

DAKKS CALIBRATION SERVICE AND VERIFICATION SERVICE

PROFESSIONAL
MEASURING

KERN & Sohn GmbH
Älteste europäische Feinwaagen und Gewichtefabrik seit 1844
 Oldest European Manufacturer of Precision Balances since 1844

akkreditiert durch die / accredited by the
Deutsche Akkreditierungsstelle GmbH
 als Kalibrierlaboratorium im / as calibration laboratory in
Deutschen Kalibrierdienst

Sample
D-K-19408-01-00
2014-05

Kalibrierzeichen
Calibration mark

Kalibrierschein
Calibration Certificate

Gegenstand Object	Präzisionswaage Precision Balance	
Hersteller Manufacturer	KERN & Sohn GmbH Ziegelei 1 72336 Balingen GERMANY	Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAKKS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich. This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAKKS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals.
Typ Type	PLJ 600-3CM	
Fabrikate/Serien-Nr. Serial number	123456789	
Auftraggeber Customer	Mustermann GmbH Musterstraße 1 12345 Musterort Deutschland	

Auftragsnummer
Order No. 2014-12345678

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate 6

Datum der Kalibrierung
Date of calibration 27.05.2014












































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 This calibration certificate may not be reproduced other than in full except with the permission of both the accreditation body of the Deutsche Akkreditierungsstelle GmbH and the issuing laboratory. Calibration certificates without signature are not valid.

	Datum Date 27.05.2014	Leiter des Kalibrierlaboratoriums Head of the Calibration Laboratory Otto Grunenberg	Bearbeiter Person-in-charge Frank Kleißberg
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 Phone +49-7433-99330, Fax +49-7433-9933-149 QXC132 (rev 5)

2020

KERN Pictograms

 Internal adjusting: Quick setting up of the balance's accuracy with internal adjusting weight (motordriven)	 KERN Communication Protocol (KCP): It is a standardized interface command set for KERN balances and other instruments, which allows retrieving and controlling all relevant parameters and functions of the device. KERN devices featuring KCP are thus easily integrated with computers, industrial controllers and other digital systems	 Protection against dust and water splashes IPxx: The type of protection is shown in the pictogram. For details see page 62
 Adjusting program CAL: For quick setting up of the balance's accuracy. External adjusting weight required	 GLP/ISO log: The balance displays serial number, user ID, weight, date and time, regardless of a printer connection	 Stainless steel: The balance is protected against corrosion
 Easy Touch: Suitable for the connection, data transmission and control through PC, tablet or smartphone	 GLP/ISO log: With weight, date and time. Only with KERN printers, see page 171-173	 Suspended weighing: Load support with hook on the underside of the balance
 Memory: Balance memory capacity, e.g. for article data, weighing data, tare weights, PLU etc.	 GLP/ISO log: With weight, date and time. Only with KERN printers, see page 171-173	 Battery operation: Ready for battery operation. The battery type is specified for each device
 Alibi memory: Secure, electronic archiving of weighing results, complying with the 2014/31/EU standard. For details see page 223	 Piece counting: Reference quantities selectable. Display can be switched from piece to weight	 Rechargeable battery pack: Rechargeable set
 Data interface RS-232: To connect the balance to a printer, PC or network	 Recipe level A: The weights of the recipe ingredients can be added together and the total weight of the recipe can be printed out	 Universal mains adapter: with universal input and optional input socket adapters for A) EU, CH, GB B) EU, CH, GB, USA C) EU, CH, GB, USA, AUS
 RS-485 data interface: To connect the balance to a printer, PC or other peripherals. Suitable for data transfer over large distances. Network in bus topology is possible	 Recipe level B: Internal memory for complete recipes with name and target value of the recipe ingredients. User guidance through display	 Mains adapter: 230V/50Hz in standard version for EU, CH. On request GB, USA or AUS version available
 USB data interface: To connect the balance to a printer, PC or other peripherals	 Recipe level C: Internal memory for complete recipes with name and target value of the recipe ingredients. User guidance through display, multiplier function, adjustment of recipe when dosages are exceeded or barcode recognition	 Power supply: Integrated in balance. 230V/50Hz standard EU. More standards e.g. GB, USA or AUS on request
 Bluetooth* data interface: To transfer data from the balance to a printer, PC or other peripherals	 Totalising level A: The weights of similar items can be added together and the total can be printed out	 Weighing principle: Strain gauges Electrical resistor on an elastic deforming body
 WLAN data interface: To transfer data from the balance to a printer, PC or other peripherals	 Percentage determination: Determining the deviation in % from the target value (100 %)	 Weighing principle: Tuning fork A resonating body is electromagnetically excited, causing it to oscillate
 Control outputs (optocoupler, digital I/O): To connect relays, signal lamps, valves, etc.	 Weighing units: Can be switched to e.g. nonmetric units at the touch of a key. See balance model. Please refer to KERN's website for more details	 Weighing principle: Electromagnetic force compensation Coil inside a permanent magnet. For the most accurate weighings
 Analogue interface: to connect a suitable peripheral device for analogue processing of the measurements	 Weighing with tolerance range: (Checkweighing) Upper and lower limiting can be programmed individually, e.g. for sorting and dosing. The process is supported by an audible or visual signal, see the relevant model	 Weighing principle: Single cell technology: Advanced version of the force compensation principle with the highest level of precision
 Interface for second balance: For direct connection of a second balance	 Hold function: (Animal weighing program) When the weighing conditions are unstable, a stable weight is calculated as an average value	 Verification possible: The time required for verification is specified in the pictogram
 Network interface: For connecting the scale to an Ethernet network	 Package shipment: The time required for internal shipping preparations is shown in days in the pictogram	 DAkkS calibration possible (DKD): The time required for DAkkS calibration is shown in days in the pictogram
 Wireless data transfer: between the weighing unit and the evaluation unit using an integrated radio module	 Pallet shipment: The time required for internal shipping preparations is shown in days in the pictogram	 Pallet shipment: The time required for internal shipping preparations is shown in days in the pictogram

KERN – measuring technology and testing services from a single source



Balances & Test service catalogue

Provides a complete overview of the KERN line of balances, test weights, and services such as verification, calibration, etc.



Medical scales catalogue

Complete line of medical scales, from infant scales to patient scales, chair scales and adiposity scales, as well as hand grip dynamometers, chemist's balances and veterinary scales.



Microscopes & refractometers catalogue

Extensive range in the area of optical instruments, such as, for example, biological microscopes, stereo microscopes, metallurgical microscopes, polarisation microscopes as well as analogue and digital refractometers.



SAUTER measuring equipment catalogue

Test instruments for industry and commerce, such as force, coating thickness, material thickness and calibration service.



DAkkS calibration service brochure

Detailed information on topics pertaining to the calibration and verification of balances, test weights, and force measuring devices.

Your advantages

fast

- 24 hours delivery service for products in stock – ordered today, on its way tomorrow
- Sales & service hotline available from 8:00 am to 6:00 pm

reliable

- Up to 3 years warranty
- Precision in weighing technology for more than 175 years

competent

- DAkkS accreditation DIN EN ISO/IEC 17025
- Certified QM system DIN EN ISO 9001
- Authorisation for initial verification by the manufacturer 2014/31/EU
- Medical certifications DIN EN ISO 13485 and 93/42/EWG

versatile

- One-stop shopping: from pocket balances through to 15 t crane balance – everything from one supplier
- Find the product you want at lightning speed with the “Balance Quick-Finder” at www.kern-sohn.com



Order hotline
+49 7433 9933-0



Online Shop
www.kern-sohn.com



Service hotline
+49 7433 9933-199



E-mail order
info@kern-sohn.com



Calibration hotline
+49 7433 9933-196



Fax order
+49 7433 9933-146



Our team of consultants will assist you
from Monday to Friday
from 8:00 am to 6:00 pm



www.kern-sohn.com

Information on current product availability, product data sheets, user instructions, useful knowledge, technical glossary, images and much for you to download, practical topic areas, which will guide you to the right product in your industry as well as a clever test weight and balance search engine.

DAkKS Calibration Service and Verification service



The DAkKS (German accreditation body)

The DAkKS is the national accreditation body of the Federal Republic of Germany. According to Regulation (EC) No. 765/2008 and the Accreditation Body Act (AkkStelleG), the DAkKS acts in the public interest as the sole service provider for accreditation in Germany.

In order to be able to fulfil its sovereign accreditation tasks, the DAkKS was entrusted by the Federal Government. As an entrusted body, the DAkKS is subject to federal supervision.

Only an accredited calibration laboratory can issue a DAkKS calibration certificate. This defines not only the measuring method as well as the measuring result, but also gives information on tracing the test medium to national standards and the relevant uncertainty of measurement.

- ▶ **You are certified to ...**
ISO 9001, QS 9000, GLP, GMP, TS16949
- ▶ **You need ...**
to control your measuring equipment
- ▶ **Our solution ...**
DAkKS calibration certificate; (traceability, measuring uncertainty, internationally recognised)

KERN – Precision is our business

The KERN calibration laboratory for electronic balances and weights has been accredited by DKD since 1994 and today is one of the most modern and best-equipped DKD calibration laboratories for balances, test weights and force measurement in Europe.

Thanks to the high level of automation, we can carry out DAkKS calibration of balances, test weights and force-measuring devices 24 hours a day, 7 days a week.

