Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
DC voltage sources: single values	Standard cell, solid state voltage standard	Voltage ratio with standard resistors, Measurement with nanovoltmeter / DMM	1	10	V	Voltage	1 V, 1.018 V and 10 V	0.5 to 0.7	µV/V	2	95%	Yes	DCV_Sources	Approved on 07 February 2019	164
DC voltage sources: low values	DC voltage source, calibrator	Voltage ratio with resistive divider, Voltage ratio with standard resistors, Measurement with nanovoltmeter / DMM	0	100	mV			40 to 750	nV	2	95%	No	DCV_Sources	Approved on 07 February 2019	4
DC voltage sources: low values	DC voltage source, multifunction calibrator	Voltage ratio with resistive divider, Measurement with DMM	0.1	10	V			0.6 to 7.5	µV/V	2	95%	Yes	DCV_Sources	Approved on 07 February 2019	9
DC voltage sources: intermediate values	DC voltage source, multifunction calibrator	Voltage ratio with standard resistors, Measurement with calibrator	10	1000	V			0.6 to 11	µV/V	2	95%	Yes	DCV_Sources	Approved on 07 February 2019	11
DC voltage meters: very low values	Nanovoltmeter, microvoltmeter	Voltage ratio with standard resistors, Measurement with calibrator	0	1	mV			12 to 40	nV	2	95%	No	DCV-Meters	Approved on 07 February 2019	13
DC voltage meters: intermediate values	DC voltmeter, multimeter, multifunction transfer standard	Voltage ratio with resistive divider, Measurement with calibrator	1	100	mV			17 to 1400	nV	2	95%	No	DCV-Meters	Approved on 07 February 2019	16
DC voltage meters: intermediate values	DC voltmeter, multimeter, multifunction transfer standard	Direct comparison with standard	0.1	1000	V			0.6 to 14	µV/V	2	95%	Yes	DCV-Meters	Approved on 07 February 2019	165

