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ACCREDITED CALIBRATION, 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 certificate with accreditation symbol. 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 ...**
Calibration certificate with accreditation symbol
(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 DAkkS calibration laboratories for balances, test weights and force measurement in Europe.

Thanks to the high level of automation, we can carry out accredited 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

Accredited calibration

Why? Accredited 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 accredited 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 certificate with accreditation symbol 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? The operator control the use of checking equipment and periodic recalibration time intervals themselves

Range of services:

Area accredited by DAkkS:

- Accredited calibration of balances with a maximum load of up to 50.000 kg
- Accredited 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
- Accredited calibration of force gauges and force transducers
- Volume determination for weights of accuracy class E1
- Accredited calibration of temperature and humidity sensors

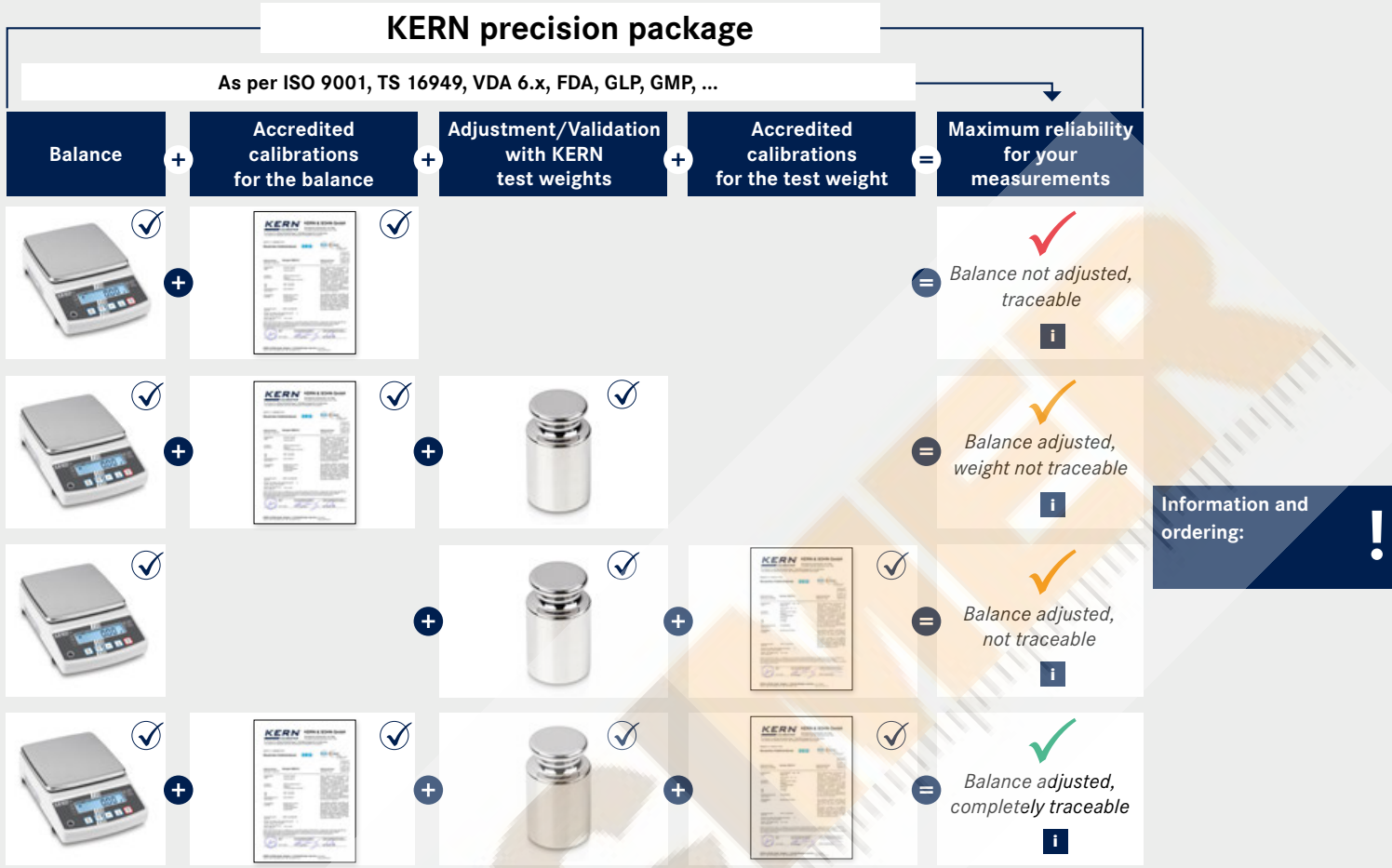
Area offered as factory calibration:

- 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 initial or periodic verification of balances, as well as periodic verification of weights.

And on top of all these services, we also offer additional services.

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 numerous fields.

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:

Balances

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

Weights

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

Force measuring devices and force transducers

- ▶ Accredited calibration up to 5 kN

Temperature and humidity sensors

- ▶ Accredited calibration up to 50 °C resp. 75 %

Factory calibration for

- ▶ Force measuring devices and force transducers ≤ 250 kN
- ▶ Hardness
- ▶ Layer thickness
- ▶ Material thickness
- ▶ Temperature of moisture analysers

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

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

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 rely on us to support you, and we will remind you in time, free of charge, when the next recalibration is due. In addition, you have the option of managing your test equipment online by yourself (cf. 1, 10).

► 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. 1)

► Collection service

We will be pleased to arrange a pick up by our forwarding agent the goods from your premises. You only need to tell us the weight and dimensions of your package and leave the rest to us (cf. 2)

► 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. 5, 6)

► 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. 8).

► Express service and dispatch

If you need a particularly fast service, you can use our express service. You will receive your test equipment after only 2 days (cf. 9).

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 about the long-term stability and trend behaviour of your test equipment as well as the necessary recalibration period can easily be determined and specified.

Paperless documentation

So 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 in paper form, for example? Of course this is not a problem either. We will send you everything you require by post.

Calibration certificate download

By 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 have to look for your certificates again.



Accredited 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 calibration certificates with accreditation symbol 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 to recalibrate your balance every 6 months and at normal (weekly) use, every 12 months.



