

Deutsche Akkreditierungsstelle

Annex to the Accreditation Certificate D-K-15103-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: 19.02.2026

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This annex is part of the Accreditation Certificate D-K-15103-01-00.

Holder of the Accreditation Certificate:

**ZERA GmbH
Kalibrierlabor
Humboldtstraße 2a, 53639 Königswinter**

with the location

**ZERA GmbH
Kalibrierlabor
Humboldtstraße 2a, 53639 Königswinter**

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.

*This annex to the certificate was issued by the Deutsche Akkreditierungsstelle GmbH (DAKKS) and is digitally sealed.
This annex to the certificate 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 valid and surveyed accreditation can be found in the directory of accredited bodies maintained by Deutsche Akkreditierungsstelle GmbH (www.dakks.de).*

Annex to the Accreditation Certificate D-K-15103-01-01

Calibrations in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage
- DC current
- AC voltage
- AC current
- Electric power
- Electric energy
- Phase angle
- Voltage ratio
- Current ratio

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Permanent Laboratory

Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
DC voltage	1,018 V	Comparison with 1,018-V-standard	$3,2 \cdot 10^{-6}$	U: Measurement voltage
	10 V	Comparison with 10-V- standard	$3,3 \cdot 10^{-6}$	
	0,02 V to < 0,1 V	with DMM HP 3458A	$36 \cdot 10^{-6}$	
	0,1 V to 500 V		$23 \cdot 10^{-6}$	
	> 500 V to 1000 V		$31 \cdot 10^{-6}$	
	0,02 V to < 0,12 V	mit Kalibrator Fluke 5550A	$83 \cdot 10^{-6}$	
	0,12 V to 1000 V		$31 \cdot 10^{-6}$	
DC current	1 mA to < 5 mA		$68 \cdot 10^{-6}$	with 10 Ω Shunt
	5 mA to < 0,5 A		$47 \cdot 10^{-6}$	
	0,5 A to < 200 A		$78 \cdot 10^{-6}$	with Fluxgate current transformer and Shunt (CTD1500)
	200 A to 800 A		$120 \cdot 10^{-6}$	
AC voltage three-phase	60 V; 120 V; 240 V	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	$20 \cdot 10^{-6}$	with COM 303-3
	30 V to 240 V			30 V
	> 240 V to 480 V			> 240 V
single-phase	0,002 V to < 0,02 V	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	$2,5 \cdot 10^{-3}$	with MT 3000
	0,02 V to < 0,2 V		$0,6 \cdot 10^{-3}$	
	0,2 V to < 2 V		$0,29 \cdot 10^{-3}$	
	2 V to < 30 V		$0,11 \cdot 10^{-3}$	
	0,005 V to < 0,05 V	$47,5 \text{ Hz} \leq f \leq 62,5 \text{ Hz}$	$50 \cdot 10^{-6}$	with PPCS system
	0,05 V to < 0,5 V		$25 \cdot 10^{-6}$	and RT-60
	0,5 V to 6 V		$13 \cdot 10^{-6}$	with PPCS system
	> 6 V to < 30 V		$20 \cdot 10^{-6}$	
	30 V to 240 V		$13 \cdot 10^{-6}$	
	> 240 V to 480 V		$32 \cdot 10^{-6}$	
AC current three-phase	5 mA to 20 mA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	three-phase	5 mA
	> 0,02 A to 0,1 A			> 0,02 A
	> 0,1 A to 10 A			> 0,1 A
	> 10 A to 160 A			> 10 A
single-phase	0,05 A to 10 A	$47,5 \text{ Hz} \leq f \leq 62,5 \text{ Hz}$	$13 \cdot 10^{-6}$	with PPCS system
	> 10 A to 100 A		$28 \cdot 10^{-6}$	

