

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-K-19153-01-00 according to DIN EN ISO/IEC 17025:2005

Valid from: 12.10.2018

Date of issue: 12.10.2018

Holder of certificate:

HIGHVOLT Prüftechnik Dresden GmbH

with its calibration laboratory

**Kalibrierlaboratorium der HIGHVOLT Prüftechnik Dresden GmbH
Marie-Curie-Straße 10, 01139 Dresden**

Head:	Dr. Frank Böhme
Deputy head:	Dr.-Ing. Stefan Maucksch Dr. rer. nat. Martin Greschner Dipl.-Ing. Jürgen Weise Marco Schäfer

Accredited as calibration laboratory since: 06.04.1999

Calibration in the fields:

Electrical quantities

DC and low frequency quantities

- DC voltage *)
- AC voltage *)
- AC current *)
- Capacitance *)
- High voltage quantities *)
- High voltage impulse quantities *)
- Electrical power *)

*) also on-site calibration

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

Abbreviations used: see last page

*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>*

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Permanent Laboratory

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
DC voltage	1 V to 1000 V		0.05 %	Calibration of instruments
AC voltage	1 V to 700 V	50 Hz	0.08 %	Calibration of instruments $U_{eff}, \dot{U}/\sqrt{2}$
	100 V to 100 V	10 Hz to 500 Hz	0.08 %	
	30 V to 30 V	40 Hz to 1 kHz	0.08 %	
DC voltage	1 kV to 300 kV	IEC 60060:2018	0.4 %	Calibration of measuring systems and dividers
	300 kV to 600 kV	IEC 60060:2018	0.8 %	
	300 kV to 1500 kV	linearity test	1.3 %	
	600 kV to 2000 kV	IEC 60060:2018	1.5 %	
AC voltage	1 kV to 5 kV	50 Hz	0.8 %	Calibration of measuring systems and dividers $U_{eff}, \dot{U}/\sqrt{2}$
	5 kV to 100 kV	30 Hz to 300 Hz	0.4 %	
	5 kV to 200 kV	50 Hz	0.45 %	
	5 kV to 200 kV	30 Hz to 300 Hz	0.75 %	
	50 kV to 800 kV	50 Hz	0.8 %	
	50 kV to 800 kV	30 Hz to 300 Hz	0.9 %	
	800 kV to 1800 kV	50 Hz, linearity test IEC 60060:2018-2	1.5 %	
Lightning impulse voltage peak value LI	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.3 %	Calibration of instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements
	35 V to 1000 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.6 %	
Lightning impulse voltage LI front time T_1	0.84 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.3 %	
	0.84 μs	35 V to 1000 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
	1.56 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.3 %	
Lightning impulse voltage LI time to half value T_2	60 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$	1.0 %	
	60 μs	35 V to 1000 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks	
Switching impulse voltage peak value SI	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.3 %	Calibration of measuring instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements	
	35 V to 850 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.6 %		
Switching impulse voltage SI time to peak T_P	20 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.5 %		
	250 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.5 %		
	250 μs	35 V to 850 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %		
Switching impulse voltage SI time to half value T_2	4000 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.0 %		
	2500 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.0 %		
	2500 μs	35 V to 850 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %		
Chopped lightning impulse voltage LIC peak value	20 V to 310 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.7 %		Calibration of measuring instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements
	35 V to 750 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.7 %		
Chopped lightning impulse voltage LIC time to chop T_C	0.5 μs to 6 μs	20 V to 310 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.6 %		
	0.5 μs to 6 μs	35 V to 750 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %		