Do you have any further requests or questions on this matter? We would be pleased to help you or visit us on the web at www.kern-lab.com

DAkKS calibration

- Why?** DAkKS calibration is always necessary when checking equipment (balance or test weight) is to be used in a QM process (e.g. to ISO 9000ff, GS 9000, TS 16949, VDA 6.1, FDA, GLP, GMP, GMP etc.)
- What?** Any checking equipment in proper condition can be DAkKS calibrated
- How?** Determination of accuracy throughout the world by a laboratory which is accredited to DIN EN ISO 17025. Traceability to internationally recognised standards. The DAkKS calibration certificate confirms both the measurement characteristics of the checking equipment and the general requirements for the control of checking equipment.
- Where?** Internationally recognised – this is monitored by ILAC (International Laboratory Accreditation Cooperation) and e.g. DAkKS (German calibration service) in Germany
- When?** Operator control the use of checking equipment and periodic recalibration time intervals themselves

Range of services:

- DAkKS calibration of balances with a maximum load of up to 50.000 kg
- DAkKS calibration of weights in the range of 1 mg – 2.500 kg. Calibrations can be carried out in the following classes: E1, E2, F1, F2, M1, M2, M3
- DAkKS calibration of force gauges and force transducers
- Volume determination for weights of accuracy class E1
- Measuring of sensitivity (magnetic characteristics)
- Factory calibration in various sizes:
- Force (sensors and measuring devices), hardness (Shore, UCI, Leeb, etc.), thickness of coatings and walls, torque wrench testing devices, and much more
- Conformity assessments and recalibration of balances and weights at the KERN verification point, working closely with the verification authorities

And on top of all these services, we also offer additional services – see page 212/213.



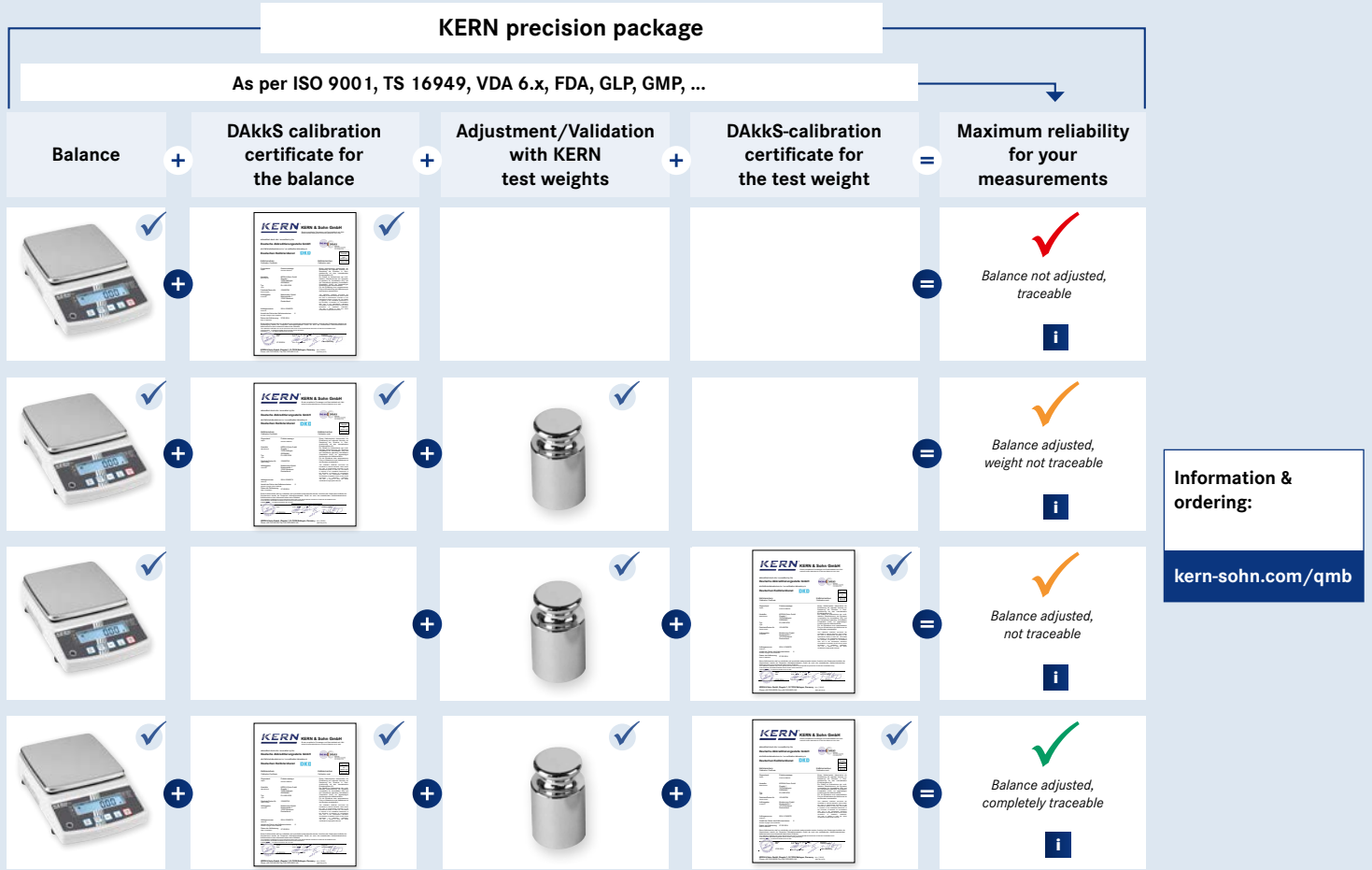
Waldemar Fleitling

Product specialist Calibration service

Tel. +49 7433 9933-163
Fax +49 7433 9933-29163
fleitling@kern-sohn.com

Balance & weight in the quality management system

Do you already use all the modules of the KERN precision package for maximum accuracy and reliability of your balance?



The KERN calibration laboratory (D-K-19408-01-00)

KERN has a highly-automated DAkkS laboratory with accreditation to DIN EN ISO/IEC 17025 in the field of balances, test weights and force measurement. By using the most modern calibration technology with high-end calibration robots in fully air-conditioned laboratories, the measurement uncertainty and process times are reduced to a minimum, and also the quality of the calibration is increased.

As an accredited and certified calibration service provider with decades of experience, KERN offers you an extensive range of services, which will leave no demand unfulfilled. The accreditation applies to the extent specified in the appendix to the certificate D-K-19408-01-00.

We offer the following services:

Waagen:

- ▶ DAkkS calibration up to 50 t
- ▶ Minimum sample weight (in use)
- ▶ Usage accuracy
- ▶ Adjustment at the location of installation
- ▶ Certificate of conformity
- ▶ Equipment qualification:
 - > Installation qualification (IQ)
 - > Function qualification (OQ)
 - > Performance qualification (PQ)
 - > Maintenance qualification (MQ)

Weights:

- ▶ DAkkS calibration up to 2.5 t (OIML classes E1 – M3)
- ▶ Volume determination for OIML class E1
- ▶ Measuring of sensitivity (magnetic characteristics)

Force:

- ▶ DAkkS calibration up to 5 kN

Factory calibration for:

- ▶ Force-measuring devices
 - ▶ Hardness
 - ▶ Layer thickness
 - ▶ Material thickness
 - ▶ Temperature of moisture analysers
- Authorised verification point for balances and weights (initial verification and re-verification)

Our commitment to satisfy our customers never stops. Perhaps this is one of the reasons why our roots can perhaps be traced so far back in history. **Discover the KERN route to success: fast - competent - reliable - versatile!**

The order process

- ➊ You will receive a **reminder** that your test equipment is due or you will generate a quotation for new or existing test equipment
- ➋ Submission or collection of your test equipment
- ➌ Initial inspection of your goods, to check that they are suitable for calibration, and are complete, etc.
- ➍ You will get a detailed order confirmation
- ➎ Our experts will carry out initial calibration
- ➏ Checked for conformity with required tolerances and if required, any necessary actions which arise from this are carried out
- ➐ Before these actions are carried out, we will contact you (in so far as no individual processing has been agreed with you beforehand)
- ➑ After your approval the necessary actions will be implemented and the calibration will be completed
- ➒ After that your test equipment will be returned without delay, together with the appropriate calibration certificates
- ➓ We will monitor your recalibration periods and will send you, free of charge, a reminder about your next calibration

Our service

► Reminder service

The continuous cyclic recalibration of your checking equipment is an integral part of the reliable management of test equipment. You can depend on us to support you, and we will remind you in good time, free of charge, when the next recalibration is due. In addition, you have the option of managing your test equipment yourself online (cf. ➊, ➓).

► Quote generator

You will be impressed by our price-to-performance ratio. Request a non-binding quotation or create it yourself to suit your specifications at www.kern-lab.com (cf. ➊).

► Collection service

We will be pleased to arrange for our shipping company to pick up the goods from your premises. Simply tell us the weight and dimensions of your package and leave the rest to us (cf. ➋).

► Repair and reconditioning of balances and weights

KERN will get your weights back up to standard, regardless of the manufacturer. Whether it is adjustment, marking, sand blasting or lacquering - the aim here is compliance and long-term stability. Any repairs of balances and instruments which may be necessary can be carried out quickly and easily (cf. ➍, ➏).

► Individual processing

In order to avoid delays with future orders, we would be pleased to incorporate your individual requirements for future processing of such calibration results. Even for smaller issues such as the printing of calibration certificates (stapling, punching, double-sided) we can work to your requirements (cf. ➐).

