



## Potvrda o akreditaciji Accreditation Certificate

### Ovime se utvrđuje da je

This is to recognize that

**CEI-IETA d.o.o.**

**Mjeriteljski laboratorij**

Nikole Božidarevića 13, HR-10000 Zagreb

### osposobljen prema zahtjevima norme

is competent according to

**HRN EN ISO/IEC 17025:2017**

(ISO/IEC 17025:2017;

EN ISO/IEC 17025:2017)

za/to carry out

**Umjeravanje etalona i mjerila: električnih veličina, frekvencije, vremenskog intervala, temperature, tlaka, relativne vlažnosti, osvjetljenja i brzine protoka zraka**

Calibration of measurement standards and electrical measuring instruments, frequency, time interval, temperature, pressure, relative humidity, illuminance and airflow velocity

**u području opisanom u prilogu koji je sastavni dio ove potvrde o akreditaciji.**

for the scope described in the annex which is the constituent part of this accreditation certificate.

**Br./No.:** 2058

**Klasa/Ref.No.:** 383-02/19-80/008

**Urbroj/Id.No.:** 569-02/8-19-64

Zagreb, 2019-10-02

**Akreditacija istječe**•Accreditation expiry: 2024-09-15

**Prva akreditacija**•Initial accreditation: 2004-09-03

**HAA je potpisnica multilateralnog sporazuma s Europskom organizacijom za akreditaciju (EA)**

HAA is a signatory of the European co-operation for Accreditation (EA) Multilateral Agreement

**v.d. Ravnatelja:**

Acting Director General:

Tihomir Babić, dipl. ing.



**HAA**

**Hrvatska akreditacijska agencija**  
Croatian Accreditation Agency



Hrvatska akreditacijska agencija  
Croatian Accreditation Agency

**PRILOG POTVRDI O AKREDITACIJI br.: 2058**

*Annex to the Accreditation Certificate No.:*

Klasa/Ref. No.: 383-02/19-80/008

Urbroj/Id. No.: 569-02/8-21-13

Datum izdanja priloga /Annex Issued on: 2021-04-21

Zamjenjuje prilog/Replaces Annex:

Klasa/Ref. No.: 383-02/19-80/008

Urbroj/Id. No.: 569-02/8-19-63

Datum/Date: 2019-10-02

**Norma: HRN EN ISO/IEC 17025:2017**

*Standard: (ISO/IEC 17025:2017; EN ISO/IEC 17025:2017)*

**Akreditacija istječe: 2024-09-15**

*Accreditation expiry:*

**Prva akreditacija: 2004-09-03**

*Initial accreditation:*

**Akreditirani laboratorij**

*Accredited laboratory*

**CEI-IETA d.o.o.**

**Mjeriteljski laboratorij**

Nikole Božidarevića 13, HR-10000 Zagreb

**Područje akreditacije:**

*Scope of Accreditation:*

**Umjeravanje etalona i mjerila: električnih veličina, frekvencije,  
vremenskog intervala, temperature, tlaka, relativne vlažnosti,  
osvjetljenja i brzine protoka zraka**

*Calibration of measurement standards and electrical measuring instruments,  
frequency, time interval, temperature, pressure, relative humidity,  
illuminance and airflow velocity*

Važeće izdanje Priloga dostupno je na web adresi: [www.akreditacija.hr](http://www.akreditacija.hr) /  
*Valid issue of the Annex is available at the web address: [www.akreditacija.hr](http://www.akreditacija.hr)*

**Ravnateljica:**

*Director General:*

**mr. sc. Mirela Zečević**

**PODRUČJE AKREDITACIJE / SCOPE OF ACCREDITATION**

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
1.	Istosmjerni napon DC Voltage	0 mV do/to 120 mV		$1,5 \cdot 10^{-5} \cdot U + 2 \mu\text{V}$	Vlastiti postupci In-house procedures	Mjerenje + generiranje Measurement + generating
		120 mV do/to 1000 V		$1,5 \cdot 10^{-5} \cdot U$	TP-ELQ-01-U Izdanje/Issue 05 2021-02-09;	
		1 kV do/to 7,5 kV		$1,6 \cdot 10^{-2} \cdot U$	TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09	Mjerenje / Measurement
		7,5 kV do/to 15 kV		$1,5 \cdot 10^{-2} \cdot U$		
		15 kV do/to 30 kV		$1,5 \cdot 10^{-2} \cdot U$		
		30 kV do/to 40 kV		$2,4 \cdot 10^{-2} \cdot U$	EURAMET cg-15 v.3.0, 2015-02	
2.	Izmjenični napon AC Voltage	0 mV do/to 10 mV	1 Hz do/to 40 Hz	$4,0 \cdot 10^{-4} \cdot U + 6 \mu\text{V}$	Vlastiti postupci In-house procedures TP-ELQ-01-U Izdanje/Issue 05 2021-02-09;	Mjerenje / Measurement
			40 Hz do/to 1 kHz	$2,5 \cdot 10^{-4} \cdot U + 5 \mu\text{V}$		
			1 kHz do/to 20 kHz	$4,0 \cdot 10^{-4} \cdot U + 5 \mu\text{V}$		
			20 kHz do/to 50 kHz	$1,2 \cdot 10^{-3} \cdot U + 5 \mu\text{V}$		
			50 kHz do/to 100 kHz	$6,0 \cdot 10^{-3} \cdot U + 5 \mu\text{V}$		
			100 kHz do/to 300 kHz	$4,7 \cdot 10^{-2} \cdot U + 5,5 \mu\text{V}$		
			300 kHz do/to 1 MHz	$1,4 \cdot 10^{-2} \cdot U + 7,5 \mu\text{V}$		
			1 MHz do/to 2 MHz	$8,5 \cdot 10^{-2} \cdot U + 9,5 \mu\text{V}$		
		10 mV do/to 10 V	1 Hz do/to 1 kHz	$4,0 \cdot 10^{-4} \cdot U$	TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09	
			1 kHz do/to 20 kHz	$2,0 \cdot 10^{-4} \cdot U$		
		10 mV do/to 10 V	20 kHz do/to 50 kHz	$4,0 \cdot 10^{-4} \cdot U$	EURAMET cg-15 v.3.0, 2015-02	
			50 kHz do/to 100 kHz	$1,0 \cdot 10^{-3} \cdot U$		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
2.↑	Izmjenični napon AC Voltage	10 mV do/to 10 V	100 kHz do/to 300 kHz	$4,0 \cdot 10^{-3} \cdot U$	Vlastiti postupci In-house procedures TP-ELQ-01-U Izdanje/Issue 05 2021-02-09;  TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09  EURAMET cg-15 v.3.0, 2015-02	Mjerenje / Measurement
			300 kHz do/to 1 MHz	$1,2 \cdot 10^{-2} \cdot U$		
			1 MHz do/to 2 MHz	$3,0 \cdot 10^{-2} \cdot U$		
		10 V do/to 100 V	1 Hz do/to 20 kHz	$3,0 \cdot 10^{-4} \cdot U$		
			20 kHz do/to 50 kHz	$4,5 \cdot 10^{-4} \cdot U$		
			50 kHz do/to 100 kHz	$1,5 \cdot 10^{-3} \cdot U$		
			100 kHz do/to 300 kHz	$5,0 \cdot 10^{-3} \cdot U$		
		100 V do/to 1000 V	300 kHz do/to 1 MHz	$1,8 \cdot 10^{-2} \cdot U$		
			1 Hz do/to 40 Hz	$5,5 \cdot 10^{-4} \cdot U$		
			40 Hz do/to 1 kHz	$5,0 \cdot 10^{-4} \cdot U$		
			1 kHz do/to 20 kHz	$7,5 \cdot 10^{-4} \cdot U$		
		1 kV do/to 7,5 kV	20 kHz do/to 50 kHz	$1,5 \cdot 10^{-3} \cdot U$		
			50 kHz do/to 100 kHz	$3,5 \cdot 10^{-3} \cdot U$		
			50 Hz	$1,5 \cdot 10^{-2} \cdot U$		
		7,5 kV do/to 15 kV	50 Hz	$1,5 \cdot 10^{-2} \cdot U$		
		15 kV do/to 30 kV	50 Hz	$1,5 \cdot 10^{-2} \cdot U$		
		0 mV do/to 10 mV	10 Hz do/to 3 kHz	$8,5 \cdot 10^{-4} \cdot U + 0,45 \text{ mV}$		
			3 kHz do/to 10 kHz	$1,5 \cdot 10^{-3} \cdot U + 0,6 \text{ mV}$		
			10 kHz do/to 30 kHz	$2,0 \cdot 10^{-3} \cdot U + 1,2 \text{ mV}$		
			30 kHz do/to 50 kHz	$3,0 \cdot 10^{-3} \cdot U + 2,3 \text{ mV}$		
10 mV do/to 32 mV	50 kHz do/to 100 kHz	$4,5 \cdot 10^{-3} \cdot U + 6 \text{ mV}$				
	10 Hz do/to 3 kHz	$4,0 \cdot 10^{-3} \cdot U$				
	3 kHz do/to 10 kHz	$5,5 \cdot 10^{-3} \cdot U$				
	10 kHz do/to 30 kHz	$9,5 \cdot 10^{-3} \cdot U$				
	30 kHz do/to 50 kHz	$1,9 \cdot 10^{-2} \cdot U$				
		50 kHz do/to 100 kHz	$5,0 \cdot 10^{-2} \cdot U$		Generiranje / Generating	