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
STEP (step voltage)	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.35 %	Calibration of measuring instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements
Lightning impulse voltage Peak value LI	180 kV to 200 kV	IEC 60060:2018	0.45 %	Calibration of measuring systems and dividers
	50 kV to 700 kV	IEC 60060:2018	0.7 %	
	10 kV to 200 kV	IEC 60060:2018	1.0 %	
	700 kV to 3500 kV	Linearity test IEC 60060:2018	1.4 %	
Lightning impulse voltage LI Front time T_1	0.8 μs to 1.6 μs	IEC 60060:2018, 50 kV to 700 kV	2.0 %	
	0.8 μs to 1.6 μs	IEC 60060:2018, 10 kV to 200 kV	4.0 %	
Lightning impulse voltage LI Time to half value T_2	40 μs to 60 μs	IEC 60060:2018, 50 kV to 700 kV	2.0 %	
	40 μs to 60 μs	IEC 60060:2018, 10 kV to 200 kV	3.7 %	
Switching impulse voltage Peak value SI	180 kV to 200 kV	IEC 60060:2018	0.5 %	
	50 kV to 500 kV	IEC 60060:2018	0.7 %	
	500 kV to 2500 kV	IEC 60060:2018	1.4 %	
Switching impulse voltage SI Time to peak T_p	200 μs to 300 μs	IEC 60060:2018	2.0 %	
Switching impulse voltage SI Time to half value T_2	1000 μs to 4000 μs	IEC 60060:2018	2.0 %	
Lightning impulse voltage LIC Peak value	180 kV to 600 kV	IEC 60060:2018 T_c 0.5 μs to 6 μs	0.85 %	
Lightning impulse voltage LIC Time to chop T_c	0.5 μs to 6 μs	IEC 60060:2018	2.0 %	
Capacitance	10 pF to 100 pF	5 kV to 200 kV, 50 Hz	0.05 %	Calibration of capacitors
	10 pF to 10 nF	10 kV to 800 kV, 50 Hz	0.1 %	Calibration of C/tan δ -measuring bridges
	100 pF to 100 pF	5 kV to 100 kV, 50 Hz	0.05 %	
	10 pF to 10 nF	5 kV to 100 kV, 50 Hz	0.1 %	
Dissipation factor tan δ	$1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$		$3.5 \cdot 10^{-5}$ (absolute value)	Calibration of capacitors
	$> 1 \cdot 10^{-3}$ to $1 \cdot 10^{-2}$		$3.0 \cdot 10^{-4}$ (absolute value)	
	$1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$		$2.0 \cdot 10^{-5}$ (absolute value)	Calibration of C/tan δ -measuring bridges
	$> 1 \cdot 10^{-3}$ to $1 \cdot 10^{-2}$		$2.0 \cdot 10^{-4}$ (absolute value)	
Impulse current shunt, Measuring systems with shunt	200 A to 40 kA	IEC 62475:2010	1.0 %	Impulse current up to 8 μs / 20 μs
Impulse current Rogowski-current sensors and measuring systems Rogowski-current sensors	200 A to 200 kA	IEC 62475:2010	1.0 %	

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Impulse current Time parameters	6 μ s to 24 μ s	IEC 62475:2010	2.5 %	
AC voltage	40 V to 100 kV	50 Hz $\leq f \leq$ 60 Hz	0.025 %	Calibration of power measuring systems and components, U_{eff}, \hat{U}
AC current	0.4 to 2000 A	40 V $\leq U \leq$ 100 kV 0.4 A $\leq I \leq$ 2000 A 90° $\leq \varphi_{U,I} \leq$ 90° 50 Hz $\leq f \leq$ 60 Hz	0.035 %	Calibration of power measuring systems and components, I_{eff}, \hat{I}
AC current active power single phase P	0 W to 200 MW	40 V $\leq U \leq$ 100 kV 0.4 A $\leq I \leq$ 2000 A 90° $\leq \varphi_{U,I} \leq$ 90° 50 Hz $\leq f \leq$ 60 Hz	0.04 %	Calibration of power measuring systems, relative measurement uncertainty in relation to apparent power S
AC current reactive power single phase Q	0 var to 200 Mvar	40 V $\leq U \leq$ 100 kV 0.4 A $\leq I \leq$ 2000 A 90° $\leq \varphi_{U,I} \leq$ 90° 50 Hz $\leq f \leq$ 60 Hz	0.04 %	
AC current apparent power single phase S	16 VA to 200 MVA	40 V $\leq U \leq$ 100 kV 0.4 A $\leq I \leq$ 2000 A 50 Hz $\leq f \leq$ 60 Hz	0.04 %	

