

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-21039-01-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 13.11.2020

Date of issue: 13.11.2020

Holder of certificate:

Framatome GmbH

with its calibration laboratory at the locations:

Paul-Gossen-Straße 100, 91052 Erlangen

Seligenstädter Straße 100, 63791 Karlstein am Main

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage ^{a)}
- DC current ^{a)}
- DC resistance ^{a)}
- AC voltage ^{a)}
- AC current ^{a)}

Time and frequency

- Frequency ^{a)}
- Time interval ^{a)}

High frequency quantities

- Oscilloscope quantities ^{a)}

^{a)} also on-site calibration

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

Annex to the accreditation certificate D-K-21039-01-00

**Permanent Laboratory
Erlangen location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC voltage Measuring instruments	0 V to < 0.33 V	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot U + 2.0 \mu\text{V}$	U: Measured value
	0.33 V to < 3.3 V		$15 \cdot 10^{-6} \cdot U + 3.0 \mu\text{V}$	
	3.3 V to < 33 V		$15 \cdot 10^{-6} \cdot U + 30 \mu\text{V}$	
	33 V to < 330 V		$25 \cdot 10^{-6} \cdot U + 0.20 \text{ mV}$	
	330 V to 1000 V		$25 \cdot 10^{-6} \cdot U + 2.0 \text{ mV}$	
Sources	0 V to 0.1 V	FAW D-0022 Rev. B, 2020	$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 0.1 V to 1 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 1 V to 10 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 10 V to 100 V		$15 \cdot 10^{-6} \cdot U + 50 \mu\text{V}$	
	> 100 V to 1000 V		$15 \cdot 10^{-6} \cdot U + 0.15 \text{ mV}$	
DC current Measuring instruments	20 μA to < 330 μA	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	I: Measured value
	330 μA to < 3.3 mA		$0.15 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.13 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.13 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	330 mA to < 1.1 A		$0.25 \cdot 10^{-3} \cdot I + 60 \mu\text{A}$	
	1.1 A to < 3.0 A		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	3.0 A to < 11 A		$0.60 \cdot 10^{-3} \cdot I + 0.70 \text{ mA}$	
	11 A to 20 A		$1.2 \cdot 10^{-3} \cdot I + 1.0 \text{ mA}$	
Sources	> 0.1 μA to 1 μA	FAW D-0022 Rev. B, 2020	$30 \cdot 10^{-6} \cdot I + 0.00010 \mu\text{A}$	
	> 1 μA to 10 μA		$30 \cdot 10^{-6} \cdot I + 0.00015 \mu\text{A}$	
	> 10 μA to 100 μA		$30 \cdot 10^{-6} \cdot I + 0.0015 \mu\text{A}$	
	> 100 μA to 1 mA		$25 \cdot 10^{-6} \cdot I + 0.010 \mu\text{A}$	
	> 1 mA to 10 mA		$30 \cdot 10^{-6} \cdot I + 0.10 \mu\text{A}$	
	> 10 mA to 100 mA		$50 \cdot 10^{-6} \cdot I + 1.0 \mu\text{A}$	
	> 100 mA to 1 A		$150 \cdot 10^{-6} \cdot I + 10 \mu\text{A}$	

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.

