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ИНСТИТУТ ЗА АКРЕДИТАЦИЈА НА РЕПУБЛИКА СЕВЕРНА МАКЕДОНИЈА

Institute for Accreditation of the Republic of North Macedonia

СЕРТИФИКАТ ЗА АКРЕДИТАЦИЈА

Бр. ЛК- 011
Accreditation Certificate No. LC-011

HTT – High Tech Tests

е акредитиран од
Институтот за акредитација на Република Северна Македонија

Со овој Сертификат се потврдува дека се исполнети барањата на стандардот:

МКС EN ISO/IEC 17025:2018

за дејностите кои се опишани во прилогот на овој Сертификат кој е означен со ист број.

This above-named entity is accredited by the Institute for Accreditation of the Republic of North Macedonia.
By this Certificate the fulfilment of the requirements of the standard
МКС ISO/IEC 17025:2018
is acknowledged for the field of accreditation in its full scope as described in the Annex to this Certificate marked with the same number.

Директор
Director
М-р Слободен Чокревски
Sloboden Chokrevski, Msc

Дата на додела на акредитацијата/ 26.10.2015
Date of the initial accreditation: 26.10.2015
Дата на реиздавање/*Reissuing Date*: 29.09.2023

Важи до/ *Valid until*: 25.10.2027

Прилог кон сертификатот за акредитација на лабораторија за калибрација
Annex to the Accreditation Certificate of Calibration Laboratory
Бр. ЛК-011 / *No. LC-011*

Датум:15.09.2025
Date:15.09.2025

Го заменува прилогот од: 18.09.2024
Replace the annex from: 18.09.2024

1.	**АКРЕДИТИРАНО ТЕЛО** ***Accredited body***	**HTT – High Tech Tests**
2.	**ЛОКАЦИЈА** ***Location***	***Municipal Unit No. 7, Street "Andrea Kushi", Building No.27, Apt. No. 5, Postal Code 1023, Tirana, ALBANIA***
3.	**СТАНДАРД** ***Standard***	**МКС EN ISO/IEC 17025 : 2018** ***MKS EN ISO/IEC 17025 : 2018***
4.	**КРАТОК ОПИС НА ОПСЕГОТ НА АКРЕДИТАЦИЈАТА** ***A short description of the accreditation scope***	**Калибрација на електрични броила; Калибрација на стандардни референтни броила и калибрација на мерни инструменти за електрични големини.** ***Calibration of Electric Meters; Calibration of Standard Reference Meters and Calibration of Measuring Instruments for Electrical Quantities.***

5. ДЕТАЛЕН ОПИС НА ОПСЕГОТ НА АКРЕДИТАЦИЈА
Detailed description of the accreditation scope

Подрачје (од ИАРСМ документот Р 15) / *Field (from the IARNM document R 15):*
5 - ELECTRICITY
5.6 – ENERGY

Локација каде се изведува калибрацијата / *Location where calibration is performed*:
Laboratory in Permanent location

Реден број *No.*	Предмет на калибрација *Subject of calibration*	Мерен опсег *Measuring range*	Калибрациска мерна можност *Calibration measurement capability (cmc)**	Метода на калибрација *Method of calibration*	Забелешка *Remark*
1	2	3	4	5	6
1	Electrical Energy Meters Class 0.2S; 0.5S; 0.5; C	Voltage: 0 V ÷ 300 V Current: 0 A ÷ 120 A Frequency: 45 Hz ÷ 65 Hz Phase Angle: $0^{\circ} \div 360^{\circ}$	0.027%; 0.066%	Self-Developed Procedure by HTT-High Tech Tests: PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE&MIEQ) IPR-305-1-Instruction for Calibration of Measuring Instrument of Energy (MIE) (Indicators) **User Manual PRS.600.3 + PPS.400.3** User Manual KP-P3001-C EA-4/02 M:2022, Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008, Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
2	Electric Energy Reference Standards Class 0.05 to 0.5	Voltage: 0 V ÷ 300 V Current: 0 A ÷ 120 A Frequency: 45 Hz ÷ 65 Hz Phase Angle: $0^{\circ} \div 360^{\circ}$	0.027%	Self-Developed Procedure by HTT-High Tech Tests: PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE&MIEQ) IPR-305-1-Instruction for Calibration of Measuring Instrument of Energy (MIE) (Indicators) IPR-305-2-Instruction for Calibration of Measuring Instrument of Energy with Power Source (MIE) (Generators)	/