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
DC voltage meters: intermediate values	DC voltmeter, multimeter, multifunction transfer standard	Comparison to reference divider	1	10	V	Voltage	1 V, 1.018 V and 10 V	0.5 to 0.7	µV/V	2	95%	Yes	DCV-Meters	Approved on 07 February 2019	166
DC voltage ratios: up to 1100 V	Resistive divider, ratio meter	Zero flux method, Voltage drops method, Comparison by means of a current comparator bridge	0.01:1	1.1:1		Input voltage	1 V to 1000 V	0.35 to 2.5	µV/V	2	95%	Yes	DCV_Ratio	Approved on 07 February 2019	21
DC resistance standards and sources: low values	Fixed resistor, DCCT	Zero flux method, Voltage drops method, Comparison by means of a current comparator bridge	0.0001	1	mΩ	Test current	up to 500 A	0.8 to 1200	µΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	12 (177)
DC resistance standards and sources: low values	Fixed resistor, resistance box	Zero flux method, Voltage drops method, Comparison by means of a current comparator bridge, Direct calibration with DMM	0.001	1	Ω	Test current	up to 500 A	0.5 to 30	µΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	13 (179)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
DC resistance standards and sources: intermediate values	Fixed resistor, resistance box	Zero flux method, Voltage drops method, Comparison by means of a current comparator bridge, Comparison by means of a binary voltage divider bridge, Direct calibration with DMM	0.001	10	kΩ	Test current, Test Voltage	up to 500 A, up to 100 V	0.3 to 30	μΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	14 (25)
DC resistance standards and sources: intermediate values	Fixed resistor, resistance box	Voltage drops method, Comparison by means of a current comparator bridge, Comparison by means of a binary voltage divider bridge, Direct calibration with DMM	0.01	1	MΩ	Test current, Test Voltage	up to 100 A, up to 100 V	0.3 to 17	μΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	27
DC resistance standards and sources: high values	Fixed resistor, three terminal resistor, resistance box	Voltage drops method, Comparison by means of a binary voltage divider bridge, Current integration, Direct calibration with DMM	0.000001	1	TΩ	Test voltage	up to 1000 V	1 to 8000	μΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	15 (29)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
DC resistance standards and sources: high values	Fixed resistor, three terminal resistor, resistance box	Comparison by means of a binary voltage divider bridge, Current integration	1	100	TΩ	Test voltage	up to 1000 V	0.8 to 6	mΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	16 (35)
DC resistance standards and sources: multiple ranges	Multifunction calibrator	Comparison by means of a current comparator bridge, Comparison by means of a binary voltage divider bridge	0.000001	100	MΩ			0.4 to 3	μΩ/Ω	2	95%	Yes	R_1	Approved on 07 February 2019	17 (37)
DC resistance meters: low values	Microohmmeter, multimeter, multifunction transfer standard, resistance bridge	Comparison to standard resistor	0.00002	1	Ω			1 to 750	μΩ/Ω	2	95%	Yes	R_2	Approved on 07 February 2019	18 (43)
DC resistance meters: intermediate values	Ohmmeter, multimeter, multifunction transfer standard, resistance bridge	Comparison to standard resistor	0.000001	1000	MΩ			1 to 20	μΩ/Ω	2	95%	Yes	R_2	Approved on 07 February 2019	20 (48)
DC resistance meters: high values	Teraohmmeter, resistance bridge	Comparison to standard resistor	0.001	100	TΩ			2 to 9	mΩ/Ω	2	95%	Yes	R_2	Approved on 07 February 2019	21 (54)
DC current sources: low values	Current generator, multifunction calibrator	U / R ratio	0.01	100	μA			8 to 90	μA/A	2	95%	Yes	DCI_1	Approved on 07 February 2019	22 (183)
DC current sources: low values	Current generator, multifunction calibrator	Measurement with picoampermeter / DMM	0.000001	100	μA			18 to 12000	μA/A	2	95%	Yes	DCI_1	Approved on 07 February 2019	
DC current sources: imtermediate values	Current generator, multifunction calibrator	U / R ratio	0.0001	20	A			5 to 100	μA/A	2	95%	Yes	DCI_1	Approved on 07 February 2019	23 (185)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
DC current sources: imtermediate values	Current generator, multifunction calibrator	Measurement with DMM	0.0001	20	A			16 to 560	µA/A	2	95%	Yes	DCI_1	Approved on 07 February 2019	
DC current sources: imtermediate values	Current generator, multifunction calibrator	Zero flux method	0.1	20	A			30	µA/A	2	95%	Yes	DCI_1	Approved on 07 February 2019	24 (186)
DC current sources: high values	Current generator, multifunction calibrator	Zero flux method	20	100	A			30	µA/A	2	95%	Yes		Approved on 07 February 2019	25 (187)
DC current meters: low values	Nanoammeter, multimeter, multifunction transfer standard	U / R ratio	0,000001	100	µA			8 to 6000	µA/A	2	95%	Yes	DCI_2	Approved on 07 February 2019	26 (188)
DC current meters: intermediate values	Multimeter, multifunction transfer standard	U / R ratio	0.0001	20	A			5 to 100	µA/A	2	95%	Yes	DCI_2	Approved on 07 February 2019	27 (190)
DC current meters: intermediate values	Multimeter, multifunction transfer standard	Direct calibration with current source	0.0001	20	A			55 to 1250	µA/A	2	95%	Yes	DCI_2	Approved on 07 February 2019	
DC current meters: intermediate values	Multimeter, multifunction transfer standard	Zero flux method	0.1	20	A			30	µA/A	2	95%	Yes	DCI_2	Approved on 07 February 2019	28 (191)
DC current meters: high values	Current generator, multifunction calibrator	Zero flux method	20	100	A			30	µA/A	2	95%	Yes		Approved on 07 February 2019	29 (192)
AC resistance: real component	Fixed resistor	Comparison to standard resistor	0.001	10	kΩ	Frequency	40 Hz to 20 kHz	100	µΩ/Ω	2	95%	Yes		Approved on 06 August 2013	30 (70)
AC resistance: real component	Fixed resistor	Measurement with LCR meter	0.001	10000	kΩ	Frequency	100 Hz to 1 MHz	1.3 to 30	mΩ/Ω	2	95%	Yes		Approved on 06 August 2013	31 (71)
AC resistance: meters	LCR meter, impedance analyzer	Direct measurement	0.001	10	kΩ	Frequency	40 Hz to 20 kHz	100	µΩ/Ω	2	95%	Yes		Approved on 06 August 2013	32 (72)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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**	**Comments**	**NMI Service Identifier**
Capacitance: low loss capacitors	Standard capacitor (air, fused silica)	Measurement with transformer bridge	1	1000	pF	Frequency	1 kHz	7 to 30	µF/F	2	95%	Yes	Cap_1	Approved on 06 August 2013	34 (73)
Capacitance: dissipation factor for low loss capacitors	Standard capacitor (air, fused silica): dissipation factor *D*	Measurement with transformer bridge	0	0.1		Capacitance *C*	1 pF to 1 nF	2E-05 + 1E-03*D* + 5E+01*C* /F		2	95%	No		Approved on 06 August 2013	35 (74)
						Frequency	1 kHz								
Capacitance: low loss capacitors	Standard capacitor (air, fused silica)	Comparison to standard capacitor	1	1000	pF	Capacitance	1 pF, 10 pF, 100 pF and 1000 pF	15 to 5100	µF/F	2	95%	Yes	Cap_1	Approved on 06 August 2013	36 (75)
						Frequency	100 Hz to 10 MHz								
Capacitance: low loss capacitors	Fixed capacitor, variable capacitor, capacitance box	Direct measurement	1	2000	pF	Frequency	20 Hz to 10 MHz	1E-03 to 3E-02	F/F	2	95%	Yes	Cap_3	Approved on 06 August 2013	37 (194)
Capacitance: dissipation factor for low loss capacitors	Fixed capacitor, variable capacitor, capacitance box	Direct measurement	0	0.1		Capacitance	1 pF to 2 nF	0.0005 to 3E-02*D*		2	95%	No	Diss_1	Approved on 06 August 2013	38 (76)
						Frequency	20 Hz to 10 MHz								
Capacitance: dielectric capacitors	Fixed capacitor, variable capacitor, capacitance box	Measurement with transformer bridge	1E-12	1E-05	F	Frequency	1 kHz	7 to 100	µF/F	2	95%	Yes	Cap_1	Approved on 06 August 2013	40 (80)
Capacitance: dissipation factor for dielectric capacitors	Fixed capacitor, variable capacitor, capacitance box : dissipation factor *D*	Fixed capacitor, variable capacitor, capacitance box	0	1		Capacitance *C*	1 pF to 10 µF	2E-05 + 1E-03*D* + 5E+01*C* /F		2	95%	No		Approved on 06 August 2013	41 (81)
						Frequency	1 kHz								
Capacitance: dielectric capacitors	Fixed capacitor, variable capacitor, capacitance box	Comparison to standard capacitor	10	10000	nF	Frequency	100 Hz to 1 MHz	15 to 510	µF/F	2	95%	Yes	Cap_1	Approved on 06 August 2013	42 (195)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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**	**Comments**	**NMI Service Identifier**
Capacitance: dielectric capacitors	Fixed capacitor, variable capacitor, capacitance box	Comparison by means of a Schering bridge	1E-11	1E-03	F	Frequency	50 Hz	0.2 to 1	mF/F	2	95%	Yes	Cap_4	Approved on 06 August 2013	44 (84)
Capacitance: dissipation factor for dielectric capacitors	Fixed capacitor, variable capacitor, capacitance box: dissipation factor *D*	Comparison by means of a Schering bridge	0	1		Capacitance	10 pF to 1 mF	(0.00005 + 0.005*D*) to (0.0001 + 0.005*D*)		2	95%	No	Diss_2	Approved on 06 August 2013	45 (85)
						Frequency	50 Hz								
Capacitance: dielectric capacitors	Fixed capacitor	Comparison to transformed capacitor	0.1	1	mF	Frequency	100 Hz, 120 Hz, 1 kHz	0.7 to 5	mF/F	2	95%	Yes	Cap_2	Approved on 06 August 2013	46 (88)
Capacitance: transformed capacitors	Fixed capacitor, switched capacitor	Comparison to transformed capacitor	1	1000	mF	Frequency	100 Hz, 120 Hz, 1 kHz	2 to 20	mF/F	2	95%	Yes	Cap_2	Approved on 06 August 2013	47 (89)
Capacitance: meters	Capacitance bridge, LCR meter	Direct measurement	1E-12	1	F	Frequency	20 Hz to 10 MHz	3 to 10000	µF/F	2	95%	Yes	Cap_1	Approved on 06 August 2013	48 (211)
Capacitance: meters	LCR meter, impedance analyzer	Comparison to reference LCR meter	0.001	10000	nF	Frequency	20 Hz to 10 MHz	15E-06 to 3E-02	F/F	2	95%	Yes	Cap_3	Approved on 06 August 2013	51 (219)
Inductance: self inductance, low values	Fixed inductor, variable inductor, inductance box	Comparison to standard inductor	0.1	0.1	mH	Frequency	100 Hz to 1 kHz	0.17 to 0.23	mH/H	2	95%	Yes	Ind_1	Approved on 06 August 2013	52 (95)
Inductance: self inductance, low values	Fixed inductor, variable inductor, inductance box	Direct measurement	0.1	1	mH	Frequency	100 Hz to 1 kHz	2 to 25	mH/H	2	95%	Yes	Ind_2	Approved on 06 August 2013	53 (224)
Inductance: self inductance, intermediate values	Fixed inductor, variable inductor, inductance box	Comparison to standard inductor	1	1000	mH	Inductance	1 mH, 10 mH, 100 mH and 1000 mH	0.14 to 0.17	mH/H	2	95%	Yes	Ind_1	Approved on 06 August 2013	54 (97)
						Frequency	100 Hz to 1 kHz								
Inductance: self inductance, intermediate values	Fixed inductor, variable inductor, inductance box	Direct measurement	1	1000	mH	Frequency	100 Hz to 1 kHz	1 to 4	mH/H	2	95%	Yes	Ind_2	Approved on 06 August 2013	55 (98)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
Inductance: self inductance, high values	Fixed inductor, variable inductor, inductance box	Comparison to standard inductor	10	10	H	Frequency	100 Hz to 1 kHz	0.14 to 0.17	mH/H	2	95%	Yes	Ind_1	Approved on 06 August 2013	56 (99)
Inductance: self inductance, high values	Fixed inductor, variable inductor, inductance box	Direct measurement	1	10	H	Frequency	100 Hz to 1 kHz	1	mH/H	2	95%	Yes		Approved on 06 August 2013	57 (100)
Inductance: meters	Inductance bridge, LCR meter	Direct measurement	0.1	10000	mH	Inductance	0.0001 H, 0.001 H, 0.01 H, 0.1 H, 1 H and 10 H	0.08 to 0.2	mH/H	2	95%	Yes	Ind_3	Approved on 06 August 2013	58 (101)
						Frequency	100 Hz to 1 kHz								
Inductance: meters	Inductance bridge, LCR meter	Comparison to reference LCR meter	0.1	10000	mH	Frequency	100 Hz to 1 kHz	1 to 25	mH/H	2	95%	Yes	Ind_2	Approved on 06 August 2013	59 (102)
AC voltage: AC-DC transfer difference at low voltages	Thermal converter, AC-DC transfer standard	Comparison with reference standard	0.002	0.5	V	Frequency	10 Hz to 1 MHz	6 to 400	µV/V	2	95%	Yes	ACV_Diff	Approved on 06 January 2015	60 (225)
AC voltage: AC-DC transfer difference at medium voltages	Thermal converter, AC-DC transfer standard	Comparison with reference standard	0.5	5	V	Frequency	10 Hz to 1 MHz	4 to 50	µV/V	2	95%	Yes	ACV_Diff	Approved on 06 January 2015	61 (103)
AC voltage: AC-DC transfer difference at higher voltages	Thermal converter, AC-DC transfer standard	Comparison with reference standard	5	1000	V	Frequency	10 Hz to 1 MHz	6 to 120	µV/V	2	95%	Yes	ACV_Diff	Approved on 06 January 2015	62 (104)
AC voltage up to 1100 V: sources	Multifunction calibrator	Comparison with reference standard	0.002	1000	V	Frequency	10 Hz to 1 MHz	0.028 to 7.8	mV/V	2	95%	Yes	ACV_1	Approved on 06 January 2015	63 (105)
AC voltage up to 1100 V: sources	Multifunction calibrator	ac/dc voltage transfer method	0.002	1000	V	Frequency	10 Hz to 1 MHz	15 to 1200	µV/V	2	95%	Yes	ACV_2	Approved on 7 February 2019	
AC voltage up to 1100 V: meters	AC voltmeter, multimeter, multifunction transfer standard	Comparison with reference standard	0.002	1000	V	Frequency	10 Hz to 1 MHz	0.028 to 7.8	mV/V	2	95%	Yes	ACV_1	Approved on 7 February 2019	64 (106)
AC voltage up to 1100 V: meters	AC voltmeter, multimeter, multifunction transfer standard	ac/dc voltage transfer method	0.002	1000	V	Frequency	10 Hz to 1 MHz	15 to 1200	µV/V	2	95%	Yes	ACV_2	Approved on 7 February 2019	