Annex to the accreditation certificate D-K-21039-01-00

**Permanent Laboratory
Erlangen location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC resistance Measuring instruments	1 Ω to < 11 Ω	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot R + 0.70 \text{ m}\Omega$	R: Measured value
	11 Ω to < 33 Ω	FAW D-0030 Rev. B, 2020	$30 \cdot 10^{-6} \cdot R + 0.50 \text{ m}\Omega$	
	33 Ω to < 330 Ω		$40 \cdot 10^{-6} \cdot R + 0.20 \text{ m}\Omega$	
	330 Ω to < 3.3 kΩ		$40 \cdot 10^{-6} \cdot R + 2.0 \text{ m}\Omega$	
	3.3 kΩ to < 33 kΩ		$40 \cdot 10^{-6} \cdot R + 20 \text{ m}\Omega$	
	33 kΩ to < 110 kΩ		$30 \cdot 10^{-6} \cdot R + 2.0 \Omega$	
	110 kΩ to < 330 kΩ		$40 \cdot 10^{-6} \cdot R + 10 \Omega$	
	330 kΩ to < 1.1 MΩ		$40 \cdot 10^{-6} \cdot R + 0.15 \text{ k}\Omega$	
	1.1 MΩ to < 3.3 MΩ		$40 \cdot 10^{-6} \cdot R + 1.5 \text{ k}\Omega$	
	3.3 MΩ to < 11 MΩ		$0.10 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	11 MΩ to < 33 MΩ		$0.30 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	33 MΩ to < 110 MΩ		$0.60 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
	110 MΩ to < 330 MΩ		$3.5 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
330 MΩ to < 1.1 GΩ		$18 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$		
Resistors	1 Ω to 10 Ω	FAW D-0026 Rev. B, 2020	$20 \cdot 10^{-6} \cdot R + 0.10 \text{ m}\Omega$	
	> 10 Ω to 100 Ω	FAW D-0033 Rev. B, 2020	$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 100 Ω to 1 kΩ		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 1 kΩ to 10 kΩ		$15 \cdot 10^{-6} \cdot R + 10 \text{ m}\Omega$	
	> 10 kΩ to 100 kΩ		$15 \cdot 10^{-6} \cdot R + 0.10 \Omega$	
	> 100 kΩ to 1 MΩ		$20 \cdot 10^{-6} \cdot R + 4.0 \Omega$	
	> 1 MΩ to 10 MΩ		$60 \cdot 10^{-6} \cdot R + 0.20 \text{ k}\Omega$	
	> 10 MΩ to 100 MΩ		$0.60 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
> 100 MΩ to 1 GΩ		$6.0 \cdot 10^{-3} \cdot R + 20 \text{ k}\Omega$		
AC voltage Measuring instruments	0.001 V to < 0.033 V	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot U + 10 \mu\text{V}$	U: Measured value
	0.033 V to < 0.33 V	45 Hz to 10 kHz	$0.20 \cdot 10^{-3} \cdot U + 15 \mu\text{V}$	
	0.33 V to < 3.3 V		$0.20 \cdot 10^{-3} \cdot U + 0.10 \text{ mV}$	
	3.3 V to < 33 V		$0.20 \cdot 10^{-3} \cdot U + 1.0 \text{ mV}$	
	33 V to < 330 V		$0.25 \cdot 10^{-3} \cdot U + 10 \text{ mV}$	
	330 V to 1000 V		$0.35 \cdot 10^{-3} \cdot U + 15 \text{ mV}$	
Sources	0.001 V to 0.01 V	FAW D-0022 Rev. B, 2020	$0.40 \cdot 10^{-3} \cdot U + 2.0 \mu\text{V}$	
	> 0.01 V to 0.1 V	40 Hz to 20 kHz	$0.20 \cdot 10^{-3} \cdot U + 3.0 \mu\text{V}$	
	> 0.1 V to 1 V		$0.20 \cdot 10^{-3} \cdot U + 30 \mu\text{V}$	
	> 1 V to 10 V		$0.20 \cdot 10^{-3} \cdot U + 0.30 \text{ mV}$	
	> 10 V to 100 V		$0.30 \cdot 10^{-3} \cdot U + 3.0 \text{ mV}$	
	> 100 V to 700 V	40 Hz to 1 kHz	$0.60 \cdot 10^{-3} \cdot U + 30 \text{ mV}$	

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.

Annex to the accreditation certificate D-K-21039-01-00
**Permanent Laboratory
 Erlangen location**
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC current Measuring instruments	29 μ A to < 330 μ A	FAW D-0026 Rev. B, 2020 45 Hz to 1 kHz	$1.5 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	I: Measured value
	330 μ A to < 3.3 mA		$1.2 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.50 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	330 mA to < 1.1 A		$0.60 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	1.1 A to < 3 A		$0.70 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	3 A to < 11 A		$1.2 \cdot 10^{-3} \cdot I + 3.0 \text{ mA}$	
	11 A to 20 A		$1.8 \cdot 10^{-3} \cdot I + 12 \text{ mA}$	
Sources	10 μ A to 100 μ A	FAW D-0022 Rev. B, 2020 45 Hz to 5 kHz	$0.70 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	> 100 μ A to 1 mA		$0.70 \cdot 10^{-3} \cdot I + 0.50 \mu\text{A}$	
	> 1 mA to 10 mA		$0.70 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	> 10 mA to 100 mA		$0.70 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	> 100 mA to 1 A		$1.5 \cdot 10^{-3} \cdot I + 0.30 \text{ mA}$	
Frequency Measuring instruments	0.1 Hz to 20 MHz	FAW D-0035 Rev. B, 2018	$25 \cdot 10^{-6} \cdot f$	f: Measured value
	Sources	FAW D-0036 Rev. B, 2018	$6.0 \cdot 10^{-6} \cdot f$	
Time interval Sources	50 ns to 10 s	FAW D-0036 Rev. B, 2018	$25 \cdot 10^{-6} \cdot t$	t: Measured value

**On-site Calibration
 Erlangen location**
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC voltage Measuring instruments	0 V to < 0.33 V	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot U + 2.0 \mu\text{V}$	U: Measured value
	0.33 V to < 3.3 V		$15 \cdot 10^{-6} \cdot U + 3.0 \mu\text{V}$	
	3.3 V to < 33 V		$15 \cdot 10^{-6} \cdot U + 30 \mu\text{V}$	
	33 V to < 330 V		$25 \cdot 10^{-6} \cdot U + 0.20 \text{ mV}$	
	330 V to 1000 V		$25 \cdot 10^{-6} \cdot U + 2.0 \text{ mV}$	
Sources	0 V to 0.1 V	FAW D-0022 Rev. B, 2020	$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 0.1 V to 1 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 1 V to 10 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 10 V to 100 V		$15 \cdot 10^{-6} \cdot U + 50 \mu\text{V}$	
	> 100 V to 1000 V		$15 \cdot 10^{-6} \cdot U + 0.15 \text{ mV}$	

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.

