

Deutsche Akkreditierungsstelle GmbH German Accreditation Body

**Entrusted according to Section 8 subsection 1 AkkStelleG in connection with
Section 1 subsection 1 AkkStelleGBV**

Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation



The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the calibration laboratory

ZERA GmbH
Hauptstraße 392, 53639 Königswinter
Germany

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out calibrations in the following fields:

Electrical quantities:


DC and low frequency quantities:

- Voltage
- Current
- Power and energy

The accreditation certificate shall only apply in connection with the notice of accreditation of 20.12.2010 with the accreditation number D-K-15103-01 and is valid until 30.06.2012. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 06 pages.

Registration number of the certificate: **D-K-15103-01-00**

Braunschweig, 20.12.2010



Dr. Michael Wolf
Head of Division

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Annex to the Accreditation Certificate D-K-15103-01-00
according to DIN EN ISO/IEC 17025:2005

Period of validity: 20.12.2010 to 30.06.2012

Holder of certificate:

ZERA GmbH
Hauptstraße 392, 53639 Königswinter

Head:	Helmut Mauer
Deputy:	Frank Quadflieg Dipl.-Ing. (FH) Hubertus Hüttemann

Accredited since: 27.01.2000

Calibrations in the fields:

Electrical quantities:

DC and low frequency quantities:

- Voltage
- Current
- Power and energy

Abbreviations used: see last page

Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
DC voltage	1,018 V	Compared to 1,018 V respectively 10 V standard	$3,2 \cdot 10^{-6}$	U = measuring voltage
	10 V		$3,3 \cdot 10^{-6}$	
	2 V to 100 V	Comparison with 10 V standard with Kelvin Varley divider to HP 3458A	$3,7 \cdot 10^{-6}$	
	0,02 V to 0,1 V		$7 \cdot 10^{-6} U + 11 \mu\text{V}$	
	> 0,1 V to < 1 V		$7 \cdot 10^{-6} U + 1 \mu\text{V}$	
	1 V to 10 V		$7 \cdot 10^{-6}$	
> 10 V to 100 V	$11 \cdot 10^{-6}$			
> 100 V to 1000 V	$16 \cdot 10^{-6}$			
AC voltage	60 V; 120 V; 240 V	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	$20 \cdot 10^{-6}$	with COM 303-3
	> 240 V to 480 V		$57 \cdot 10^{-6}$	
	30 V to 240 V		$50 \cdot 10^{-6}$	
AC current	5 mA to 20 mA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	$50 \cdot 10^{-6}$	
	> 0,02 A to 0,1 A		$32 \cdot 10^{-6}$	
	> 0,1 A to 10 A		$22 \cdot 10^{-6}$	
	> 10 A to 160 A		$58 \cdot 10^{-6}$	
AC active power, single phase	37,5 mW to < 88 kW	$40 \text{ Hz} \leq f \leq 60 \text{ Hz};$ $0,25 \leq \cos \varphi \leq 1$ $30 \text{ V} < U \leq 240 \text{ V}$	$99 \cdot 10^{-6}$	relative measurement uncertainty related to the apparent power with COM 303-3
		$5 \text{ mA} < I < 20 \text{ mA}$ $20 \text{ mA} \leq I \leq 50 \text{ mA}$ $0,05 \text{ A} < I \leq 10 \text{ A}$ $10 \text{ A} < I < 160 \text{ A}$	$68 \cdot 10^{-6}$ $61 \cdot 10^{-6}$ $78 \cdot 10^{-6}$	
AC active power, single phase	0,3 W to 76,8 kW	$40 \text{ Hz} \leq f \leq 60 \text{ Hz};$ $0,25 \leq \cos \varphi \leq 1$ $240 \text{ V} < U \leq 480 \text{ V}$	$0,22 \cdot 10^{-3}$	relative measurement uncertainty related to the apparent power with COM 303-3
		$5 \text{ mA} \leq I < 10 \text{ mA}$ $10 \text{ mA} \leq I < 20 \text{ mA}$ $20 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I \leq 160 \text{ A}$	$0,16 \cdot 10^{-3}$ $0,12 \cdot 10^{-3}$ $78 \cdot 10^{-6}$ $66 \cdot 10^{-6}$ $78 \cdot 10^{-6}$	
AC active energy, single phase	3,75 Ws to < 1,07 kWh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz};$ $0,25 \leq \cos \varphi \leq 1$ $30 \text{ V} < U \leq 240 \text{ V}$ $t = 100 \text{ s}$	$99 \cdot 10^{-6}$	relative measurement uncertainty related to the apparent energy with COM 303-3
		$5 \text{ mA} < I < 20 \text{ mA}$ $20 \text{ mA} \leq I \leq 50 \text{ mA}$ $0,05 \text{ A} < I \leq 10 \text{ A}$ $10 \text{ A} < I < 160 \text{ A}$	$68 \cdot 10^{-6}$ $61 \cdot 10^{-6}$ $78 \cdot 10^{-6}$	