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Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
Power and energy DC current power		0,12 V bis < 1000 V		with Calibrator and 10 Ω Shunt and CTD1500
	0,12 mW to 5 W	1 mA bis < 5 mA	$77 \cdot 10^{-6}$	
	0,6 mW to 500 W	5 mA bis < 0,5 A	$59 \cdot 10^{-6}$	
	0,06 W to 200 kW	0,5 A bis < 200 A	$78 \cdot 10^{-6}$	
	24 W to 800 kW	200 A bis 800 A	$120 \cdot 10^{-6}$	
DC current energy	t = 1 s to 60 s	0,12 V to 1000 V		with Calibrator and 10 Ω Shunt and CTD1500
	0,12 mWs to 0,3 kWs	1 mA to < 5 mA	$77 \cdot 10^{-6}$	
	0,6 mWs to 30 kWs	5 mA to < 0,5 A	$59 \cdot 10^{-6}$	
	0,06 Ws to 3,33 kWh	0,5 A to < 200 A	$78 \cdot 10^{-6}$	
	24 Ws to 13,33 kWh	200 A to 800 A	$120 \cdot 10^{-6}$	

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Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
Power and energy AC current - active power single-phase	0 W to 2,4 kW	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $30 \text{ V} \leq U \leq 240 \text{ V}$ $0,05 \text{ A} \leq I \leq 10 \text{ A}$	$18 \cdot 10^{-6}$	with PPCS system relative measurement uncertainty related on the apparent power
	0 W to 24 kW	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $30 \text{ V} \leq U \leq 240 \text{ V}$ $10 \text{ A} \leq I \leq 100 \text{ A}$	$45 \cdot 10^{-6}$	
	0 W to 4,8 kW	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $240 \text{ V} < U \leq 480 \text{ V}$ $0,05 \text{ A} \leq I \leq 10 \text{ A}$	$47 \cdot 10^{-6}$	
	0 W to 48 kW	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $240 \text{ V} < U \leq 480 \text{ V}$ $10 \text{ A} \leq I \leq 100 \text{ A}$	$50 \cdot 10^{-6}$	
AC current - reactive power single-phase	0 var to 2,4 kvar	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $30 \text{ V} \leq U \leq 240 \text{ V}$ $0,05 \text{ A} \leq I \leq 10 \text{ A}$	$18 \cdot 10^{-6}$	with PPCS system relative measurement uncertainty related on the apparent power
	0 var to 24 kvar	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $30 \text{ V} \leq U \leq 240 \text{ V}$ $10 \text{ A} \leq I \leq 100 \text{ A}$	$45 \cdot 10^{-6}$	
	0 var to 4,8 kvar	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $240 \text{ V} < U \leq 480 \text{ V}$ $0,05 \text{ A} \leq I \leq 10 \text{ A}$	$47 \cdot 10^{-6}$	
	0 var to 48 kvar	47,5 Hz $\leq f \leq$ 62,5 Hz $-90^\circ \leq \varphi_{U,I} \leq 90^\circ$ $240 \text{ V} < U \leq 480 \text{ V}$ $10 \text{ A} \leq I \leq 100 \text{ A}$	$50 \cdot 10^{-6}$	

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AC current - apparent power single-phase	1,5 VA to 2,4 kVA	47,5 Hz $\leq f \leq$ 62,5 Hz 30 V $\leq U \leq$ 240 V 0,05 A $\leq I \leq$ 10 A	$18 \cdot 10^{-6}$	with PPCS system
	300 VA to 24 kVA	47,5 Hz $\leq f \leq$ 62,5 Hz 30 V $\leq U \leq$ 240 V 10 A $\leq I \leq$ 100 A	$45 \cdot 10^{-6}$	
	12 VA to 4,8 kVA	47,5 Hz $\leq f \leq$ 62,5 Hz 240 V $< U \leq$ 480 V 0,05 A $\leq I \leq$ 10 A	$47 \cdot 10^{-6}$	
	2,4 kVA to 48 kVA	47,5 Hz $\leq f \leq$ 62,5 Hz 240 V $< U \leq$ 480 V 10 A $\leq I \leq$ 100 A	$50 \cdot 10^{-6}$	
AC current- active power three-phase	0,1125 W to 115,2 kW	40 Hz $\leq f \leq$ 60 Hz 0,25 $\leq \cos \varphi \leq$ 1 30 V $\leq U \leq$ 240 V 5 mA $\leq I <$ 10 mA 0,01 A $\leq I <$ 0,02 A 0,02 A $\leq I <$ 0,05 A 0,05 A $\leq I <$ 0,1 A 0,1 A $\leq I <$ 20 A 20 A $\leq I \leq$ 160 A	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $0,10 \cdot 10^{-3}$ $54 \cdot 10^{-6}$ $72 \cdot 10^{-6}$	relative measurement uncertainty related on the apparent power with COM 303-3
	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 0,01 A $\leq I <$ 0,02 A 0,02 A $\leq I <$ 0,05 A 0,05 A $\leq I <$ 0,1 A 0,1 A $\leq I <$ 20 A 20 A $\leq I \leq$ 160 A	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $0,16 \cdot 10^{-3}$ $71 \cdot 10^{-6}$ $86 \cdot 10^{-6}$	