Annex to the accreditation certificate D-K-21039-01-00

On-site Calibration
Erlangen location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC current Measuring instruments	20 μ A to < 330 μ A	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	I: Measured value
	330 μ A to < 3.3 mA		$0.15 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.13 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.13 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	330 mA to < 1.1 A		$0.25 \cdot 10^{-3} \cdot I + 60 \mu\text{A}$	
	1.1 A to < 3.0 A		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	3.0 A to < 11 A		$0.60 \cdot 10^{-3} \cdot I + 0.70 \text{ mA}$	
	11 A to 20 A		$1.2 \cdot 10^{-3} \cdot I + 1.0 \text{ mA}$	
Sources	> 0.1 μ A to 1 μ A	FAW D-0022 Rev. B, 2020	$30 \cdot 10^{-6} \cdot I + 0.00010 \mu\text{A}$	
	> 1 μ A to 10 μ A		$30 \cdot 10^{-6} \cdot I + 0.00015 \mu\text{A}$	
	> 10 μ A to 100 μ A		$30 \cdot 10^{-6} \cdot I + 0.0015 \mu\text{A}$	
	> 100 μ A to 1 mA		$25 \cdot 10^{-6} \cdot I + 0.010 \mu\text{A}$	
	> 1 mA to 10 mA		$30 \cdot 10^{-6} \cdot I + 0.10 \mu\text{A}$	
	> 10 mA to 100 mA		$50 \cdot 10^{-6} \cdot I + 1.0 \mu\text{A}$	
	> 100 mA to 1 A		$150 \cdot 10^{-6} \cdot I + 10 \mu\text{A}$	
DC resistance Measuring instruments	1 Ω to < 11 Ω	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot R + 0.70 \text{ m}\Omega$	R: Measured value
	11 Ω to < 33 Ω	FAW D-0030 Rev. B, 2020	$30 \cdot 10^{-6} \cdot R + 0.50 \text{ m}\Omega$	
	33 Ω to < 330 Ω		$40 \cdot 10^{-6} \cdot R + 0.20 \text{ m}\Omega$	
	330 Ω to < 3.3 k Ω		$40 \cdot 10^{-6} \cdot R + 2.0 \text{ m}\Omega$	
	3.3 k Ω to < 33 k Ω		$40 \cdot 10^{-6} \cdot R + 20 \text{ m}\Omega$	
	33 k Ω to < 110 k Ω		$30 \cdot 10^{-6} \cdot R + 2.0 \Omega$	
	110 k Ω to < 330 k Ω		$40 \cdot 10^{-6} \cdot R + 10 \Omega$	
	330 k Ω to < 1.1 M Ω		$40 \cdot 10^{-6} \cdot R + 0.15 \text{ k}\Omega$	
	1.1 M Ω to < 3.3 M Ω		$40 \cdot 10^{-6} \cdot R + 1.5 \text{ k}\Omega$	
	3.3 M Ω to < 11 M Ω		$0.10 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	11 M Ω to < 33 M Ω		$0.30 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	33 M Ω to < 110 M Ω		$0.60 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
	110 M Ω to < 330 M Ω		$3.5 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
330 M Ω to < 1.1 G Ω		$18 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$		

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.