¹⁾ The best measurement capabilities are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
AC active energy, single phase	30 Ws to 21,3 kWh	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ cos φ ≤ 1 240 V < U ≤ 480 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,16 · 10 ⁻³ 0,12 · 10 ⁻³ 78 · 10 ⁻⁶ 66 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC reactive power, single phase	37,5 mvar to < 38,4 kvar	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 30 V < U ≤ 240 V 5 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I ≤ 10 A 10 A < I < 160 A	98 · 10 ⁻⁶ 61 · 10 ⁻⁶ 54 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC reactive power, single phase	0,3 var to 76,8 kvar	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 240 V < U ≤ 480 V 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,16 · 10 ⁻³ 0,12 · 10 ⁻³ 78 · 10 ⁻⁶ 66 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC reactive energy, single phase	3,75 vars to < 10,7 kvarh	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 30 V < U ≤ 240 V t = 100 s 5 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I ≤ 10 A 10 A < I < 160 A	98 · 10 ⁻⁶ 61 · 10 ⁻⁶ 54 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC reactive energy, single phase	30 vars to 21,3 kvarh	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 30 V < U ≤ 240 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,16 · 10 ⁻³ 0,12 · 10 ⁻³ 78 · 10 ⁻⁶ 66 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3

¹⁾ The best measurement capabilities are stated according to DAkKS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
AC active power, three phase	0,1125 W to 115,2 kW	40 Hz $c f \leq 60$ Hz; 0,25 $\leq \cos \varphi \leq 1$ 30 V $< U \leq 240$ V 5 mA $\leq I < 10$ mA 10 mA $\leq I < 20$ mA 20 mA $\leq I < 50$ mA 0,05 A $\leq I < 0,1$ A 0,1 A $\leq I < 20$ A 20 A $\leq I \leq 160$ A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,10 · 10 ⁻³ 64 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC active power, three phase	0,9 W to 230,4 kW	40 Hz $\leq f \leq 60$ Hz; 0,25 $\leq \cos \varphi \leq 1$ 240 V $< U \leq 480$ V 5 mA $\leq I < 10$ mA 10 mA $\leq I < 20$ mA 20 mA $\leq I < 50$ mA 0,05 A $\leq I < 0,1$ A 0,1 A $\leq I < 20$ A 20 A $\leq I \leq 160$ A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,16 · 10 ⁻³ 60 · 10 ⁻⁶ 67 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC active energy, three phase	11,25 Ws to 3,2 kWh	40 Hz $\leq f \leq 60$ Hz; 0,25 $\leq \cos \varphi \leq 1$ 30 V $< U \leq 240$ V $t = 100$ s 5 mA $\leq I < 10$ mA 10 mA $\leq I < 20$ mA 20 mA $\leq I < 50$ mA 0,05 A $\leq I < 0,1$ A 0,1 A $\leq I < 20$ A 20 A $\leq I \leq 160$ A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,10 · 10 ⁻³ 64 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC active energy, three phase	90 Ws to 6,4 kWh	40 Hz $\leq f \leq 60$ Hz; 0,25 $\leq \cos \varphi \leq 1$ 240 V $< U \leq 480$ V $t = 100$ s 5 mA $\leq I < 10$ mA 10 mA $\leq I < 20$ mA 20 mA $\leq I < 50$ mA 0,05 A $\leq I < 0,1$ A 0,1 A $\leq I < 20$ A 20 A $\leq I \leq 160$ A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,16 · 10 ⁻³ 60 · 10 ⁻⁶ 67 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3