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AC current-active power single-phase	7,5 mW to 10,8 kW	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \cos \varphi \leq 1$ $2 \text{ V} < U \leq 30 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,42 \cdot 10^{-3}$ $0,30 \cdot 10^{-3}$	relative measurement uncertainty related on the apparent power with MT 3000
	0,75 mW to 720 W	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \cos \varphi \leq 1$ $0,2 \text{ V} < U \leq 2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,7 \cdot 10^{-3}$ $0,6 \cdot 10^{-3}$	
	75 μ W to 72 W	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \cos \varphi \leq 1$ $0,02 \text{ V} < U \leq 0,2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$1,2 \cdot 10^{-3}$ $1,1 \cdot 10^{-3}$	
	7,5 μ W to 7,2 W	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \cos \varphi \leq 1$ $0,002 \text{ V} \leq U \leq 0,02 \text{ V}$ $5 \text{ mA} \leq I < 120 \text{ A}$	$10 \cdot 10^{-3}$	
AC current-active energy three-phase	11,25 Ws to 3,2 kWh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \cos \varphi \leq 1$ $30 \text{ V} < U \leq 240 \text{ V}$ $t = 100 \text{ s}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I \leq 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $0,10 \cdot 10^{-3}$ $54 \cdot 10^{-6}$ $72 \cdot 10^{-6}$	relative measurement uncertainty related on the apparent energy with COM 303-3

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AC current-active energy three-phase	90 Ws to 6,4 kWh	40 Hz $\leq f \leq$ 60 Hz		relative measurement uncertainty related on the apparent energy with COM 303-3
		0,25 $\leq \cos \varphi \leq$ 1		
		240 V $< U \leq$ 480 V		
		$t = 100$ s		
		5 mA $\leq I <$ 10 mA	$0,22 \cdot 10^{-3}$	
		0,01 A $\leq I <$ 0,02 A	$0,17 \cdot 10^{-3}$	
		0,02 A $\leq I <$ 0,05 A	$0,13 \cdot 10^{-3}$	
AC current-reactive power three-phase	112,5 mvar to 115,2 kvar	0,05 A $\leq I <$ 0,1 A	$0,16 \cdot 10^{-3}$	relative measurement uncertainty related on the apparent power with COM 303-3
		0,1 A $\leq I <$ 20 A	$71 \cdot 10^{-6}$	
		20 A $\leq I \leq$ 160 A	$86 \cdot 10^{-6}$	
	0,9 var to 230,4 kvar	40 Hz $\leq f \leq$ 60 Hz		
		0,25 $\leq \sin \varphi \leq$ 1		
		240 V $< U \leq$ 480 V		
		5 mA $\leq I <$ 10 mA	$0,22 \cdot 10^{-3}$	
		0,01 A $\leq I <$ 0,02 A	$0,17 \cdot 10^{-3}$	
		0,02 A $\leq I <$ 0,05 A	$0,13 \cdot 10^{-3}$	
		0,05 A $\leq I <$ 0,1 A	$0,16 \cdot 10^{-3}$	
		0,1 A $\leq I <$ 20 A	$71 \cdot 10^{-6}$	
		20 A $\leq I \leq$ 160 A	$91 \cdot 10^{-6}$	
	0,9 var to 230,4 kvar	40 Hz $\leq f \leq$ 60 Hz		
		0,25 $\leq \sin \varphi \leq$ 1		
		240 V $< U \leq$ 480 V		
		5 mA $\leq I <$ 10 mA	$0,22 \cdot 10^{-3}$	
		0,01 A $\leq I <$ 0,02 A	$0,17 \cdot 10^{-3}$	
		0,02 A $\leq I <$ 0,05 A	$0,13 \cdot 10^{-3}$	
		0,05 A $\leq I <$ 0,1 A	$0,16 \cdot 10^{-3}$	