► Express service and dispatch

If you need a particularly fast service, you can use your DAkkS express service. You will receive your test equipment after just 2 days (cf. ➒).

www.kern-lab.com – the central portal for everything you need to know about the extensive KERN calibration services

On our website you will always find the latest news and useful information about testing and measuring devices, calibration, legal metrology and expansions to our range of services. You will also find numerous online services on the website.

Database supported management of test equipment

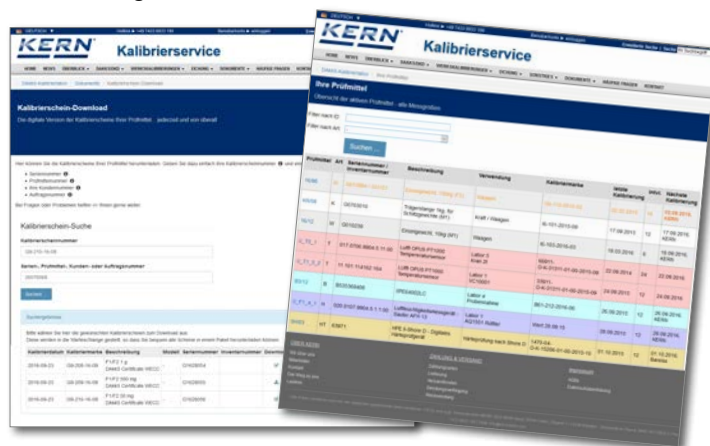
Information on your test equipment which has been calibrated by us is stored in our database. In this way it is possible to make trend calculations. You will therefore get an overview of the long-term stability and trend behaviour of your test equipment and the necessary recalibration period can easily be determined and specified.

Paperless documentation

So that there is no administrative effort, we can handle all calibration documentation in a paperless process. From quotation, through to order confirmation, delivery note and invoice right up to calibration certificate, you will receive all documents by e-mail or you can retrieve them online. Would you prefer to receive your certificate or your invoice, for example, in paper form? Of course this is not a problem either. We will send you everything you require by post.

Calibration certificate download

Using our download service you can easily download your calibration certificates as soon as the calibration work is complete and you will have access to them at any time in the future. Simply create your user account on www.kern-lab.com and you will never need to look for your certificates again.

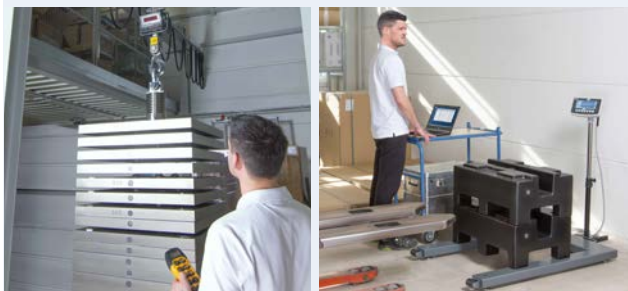


DAkkS Calibration of balances

Any balance will only give correct results if it is checked regularly, i.e. calibrated correctly and adjusted when required. A balance is only a reliable measuring and checking tool if it is calibrated and this calibration is documented. The issued DAkkS calibration certificates are proof of the metrological traceability to national and international standards, as required by the DIN EN ISO 9000 and DIN EN ISO/IEC 17025 standards, amongst others. KERN recommends a recalibration period of one year. The standard does not give a defined recalibration period. KERN recommends that, with intensive (daily) use, you recalibrate your balance every 6 months and with normal (weekly) use, every 12 months.

THE ADVANTAGES OF USING THE KERN IN-HOUSE CALIBRATION:

- + **Short calibration time:** Test time in the laboratory is only four working days
- + **Competence:** Calibration laboratory, which complies with the highest standards in the area of metrology
- + **Independent management** of the recalibration calendar for your individual measuring instrument is possible
- + **Cross-brand service:** Measuring devices from any manufacturer can be calibrated independently
- + **Repair:** Any necessary repairs can be carried out immediately, if you wish



a) Calibration at the KERN factory (you send your balance to us)

Recommended for new devices and for balances which can be affordably transported, as then there is no need for us to travel to carry out the calibration on-site. Repairs can be carried out at the same time, quickly and in full.

The process would be as follows:

- Day 1: Send your balance to the KERN calibration laboratory in Balingen.
- Day 2 to 3: Evaluation and calibration of your balance by our specialists.
- Day 4: After positive validation, your balance is returned.

THE ADVANTAGES OF USING THE KERN ON-SITE CALIBRATION:

- + **Calibration on-site** at your premises in the field of use
- + **No risk of damage** during transportation
- + **Low downtime**
- + **Cross-brand servicing**, basic inspection and adjustment by a specialist
- + You tell us **when you would like us to come**
- + **Device training** for qualified users



b) KERN on-site calibration (we visit you)

In Germany, KERN has a close-knit network of KERN DAkkS calibration laboratory employees, who can carry out on-site calibration of balances up to 50 tonnes.

This on-site testing service is metrologically recommended, as your balance is in its field of use and can be calibrated without any possible transportation problems.

Lower downtime and personal contact with our expert are the major benefits of this service.

Preparatory maintenance work by agreement. Prices for on-site calibration on request.

You tell us when you would like us to come, giving us details of the balances to be tested. Our on-site DAkkS calibration team will then get in touch with you immediately and will discuss the process with you at your premises – it's straight forward and professional.

This KERN calibration service is also independent of the brand.

akkreditiert durch die / accredited by the
Deutsche Akkreditierungsstelle GmbH
 als Kalibrierlaboratorium im / as calibration laboratory in
Deutschen Kalibrierdienst DKD

Kalibrierschein
 Calibration Certificate 1

Gegenstand
 Object 2

Hersteller
 Manufacturer 3

Typ
 Type 4

Fabrikate/Serien-Nr.
 Serial number

Kalibrierzeichen
 Calibration mark

Sample
 D-K-
 19408-01-00
 2014-05

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem internationalen Einheitensystem (SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierdienste. Für die Einhaltung einer angemessenen Frist zur Kalibrierung ist

Hersteller
 Mustermann GmbH

Messergebnisse / Measurement results

1. Wiederholbarkeit / Repeatability

Messung Measuring	Prüflast Load	Waagenanzeige Indication
No. 1	500 g	499,999 g
No. 2	500 g	499,999 g
No. 3	500 g	500,000 g
No. 4	500 g	500,000 g
No. 5	500 g	500,000 g

Standardabweichung: s = 0,0006 g
 Standard deviation:

2. Richtigkeit / Linearity

Prüflast Load	Waagenanzeige Indication
100 g	100,000 g
200 g	200,000 g
300 g	300,001 g
500 g	500,000 g
600 g	600,001 g

3. Außermittige Belastung / Eccentricity

Position Position	Prüflast Load	Waagenanzeige Indication
No. 1	500 g	500,000 g
No. 2	500 g	499,999 g
No. 3	500 g	500,001 g
No. 4	500 g	500,001 g
No. 5	500 g	500,001 g

Messunsicherheit U / Measuring uncertainty U

Last Load	Abweichung Error	Erweiterungs- faktor k Coverage factor	Unsicherheit Uncertainty	relative Messunsicherheit Rel. uncertainty
100 g	0,000 g	2,38	0,0016 g	0,00154 %
200 g	0,000 g	2,32	0,0016 g	0,00078 %
300 g	0,001 g	2,24	0,0017 g	0,00053 %
500 g	0,000 g	2,12	0,0018 g	0,00036 %
600 g	0,001 g	2,08	0,0020 g	0,00032 %

Darstellung im Diagramm / Representation as chart

Nettobelastung / Net-Load in g

Verwendungsgenauigkeit G / Usage accuracy G

Diagramm der Verwendungsgenauigkeit / Graph of usage accuracy:

$$G = 0,0013 \text{ g} + 8,72 \cdot 10^{-6} \cdot m_w$$

m_w = Nettoanzeige bei zunehmender Belastung
 net display with increasing load

Last / Load in g

rel. Meßunsicherheit

Nettobelastung

Mindesteinwaage / Minimum weight of sample

—■— G Prozessgenauigkeit / Process accuracy
 —○— U Messunsicherheit / Uncertainty

DAkkS calibration certificate for balances (extract)

- 1 Official document
- 2 Item to be calibrated
- 3 Traceability, see page 225

- 4 Identification/Applicant
- 5 Metrological component
- 6 Uncertainty of measurement, see page 225

- 7 Application accuracy, see page 223
- 8 Minimum weight of sample (additional price)

To get reliable weighing results you need to have calibrated balances. KERN offers you an extensive calibration service for your balances – you have the choice:

Recalibration

- The recalibration schedule depends on the frequency of use, the conditions of use and the safety requirements.
- We would recommend that you recalibrate your balances every 6 months if they are used intensively, and every 12 months with normal use.
- The KERN calibration service is independent of the brand.



