



# DAKKS CALIBRATION SERVICE, 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 DAKKS 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

## 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?** The operator control the use of checking equipment and periodic recalibration time intervals themselves

## Range of services:

Area accredited by DAKKS:

- 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
- DAKKS calibration of temperature and humidity sensors

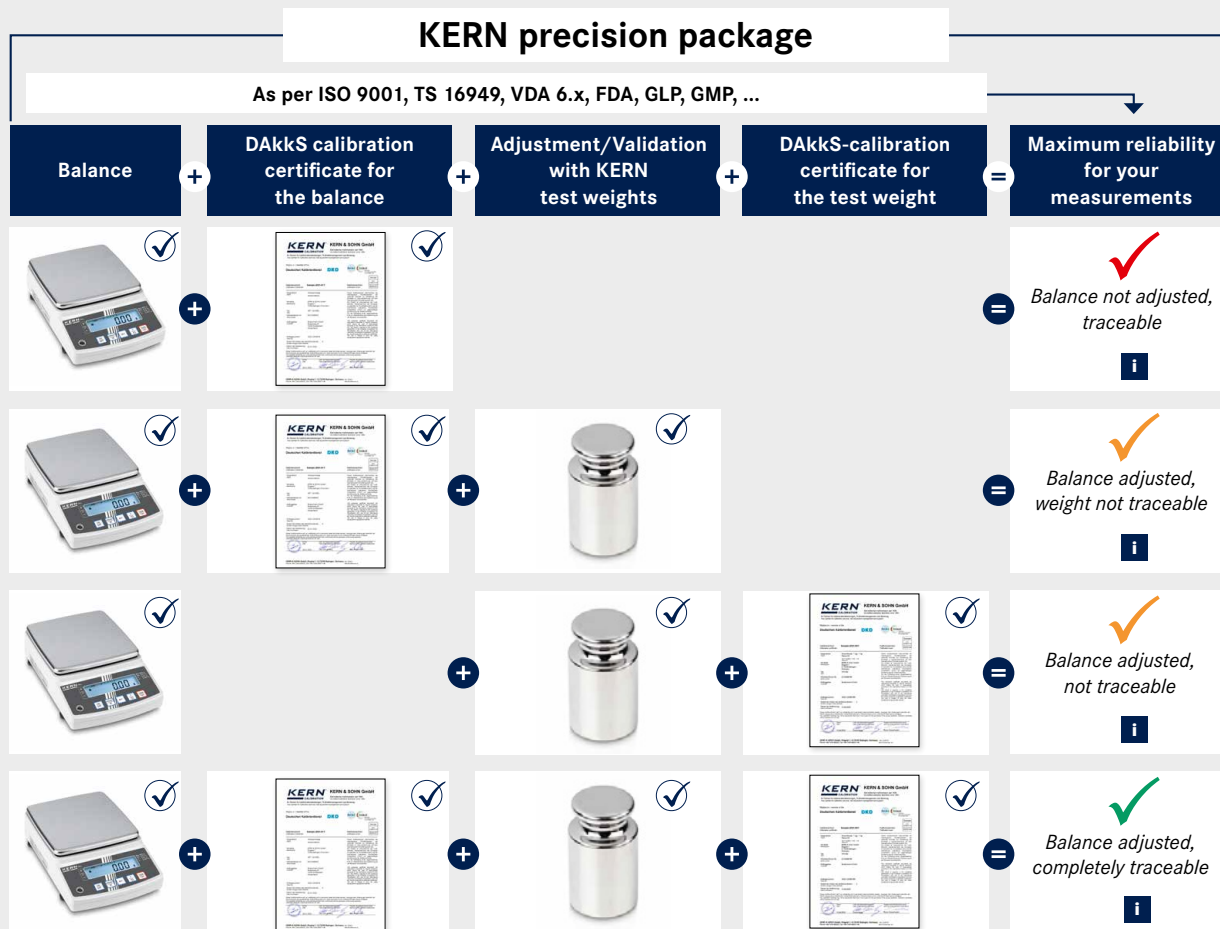
Area offered as factory calibration:

- 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 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 *DAKKS Calibration Service*.