Annex to the accreditation certificate D-K-21039-01-00

**On-site Calibration
Erlangen location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Resistors	1 Ω to 10 Ω	FAW D-0026 Rev. B, 2020 FAW D-0033 Rev. B, 2020	$20 \cdot 10^{-6} \cdot R + 0.10 \text{ m}\Omega$	R: Measured value
	> 10 Ω to 100 Ω		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 100 Ω to 1 kΩ		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 1 kΩ to 10 kΩ		$15 \cdot 10^{-6} \cdot R + 10 \text{ m}\Omega$	
	> 10 kΩ to 100 kΩ		$15 \cdot 10^{-6} \cdot R + 0.10 \Omega$	
	> 100 kΩ to 1 MΩ		$20 \cdot 10^{-6} \cdot R + 4.0 \Omega$	
	> 1 MΩ to 10 MΩ		$60 \cdot 10^{-6} \cdot R + 0.20 \text{ k}\Omega$	
	> 10 MΩ to 100 MΩ > 100 MΩ to 1 GΩ		$0.60 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$ $6.0 \cdot 10^{-3} \cdot R + 20 \text{ k}\Omega$	
AC voltage Measuring instruments	0.001 V to < 0.033 V	FAW D-0026 Rev. B, 2020 45 Hz to 10 kHz	$0.20 \cdot 10^{-3} \cdot U + 10 \mu\text{V}$	U: Measured value
	0.033 V to < 0.33 V		$0.20 \cdot 10^{-3} \cdot U + 15 \mu\text{V}$	
	0.33 V to < 3.3 V		$0.20 \cdot 10^{-3} \cdot U + 0.10 \text{ mV}$	
	3.3 V to < 33 V		$0.20 \cdot 10^{-3} \cdot U + 1.0 \text{ mV}$	
	33 V to < 330 V		$0.25 \cdot 10^{-3} \cdot U + 10 \text{ mV}$	
	330 V to 1000 V		$0.35 \cdot 10^{-3} \cdot U + 15 \text{ mV}$	
Sources	0.001 V to 0.01 V	FAW D-0022 Rev. B, 2020 40 Hz to 20 kHz	$0.40 \cdot 10^{-3} \cdot U + 2.0 \mu\text{V}$	
	> 0.01 V to 0.1 V		$0.20 \cdot 10^{-3} \cdot U + 3.0 \mu\text{V}$	
	> 0.1 V to 1 V		$0.20 \cdot 10^{-3} \cdot U + 30 \mu\text{V}$	
	> 1 V to 10 V		$0.20 \cdot 10^{-3} \cdot U + 0.30 \text{ mV}$	
	> 10 V to 100 V		$0.30 \cdot 10^{-3} \cdot U + 3.0 \text{ mV}$	
	> 100 V to 700 V	40 Hz to 1 kHz $0.60 \cdot 10^{-3} \cdot U + 30 \text{ mV}$		
AC current Measuring instruments	29 μA to < 330 μA	FAW D-0026 Rev. B, 2020 45 Hz to 1 kHz	$1.5 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	I: Measured value
	330 μA to < 3.3 mA		$1.2 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.50 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	330 mA to < 1.1 A		$0.60 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	1.1 A to < 3 A		$0.70 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	3 A to < 11 A		$1.2 \cdot 10^{-3} \cdot I + 3.0 \text{ mA}$	
	11 A to 20 A		$1.8 \cdot 10^{-3} \cdot I + 12 \text{ mA}$	
Sources	10 μA to 100 μA	FAW D-0022 Rev. B, 2020 45 Hz to 5 kHz	$0.70 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	> 100 μA to 1 mA		$0.70 \cdot 10^{-3} \cdot I + 0.50 \mu\text{A}$	
	> 1 mA to 10 mA		$0.70 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	> 10 mA to 100 mA		$0.70 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	> 100 mA to 1 A	45Hz to 1 kHz $1.5 \cdot 10^{-3} \cdot I + 0.30 \text{ mA}$		

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.

Annex to the accreditation certificate D-K-21039-01-00

**On-site Calibration
Erlangen location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Frequency				
Measuring instruments	0.1 Hz to 20 MHz	FAW D-0035 Rev. B, 2018	$25 \cdot 10^{-6} \cdot f$	<i>f</i> : Measured value
Sources	0.1 Hz to 20 MHz	FAW D-0036 Rev. B, 2018	$6.0 \cdot 10^{-6} \cdot f$	
Time interval				
Sources	50 ns to 10 s	FAW D-0036 Rev. B, 2018	$25 \cdot 10^{-6} \cdot t$	<i>t</i> : Measured value

**Permanent Laboratory
Karlstein am Main location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC voltage				
Measuring instruments	0 V to < 0.33 V 0.33 V to < 3.3 V 3.3 V to < 33 V 33 V to < 330 V 330 V to 1000 V	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot U + 2.0 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 3.0 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 30 \mu\text{V}$ $25 \cdot 10^{-6} \cdot U + 0.20 \text{ mV}$ $25 \cdot 10^{-6} \cdot U + 2.0 \text{ mV}$	<i>U</i> : Measured value
Sources	0 V to 0.1 V > 0.1 V to 1 V > 1 V to 10 V > 10 V to 100 V > 100 V to 1000 V	FAW D-0022 Rev. B, 2020	$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 50 \mu\text{V}$ $15 \cdot 10^{-6} \cdot U + 0.15 \text{ mV}$	
DC current				
Measuring instruments	20 μA to < 330 μA 330 μA to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA 330 mA to < 1.1 A 1.1 A to < 3.0 A 3.0 A to < 11 A 11 A to 20 A	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$ $0.15 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$ $0.13 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$ $0.13 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$ $0.25 \cdot 10^{-3} \cdot I + 60 \mu\text{A}$ $0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$ $0.60 \cdot 10^{-3} \cdot I + 0.70 \text{ mA}$ $1.2 \cdot 10^{-3} \cdot I + 1.0 \text{ mA}$	<i>I</i> : Measured value
Sources	> 0.1 μA to 1 μA > 1 μA to 10 μA > 10 μA to 100 μA > 100 μA to 1 mA > 1 mA to 10 mA > 10 mA to 100 mA > 100 mA to 1 A	FAW D-0022 Rev. B, 2020	$30 \cdot 10^{-6} \cdot I + 0.00010 \mu\text{A}$ $30 \cdot 10^{-6} \cdot I + 0.00015 \mu\text{A}$ $30 \cdot 10^{-6} \cdot I + 0.0015 \mu\text{A}$ $25 \cdot 10^{-6} \cdot I + 0.010 \mu\text{A}$ $30 \cdot 10^{-6} \cdot I + 0.10 \mu\text{A}$ $50 \cdot 10^{-6} \cdot I + 1.0 \mu\text{A}$ $150 \cdot 10^{-6} \cdot I + 10 \mu\text{A}$	

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.