The advantages of using on-site calibration:

- + **Calibration on-site** at your premises in the field of use
- + **Minimisation of measurement uncertainty** and guarantee of process accuracy strictly according to guideline EURAMET cg-18
- + **No risk of damage** during transportation
- + **Low downtime**
- + **Direct and personal contact** with the service technician
- + **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



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

In Germany, KERN has a close-knit network of 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 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.



The advantages of using 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

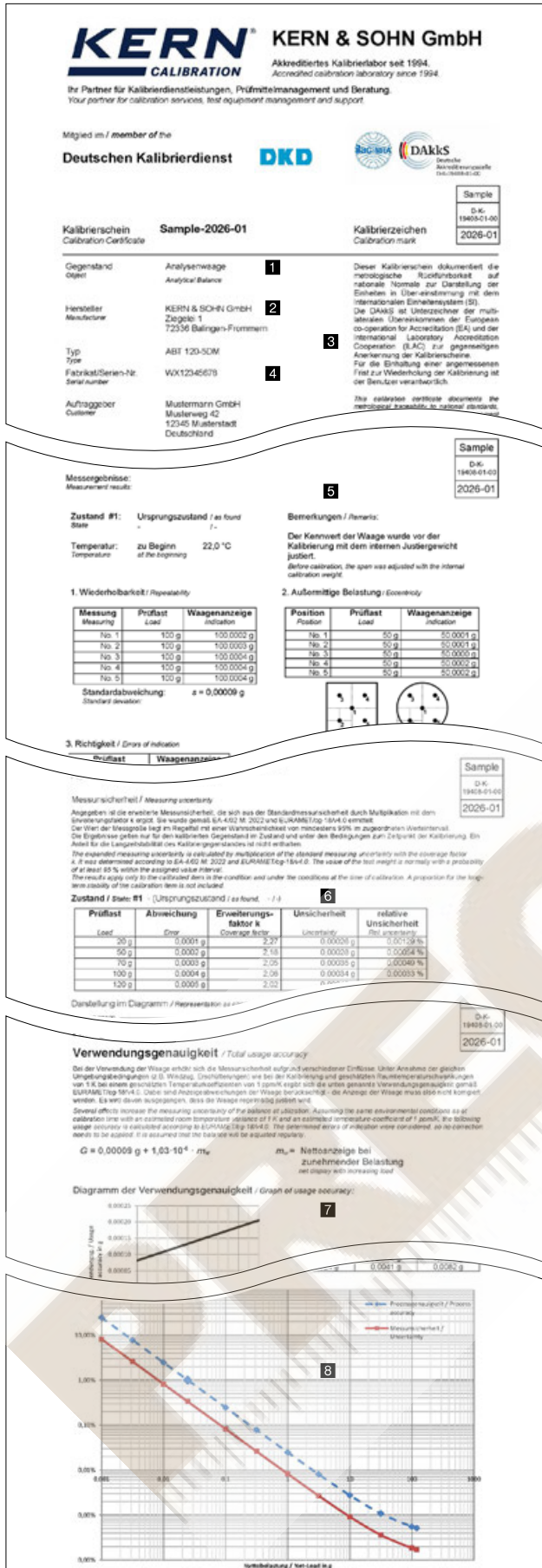


b) Calibration at the KERN factory (you send your balance to us)

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.



18 Calibration certificate with accreditation symbol for balances (extract)

- 1** Official document
- 2** Item to be calibrated
- 3** Traceability, see the *Glossary*
- 4** Identification/Applicant
- 5** Metrological component
- 6** Uncertainty of measurement, see the *Glossary*
- 7** Application accuracy, see the *Glossary*
- 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.



Recalibration of balances at the KERN factory KERN

Weighing capacity

Analytical balances	
[Max] ≤ 5 kg	963-101R
[Max] > 5 kg	963-102R
Precision balances/Industrial scales	
[Max] ≤ 5 kg	963-127R
[Max] > 5 kg - 50 kg	963-128R
[Max] > 50 kg - 350 kg	963-129R
[Max] > 350 kg - 1500 kg	963-130R
[Max] > 1500 kg - 2900 kg ¹⁾	963-131R
[Max] > 2900 kg - 6000 kg ¹⁾	963-132R
[Max] > 6000 kg - 12000 kg ¹⁾	963-133R
Hanging scales/Crane scales	
[Max] ≤ 5 kg	963-127HR
[Max] > 5 kg - 50 kg	963-128HR
[Max] > 50 kg - 350 kg	963-129HR
[Max] > 350 kg - 1500 kg	963-130HR
[Max] > 1500 kg - 2900 kg	963-131HR
[Max] > 2900 kg - 6000 kg	963-132HR
[Max] > 6000 kg - 12000 kg ³⁾	963-133HR
Preparation for recalibration (cleaning, function test)	969-003R
Additional services	
Minimum weight of sample (for details see page 209)	969-103R
Additional measurement points (as part of the) weighing test	963-140R
Additional measurement points (as part of the) repeatability testing	963-140R
Express service with delivery time 48 hours (only on initial purchase)	962-116R
Express shipping: Express supplement for guaranteed delivery on the next working day (if ready for shipment before 12:00 noon)	in GER only (other countries on request)

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
[Max] ≤ 5 kg	961-247
[Max] > 5 - 50 kg	961-248
[Max] > 50 - 350 kg	961-249
[Max] > 350 - 1500 kg	961-250
[Max] > 1500 - 2900 kg	961-251
[Max] > 2900 - 6000 kg	961-252
[Max] > 6000 - 12000 kg	961-253

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 <math><60,000\text{ d}</math>. 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 calibration certificate with accreditation symbol 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
Usage accuracy*	relative	969-511
	absolute	969-512
Calibration results*	relative	969-513
	absolute	969-514
Measurements as manufacturer or customer specification	Foreign devices	969-515
	Customer specific. devices	969-516
	KERN devices	969-517

relative = % / absolute = g

*as attachment to the calibration certificate with accreditation symbol

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	☑
2	0 g	1000 g	1000,00 g	0,00 g	± 0,015 g	± 0,05 g	☑
3	0 g	1500 g	1500,01 g	0,01 g	± 0,017 g	± 0,05 g	☑
4	0 g	2000 g	2000,01 g	0,01 g	± 0,020 g	± 0,10 g	☑
5	0 g	3000 g	3000,02 g	0,02 g	± 0,022 g	± 0,10 g	☑

¹⁾Evaluation criteria: $|[\text{Deviation}]| + [\text{extended measuring uncertainty}] \leq [\text{tolerance}]$

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. According to the guiding principle of GMP/GLP: "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 as well as our EQS (Equipment Qualification Software) 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 calibration certificate with accreditation symbol as well as records in your qualification log book of the EQS software (Equipment Qualification Software).