Initial calibration and recalibration of balance at the KERN factory	KERN	Price excl. of VAT ex works €
Weighing capacity		
Analytical balances		
[Max] ≤ 5 kg	963-101	138,-
[Max] > 5 kg	963-102	176,-
Precision balances/Industrial scales		
[Max] ≤ 5 kg	963-127	72,-
[Max] > 5 kg – 50 kg	963-128	88,-
[Max] > 50 kg – 350 kg	963-129	105,-
[Max] > 350 kg – 1500 kg	963-130	165,-
[Max] > 1500 kg – 2900 kg ¹⁾	963-131	220,-
[Max] > 2900 kg – 6000 kg ¹⁾	963-132	440,-
[Max] > 6000 kg – 12000 kg ¹⁾	963-133	500,-
Hanging scales/Crane scales		
[Max] ≤ 5 kg	963-127H	72,-
[Max] > 5 kg – 50 kg	963-128H	88,-
[Max] > 50 kg – 350 kg	963-129H	105,-
[Max] > 350 kg – 1500 kg	963-130H	165,-
[Max] > 1500 kg – 2900 kg	963-131H	250,-
[Max] > 2900 kg – 6000 kg	963-132H	500,-
[Max] > 6000 kg – 12000 kg ³⁾	963-133H	700,-
Preparation for recalibration (cleaning, adjustment, function test)	969-003R	20,-
Additional services		
Minimum weight of sample (for details see internet)	969-103	10,-
Additional measurement points (as part of the) weighing test	963-140	5,-/ measurement point
Additional measurement points (as part of the) repeatability testing	963-140	5,-/ each further m.p.
DAkkS Express service with delivery time 48 hours (only on initial purchase, details see p. 202)	962-116	50,-/ scale
Express shipping: Express supplement for guaranteed delivery on the next working day (if ready for shipment before 12:00 noon)	in GER only	40,-/ parcel

¹⁾ Floor scales & axle load scales only (Price per weighing panel). Please ask for further details.
²⁾ On request
³⁾ Processing time 4 working days
⁴⁾ Processing time 15 working days

Minimum weight of sample (in use)

What is the lightest item you can weigh on your balance, while still achieving accurate and reliable weighing results? What exactly is the limit?

The KERN minimum sample weight protocol accounts for the established minimum sample weight of your balance and its location of installation and use with the relative measuring uncertainty. With various safety coefficients and required weighing accuracy (process accuracy), depending on standard or quality-related requirements on the balance being used.

The higher the selected safety coefficient, the higher the safety when using the balance in a particular process. Typical perturbations when using the balance e.g. small fluctuations in temperature are taken into account. In easily predictable conditions in a professional environment of use, KERN recommends a safety coefficient of 3. For critical processes, a correspondingly higher factor should be selected. The minimum sample weight protocol contains a diagram as well as a table, from which you can ascertain the minimum sample weight for your balance, depending on the process.

Adjustment at the location of installation

Why?

Adjustment at the location of installation is necessary, as the measuring results of balances depend on the local gravitational force (gravitational acceleration) and therefore depend on the location of use. KERN can carry this out just before shipping at the factor, individually to suit the location of installation.

What are the advantages of carrying out adjustment at the location of installation?

- The balance gives reliable measurement results at the location of installation.
- No time-consuming on-site adjustment necessary.
- You do not need a Service Engineer or any additional weights.
- The balance is ready for immediate use.

Pricing table for adjustment at the location of installation

Weighing capacity	KERN	Price excl. of VAT ex works €
[Max] ≤ 5 kg	961-247	36,-
[Max] > 5 - 50 kg	961-248	44,-
[Max] > 50 - 350 kg	961-249	52,-
[Max] > 350 - 1500 kg	961-250	83,-
[Max] > 1500 - 2900 kg	961-251	110,-
[Max] > 2900 - 6000 kg	961-252	220,-
[Max] > 6000 - 12000 kg	961-253	250,-

For adjustment to the location of installation you need the value for gravitational acceleration at the location of installation, which KERN can calculate using the point of use. The procedure is suitable for balances with a resolution of <60,000 d. For higher resolutions we recommend a balance with an internal adjusting weight or adjustment with a calibrated adjusting weight at the location of installation.

Certificate of conformity

With a certificate of conformity you get a statement about whether the balance meets your defined requirements.

In conjunction with a DAkkS calibration certificate it serves as documented proof that the balance fulfils the required process demands. When doing this the process owner for the balance can select from different temperature specifications – depending on its individual requirements:

Conformity evaluation on the basis of the:	KERN		Price excl. of VAT ex works €
Usage accuracy*	relative	969-511	on request
	absolute	969-512	
Calibration results*	relative	969-513	on request
	absolute	969-514	
Measurements as manufacturer or customer specification	Foreign device Customer specifications KERN devices	969-515	on request
		969-516	
		969-517	

relative = % / absolute = g

*as attachment to the DAkkS calibration certificate (Details see www.kern-lab.com)

Example for absolute customer tolerance (absolute) (Item no. 969-511):

No.	Tare	Load	Display	Deviation	Uncertainty	Customer tolerance	Conformity ¹⁾
1	0 g	500 g	500,00 g	0,00 g	± 0,013 g	± 0,05 g	<input checked="" type="checkbox"/>
2	0 g	1000 g	1000,00 g	0,00 g	± 0,015 g	± 0,05 g	<input checked="" type="checkbox"/>
3	0 g	1500 g	1500,01 g	0,01 g	± 0,017 g	± 0,05 g	<input checked="" type="checkbox"/>
4	0 g	2000 g	2000,01 g	0,01 g	± 0,020 g	± 0,10 g	<input checked="" type="checkbox"/>
5	0 g	3000 g	3000,02 g	0,02 g	± 0,022 g	± 0,10 g	<input checked="" type="checkbox"/>

1) Evaluation criteria: |[Deviation]| + [extended measuring uncertainty] ≤ [tolerance]

Documented quality of your balances in the log book

Consistently high product quality requires the use of measuring and test equipment that provides comprehensible, consistent and reproducible results. Hence, quality management systems require that measuring and test equipment produces a detailed traceable description and documentation of calibration results and conformity statements. Work not documented is work not done.

Equipment qualification is documentary evidence that a equipment is suitable for the intended purpose and is working faultlessly. A balance log book is used to record all activities and results required for the qualification and monitoring of balances during routine operation. This includes the installation and commissioning of the balances, routine tests, maintenance as well as the recording of special events (failures, repairs, change of location).

The structure of the balance log book is based on the qualification process of the balance. The requirements for the qualification system such as DIN EN ISO 9001, DIN EN ISO/IEC 17025, GLP/GMP, VDA must be taken into account. The log book supports the user in his/her daily work with the balance and is meant to serve as necessary evidence during inspections and audits. The responsibility for maintaining the log book and its appropriate use is to be borne by the user.

Our proposal: Count on our support!

KERN offers this qualification concept throughout. Our validation services are carried out on the spot by technicians of our calibration laboratory and comprise among other things: installation, measurement test inclusive DAkks calibration certificate as well as records in your qualification log book.

We give you advice about the options of device qualification, as required and will be happy to set up an appointment for qualification at the place of installation. We offer individual calibration and maintenance agreements for the periodically required requalification.

Further information can be found at www.kern-lab.com



Installation qualification (IQ)

All steps to be taken for the installation and commissioning of the equipment are described in detail in the installation qualification. These include among others:

- checking for completeness of delivery and assurance that the delivered equipment meets the required specifications
- a description of the ambient conditions at the place of installation
- proper installation and assurance that the equipment is ready for operation after installation
- documentation of equipment configuration and equipment settings
- Recording and installation of connected peripherals units



Function qualification (OQ)

The operational qualification describes the metrological test performed for the balance at the place of installation. In the course of this all parameters that define the efficiency of a measurement will be checked. Functional qualification is carried out with the help of a standard operating procedure (SOP) and recorded in a calibration certificate. The OQ must be carried out by trained staff with the help of qualified aids (such as certified weights that are traceable to an approved standard). Briefing / training of users must be assured and recorded in the OQ.



Performance qualification (PQ)

The PQ represents documented evidence that the balance or weighing system functions in the selected application as intended. This will be assured by a qualification test of the equipment under real conditions with respect to its surroundings and the problem definition (such as traceable data transmission). If the balance or weighing system is "merely" to be used for weighing it will not be necessary to carry out a PQ as the ability to function has already been proven during the metrological test (OQ).




Maintenance qualification (MQ)

The periodical maintenance, cleaning work and complete metrological test of the balance/weighing system is documented in the MQ by a trained authorised engineer. The results are documented on a DAkks calibration certificate. Maintenance is carried out with the help of a maintenance schedule.




If you are interested in a qualification or training for equipment qualification, please feel free to contact us at **+49 7433 9933-136**



KERN & Sohn GmbH
Älteste europäische Feinwaagen und Gewichtfabrik seit 1844
 Oldest European Manufacturer of Precision Balances since 1844

akkreditiert durch die / accredited by the
Deutsche Akkreditierungsstelle GmbH
als Kalibrierlaboratorium im / as calibration laboratory in the
Deutschen Kalibrierdienst DKD



Kalibrierschein
Calibration certificate

Kalibrierzeichen
Calibration mark

G1-123
D-K-19408-01-00
2014-05

Gegenstand Object	Gewichtssatz, 1 mg - 1 kg Klasse E2	Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
Hersteller Manufacturer	KERN & Sohn GmbH Ziegelei 1 D-72336 Balingen Germany	Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
Typ Type	313-052	Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.
Fabrikate/Serien-Nr. Serial number	G123456789	This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).
Auftraggeber Customer	Mustermann GmbH Teststr. 1 42446 Musterstadt Deutschland	The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Accreditation (ILAC).

Auftragsnummer 2014-123456789

Kalibrierverfahren:
Calibration method

Die Kalibrierung erfolgte durch Vergleich mit den Bezugsnormalen des Kalibrierlaboratoriums nach der Substitutionsmethode mit Auftriebskorrektur.
The calibration ensued through comparison with the reference standards of the calibration laboratory using the substitution method with air buoyancy correction.