				User Manual PRS.600.3 + PPS.400.3 EA-4/02 M:2022, Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008, Evaluation of measurement data – Guide to the expression of uncertainty in measurement	

Реден број *No.*	Предмет на калибрација *Subject of calibration*	Мерен опсег *Measuring range*	Калибрациска мерна можност *Calibration measurement capability (cmc)**	Метода на калибрација *Method of calibration*	Забелешка *Remark*
Локација каде се изведува калибрацијата / *Location where calibration is performed*: **Laboratory in Permanent location**					
Подрачје (од ИАРМ документот Р 15) / *Field (from the IARM document R 15):* **5 - ELECTRICITY** **5.1 - DC/LF Voltage**					
3	Digital and analog multimeters, voltmeters and measuring instruments of DC V which are primarily intended for measuring quantities of a different type	0 mV ÷ 329.9 mV	9.4 µV	Self-Developed Procedure by HTT-High Tech Tests: PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3-Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A User Manual: Fluke 5320A EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement	/
		0.33 V ÷ 3.29 V	61 µV		
		3.3 V ÷ 32.9 V	0.68 mV		
		33 V ÷ 329.9 V	8.4 mV		
		330 V ÷ 1020 V	29 mV		

				data – Guide to the expression of uncertainty in measurement	

4	Digital and analog multimeters, voltmeters and measuring instruments of AC V which are primarily intended for measuring quantities of a different type	1.0 mV ÷ 329.9 mV (10 Hz ÷ 500kHz)	0.32 mV	Self-Developed Procedure by HTT-High Tech Tests: PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3-Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A User Manual: Fluke 5320A EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
		0.33 V ÷ 3.29 V (10 Hz ÷ 500 kHz)	4.8 mV		
		3.3 V ÷ 32.9 V (10 Hz ÷ 500 kHz)	44 mV		
		33 V ÷ 329.9 V (10 Hz ÷ 500kHz)	0.98 V		
		330 V ÷ 1020 V (45 Hz ÷ 10kHz)	0.46 V		
5.2 - DC/LF Current					
5	Digital and analog multimeters, ammeters and measuring instruments of DC A which are primarily intended for measuring quantities	0 μA ÷ 329.9 μA	77 nA	Self-Developed Procedure by HTT-High Tech Tests: PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3-Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A	/
		0.33 mA ÷ 3.29 mA	0.44 μA		
		3.3 mA ÷ 32.9 mA	4.4 μA		
		33 mA ÷ 329.9 mA	66 μA		

	of a different type	0.33 A ÷ 2.9 A	6.2 mA	User Manual: Fluke 5320A User Manual: Fluke 52120A User Manual: Fluke Coil 3kA EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	
		3 A ÷ 20.5 A	23 mA		
		20.5 A ÷ 100 A	0.67 A		
		100 A ÷ 2500 A	1.7 A		
6	Digital and analog multimeters, ammeters and measuring instruments of AC A which are primarily intended for measuring quantities of a different type	29 µA ÷ 3.29 mA (10 Hz ÷ 30 kHz)	18 µA	Self-Developed Procedure by HTT-High Tech Tests: PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A User Manual: Fluke 5320A User Manual: Fluke 52120A User Manual: Fluke Coil 3kA EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M: 2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
		3.3 mA ÷ 32.9 mA (10 Hz ÷ 30 kHz)	80 µA		
		33 mA ÷ 329.9 mA (10 Hz ÷ 30 kHz)	0.98 mA		
		0.33 A ÷ 2.9 A (10 Hz ÷ 10 kHz)	84 mA		
		3 A ÷ 20.5 A (45 Hz ÷ 5 kHz)	0.63 A		
		20.5 A ÷ 120 A (10 Hz ÷ 10 kHz)	0.22 A		
		120 A ÷ 3000 A (10 Hz ÷ 10 kHz)	1.6 A		

