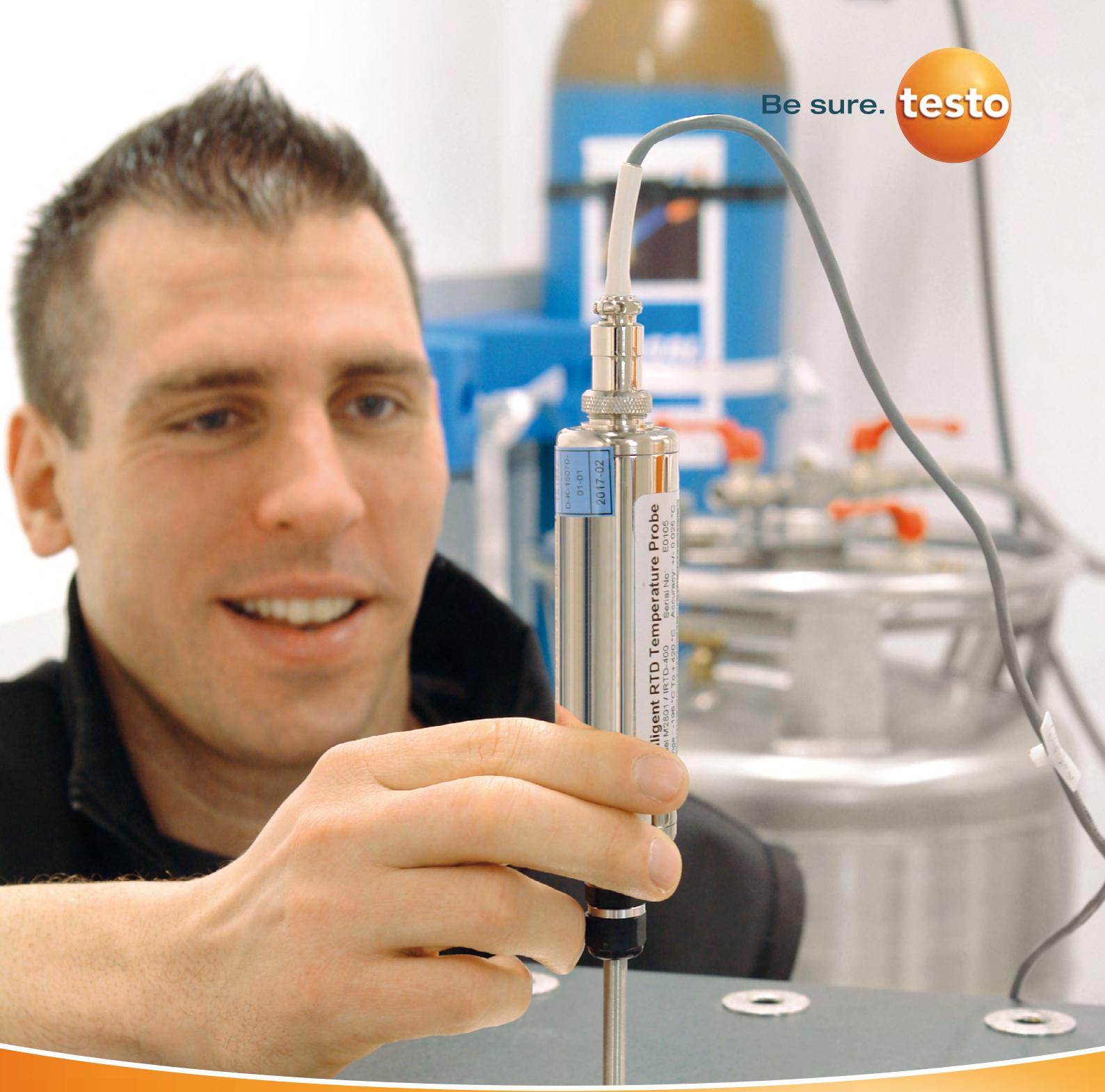


Calibration of high-quality reference standards

Testo Industrial Services – More assurance, better service.

www.testotis.com

Your partner for calibration of reference standards

Testo Industrial Services is one of the leading manufacturer independent providers of calibration services in Europe. With more than 250 accredited calibration procedures, we cover nearly all requirements within the sectors of electrical-, mechanical-, dimensional-, thermodynamical- and flow calibration.

Quality, reliability and low measurement uncertainties are characteristics for our service portfolio. Our services comprise from calibration to complete test equipment management solutions. Our primary laboratory works on the highest level of measurement technology. Furthermore, a specially developed logistics- and handling process completes our services.