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
2.↑	Izmjenični napon AC Voltage	32 mV do/to 3,2 V	10 Hz do/to 3 kHz	$9,0 \cdot 10^{-4} \cdot U$	Vlastiti postupci In-house procedures TP-ELQ-01-U Izdanje/Issue 05 2021-02-09; TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09 EURAMET cg-15 v.3.0, 2015-02	Generiranje / Generating
			3 kHz do/to 10 kHz	$1,5 \cdot 10^{-3} \cdot U$		
			10 kHz do/to 30 kHz	$2,0 \cdot 10^{-3} \cdot U$		
			30 kHz do/to 50 kHz	$3,0 \cdot 10^{-3} \cdot U$		
			50 kHz do/to 100 kHz	$5,0 \cdot 10^{-3} \cdot U$		
		3,2 V do/to 105 V	10 Hz do/to 10 kHz	$1,5 \cdot 10^{-3} \cdot U$		
			10 kHz do/to 30 kHz	$2,5 \cdot 10^{-3} \cdot U$		
			30 kHz do/to 50 kHz	$3,5 \cdot 10^{-3} \cdot U$		
		105 V do/to 800 V	50 kHz do/to 100 kHz	$6,5 \cdot 10^{-3} \cdot U$		
			40 Hz do/to 100 Hz	$6,0 \cdot 10^{-3} \cdot U$		
		800 V do/to 1050 V	100 Hz do/to 10 kHz	$4,0 \cdot 10^{-3} \cdot U$		
			10 kHz do/to 30 kHz	$4,5 \cdot 10^{-3} \cdot U$		
10 kHz do/to 20 kHz	$4,5 \cdot 10^{-3} \cdot U$					
3.	Istosmjerna struja DC Current	0 do/to 100 nA		$4,5 \cdot 10^{-5} \cdot I + 0,05 \text{ nA}$	Vlastiti postupci In-house procedures TP-ELQ-01-U Izdanje/Issue 05 2021-02-09 TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09 EURAMET cg-15 v.3.0, 2015-02	Mjerenje / Measurement
		100 nA do/to 1 μA		$8,0 \cdot 10^{-5} \cdot I$		
		1 μA do/to 100 μA		$4,5 \cdot 10^{-5} \cdot I$		
		100 μA do/to 10 mA		$4,0 \cdot 10^{-5} \cdot I$		
		10 mA do/to 100 mA		$5,5 \cdot 10^{-5} \cdot I$		
		100 mA do/to 1 A		$1,5 \cdot 10^{-4} \cdot I$		
		1 A do/to 20 A		$2,0 \cdot 10^{-3} \cdot I$		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
3. ↑	Istosmjerna struja DC Current	4 A do/to 600 A		$4,0 \cdot 10^{-3} \cdot I$	Vlastiti postupak In-house procedure TP-ELQ-02-I Izdanje/Issue 06 2021-02-09	Mjerenje pomoću strujnog transformatora Measurement with current transformer
		0 μA do/to 320 μA		$2,0 \cdot 10^{-4} \cdot I + 0,015 \mu\text{A}$	Vlastiti postupci In-house procedures TP-ELQ-02-I Izdanje/Issue 06 2021-02-09;	Generiranje /Generating
		0,32 mA do/to 32 mA		$2,0 \cdot 10^{-4} \cdot I$	TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09	
		32 mA do/to 320 mA		$2,5 \cdot 10^{-4} \cdot I$		
		0,32 A do/to 10,5 A		$7,5 \cdot 10^{-4} \cdot I$		
		10,5 A do/to 20 A		$9,0 \cdot 10^{-4} \cdot I$	EURAMET cg-15 v.3.0, 2015-02	
		10 μA do/to 320 μA		$2,0 \cdot 10^{-4} \cdot I + 0,02 \mu\text{A}$	Vlastiti postupak In-house procedure TP-ELQ-02-I Izdanje/Issue 06 2021-02-09	Generiranje / Generating  Umjeravanje strujnih kliješta Current clamp calibration
		0,32 mA do/to 3,2 mA		$2,0 \cdot 10^{-4} \cdot I + 0,2 \mu\text{A}$		
		3,2 mA do/to 32 mA		$2,0 \cdot 10^{-4} \cdot I + 2 \mu\text{A}$		
		32 mA do/to 320 mA		$2,0 \cdot 10^{-4} \cdot I + 0,05 \text{ mA}$		
		0,32 A do/to 3,2 A		$7,0 \cdot 10^{-4} \cdot I + 0,01 \text{ A}$		
		3,2 A do/to 105 A		$2,5 \cdot 10^{-3} \cdot I + 0,2 \text{ A}$		
		105 A do/to 160 A		$2,5 \cdot 10^{-3} \cdot I + 0,4 \text{ A}$		
		160 A do/to 525 A		$2,5 \cdot 10^{-3} \cdot I + 1 \text{ A}$		
525 A do/to 1000 A		$2,5 \cdot 10^{-3} \cdot I + 2 \text{ A}$				