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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**	**Comments**	**NMI Service Identifier**
AC power and energy: single phase (f <= 400 Hz), apparent power	Power converter, power meter, wattmeter	Direct voltage sampling	0.0001	35000	VA	Frequency	45 Hz to 65 Hz	25 to 200	µVA/VA	2	95%	Yes	P	Approved on 06 August 2013	67 (109)
						Voltage	0.1 V to 700 V								
						Current	1 mA to 50 A								
AC power and energy: single phase (f <= 400 Hz), active power	Power converter, power meter, wattmeter: angle φ	Direct voltage sampling	0	35000	W	Power factor	1 to 0, inductive or capacitive	25 to 800	µW/VA	2	95%	Yes	P	Approved on 06 August 2013	68 (112)
						Voltage	0.1 V to 700 V								
						Current	1 mA to 50 A								
						Frequency	45 Hz to 65 Hz								
AC power and energy: single phase (f <= 400 Hz), reactive power	Power converter, power meter, wattmeter: angle φ	Direct voltage sampling	0.0001	3500	var	Power factor	0 to 1, inductive or capacitive	25 to 320	µvar/VA	2	95%	Yes	P	Approved on 06 August 2013	69 (115)
						Voltage	0.1 V to 700 V								
						Current	1 mA to 50 A								
						Frequency	45 Hz to 65 Hz								
High DC voltage: average value	DC kilovolt source, DC kilovoltmeter, dedicated set-up for high voltage	Measurement with resistive divider	1	120	kV			0.3	mV/V	2	95%	Yes		Approved on 7 February 2019	71 (119)
High DC current: average value	Current generator, multifunction calibrator, AC current measuring system	Zero flux method	100	500	A			30	µA/A	2	95%	Yes		Approved on 7 February 2019	73 (236)
RF power: absolute power on coaxials	Reference source	Reference power sensor	1	1	mW	Frequency	50 MHz	5	mW/W	2	95%	Yes		Approved on 06 August 2013	74 (120)
RF power: absolute power on coaxials	Power source, power meter	Power sensor	2E-16	25	W	Frequency	DC to 26.5 GHz	10 to 60	mW/W	2	95%	Yes	RF_P_1	Approved on 07 April 2016	75 (121)

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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**	**Comments**	**NMI Service Identifier**
RF power: absolute power on coaxials	Power meter: linearity	Comparison with reference attenuator	1E-10	100	mW	Frequency	10 MHz to 18 GHz	3 to 18	mW/W	2	95%	Yes		Approved on 06 August 2013	76 (226)
						Connector	type N, 50 Ω; PC-7; PC-3.5								
RF power: calibration factor on coaxials	Thermistor, power sensor	Comparison with reference sensor	0.7	1.1		Frequency	DC to 26.5 GHz	0.001 to 0.02		2	95%	No	RF_P_2	Approved on 07 April 2016	77 (125)
						Power	0.01 mW to 10 mW								
Scalar RF reflection coefficient: on coaxials	Passive device	Scalar network analyzer	0	1		Frequency	10 MHz to 26,5 GHz	0.010 to 0.15		2	95%	No	RF_SRC	Approved on 06 August 2013	78 (131)
Scalar RF attenuation: on coaxials	Passive device	Broadband power ratio	0	30	dB	Frequency	DC to 26.5 GHz	0.02 to 0.20	dB	2	95%	No	RF_ATT_1	Approved on 06 August 2013	79 (135)
						Connector	type N, 50 Ω; PC-7; PC-3.5								
Scalar RF reflection and attenuation: directivity	Directional bridge	Reference load measurement, Ripple extraction	0	0.1		Frequency	10 MHz to 26.5 GHz	0.003		2	95%	No	RF_DIR	Approved on 06 August 2013	80 (229)
						Connector	type N; PC-7; PC-3.5								
Scattering parameters: reflection coefficient (Sii) on coaxials, real and imaginary	Passive device	Vector network analyzer	-1	1		Frequency	9 kHz to 3 GHz	0.005 to 0.1		2	95%	No	RF_VRC	Approved on 07 April 2016	95 (163)
Signal and pulse characteristics: pulse amplitude	Oscilloscope, pulse and function generator: pulse amplitude *U*	DC voltage sampling	0.2	2	mV	Frequency	DC or square wave at 1 kHz	(1E-03 + 1E-03*U*) , *U* in mV	mV	2	95%	No		Approved on 06 August 2013	81 (141)
Signal and pulse characteristics: pulse amplitude	Oscilloscope, pulse and function generator	DC voltage sampling	0.002	100	V	Frequency	DC or square wave at 1 kHz	0.5	mV/V	2	95%	Yes		Approved on 06 August 2013	82 (143)

