

# Deutsche Akkreditierungsstelle GmbH

## Scope of Accreditation D-K-15070-01-08 to DIN EN ISO/IEC 17025:2005

Period of validity: 13.11.2015 to 20.10.2016

Date of issue: 13.11.2015

Certificate bearer:

**Testo Industrial Services GmbH**  
**Gewerbestraße 3, 79199 Kirchzarten**

with the calibration laboratory:

**Testo Industrial Services GmbH**  
**Kalibrierlabor München**  
**Nikolaus-Otto-Straße 2 , 85221 Dachau**

Laboratory chief: Dipl.-Phys. Eugen Sander  
Section leaders: Dipl.-Ing. (FH) Christian Knapp  
Clemens Bender  
Karl Scharber  
Christian Kliche

Accredited calibration laboratory since: 04.03.1987

Areas of calibration:

### Electrical measurands

#### DC and low frequency measurands

- DC voltage
- AC voltage
- Direct current
- Alternating Current
- DC resistance

#### Power and energy

- Electrical power

#### Time and frequency

- Time interval
- Frequency and rotational speed

### Dimensional measurands

#### Length

- Length-measuring instruments
- Diameter
- Thread

#### Flow rate measurands

##### Liquid flow rate

- Mass of flowing liquids
- Volume of flowing liquids

##### Gas flow rate

- Mass of flowing gases
- Volume of flowing gases

Definition of abbreviations used: see last page

The German original version "[Anlage zur Akkreditierungsurkunde D-K-15070-01-08 nach DIN EN ISO/IEC 17025:2005](#)" is valid.

Scope of Accreditation D-K-15070-01-08

Permanent Laboratory

Measurand/ Equipment	Range	Measurement Conditions/ Procedure	Smallest Measurement Uncertainty 1)	Remarks
DC Voltage Measuring Instruments	10 mV to 220 mV > 0.22 V to 2.2 V > 2.2 V to 11 V > 11 V to 22 V > 22 V to 220 V > 220 V to 1000 V		$1.5 \mu\text{V} + 10 \cdot 10^{-6} U$ $16 \cdot 10^{-6} U$ $11 \cdot 10^{-6} U$ $10 \cdot 10^{-6} U$ $16 \cdot 10^{-6} U$ $16 \cdot 10^{-6} U$	$U =$ measured value Fluke 5700A
Sources	10 mV to 100 mV > 100 mV to 1 V > 1 V to 10 V > 10 V to 100 V > 100 V to 1000 V		$1.5 \mu\text{V} + 10 \cdot 10^{-6} U$ $13 \cdot 10^{-6} U$ $10 \cdot 10^{-6} U$ $15 \cdot 10^{-6} U$ $18 \cdot 10^{-6} U$	$U =$ measured value HP 3458A
DC Current	>1 $\mu\text{A}$ to 1 A > 1 A to 10 A > 10 A to 20 A		$25 \cdot 10^{-6} I$ $0.15 \cdot 10^{-3} I$ $0.20 \cdot 10^{-3} I$	$I =$ measured value
DC Resistance	1 m $\Omega$ to 10 m $\Omega$ > 10 m $\Omega$ to < 1 $\Omega$ 1 $\Omega$ to 10 M $\Omega$ > 10 M $\Omega$ to 100 M $\Omega$		$0.15 \cdot 10^{-3} R$ $50 \cdot 10^{-6} R$ $20 \cdot 10^{-6} R$ $0.20 \cdot 10^{-3} R$	$R =$ measured value
DC Power	10 mW to 100 kW	Product of $U$ and $I$ ; $10 \text{ mV} \leq U \leq 1000 \text{ V}$ $100 \mu\text{A} \leq I \leq 100 \text{ A}$	$0.20 \cdot 10^{-3} P$	$P =$ measured value
AC Voltage Measuring Instruments	0.1 V to 0.2 V  > 0.2 V to 2.2 V  > 2.2 V to 22 V  > 22 V to 220 V  > 220 V to 1000 V	40 Hz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz  40 Hz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz  40 Hz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz  40 Hz to 20 kHz > 20 kHz to 50 kHz > 50 kHz to 100 kHz	$0.25 \cdot 10^{-3} U$ $0.51 \cdot 10^{-3} U$ $1.4 \cdot 10^{-3} U$  $0.14 \cdot 10^{-3} U$ $0.27 \cdot 10^{-3} U$ $0.75 \cdot 10^{-3} U$  $0.14 \cdot 10^{-3} U$ $0.26 \cdot 10^{-3} U$ $0.51 \cdot 10^{-3} U$  $0.16 \cdot 10^{-3} U$ $0.48 \cdot 10^{-3} U$ $1.2 \cdot 10^{-3} U$  $0.13 \cdot 10^{-3} U$	$U =$ measured value Fluke 5700A

<sup>1)</sup> The smallest measurement uncertainties are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties with a 95 % level of confidence and, unless otherwise stated, using a coverage factor of  $k = 2$ . Uncertainties that appear without units are relative to the measured value unless otherwise stated.