Umgebungsbedingungen:
Ambient conditions

Die Kalibrierung wurde bei folgenden Umgebungsbedingungen ausgeführt:
The calibration was carried out under the following ambient conditions:

	von from	bis to	Unsicherheit uncertainty
Temperatur (°C) temperature	22,9	24,1	0,1
rel. Luftfeuchte (%) relative humidity	48,5	53,4	2,0
Luftdruck (hPa) air pressure	942,5	948,5	0,3

Referenzgewichte:
Standard weights

G1-123-D-K-19408-01-00-2014-05

Material / angenommene Dichte:
Material / assumed density

Nennwert nominal value	Dichte density	Unsicherheit uncertainty	Material material	Form shape
1 mg - 500 mg	7950 kg/m ³	140 kg/m ³	Edelstahl Stainless steel	Draht Wire
1 g - 1 kg	8000 kg/m ³	100 kg/m ³	Edelstahl Stainless steel	Knopf Cylindrical form

Messergebnisse:
Measurement results:

Nennwert nominal value	Kennzeichnung marking	konventioneller Wägewert conventional mass	Unsicherheit k=2 uncertainty	Fehlergrenze max. perm. error	Klasse* class*
1 mg		1 mg + 0.0010 mg	0.0020 mg	± 0.0060 mg	E2 ✓
2 mg		2 mg + 0.0005 mg	0.0020 mg	± 0.0060 mg	E2 ✓
2 mg	*	2 mg + 0.0016 mg	0.0020 mg	± 0.0060 mg	E2 ✓
5 mg		5 mg + 0.0010 mg	0.0020 mg	± 0.0060 mg	E2 ✓
10 mg		10 mg + 0.0009 mg	0.0020 mg	± 0.0080 mg	E2 ✓
20 mg		20 mg - 0.001 mg	0.003 mg	± 0.010 mg	E2 ✓
20 mg	*	20 mg + 0.001 mg	0.003 mg	± 0.010 mg	E2 ✓
50 mg		50 mg + 0.001 mg	0.004 mg	± 0.012 mg	E2 ✓
100 mg		100 mg + 0.001 mg	0.005 mg	± 0.016 mg	E2 ✓
200 mg		200 mg + 0.002 mg	0.006 mg	± 0.020 mg	E2 ✓
200 mg	*	200 mg + 0.003 mg	0.006 mg	± 0.020 mg	E2 ✓
500 mg		500 mg + 0.005 mg	0.006 mg	± 0.025 mg	E2 ✓
1 g		1 g + 0.002 mg	0.010 mg	± 0.030 mg	E2 ✓
2 g		2 g + 0.002 mg	0.013 mg	± 0.040 mg	E2 ✓
2 g	*	2 g + 0.002 mg	0.013 mg	± 0.040 mg	E2 ✓
5 g		5 g + 0.010 mg	0.016 mg	± 0.050 mg	E2 ✓
10 g		10 g - 0.007 mg	0.020 mg	± 0.060 mg	E2 ✓
20 g		20 g + 0.005 mg	0.026 mg	± 0.080 mg	E2 ✓
20 g	*	20 g + 0.015 mg	0.026 mg	± 0.080 mg	E2 ✓
50 g		50 g + 0.02 mg	0.03 mg	± 0.10 mg	E2 ✓
100 g		100 g + 0.01 mg	0.05 mg	± 0.16 mg	E2 ✓
200 g		200 g + 0.05 mg	0.10 mg	± 0.30 mg	E2 ✓
200 g	*	200 g - 0.00 mg	0.10 mg	± 0.30 mg	E2 ✓
500 g		500 g + 0.10 mg	0.26 mg	± 0.80 mg	E2 ✓
1 kg		1 kg + 0.1 mg	0.5 mg	± 1.6 mg	E2 ✓

Traceable KERN test weights –

Calibration of test weights

Calibrated measuring equipment requires calibrated checking equipment. For balances, these are calibrated test weights, also called “standard weights”.

KERN will calibrate your test weights

- In all classes with permissible error limits E1–M3 according to OIML R111:2004 (for tolerance tables, see page 188), in sizes 1 mg to 2500 kg.
- With free nominal value
- Newton (N)
- Independent of design (special designs)

The advantages of using the KERN in-house calibration

You send your test weights to us.

- Excellent price performance ratio
- The quickest processing time
 - DAkkS standard service: 4 working days
 - DAkkS express service: 48 hrs (new weights)
- The most modern calibration methods with robot controlled comparators allow the most accurate calibration results and fastest throughput time
- KERN DAkkS calibration certificates are internationally recognised
- A calibration service which is independent of the brand
- KERN also reconditions existing customer weights (e.g. cleaning or readjustment)
- On request, we can also provide a pick-up and collection service with our parcel service

The advantages of using the KERN on-site calibration

We visit you.

We would be pleased to visit you within Germany and carry out the calibration of your reference standards to OIML classes M1–M3, 10 kg–2500 kg with permissible error limits, using our mobile MACOS system. Minimized downtime of your checking equipment and direct contact with our expert are the major benefits of this service. Price on request.

Recalibration

- The recalibration schedule depends on the frequency of use, the conditions of use and the safety requirements
- In terms of standardisation, no particular recalibration interval is specified
- We would recommend that you recalibrate your test weights every six months if they are used intensively, and every 12 months with normal use
- We would be pleased to monitor your recalibration schedule

DAkkS calibration certificate for test weights (extract)

For more details on our calibration service and other useful information, please see the internet on www.kern-lab.com

- 1 Official document
- 2 Item to be calibrated
- 3 Traceability, see page 225
- 4 Identification/Applicant
- 5 Environmental conditions
- 6 Metrological component
- 7 Conventional mass
- 8 Uncertainty of measurement, see page 225



Recalibration price of test weights (DAkkS calibration)

Class acc. →	E1 with volume determination		E1 without volume determination		E2		F1/F2 * F2 only		M1/M2/M3	
	Nominal value ↓	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works
1 mg	-	-	962-251R	52,-	962-351R	26,-	962-451R	18,-	962-651R	15,-
2 mg	-	-	962-252R	52,-	962-352R	26,-	962-452R	18,-	962-652R	15,-
5 mg	-	-	962-253R	52,-	962-353R	26,-	962-453R	18,-	962-653R	15,-
10 mg	-	-	962-254R	52,-	962-354R	26,-	962-454R	18,-	962-654R	15,-
20 mg	-	-	962-255R	52,-	962-355R	26,-	962-455R	18,-	962-655R	15,-
50 mg	-	-	962-256R	52,-	962-356R	26,-	962-456R	18,-	962-656R	15,-
100 mg	-	-	962-257R	52,-	962-357R	26,-	962-457R	18,-	962-657R	15,-
200 mg	-	-	962-258R	52,-	962-358R	26,-	962-458R	18,-	962-658R	15,-
500 mg	-	-	962-259R	52,-	962-359R	26,-	962-459R	18,-	962-659R	15,-
1 g	963-231	193,-	962-231R	52,-	962-331R	26,-	962-431R	18,-	962-631R	15,-
2 g	963-232	193,-	962-232R	52,-	962-332R	26,-	962-432R	18,-	962-632R	15,-
5 g	963-233	193,-	962-233R	52,-	962-333R	26,-	962-433R	18,-	962-633R	15,-
10 g	963-234	193,-	962-234R	52,-	962-334R	26,-	962-434R	18,-	962-634R	15,-
20 g	963-235	193,-	962-235R	52,-	962-335R	26,-	962-435R	18,-	962-635R	15,-
50 g	963-236	193,-	962-236R	52,-	962-336R	26,-	962-436R	18,-	962-636R	15,-
100 g	963-237	193,-	962-237R	52,-	962-337R	33,-	962-437R	20,-	962-637R	16,-
200 g	963-238	193,-	962-238R	52,-	962-338R	33,-	962-438R	20,-	962-638R	16,-
500 g	963-239	193,-	962-239R	52,-	962-339R	33,-	962-439R	20,-	962-639R	16,-
1 kg	963-241	193,-	962-241R	52,-	962-341R	33,-	962-441R	20,-	962-641R	16,-
2 kg	963-242	465,-	962-242R	64,-	962-342R	41,-	962-442R	25,-	962-642R	17,-
5 kg	963-243	465,-	962-243R	64,-	962-343R	41,-	962-443R	25,-	962-643R	17,-
10 kg	963-244	465,-	962-244R	64,-	962-344R	41,-	962-444R	25,-	962-644R	17,-
20 kg	963-245	1160,-	962-245R	590,-	962-345R	52,-	962-445R	28,-	962-645R	22,-
50 kg	963-246	1360,-	962-246R	660,-	962-346R	64,-	962-446R	39,-	962-646R	24,-
100 kg	-	-	-	-	-	-	962-591R*	116,-	962-691R	63,-
200 kg	-	-	-	-	-	-	962-592R*	116,-	962-692R	63,-
500 kg	-	-	-	-	-	-	962-593R*	116,-	962-693R	63,-
1000 kg	-	-	-	-	-	-	-	-	962-694R	136,-
2000 kg	-	-	-	-	-	-	-	-	962-695R	250,-
1 mg-500 mg	-	-	962-250R	350,-	962-350R	190,-	962-450R	100,-	962-650R	63,-
1 mg-50 g	963-201	1070,-	962-201R	560,-	962-301R	315,-	962-401R	167,-	962-601R	106,-
1 mg-100 g	963-202	1170,-	962-202R	580,-	962-302R	340,-	962-402R	178,-	962-602R	112,-
1 mg-200 g	963-203	1350,-	962-203R	630,-	962-303R	385,-	962-403R	199,-	962-603R	125,-
1 mg-500 g	963-204	1440,-	962-204R	660,-	962-304R	410,-	962-404R	210,-	962-604R	131,-
1 mg-1 kg	963-205	1530,-	962-205R	700,-	962-305R	435,-	962-405R	220,-	962-605R	137,-
1 mg-2 kg	963-206	2000,-	962-206R	750,-	962-306R	495,-	962-406R	250,-	962-606R	152,-
1 mg-5 kg	963-207	2450,-	962-207R	770,-	962-307R	530,-	962-407R	265,-	962-607R	160,-
1 mg-10 kg	963-208	2900,-	962-208R	800,-	962-308R	560,-	962-408R	285,-	962-608R	167,-
1 g-50 g	963-215	770,-	962-215R	245,-	962-315R	127,-	962-415R	67,-	962-615R	42,-
1 g-100 g	963-216	860,-	962-216R	270,-	962-316R	150,-	962-416R	77,-	962-616R	49,-
1 g-200 g	963-217	1040,-	962-217R	320,-	962-317R	196,-	962-417R	98,-	962-617R	61,-
1 g-500 g	963-218	1130,-	962-218R	350,-	962-318R	220,-	962-418R	109,-	962-618R	68,-
1 g-1 kg	963-219	1230,-	962-219R	375,-	962-319R	245,-	962-419R	119,-	962-619R	74,-
1 g-2 kg	963-220	1780,-	962-220R	425,-	962-320R	305,-	962-420R	151,-	962-620R	89,-
1 g-5 kg	963-221	2230,-	962-221R	450,-	962-321R	340,-	962-421R	166,-	962-621R	96,-
1 g-10 kg	963-222	2690,-	962-222R	485,-	962-322R	370,-	962-422R	182,-	962-622R	104,-