Annex to the accreditation certificate D-K-21039-01-00

Permanent Laboratory
Karlstein am Main location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC resistance Measuring instruments	1 Ω to < 11 Ω	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot R + 0.70 \text{ m}\Omega$	R: Measured value
	11 Ω to < 33 Ω	FAW D-0030 Rev. B, 2020	$30 \cdot 10^{-6} \cdot R + 0.50 \text{ m}\Omega$	
	33 Ω to < 330 Ω		$40 \cdot 10^{-6} \cdot R + 0.20 \text{ m}\Omega$	
	330 Ω to < 3.3 kΩ		$40 \cdot 10^{-6} \cdot R + 2.0 \text{ m}\Omega$	
	3.3 kΩ to < 33 kΩ		$40 \cdot 10^{-6} \cdot R + 20 \text{ m}\Omega$	
	33 kΩ to < 110 kΩ		$30 \cdot 10^{-6} \cdot R + 2.0 \Omega$	
	110 kΩ to < 330 kΩ		$40 \cdot 10^{-6} \cdot R + 10 \Omega$	
	330 kΩ to < 1.1 MΩ		$40 \cdot 10^{-6} \cdot R + 0.15 \text{ k}\Omega$	
	1.1 MΩ to < 3.3 MΩ		$40 \cdot 10^{-6} \cdot R + 1.5 \text{ k}\Omega$	
	3.3 MΩ to < 11 MΩ		$0.10 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	11 MΩ to < 33 MΩ		$0.30 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	33 MΩ to < 110 MΩ		$0.60 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
	110 MΩ to < 330 MΩ		$3.5 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
330 MΩ to < 1.1 GΩ		$18 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$		
Resistors	1 Ω to 10 Ω	FAW D-0026 Rev. B, 2020	$20 \cdot 10^{-6} \cdot R + 0.10 \text{ m}\Omega$	
	> 10 Ω to 100 Ω	FAW D-0033 Rev. B, 2020	$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 100 Ω to 1 kΩ		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 1 kΩ to 10 kΩ		$15 \cdot 10^{-6} \cdot R + 10 \text{ m}\Omega$	
	> 10 kΩ to 100 kΩ		$15 \cdot 10^{-6} \cdot R + 0.10 \Omega$	
	> 100 kΩ to 1 MΩ		$20 \cdot 10^{-6} \cdot R + 4.0 \Omega$	
	> 1 MΩ to 10 MΩ		$60 \cdot 10^{-6} \cdot R + 0.20 \text{ k}\Omega$	
	> 10 MΩ to 100 MΩ		$0.60 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
> 100 MΩ to 1 GΩ		$6.0 \cdot 10^{-3} \cdot R + 20 \text{ k}\Omega$		
AC voltage Measuring instruments	0.001 V to < 0.033 V	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot U + 10 \mu\text{V}$	U: Measured value
	0.033 V to < 0.33 V	45 Hz to 10 kHz	$0.20 \cdot 10^{-3} \cdot U + 15 \mu\text{V}$	
	0.33 V to < 3.3 V		$0.20 \cdot 10^{-3} \cdot U + 0.10 \text{ mV}$	
	3.3 V to < 33 V		$0.20 \cdot 10^{-3} \cdot U + 1.0 \text{ mV}$	
	33 V to < 330 V		$0.25 \cdot 10^{-3} \cdot U + 10 \text{ mV}$	
	330 V to 1000 V		$0.35 \cdot 10^{-3} \cdot U + 15 \text{ mV}$	
Sources	0.001 V to 0.01 V	FAW D-0022 Rev. B, 2020	$0.40 \cdot 10^{-3} \cdot U + 2.0 \mu\text{V}$	
	> 0.01 V to 0.1 V	40 Hz to 20 kHz	$0.20 \cdot 10^{-3} \cdot U + 3.0 \mu\text{V}$	
	> 0.1 V to 1 V		$0.20 \cdot 10^{-3} \cdot U + 30 \mu\text{V}$	
	> 1 V to 10 V		$0.20 \cdot 10^{-3} \cdot U + 0.30 \text{ mV}$	
	> 10 V to 100 V		$0.30 \cdot 10^{-3} \cdot U + 3.0 \text{ mV}$	
	> 100 V to 700 V	40 Hz to 1 kHz	$0.60 \cdot 10^{-3} \cdot U + 30 \text{ mV}$	

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.