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.



Important elements of equipment qualification:



Design qualification (DQ)

With the design qualification, which is carried out under consideration of a requirement specification/functional description, all the requirements on which you as a user depend on, are defined. The purchase decision is made on the basis of the design specifications and the available devices. Careful selection in the DQ can prevent subsequent deficiencies.



Installation qualification (IQ)

During the installation qualification based on a FMEA, we perform a documented installation, up to the qualified commissioning of your device. Points of this qualification are:

- Scope of delivery and identification
- Visual inspection of the system components
- Evaluation of the installation site
- Hardware installation and device settings
- Cleaning
- Query of work instructions during use
- Clarification of deviations
- Document review and approval

We carry out our qualifications in accordance with the GMP standard.



Function qualification (OQ)

Instruction is given to the user/s. Items of the OQ are:

- Function test of the system
- Initial adjustment on site
- Metrological verification including USP & Ph.Eur.
- Creation of test protocols
- Check of menu function and error message
- Review and approval of documents
- Evaluation of performance and determination of further test procedure



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).



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. Maintenance is carried out with the help of a maintenance schedule. The maintenance times are determined by you. We are happy to support you with a maintenance contract for the entire organisation of your measuring system.



If you are interested in a training for equipment qualification, please feel free to contact us

KERN CALIBRATION 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.

Mitglied im / member of the
Deutschen Kalibrierdienst **DKD** **DAKKS**

Sample: D-K, 19408-01-00, 2026-01

Kalibrierschein / Calibration certificate: Sample-2026-01, Kalibrierzeichen / Calibration mark: 2026-01

Gegenstand / Object: Gewichtssatz, 1 mg - 1 kg, Klasse E2. Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf rationale Normale zur Darstellung der Erhalten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAKKS ist Unterzeichner der multilateralen Übereinkommen der Europäischen Kooperation für Akkreditation (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.

Hersteller / Manufacturer: KERN & Sohn GmbH, Zögeler 1, D-72336 Balingen, Germany

Typ / Type: 313-052

Fabrikate/Serien-Nr. / Serial number: G123456789

Auftraggeber / Customer: Mustermann GmbH

Auftragsnummer / Order No.: 2026-123456789

Ort der Kalibrierung: Kalibrierlaboratorium KERN

Umgebungsbedingungen: Temperatur (°C) 22,9 bis 24,1, Unsicherheit 0,1; rel. Luftfeuchte (%) 48,5 bis 53,4, Unsicherheit 2,0; Luftdruck (hPa) 942,5 bis 946,5, Unsicherheit 0,3

Nennwert	Dichte	Unsicherheit	Material	Form
1 mg - 500 mg	7950 kg/m³	140 kg/m³	Edelstahl Stainless steel	Cylinder Wire
1 g - 1 kg	8000 kg/m³	100 kg/m³	Edelstahl Stainless steel	Knopf Cylindrical form

Nennwert	Kennzeichnung	konventioneller Wert	Unsicherheit	Fehlergrenze	Klasse*
1 mg		1 mg + 0.0010 mg	0.0020 mg	± 0.0060 mg	E2 ✓
2 mg	*	2 mg + 0.0025 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 + 0.0020 mg	0.0020 mg	± 0.0060 mg	E2 ✓
20 mg	*	20 mg + 0.0010 mg	0.0030 mg	± 0.010 mg	E2 ✓
50 mg	*	50 mg + 0.0010 mg	0.0040 mg	± 0.015 mg	E2 ✓
100 mg	*	100 mg + 0.0010 mg	0.0050 mg	± 0.015 mg	E2 ✓
200 mg	*	200 mg + 0.0020 mg	0.0060 mg	± 0.020 mg	E2 ✓
500 mg	*	500 mg + 0.0050 mg	0.0080 mg	± 0.025 mg	E2 ✓
1 g	*	1 g + 0.0020 mg	0.010 mg	± 0.030 mg	E2 ✓
2 g	*	2 g + 0.0020 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 + 0.010 mg	0.020 mg	± 0.060 mg	E2 ✓
20 g	*	20 g + 0.015 mg	0.025 mg	± 0.080 mg	E2 ✓
50 g	*	50 g + 0.015 mg	0.028 mg	± 0.090 mg	E2 ✓
100 g	*	100 g + 0.020 mg	0.030 mg	± 0.10 mg	E2 ✓
200 g	*	200 g + 0.020 mg	0.030 mg	± 0.10 mg	E2 ✓
500 g	*	500 g + 0.030 mg	0.030 mg	± 0.10 mg	E2 ✓
1 kg	*	1 kg + 0.1 mg	0.5 mg	± 1.0 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 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
 - Standard service: 4 working days
 - 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 calibration certificates with accreditation symbol 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

Calibration certificate with accreditation symbol for test weights (extract).

For more details on our calibration service and other useful information, please see the internet

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

Recalibration Price of Test Weights (Accredited Calibration)