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
4.	Izmjenična struja AC Current	0 μA do/to 100 μA	10 Hz do/to 20 Hz	$5,0 \cdot 10^{-3} \cdot I + 0,035 \mu A$	Vlastiti postupci In-house procedures TP-ELQ-02-I Izdanje/Issue 06 2021-02-09; TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09 EURAMET cg-15 v.3.0, 2015-02	Mjerenje /Measurement
			20 Hz do/to 45 Hz	$2,0 \cdot 10^{-3} \cdot I + 0,035 \mu A$		
			45 Hz do/to 5 kHz	$7,5 \cdot 10^{-4} \cdot I + 0,035 \mu A$		
		100 μA do/to 100 mA	10 Hz do/to 20 Hz	$5,0 \cdot 10^{-3} \cdot I$		
			20 Hz do/to 45 Hz	$2,0 \cdot 10^{-3} \cdot I$		
			45 Hz do/to 100 Hz	$9,5 \cdot 10^{-4} \cdot I$		
			100 Hz do/to 5 kHz	$6,2 \cdot 10^{-4} \cdot I$		
			5 kHz do/to 20 kHz	$2,5 \cdot 10^{-3} \cdot I$		
			20 kHz do/to 50 kHz	$5,5 \cdot 10^{-3} \cdot I$		
		100 mA do/to 1 A	50 kHz do/to 100 kHz	$8,5 \cdot 10^{-3} \cdot I$		
			10 Hz do/to 20 Hz	$5,0 \cdot 10^{-3} \cdot I$		
			20 Hz do/to 45 Hz	$2,5 \cdot 10^{-3} \cdot I$		
			45 Hz do/to 100 Hz	$1,5 \cdot 10^{-3} \cdot I$		
		100 mA do/to 1 A	100 Hz do/to 5 kHz	$2,0 \cdot 10^{-3} \cdot I$		
			5 kHz do/to 20 kHz	$5,4 \cdot 10^{-3} \cdot I$		
		1 A do/to 20 A	20 kHz do/to 50 kHz	$1,3 \cdot 10^{-2} \cdot I$		
			0,05 Hz do/to 45 Hz	$1,0 \cdot 10^{-3} \cdot I$		
		1 A do/to 2,5 A	45 Hz do/to 65 Hz	$2,0 \cdot 10^{-3} \cdot I$		
		2,5 A do/to 20 A	45 Hz do/to 65 Hz	$2,5 \cdot 10^{-3} \cdot I$		
		1 A do/to 20 A	65 Hz do/to 1 kHz	$2,0 \cdot 10^{-3} \cdot I$		
1 kHz do/to 3 kHz	$1,5 \cdot 10^{-3} \cdot I$					
3 kHz do/to 15 kHz	$9,0 \cdot 10^{-3} \cdot I$					
4 A do/to 600 A	0,05 Hz do/to 1 kHz	$4,0 \cdot 10^{-3} \cdot I$	Vlastiti postupak In-house procedure TP-ELQ-02-I Izdanje/Issue 06 2021-02-09	Mjerenje pomoću strujnog transformatora Measurement with current transformer		

Umjeravanje u laboratoriju / Calibration performed in the laboratory							
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
Umjeravanje u laboratoriju / Calibration performed in the laboratory							
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
4. ↑	Izmjenična struja AC Current	4 A do/to 1000 A	2 Hz do/to 10 Hz	$1,5 \cdot 10^{-2} \cdot I$	Vlastiti postupak In-house procedure TP-ELQ-02-I Izdanje/Issue 06 2021-02-09	Mjerenje pomoću strujnih kliješta Measurement with current clamp	
			10 Hz do/to 45 Hz	$4,0 \cdot 10^{-3} \cdot I$			
		4 A do/to 20 A 20 A do/to 120 A 120 A do/to 240 A 240 A do/to 1000 A	45 Hz do/to 65 Hz	$8,5 \cdot 10^{-3} \cdot I$			
				$5,5 \cdot 10^{-3} \cdot I$			
				$7,0 \cdot 10^{-3} \cdot I$			
				$5,5 \cdot 10^{-3} \cdot I$			
		4 A do/to 120 A 120 A do/to 1000 A	65 Hz do/to 1 kHz	$1,5 \cdot 10^{-2} \cdot I$			
				$2,0 \cdot 10^{-2} \cdot I$			
		10 μA do/to 3,2 mA 3,2 mA do/to 32 mA	10 Hz do/to 3 kHz	$1,5 \cdot 10^{-3} \cdot I + 3 \mu\text{A}$			
				$1,5 \cdot 10^{-3} \cdot I + 0,03 \text{ mA}$			
		32 mA do/to 320 mA 320 mA do/to 3,2 A	10 Hz do/to 3 kHz	$1,5 \cdot 10^{-3} \cdot I + 1 \text{ mA}$			
				$3,0 \cdot 10^{-3} \cdot I + 10 \text{ mA}$			
		3,2 A do/to 32 A 32 A do/to 160 A	10 Hz do/to 100 Hz	$4,0 \cdot 10^{-3} \cdot I + 0,2 \text{ A}$			
				$4,0 \cdot 10^{-3} \cdot I + 0,6 \text{ A}$			
		160 A do/to 500 A 500 A do/to 1000 A	10 Hz do/to 50 Hz	$4,0 \cdot 10^{-3} \cdot I + 3 \text{ A}$			
				$4,0 \cdot 10^{-3} \cdot I + 3 \text{ A}$			
		3,2 A do/to 32 A 32 A do/to 200 A	100 Hz do/to 440 Hz	$1,5 \cdot 10^{-2} \cdot I + 0,2 \text{ A}$			
				$1,0 \cdot 10^{-2} \cdot I + 0,5 \text{ A}$			
		0 μA do/to 32 μA	10 Hz do/to 3 kHz 3 kHz do/to 10 kHz 10 kHz do/to 20 kHz 20 kHz do/to 30 kHz	$1,5 \cdot 10^{-3} \cdot I + 1,1 \mu\text{A}$		Vlastiti postupci In-house procedures TP-ELQ-02-I Izdanje/Issue 06 2021-02-09;	Generiranje / generating
				$3,5 \cdot 10^{-3} \cdot I + 2,1 \mu\text{A}$			
$5,5 \cdot 10^{-3} \cdot I + 7 \mu\text{A}$							
$8,0 \cdot 10^{-3} \cdot I + 11 \mu\text{A}$							
32 μA do/to 320 μA	10 Hz do/to 3 kHz 3 kHz do/to 10 kHz	$3,0 \cdot 10^{-3} \cdot I$	TP-ELQ-07-DMM				
		$1,3 \cdot 10^{-2} \cdot I$					



Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
			10 kHz do/to 20 kHz	$4,5 \cdot 10^{-2} \cdot I$	Izdanje/Issue 05 2021-02-09	
			20 kHz do/to 30 kHz	$9,2 \cdot 10^{-2} \cdot I$	EURAMET cg-15 v.3.0, 2015-02	
4. ↑	Izmjenična struja AC Current	0,32 mA do/to 3,2 mA	10 Hz do/to 3 kHz	$2,0 \cdot 10^{-3} \cdot I$	Vlastiti postupci In-house procedures TP-ELQ-02-I Izdanje/Issue 06 2021-02-09; TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09 EURAMET cg-15 v.3.0, 2015-02	Generiranje / Generating
			3 kHz do/to 10 kHz	$4,0 \cdot 10^{-3} \cdot I$		
			10 kHz do/to 20 kHz	$8,0 \cdot 10^{-3} \cdot I$		
			20 kHz do/to 30 kHz	$1,4 \cdot 10^{-2} \cdot I$		
		3,2 mA do/to 32 mA	10 Hz do/to 3 kHz	$2,0 \cdot 10^{-3} \cdot I$		
			3 kHz do/to 10 kHz	$3,5 \cdot 10^{-3} \cdot I$		
		3,2 mA do/to 32 mA	10 kHz do/to 20 kHz	$7,0 \cdot 10^{-3} \cdot I$		
			20 kHz do/to 30 kHz	$1,1 \cdot 10^{-2} \cdot I$		
		32 mA do/to 320 mA	10 Hz do/to 3 kHz	$2,0 \cdot 10^{-3} \cdot I$		
			3 kHz do/to 10 kHz	$3,5 \cdot 10^{-3} \cdot I$		
			10 kHz do/to 20 kHz	$5,5 \cdot 10^{-3} \cdot I$		
		0,32 A do/to 3,2 A	20 kHz do/to 30 kHz	$8,0 \cdot 10^{-3} \cdot I$		
			10 Hz do/to 3 kHz	$3,0 \cdot 10^{-3} \cdot I$		
		3,2 A do/to 10,5 A	3 kHz do/to 10 kHz	$1,4 \cdot 10^{-2} \cdot I$		
			10 Hz do/to 3 kHz	$4,0 \cdot 10^{-3} \cdot I$		
		10,5 A do/to 20 A	3 kHz do/to 10 kHz	$1,5 \cdot 10^{-2} \cdot I$		
10 Hz do/to 3 kHz	$4,5 \cdot 10^{-3} \cdot I$					
5.	Otpor /Resistance	0 Ω do/to 10 Ω		$2,5 \cdot 10^{-5} \cdot R + 0,12 \text{ m}\Omega$	Vlastiti postupci In-house procedures TP-ELQ-03-R Izdanje/Issue 05; 2021-02-09; TP-ELQ-07-DMM	Mjerenje / Measurement
		10 Ω do/to 100 Ω		$3,5 \cdot 10^{-5} \cdot R$		
		100 Ω do/to 100 kΩ		$2,0 \cdot 10^{-5} \cdot R$		
		100 kΩ do/to 1 MΩ		$3,0 \cdot 10^{-5} \cdot R$		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
		1 MΩ do/to 10 MΩ		$1,0 \cdot 10^{-4} \cdot R$	Izdanje/Issue 05 2021-02-09	
		10 MΩ do/to 100 MΩ		$1,5 \cdot 10^{-3} \cdot R$		
		100 MΩ do/to 1 GΩ		$1,2 \cdot 10^{-2} \cdot R$	EURAMET cg-15 v.3.0, 2015-02	
5. ↑	Otpor /Resistance	0 Ω do/to 0,06 Ω	1 kHz	$5,0 \cdot 10^{-2} \cdot R + 0,6 \text{ m}\Omega$	Vlastiti postupci In-house procedures TP-ELQ-03-R Izdanje/Issue 05 2021-02-09; TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09 EURAMET cg-15 v.3.0, 2015-02	Mjerenje / Measurement
		0,06 Ω do/to 0,6 Ω		$5,0 \cdot 10^{-3} \cdot R$		
		0,6 Ω do/to 6 Ω		$2,5 \cdot 10^{-3} \cdot R$		
		6 Ω do/to 100 Ω		$2,0 \cdot 10^{-3} \cdot R$		
		100 Ω do/to 1,6 kΩ		$2,5 \cdot 10^{-3} \cdot R$		
		1,6 kΩ do/to 400 kΩ		$3,5 \cdot 10^{-3} \cdot R$		
		400 kΩ do/to 4 MΩ		$5,0 \cdot 10^{-3} \cdot R$		
		0,06 mΩ (1000 A, 60 mV)	$1,0 \cdot 10^{-2} \cdot R$	Generiranje / Generating		
		0,4 mΩ (150 A, 60 mV)	$6,1 \cdot 10^{-3} \cdot R$			
		0,6 mΩ (100 A, 60 mV)	$5,8 \cdot 10^{-3} \cdot R$			
		1,5 mΩ (40 A, 60 mV)	$5,8 \cdot 10^{-3} \cdot R$	Shunt /Shunt		
		2 mΩ (30 A, 60 mV)	$5,8 \cdot 10^{-3} \cdot R$			
		0,01 Ω do/to 0,1 Ω	$4,7 \cdot 10^{-2} \cdot R$	Generiranje / Generating		
		0,1 Ω do/to 1 Ω	$7,0 \cdot 10^{-3} \cdot R$			
		1 Ω do/to 10 Ω	$1,5 \cdot 10^{-3} \cdot R$			
		10 Ω do/to 100 Ω	$5,0 \cdot 10^{-4} \cdot R$	Dekada / Decade		
		100 Ω do/to 10 MΩ	$1,5 \cdot 10^{-4} \cdot R$			
		0 Ω do/to 40 Ω	$3,0 \cdot 10^{-4} \cdot R + 0,012 \Omega$	Generiranje / Generating		
		40 Ω do/to 400 Ω	$2,5 \cdot 10^{-4} \cdot R$			
		0,4 kΩ do/to 40 kΩ	$2,0 \cdot 10^{-4} \cdot R$			
40 kΩ do/to 400 kΩ	$2,5 \cdot 10^{-4} \cdot R$					
0,4 MΩ do/to 4 MΩ	$3,0 \cdot 10^{-4} \cdot R$					

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
		4 MΩ do/to 40 MΩ		$6,5 \cdot 10^{-4} \cdot R$		
		40 MΩ do/to 400 MΩ		$8,5 \cdot 10^{-4} \cdot R$		
		100 MΩ		$1,0 \cdot 10^{-4} \cdot R$		
5. ↑	Otpor /Resistance	1 GΩ		$1,0 \cdot 10^{-3} \cdot R$	Vlastiti postupci In-house procedures TP-ELQ-03-R Izdanje/Issue 05 2021-02-09 TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09  EURAMET/cg-15 v.3.0, 2015-02	Generiranje / Generating
		10 GΩ		$5,0 \cdot 10^{-3} \cdot R$		
		100 GΩ		$2,8 \cdot 10^{-3} \cdot R$		
		1 TΩ		$1,7 \cdot 10^{-2} \cdot R$		
6.	Kapacitet Capacitance	0 pF do/to 4 pF	1 kHz	$5,0 \cdot 10^{-2} \cdot C + 0,01 \text{ pF}$	Vlastiti postupak In-house procedure TP-ELQ-04-C Izdanje/Issue 04, 2021-02-09	Mjerenje / Measurement
		4 pF do/to 40 pF		$5,0 \cdot 10^{-3} \cdot C$		
		40 pF do/to 25 μF		$6,0 \cdot 10^{-4} \cdot C$		
		25 μF do/to 250 μF		$5,0 \cdot 10^{-3} \cdot C$		
		250 μF do/to 2500 μF		$5,0 \cdot 10^{-2} \cdot C$		
		1 pF do/to 10 pF		$5,9 \cdot 10^{-2} \cdot C$		
		10 pF do/to 100 pF		$6,5 \cdot 10^{-3} \cdot C$		Generiranje / Generating
		100 pF do/to 1000 pF		$1,5 \cdot 10^{-3} \cdot C$		
		1 nF do/to 10 nF		$6,5 \cdot 10^{-4} \cdot C$		
		10 nF do/to 1 μF		$6,0 \cdot 10^{-4} \cdot C$		
		1 μF do/to 10 μF		$2,4 \cdot 10^{-2} \cdot C$		
		0,5 nF do/to 4 nF		$1,6 \cdot 10^{-2} \cdot C$		
		4 nF do/to 40 nF		$9,0 \cdot 10^{-3} \cdot C$		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks
		40 nF do/to 400 nF		$8,0 \cdot 10^{-3} \cdot C$		
		400 nF do/to 4 $\mu$ F		$1,1 \cdot 10^{-2} \cdot C$		
		4 $\mu$ F do/to 4 mF		$1,3 \cdot 10^{-2} \cdot C$		
		4 mF do/to 40 mF		$2,7 \cdot 10^{-2} \cdot C$		
7.	Induktivitet Inductance	0 mH do/to 0,01 mH	1 kHz	$5,0 \cdot 10^{-2} \cdot L + 0,06 \mu\text{H}$	Vlastiti postupak In-house procedure TP-ELQ-05-L Izdanje/Issue 04, 2021-02-09	Mjerenje / Measurement
		0,01 mH do/to 0,1 mH		$5,0 \cdot 10^{-3} \cdot L$		
		0,1 mH do/to 64 H		$8,0 \cdot 10^{-4} \cdot L$		
		64 H do/to 640 H		$5,0 \cdot 10^{-3} \cdot L$		
		640 H do/to 6400 H		$5,0 \cdot 10^{-2} \cdot L$		
		0,01 mH do/to 10 mH		$1,2 \cdot 10^{-2} \cdot L$		Generiranje / Generating Dekada / Decade