## 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?



Information  
& ordering:  
[kern-sohn.com/qmb](http://kern-sohn.com/qmb)

## 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:

### Balances

- ▶ DAkkS 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

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

### Force measuring devices and force transducers

- ▶ DAkkS calibration up to 5 kN

### Temperature and humidity sensors

- ▶ DAkkS 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](http://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 your DAKS 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.

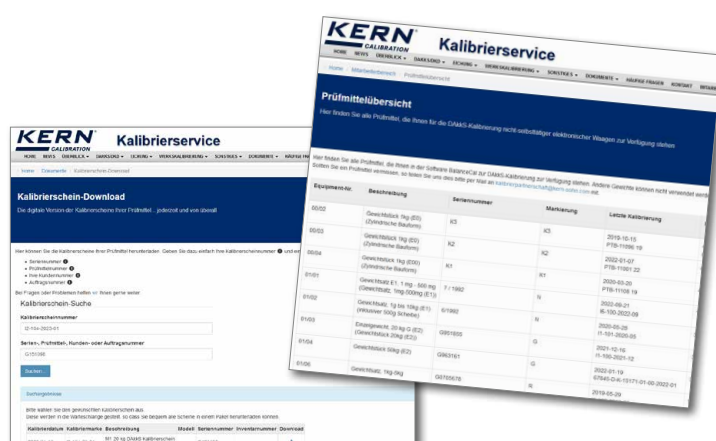
### Paperless documentation

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](http://www.kern-lab.com) and you will never have 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 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 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.**

### 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.





## 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 <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

|  |                         |         |
|--|-------------------------|---------|
| Usage accuracy*  | relative                | 969-511 |
|  | absolute                | 969-512 |
| Calibration results*                                   | relative                | 969-513 |
|  | absolute                | 969-514 |
| Measurements as manufacturer or customer specification | Foreign device          | 969-515 |
|  | Customer specifications | 969-516 |
|  | KERN devices            | 969-517 |
|  |                         |         |

relative = % / absolute = g \* as attachment to the DAkkS calibration certificate

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

| No. | Tare | Load   | Display   | Deviation | Uncertainty | Customer tolerance | Conformity <sup>1)</sup> |
|-----|------|--------|-----------|-----------|-------------|--------------------|--------------------------|
| 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 DAkks calibration certificate as well as records in your qualification log book of the EQS software (Equipment Qualification Software).

We give you advice already when selecting a new device, for example KERN ADB/ADJ, ALS/ALJ, ABS/ABJ, ACJ, ABT, ABP, PLS/PLJ, PNS/PNJ, EG-N, PBS/PBJ, PES/PEJ, about the options of device qualification on the location of use.

We offer individual calibration and maintenance agreements for the periodically required requalification.



## Important elements of equipment qualification:



### Design qualification (DQ)

With the design qualification, all requirements on which you as a user depend 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)

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).



### 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







## Recalibration Price of Test Weights (DAkKS Calibration)

| Class acc.      | → E1 <sup>2)</sup><br>with volume determination | E1 <sup>1)</sup> without volume<br>determination | E2 <sup>1)</sup> | F1/F2 <sup>1)</sup><br>* F2 only | M1/M2/M3 <sup>1)</sup> |
|-----------------|---|--|------------------|----------------------------------|------------------------|
| 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               |

<sup>1)</sup> Processing time 4 working days, <sup>2)</sup> Processing time 15 working days, <sup>1)</sup> 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 E1 (DAkKS only), E2 ...) | 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 DAkKS Express Service\*<sup>1</sup>

DAkKS standard service Class E2–M3 4 working days

DAkKS standard service Class E1, 1 mg–500 mg, and recalibration 10 working days  
1 g–10 kg with a known volume

Class E1, ≥ 1 g, incl. volume determination (new weights) 15 working days

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



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
- For Express shipping, see page 226