Class acc.	→ E1 ²⁾ with volume determination	E1 ¹⁾ without volume determination	E2 ¹⁾	F1/F2 ¹⁾ * F2 only	M1/M2/M3 ¹⁾
Nominal value ↓	KERN	KERN	KERN	KERN	KERN
1 mg	-	962-251R	962-351R	962-451R	962-651R
2 mg	-	962-252R	962-352R	962-452R	962-652R
5 mg	-	962-253R	962-353R	962-453R	962-653R
10 mg	-	962-254R	962-354R	962-454R	962-654R
20 mg	-	962-255R	962-355R	962-455R	962-655R
50 mg	-	962-256R	962-356R	962-456R	962-656R
100 mg	-	962-257R	962-357R	962-457R	962-657R
200 mg	-	962-258R	962-358R	962-458R	962-658R
500 mg	-	962-259R	962-359R	962-459R	962-659R
1 g	963-231	962-231R	962-331R	962-431R	962-631R
2 g	963-232	962-232R	962-332R	962-432R	962-632R
5 g	963-233	962-233R	962-333R	962-433R	962-633R
10 g	963-234	962-234R	962-334R	962-434R	962-634R
20 g	963-235	962-235R	962-335R	962-435R	962-635R
50 g	963-236	962-236R	962-336R	962-436R	962-636R
100 g	963-237	962-237R	962-337R	962-437R	962-637R
200 g	963-238	962-238R	962-338R	962-438R	962-638R
500 g	963-239	962-239R	962-339R	962-439R	962-639R
1 kg	963-241	962-241R	962-341R	962-441R	962-641R
2 kg	963-242	962-242R	962-342R	962-442R	962-642R
5 kg	963-243	962-243R	962-343R	962-443R	962-643R
10 kg	963-244	962-244R	962-344R	962-444R	962-644R
20 kg	963-245	962-245R	962-345R	962-445R	962-645R
50 kg	963-246	962-246R	962-346R	962-446R	962-646R
100 kg	-	-	-	962-591R*	962-691R
200 kg	-	-	-	962-592R*	962-692R
500 kg	-	-	-	962-593R*	962-693R
1000 kg	-	-	-	-	962-694R
2000 kg	-	-	-	-	962-695R
1 mg-500 mg	-	962-250R	962-350R	962-450R	962-650R
1 mg-50 g	963-201	962-201R	962-301R	962-401R	962-601R
1 mg-100 g	963-202	962-202R	962-302R	962-402R	962-602R
1 mg-200 g	963-203	962-203R	962-303R	962-403R	962-603R
1 mg-500 g	963-204	962-204R	962-304R	962-404R	962-604R
1 mg-1 kg	963-205	962-205R	962-305R	962-405R	962-605R
1 mg-2 kg	963-206	962-206R	962-306R	962-406R	962-606R
1 mg-5 kg	963-207	962-207R	962-307R	962-407R	962-607R
1 mg-10 kg	963-208	962-208R	962-308R	962-408R	962-608R
1 g-50 g	963-215	962-215R	962-315R	962-415R	962-615R
1 g-100 g	963-216	962-216R	962-316R	962-416R	962-616R
1 g-200 g	963-217	962-217R	962-317R	962-417R	962-617R
1 g-500 g	963-218	962-218R	962-318R	962-418R	962-618R
1 g-1 kg	963-219	962-219R	962-319R	962-419R	962-619R
1 g-2 kg	963-220	962-220R	962-320R	962-420R	962-620R
1 g-5 kg	963-221	962-221R	962-321R	962-421R	962-621R
1 g-10 kg	963-222	962-222R	962-322R	962-422R	962-622R

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

Additional costs for preparation, overhaul and adjustment before the calibration	KERN
Preparation of weights (e.g. cleaning, etc.)	
Single weight	969-001R
Weight set	969-002R
Subsequent services are carried out after confirmation	
Continued overhaul of weights e.g. wet-cleaning, markings, repair, special packaging, adjustment, ...	969-005R
Adjustment, per weight only available for weights with adjustment chamber (F1 - M3)	969-010R
Second calibration after adjustment or substitution, per weight	
Class E1	969-210R
Class E1 incl. volume determination	969-211R
Class E2	969-310R
Class F1/F2	969-410R
Class M1 - M3	969-610R
Testing of magnetic properties according to OIML R111:2004, per weight	961-115R
Calibration of NON-OIML test weights, additional price per weight	-

KERN Standard Service Time*¹⁾

Standard service Class E2 - M3	4 working days
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

¹⁾ The delivery time for recalibrations can vary depending on the order situation as well as in case of queries, bottlenecks, etc.



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 Express Service, for each test weight, KERN 962-115R
- For Express shipping

Class

	KERN
Accuracy class I (precision balances) ¹⁾	
[Max] ≤ 5 kg ¹⁾	950-101R
[Max] > 5 kg ¹⁾	950-102R
Accuracy class II (precision balances) ¹⁾	
[Max] ≤ 5 kg ¹⁾	950-116R
[Max] > 5 kg - 50 kg ¹⁾	950-117R
[Max] > 50 kg - 350 kg ¹⁾	950-118R
Accuracy class III-IV ¹⁾	
Bench scales and industrial scales (excl. crane scales)	
[Max] ≤ 5 kg ¹⁾	950-127R
[Max] > 5 kg - 50 kg ¹⁾	950-128R
[Max] > 50 kg - 350 kg ¹⁾	950-129R
[Max] > 350 kg - 1500 kg ¹⁾	950-130R
[Max] > 1500 kg - 2900 kg ¹⁾	950-131R
[Max] > 2900 kg - 6000 kg ¹⁾	950-132R
Crane scales	
[Max] > 50 kg - 350 kg ¹⁾	950-129HR
[Max] > 350 kg - 1500 kg ¹⁾	950-130HR
[Max] > 1500 kg - 2900 kg ¹⁾	950-131HR
[Max] > 2900 kg - 6000 kg ¹⁾	950-132HR
[Max] > 6000 kg - 12000 kg ¹⁾	950-133HR

¹⁾ Preparation of reverification of balances, 969-006R

²⁾ Verification ("reverification"), valid only in Germany



Accredited calibration with calibration certificate for force gauges

The KERN calibration laboratory is at your side when you need an accredited calibration. From the transducer to the full measuring chain, we are happy to take care of traceable calibration of your test equipment for you.

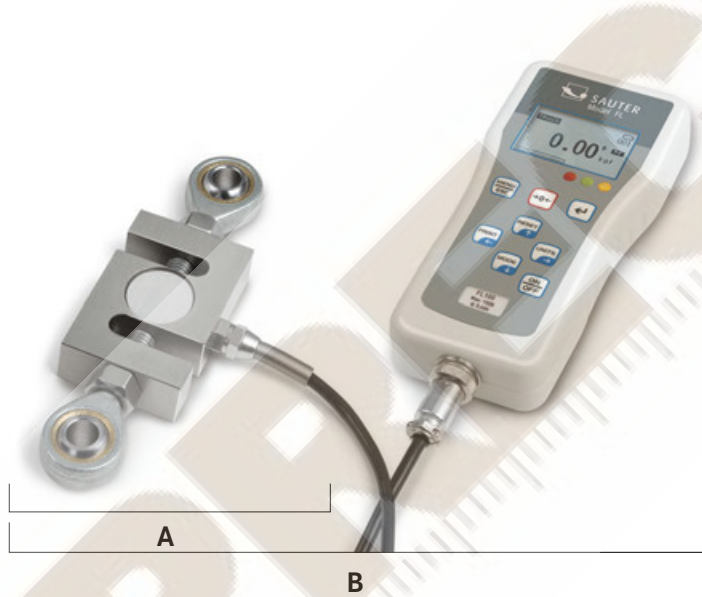
Our accreditation includes the calibration of tensile and pressure force up to 5 kN according to the standards DIN EN ISO 376 and DKD-R 3-3, each with the Newton (N) display unit for a complete measuring chain (situation A) or voltage ratio/transmission coefficient (mV/V, situation B).