Additional costs for preparation, overhaul and adjustment before the calibration	KERN	Price excl. of VAT ex works €
Preparation of weights (e.g. cleaning, etc.)		
Single weight	969-001R	3,-
Weight set	969-002R	16,-
Subsequent services are carried out after confirmation		
Continued overhaul of weights (e.g. wet-cleaning, markings, repair, special packaging, adjustment E1 (DAkkS only), E2 ...)	969-005R	T & M basis
Adjustment, per weight only available for weights with adjustment chamber (F1-M3)	969-010R	12,-
Second calibration after adjustment or substitution, per weight		
Class E1	969-210R	40,-
Class E1 incl. volume determination	969-211R	80,-
Class E2	969-310R	14,-
Class F1/F2	969-410R	14,-
Class M1-M3	969-610R	14,-
Testing of magnetic properties according to OIML R 111:2004, per weight	972-000	12,-
Calibration of NON-OIML test weights, additional price per weight	-	8,-

KERN DAkkS Express Service	
DAkkS standard service Class E2-M3	4 working days
DAkkS standard service Class E1, 1 mg-500 mg, and recalibration 1 g-10 kg with a known volume	10 working days
Class E1, ≥ 1 g, incl. volume determination (new weights)	15 working days



DAkkS Express service in 48 hours except for class E1

- Urgent order is received at KERN by 12:00 noon at the latest
- Ready for shipping at KERN within two working days, at 12:00 noon
- Return by standard parcel service or express shipping (Costs and processing time on request)
- Additional cost for DAkkS Express Service, for each KERN test weight KERN KERN 962-115 € 20,-
- For Express shipping, see page 2 14

Verification prices for test weights and (crane) scales

Class acc. → OIML R 111:2004	E2 with verification certificate		F1/F2 with verification certificate		M1 with verification certificate	
	Nominal value ↓ KERN	Price excl. of VAT ex works €	KERN	Price excl. of VAT ex works €	KERN	Price excl. of VAT ex works €
1 mg	952-351	44,-	952-451	38,-	952-651	26,-
2 mg	952-352	44,-	952-452	38,-	952-652	26,-
5 mg	952-353	44,-	952-453	38,-	952-653	26,-
10 mg	952-354	44,-	952-454	38,-	952-654	26,-
20 mg	952-355	44,-	952-455	38,-	952-655	26,-
50 mg	952-356	44,-	952-456	38,-	952-656	26,-
100 mg	952-357	44,-	952-457	38,-	952-657	26,-
200 mg	952-358	44,-	952-458	38,-	952-658	26,-
500 mg	952-359	44,-	952-459	38,-	952-659	26,-
1 g	952-331	44,-	952-431	38,-	952-631	26,-
2 g	952-332	44,-	952-432	38,-	952-632	26,-
5 g	952-333	44,-	952-433	38,-	952-633	26,-
10 g	952-334	44,-	952-434	38,-	952-634	26,-
20 g	952-335	44,-	952-435	38,-	952-635	26,-
50 g	952-336	44,-	952-436	38,-	952-636	26,-
100 g	952-337	50,-	952-437	38,-	952-637	26,-
200 g	952-338	50,-	952-438	44,-	952-638	26,-
500 g	952-339	50,-	952-439	44,-	952-639	26,-
1 kg	952-341	50,-	952-441	44,-	952-641	26,-
2 kg	952-342	56,-	952-442	46,-	952-642	28,-
5 kg	952-343	56,-	952-443	46,-	952-643	28,-
10 kg	952-344	56,-	952-444	46,-	952-644	35,-
20 kg	952-345	65,-	952-445	46,-	952-645	40,-
50 kg	952-346	74,-	952-446	55,-	952-646	41,-
1 mg-500 mg	952-350	220,-	952-450	116,-	952-650	73,-
1 mg-50 g	952-301	365,-	952-401	193,-	952-601	122,-
1 mg-100 g	952-302	395,-	952-402	205,-	952-602	129,-
1 mg-200 g	952-303	445,-	952-403	230,-	952-603	144,-
1 mg-500 g	952-304	475,-	952-404	240,-	952-604	151,-
1 mg-1 kg	952-305	500,-	952-405	255,-	952-605	158,-
1 mg-2 kg	952-306	570,-	952-406	285,-	952-606	175,-
1 mg-5 kg	952-307	620,-	952-407	310,-	952-607	185,-
1 mg-10 kg	952-308	650,-	952-408	330,-	952-608	193,-
1 g-50 g	952-315	146,-	952-415	84,-	952-615	55,-
1 g-100 g	952-316	173,-	952-416	89,-	952-616	59,-
1 g-200 g	952-317	225,-	952-417	113,-	952-617	70,-
1 g-500 g	952-318	260,-	952-418	125,-	952-618	78,-
1 g-1 kg	952-319	280,-	952-419	138,-	952-619	86,-
1 g-2 kg	952-320	350,-	952-420	174,-	952-620	102,-
1 g-5 kg	952-321	390,-	952-421	191,-	952-621	111,-
1 g-10 kg	952-322	430,-	952-422	210,-	952-622	120,-

KERN verification delivery time	
Standard verification service Class E2 - M1	6 working days

Additional costs for preparation, overhaul and adjustment before the verification	KERN	Price excl. of VAT ex works €
Preparation of weights (e.g. cleaning, etc.)		

Single weight	969-008R	3,-
Weight set	969-009R	16,-

Subsequent services are carried out after confirmation

Continued overhaul of weights (e.g. wet-cleaning, markings, repair, special packaging, adjustment E2 ...)	969-005R	T & M basis
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Adjustment, per weight only available for weights with adjustment chamber (F1/F2 - M1)	969-010R	12,-
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Verification after adjustment or substitution, per weight

Class E2	969-310R	14,-
Class F1/F2	969-410R	14,-
Class M1	969-610R	14,-

Verification prices for balances	Reverification	Price excl. of VAT ex works €
Accuracy class I (precision balances) ¹⁾		
[Max] ≤ 5 kg ¹⁾	950-101R	198,-
[Max] > 5 kg ¹⁾	950-102R	255,-
Accuracy class II (precision balances) ¹⁾		
[Max] ≤ 5 kg ¹⁾	950-116R	99,-
[Max] > 5 kg - 50 kg ¹⁾	950-117R	121,-
[Max] > 50 kg - 350 kg ¹⁾	950-118R	187,-
Accuracy class III-IV ¹⁾		
Bench scales and industrial scales (excl. crane scales)		
[Max] ≤ 5 kg ¹⁾	950-127R	95,-
[Max] > 5 kg - 50 kg ¹⁾	950-128R	95,-
[Max] > 50 kg - 350 kg ¹⁾	950-129R	152,-
[Max] > 350 kg - 1500 kg ¹⁾	950-130R	220,-
[Max] > 1500 kg - 2900 kg ¹⁾	950-131R	310,-
[Max] > 2900 kg - 6000 kg ¹⁾	950-132R	475,-
Crane scales		
[Max] > 50 kg - 350 kg ¹⁾	950-129HR	165,-
[Max] > 350 kg - 1500 kg ¹⁾	950-130HR	275,-
[Max] > 1500 kg - 2900 kg ¹⁾	950-131HR	395,-
[Max] > 2900 kg - 6000 kg ¹⁾	950-132HR	600,-
[Max] > 6000 kg - 12000 kg ¹⁾	950-133HR	960,-

¹⁾ Processing time 4 working days, ²⁾ Processing time 15 working days, ¹⁾²⁾ Preparation of reverification of balances, 969-006R, € 20,-

The force gauge

Accredited calibration with DAkkS calibration certificate for force gauges

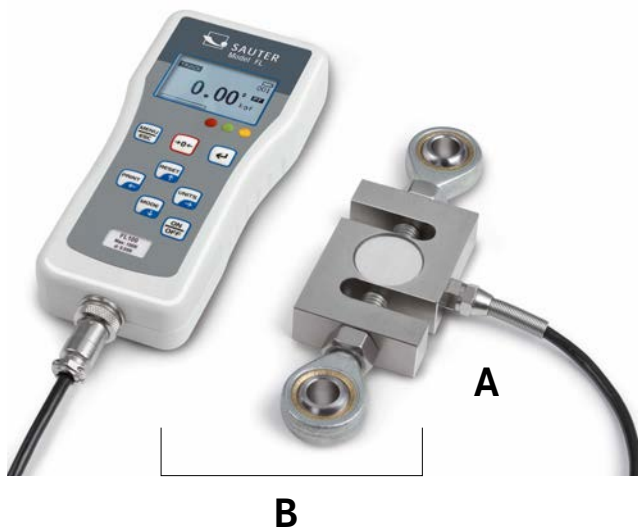
The KERN calibration laboratory is at your side when you need to calibrate DAkkS reliably.

