

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-12011-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 15.09.2020

Date of issue: 15.09.2020

Holder of certificate:

**EMH Energie-Messtechnik GmbH
Vor dem Hassel 2, 21438 Brackel**

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- **DC voltage**
- **AC voltage**
- **AC current**
- **Electric power**
- **Electric energy**

The management system requirements in DIN EN ISO/IEC 17025 are written in language relevant to operations of calibration laboratories and operate generally in accordance with the principles of DIN EN ISO 9001.

*The certificate together with its annex reflects the status at the time of the date of issue. The current status of the scope of accreditation can be found in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH.
<https://www.dakks.de/en/content/accredited-bodies-dakks>*

Abbreviations used: see last page

Page 1 of 3

This document is a translation. The definitive version is the original German annex to the accreditation certificate.

Annex to the accreditation certificate D-K-12011-01-00

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC voltage	0,1 V to < 1 V		$15 \cdot 10^{-6}$	Comparison with Fluke 732B and Kelvin Varley divider to Fluke 720A
	1 V to 10 V		$5 \cdot 10^{-6}$	
	> 10 V to 100 V		$5 \cdot 10^{-6}$	
	0,1 V to < 1 V		$20 \cdot 10^{-6}$	Comparison with Digitalmultimeter Agilent / Hewlett Packard 3458
	1 V to 10 V		$8 \cdot 10^{-6}$	
> 10 V to 100 V	$12 \cdot 10^{-6}$			
AC voltage	60V, 120V, 240V, 480V	45 Hz $\leq f \leq$ 65 Hz	$44 \cdot 10^{-6}$	Comparison with HEG K2005
	30 V to 480 V		$50 \cdot 10^{-6}$	
AC current	25 mA		$51 \cdot 10^{-6}$	f: Frequency
	50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2,5 A, 5 A, 10 A		$38 \cdot 10^{-6}$	
	25 A, 50 A, 100 A		$44 \cdot 10^{-6}$	
	20 mA to < 50 mA		$57 \cdot 10^{-6}$	
	50 mA to < 10 A		$45 \cdot 10^{-6}$	
	10 A to 100 A		$50 \cdot 10^{-6}$	
AC active power and energy	750 mW to 4800 W 750 mWh to 4800 Wh	45 Hz $\leq f \leq$ 65 Hz $0,25 \leq \cos \varphi \leq 1$ 60 V, 120 V, 240 V, 480 V 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2,5 A, 5 A, 10 A	$51 \cdot 10^{-6}$	Comparison with HEG K2005 Relative measurement uncertainty related to the apparent power or energy
	375 W to 48 kW 375 Wh to 48 kWh	45 Hz $\leq f \leq$ 65 Hz $0,25 \leq \cos \varphi \leq 1$ 60 V, 120 V, 240 V, 480 V 25 A, 50 A, 100 A	$60 \cdot 10^{-6}$	
	150 mW to < 26 W 150 mWh to < 26 Wh	45 Hz $\leq f \leq$ 65 Hz $0,25 \leq \cos \varphi \leq 1$ 30 V to 480 V 20 mA to < 50 mA	$0,15 \cdot 10^{-3}$	
	375 mW to < 4,8 kW 375 mWh to < 4,8 kWh	45 Hz $\leq f \leq$ 65 Hz $0,25 \leq \cos \varphi \leq 1$ 30 V to 480 V 50 mA to < 10 A	$57 \cdot 10^{-6}$	
	> 75 W to 4,8 kW > 75 Wh to 4,8 kWh	45 Hz $\leq f \leq$ 65 Hz $0,25 \leq \cos \varphi \leq 1$ 30 V to 480 V 10 A to 100 A	$64 \cdot 10^{-6}$	
AC voltage	30 V to 480 V	45 Hz $\leq f \leq$ 65 Hz	$64 \cdot 10^{-6}$	Comparison with EMH K2006
AC current	5 mA to 10 mA		$0,24 \cdot 10^{-3}$	
	> 10 mA to 20 mA		$0,17 \cdot 10^{-3}$	
	> 20 mA to 50 mA		$0,1 \cdot 10^{-3}$	
	> 50 mA to 160 A		$70 \cdot 10^{-6}$	

¹⁾ The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of $k = 2$ unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC active power and energy, effective, reactive and apparent power	37,5 mW to 2,4 W 37,5 mWh to 2,4 Wh 37,5 mVAr to 2,4 VAr 37,5 mVArh to 2,4 VArh 150 mVA to 2,4 VA 150 mVAh to 2,4 VAh	45 Hz ≤ f ≤ 65 Hz ± 0,25 ≤ cos φ ≤ ± 1 ± 0,25 ≤ sin φ ≤ ± 1 30 V to 240 V 5 mA to 10 mA	0,24 · 10 ⁻³	Comparison with EMH K2006 Relative measurement uncertainty related to the apparent power respectively energy
	> 75 mW to 4,8 W > 75 mWh to 4,8 Wh > 75 mVAr to 4,8 VAr > 75 mVArh to 4,8 VArh > 300 mVA to 4,8 VA > 300 mVAh to 4,8 VAh	45 Hz ≤ f ≤ 65 Hz ± 0,25 ≤ cos φ ≤ ± 1 ± 0,25 ≤ sin φ ≤ ± 1 30 V to 240 V > 10 mA to 20 mA	0,2 · 10 ⁻³	
	> 150 mW to 12 W > 150 mWh to 12 Wh > 150 mVAr to 12 VAr > 150 mVArh to 12 VArh > 600 mVA to 12 VA > 600 mVAh to 12 VAh	45 Hz ≤ f ≤ 65 Hz ± 0,25 ≤ cos φ ≤ ± 1 ± 0,25 ≤ sin φ ≤ ± 1 30 V to 240 V > 20 mA to 50 mA	0,12 · 10 ⁻³	
	> 375 mW to 9,6 kW > 375 mWh to 9,6 kWh > 375 mVAr to 9,6 kVAr > 375 mVArh to 9,6 kVArh > 1,5 VA to 9,6 kVA > 1,5 VAh to 9,6 kVAh	45 Hz ≤ f ≤ 65 Hz ± 0,25 ≤ cos φ ≤ ± 1 ± 0,25 ≤ sin φ ≤ ± 1 30 V to 480 V > 50 mA to 20 A	92 · 10 ⁻⁶	
	> 150 W to 76,8 kW > 150 Wh to 76,8 kWh > 150 VAr to 76,8 kVAr > 150 VArh to 76,8 kVArh > 600 VA to 76,8 kVA > 600 VAh to 76,8 kVAh	45 Hz ≤ f ≤ 65 Hz ± 0,25 ≤ cos φ ≤ ± 1 ± 0,25 ≤ sin φ ≤ ± 1 30 V to 480 V > 20 A to 160 A	92 · 10 ⁻⁶	
	Current transformers with transformation ratio 1:1	20 mA to < 50 mA 50 mA to 160 A	45 Hz ≤ f ≤ 65 Hz	

Abbreviations used:

CMC Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
 EMH EMH Energie-Messtechnik GmbH
 HEG Hamburger Elektronik Gesellschaft

¹⁾ The expanded uncertainties according to EA-4/02 M:2013 are part of CMC and are the best measurement uncertainties within accreditation. They have a coverage probability of approximately 95 % and have a coverage factor of k = 2 unless stated otherwise. Uncertainties without unit are relative uncertainties referring to the measurement value unless stated otherwise.