Annex to the accreditation certificate D-K-21039-01-00
**Permanent Laboratory
 Karlstein am Main location**
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
AC current Measuring instruments	29 μ A to < 330 μ A 330 μ A to < 3.3 mA 3.3 mA to < 33 mA 33 mA to < 330 mA 330 mA to < 1.1 A 1.1 A to < 3 A 3 A to < 11 A 11 A to 20 A	FAW D-0026 Rev. B, 2020 45 Hz to 1 kHz	$1.5 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$ $1.2 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$ $0.50 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$ $0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$ $0.60 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$ $0.70 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$ $1.2 \cdot 10^{-3} \cdot I + 3.0 \text{ mA}$ $1.8 \cdot 10^{-3} \cdot I + 12 \text{ mA}$	<i>I</i> : Measured value
Sources	10 μ A to 100 μ A > 100 μ A to 1 mA > 1 mA to 10 mA > 10 mA to 100 mA ----- > 100 mA to 1 A	FAW D-0022 Rev. B, 2020 45 Hz to 5 kHz ----- 45Hz to 1 kHz	$0.70 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$ $0.70 \cdot 10^{-3} \cdot I + 0.50 \mu\text{A}$ $0.70 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$ $0.70 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$ $1.5 \cdot 10^{-3} \cdot I + 0.30 \text{ mA}$	
Frequency Measuring instruments	0.1 Hz to 20 MHz	FAW D-0035 Rev. B, 2020	$25 \cdot 10^{-6} \cdot f$	<i>f</i> : Measured value
Sources	0.1 Hz to 35 MHz	FAW D-0036 Rev. B, 2020	$6.0 \cdot 10^{-6} \cdot f$	
Time interval Sources	2.0 ns to 10 ns > 10 ns to 0.10 μ s > 0.1 μ s to 1.0 μ s > 1.0 μ s to 10 μ s > 10 μ s to 50 μ s > 50 μ s to 0.10 ms > 0.10 ms to 0.50 ms > 0.50 ms to 1.0 ms	FAW M-0075 Rev. B, 2019	0.050 ns 0.20 ns 0.30 ns 3.0 ns 10 ns 30 ns 0.10 μ s 0.30 μ s	

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.

Annex to the accreditation certificate D-K-21039-01-00
**Permanent Laboratory
 Karlstein am Main location**
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Oscilloscope quantities Voltage measurement	5 mV to 10 mV	FAW M-0075 Rev. B, 2019 DC to 10 MHz	$40 \cdot 10^{-3}$	Oscilloscope as normal
	> 10 mV to 20 mV		$35 \cdot 10^{-3}$	
	> 20 mV to 50 mV		$35 \cdot 10^{-3}$	
	> 50 mV to 100 mV		$35 \cdot 10^{-3}$	
	> 0.1 V to 0.2 V		$35 \cdot 10^{-3}$	
	> 0.2 V to 0.5 V		$35 \cdot 10^{-3}$	
	> 0.5 V to 1 V		$35 \cdot 10^{-3}$	
	> 1 V to 2 V		$35 \cdot 10^{-3}$	
	> 2 V to 5 V	$35 \cdot 10^{-3}$		
Frequency measurement	0.5 MHz to 1 MHz	FAW M-0075 Rev. B, 2019	$2 \cdot 10^{-3}$	Oscilloscope as normal
	> 1 MHz to 2 MHz		$2 \cdot 10^{-3}$	
	> 2 MHz to 5 MHz		$4 \cdot 10^{-3}$	
	> 5 MHz to 10 MHz		$7 \cdot 10^{-3}$	
	> 10 MHz to 20 MHz		$8 \cdot 10^{-3}$	
	> 20 MHz to 25 MHz		$8 \cdot 10^{-3}$	
	> 25 MHz to 30 MHz		$10 \cdot 10^{-3}$	
	> 30 MHz to 35 MHz		$12 \cdot 10^{-3}$	

**On-site Calibration
 Karlstein am Main location**
Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC voltage Measuring instruments	0 V to < 0.33 V	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot U + 2.0 \mu\text{V}$	U: Measured value
	0.33 V to < 3.3 V		$15 \cdot 10^{-6} \cdot U + 3.0 \mu\text{V}$	
	3.3 V to < 33 V		$15 \cdot 10^{-6} \cdot U + 30 \mu\text{V}$	
	33 V to < 330 V		$25 \cdot 10^{-6} \cdot U + 0.20 \text{ mV}$	
	330 V to 1000 V		$25 \cdot 10^{-6} \cdot U + 2.0 \text{ mV}$	
Sources	0 V to 0.1 V	FAW D-0022 Rev. B, 2020	$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 0.1 V to 1 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 1 V to 10 V		$15 \cdot 10^{-6} \cdot U + 1.0 \mu\text{V}$	
	> 10 V to 100 V		$15 \cdot 10^{-6} \cdot U + 50 \mu\text{V}$	
	> 100 V to 1000 V		$15 \cdot 10^{-6} \cdot U + 0.15 \text{ mV}$	

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.