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:
Separate force transducer,
display unit mV/V

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

► See also tables, right side



Messwerte (Zugkraft) / Measurement results (tension force)

Ausrichtung / rotation	Ausgangsposition / Initial position		120°		240°	
Kraft / force	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
200,0 N	-199,5 N	-199,5 N	-199,5 N	-200,0 N	-199,5 N	-200,0 N
400,0 N	-399,5 N	-399,5 N	-399,5 N	-400,0 N	-399,5 N	-400,0 N
600,0 N	-599,5 N	-599,5 N	-599,5 N	-599,5 N	-599,5 N	-599,5 N
800,0 N	-799,5 N	-799,5 N	-799,5 N	-799,5 N	-799,5 N	-799,5 N
1000,0 N	-999,5 N	-999,5 N	-999,5 N	-999,5 N	-999,5 N	-999,5 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 / Rel. cal. max. load error: $k_1 = 0,000\%$
 Rel. Nullpunktabweichungen / Rel. zero error: $f_0 = 0,000\%$ (R1), 0,000 % (R2), 0,000 % (R3/R4), 0,000 % (R5/R6)

Kraft / force	abh. Mittelwert \bar{x}_i average \bar{x}_i	rel. Wiederholgenauigkeit s_i rel. repeatability s_i	rel. Vergleichs- präzision s_i rel. reproducibility s_i	rel. Umkehrgenauigkeit v_i hysteresis v_i
200,0 N	-199,5 N	0,000 %	0,000 %	+0,251 %
400,0 N	-399,5 N	0,000 %	0,000 %	+0,248 %
600,0 N	-599,5 N	0,000 %	0,000 %	0,000 %
800,0 N	-799,5 N	0,000 %	0,000 %	+0,060 %
1000,0 N	-999,5 N	+0,000 %	0,000 %	0,000 %

Angaben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor $k=2$ ergibt. Sie wurde gemäß EN-ISO 10222 und DKD-R 3-3 ermittelt und gilt jeweils für Belastungen zwischen der angegebenen Kraftstufe und der Kalibriermittelkraft. Der Wert der Messgröße liegt mit einer Wahrscheinlichkeit von mindestens 95% im angegebenen Messbereich.

Calibration certificate with accreditation symbol for force-measuring devices (extract).

Prices for accredited recalibration 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	KERN	Measuring range
Tensile force:			
963-161IVR	≤ 500 N	963-161VR	≤ 500 N
963-162IVR	≤ 2 kN	963-162VR	≤ 2 kN
963-163IVR	≤ 5 kN	963-163VR	≤ 5 kN
Compression force:			
963-261IVR	≤ 500 N	963-261VR	≤ 500 N
963-262IVR	≤ 2 kN	963-262VR	≤ 2 kN
963-263IVR	≤ 5 kN	963-263VR	≤ 5 kN
Tensile and Compression force:			
963-361IVR	≤ 500 N	963-361VR	≤ 500 N
963-362IVR	≤ 2 kN	963-362VR	≤ 2 kN
963-363IVR	≤ 5 kN	963-363VR	≤ 5 kN
969-003R	Preparation for recalibration (cleaning, function test)		

Situation B: Complete force gauge (in N)*2

ISO 376 (8 stages)		DKD-R 3-3 (5 stages, sequence A)	
KERN	Measuring range	KERN	Measuring range
Tensile force:			
963-161IR	≤ 500 N	963-161R	≤ 500 N
963-162IR	≤ 2 kN	963-162R	≤ 2 kN
963-163IR	≤ 5 kN	963-163R	≤ 5 kN
Compression force:			
963-261IR	≤ 500 N	963-261R	≤ 500 N
963-262IR	≤ 2 kN	963-262R	≤ 2 kN
963-263IR	≤ 5 kN	963-263R	≤ 5 kN
Tensile and Compression force:			
963-361IR	≤ 500 N	963-361R	≤ 500 N
963-362IR	≤ 2 kN	963-362R	≤ 2 kN
963-363IR	≤ 5 kN	963-363R	≤ 5 kN
969-003R	Preparation for recalibration (cleaning, function test)		

Factory calibration for force

This is not an accredited calibration (no proof of metrological traceability).

Situation A: Force transducer (voltage ratio, in mV/V)*1,2

Situation B: Complete force gauge (in N)*2

ISO 376 (8 stages)		DKD-R 3-3 (5 stages, sequence A)	
KERN	Measuring range	KERN	Measuring range
Tensile force:			
961-161VR	≤ 500 N	961-161R	≤ 500 N
961-162VR	≤ 2 kN	961-162R	≤ 2 kN
961-163VR	≤ 5 kN	961-163R	≤ 5 kN
961-164VR	≤ 20 kN	961-164R	≤ 20 kN
961-165VR	≤ 50 kN	961-165R	≤ 50 kN
961-166VR	≤ 120 kN	961-166R	≤ 120 kN
961-167VR	≤ 250 kN	961-167R	≤ 250 kN
Compression force:			
961-261VR	≤ 500 N	961-261R	≤ 500 N
961-262VR	≤ 2 kN	961-262R	≤ 2 kN
961-263VR	≤ 5 kN	961-263R	≤ 5 kN
961-264VR	≤ 20 kN	961-264R	≤ 20 kN
961-265VR	≤ 50 kN	961-265R	≤ 50 kN
961-266VR	≤ 120 kN	961-266R	≤ 120 kN
961-267VR	≤ 250 kN	961-267R	≤ 250 kN
Tensile and Compression force:			
961-361VR	≤ 500 N	961-361R	≤ 500 N
961-362VR	≤ 2 kN	961-362R	≤ 2 kN
961-363VR	≤ 5 kN	961-363R	≤ 5 kN
961-364VR	≤ 20 kN	961-364R	≤ 20 kN
961-365VR	≤ 50 kN	961-365R	≤ 50 kN
961-366VR	≤ 120 kN	961-366R	≤ 120 kN
961-367VR	≤ 250 kN	961-367R	≤ 250 kN
969-003R	Preparation for recalibration (cleaning, function test)		

R = Recalibration
For each force gauge without interface or from other manufacturers we charge a surcharge

*1 Compatibility with our amplifiers required;

*2 Installation in our measuring equipment required

Factory calibration certificates

As calibration certificates with accreditation symbol cannot be offered for all measuring devices or measurement sizes, or where it is not customary, we then offer factory calibration certificates. This is not an accredited calibration (no proof of metrological traceability). 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 250 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.