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AC current-reactive power single-phase	7,5 mvar to 10,8 kvar	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $2 \text{ V} < U \leq 30 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,42 \cdot 10^{-3}$ $0,30 \cdot 10^{-3}$	relative measurement uncertainty related on the apparent power with MT 3000
	0,75 mvar to 720 var	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $0,2 \text{ V} < U \leq 2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,7 \cdot 10^{-3}$ $0,6 \cdot 10^{-3}$	
	75 μ var to 72 var	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $0,02 \text{ V} < U \leq 0,2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$1,2 \cdot 10^{-3}$ $1,1 \cdot 10^{-3}$	
	7,5 μ var to 7,2 var	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $0,002 \text{ V} \leq U \leq 0,02 \text{ V}$ $5 \text{ mA} \leq I < 120 \text{ A}$	$10 \cdot 10^{-3}$	
AC current-reactive energy three-phase	11,25 vars to 3,2 kvarh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $30 \text{ V} < U \leq 240 \text{ V}$ $t = 100 \text{ s}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I \leq 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $99 \cdot 10^{-6}$ $54 \cdot 10^{-6}$ $76 \cdot 10^{-6}$	relative measurement uncertainty related on the apparent energy with COM 303-3

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Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
AC current-reactive energy three-phase	90 vars to 6,4 kvarh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,25 \leq \sin \varphi \leq 1$ $240 \text{ V} < U \leq 480 \text{ V}$ $t = 100 \text{ s}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I \leq 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $0,16 \cdot 10^{-3}$ $71 \cdot 10^{-6}$ $91 \cdot 10^{-6}$	relative measurement uncertainty related on the apparent energy with COM 303-3
AC current-apparent power three-phase	0,45 VA to 115,2 kVA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $30 \text{ V} < U \leq 240 \text{ V}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I < 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $99 \cdot 10^{-6}$ $54 \cdot 10^{-6}$ $68 \cdot 10^{-6}$	with COM 303-3
	3,6 VA to 230,4 kVA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $240 \text{ V} < U \leq 480 \text{ V}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I < 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $99 \cdot 10^{-6}$ $69 \cdot 10^{-6}$ $84 \cdot 10^{-6}$	
AC current-apparent power single-phase	30 mVA to 10,8 kVA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $2 \text{ V} < U \leq 30 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,42 \cdot 10^{-3}$ $0,30 \cdot 10^{-3}$	with MT 3000

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Calibration and Measurement Capabilities (CMC)				
Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
AC current- apparent power single-phase	3 mVA to 720 VA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,2 \text{ V} < U \leq 2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$0,7 \cdot 10^{-3}$ $0,6 \cdot 10^{-3}$	with MT 3000
	0,3 mVA to 72 VA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,02 \text{ V} < U \leq 0,2 \text{ V}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	$1,2 \cdot 10^{-3}$ $1,1 \cdot 10^{-3}$	
	30 μ VA to 7,2 VA	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $0,002 \text{ V} < U \leq 0,02 \text{ V}$ $5 \text{ mA} \leq I < 120 \text{ A}$	$10 \cdot 10^{-3}$	
AC current- apparent energy three-phase	45 VAs to 3,2 kVAh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $30 \text{ V} < U \leq 240 \text{ V}$ $t = 100 \text{ s}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I < 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $99 \cdot 10^{-6}$ $54 \cdot 10^{-6}$ $68 \cdot 10^{-6}$	with COM 303-3
	360 VAs to 6,4 kVAh	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $240 \text{ V} < U \leq 480 \text{ V}$ $t = 100 \text{ s}$ $5 \text{ mA} \leq I < 10 \text{ mA}$ $0,01 \text{ A} \leq I < 0,02 \text{ A}$ $0,02 \text{ A} \leq I < 0,05 \text{ A}$ $0,05 \text{ A} \leq I < 0,1 \text{ A}$ $0,1 \text{ A} \leq I < 20 \text{ A}$ $20 \text{ A} \leq I < 160 \text{ A}$	$0,22 \cdot 10^{-3}$ $0,17 \cdot 10^{-3}$ $0,13 \cdot 10^{-3}$ $99 \cdot 10^{-6}$ $69 \cdot 10^{-6}$ $84 \cdot 10^{-6}$	