Annex to the accreditation certificate D-K-21039-01-00

On-site Calibration
Karlstein am Main location

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
DC current Measuring instruments	20 µA to < 330 µA	FAW D-0026 Rev. B, 2020	$0.20 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	I: Measured value
	330 µA to < 3.3 mA		$0.15 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.13 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.13 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	330 mA to < 1.1 A		$0.25 \cdot 10^{-3} \cdot I + 60 \mu\text{A}$	
	1.1 A to < 3.0 A		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	3.0 A to < 11 A		$0.60 \cdot 10^{-3} \cdot I + 0.70 \text{ mA}$	
	11 A to 20 A		$1.2 \cdot 10^{-3} \cdot I + 1.0 \text{ mA}$	
Sources	> 0.1 µA to 1 µA	FAW D-0022 Rev. B, 2020	$30 \cdot 10^{-6} \cdot I + 0.00010 \mu\text{A}$	
	> 1 µA to 10 µA		$30 \cdot 10^{-6} \cdot I + 0.00015 \mu\text{A}$	
	> 10 µA to 100 µA		$30 \cdot 10^{-6} \cdot I + 0.0015 \mu\text{A}$	
	> 100 µA to 1 mA		$25 \cdot 10^{-6} \cdot I + 0.010 \mu\text{A}$	
	> 1 mA to 10 mA		$30 \cdot 10^{-6} \cdot I + 0.10 \mu\text{A}$	
	> 10 mA to 100 mA		$50 \cdot 10^{-6} \cdot I + 1.0 \mu\text{A}$	
	> 100 mA to 1 A		$150 \cdot 10^{-6} \cdot I + 10 \mu\text{A}$	
DC resistance Measuring instruments	1 Ω to < 11 Ω	FAW D-0026 Rev. B, 2020	$25 \cdot 10^{-6} \cdot R + 0.70 \text{ m}\Omega$	R: Measured value
	11 Ω to < 33 Ω	FAW D-0030 Rev. B, 2020	$30 \cdot 10^{-6} \cdot R + 0.50 \text{ m}\Omega$	
	33 Ω to < 330 Ω		$40 \cdot 10^{-6} \cdot R + 0.20 \text{ m}\Omega$	
	330 Ω to < 3.3 kΩ		$40 \cdot 10^{-6} \cdot R + 2.0 \text{ m}\Omega$	
	3.3 kΩ to < 33 kΩ		$40 \cdot 10^{-6} \cdot R + 20 \text{ m}\Omega$	
	33 kΩ to < 110 kΩ		$30 \cdot 10^{-6} \cdot R + 2.0 \Omega$	
	110 kΩ to < 330 kΩ		$40 \cdot 10^{-6} \cdot R + 10 \Omega$	
	330 kΩ to < 1.1 MΩ		$40 \cdot 10^{-6} \cdot R + 0.15 \text{ k}\Omega$	
	1.1 MΩ to < 3.3 MΩ		$40 \cdot 10^{-6} \cdot R + 1.5 \text{ k}\Omega$	
	3.3 MΩ to < 11 MΩ		$0.10 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	11 MΩ to < 33 MΩ		$0.30 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
	33 MΩ to < 110 MΩ		$0.60 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
	110 MΩ to < 330 MΩ		$3.5 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$	
330 MΩ to < 1.1 GΩ		$18 \cdot 10^{-3} \cdot R + 5.0 \text{ k}\Omega$		

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.