¹⁾ The best measurement capabilities are stated according to DAkks-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
AC reactive power, three phase	112,5 mvar to 115,2 kvar	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 30 V < U ≤ 240 V 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 64 · 10 ⁻⁶ 91 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC reactive power, three phase	0,9 var to 230,4 kvar	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 240 V < U ≤ 480 V 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,16 · 10 ⁻³ 60 · 10 ⁻⁶ 67 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power apparent power with COM 303-3
AC reactive energy, three phase	11,25 vars to 3,2 kvarh	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 30 V < U ≤ 240 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 64 · 10 ⁻⁶ 91 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC reactive energy, three phase	90 vars to 6,4 kvarh	40 Hz ≤ f ≤ 60 Hz; 0,25 ≤ sin φ ≤ 1 240 V < U ≤ 480 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 20 A 20 A ≤ I ≤ 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 0,16 · 10 ⁻³ 60 · 10 ⁻⁶ 67 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC apparent power, single phase	0,15 VA to 38,4 kVA	40 Hz ≤ f ≤ 60 Hz; 30 V < U ≤ 240 V 5 mA ≤ I ≤ 20 mA 20 mA ≤ I ≤ 100 mA 0,1 A ≤ I ≤ 10 A 10 A < I ≤ 160 A	97 · 10 ⁻⁶ 58 · 10 ⁻⁶ 54 · 10 ⁻⁶ 83 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3

¹⁾ The best measurement capabilities are stated according to DAkKS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
AC apparent power, three phase	0,45 VA to 115,2 kVA	40 Hz ≤ f ≤ 60 Hz; 30 V < U ≤ 240 V 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC apparent power, three phase	3,6 VA to 230,4 kVA	40 Hz ≤ f ≤ 60 Hz; 240 V < U ≤ 480 V 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent power with COM 303-3
AC apparent energy, single phase	15 VAs to 1,067 kVAh	40 Hz ≤ f ≤ 60 Hz; 30 V < U ≤ 240 V t = 100 s 5 mA ≤ I < 20 mA 20 mA ≤ I < 100 mA 0,1 A ≤ I ≤ 10 A 10 A < I ≤ 160 A	97 · 10 ⁻⁶ 58 · 10 ⁻⁶ 54 · 10 ⁻⁶ 83 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC apparent energy, three phase	45 VAs to 3,2 kVAh	40 Hz ≤ f ≤ 60 Hz; 30 V < U ≤ 240 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3
AC apparent energy, three phase	360 VAs to 6,4 kVAh	40 Hz ≤ f ≤ 60 Hz; 240 V < U ≤ 480 V t = 100 s 5 mA ≤ I < 10 mA 10 mA ≤ I < 20 mA 20 mA ≤ I < 50 mA 0,05 A ≤ I < 0,1 A 0,1 A ≤ I < 160 A	0,22 · 10 ⁻³ 0,17 · 10 ⁻³ 0,13 · 10 ⁻³ 99 · 10 ⁻⁶ 78 · 10 ⁻⁶	relative measurement uncertainty related to the apparent energy with COM 303-3

Abbreviations used:

COM 303-3 Standard measuring device

¹⁾ The best measurement capabilities are stated according to DAKkS-DKD-3 (EA-4/02). These are expanded uncertainties of measurement with a coverage probability of 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.