**Scope of Accreditation D-K-15070-01-08**

Measurand/ Equipment	Range	Measurement Conditions/ Procedure	Smallest Measurement uncertainty <sup>1)</sup>	Remarks
AC Voltage Sources	0.1 V to 10 V	40 Hz to 1 kHz > 1 kHz to 20 kHz > 20 kHz to 50 kHz	$0.30 \cdot 10^{-3} U$ $0.40 \cdot 10^{-3} U$ $0.60 \cdot 10^{-3} U$	U = measured value HP 3458A
	> 10 V to 100 V	40 Hz to 1 kHz > 1 kHz to 20 kHz > 20 kHz to 50 kHz	$0.50 \cdot 10^{-3} U$ $0.50 \cdot 10^{-3} U$ $0.60 \cdot 10^{-3} U$	
	> 100 V to 700 V	40 Hz to 1 kHz	$0.60 \cdot 10^{-3} U$	
AC Current Measuring Instruments	1 mA to 2,2 mA	40 Hz to 1 kHz > 1 kHz to 5 kHz > 5 kHz to 10 kHz	$0.04 \mu A + 0.19 \cdot 10^{-3} I$ $0.5 \mu A + 0.82 \cdot 10^{-3} I$ $1 \mu A + 2.1 \cdot 10^{-3} I$	I = measured value Fluke 5700A
	> 2.2 mA to 22 mA	40 Hz to 1 kHz > 1 kHz to 5 kHz > 5 kHz to 10 kHz	$0.4 \mu A + 0.19 \cdot 10^{-3} I$ $5 \mu A + 0.82 \cdot 10^{-3} I$ $12 \mu A + 2.1 \cdot 10^{-3} I$	
	> 22 mA to 220 mA	40 Hz to 1 kHz > 1 kHz to 5 kHz > 5 kHz to 10 kHz	$5 \mu A + 0.21 \cdot 10^{-3} I$ $60 \mu A + 0.81 \cdot 10^{-3} I$ $0.12 \text{ mA} + 2.1 \cdot 10^{-3} I$	
	> 0.22 A to 2.2 A	40 Hz to 1 kHz > 1 kHz to 5 kHz > 5 kHz to 10 kHz	$50 \mu A + 0.87 \cdot 10^{-3} I$ $0.12 \text{ mA} + 0.98 \cdot 10^{-3} I$ $0.23 \text{ mA} + 12 \cdot 10^{-3} I$	
	> 2.2 A to 19.9 A	40 Hz to 5 kHz	$3.0 \cdot 10^{-3} I$	
Sources	1 mA to 100 mA	40 Hz to 5 kHz	$3.0 \cdot 10^{-3} I$	I = measured value HP 3458A
	> 100 mA to 1 A	40 Hz to 5 kHz	$3.5 \cdot 10^{-3} I$	
Frequency	1 MHz to 10 MHz	1 MHz	$U_{Tf} + 5 \cdot 10^{-11} \cdot f$	f = measured value U <sub>Tf</sub> = Trigger-uncertainties
Time Interval	1 MHz to 1 GHz		$U_{Tf} + 2 \cdot 10^{-9} \cdot f$	
	1 μs to 10000 s		$U_{Tt} + 2 \text{ ns} + 2 \cdot 10^{-9} \cdot t$	t = measured value U <sub>Tt</sub> = Trigger-uncertainties