Annex to the accreditation certificate D-K-21039-01-00

**On-site Calibration
Karlstein am Main location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Resistors	1 Ω to 10 Ω	FAW D-0026 Rev. B, 2020 FAW D-0033 Rev. B, 2020	$20 \cdot 10^{-6} \cdot R + 0.10 \text{ m}\Omega$	R: Measured value
	> 10 Ω to 100 Ω		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 100 Ω to 1 kΩ		$15 \cdot 10^{-6} \cdot R + 1.0 \text{ m}\Omega$	
	> 1 kΩ to 10 kΩ		$15 \cdot 10^{-6} \cdot R + 10 \text{ m}\Omega$	
	> 10 kΩ to 100 kΩ		$15 \cdot 10^{-6} \cdot R + 0.10 \Omega$	
	> 100 kΩ to 1 MΩ		$20 \cdot 10^{-6} \cdot R + 4.0 \Omega$	
	> 1 MΩ to 10 MΩ		$60 \cdot 10^{-6} \cdot R + 0.20 \text{ k}\Omega$	
	> 10 MΩ to 100 MΩ		$0.60 \cdot 10^{-3} \cdot R + 1.5 \text{ k}\Omega$	
> 100 MΩ to 1 GΩ	$6.0 \cdot 10^{-3} \cdot R + 20 \text{ k}\Omega$			
AC voltage Measuring instruments	0.001 V to < 0.033 V	FAW D-0026 Rev. B, 2020 45 Hz to 10 kHz	$0.20 \cdot 10^{-3} \cdot U + 10 \mu\text{V}$	U: Measured value
	0.033 V to < 0.33 V		$0.20 \cdot 10^{-3} \cdot U + 15 \mu\text{V}$	
	0.33 V to < 3.3 V		$0.20 \cdot 10^{-3} \cdot U + 0.10 \text{ mV}$	
	3.3 V to < 33 V		$0.20 \cdot 10^{-3} \cdot U + 1.0 \text{ mV}$	
	33 V to < 330 V		$0.25 \cdot 10^{-3} \cdot U + 10 \text{ mV}$	
	330 V to 1000 V		$0.35 \cdot 10^{-3} \cdot U + 15 \text{ mV}$	
Sources	0.001 V to 0.01 V	FAW D-0022 Rev. B, 2020 40 Hz to 20 kHz	$0.40 \cdot 10^{-3} \cdot U + 2.0 \mu\text{V}$	
	> 0.01 V to 0.1 V		$0.20 \cdot 10^{-3} \cdot U + 3.0 \mu\text{V}$	
	> 0.1 V to 1 V		$0.20 \cdot 10^{-3} \cdot U + 30 \mu\text{V}$	
	> 1 V to 10 V		$0.20 \cdot 10^{-3} \cdot U + 0.30 \text{ mV}$	
	> 10 V to 100 V		$0.30 \cdot 10^{-3} \cdot U + 3.0 \text{ mV}$	
	> 100 V to 700 V	40 Hz to 1 kHz	$0.60 \cdot 10^{-3} \cdot U + 30 \text{ mV}$	
AC current Measuring instruments	29 μA to < 330 μA	FAW D-0026 Rev. B, 2020 45 Hz to 1 kHz	$1.5 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	I: Measured value
	330 μA to < 3.3 mA		$1.2 \cdot 10^{-3} \cdot I + 1.0 \mu\text{A}$	
	3.3 mA to < 33 mA		$0.50 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	33 mA to < 330 mA		$0.50 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	330 mA to < 1.1 A		$0.60 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	1.1 A to < 3 A		$0.70 \cdot 10^{-3} \cdot I + 0.20 \text{ mA}$	
	3 A to < 11 A		$1.2 \cdot 10^{-3} \cdot I + 3.0 \text{ mA}$	
	11 A to 20 A		$1.8 \cdot 10^{-3} \cdot I + 12 \text{ mA}$	
Sources	10 μA to 100 μA	FAW D-0022 Rev. B, 2020 45 Hz to 5 kHz	$0.70 \cdot 10^{-3} \cdot I + 0.10 \mu\text{A}$	
	> 100 μA to 1 mA		$0.70 \cdot 10^{-3} \cdot I + 0.50 \mu\text{A}$	
	> 1 mA to 10 mA		$0.70 \cdot 10^{-3} \cdot I + 5.0 \mu\text{A}$	
	> 10 mA to 100 mA		$0.70 \cdot 10^{-3} \cdot I + 50 \mu\text{A}$	
	> 100 mA to 1 A	45 Hz to 1 kHz	$1.5 \cdot 10^{-3} \cdot I + 0.30 \text{ mA}$	
Frequency Measuring instruments	0.1 Hz to 20 MHz	FAW D-0035 Rev. B, 2018	$25 \cdot 10^{-6} \cdot f$	f: Measured value
	Sources	0.1 Hz to 35 MHz	FAW D-0036 Rev. B, 2018	

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.

Annex to the accreditation certificate D-K-21039-01-00

**On-site Calibration
Karlstein am Main location**

Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Range	Measurement conditions / procedure	Expanded uncertainty of measurement ¹⁾	Remarks
Time interval Sources	2.0 ns to 10 ns > 10 ns to 0.10 µs > 0.1 µs to 1.0 µs > 1.0 µs to 10 µs > 10 µs to 50 µs > 50 µs to 0.10 ms > 0.10 ms to 0.50 ms > 0.50 ms to 1.0 ms	FAW M-0075 Rev. B, 2019	0.050 ns 0.20 ns 0.30 ns 3.0 ns 10 ns 30 ns 0.10 µs 0.30 µs	
Oscilloscope quantities Voltage measurement	5 mV to 10 mV > 10 mV to 20 mV > 20 mV to 50 mV > 50 mV to 100 mV > 0.1 V to 0.2 V > 0.2 V to 0.5 V > 0.5 V to 1 V > 1 V to 2 V > 2 V to 5 V	FAW M-0075 Rev. B, 2019 DC to 10 MHz	$40 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$ $35 \cdot 10^{-3}$	Oscilloscope as normal
Frequency measurement	0.5 MHz to 1 MHz > 1 MHz to 2 MHz > 2 MHz to 5 MHz > 5 MHz to 10 MHz > 10 MHz to 20 MHz > 20 MHz to 25 MHz > 25 MHz to 30 MHz > 30 MHz to 35 MHz	FAW M-0075 Rev. B, 2019	$2 \cdot 10^{-3}$ $2 \cdot 10^{-3}$ $4 \cdot 10^{-3}$ $7 \cdot 10^{-3}$ $8 \cdot 10^{-3}$ $8 \cdot 10^{-3}$ $10 \cdot 10^{-3}$ $12 \cdot 10^{-3}$	Oscilloscope as normal

Abbreviations used:

CMC Calibration and measurement capabilities
DIN Deutsches Institut für Normung e.V.
FAW Instruction manual of Framatome GmbH

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.