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Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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**	**Comments**	**NMI Service Identifier**
Signal and pulse characteristics: pulse amplitude	Oscilloscope, pulse and function generator	Measurement with sampling oscilloscope	-1.5	1.5	V	Pulse repetition frequency	< 1 GHz	2 to 17	mV	2	95%	No		Approved on 06 August 2013	83 (144)
Signal and pulse characteristics: pulse time parameters: time interval	Oscilloscope, pulse and function generator: time interval absolute *t*	Measurement with sampling oscilloscope or time interval counter	-1	1E+05	s			1 to (600 + 1E-09*t*), *t* in ps	ps	2	95%	No	TI	Approved on 06 August 2013	84 (145)
Signal and pulse characteristics: pulse time parameters: risetime	Oscilloscope, pulse and function generator: risetime *tr*	Measurement with sampling oscilloscope	2E-11	10	s	Pulse repetition frequency	up to 100 kHz	(1 + 0.05*tr*), *tr* in ps	ps	2	95%	No		Approved on 06 August 2013	85 (149)
Signal and pulse characteristics: amplitude modulation	Signal generator, spectrum analyser, modulation meter: modulation index *m*	Amplitude measurement on sampling osciloscope	0.05	0.95		Carrier frequency	0.15 MHz to 26.5 GHz	(1E-03 + 1.5E-02*m*), *m* without units		2	95%	No		Approved on 06 August 2013	86 (150)
						Modulating frequency	0.05 kHz to 100 kHz								
Signal and pulse characteristics: frequency modulation	Signal generator, spectrum analyser, modulation meter, jitter meter	Comparison by means of measuring receiver	1	200	kHz	Carrier frequency	0.15 MHz to 1300 MHz	10 to 50	mHz/Hz	2	95%	Yes	FM	Approved on 06 August 2013	87 (154)
						Modulating frequency	0.02 kHz to 10 kHz								
Signal and pulse characteristics: frequency modulation	Signal generator, spectrum analyser, modulation meter, jitter meter	Bessel zero measurement	1	200	kHz	Carrier frequency	0.15 MHz to 26.5 GHz	5 to 10	mHz/Hz	2	95%	Yes		Approved on 06 August 2013	88 (156)
						Modulating frequency	0.02 kHz to 200 kHz								

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Calibration or Measurement Services			Measurand Level or Range			Measurement Conditions/Independent variables		Expanded Uncertainty							
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	Comments	NMI Service Identifier
Signal and pulse characteristics: distortion	Signal generator, spectrum analyzer, distortion meter	AC voltage ratio	0	0.1		Frequency	20 Hz to 100 kHz	0.00007 to 0.027		2	95%	No		Approved on 06 August 2013	89 (157)
Signal and pulse characteristics: harmonic content	Signal generator, spectrum analyzer	Spectrum analyzer	0	70	dBc	Frequency of highest harmonic	up to 26.5 GHz	2 to 3	dB	2	95%	No		Approved on 06 August 2013	90 (158)
RF voltage sources	RF generator: matched output voltage	Thermocouple power sensor	0.02	2.2	V	Frequency	9 kHz to 2 GHz	4.5 to 12	mV/V	2	95%	Yes	RF_V_1	Approved on 07 April 2016	92 (160)
						Connector	BNC, Type-N 75 ohm, Type-N 50 ohm, Balanced								
RF voltage meters	RF voltmeter: incident voltage	Power splitter and thermocouple power sensor	0.02	2.2	V	Frequency	9 kHz to 2 GHz	5 to 12	mV/V	2	95%	Yes	RF_V_2	Approved on 07 April 2016	93 (161)
						Connector	BNC, Type-N 75 ohm, Type-N 50 ohm, Balanced								
RF voltage meters	RF voltmeter: input voltage	Power splitter and thermocouple power sensor	0.02	2.2	V	Frequency	9 kHz to 2 GHz	6 to 12	mV/V	2	95%	Yes	RF_V_3	Approved on 07 April 2016	94 (162)
						Connector	BNC, Type-N 75 ohm, Type-N 50 ohm, Balanced								
AC current: AC-DC current transfer	Thermal converter, current shunt	Comparison with reference standard	0.001	100	A	Frequency	10 Hz to 100 kHz	6 to 130	µA/A	2	95%	Yes	ACI_Diff	Approved on 11 May 2017	
AC current up to 100 A: sources	Multifunction calibrator, transconductance amplifier	Direct measurement with current shunts	0.0001	100	A	Frequency	10 Hz to 30 kHz	30 to 360	µA/A	2	95%	Yes	ACI	Approved on 11 May 2017	65 (107)
AC current up to 100 A: meters	AC ammeter, multimeter, multifunction transfer standard	Direct measurement with current shunts	0.0001	100	A	Frequency	10 Hz to 30 kHz	30 to 360	µA/A	2	95%	Yes	ACI	Approved on 11 May 2017	66 (108)

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: DCV_Sources

	Voltage ratio with resistive divider	Direct comparison with standard	Voltage ratio with standard resistors	Direct calibration with nanovoltmeter / DMM
100 mV	2	-	-	-
1 V	0.8	0.7	-	-
1.018 V	-	0.7	-	-
10 V	0.6	0.5	-	-
100 V	0.7	-	-	-
1000 V	0.9	-	-	-
0 mV to 0.01 mV	-	-	40 nV	60 nV
0.01 mV to 0.1 mV	-	-	45 nV	-
0.1 mV to 10 mV			45 nV to 90 nV	70 nV to 210 nV
10 mV to 100 mV	-	-	90 nV to 540 nV	210 nV to 750 nV
100 mV to 1 V	2.5	-	-	6.5 to 7.5
1 V to 10 V	1.5	-	-	6.5 to 7
10 V to 100 V	1.5	-	-	7 to 9
100 V to 1000 V	4	-	-	7 to 11

The expanded uncertainties given in this table are expressed in µV/V, except where it is expressed in nV.

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: DCV_Meters

	Voltage ratio with resistive divider	Direct comparison with standard	Voltage ratio with standard resistors	Direct calibration with generator
100 mV	2	-	-	-
1 V	0.8	0.7	-	-
1.018 V	-	0.7	-	-
10 V	0.6	0.5	-	-
100 V	0.7	-	-	-
1000 V	0.9	-	-	-
0 mV to 0.01 mV	-	-	12 nV	40 nV
0.01 mV to 1 mV	-	-	12 nV to 17 nV	-
1 mV to 10 mV	-	-	17 nV to 62 nV	510 nV to 590 nV
10 mV to 100 mV	-	-	62 nV to 520 nV	590 nV to 1400 nV
100 mV to 1 V	2.5	-	-	10 to 14
1 V to 10 V	1.5	-	-	5 to 10
10 V to 100 V	1.5	-	-	5 to 8
100 V to 1000 V	4	-	-	8 to 10

The expanded uncertainties given in this table are expressed in µV/V, except where it is expressed in nV.