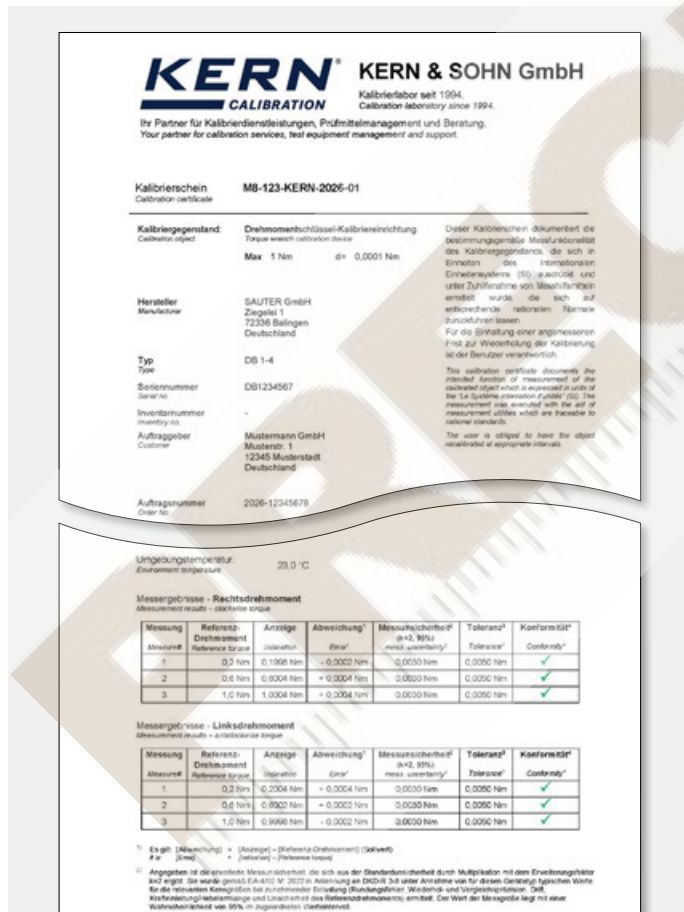
KERN	Measuring device	Measuring range
Factory calibration		
961-102KR	Digital dynamometer KERN MAP	≤ 130 kg
961-110R	Coating thickness	≤ 2000 µm F or N
961-112R	Coating thickness	≤ 2000 µm FN
961-113R	Wall thickness (ultra sound)	≤ 300 mm (in stainless steel)
961-170R	Hardness comparison plate (Shore)	For sets up to 7 plates
961-131R	Hardness tester (Leeb)	400 – 800 HLD
961-132R	Hardness comparison plate (Leeb)	Hardness comparison plate (for Leeb durometer)
961-270R	Hardness (UCI)	200 - 800 HV
961-150R	Length	≤ 300 mm
961-190R	Light	≤ 200000 lx
961-100R	Mechanical balances/ spring balances	≤ 5 kg
961-101R	Mechanical balances/ spring balances	> 5 - 50 kg
961-102R	Mechanical balances/ spring balances	> 50 - 350 kg
961-103R	Mechanical balances/ spring balances	> 350 - 1500 kg
961-104R	Mechanical balances/ spring balances	> 1500 - 3000 kg
961-105R	Mechanical balances/ spring balances	> 3000 - 6000 kg
961-106R	Mechanical balances/ spring balances	> 6000 - 12000 kg
961-120R	Torque wrench test devices	1 Nm - 200 Nm
964-305R	Temperature calibration for moisture analyzer	
961-290R	Refractometers	

Additional services

962-116R	Express service with 48 hour delivery
969-003R	Preparation for recalibration (cleaning, function test)

R = Recalibration

For each force gauge without interface or from other manufacturers we charge a surcharge



Factory calibration certificate for torque wrench test devices
(extract from the factory calibration certificate) **Further details on the internet**

A

Accuracy classes for test weights

E, F, M ▶ *Error limit classes*

Adjusting of measurement equipment

Precise setting of a measurement value via a professional intervention in the measurement system.

Adjusting the weighing range of a balance



Either with the external test weight via the **adjusting program CAL**, or with the **internal automatic adjustment** resp. **adjusting switch**. It is necessary with variations in temperature, a change of environmental conditions, change of location, etc. Recommended as a daily check routine.

Alibi memory

For weighings where verification is mandatory, and which are to be analysed and processed by a PC (e.g. printing out a packing list using a PC instead of a printer connected directly to the balance) electronic archiving is required by the metrological authorities by a verifiable data memory which cannot be manipulated. Alibi memories from KERN fulfil this requirement. They are for paperless archiving of weighing results. For KERN products the alibi memory is fitted inside the balance, right between where the weight is determined and the output to the PC.

All data transferred to the PC is stored with date, time and all important weights for at least three months. These stored data strings can be displayed on the balance at any time. The data in the alibi memory can be deleted, but not changed.

Application accuracy

Allowance for measuring uncertainty during practical use of a balance. Is given in the appendix to the calibration certificate with accreditation symbol.

ATEX

Derived from **AT**mosphere **EX**plosibles. (explosive atmosphere). A synonym for EU guidelines, which controls the quality and use of equipment in hazardous industrial environments, where there is explosion danger, e.g. by handling of flammable substances, which are present in high concentrations in the form of gas, mist, vapour or dust. Therefore see also directives 2014/34/EU as well as 1999/92/EU.

B

Balances which are verified/ not approved for verification

Metrologically almost identical. For verified balances certain details are regulated by law, e.g. software changes and additional markings.