From the transducer to the full measuring chain, we are happy to take care of traceable calibration of your test equipment for you. Our accreditation includes the calibration of tensile and pressure force up to 5 kN according to the standards DIN EN ISO 376 and DKD-R 3-3, each with the Newton (N) display unit for a complete measuring chain (situation A) or voltage ratio/transmission coefficient (mV/V, situation B).

Below you will find a comparison of which standard meets which criteria:

Comparison of DIN EN ISO 376 and DKD-R 3-3		
	ISO 376	DKD-R 3-3
Standardization	ISO standard (internationally standardized)	Standard of the DKD (Germany)
Measuring equipment	Force transducers and complete measuring chains	Force transducers and complete measuring chains
Area of application	Specifically force gauges for the testing of testing equipment	General force gauges
Number of power stages	8	5
Classification/Assessment	Classification in classes 00; 0,5; 1 and 2	None in standard
Test sequences	Fixed procedure	Sequences A, B, C, D possible Standard is sequence A B, C and D are reduced sequences, relevant previous knowledge is necessary
Summary	Higher-quality calibration, as 8 force levels are calibrated	High-quality calibration, reduced sequences with less effort possible

We can offer you a calibration solution for the following situations:



Situation A:
Force transducer (mV/V)

Situation B:
Complete force gauge (N), consisting of transducer, amplifier and display

You can find further information on this topic at: www.kern-lab.com

KERN & Sohn GmbH
Akkreditiertes Kalibrierlabor seit 1994.
 Accredited calibration laboratory since 1994.

Ihr Partner für Kalibrierdienstleistungen, Prüfmittelmanagement und Beratung.
 Your partner for calibration services, test equipment management and support.

akkreditiert durch die / accredited by the
Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / as calibration laboratory in the
Deutschen Kalibrierdienst DDK

Kalibrierschein
Calibration certificate

Gegenstand
Object
 Kraftmessgerät
Load cell
 Max 500 N, d= 0,1 N

Hersteller
Manufacturer
 Sauter GmbH
 Zöggen 1
 72230 Balingen
 Deutschland

Typ
Type
 FH 500

Fabrikat-/Serien-Nr.
Serial number
 ZH11110671

Auftraggeber
Customer
 Müstlermann GmbH

akkreditiert durch die / accredited by the
DAkkS
Deutsche Akkreditierungsstelle
 für Kalibrierlaboratorien
 DIN EN ISO 17025

als Kalibrierlaboratorium im / as calibration laboratory in the
Deutschen Kalibrierdienst DDK

Kalibrierscheine
Calibration mark

Sample
Dok. 19405-01-00
 2017-05

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).
 Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.
 Für die Erhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Messwerte (Zugkraft) / Measurement results (tension force) 2017-05

Ausrichtung / Kraft / force	Ausgangsposition / initial position		120°				240°	
	R1	R2	R3	R4	R5	R6		
0 N	0,0 N	0,0 N	0,0 N	0,0 N	0,0 N	0,0 N		
100,0 N	-59,8 N	-59,8 N	-59,8 N	-59,8 N	-59,8 N	-59,8 N		
200,0 N	-199,6 N	-199,6 N	-199,6 N	-199,6 N	-199,6 N	-199,6 N		
300,0 N	-299,4 N	-299,4 N	-299,4 N	-299,4 N	-299,4 N	-299,4 N		
400,0 N	-399,2 N	-399,2 N	-399,2 N	-399,2 N	-399,2 N	-399,2 N		
500,0 N	-499,0 N	-499,0 N	-499,0 N	-499,0 N	-499,0 N	-499,0 N		
0 N	0,0 N	0,0 N	0,0 N	0,0 N	0,0 N	0,0 N		

Messergebnisse (Zugkraft) / Measured values (tension force)

Aus den oben aufgeführten Messwerten ergeben sich die folgenden Messergebnisse:
 The following measurement results are calculated using the measured values above:
 rel. Kalibrierabweichung: 0,000 %
 rel. Nullpunktabweichungen: 0,000 % (R1), 0,000 % (R2), 0,000 % (R3/R4), 0,000 % (R5/R6)

Kraft / force	arith. Mittelwert / average	rel. Wiederhol- / Wiederholbarkeit	rel. Vergleichs- / prazisionen b reproducibility	rel. Umkehrprazision * / hysteresis
100,0 N	-59,8 N	0,000 %	0,000 %	0,000 %
200,0 N	-199,6 N	0,000 %	0,000 %	0,000 %
300,0 N	-299,4 N	0,000 %	-0,033 %	-0,017 %
400,0 N	-399,2 N	0,000 %	-0,025 %	-0,013 %
500,0 N	-499,0 N	0,000 %	0,000 %	0,000 %

DAkkS Calibration certificate for force-measuring devices (except).

Prices for DAkkS calibration of force gauges and force transducers

Situation A: Force transducer (voltage ratio, in mV/V)* ^{1,2}					
ISO 376 (8 stages)			DKD-R 3-3 (5 stages, sequence A)		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
Tensile force:					
963-161IV (R)	≤ 500 N	181,-	963-161V (R)	≤ 500 N	168,-
963-162IV (R)	≤ 2 kN	214,-	963-162V (R)	≤ 2 kN	198,-
963-163IV (R)	≤ 5 kN	280,-	963-163V (R)	≤ 5 kN	258,-
Compression force:					
963-261IV (R)	≤ 500 N	181,-	963-261V (R)	≤ 500 N	168,-
963-262IV (R)	≤ 2 kN	214,-	963-262V (R)	≤ 2 kN	198,-
963-263IV (R)	≤ 5 kN	280,-	963-263V (R)	≤ 5 kN	258,-
Tensile and Compression force:					
963-361IV (R)	≤ 500 N	302,-	963-361V (R)	≤ 500 N	278,-
963-362IV (R)	≤ 2 kN	363,-	963-362V (R)	≤ 2 kN	333,-
963-363IV (R)	≤ 5 kN	478,-	963-363V (R)	≤ 5 kN	438,-

Situation B: Complete force gauge (in N)* ²					
ISO 376 (8 stages)			DKD-R 3-3 (5 stages, sequence A)		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
Tensile force:					
963-161I (R)	≤ 500 N	149,-	963-161 (R)	≤ 500 N	135,-
963-162I (R)	≤ 2 kN	182,-	963-162 (R)	≤ 2 kN	165,-
963-163I (R)	≤ 5 kN	248,-	963-163 (R)	≤ 5 kN	225,-
Compression force:					
963-261I (R)	≤ 500 N	149,-	963-261 (R)	≤ 500 N	135,-
963-262I (R)	≤ 2 kN	182,-	963-262 (R)	≤ 2 kN	165,-
963-263I (R)	≤ 5 kN	248,-	963-263 (R)	≤ 5 kN	225,-
Tensile and Compression force:					
963-361I (R)	≤ 500 N	270,-	963-361 (R)	≤ 500 N	245,-
963-362I (R)	≤ 2 kN	330,-	963-362 (R)	≤ 2 kN	300,-
963-363I (R)	≤ 5 kN	446,-	963-363 (R)	≤ 5 kN	405,-

Factory calibration for force

Situation A: Force transducer (voltage ratio, in mV/V)* ^{1,2}			Situation B: Complete force gauge (in N)* ²		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
Tensile force:					
961-161V (R)	≤ 500 N	168,-	961-161 (R)	≤ 500 N	135,-
961-162V (R)	≤ 2 kN	198,-	961-162 (R)	≤ 2 kN	165,-
961-163V (R)	≤ 5 kN	258,-	961-163 (R)	≤ 5 kN	225,-
961-164V (R)	≤ 20 kN	328,-	961-164 (R)	≤ 20 kN	295,-
961-165V (R)	≤ 50 kN	328,-	961-165 (R)	≤ 50 kN	295,-
961-166V (R)	≤ 120 kN	358,-	961-166 (R)	≤ 120 kN	325,-
Compression force:					
961-261V (R)	≤ 500 N	168,-	961-261 (R)	≤ 500 N	135,-
961-262V (R)	≤ 2 kN	198,-	961-262 (R)	≤ 2 kN	165,-
961-263V (R)	≤ 5 kN	258,-	961-263 (R)	≤ 5 kN	225,-
961-264V (R)	≤ 20 kN	328,-	961-264 (R)	≤ 20 kN	295,-
961-265V (R)	≤ 50 kN	328,-	961-265 (R)	≤ 50 kN	295,-
961-266V (R)	≤ 120 kN	358,-	961-266 (R)	≤ 120 kN	325,-
Tensile and Compression force:					
961-361V (R)	≤ 500 N	278,-	961-361 (R)	≤ 500 N	245,-
961-362V (R)	≤ 2 kN	333,-	961-362 (R)	≤ 2 kN	300,-
961-363V (R)	≤ 5 kN	438,-	961-363 (R)	≤ 5 kN	405,-
961-364V (R)	≤ 20 kN	473,-	961-364 (R)	≤ 20 kN	440,-
961-365V (R)	≤ 50 kN	473,-	961-365 (R)	≤ 50 kN	440,-
961-366V (R)	≤ 120 kN	520,-	961-366 (R)	≤ 120 kN	485,-

(R): Recalibration

For each force gauge without interface or from other manufacturers we charge a surcharge of € 10,- for the additional effort.