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: DCV_Ratio

	Input voltage	Expanded uncertainty
0.01:1	1000 V	0.6
0.01:1 to 0.1:1	10 V to 100 V	1.4 to 0.35
0.1:1 to 1.1:1	1 V to 10 V	1.4 to 0.35
0.1:1 to 1.1:1	10 V to 100 V	0.35
0.01:1 to 1.1:1	100 V to 300 V	0.35
0.01:1 to 1.1:1	300 V to 600 V	0.35 to 0.9
0.01:1 to 1.1:1	600 V to 1000 V	0.9 to 2.5

The expanded uncertainties given in this table are expressed in µV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: R_1

	Zero flux method (up to 500 A)	Voltage drops method	Comparison by means of a current comparator bridge	Comparison by means of a binary voltage divider bridge (up to 100 V)	Current integration (up to 1000 V)	Direct calibration with DMM
0.1 μΩ to 1 μΩ	1200	-	-	-	-	-
1 μΩ to 10 μΩ	200	-	-	-	-	-
10 μΩ to 100 μΩ	80	-	1.2	-	-	-
100 μΩ to 1 mΩ	35	16	1.0	-	-	-
1 mΩ to 10 mΩ	30	11	0.8	-	-	-
10 mΩ to 100 mΩ	30	3	0.7	-	-	-
100 mΩ to 1 Ω	30	1.2	0.5	-	-	-
1 Ω to 10 Ω	-	0.8	0.5	-	-	14 to 25
10 Ω to 100 Ω	-	0.8	0.5	-	-	13 to 14
100 Ω to 1 kΩ	-	0.6	0.4	-	-	13
1 kΩ to 10 kΩ	-	0.6	0.4	-	-	13
10 kΩ	-	0.6	0.3	-	-	13
10 kΩ to 100 kΩ	-	0.8	-	0.7	-	13
100 kΩ to 1 MΩ	-	1.1	-	1	-	13 to 17
1 MΩ to 10 MΩ	-	2.1	-	2	-	17 to 26
10 MΩ to 100 MΩ	-	-	-	3	500	26 to 150
100 MΩ to 1 GΩ	-	-	-	15	600	150 to 800
1 GΩ to 10 GΩ	-	-	-	40	900	800 to 8000
10 GΩ to 100 GΩ	-	-	-	300	1200	-
100 GΩ to 1 TΩ	-	-	-	800	2500	-
1 TΩ to 10 TΩ	-	-	-	-	4000	-
10 TΩ to 100 TΩ	-	-	-	-	6000	-

The expanded uncertainties given in this table are expressed in μΩ/Ω

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: R_2

	Expanded uncertainty
0.02 mΩ	750
0.08 mΩ	750
0.1 mΩ	35
0.2 mΩ	30
0.5 mΩ	750
1 mΩ	25
2 mΩ	20
3 mΩ	20
5 mΩ	20
10 mΩ to 100 mΩ	3
100 mΩ to 100 kΩ	1
100 kΩ to 1 MΩ	1.5
1 MΩ to 10 MΩ	2.5
10 MΩ to 100 MΩ	3.5
100 MΩ to 1 GΩ	20
1 GΩ to 10 GΩ	2000
10 GΩ to 100 GΩ	2500
100 GΩ to 1 TΩ	4000
1 TΩ to 10 TΩ	6000
10 TΩ to 100 TΩ	9000

The expanded uncertainties given in this table are expressed in μΩ/Ω

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: DCI_1

	U / R ratio	Zero flux method	Direct calibration with picoampermeter / DMM
1 pA to 10 pA	-	-	12000
10 pA to 100 pA	-	-	12000
100 pA to 1 nA	-	-	12000
1 nA to 10 nA	-	-	12000
10 nA to 20 nA	90	-	4000 to 8000
20 nA to 50 nA	75	-	1700 to 4000
50 nA to 200 nA	25	-	430 to 1700
200 nA to 2 µA	15	-	110 to 430
2 µA to 100 µA	8	-	18 to 125
100 µA to 200 µA	8		16 to 18
200 µA to 100 mA	5	-	16 to 65
100 mA to 1 A	8	30	65 to 250
1 A to 2 A	18	30	250
2 A to 5 A	75	30	250 to 560
5 A to 10 A	90	30	510 to 560
10 A to 20 A	100	30	490 to 510

The expanded uncertainties given in this table are expressed in µA/A

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: DCI_2

	U / R ratio	Zero flux method	Direct calibration with current source
1 pA to 10 pA	6000	-	-
10 pA to 100 pA	1900	-	-
100 pA to 1 nA	150	-	-
1 nA to 10 nA	90	-	-
10 nA to 20 nA	90	-	-
20 nA to 50 nA	75	-	-
50 nA to 200 nA	25	-	-
200 nA to 2 µA	15	-	-
2 µA to 100 µA	8	-	-
100 µA to 200 µA	8	-	100 to 150
200 µA to 100 mA	5	-	55 to 100
100 mA to 1 A	8	30	65 to 125
1 A to 2 A	18	30	115 to 125
2 A to 5 A	75	30	115 to 425
5 A to 10 A	90	30	425
10 A to 20 A	100	30	425 to 1250

The expanded uncertainties given in this table are expressed in µA/A

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACV_Diff

	10 Hz	20 Hz	30 Hz	40 Hz	55 Hz	120 Hz	500 Hz	1 kHz	10 kHz	20 kHz
0.002 V	200	160	150	150	150	150	150	150	150	150
0.005 V	120	100	100	100	100	100	100	100	100	100
0.01 V	100	90	80	80	80	80	80	80	80	80
0.02 V	80	70	60	60	60	60	60	60	60	60
0.05 V	50	35	30	30	30	30	30	30	30	30
0.1 V	40	28	25	23	23	23	23	23	23	23
0.2 V	40	28	25	23	23	23	23	23	23	23
0.5 V	10	8	8	6	6	6	6	6	6	6
1 V	6	5	4	4	4	4	4	4	4	4
2 V	7	5	4	4	4	4	4	4	4	4
5 V	10	7	7	6	6	6	6	6	6	6
10 V	12	9	9	8	8	8	8	8	8	8
20 V	14	11	11	10	10	10	10	10	10	10
50 V	16	13	13	12	12	12	12	12	12	12
100 V	18	15	15	14	14	14	14	14	14	14
200 V	20	17	17	16	16	16	16	16	16	16
400 V	25	22	22	20	20	20	20	20	20	20
1000 V	30	26	26	24	24	24	24	24	24	24

The expanded uncertainties given in this table are expressed in µV/V

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Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACV_Diff (Continued)

	30 kHz	50 kHz	70 kHz	100 kHz	200 kHz	300 kHz	500 kHz	700 kHz	800 kHz	1 MHz
0.002 V	150	160	160	180	200	200	250	300	350	400
0.005 V	100	100	100	120	140	140	200	250	250	300
0.01 V	80	80	80	100	120	120	150	200	250	300
0.02 V	60	70	70	80	100	100	120	180	180	280
0.05 V	30	30	35	40	50	50	75	100	100	150
0.1 V	23	23	25	35	40	40	65	95	95	125
0.2 V	23	23	25	35	40	40	65	95	95	125
0.5 V	6	6	8	10	15	15	25	40	40	50
1 V	4	4	5	6	8	8	10	14	15	25
2 V	4	4	5	6	8	8	11	14	16	25
5 V	7	7	7	8	11	11	15	20	25	45
10 V	9	9	9	10	13	13	20	30	45	75
20 V	11	11	11	12	15	15	25	40	75	120
50 V	14	14	14	20	30	-	-	-	-	-
100 V	17	17	17	25	40	-	-	-	-	-
200 V	20	20	25	35	-	-	-	-	-	-
400 V	25	30	40	50	-	-	-	-	-	-
1000 V	30	40	60	80	-	-	-	-	-	-