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Measurand/ Equipment	Range	Measurement Conditions/ Procedure	Smallest Measurement uncertainty <sup>1)</sup>	Remarks
Temperature Indicators and -Simulation				
Resistance-thermometer	-200 °C to 850°C		0.03 K	Characteristic according to DIN EN IEC 60751
Precious Metal Thermocouples	-200 °C to 1750°C		0.1 K	Characteristic according to DIN EN IEC 60584
Non-Precious-Metal Thermocouples	-200 °C to 1300°C		0.05 K	Characteristic according to DIN EN IEC 60584
Length Cylindrical Setting Gauge Ring Gauge Diameter	3 mm to 150mm	DAkKS-DKD-R 4-3 Page 4.1, Point 5.3.3, Point 5.3.4:2010	$0.8 \mu\text{m} + 2 \cdot 10^{-6} \cdot d$	$d =$ measured diameter
Plug Gauge Diameter	1 mm to 150mm	DAkKS-DKD-R 4-3 Page 4.1, Point 5.3.3, Point 5.3.4:2010	$0.8 \mu\text{m} + 2 \cdot 10^{-6} \cdot d$	
Pin Gauge Diameter	1 mm to 20mm	DAkKS-DKD-R 4-3 Page 4.2, Point 5.3.3:2010	$0.8 \mu\text{m} + 2 \cdot 10^{-6} \cdot d$	
Thread Gauge (Single and Multi-Start Cylindrical Outer and Inner Threads with Straight-Sided Symmetrical Profile)				
Thread Pin: Simple Pitch Diameter	1,4 mm to 150 mm Nominal Pitch: 0.3 mm to 6 mm	DAkKS-DKD-R 4-3 Page 4.8 Option 1:2010	$3 \mu\text{m} + 10 \cdot 10^{-6} \cdot d$	
Thread Ring: Simple Pitch Diameter	3 mm to 200 mm Nominal Pitch: 0.5 mm to 6 mm	DAkKS-DKD-R 4-3 Page 4.9 Option 1:2010	$3 \mu\text{m} + 10 \cdot 10^{-6} \cdot d$	
Caliper for Outer and Inner Depth Measurements	0 mm to 500 mm	DAkKS-DKD-R 4-3 Page 9.1:2010	$30 \mu\text{m} + 30 \cdot 10^{-6} \cdot l$	
Depth Gauge		DAkKS-DKD-R 4-3 Page 9.2:2010		
Micrometer	0 mm to 150 mm	DAkKS-DKD-R 4-3 Page 10.1:2010	$3 \mu\text{m} + 10 \cdot 10^{-6} \cdot l$	
Dial Indicator	to 50 mm	DAkKS-DKD-R 4-3 Page 11.1:2010	$3 \mu\text{m} + 10 \cdot 10^{-6} \cdot l$	
Indicating Caliper	to 3 mm	DAkKS-DKD-R 4-3 Page 11.2:2010	0.6 $\mu\text{m}$	
Feeler Gauge	to 1.6 mm	DAkKS-DKD-R 4-3 Page 11.3:2010	1.0 $\mu\text{m}$	

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Measurand/ Equipment	Range	Measurement Conditions/ Procedure	Smallest Measurement uncertainty <sup>1)</sup>	Remarks
Flow rate of liquids Volume Flow $dV/dt$ of flowing liquids	0.8 mL/min to 40 L/min	Piston Calibrator Volumetric measurement Liquid with a density of 700 kg/m <sup>3</sup> to 1100 kg/m <sup>3</sup> Viscosity of 0.3 mm <sup>2</sup> /s to 1600 mm <sup>2</sup> /s	0.08 %	Measurement instruments with analog output, Frequency Output, Visual Display
	10 mL/min to 300 L/min		0.08 %	
	1 L/min to 1200 L/min		0.05 %	
Mass Flow $dm/dt$ of flowing liquids	0.6 g/min to 32 kg/min		0.12 %	
	8 g/min to 240 kg/min		0.12 %	
	0.8 kg/min to 1000 kg/min		0.09 %	
Volume $V$ of flowing liquids	25 mL to 2.5 L		0.08 %	Measurement instruments with analog output, Frequency Output, Visual Display Flow rate not less than 0.5 mL/min
	190 mL to 19 L			Measurement instruments with analog output, Frequency Output, Visual Display Flow rate not less than 10 mL/min
	410 mL to 41 L			Measurement instruments with analog output, Frequency Output, Visual Display Flow rate not less than 1 mL/min

<sup>1)</sup> The smallest measurement uncertainties are stated according to DAkkS-DKD-3 (EA-4/02). These are expanded uncertainties with a 95 % level of confidence and, unless otherwise stated, using a coverage factor of  $k = 2$ . Uncertainties that appear without units are relative to the measured value unless otherwise stated.

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Measurand/ Equipment	Range	Measurement Conditions/ Procedure	Smallest Measurement uncertainty <sup>1)</sup>	Remarks
Flow rate of gases Volume flow rate <i>dV/dt of flowing gases</i>	1 mL/min to < 3 mL/min	Laminar Flow Elements Dry air (Dew point less than -15 °C)	0.40 %	Measurement instruments with analog output, Frequency Output, Visual Display Measurement
	≥ 3 mL/min to 1000 L/min		0.33 %	
	≥ 8 L/min to 2000 L/min	Critical Nozzles Dry Air (Dew point less than -15 °C)	0.22 %	
Mass flow rate <i>dm/dt of flowing gases</i>	1.3 mg/min to < 3.9 mg/min	Laminar Flow Elements Dry air (Dew point less than -15 °C)	0.42 %	
	≥ 3.9mg/min to 1300 g/min		0.36 %	
	10 g/min to 1500 kg/min	Critical Nozzles Dry Air (Dew point less than -15 °C)	0.24 %	

**Abbreviations used:**

DAkS-DKD-R A calibration directive from the „Deutsche Akkreditierungsstelle“ formerly „Deutscher Kalibrierdienst“

<sup>1)</sup> The smallest measurement uncertainties are stated according to DAkS-DKD-3 (EA-4/02). These are expanded uncertainties with a 95 % level of confidence and, unless otherwise stated, using a coverage factor of  $k = 2$ . Uncertainties that appear without units are relative to the measured value unless otherwise stated.