*1 Compatibility with our amplifiers required

*2 Installation in our measuring equipment required

Factory calibration certificates

As DAkkS calibration certificates cannot be offered for all measuring devices or measurement sizes, or where it is not customary, we then offer factory calibration certificates. These calibration certificates meet international standards and are particularly suitable as proof of exacting calibration in the monitoring of your checking equipment, for example:

- Mechanical balances (spring balances, etc.)
- Force-measuring devices up to 120 kN
- Measuring devices for layer thickness 0 µm – 2000 µm
- Hardness testing devices in accordance with Leeb tests
- Ultrasonic material thickness testing device 25 mm - 300 mm

We carry out calibrations independent of brand. In order to avoid any unnecessary delays when processing your order, please send us the technical documents and necessary accessories with the checking device. Calibration time 4 working days.

For up-to-date information on test services for further measuring sizes please visit our website www.kern-lab.com

KERN	Physical unit	Measuring range	Price excl. of VAT ex works €
Factory calibration			
961-161 (O)	Force: Tension	≤ 500 N	135,-
961-162 (O)	Force: Tension	≤ 2 kN	165,-
961-163 (O)	Force: Tension	≤ 5 kN	225,-
961-164	Force: Tension	≤ 20 kN	295,-
961-165	Force: Tension	≤ 50 kN	295,-
961-166	Force: Tension	≤ 120 kN	325,-
961-261 (O)	Force: Compression	50 – 500 N	135,-
961-262 (O)	Force: Compression	≤ 2 kN	165,-
961-263 (O)	Force: Compression	≤ 5 kN	225,-
961-264(O)	Force: Compression	≤ 20 kN	295,-
961-265(O)	Force: Compression	≤ 50 kN	295,-
961-266(O)	Force: Compression	≤ 120 kN	325,-
961-361 (O)	Force: Tens. and Comp.	≤ 500 N	245,-
961-362 (O)	Force: Tens. and Comp.	≤ 2 kN	300,-
961-363 (O)	Force: Tens. and Comp.	≤ 5 kN	405,-
961-364 (O)	Force: Tens. and Comp.	≤ 20 kN	440,-
961-365 (O)	Force: Tens. and Comp.	≤ 50 kN	440,-
961-366 (O)	Force: Tens. and Comp.	≤ 120 kN	485,-
961-167	Force (for digital dynamometer KERN MAP)	≤ 130 kg	120,-
961-110	Coating thickness	≤ 2000 µm F or N	120,-
961-112	Coating thickness	≤ 2000 µm FN	170,-
961-113	Wall thickness (ultra sound)	≤ 300 mm (in stainless steel)	120,-
961-114	Wall thickness (Test blocks)	≤ 300 mm	150,-
961-170	Hardness comparison plate (Shore)	For sets up to 7 plates	95,-
961-131	Hardness tester (Leeb)	400 – 800 HLD	120,-
961-132	Hardness comparison plate (Leeb)	Hardness comparison plate (for Leeb durometer)	120,-
961-270	Hardness (UCI)	200 – 800 HV	260,-
961-150	Length	≤ 300 mm	120,-
961-190	Light	≤ 200000 lx	165,-
961-100	Mass (Mechanical balances/ spring balances)	≤ 5 kg	72,-
961-101	Mass (Mechanical balances/ spring balances)	> 5 – 50 kg	88,-
961-102	Mass (Mechanical balances/ spring balances)	> 50 – 350 kg	105,-
961-103	Mass (Mechanical balances/ spring balances)	> 350 – 1500 kg	165,-
961-120	Torque wrench test devices	1 Nm - 200 Nm	170,-
Additional services			
962-116	Express service with 48 hour delivery		50,-/ instrument

KERN & Sohn GmbH
 Calibration Laboratory since 1994.
 Ihr Partner für Kalibrierdienstleistungen, Prüfmittelmanagement und Beratung.
 Your partner for calibration services, test equipment management and support.

Kalibrierschein MS-123-KERN-2016-08
 Calibration certificate

Kalibriergegenstand Drehmomentschlüssel-Kalibriereinrichtung
 Calibration object Torque wrench calibration device
 Max. 1 Nm d= 0,0001 Nm

Hersteller SAUTER GmbH
 Manufacturer Ziegen 1
 72336 Balingen
 Deutschland

Typ DB 14
 Type

Fabrikat/Serien-Nr. DB1234567
 Serial number

Inventurnummer -
 Inventory number

Auftraggeber Mustermann GmbH
 Customer Musterstr. 1
 12345 Musterstadt
 Deutschland

Auftragsnummer 2016-12345678
 Order No. 01.08.2016

Messungsergebnisse - Rechtsdrehmoment
 Measurement results - clockwise torque

Messung	Referenz-Drehmoment	Anzeige	Abweichung	Messunsicherheit	Toleranz	Konformität
Measurement	Reference torque	Indication	Error	meas. uncertainty	Tolerance	Conformity
1	0,2 Nm	0,1998 Nm	-0,0002 Nm	0,0030 Nm	0,0050 Nm	✓
2	0,6 Nm	0,6004 Nm	+0,0004 Nm	0,0030 Nm	0,0050 Nm	✓
3	1,0 Nm	1,0004 Nm	+0,0004 Nm	0,0030 Nm	0,0050 Nm	✓

Messungsergebnisse - Linksdrehmoment
 Measurement results - anticlockwise torque

Messung	Referenz-Drehmoment	Anzeige	Abweichung	Messunsicherheit	Toleranz	Konformität
Measurement	Reference torque	Indication	Error	meas. uncertainty	Tolerance	Conformity
1	0,2 Nm	0,2004 Nm	+0,0004 Nm	0,0030 Nm	0,0050 Nm	✓
2	0,6 Nm	0,6002 Nm	-0,0002 Nm	0,0030 Nm	0,0050 Nm	✓
3	1,0 Nm	0,9998 Nm	-0,0002 Nm	0,0030 Nm	0,0050 Nm	✓

1) E.g. gilt: (Abweichung) = (Anzeige) - (Referenz-Drehmoment) (showed) (indicated) - (reference torque).
 2) Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k=2 ergibt. Sie wurde gemäß DAkkS-ENK-3 in Anlehnung an DAkkS-DKD-R 3-8 unter Annahme von für diesen Gerätetyp typischen Werten für die relevanten Kenngrößen bei zweidirektionaler Belastung (Rücklauffehler, Wiederhol- und Vergleichsprecision, Drift).

Factory calibration certificate for torque wrench test devices (except from the factory calibration certificate)
 Further details on the internet at www.kern-lab.com

O = no interface (applies to Sauter devices without an interface and also devices from other manufacturers)

KERN & SOHN GmbH
Balances, Test weights, Microscopes,
DAkkS calibration laboratory

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 72336 Balingen
 Germany

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 Fax +49 7433 9933-149

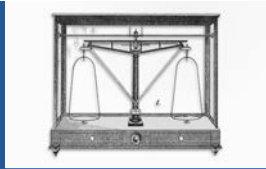
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 www.kern-sohn.com

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1769

Ancestor Johann Jakob Sauter built the Hahn inclination scale out of iron, a foundation stone for weighing for the balance industry in Southern Germany



1844

KERN is founded – precision balances are produced



1863

A proud Gottlieb Kern with his staff



1880

Pharmaceutical balance with Aesculap



1923

Inflation – KERN wages are paid with self printed currency



1980

The electronic balance ousts mechanical devices



1994

Accredited DKD laboratory (ISO 17025)



2000

New premises in Balingen



2002

Existing QM system certification in accordance with DIN EN ISO 9001:2000 standards



2007

Approval for the manufacture of medical products (DIN EN 13485 and 93/42/EEC)



2008

Authorisation for initial verification by the manufacturer (2009/23/EC)



2009

Approval for the manufacture and sale of height rods (DIN EN 13485 and 93/42/EEC)



2012

Verification point for non-automatic balances and test weights.

New customer portal www.kern-sohn.com goes live



2014

Expansion of the product range to include optical instruments (microscopes and refractometers)



2015

Inauguration of Ziegelei 2.0 with computer-controlled high-bay warehouse



2017

Come with KERN into the digital future: Expansion of the model ranges compatible with Industry 4.0, as well as the related services



2019

Significant anniversary year! 25 years of accredited DKD laboratory 175 years of KERN & SOHN 250 years of balance manufacture in the Sauter family-owned company



2020

Construction of Ziegelei 3.0, extension of administration building