C

CAL

Adjusting the balance is triggered with an external test weight by using the CAL key on the key pad or on the touch display of the display device or the CAL menu option. This will guarantee the consistent high accuracy of the balance.

Calibration of measurement equipment

Determination of the precision of a measurement value without intervention in the measurement system. Example: to check a balance you load a ▶ **test weight** upon it. The term "Calibrating" was formerly also used for ▶ **Adjusting**.

Calibration certificate with accreditation symbol



See product group 18 "Calibration service"

Calibration or verification



DAkkS accredited Calibration is possible for every balance in perfect condition. DAkkS accredited calibration (DKD) is a private service monitored by the state for ensuring high quality requirements according to ISO 9000ff and others, e.g. in production or research. **Verifying (conformity assessment)** is only possible for type-approved balances marked with the green **M** ▶ **Verification**

Commercial error limit

Permitted tolerance (plus and minus) of measuring devices where verification is mandatory when used within their verification validity period. This tolerance is double the permissible error limit, in so far as this is not specified otherwise in the Weights and Measures Act).

Conformity assessment

Procedure for confirming warranted characteristics in accordance with recognised rules. For balances this relates to verification.

Conformity declaration from the manufacturer

The manufacturer declares that the product fulfils the applicable EU directives. With electronic balances this is always in conjunction with the CE mark.

Control of measuring equipment in the QM system in conjunction with quality standards

An organisation certified to a quality standard such as DIN EN ISO 9001 ff. e.g. a production plant is obliged to adhere to a defined quality standard within the framework of its quality management system. To do this, it is imperative to have a measurement equipment which is working accurately. Chapter 7.1.5 "Resources for monitoring and measuring" of DIN EN ISO 9001:2015-11 states that measuring equipment must be calibrated at defined intervals and before use. The measurement devices and measurement standards needed to do this must: - be traced back to international or national standards. (▶ **Traceability to the National Standard**)

- their uncertainty of measurement must be known
- they must be marked with a clear identification
- the test must be documented

The ▶ **Calibration certificate with accreditation symbol** fulfils all these requirements.

Conventional mass of weights

The problem is the air movement, which makes the weight appear lighter. In order to avoid this "distortion" in daily use, all weights are adjusted to the unit specifications given in R111, e.g. it is accepted that: material density of the weights is 8000 kg/m³, air density is 1.2 kg/m³ and measuring temperature is 20° C.

Counting resolution

The counting resolution is calculated in points from the ratio of the weighing range [Max] divided by the smallest part weight. It is a statement of counting accuracy.

D

DAkkS = German accreditation authority

▶ **Calibration certificate with accreditation symbol**

See product group 18 "Calibration service"



Data interface

To connect the balance to a printer, PC, network or a second balance. Typical interfaces are, for example, RS-232, RS-485, USB, Bluetooth, LAN, Digital I/O, DUAL, LAN etc. The interface parameters can be set using the balance. The interfaces available are stated in the model description.

Density determination

One of the main areas of application for laboratory balances is determining densities, e.g. determining the specific weight of liquids and solids. To do this you will need a highly accurate precision or analytical balance and a density set. It is particularly convenient if the balance can calculate and display the density right away. It has become apparent that by means of weighting when in the process of determining the density of liquids and solids according to the buoyancy method particularly accurate results can be obtained (Archimedes' principle).

a) Density determination of liquids: By means of measuring the buoyancy with a glass plummet with known volume immersed in the liquid to be measured

b) Density determination of solid bodies:

$$\rho = \frac{A}{A-B} \cdot \rho_0$$

ρ = Density of sample

A = Weight of sample in air

B = Weight of sample in auxiliary liquid

ρ_0 = Density of the auxiliary liquid

Applications:

- Pre-packaged goods control, whenever a product is sold according to its volume [cm³]. This volume is calculated with weight [g] : density [g/cm³].
- Materials analysis

DMS = Strain gauge

An electrical resistor strip that is glued to an elastic deforming body made of aluminium. As the strain gauge is mechanically deformed its resistance value changes, allowing the measured value to be calculated.

**Draught shield**

Required for balances with ► **Readout** $d \leq 1$ mg, to avoid disturbing air movements.

Dual-range balance

As the load increases, the balance switches automatically to the next largest range, for both, weighing range [Max] as well as readout [d].

E**Error limit classes for test weights according to EU directive OIML R111**

For further details, see product group 17 "Test weights"

F**FACTORY**

These options can only be carried out at KERN factory.

FORCE = Electromagnetic force compensation

A counterforce is created by means of a coil in a permanent magnet. This counterforce is the same as the load of the weight being measured on the scale and therefore equalising. The measured value is calculated via the change in the coil current.

G**GLP = Good Laboratory Practice**

► **ISO/GLP**

Gravitational acceleration

► **Gravitational force**

Gravitational force

very important influence for precise electronic balances. Due to the varying influence balances have to be ► **adjusted at the location of use.**

H**HACCP = Hazard Analysis and Critical Control Points (HACCP)**

The HACCP concept is a preventative system, which is designed to guarantee the safety of foodstuffs. EC regulation 852/2004 mandates the use of the HACCP concept for all companies which are involved in production, processing and sales of foodstuffs.

ISO 9000ff/DIN EN ISO 9000ff

Quality Management System in the form of a DIN Norm for quality assurance in a factory.

ISO calibration/ISO certificate = factory calibration certificate

Testing measurement devices for accuracy in accordance with a procedure which is recognised, but not accredited.

ISO/GLP record keeping

Quality Assurance Systems demands record keeping of weighing results and correct adjusting of the balance, giving details of date, time and balance identification. The easiest way to obtain this documentation is by means of a connected printer.

J**Junction Box**

For connection and simple corner adjustment of several load cells.

K**KCP**

KCP is an universal communication protocol between laboratory balances, industrial scales or other measuring instruments and digital devices, such as a computer, server or process management system. Due to the universal protocol structure, one measuring instrument can be replaced by another without adapting the communication interface.

L**Linearity/Precision**

Greatest deviation of the weight displayed of a balance with regard to the value of the respective test weight in terms of plus and minus across the whole weighing range.

M**Minimum load [Min]**

Lower limit of the verifiable weighing range. Is marked on the verification mark. The function of the balance is also given below the minimum load.

