Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-22359-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: **08.03.2024**

Date of issue: 08.03.2024

Holder of accreditation certificate:

ZES ZIMMER Electronic Systems GmbH
Pfeiffstraße 12, 61440 Oberursel

with the location

ZES ZIMMER Electronic Systems GmbH
Pfeiffstraße 12, 61440 Oberursel

The calibration laboratory meets the requirements of DIN EN ISO/IEC 17025:2018 to carry out the conformity assessment activities listed in this annex. The calibration laboratory meets additional legal and normative requirements, if applicable, including those in relevant sectoral schemes, provided that these are explicitly confirmed below.

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

Calibration in the areas:

Electrical quantities

DC and low frequency quantities

- **AC current**
- **AC voltage**
- **AC resistance**
- **Electrical power**
- **Frequency**

This certificate annex is only valid together with the written accreditation certificate and reflects the status as indicated by the date of issue. The current status of any given scope of accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH at https://www.dakks.de.

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
AC current Measuring instruments	5 mA to 10 A	45 Hz to 65 Hz	$1.4 \cdot 10^{-4} \cdot I$	*I*: measuring value
	5 mA, 10 mA, 20 mA, 40 mA, 80 mA, 150 mA, 240 mA, 300 mA, 480 mA, 600 mA, 720 mA, 960 mA, 1,2 A, 2,5 A, 5 A, 10 A		$1.1 \cdot 10^{-4} \cdot I$	
AC voltage Measuring instruments	30 mV to 480 V		$1.4 \cdot 10^{-4} \cdot U$	*U*: measuring value
	30 mV, 60 mV, 120 mV, 200 mV, 250 mV, 400 mV, 500 mV, 600 mV, 800 mV, 1 V, 1,2 V, 1,8 V, 2 V, 2,4 V, 3 V, 4 V, 6 V, 12,5 V, 25 V, 48 V, 60 V, 96 V, 130 V, 144 V, 192 V, 240 V, 250 V, 400 V, 480 V		$1.1 \cdot 10^{-4} \cdot U$	
Electrical power Measuring instruments	0 W to 4.8 kW	45 Hz to 65 Hz 5 mA to 10 A 0.6 V to 480 V $0 \le PF \le 1$	$1.8 \cdot 10^{-4} \cdot S$	*S*: apparent power *PF*: power factor ind.: inductive 0°: phase angle zero
	1.2 W to 2.4 kW	45 Hz to 65 Hz (240 V; *PF* = 1), 5 mA, 10 mA, 20 mA 40 mA, 80 mA, 150 mA 300 mA, 600 mA, 1.2 A, 2.5 A, 5 A, 10 A	$1.3 \cdot 10^{-4} \cdot S$	
	0.72 W to 576 W	45 Hz to 65 Hz (1.2 A; *PF* = 1) 0.6 V, 1.2 V, 3 V, 6 V 12.5 V, 25 V, 60 V, 130 V 240 V, 250 V, 400 V, 480 V		
	0 W to 184 W	45 Hz to 65 Hz (0.24 A; 48 V; 0°) (0.48 A; 96 V; 0°) (0.72 A; 144 V; 0°) (0.96 A; 192 V; 0°) (1.2 A; 240 V; 89° ind.) (9 A; 130 V; 89° ind.)		
	18 mW to 1920 W	45 Hz to 65 Hz shunt-voltage: 30 mV to 4 V AC-U: 600 mV to 480 V $0 \le PF \le 1$	$1.8 \cdot 10^{-4} \cdot S$	

Permanent Laboratory

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement	Remarks
Electrical power Measuring instruments	90 mW to 12 W	45 Hz to 65 Hz (AC-U: 3 V; *PF* = 1) shunt-voltage: 30 mV, 60 mV, 120 mV 250 mV, 500 mV 1 V, 2 V, 4 V	$1.3 \cdot 10^{-4} \cdot S$	*S*: apparent power *PF*: power factor
	120 mW to 1.92 W	45 Hz to 65 Hz *PF* = 1 (shunt-voltage; AC-U) (200 mV; 0.6 V) (400 mV; 1.2 V) (600 mV; 1.8 V) (800 mV; 2.4 V)		
Frequency Measuring instruments	53 Hz	3 V (sinusoidal signal)	$1.2 \cdot 10^{-5} \cdot f$	*f*: frequency
AC resistance Impedance	0.1 Ω to 0.5 Ω	(50 Hz; 8 A)	$4.0 \cdot 10^{-4} \cdot R$	*R*: measuring value
	0.15 Ω to 0.6 Ω		$4.0 \cdot 10^{-4} \cdot Z$	*Z*: measuring value impedance
	0.07 Ω to 0.3 Ω		$4.0 \cdot 10^{-4} \cdot X$	*X*: measuring value reactance

Abbreviations used:

CMC Calibration and measurement capabilities (Kalibrier- und Messmöglichkeiten)
DIN Deutsches Institut für Normung e.V. – German institute for standardization
EN Europäische Norm – European Standard
IEC International Electrotechnical Commission
ISO International Organization for Standardisation