The expanded uncertainties given in this table are expressed in μV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACV_1

	10 Hz to 20 Hz	20 Hz to 40 Hz	40 Hz to 20 kHz	20 kHz to 50 kHz	50 kHz to 100 kHz	100 kHz to 200 kHz	200 kHz to 500 kHz	500 kHz to 1 MHz
2 mV to 5 mV	1.1	1	1	1.4	1.7	2.7	5.5	7.8
5 mV to 10 mV	0.5	0.41	0.41	0.6	0.7	1.1	2.4	4.3
10 mV to 20 mV	0.25	0.2	0.2	0.3	0.4	0.6	1.4	2.7
20 mV to 60 mV	0.12	0.08	0.08	0.1	0.15	0.25	0.55	1.4
60 mV to 200 mV	0.1	0.06	0.05	0.05	0.09	0.18	0.4	1.2
200 mV to 2 V	0.08	0.04	0.028	0.03	0.065	0.14	0.28	1.1
2 V to 20 V	0.08	0.04	0.028	0.035	0.08	0.18	0.45	1.4
20 V to 200 V	0.08	0.04	0.033	0.045	0.09	-	-	-
200 V to 1000 V	0.08	0.05	0.04	0.13	0.6	-	-	-

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACV_2

	10 Hz	20 Hz	30 Hz	40 Hz	55 Hz	120 Hz	500 Hz	1 kHz	10 kHz	20 kHz
0.002 V	700	650	650	650	650	650	650	650	650	650
0.005 V	300	250	250	250	250	250	250	250	250	250
0.01 V	130	120	120	110	110	110	110	110	110	110
0.02 V	100	90	90	80	80	80	80	80	80	80
0.05 V	75	60	60	50	50	50	50	50	50	50
0.1 V	75	60	60	50	50	50	50	50	50	50
0.2 V	75	60	60	50	50	50	50	50	50	50
0.5 V	30	25	25	20	20	20	18	15	15	18
1 V	30	25	25	20	20	20	18	15	15	18
2 V	30	25	25	20	20	20	18	15	15	18
5 V	30	25	25	20	20	20	18	18	18	18
10 V	30	25	25	20	20	20	20	20	20	20
20 V	30	25	25	20	20	20	20	20	20	20
50 V	35	35	35	30	30	30	30	30	30	30
100 V	40	35	35	35	35	35	35	35	35	35
200 V	40	35	35	35	35	35	35	35	35	35
400 V	45	40	40	40	40	40	40	40	40	40
1000 V	50	45	45	40	40	40	40	40	40	40

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACV_2 (continued)

	30 kHz	50 kHz	70 kHz	100 kHz	200 kHz	300 kHz	500 kHz	700 kHz	800 kHz	1 MHz
0.002 V	650	650	650	650	700	700	800	1000	1000	1200
0.005 V	250	250	300	300	350	350	400	500	600	700
0.01 V	110	120	120	150	160	200	300	400	400	500
0.02 V	80	100	100	120	140	160	250	300	400	450
0.05 V	60	80	100	100	150	150	250	300	350	400
0.1 V	60	80	100	100	150	150	250	300	350	400
0.2 V	60	80	100	100	150	150	250	300	350	400
0.5 V	18	20	25	30	50	75	100	200	250	300
1 V	18	20	25	30	50	75	100	200	250	300
2 V	18	20	25	30	50	75	100	200	250	300
5 V	20	25	25	30	50	75	100	200	250	300
10 V	25	25	25	30	50	75	100	200	250	300
20 V	25	25	25	30	50	75	100	200	250	300
50 V	35	35	40	50	60	-	-	-	-	-
100 V	40	45	50	60	75	-	-	-	-	-
200 V	40	45	50	65	-	-	-	-	-	-
400 V	45	50	70	80	-	-	-	-	-	-
1000 V	50	60	80	100	-	-	-	-	-	-

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACI_Diff

	10 Hz to < 40 Hz	40 Hz to 10 kHz	> 10 kHz to 30 kHz	> 30 kHz to 50 kHz	> 50 kHz to 70 kHz	> 70 kHz to 100 kHz
1 mA to 5 mA	60	20	30	50	60	80
> 5 mA to 10 mA	10	6	6	6	9	10
> 10 mA to 20 mA	10	7	7	7	10	13
> 20 mA to 50 mA	14	10	10	10	15	17
> 50 mA to 100 mA	17	12	12	12	19	20
> 100 mA to 200 mA	20	14	14	14	22	23
> 200 mA to 500 mA	22	16	16	16	25	26
> 500 mA to 1 A	24	18	18	18	28	30
> 1 A to 2 A	26	20	20	20	32	32
> 2 A to 5 A	28	22	22	22	35	35
> 5 A to 10 A	30	25	25	50	80	80
> 10 A to 20 A	35	30	40	60	90	100
> 20 A to 50 A	40	35	50	70	90	110
> 50 A to 100 A	45	40	60	80	100	130

The expanded uncertainties given in this table are expressed in µA/A

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: ACI

	10 Hz to 20 Hz	20 Hz to 40 Hz	40 Hz to 1 kHz	1 kHz to 5 kHz	5 kHz to 10 kHz	10 kHz to 30 kHz
0.1 mA to 1 mA	-	120	120	160	360	-
1 mA to 1 A	55	45	30	30	30	35
1 A to 5 A	60	50	35	35	35	35
5 A to 10 A	60	55	40	40	40	55
10 A to 20 A	70	65	55	65	65	80
20 A to 50 A	110	90	85	95	95	120
50 A to 100 A	140	130	130	130	130	160

The expanded uncertainties given in this table are expressed in µA/A

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: P

	Current	PF	Apparent power	Active power	Reactive power
0.0001 VA to 14 VA	1 mA to 20 mA	1	25	-	-
0.0001 VA to 700 VA	20 mA to 1 A	1	200	-	-
0.0001 VA to 3.5 VA	1 A to 5 A	1	25	-	-
0.0001 VA to 35 kVA	5 A to 50 A	1	200	-	-
0.0001 W to 14 W	1 mA to 20 mA	1 to 0, inductive or capacitive	-	25	-
0.0001 W to 700 W	20 mA to 1 A	0.8 to 1, inductive or capacitive	-	250	-
0.0001 W to 700 W	20 mA to 1 A	0.5 to 0.8, inductive or capacitive	-	475	-
0.0001 W to 700 W	20 mA to 1 A	0 to 0.5, inductive or capacitive	-	800	-
0.0001 W to 3.5 W	1 A to 5 A	1 to 0, inductive or capacitive	-	25	-
0.0001 W to 35 W	5 A to 50 A	0.8 to 1, inductive or capacitive	-	250	-
0.0001 W to 35 W	5 A to 50 A	0.5 to 0.8, inductive or capacitive	-	475	-
0.0001 W to 35 kW	5 A to 50 A	0 to 0.5, inductive or capacitive	-	800	-
0.0001 var to 14 var	1 mA to 20 mA	0 to 1, inductive or capacitive	-	-	25
0.0001 var to 700 var	20 mA to 1 A	0 to 1, inductive or capacitive	-	-	320
0.0001 var to 3.5 kvar	1 A to 5 A	0 to 1, inductive or capacitive	-	-	25
0.0001 var to 35 kvar	5 A to 50 A	0 to 1, inductive or capacitive	-	-	320