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On-site Calibration

Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
DC voltage	1 kV to 300 kV	IEC 60060:2018	0.4 %	Calibration of measuring systems and dividers
	300 kV to 600 kV	IEC 60060:2018	0.8 %	
	300 kV to 1500 kV	linearity test IEC 60060:2018	1.0 %	
	600 kV to 2000 kV	linearity test IEC 60060:2018	1.3 %	
AC voltage	1 kV to 5 kV	50 Hz	0.8 %	Calibration of measuring systems and dividers $U_{\text{eff}}, \dot{U}/\sqrt{2}$
	5 kV to 100 kV	30 Hz to 300 Hz	0.4 %	
	5 kV to 200 kV	50 Hz	0.45 %	
	5 kV to 200 kV	30 Hz to 300 Hz	0.75 %	
	200 kV to 1000 kV	50 Hz, linearity test IEC 60060:2018-2	1.5 %	
Lightning impulse voltage peak value LI	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.3 %	Calibration of measuring instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements
	35 V to 1000 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.6 %	
Lightning impulse voltage LI front time T_1	0.84 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.3 %	
	0.84 μs	35 V to 1000 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
	1.56 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.3 %	
Lightning impulse voltage LI time to half value T_2	60 μs	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.0 %	
	60 μs	35 V to 1000 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
Switching impulse voltage Peak value SI	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.3 %	
	35 V to 850 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.6 %	

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Switching impulse voltage SI time to peak T_p	20 μ s	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.5 %	Calibration of measuring instruments and calibrators, measurement uncertainties are valid for the arithmetic mean value of at least 10 measurements
	250 μ s	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.5 %	
	250 μ s	35 V to 850 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
Switching impulse voltage SI time to half value T_2	4000 μ s	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.0 %	
	2500 μ s	9 V to 330 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.0 %	
	2500 μ s	35 V to 850 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
Chopped lightning impulse voltage LIC peak value	20 V to 310 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.7 %	
	35 V to 750 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	0.7 %	
Chopped lightning impulse voltage LIC time to chop T_c	0.5 μ s to 6 μ s	20 V to 310 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	1.6 %	
	0.5 μ s to 6 μ s	35 V to 750 V IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, connection via coaxial cable length 2 m	1.6 %	
STEP (step voltage)	9 V to 330 V	IEC 61083:2013, load $\geq 1 \text{ M}\Omega \leq 50 \text{ pF}$, direct connected	0.35 %	