<b>Umjeravanje u laboratoriju / Calibration performed in the laboratory</b>						
<b>Br. No.</b>	<b>Mjerna veličina/Mjerilo</b> <i>Measurand/ Calibration item</i>		<b>Mjerno područje</b> <i>Measurement range</i>	<b>Mjerna sposobnost*</b> <i>Calibration and measurement capability* (CMC)</i>	<b>Metode mjeravanja</b> <i>Calibration methods</i>	<b>Napomene</b> <i>Remarks</i>
8.	Vremenski interval <i>Time interval</i>		2 μs do/to 1 s	3 ns	Vlastiti postupak <i>In-house procedure</i> TP-TIF-01-TI Izdanje/Issue 04 2021-02-09	Ručni elektronički sekundomjeri - mjerjenje odstupanja s/d  <i>Digital hand stopwatches - measurement of deviation s/d</i>
			1 s do/to 10 <sup>8</sup> s	2,2 · 10 <sup>-9</sup> · t		
			0,00 s/d do/to ±9,99 s/d	0,03 s/d		
			±9,99 s/d do/to ±59,9 s/d	0,06 s/d		
9.	Frekvencija / <i>Frequency</i>		2 mHz do/to 10 Hz	6 nHz	Vlastiti postupak <i>In-house procedure</i> TP-TIF-02-F Izdanje/Issue 04 2021-02-09	Mjerenje / <i>Measurement</i>
			10 Hz do/to 3 GHz	6,0 · 10 <sup>-10</sup> · f		
			3 GHz do/to 46 GHz	1,3 · 10 <sup>-9</sup> · f		
			1 μHz do/to 10 Hz	0,5 μHz		Generiranje / <i>Generating</i>
			10 Hz do/to 250 kHz	5,0 · 10 <sup>-8</sup> · f		
250 kHz do/to 40 GHz	6,0 · 10 <sup>-9</sup> · f					
10.	Impulsi / <i>Pulses</i>	Broj / <i>Number</i>	0 do/to 10 <sup>5</sup>	2	Vlastiti postupak <i>In-house procedure</i> TP-TIF-03-IMP Izdanje/Issue 04 2016-11-30	Mjerenje / <i>Measurement</i>  Generiranje / <i>Generating</i>
		Frekvencija / <i>Frequency</i>	0,1 Hz do/to 1 Hz	6,0 · 10 <sup>-7</sup> · f + 0,8 μHz		
			1 Hz do/to 10 Hz	6,0 · 10 <sup>-7</sup> · f + 8 μHz		
			10 Hz do/to 100 Hz	6,0 · 10 <sup>-7</sup> · f + 80 μHz		
			0,1 kHz do/to 1 kHz	6,0 · 10 <sup>-7</sup> · f + 0,8 mHz		
			1 kHz do/to 10 kHz	6,0 · 10 <sup>-7</sup> · f + 8 mHz		
			10 kHz do/to 100 kHz	6,0 · 10 <sup>-7</sup> · f + 80 mHz		
			0,1 MHz do/to 1 MHz	6,0 · 10 <sup>-7</sup> · f + 0,8 Hz		
		1 MHz do/to 10 MHz	6,0 · 10 <sup>-7</sup> · f + 8 Hz			
		Period / <i>Period</i>	0,1 μs do/to 100 μs	6,0 · 10 <sup>-7</sup> · t + 3 ns		
			0,1 ms do/to 1 ms	6,0 · 10 <sup>-7</sup> · t + 3,5 ns		
			1 ms do/to 10 ms	6,0 · 10 <sup>-7</sup> · t + 15 ns		
			10 ms do/to 100 ms	6,0 · 10 <sup>-7</sup> · t + 0,15 μs		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
10. ↑	Impulsi / Pulses	Period / Period	0,1 s do/to 1 s	$6,0 \cdot 10^{-7} \cdot t + 20 \mu\text{s}$	Vlastiti postupak In-house procedure TP-TIF-03-IMP Izdanje/Issue 04 2016-11-30	Mjerenje / Measurement  Generiranje / Generating
			1 s do/to 10 s	$6,0 \cdot 10^{-7} \cdot t + 0,25 \text{ ms}$		
			10 s do/to 100 s	$6,0 \cdot 10^{-7} \cdot t + 0,5 \text{ ms}$		
		Širina / Width	0,1 μs do/to 100 μs	$6,0 \cdot 10^{-7} \cdot t + 3 \text{ ns}$		
			0,1 ms do/to 1 ms	$6,0 \cdot 10^{-7} \cdot t + 4 \text{ ns}$		
			1 ms do/to 10 ms	$6,0 \cdot 10^{-7} \cdot t + 15 \text{ ns}$		
			10 ms do/to 100 ms	$6,0 \cdot 10^{-7} \cdot t + 0,15 \mu\text{s}$		
			0,1 s do/to 10 s	$6,0 \cdot 10^{-7} \cdot t + 20 \mu\text{s}$		
			10 s do/to 100 s	$6,0 \cdot 10^{-7} \cdot t + 0,9 \text{ ms}$		
			Vrijeme porasta / Rise Time	10 ns do/to 100 ns		
		0,1 μs do/to 1 μs		$6,0 \cdot 10^{-6} \cdot t + 8 \text{ ns}$		
		1 μs do/to 10 μs		$6,0 \cdot 10^{-6} \cdot t + 55 \text{ ns}$		
		10 μs do/to 100 μs		$6,0 \cdot 10^{-6} \cdot t + 0,3 \mu\text{s}$		
		0,1 ms do/to 1 ms		$6,0 \cdot 10^{-6} \cdot t + 7 \mu\text{s}$		
		1 ms do/to 10 ms		$6,0 \cdot 10^{-6} \cdot t + 40 \mu\text{s}$		
		10 ms do/to 100 ms		$6,0 \cdot 10^{-6} \cdot t + 55 \mu\text{s}$		
		0,1 s do/to 1 s		$6,0 \cdot 10^{-6} \cdot t + 20 \text{ ms}$		
		11.	Impulsi Pretvornici impulsa u druge mjerne veličine i drugih mjernih veličina u impulse  Pulses Pulse transducers to other measuring quantities and other measuring quantities to pulses	Broj/Number		
Frekvencija /Frequency	0,1 Hz do/to 1 Hz			$1,0 \cdot 10^{-4} \cdot f + 1 \mu\text{Hz}$		
	1 Hz do/to 10 Hz			$1,0 \cdot 10^{-4} \cdot f + 10 \mu\text{Hz}$		
	10 Hz do/to 100 Hz			$1,0 \cdot 10^{-4} \cdot f + 0,1 \text{ mHz}$		
	0,1 kHz do/to 1 kHz			$1,0 \cdot 10^{-4} \cdot f + 1 \text{ mHz}$		
	1 kHz do/to 10 kHz			$1,0 \cdot 10^{-4} \cdot f + 10 \text{ mHz}$		
	10 kHz do/to 100 kHz			$1,0 \cdot 10^{-4} \cdot f + 0,1 \text{ Hz}$		
	0,1 MHz do/to 1 MHz			$1,0 \cdot 10^{-4} \cdot f + 1 \text{ Hz}$		
	1 MHz do/to 10 MHz			$1,0 \cdot 10^{-4} \cdot f + 10 \text{ Hz}$		

