACI multimeter**

	10 Hz	55 Hz	1 kHz	5 kHz
2 mA	260	260	260	290
10 mA	100	100	100	130
19 mA	80	80	80	115
20 mA	260	260	260	290
100 mA	100	100	100	130
190 mA	80	80	80	115
0.2 A	440	440	440	650
1 A	220	220	220	330
1.9 A	200	200	200	300

The expanded uncertainties given in this table are expressed in  $\mu\text{A/A}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**2W-a**

	For calibration of power meter, power converter, power comparator, wattmeter and energy meter				For calibration of power calibrator		
Power factor	10 V to 240 V 0.002 A to 0.05 A	10 V to 240 V 0.051 A to 100 A	241 V to 480 V 0.002 A to 0.05 A	241 V to 480 V 0.051 A to 100 A	10 V to 480 V 0.002 A to 0.1 A	10 V to 480 V 0.101 A to 50 A	10 V to 480 V 50.001 A to 100 A
1 to 0.8 inductive or capacitive	20	16	40	30	150	35	120
0.5 inductive or capacitive	30	25	60	50	150	65	120

The expanded uncertainties given in this table are expressed in  $\mu\text{W}/\text{VA}$  and  $\mu\text{Ws}/\text{VAs}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**2W-r**

	10 V to 240 V		241 V to 480 V	
Power factor	0.002 A to 0.05 A	0.051 A to 100 A	0.002 A to 0.05 A	0.051 A to 100 A
1	20	16	40	30
0.5 inductive or capacitive	30	25	60	50

The expanded uncertainties given in this table are expressed in  $\mu\text{var}/\text{VA}$  and  $\mu\text{vars}/\text{VAs}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**2W-app**

	Current	10 V to 240 V	241 V to 480 V
For calibration of: power meter, power converter, power comparator	0.002 A to 0.05 A	20	40
	0.051 A to 100 A	16	30
For calibration of power calibrator	0.002 A to 0.1 A	150	150
	0.101 A to 50 A	35	35
	50.001 A to 80 A	120	120

The expanded uncertainties given in this table are expressed in  $\mu\text{VA}/\text{VA}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**3phase**

	For calibration of power meter, power converter, power comparator, wattmeter and energy meter					For calibration of power calibrator
Power factor	4-wire measuring mode 10 V to 240 V 0.002 A to 0.05 A	4-wire measuring mode 10 V to 240 V 0.051 A to 100 A	4-wire measuring mode 241 V to 480 V 0.002 A to 0.05 A	4-wire measuring mode 241 V to 480 V 0.051 A to 100 A	3-wire measuring mode 10 V to 480 V 0.002 A to 100 A	4-wire and 3 wire measuring mode 10 V to 480 V 0.002 A to 100 A
1 to 0.8 inductive or capacitive	20	16	40	30	140	170
0.5 inductive or capacitive	30	25	60	50	140	170

The expanded uncertainties given in this table are expressed in  $\mu\text{W}/\text{VA}$  and  $\mu\text{Ws}/\text{VAs}$ ,  $\mu\text{var}/\text{VA}$  and  $\mu\text{vars}/\text{VAs}$ , and  $\mu\text{VA}/\text{VA}$



**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DC HVs**

	Expanded uncertainty
1 kV to 2.9 kV	22
3 kV to 6.9 kV	32
7 kV to 9.9 kV	40
10 kV to 49.99 kV	16
50 kV to 200 kV	12

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**AC HVs**

	Expanded uncertainty
1 kV to 2.9 kV	22
3 kV to 6.9 kV	32
7 kV to 9.9 kV	40
10 kV to 49.99 kV	26
50 kV to 200 kV	13

The expanded uncertainties given in this table are expressed in  $\mu\text{V/V}$

**Electricity and Magnetism, Bulgaria, BIM (Bulgarian Institute of Metrology)**

**DC kVms**

	Expanded uncertainty
0.2 kV to 10 kV	0.1 kV
10 kV to 50 kV	0.3 kV
50 kV to 100 kV	0.7 kV