Minimum sample weight

Indicates the smallest weight which can be determined, depending on the process accuracy required.

Multi-division balance/ Multi-range balance

On multi-division balances, the weighing range is subdivided several times, each with a different readability. The readability [d] changes automatically with increasing and decreasing load. Multi-range balances have several weighing ranges with different maximum loads and

different numerical increments. Switching takes effect automatically when the load increases; switching back to the lower weighing range only takes effect when the scale has been completely unloaded.

N**Newton**

Newton (N) is the unit for physical force values. A Newton is the force required to accelerate a 1 kg mass at rest to a speed of 1 m/s within one second.

Notified body

Neutral and independent, predominantly government bodies, which are formally appointed by the EC. They are engaged in the field of verification for conformity evaluations (initial verification) and type-approval test within the scope of type approvals.

O**Optimisation of reference weight (when piece counting)**

See product group 9 "Counting balances/Counting systems"

P**Percentage determination**

Example: Reference weight prior to drying: 50 g = balance display 100 %. After drying 40 g = balance display 80 % absolute (dry mass) or 20 % relative (humidity).

**Permissible ambient temperature**

Measuring errors are possible if you use the balances outside the permitted specified ambient temperature range. With verified balances this is stated on the identification plate.

PLU (Price Look Up)

This refers to a data memory in price-computing retail scales for the base price of sales items.

Pre-packaging legislation (FPVO)

Ensures that pre-packed goods are filled correctly, for example, in food industry. The Weights and Measures Act governs the permissible weight and volume tolerances.

PRE-TARE

Entering and saving a tare weight (e.g. container weight) through weighing or manual entry using the balance keypad before the actual weighing process. When you subsequently place the tare container on the balance, the balance will show zero immediately – saves time. Particularly useful e.g. for checking fill levels

Proof of compatibility

This documents the verification compatibility for combinations of weighing modules such as display devices, load cells and connecting elements.

R

Readout [d]

Smallest readable weight increment on a digital display.

Recalibration

Periodic checking of the precision of measurement equipment/checking equipment (e.g. balances/weights) to control accuracy,
 ▶ **Control of measurement equipment**

Reference weight (when piece counting)

See product group 9
 "Counting balances/Counting systems"

Reproducibility (standard deviation)

Sequenced measure of conformity in repeated weighing (e.g. balances) subject to the same conditions. Mostly 1 [d] or less. Quality feature.

Resolution of a balance

The resolution is calculated from the weighing range [Max] divided by the readout [d], e. g. [Max] 420 g : [d] 0.001 g = 420,000 points. The resolution is a quality feature – the higher, the better.

S

SC-TECH = Single-Cell Technology

▶ **FORCE**. The load cell consists of a single aluminium block, which gives a very high measurement quality.

**Semi-micro balance**

Analytical balance with a readout [d] = 0,01 mg

Smallest part weight when counting

The smallest piece weight, which a balance can accept for piece counting. For the relevant model, enter "g/piece" in the product data table.

T

T-FORK = Tuning fork principle

A resonating body (like a tuning fork) is electromagnetically excited, causing it to oscillate. The measured value is calculated via the change in frequency corresponding to the load of the weight being measured on the scale.

**Taring, automatic**

▶ **PRE-TARE**

Taring, subtractive

The available weighing range of a balance is reduced by the value of the tare load. Example: weighing range of a balance Max 6000 g, Tare (= container) 470 g, available weighing range 5530 g.

Test weight, external (previously calibration weight)

For adjusting or checking the balance accuracy

▶ **Adjusting the weighing range.**

The external test weight can be calibrated according to DAkkS at any time, even afterwards, see product group 18 "Calibration Service".

Test weight, internal

Like test weight external, but installed in the balance and powered.

**Totalising**

Various individual weighings are added automatically to aggregate, e.g. all individual weighings of a batch.

**Traceability to the National Standard**

A pre-requisite for every perfect measurement is the validated comprehensive proof that the measuring equipment can be traced back to the international or national standards. In Germany the statutory binding standards are available from the PTB.

Type approval for balances

Strict process to test whether a balance fulfils the verification requirements. A balance can only be verified, if it has got a type approval from a
 ▶ **notified body.**

U

Uncertainty of measurement of a balance (= standard deviation)

Determined for each balance according to a precisely given test method and documented in the ▶ **Calibration certificate with accreditation symbol**. It depends on various factors, both, internal and external. Uncertainty of measurement increases by a rising charge of the balance, see product group 18 "Calibration Service"

V

Verification

Verification, in accordance with the new terminology "Conformity assessment". Only balances with ▶ **EC type approval** can be evaluated for conformity. These balances have an identification plate with the metrology marking **M**. The state requires assessment for conformity and this assessment serves as consumer protection.

According to EU directive 2014/31/EEC balances must be officially assessed for conformity (calibrated) if they are used as follows:

- a) in commercial trade when the price of a commodity is determined by weighing.
- b) in the manufacture of pharmaceuticals in pharmacies and analysis in pharmaceutical and medical laboratories.
- c) for official purposes.
- d) in the production of prepackaging.
- e) in medical applications.

Every balance is tested by KERN and marked with a conformity mark. Its accuracy within the framework of permissible tolerances is thereby confirmed. EU verification applies to all member states of the EU.

Verification classes of balances**M**

Class I – Analytical balance (precision balance),
 Class II – precision balance,
 Class III – industrial scale (commercial scale).

Verification of a balance with adjusting program

The adjusting program is sealed with an official mark after the verification. Thus the verification is only valid for the specific location of use.

▶ **Gravitational force**

To be able to correctly adjust the balance to your location of use, it is necessary to advise the location of use and postcode. See individual model details for the information as to whether verification can be carried out in the factory or at the location of use.

Verification of a balance with automatic internal adjusting

The above restrictions in respect of the location of use do not apply, because the automatic internal adjusting works also after verification, therefore it is not sealed. In this case, verification does not depend on the location.

Verification validity for balances

Generally 2 years for all verification classes, for control balances generally 1 year, after expiry the balance has to be re-verified.

Verification value [e]

Measure of the verification tolerance, depending on balance, mostly between 1 [d] and 10 [d] ▶ **Readout**

W

Weighing range [Max]

is the working range of the balance. The balance can be loaded up to the specified upper limit.