Our advantages at a glance:

- ✔ Accredited for more than 190 calibration procedures
- ✔ Manufacturer independent calibration laboratory
- ✔ Lowest measurement uncertainties within Germany for the parameters temperature and humidity
- ✔ Lowest measurement uncertainties within the electrical low-frequency measurement technology
- ✔ Short processing times due to date arrangements

High-quality references at the electrical primary laboratory

„Calibration strengthens trust! Confidence in the measurement results and in the conformity statement, confidence in the correctness of the metrological characteristics of the measuring equipment to be calibrated and thus the confidence of our customers in the quality and grade of your processes and products.

With this confidence and one of the largest portfolios of accredited calibration procedures in Europe, we as Testo Industrial Services GmbH are your contact for calibrations.“

Christian Sander, Head of Meterology

Customised logistics concept for a safe transport

As an accredited laboratory, we know that your reference standards are very valuable. Handing them over to an external transport service provider for shipment is nearly unimaginable.

In order to make this step easier for you, we have optimized our company owned pick-up and delivery-service to meet the requirements of this special transport service. The specially manufactured transport boxes are adapted to the common references and are equipped with shock-, tilt- and temperature indicators. These boxes guarantee a safe hold during the transport. Our trained and experienced drivers deliver your reference standards safely to their destination!

Special transport boxes equipped with shock-, tilt- and temperature indicators for the transport of resistance thermometers and fixed point cells.

Services of Testo Industrial Services GmbH

- ✔ Own pick-up and delivery service within selected regions in Europe
- ✔ Special transport boxes, equipped with shock-, tilt- and temperature indicators
- ✔ Experienced and trained drivers
- ✔ Individual journeys for your reference standards
- ✔ Insured transport

Spezial-Transportboxen für den Transport elektrischer Referenzen

Primary laboratory for electrical measurands

We calibrate your high-quality standards of the electrical LF measurement technology in our electrical primary laboratory. Our references are connected directly to the state institutions (PTB, METAS) and are used for the traceability of your reference standard.

The measurement uncertainties of our accredited calibration procedures are amongst the lowest of all DAkkS-laboratories.
For example resistance standards can be calibrated with a measurement uncertainty starting at 55 · 10-9.
This is unique all over Europe!

Extract of our scope of services:

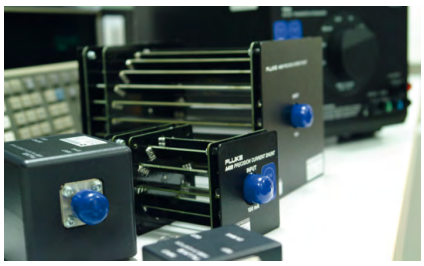
- Voltage measurement standards, e. g. Fluke 732A,
- Standard resistances from 100 µΩ bis 100 TΩ
- AC/DC-transfer with Fluke 792A, 5790A
- Calibrators, for example Fluke 5720A, 5700A, 5520A, 5820A …
- High-resolution mutlimeters, e. g. Fluke 8508A, Agilent/HP 3458A …
- Voltage ratio
- Phase angle
- Resistance ratio (AC/DC) for e. g. ASL resistance measuring bridges
- AC voltage, e.g. for wideband option in calibrators
- AC resistors
- AC active power, reactive power and apparent power

High-quality reference standards

As reference standards for DC voltage, we used a DC standard Fluke 732A (with 19-year history).
With our highly stable standard resistors (with up to 26 years of history) in our Fluke 7015 oil bath for dc current strength and resistance, we achieve minimum/smallest measurement uncertainties. For AC voltage, we use an AC/DC transfer standard, Fluke 792A. Multiple AC current shunts Fluke A40B for AC current strength and highly stable reference capacitances and inductances complete our primary electrical laboratory.

Scope of services:

Messgröße	Messbereich DAkkS	Messbedingung	Messunsicherheit
DC voltage	0 V bis 1000 V		ab 0,25 · 10^{-6}
DC current	1 pA bis 200 A		ab 6 · 10^{-6}
DC resistance	100 µΩ bis 100 TΩ		ab 50 · 10^{-9}
DC voltage power	10 mW bis 100 kW		ab 10 · 10^{-6}
AC voltage	1 mV bis 1000 V	10 Hz bis 1 MHz	ab 2 · 10^{-6}
AC/DC voltage-transfer	1 mV bis 1000 V	10 Hz bis 1 MHz	ab 2 · 10^{-6}
AC power	100 µA bis 100 A	10 Hz bis 10 kHz	ab 7 · 10^{-6}
AC/DC transfer	100 µA bis 100 A	10 Hz bis 10 kHz	ab 4 · 10^{-6}
AC resistance	0,1 Ω bis 10 kΩ	10 Hz bis 10 kHz	ab 6 · 10^{-6}
AC active power	50 µW bis 80 kW	10 Hz bis 10 kHz/0° bis ± 75°	ab 50 · 10^{-6}
AC reactive power	50 µvar bis 80 kvar	10 Hz bis 10 kHz/0° bis ± 75°	ab 50 · 10^{-6}
AC apparent power	50 µVA bis 80 kVA	10 Hz bis 10 kHz	ab 25 · 10^{-6}
Capacity	1 pF bis 10 µF	50 Hz bis 1 MHz	ab 10 · 10^{-6}
Capacity	1µF - 110mF	DC Methode	ab 0,3 · 10^{-3}
Inductivity	100 µH bis 10 H	100 Hz - 10 kHz	ab 55 · 10^{-6}
Stress ratio	2 mV/V bis 100 mV/V	DC bis 4,8 kHz	ab 0,015 µV/V
Phase angle	0° bis 360°	10 Hz bis 100 kHz	ab 0,005°
AC/DC measuring bridges	0 bis 400 Hz	0,16 bis 6,3	ab 0,2 · 10^{-6}