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
12.	Osciloskopi Oscilloscopes	Vertikalni otklon - istosmjerni napon Vertical deflection - DC voltage	0 mV do/to 320 mV	$5,0 \cdot 10^{-4} \cdot U + 10 \mu\text{V}$	Vlastiti postupak In-house procedure TP-ELQ-08-OSC Izdanje/Issue 04 2016-09-09	Generiranje / Generating
			0,32 V do/to 3,2 V	$5,0 \cdot 10^{-4} \cdot U + 0,1 \text{ mV}$		
			3,2 V do/to 32 V	$5,0 \cdot 10^{-4} \cdot U + 1 \text{ mV}$		
			32 V do/to 320 V	$5,0 \cdot 10^{-4} \cdot U + 10 \text{ mV}$		
		Vertikalni otklon - izmjenični napon Vertical deflection - AC voltage	0 mV do/to 320 mV	$1,0 \cdot 10^{-2} \cdot U + 6 \text{ mV}$		
			0,32 V do/to 3,2 V	$1,0 \cdot 10^{-2} \cdot U + 5 \text{ mV}$		
			3,2 V do/to 32 V	$1,0 \cdot 10^{-2} \cdot U + 60 \text{ mV}$		
			32 V do/to 105 V	$1,0 \cdot 10^{-2} \cdot U + 0,25 \text{ V}$		
		Frekventijski raspon Frequency bandwidth	1 Hz do/to 10 kHz	$1,0 \cdot 10^{-2} \cdot f + 0,1 \text{ Hz}$		
			10 kHz do/to 100 kHz	$1,0 \cdot 10^{-2} \cdot f + 0,2 \text{ Hz}$		
			0,1 kHz do/to 1 MHz	$1,0 \cdot 10^{-2} \cdot f + 2 \text{ Hz}$		
			1 MHz do/to 10 MHz	$1,0 \cdot 10^{-2} \cdot f + 20 \text{ Hz}$		
		Frekventijski raspon Frequency bandwidth	10 MHz do/to 100 MHz	$1,0 \cdot 10^{-2} \cdot f + 10 \text{ Hz}$		
			0,1 GHz do/to 1 GHz	$1,0 \cdot 10^{-2} \cdot f + 20 \text{ Hz}$		
			Horizontalni otklon - Vremenska baza Horizontal deflection - Time Base	10 ns do/to 1 ms		
		Vrijeme porasta / Rise Time	1 ms do/to 100 ms	$1,0 \cdot 10^{-4} \cdot t + 10 \text{ ns}$		
			0,1 s do/to 20 s	$1,0 \cdot 10^{-4} \cdot t + 1 \mu\text{s}$		
			10 ns do/to 100 ns	$1,0 \cdot 10^{-3} \cdot t + 5 \text{ ns}$		
			0,1 μs do/to 1 μs	$1,0 \cdot 10^{-3} \cdot t + 10 \text{ ns}$		
			1 μs do/to 10 μs	$1,0 \cdot 10^{-3} \cdot t + 0,1 \mu\text{s}$		
10 μs do/to 100 μs	$1,0 \cdot 10^{-3} \cdot t + 0,5 \mu\text{s}$					
0,1 ms do/to 1 ms	$1,0 \cdot 10^{-3} \cdot t + 10 \mu\text{s}$					

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
12.↑	Osciloskopi Oscilloscopes	Vrijeme porasta / Rise Time	1 ms do/to 10 ms	$1,0 \cdot 10^{-3} \cdot t + 50 \mu\text{s}$	Vlastiti postupak In-house procedure TP-ELQ-08-OSC Izdanje/Issue 04 2016-09-09	Generiranje / Generating
			10 ms do/to 100 ms	$1,0 \cdot 10^{-3} \cdot t + 0,1 \text{ ms}$		
			0,1 s do/to 1 s	$1,0 \cdot 10^{-3} \cdot t + 20 \text{ ms}$		
13.	Tlak (podtlak, pretlak)/ Opružni manometri, digitalni manometri s pokazivanjem, pretvornici tlaka s električnim izlazom  Gauge pressure/ Pressure gauges, digital pressure gauges, pressure transducers with electrical output		-800 mbar do/to 0 mbar	2 mbar	Vlastiti postupak In-house procedure TP-MEH-01-P Izdanje/Issue 03 2020-12-14	Generiranje, mjerenje Generating, measurement  Tlačni medij: plin Pressure medium: gas
			0 mbar do/to 400 mbar	1,5 mbar		
			0,4 bar do/to 10 bar	15 mbar		
			10 bar do/to 35 bar	20 mbar		
			0 bar do/to 60 bar	25 mbar	DKD-R 6-1 2014-03	Generiranje, mjerenje Generating, measurement
			60 bar do/to 250 bar	0,15 bar		
			250 bar do/to 600 bar	0,3 bar		
	600 bar do/to 1000 bar	0,45 bar	EURAMET cg-17 v.4.0, 2019-04	Tlačni medij: ulje Pressure medium: oil		
14.	Apsolutni tlak, visina/ Pitostatik kalibratori  Absolute pressure, altitude Pitostatic calibrators		(1050,41 do/to 300,89) mbar	0,14 mbar	Vlastiti postupak In-house procedure TP-MEH-03-PIT Izdanje/Issue 02 2017-10-10	
			(-304,8 do/to 9144) m	3,048 m		
			(-1000 do/to 30000) ft	10 ft		
			(300,89 do/to 115,97) mbar	0,15 mbar		
			(9144 do/to 15240) m	10,668 m		
			(30000 do/to 55000) ft	35 ft		
15.	Diferencijalni tlak, brzina/ Pitostatik kalibratori  Differential pressure, airspeed/ Pitostatic calibrators		(0,65 do/to 105) mbar (dif)	0,774 mbar		
			(10,29 do/to 128,61) m/s	0,412 m/s		
			(37,04 do/to 463) km/h	1,482 km/h		
			(0 do/to 250) kt	0,8 kt		



Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjeravanja Calibration methods	Napomene Remarks	
16.	Temperatura/ Termometri s direktnim pokazivanjem, termometri s ugrađenim pretvornikom temperature  Temperature/ Thermometers with direct display, thermometers with built-in temperature transmitter	Otpornički / Resistance	-30 °C do/to 155 °C	0,3 °C	Vlastiti postupak In-house procedure TP-THD-01-TDP Izdanje/Issue 03 2018-10-30	U laboratoriju, usporedba s etalonskim otporničkim termometrom u suhom blok kalibratoru In laboratory, comparison with standard resistance thermometer in dry block calibrator  Promjeri sonde/Sensor diameters: D = Ø 3 mm, Ø 4 mm, Ø 6 mm, Ø 6,35 mm, Ø 8 mm, Ø 10 mm  Uronjenje / Immersion > 20 × D
		Termopar / Thermocouple		0,9 °C		
		Otpornički / Resistance	155 °C do/to 425 °C	1 °C		
		Termopar / Thermocouple		1,4 °C		
		Otpornički / Resistance	425 °C do/to 600 °C	1,1 °C		
		Termopar / Thermocouple		1,9 °C		
17.	Temperatura, temperatura okoliša/ Termometri s direktnim pokazivanjem, termometri s ugrađenim pretvornikom temperature  Temperature, environmental temperature/ Thermometers with direct display, thermometers with built-in temperature transmitter	-20 °C do/to 60 °C	1 °C	Vlastiti postupak In-house procedure TP-THD-05-TAIR Izdanje/Issue 01 2013-12-02	Mjerenje + generiranje Measurement + generating	