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
Lightning impulse voltage peak value LI	180 kV to 200 kV	IEC 60060:2018	0.45 %	Calibration of measuring systems and dividers
	50 kV to 700 kV	IEC 60060:2018	0.7 %	
	10 kV to 200 kV	IEC 60060:2018	1.0 %	
	700 kV to 3500 kV	Linearity test IEC 60060:2018	1.4 %	
Lightning impulse voltage LI front time T_1	0.8 μ s to 1.6 μ s	IEC 60060:2018, 50 kV to 700 kV	2.0 %	
	0.8 μ s to 1.6 μ s	IEC 60060:2018, 10 kV to 200 kV	4.0 %	
Lightning impulse voltage LI time to half value T_2	40 μ s to 60 μ s	IEC 60060:2018, 50 kV to 700 kV	2.0 %	
	40 μ s to 60 μ s	IEC 60060:2018, 10 kV to 200 kV	3.7 %	
Switching impulse voltage peak value SI	180 kV to 200 kV	IEC 60060:2018	0.5 %	Calibration of measuring systems and dividers
	50 kV to 500 kV	IEC 60060:2018	0.7 %	
	500 kV to 2500 kV	IEC 60060:2018	1.4 %	
Switching impulse voltage SI time to peak T_p	200 μ s to 300 μ s	IEC 60060:2018	2.0 %	
Switching impulse voltage SI time to half value T_2	1000 μ s to 4000 μ s	IEC 60060:2018	2.0 %	
Lightning impulse voltage LIC peak value	180 kV to 600 kV	IEC 60060:2018 T_c 0,5 μ s to 6 μ s	0.85 %	Calibration of measuring systems and dividers
Lightning impulse voltage LIC time to chop T_c	0,5 μ s to 6 μ s	IEC 60060:2018	2.0 %	
Capacitance	10 pF to 100 pF	5 kV to 200 kV, 50 Hz	0.05 %	Calibration of capacitors
	>100pF to 10 nF		0.1 %	Calibration of C/tan δ -measuring bridges
	100 pF to 100 pF		5 kV to 100 kV, 50 Hz	
Dissipation factor tan δ	10 pF to 10 nF	5 kV to 100 kV, 50 Hz	0,1 %	
	$1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$		$3.5 \cdot 10^{-5}$ (absolute value)	Calibration of capacitors
	$> 1 \cdot 10^{-3}$ to $1 \cdot 10^{-2}$		$3.0 \cdot 10^{-4}$ (absolute value)	
	$1 \cdot 10^{-5}$ to $1 \cdot 10^{-3}$		$2.0 \cdot 10^{-5}$ (absolute value)	Calibration of C/tan δ -measuring bridges
Impulse current shunt, Measuring systems with shunt	$> 1 \cdot 10^{-3}$ to $1 \cdot 10^{-2}$		$2.0 \cdot 10^{-4}$ (absolute value)	
	200 A to 40 kA	IEC 62475:2010	1.0 %	Impulse current up to 8 μ s / 20 μ s
Impulse current Rogowski-current sensors and measuring systems Rogowski- current sensors	200 A to 200 kA	IEC 62475:2010	1.0 %	
Impulse current Time parameters	6 μ s to 24 μ s	IEC 62475:2010	2.5 %	

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Measured quantity / Calibration item	Range	Measurement conditions / procedure	Best measurement capability ¹⁾	Remarks
AC voltage	40 V to 100 kV	50 Hz ≤ f ≤ 60 Hz	0.025 %	Calibration of power measuring systems and components, U_{eff} , \hat{U}
AC current	0.4 A to 2000 A	40 V ≤ U ≤ 100 kV 0.4 A ≤ I ≤ 2000 A 90° ≤ φ _{U,I} ≤ 90° 50 Hz ≤ f ≤ 60 Hz	0.035 %	Calibration of power measuring systems and components, I_{eff} , \hat{I}
AC current-active power single phase <i>P</i>	0 W to 200 MW	40 V ≤ U ≤ 100 kV 0.4 A ≤ I ≤ 2000 A 90° ≤ φ _{U,I} ≤ 90° 50 Hz ≤ f ≤ 60 Hz	0.04 %	Calibration of power measuring systems, relative measurement uncertainty in relation to apparent power <i>S</i>
AC current-reactive power single phase <i>Q</i>	0 VAr to 200 MVar	40 V ≤ U ≤ 100 kV 0.4 A ≤ I ≤ 2000 A 90° ≤ φ _{U,I} ≤ 90° 50 Hz ≤ f ≤ 60 Hz	0.04 %	
AC current- apparent power single phase <i>S</i>	16 VA to 200 MVA	40 V ≤ U ≤ 100 kV 0.4 A ≤ I ≤ 2000 A 50 Hz ≤ f ≤ 60 Hz	0.04 %	

Abbreviations used:

IEC International Electrotechnical Commission

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