Reference standards for alternating current power

Calibration of a Fluke 5790A

Resistances and shunts

Primary laboratory for thermodynamic measurands

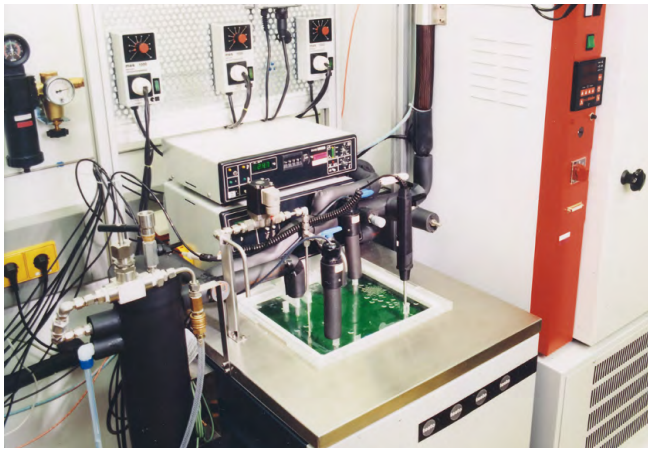
In our thermodynamic primary laboratory, we calibrate your high-quality standards at the highest metrological level. The metrological connection is realized via the standards of the PTB. Our minimal measurement uncertainties are the result of our many years of experience in temperature and humidity measurement technology and a unique combination and interweaving of our accredited measurement variables pressure, temperature and electrics.

Excerpt of our services:

- **Temperature fixed point cells**
- **Resistance thermometer (SPRT)**
- **Thermocouples type Au/Pt or Pt/Pd**
- **Precious metal thermocouples**
- **Dew point mirror**

Scope of services:

	DAkkS-Measuring Range	Description	Measurement uncertainty		
			Fixed point cells	SPRT	Thermocouples
Calibration at fixed points	-189,3442 °C	Triple point of argon	4,0 mK	4,0 mK	
	-38,8344 °C	Triple point of quicksilver	1,0 mK	1,5 mK	
	0,010 °C	Triple point of water	0,5 mK	0,5 mK	0,4 K
	29,7646 °C	Melting point of gallium	0,8 mK	1,0 mK	
	156,5985 °C	Solidification point of indium	2,5 mK	2,5 mK	
	231,928 °C	Solidification point of tin	1,5 mK	2,5 mK	0,4 K
	419,527 °C	Solidification of zinc	2,0 mK	2,5 mK	0,4 K
	660,323 °C	Solidification of aluminum	7,0 mK	7,0 mK	0,4 K
	961,78 °C	Solidification of silver			0,5 K
	0 … +1000 °C	Calibration at fixed points			0,6 K
Calibration at fixed points with deviation functiontion according to ITS-90	-196 ... -189 °C	Extrapolation acc. EURAMET tg-1		8,0 mK	
	-189 ... 0 °C	Ar, Hg, TPW		6,0 mK	
	-40 ... +30 °C	Hg, TPW, Ga		2,0 mK	
	0 ... +156 °C	TPW, In		3,5 mK	
	0 ... +232 °C	TPW, In, Sn		3,5 mK	
	>232 ... +420 °C	TPW, Sn, Zn		4,0 mK	
	>232 ... +660 °C	TPW, Sn, Zn, Al		8,0 mK	



In the 2-pressure/2-temperature humidity generator, the humidity state of the air at the output is determined by two temperatures and two pressures. From these values, the various humidity parameters are calculated according to the Sonntag and Greenspan mathematical model.

The measurement uncertainty of the calculated humidity is therefore directly dependent on the measurement uncertainties of the pressure and temperature calibration, for which Testo Industrial Services achieves the lowest measurement uncertainties in Germany with achieves the lowest measurement uncertainties with 0.05 K!

Be sure. testo

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