The expanded uncertainties given in this table are expressed in µVA/VA for the apparent power, in µW/VA for the active power, and in µvar/VA for the reactive power

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Cap_1

	20 Hz to < 100 Hz	100 Hz to < 1 kHz	1 kHz	> 1 kHz to 50 kHz	> 50 kHz to 100 kHz	300 kHz	500 kHz	1 MHz	3 MHz	5 MHz	10 MHz
1 pF	30	30	30	70	70	80	80	120	510	1510	5100
10 pF	15	15	15	70	70	81	81	121	260	410	1100
100 pF	15	15	7	70	70	82	82	122	260	410	910
1000 pF	15	15	15	70	70	83	83	140	280	420	910
10 nF	15	15	15	120	210	310	310	510	-	-	-
100 nF	20	20	20	210	210	410	510	510	-	-	-
1000 nF	100	100	100	310	310	-	-	-	-	-	-
10 µF	100	100	100	310	410	-	-	-	-	-	-
100 µF	-	2000	5000	-	-	-	-	-	-	-	-
1000 µF	-	3000	5000	-	-	-	-	-	-	-	-
10 mF	-	3000	5000	-	-	-	-	-	-	-	-
100 mF	-	3000	-	-	-	-	-	-	-	-	-
1000 mF	-	10000	-	-	-	-	-	-	-	-	-

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Cap_2

	100 Hz	120 Hz	1 kHz
0.1 mF	0.7	0.7	1
1 mF	2	2	5
10 mF	5	5	-
100 mF	10	-	-
1 F	20	-	-

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Cap_3

	20 Hz to 50 Hz	> 50 Hz to 1 kHz	> 1 kHz to 100 kHz	> 100 kHz to 1 MHz	3 MHz	5 MHz	10 MHz
1 pF	-	0.00003	0.001	0.001	0.01	0.02	0.02
10 pF	-	0.000015	0.001	0.001	0.003	0.01	0.02
100 pF	0.0025	0.000015	0.001	0.001	0.003	0.01	0.02
2000 pF	0.001	0.000015	0.001	0.001	0.005	0.03	0.03
10 nF	0.001	0.000015	0.001	0.002	-	-	-
100 nF	0.001	0.00002	0.001	0.005	-	-	-
1000 nF	0.001	0.0001	0.002	0.01	-	-	-
10 µF	0.001	0.0001	0.01	0.01	-	-	-

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Cap_4

	50 Hz
10 pF	0.2
> 10 pF to < 100 pF	0.5
100 pF	0.2
> 100 pF to < 1000 pF	0.5
1000 pF	0.2
> 1000 pF to < 10 nF	0.5
10 nF	0.2
> 10 nF to < 100 nF	0.5
100 nF	0.2
> 100 nF to 100 µF	0.5
100 µF to 1 mF	1

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Diss_1

	Capacitance	20 Hz to 1 MHz	> 1 MHz to 10 MHz
0 to 0.1	1 pF to 2 nF	0.0005	-
0.001 to 0.1	1 pF to 2 nF	-	5E-03*D* to 3E-02*D*

where *D* is the dissipation factor

The expanded uncertainties given in this table are dimensionless

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Diss_2

	Capacitance	50 Hz
0 to 1	10 pF to 100 µF	0.00005 + 0.005*D*
0 to 1	100 µF to 1 mF	0.0001 + 0.005*D*

where *D* is the dissipation factor

The expanded uncertainties given in this table are dimensionless

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Ind_1

	100 Hz	100 Hz to 1 kHz	1 kHz
100 µH	0.22	0.23	0.17
1 mH	0.16	0.17	0.14
10 mH	0.16	0.17	0.14
100 mH	0.16	0.17	0.14
1 H	0.16	0.17	0.14
10 H	0.16	0.17	0.14

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Ind_2

	100 Hz	100 Hz to 1 kHz	1 kHz
100 µH	25	15	4
1 mH	4	3	2
10 mH	2	2	1
100 mH	1	1	1
1 H	1	1	1
10 H	1	1	1

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: Ind_3

	100 Hz	100 Hz to 1 kHz	1 kHz
100 µH	0.18	0.2	0.1
1 mH	0.13	0.15	0.08
10 mH	0.13	0.15	0.08
100 mH	0.13	0.15	0.08
1 H	0.13	0.15	0.08
10 H	0.13	0.15	0.08

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

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_P_1

	Connector Type	DC to 100 kHz	100 kHz to 2.5 MHz	2.5 MHz to 10 MHz	10 MHz to 1.3 GHz	1.3 GHz to 4 GHz	4 GHz to 8 GHz	8 GHz to 18 GHz	18 GHz to 26.5 GHz	10 Hz to 1 MHz	1 MHz to 30 MHz	30 MHz to 300 MHz	300 MHz to 3 GHz
0.2 fW to 100 fW	50 ohm, Type-N, PC-7, PC-3,5	-	-	50	50	-	-	-	-	-	-	-	-
100 fW to 0.3 nW	50 ohm, Type-N, PC-7, PC-3,5	-	-	10	10 to 40	-	-	-	-	-	-	-	-
0.3 nW to 100 nW	50 ohm, Type-N, PC-7, PC-3,5	-	-	-	40	50	50	50	-	-	-	-	-
100 nW to 10 µW	50 ohm, Type-N, PC-7, PC-3,5	-	-	-	30	40	50	50	-	-	-	-	-
10 µW to 1 mW	50 ohm, Type-N, PC-7, PC-3,5	20	10	10	10	20	30	40	40	-	-	-	-
1 mW to 10 mW	50 ohm, Type-N, PC-7, PC-3,5	20	10	10	10	20	30	40	40	-	-	-	-
10 mW to 100 mW	50 ohm, Type-N, PC-7, PC-3,5	20	10	10	10	20	30	40	40	-	-	-	-
0.1 W to 3 W	50 ohm, Type-N, PC-7, PC-3,5	-	20	20	30	40	50	60	-	-	-	-	-
3 W to 25 W	50 ohm, Type-N, PC-7, PC-3,5	-	20	20	30	40	-	-	-	-	-	-	-
100 fW to 1 µW	BNC, Type-N 75 ohm	-	-	-	-	-	-	-	-	50	50	50	-
1 µW to 100 mW	BNC, Type-N 75 ohm	-	-	-	-	-	-	-	-	30	30	30	30
100 fW to 800 µW	Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	-	-	-	50	50	-	-
800 µW to 100 mW	Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	-	-	-	30	30	-	-
100 fW to 800 µW	Balanced/Coaxial 600 ohm	-	-	-	-	-	-	-	-	50	-	-	-
800 µW to 100 mW	Balanced/Coaxial 600 ohm	-	-	-	-	-	-	-	-	30	-	-	-

