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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*

**НТТ – 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.*

в.д. Директор

Acting Director

Наташа Несторовска Спасовска  
Natasha Nestorovska Spasovska

Дата на додела на акредитацијата/ 26.10.2015

Date of the initial accreditation: 26.10.2015

Дата на реиздавање/Reissuing Date: 06.09.2019

Важи до/ Valid until: 25.10.2023

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

Датум: 30.11.2022  
Date: 30.11.2022

Го заменува прилогот од: 12.10.2022  
Replace the annex from: 12.10.2022

**1. АКРЕДИТИРАНО ТЕЛО**

*Accredited body*

**НТТ – 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) / <i>Field (from the IARNM document R 15):</i> <b>5 - ELECTRICITY</b> <b>5.6 - ENERGY</b>					
Локација каде се изведува калибрацијата / <i>Location where calibration is performed</i> Municipal Unit No. 7, Street "Andrea Kushi", Building No.27, Apt. No. 5, Postal Code 1023, Tirana, Albania					
Реден број <i>No.</i>	Предмет на калибрација <i>Subject of calibration</i>	Мерен опсег <i>Measuring range</i>	Калибрациска мерна можност <i>Calibration measurement capability (cmc)*</i>	Метода на калибрација <i>Method of calibration</i>	Забелешка <i>Remark</i>
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° ÷ 360°	0.03 % ÷ 0.04%	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	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
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° ÷ 360°	0.03%	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	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%

Реден број <i>No.</i>	Предмет на калибрација <i>Subject of calibration</i>	Мерен опсег <i>Measuring range</i>	Калибрациска мерна можност <i>Calibration measurement capability (cmc)*</i>	Метода на калибрација <i>Method of calibration</i>	Забелешка <i>Remark</i>
<p>Локација каде се изведува калибрацијата / <b>Location where calibration is performed:</b> Municipal Unit No. 7, Street “Andrea Kushi”, Building No.27, Apt. No. 5, Postal Code 1023, Tirana, Albania</p>					
<p>Подрачје (од ИАРМ документот Р 15) / <i>Field (from the IARM document R 15):</i> <b>5 - ELECTRICITY</b> <b>5.1 - DC/LF Voltage</b></p>					
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 ÷ 33 mV	24 µV	Self-Developed Procedure by HTT-High Tech Tests:  PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ)	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		33 mV ÷ 330 V	24 µV ÷ 23 mV	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	
		330 V ÷ 1020 V	26 mV ÷ 29 mV	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	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 ÷ 33 mV (10 Hz ÷ 500 kHz)	40 µV	<p>Self-Developed Procedure by HTT-High Tech Tests:</p> <p>PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE &amp; MIEQ)</p> <p>IPR-305-3-Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators)</p> <p>User Manual: Fluke 5522A User Manual: Fluke 5320A</p> <p>EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters</p> <p>EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration</p> <p>JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement</p>	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		33 mV ÷ 330 V (10 Hz ÷ 500 kHz)	24 mV ÷ 0.63 V		
		330 V ÷ 1020 V (45 Hz ÷ 10kHz)	0.31 V ÷ 0.35 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 of a different type	0 µA ÷ 330 µA	30 pA ÷ 50 µA	<p>Self-Developed Procedure by HTT-High Tech Tests:</p> <p>PR-305-Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE &amp; MIEQ)</p> <p>IPR-305-3-Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators)</p> <p>User Manual: Fluke 5522A User Manual: Fluke 5320A User Manual: Fluke 52120A User Manual: Fluke Coil 3kA</p> <p>EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters</p> <p>EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration</p> <p>JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement</p>	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		330 µA ÷ 330 mA	50 µA ÷ 80 mA		
		330 mA ÷ 3 A	24 mA ÷ 25 mA		
		3 A ÷ 20.5 A	24 mA ÷ 25 mA		
		20.5 A ÷ 3000 A	1.6 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 $\mu$ A $\div$ 330 $\mu$ A (10 Hz $\div$ 30 kHz)	0.16 $\mu$ A $\div$ 0.48 $\mu$ A	Self-Developed Procedure by HTT-High Tech Tests:  PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ)	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		330 $\mu$ A $\div$ 330 mA (10 Hz $\div$ 30 kHz)	24 $\mu$ A $\div$ 0.16 mA	IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators)	
		330 mA $\div$ 3 A (10 Hz $\div$ 30 kHz)	24 mA $\div$ 25 mA	User Manual: Fluke 5522A User Manual: Fluke 5320A User Manual: Fluke 52120A User Manual: Fluke Coil 3kA	
		3 A $\div$ 20.5 A (45 Hz $\div$ 10 kHz)	0.45 mA $\div$ 0.65 mA	EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters  EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration	
		20.5 A $\div$ 3000 A (10 Hz $\div$ 30 kHz)	1 A	JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	