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Calibration and Measurement Capabilities (CMC)

Measurement quantity / Calibration item	Measurement range	Measurement conditions / procedures	Expanded measurement uncertainty	Remarks
AC voltage-phase angle	$-180^\circ \leq \delta_{U,U} \leq 180^\circ$	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$	0,4'	with COM 303-3
		with PPCS	0,1' 0,1'	with PPCS
		with PPCS and RT-60	0,2' 0,3'	with PPCS and RT-60
AC current-phase angle	$-180^\circ \leq \delta_{I,I} \leq 180^\circ$	$40 \text{ Hz} \leq f \leq 60 \text{ Hz}$ $5 \text{ mA} \leq I < 50 \text{ mA}$ $0,05 \text{ A} \leq I \leq 120 \text{ A}$	0,2' 0,1'	with COM 303-3
Isolating current transformer with ratio	Primary currents	PTB-PR issue 12 (1979)		Comparison with two standards in substitution methods
1:1; 1:2; 10:1	5 mA to < 50 mA	$45 \text{ Hz} \leq f \leq 65 \text{ Hz}$	0,016 %; 0,02 crad	MU value; phase
	50 mA to 120 A		0,011 %; 0,014 crad	MU value; phase
AC voltage measuring bridge	3,75 V bis < 15 V	PTB-PR Band 12 (1979) $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$ TV 0,5 bis 1	0,019 %; 0,025 crad	mit WM3000 U MU Betrag; Phase
	15 V bis 480 V		0,014 %; 0,016 crad	MU Betrag; Phase
AC voltage measuring bridge with EVT	25 mV bis < 200 mV	PTB-PR Band 12 (1979) $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$	0,04 %; 0,044 crad	mit WM3000 U nur für EVT MU Betrag; Phase
	200 mV bis 15 V		0,031 %; 0,032 crad	MU Betrag; Phase
AC current measuring bridge	5 mA to < 50 mA	PTB-PR Band 12 (1979) $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$ TV 0,5 to 1	0,024 %; 0,025 crad	with WM3000 I MU value; phase
	50 mA to 15 A		0,014 %; 0,016 crad	MU value; phase
AC current measuring bridge with ECT		PTB-PR issue 12 (1979)		with WM3000 I only for ECT

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	25 mV to < 200 mV	50 Hz $\leq f \leq$ 60 Hz	0,04 %; 0,042 crad	MU value; phase
	200 mV to 15 V		0,031 %; 0,037 crad	MU value; phase

Abbreviations used:

CMC	Calibration and Measurement Capabilities
COM 303-3	Standard measuring device (Comparator)
MT3000	Measuring standard for small voltage ranges
PPCS	Precision Power Calibration System
RT-60	Inductive voltage divider
$\delta_{U,U}$	AC voltage phase angle between voltages
$\delta_{I,I}$	AC current phase angle between currents
TV	Divider ratio
MU	Measurement uncertainty
WM3000 U	Voltage Transformer Measuring Bridge
WM3000 I	Current Transformer Measuring Bridge
EVT	Electronic Voltage Transformer
ECT	Electronic Current Transformer
PTB	Physikalisch Technische Bundesanstalt (National Metrology Institute)
PTB-PR	PTB testing rules