Umjeravanje u laboratoriju / Calibration performed in the laboratory							
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks		
18.	Temperatura/ Indikatori i simulatori za otporničke termometre i termoelemente  Temperature/ Indicators and simulators for resistance thermometers and thermoelements	Pt 25,5	-200 °C do/to 350 °C	0,02 °C	Vlastiti postupak In-house procedure TP-THD-02-TIS Izdanje/Issue 01 2013-12-02  EURAMET cg-11 v.2.0, 2011-03	Mjerenje + generiranje  Measurement + generating	
			350 °C do/to 630 °C	0,03 °C			
		Pt 100	-200 °C do/to 750 °C	0,02 °C			Mjerenje + generiranje, Rjoff  Measurement + generating, Rjoff
			750 °C do/to 850 °C	0,03 °C			
		Pt 500, Pt 1000	-200 °C do/to 630 °C	0,02 °C			
		Pt 10000	-200 °C do/to 600 °C	0,02 °C			
		termopar tip B thermocouple type	20 °C do/to 50 °C	6,5 °C			
			50 °C do/to 100 °C	2,3 °C			
			100 °C do/to 200 °C	1,4 °C			
			200 °C do/to 350 °C	1 °C			
			350 °C do/to 650 °C	0,5 °C			
			650 °C do/to 1150 °C	0,3 °C			
		termopar tip E thermocouple type	1150 °C do/to 1800 °C	0,2 °C			
			-250 °C do/to -200 °C	0,2 °C			
			-200 °C do/to -150 °C	0,1 °C			
		termopar tip J thermocouple type	-150 °C do/to 1000 °C	0,05 °C			
			-200 °C do/to -150 °C	0,1 °C			
		termopar tip K thermocouple type	-150 °C do/to 1200 °C	0,05 °C			
			-250 °C do/to -200 °C	0,5 °C			
			-200 °C do/to -150 °C	0,2 °C			
-150 °C do/to -50 °C	0,1 °C						
-50 °C do/to 1050 °C	0,05 °C						
	1050 °C do/to 1350 °C	0,1 °C					

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
18.↑	Temperatura/ Indikatori i simulatori za otporničke termometre i termoelemente  Temperature/ Indicators and simulators for resistance thermometers and thermoelements	termopar tip N thermocouple type	-250 °C do/to -200 °C	1 °C	Vlastiti postupak In-house procedure TP-THD-02-TIS Izdanje/Issue 01 2013-12-02  EURAMET cg-11 v.2.0, 2011-03	Mjerenje + generiranje, Rjoff  Measurement + generating, Rjoff
			-200 °C do/to -150 °C	0,2 °C		
			-150 °C do/to 1300 °C	0,1 °C		
		termopar tip R thermocouple type	-50 °C do/to 50 °C	0,5 °C		
			50 °C do/to 300 °C	0,3 °C		
			300 °C do/to 1750 °C	0,2 °C		
		termopar tip S thermocouple type	-50 °C do/to 50 °C	0,5 °C		
			50 °C do/to 450 °C	0,3 °C		
			450 °C do/to 1750 °C	0,2 °C		
		termopar tip T thermocouple type	-250 °C do/to -200 °C	0,5 °C		
			-200 °C do/to -150 °C	0,2 °C		
			-150 °C do/to -50 °C	0,1 °C		
-50 °C do/to 400 °C	0,05 °C					
19.	Temperatura/ IC termometri  Temperature/ IR thermometers	-30 °C do/to 10 °C	2,3 °C	Vlastiti postupak In-house procedure TP-THD-04-TIC Izdanje/Issue 03 2016-06-10	Promjer mete Target diameter Ø 578 mm ε=0,95  Promjer mete Target diameter Ø 58 mm ε=0,95	
		10 °C do/to 40 °C	0,8 °C			
		40 °C do/to 100 °C	1,7 °C			
		100 °C do/to 150 °C	2,4 °C			
		150 °C do/to 200 °C	4 °C			
		200 °C do/to 300 °C	6 °C			
		300 °C do/to 400 °C	7,4 °C			
400 °C do/to 500 °C	9 °C					

Umjeravanje u laboratoriju / Calibration performed in the laboratory						
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjerenja Calibration methods	Napomene Remarks	
20.	Relativna vlažnost zraka/ Higrometri	Temperatura (u kalibratoru) Temperature (in calibrator) 24,5 °C ± 3,5 °C	10 % do/to 90 %	2 %	Vlastiti postupak In-house procedure TP-THD-06-RH Izdanje/Issue 01 2013-12-02	Mjerenje + generiranje  Measurement + generating,
	Relative air humidity/ Hygrometers	Temperatura (u klima komori) Temperature (in climatic chamber) 0 °C do/to 60 °C	30 % do/to 90 %	3 %		
21.	Temperatura i relativna vlažnost/Klima komore  Temperature and relative humidity/Climate chambers		-40 °C do/to 300 °C	1,3 °C	Vlastiti postupak In-house procedure TP-THD-07-KK Izdanje/Issue 02 2014-07-10  EURAMET cg-20/ v.5.0, 2017-09  DAkKS DKD R-5-7:2010 Metode/Methods A, B, C	DAkKS DKD-R 5-7: Podmetoda A i B za komore V < 2000 l, podmetoda C za sve obujme  DAkKS DKD-R 5-7: Methods A and B for cambers with volume less than 2000 l, method C for all volumes
		10 °C do/to 70 °C	10 % do/to 90%	2,5 %		
		20 °C do/to 30 °C	90 % do/to 95%	2,5 %		
22.	Osvjetljenje / Mjerila osvjetljenja  Illuminance / Lux-meters		8 do/to 15 lux	± 6 %	Vlastiti postupak In-house procedure TP-OPT-01-LUX Izdanje/Issue 03 2020-08-07	Mjerenje / Measurement
			80 lux do/to 140 lux	± 5 %		
			800 lux do/to 1600 lux	± 5 %		
			8600 do/to 16000 lux	± 8 %		

Umjeravanje u laboratoriju / Calibration performed in the laboratory					
Br. No.	Mjerna veličina/Mjerilo Measurand/ Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode mjeravanja Calibration methods	Napomene Remarks
23.	Brzina protoka zraka / Krilni anemometri (promjer ≤ 25 mm) i termoanemometri  Airflow velocity / Rotating vane anemometers (diameter ≤ 25 mm) and thermal anemometers	0,5 m/s do/to 2 m/s	± 4,2 % ± 0,28 m/s	Vlastiti postupak In-house procedure TP-FLU-02-ANE Izdanje/Issue 04 2020-12-11	Mjerenje / Measurement
		2 m/s do/to 5 m/s	± 4,2 % ± 0,37 m/s		
		5 m/s do/to 10 m/s	± 4,2 % ± 0,33 m/s		
		10 m/s do/to 20 m/s	± 4,2 % ± 0,57 m/s		
		20 m/s do/to 30 m/s	± 4,2 % ± 0,72 m/s		