#### 5.8 – Resistance

7	Digital and analog multimeters, ohm meters and measuring instruments of $\Omega$ which are primarily intended for measuring quantities of a different type	0 $\Omega$ $\div$ 330 $\Omega$	24 m $\Omega$ $\div$ 25 m $\Omega$	Self-Developed Procedure by HTT-High Tech Tests:  PR-305- Calibration of Measuring Instruments for Energy and Electrical Quantities (MIE & MIEQ)	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		330 $\Omega$ $\div$ 330 k $\Omega$	23 $\Omega$ $\div$ 25 $\Omega$	IPR-305-3- Instruction for Calibration of Instruments used for Measuring Electrical Quantities (Indicators)  User Manual: Fluke 5522A User Manual: Fluke 5320A	
		330 k $\Omega$ $\div$ 330 M $\Omega$	24 $\Omega$ $\div$ 66 k $\Omega$	EURAMET CG-15:2015 Guidelines on the Calibration of Digital Multimeters  EA-4/02 M:2022 Evaluation of the Uncertainty of Measurements in Calibration	
		330 M $\Omega$ $\div$ 10G $\Omega$	0.5M $\Omega$ $\div$ 0.74 M $\Omega$	JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement	

5.9 – Capacitance					
8	Digital and analog multimeters, and measuring instruments of capacitance which are primarily intended for measuring quantities of a different type	220 pF ÷ 330 nF	0.31 nF ÷ 97 pF	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	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%
		330 nF ÷ 33 mF	33 nF ÷ 0.67 mF	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	0.61 mF ÷ 1 mF		
<p>Подрачје (од ИАРМ документот Р 15) / Field (from the IARM document R 15):  <b>4 – TIME AND FREQUENCY</b>  <b>4.2 – Phase Angle</b></p>					
9	Digital and analog multimeters, and measuring instruments of Phase Angle which are primarily intended for measuring quantities of a different type	<b>Phase (Φ) Watts</b> (0° ÷ 90°)	0.25° ÷ 2.0°	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	The reported expanded uncertainty is stated as the combined standard uncertainty of measurements multiplied by a coverage factor k=2,

		<b>Phase (<math>\Phi</math>) VARs</b> ( $90^\circ \div 0^\circ$ )	$0.25^\circ \div 2.0^\circ$	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	which for a normal distribution corresponds to a coverage probability of approximatel y 95%
<b>4.3 – Frequency</b>					
10	Digital and analog multimeters, and measuring instruments of Frequency which are primarily intended for measuring quantities of a different type	$0.01 \text{ Hz} \div 1.2 \text{ kHz}$	$20 \text{ mHz} \div 0.10 \text{ kHz}$	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	The reported expanded uncertainty is stated as the combined standard uncertainty of measurement s multiplied by a coverage factor $k=2$ , which for a normal distribution corresponds to a coverage probability of approximatel y 95%

Ова е електронска верзија од Прилогот кон сертификатот за акредитација

*This is on line copy of the Annex to the accreditation certificate*

м-р Слободен Чокревски  
*MSc Sloboden Chokrevski*

Директор  
*Director*