5.8 – Resistance					
7	Digital and analog multimeters, ohm meters and measuring instruments of Ω which are primarily intended for measuring quantities of a different type	0.1 Ω ÷ 4.9 Ω	46 mΩ	Self-Developed Procedure by HTT-High Tech Tests: PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A User Manual: Fluke 5320A EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M: 2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
		5 Ω ÷ 29.9 Ω	94 mΩ		
		30 Ω ÷ 199.9 Ω	0.45 Ω		
		200 Ω ÷ 499.9 Ω	1.6 Ω		
		500 Ω ÷ 1.9 kΩ	4.2 Ω		
		2 kΩ ÷ 4.9 kΩ	13 Ω		
		5 kΩ ÷ 9.9 kΩ	20 Ω		
		10 kΩ ÷ 39.9 kΩ	88 Ω		
		40 kΩ ÷ 99.9 kΩ	0.23 kΩ		
		100 kΩ ÷ 199.9 kΩ	0.42 kΩ		
		200 kΩ ÷ 999.9 kΩ	2.3 kΩ		
		1 MΩ ÷ 9.9 MΩ	64 kΩ		
		10 MΩ ÷ 999.9 MΩ	5.7 MΩ		
		1 GΩ ÷ 10 GΩ	92 MΩ		
5.9 – Capacitance					
8	Digital and analog multimeters, and measuring instruments of capacitance which are primarily intended for measuring quantities of a different type	0.22 nF ÷ 32.9 nF	0.20 nF	Self-Developed Procedure by HTT-High Tech Tests: PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A EURAMET CG-15:2015 Guidelines on the	/
		33 nF ÷ 329.9 nF	1.2 nF		
		0.33 μF ÷ 3.29 μF	12 nF		
		3.3 μF ÷ 32.9 μF	0.21 μF		
		33 μF ÷ 329.9 μF	1.9 μF		
		0.33 mF ÷ 3.29 mF	19 μF		

		3.3 mF ÷ 32.9 mF	0.29 mF	Calibration of Digital Multimeters EA-4/02 M: 2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	
		33 mF ÷ 110 mF	1.4 mF		
Подрачје (од ИАРМ документот P 15) / *Field (from the IARM document R 15):* **4 – TIME AND FREQUENCY** **4.2 – Phase Angle**					
9	Digital and analog multimeters, and measuring instruments of Phase Angle which are primarily intended for measuring quantities of a different type	Phase (°) Watts/VARs (0° ÷ 90°)	0.61°	Self-Developed Procedure by HTT-High Tech Tests: PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A User Manual: Fluke 52120A User Manual: Fluke Coil 3kA EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
4.3 – Frequency					

10	Digital and analog multimeters, and measuring instruments of Frequency which are primarily intended for measuring quantities of a different type	0.01 Hz ÷ 119.9 Hz	8.2 mHz	Self-Developed Procedure by HTT-High Tech Tests: PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ) IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators) User Manual: Fluke 5522A EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	/
		120 Hz ÷ 1199.9 Hz	0.13 Hz		
		1.2 kHz ÷ 11.9 kHz	1.3 Hz		
		12 kHz ÷ 119.9 kHz	13 Hz		
		120 kHz ÷1199.9 kHz	82 Hz		
		1.2 MHz ÷ 2 MHz	0.58 kHz		

**Калибрационата мерна можност (CMC) во Колона 4 е претставена како проширена мерна неодреденост со фактор на покривање k=2, при што интервалот на доверба е приближно 95%.*
Calibration and measurement capability (CMC) in Column 4 is expressed as expanded measurement uncertainty with coverage factor k=2, such that the coverage probability corresponds to approximately 95 %.

м-р Нико Берберу
MSc Niko Berberu

Директор
Director