Umjeravanje na terenu / On site calibration						
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Frekvencija Frequency	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks
1.	Istosmjerni napon DC Voltage	1 kV do/to 7,5 kV		$2,1 \cdot 10^{-2} \cdot U$	Vlastiti postupci In-house procedures TP-ELQ-01-U Izdanje/Issue 05 2021-02-09;	Mjerenje / Measurement
		7,5 kV do/to 15 kV		$2,1 \cdot 10^{-2} \cdot U$		
		15 kV do/to 30 kV		$2,1 \cdot 10^{-2} \cdot U$		
		30 kV do/to 40 kV		$2,4 \cdot 10^{-2} \cdot U$		
2.	Izmjenični napon AC Voltage	1 kV do/to 7,5 kV	50 Hz	$2,0 \cdot 10^{-2} \cdot U$	TP-ELQ-07-DMM Izdanje/Issue 05 2021-02-09	Mjerenje / Measurement
		7,5 kV do/to 15 kV	50 Hz	$2,0 \cdot 10^{-2} \cdot U$		
		15 kV do/to 30 kV	50 Hz	$2,0 \cdot 10^{-2} \cdot U$		

Umjeravanje na terenu / On site calibration						
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks	
3.	Tlak (podtlak, pretlak)/ Opružni manometri, digitalni manometri s pokazivanjem, pretvornici tlaka s električnim izlazom  Gauge pressure/ Pressure gauges, digital pressure gauges, pressure transducers with electrical output	-800 mbar do/to 0 mbar	2 mbar	Vlastiti postupak In-house procedure TP-MEH-01-P Izdanje/Issue 03 2020-12-14 DKD-R 6-1 2014-03  EURAMET cg 17 v.4.0, 2019-04	Mjerenje / Generiranje Measurement / Generating  Tlačni medij: plin Pressure medium: gas	
		0 mbar do/to 400 mbar	1,5 mbar			
		0,4 bar do/to 10 bar	15 mbar		Mjerenje / Generiranje Measurement / Generating	
		10 bar do/to 35 bar	20 mbar			
		0 bar do/to 60 bar	25 mbar		Tlačni medij: ulje Pressure medium: oil	
		60 bar do/to 250 bar	0,15 bar			
		250 bar do/to 600 bar	0,3 bar			
4.	Temperatura/ Termometri s direktnim pokazivanjem, termometri s ugrađenim pretvornikom temperature  Temperature/ Thermometers with direct display, thermometers with built-in temperature transmitter	Otpornički / Resistance	-30 °C do/to 155 °C	Vlastiti postupak In-house procedure TP-THD-01-TDP Izdanje/Issue 03 2018-10-30	U laboratoriju, usporedba s etalonskim otporničkim termometrom u suhom blok kalibratoru In laboratory, comparison with standard resistance thermometer in dry block calibrator  Promjeri sonde Sensor diameters: D = Ø 3 mm, Ø 4 mm, Ø 6 mm, Ø 6,35 mm, Ø 8 mm, Ø 10 mm  Uronjenje/Immersion > 20 × D	
		Termopar / Thermocouple				0,3 °C
		Otpornički / Resistance	155 °C do/to 425 °C			0,9 °C
		Termopar / Thermocouple				1 °C
		Otpornički / Resistance	425 °C do/to 600 °C			1,4 °C
		Termopar / Thermocouple				1,1 °C
		1,9 °C				

Umjeravanje na terenu / On site calibration						
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks	
5.	Temperatura/ Indikatori i simulatori za otporničke termometre i termoelemente  Temperature/ Indicators and simulators for resistance thermometers and thermoelements	Indikatori / Indicators Pt 100	-200 °C do/to 750 °C	0,1 °C	Vlastiti postupak In-house procedure TP-THD-02-TIS Izdanje/Issue 01 2013-12-02  EURAMET cg-11 v.2.0, 2011-03	Mjerenje + generiranje  Measurement + generating
			750 °C do/to 850 °C	0,2 °C		
		Indikatori / Indicators Pt 500	200 °C do/to 530 °C	0,2 °C		
		Indikatori / Indicators Pt 1000	-200 °C do/to 850 °C	0,2 °C		
		Simulatori / Simulators Pt 100	-200 °C do/to 600 °C	0,1 °C		
			600 °C do/to 850 °C	0,2 °C		
		Simulatori / Simulators Pt 500	-200 °C do/to 530 °C	0,2 °C		Mjerenje + generiranje, Rjoff  Measurement + generating, Rjoff
		Simulatori / Simulators Pt 1000	-200 °C do/to 850 °C	0,2 °C		
		Termopartip B Thermocouple type	920 °C do/to 1800 °C	0,6 °C		
		Termopar tip E Thermocouple type	-200 °C do/to 1000 °C	0,25 °C		
		Termopar tip J Thermocouple type	-190 °C do/to -1200 °C	0,25 °C		
		Termopar tip K Thermocouple type	-160 °C do/to 1260 °C	0,25 °C		
		Termopar tip N Thermocouple type	0 °C do/to 1300 °C	0,25 °C		
		Termopar tip R Thermocouple type	150 °C do/to 1750 °C	0,4 °C		
Termopar tip S Thermocouple type	170 °C do/to 1750 °C	0,4 °C				
Termopar tip T Thermocouple type	-130 °C do/to 400 °C	0,25 °C				



Umjeravanje na terenu / On site calibration							
Br. No.	Mjerna veličina/ Mjerilo Measurand / Calibration item	Mjerno područje Measurement range	Mjerna sposobnost* Calibration and measurement capability* (CMC)	Metode umjeravanja Calibration methods	Napomene Remarks		
6.	Temperatura/ IC termometri  Temperature/ IR thermometers	-30 °C do/to 10 °C	3,2 °C	Vlastiti postupak In-house procedure TP-THD-04-TIC Izdanje/Issue 03 2016-06-10	Promjer mete Target diameter: Ø 57 mm $\varepsilon=0,95$		
		10 °C do/to 40 °C	1,5 °C				
		40 °C do/to 100 °C	1,9 °C				
		100 °C do/to 150 °C	2,5 °C				
			150 °C do/to 200 °C		4 °C		Promjer mete Target diameter: Ø 58 mm $\varepsilon=0,95$
			200 °C do/to 300 °C		6 °C		
			300 °C do/to 400 °C		7,4 °C		
			400 °C do/to 500 °C		9 °C		
7.	Temperatura i relativna vlažnost/Klima komore  Temperature and relative humidity/Climate chambers	-40 °C do/to 300 °C	1,3 °C	Vlastiti postupak In-house procedure TP-THD-07-KK Izdanje/Issue 02 2014-07-10  EURAMET cg-20 v.5.0, 2017-09  DAkKS DKD R-5-7:2010 Metode/Methods A, B, C	DAkKS DKD-R 5-7: Podmetoda A i B za komore V < 2000 l, podmetoda C za sve obujme  DAkKS DKD-R 5-7: Methods A and B for cambers with volume less than 2000 l, method C for all volumes		
		10 °C do/to 70 °C	10 % do/to 90%			2,5 %	
		20 °C do/to 30 °C	90 % do/to 95%			2,5 %	

- \* CMC (Calibration and Measurement Capability) je procijenjena kao proširena mjerna nesigurnost dobivena množenjem standardne nesigurnosti s faktorom pokrivanja  $k$ , koji odgovara razini povjerenja od oko 95%. Uobičajeno i ako nije drugačije navedeno, faktor  $k$  iznosi 2.  
CMC je izračunata u skladu s EA 4/02 M:2013 Evaluation of the Uncertainty of measurement in Calibration.
- \* The CMC (Calibration and Measurement Capability) has been estimated as an expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor  $k$  corresponding to confidence level of about 95 %. Normally and unless stated otherwise, this factor  $k$  is 2.  
The CMC has been determined according to the EA 4/02 M:2013 Evaluation of the Uncertainty of measurement in Calibration.