The expanded uncertainties given in this table are expressed in mW/W

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_P_2

	DC to 1 GHz	1 GHz to 4 GHz	4 GHz to 10 GHz	10 GHz to 18 GHz	18 GHz to 26.5 GHz	10 Hz to 100 kHz	100 kHz to 1 MHz	1 MHz to 30 MHz	30 MHz to 300 MHz	300 MHz to 3 GHz
BNC, Type-N 50 ohm	0.008	0.010	0.013	0.015	-	-	-	-	-	-
PC-7 mm 50 ohm	0.008	0.010	0.013	0.015	-	-	-	-	-	-
PC-3.5 mm 50 ohm	0.008	0.010	0.013	0.015	0.020	-	-	-	-	-
BNC,Type-N 75 ohm	-	-	-	-	-	0.001	0.010	0.010	0.010	0.010
Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	0.001	0.010	0.010	-	-
Balanced/Coaxial 600 ohm	-	-	-	-	-	0.001	0.010	-	-	-

The expanded uncertainties given in this table are dimensionless

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_SRC

	abs(Sxx)	10 kHz to 18 GHz	18 GHz to 26.5 GHz
Type-N	0 to 0.1	0.01	-
Type-N	0.1 to 1	0.02	-
PC-7 mm	0 to 0.1	0.01	-
PC-7 mm	0.1 to 1	0.02	-
PC-3.5 mm	0 to 0.1	0.01	0.01
PC-3.5 mm	0.1 to 1	0.02	0.02

The expanded uncertainties given in this table are dimensionless

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_VRV

	abs(Sxx)	9 kHz to 3 GHz
BNC, Type-N 50 ohm and 75 ohm	0 to 0.1	0.005 to 0.015
BNC, Type-N 50 ohm and 75 ohm	0.1 to 1	0.015 to 0.1
PC-7 mm 50 ohm	0 to 0.1	0.005 to 0.015
PC-7 mm 50 ohm	0.1 to 1	0.015 to 0.1

The expanded uncertainties given in this table are dimensionless

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_ATT_1

	DC to 1.3 GHz	1.3 GHz to 18 GHz	18 GHz to 26.5 GHz
0 dB to 30 dB	0.02 to 0.03	0.03 to 0.08	0.08 to 0.2
30 dB to 60 dB	0.03 to 0.05	0.08 to 0.20	-
60 dB to 100 dB	0.05 to 0.08	-	-
100 dB to 120 dB	0.08 to 0.20	-	-

The expanded uncertainties given in this table are expressed in dB

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_DIR

	abs(Sxx)	10 MHz to 2 GHz	2 GHz to 3 GHz	3 GHz to 18 GHz	18 GHz to 26.5 GHz
Type N, 50 Ω	0 to 0.1	0.003	0.003	0.003 to 0.020	-
Type N, 75 Ω	0 to 0.1	0.005	-	-	-
PC-7 mm	0 to 0.1	0.003	0.003	0.003 to 0.020	-
PC-3.5 mm	0 to 0.1	0.003	0.003	0.003 to 0.020	0.010 to 0.020

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_V_1

	Connector Type	9 kHz to 30 MHz	0.03 GHz to 0.3 GHz	0.3 GHz to 0.5 GHz	0.5 GHz to 1.2 GHz	1.2 GHz to 2 GHz	9 kHz to 1 MHz	1 MHz to 30 MHz	30 MHz to 500 MHz
0.02 V to 0.1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5.5	5.5	5.5	5.5	5.5	-	-	-
0.1 V to 0.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5	5	5	5	5	-	-	-
0.2 V to 0.5 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	4.5	4.5	4.5	4.5	4.5	-	-	-
0.5 V to 1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	4.5	4.5	4.5	4.5	4.5	-	-	-
1 V to 2.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	4.5	4.5	4.5	4.5	4.5	-	-	-
0.002 V to 10 V	BNC, Type-N 75 ohm	-	-	-	-	-	5	10	12
0.002 V to 10 V	Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	5	10	-
0.002 V to 10 V	Balanced/Coaxial 600 ohm	-	-	-	-	-	5	-	-

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_V_2

	Connector Type	9 kHz to 30 MHz	0.03 GHz to 0.3 GHz	0.3 GHz to 0.5 GHz	0.5 GHz to 1.2 GHz	1.2 GHz to 2 GHz	9 kHz to 1 MHz	1 MHz to 30 MHz	30 MHz to 500 MHz
0.02 V to 0.1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	6	6	6	6	6	-	-	-
0.1 V to 0.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5.5	5.5	5.5	5.5	5.5	-	-	-
0.2 V to 0.5 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5	5	5	5	5	-	-	-
0.5 V to 1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5	5	5	5	5	-	-	-
1 V to 2.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	5	5	5	5	5	-	-	-
0.002 V to 10 V	BNC, Type-N 75 ohm	-	-	-	-	-	5	10	12
0.002 V to 10 V	Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	5	10	-
0.002 V to 10 V	Balanced/Coaxial 600 ohm	-	-	-	-	-	5	-	-

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: RF_V_3

	Connector Type	9 kHz to 30 MHz	0.03 GHz to 0.3 GHz	0.3 GHz to 0.5 GHz	0.5 GHz to 1.2 GHz	1.2 GHz to 2 GHz	9 kHz to 1 MHz	1 MHz to 30 MHz	30 MHz to 500 MHz
0.02 V to 0.1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	7.5	7.5	7.5	7.5	7.5	-	-	-
0.1 V to 0.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	7	7	7	7.5	7.5	-	-	-
0.2 V to 0.5 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	6	6	6	6.5	6.5	-	-	-
0.5 V to 1 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	6	6	6	6	6.5	-	-	-
1 V to 2.2 V	BNC, Type-N, PC-7, PC-3,5 50 ohm	6	6	6	6	6.5	-	-	-
0.002 V to 10 V	BNC, Type-N 75 ohm	-	-	-	-	-	5	10	12
0.002 V to 10 V	Balanced/Coaxial 100, 120, 124, 135, 150 ohm	-	-	-	-	-	5	10	-
0.002 V to 10 V	Balanced/Coaxial 600 ohm	-	-	-	-	-	5	-	-

The expanded uncertainties given in this table are expressed in mV/V

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: TI

	Sampling Oscilloscope	Time Interval Counter
-1 s to 10 ps	-	(0.1 + 1E-09*t*), *t* in ns
10 ps to 100 ps	(1 + 15E-03*t*), *t* in ps	(0.1 + 1E-09*t*), *t* in ns
0.1 ns to 1 ns	(2 + 6E-03*t*), *t* in ps	(0.1 + 1E-09*t*), *t* in ns
1 ns to 1000 ns	(8 + 1E-04*t*), *t* in ps	(0.1 + 1E-09*t*), *t* in ns
1000 ns to 5 s	-	(0.1 + 1E-09*t*), *t* in ns
5 s to 100000 s	-	(0.6 + 1E-09*t*), *t* in ns

The expanded uncertainties given in this table are expressed in ps

Electricity and Magnetism, Slovenia, MIRS/SIQ/Metrology (MIRS/Slovenian Institute of Quality and Metrology/Metrology)

Matrix: FM

	Carrier frequency	Modulating frequency	Expanded uncertainty
1 kHz to 200 kHz	0.15 MHz to 10 MHz	0.02 kHz to 10 kHz	20
1 kHz to 200 kHz	10 MHz to 1300 MHz	0.02 kHz to 0.05 kHz	50
1 kHz to 200 kHz	10 MHz to 1300 MHz	0.05 kHz to 100 kHz	10
1 kHz to 200 kHz	10 MHz to 1300 MHz	100 kHz to 200 kHz	50

The expanded uncertainties given in this table are expressed in mHz/Hz