## Verification Prices for Test Weights and (Crane) Scales

**Class acc.** → **E2<sup>1)</sup>** with verification certificate      **F1<sup>1)</sup>** with verification certificate      **M1<sup>1)</sup>** with verification certificate

### KERN verification delivery time

| Nominal value ↓ | KERN    | KERN    | KERN    |
|-----------------|---------|---------|---------|
| 1 mg            | 952-351 | 952-451 | 952-651 |
| 2 mg            | 952-352 | 952-452 | 952-652 |
| 5 mg            | 952-353 | 952-453 | 952-653 |
| 10 mg           | 952-354 | 952-454 | 952-654 |
| 20 mg           | 952-355 | 952-455 | 952-655 |
| 50 mg           | 952-356 | 952-456 | 952-656 |
| 100 mg          | 952-357 | 952-457 | 952-657 |
| 200 mg          | 952-358 | 952-458 | 952-658 |
| 500 mg          | 952-359 | 952-459 | 952-659 |
| 1 g             | 952-331 | 952-431 | 952-631 |
| 2 g             | 952-332 | 952-432 | 952-632 |
| 5 g             | 952-333 | 952-433 | 952-633 |
| 10 g            | 952-334 | 952-434 | 952-634 |
| 20 g            | 952-335 | 952-435 | 952-635 |
| 50 g            | 952-336 | 952-436 | 952-636 |
| 100 g           | 952-337 | 952-437 | 952-637 |
| 200 g           | 952-338 | 952-438 | 952-638 |
| 500 g           | 952-339 | 952-439 | 952-639 |
| 1 kg            | 952-341 | 952-441 | 952-641 |
| 2 kg            | 952-342 | 952-442 | 952-642 |
| 5 kg            | 952-343 | 952-443 | 952-643 |
| 10 kg           | 952-344 | 952-444 | 952-644 |
| 20 kg           | 952-345 | 952-445 | 952-645 |
| 50 kg           | -       | 952-446 | 952-646 |
| 1 mg-500 mg     | 952-350 | 952-450 | 952-650 |
| 1 mg-50 g       | 952-301 | 952-401 | 952-601 |
| 1 mg-100 g      | 952-302 | 952-402 | 952-602 |
| 1 mg-200 g      | 952-303 | 952-403 | 952-603 |
| 1 mg-500 g      | 952-304 | 952-404 | 952-604 |
| 1 mg-1 kg       | 952-305 | 952-405 | 952-605 |
| 1 mg-2 kg       | 952-306 | 952-406 | 952-606 |
| 1 mg-5 kg       | 952-307 | 952-407 | 952-607 |
| 1 mg-10 kg      | 952-308 | 952-408 | 952-608 |
| 1 g-50 g        | 952-315 | 952-415 | 952-615 |
| 1 g-100 g       | 952-316 | 952-416 | 952-616 |
| 1 g-200 g       | 952-317 | 952-417 | 952-617 |
| 1 g-500 g       | 952-318 | 952-418 | 952-618 |
| 1 g-1 kg        | 952-319 | 952-419 | 952-619 |
| 1 g-2 kg        | 952-320 | 952-420 | 952-620 |
| 1 g-5 kg        | 952-321 | 952-421 | 952-621 |
| 1 g-10 kg       | 952-322 | 952-422 | 952-622 |

**Standard verification service**      6 working days  
Class E2 – M1

**Additional costs**      **KERN**  
for preparation, overhaul  
and adjustment before  
the verification

### Preparation of weights (e.g. cleaning, etc.)

Single weight      969-008R

Weight set      969-009R

### Subsequent services are carried out after confirmation

Continued overhaul  
of weights  
(e.g. wet-cleaning,  
markings, repair,  
special packaging,  
adjustment E2 ...)

969-005R

Adjustment, per weight  
only available for weights  
with adjustment chamber  
(F1/F2 – M1)

969-010R

### Verification after adjustment or substitution, per weight

Class E2      969-310R

Class F1/F2      969-410R

Class M1      969-610R

## Verification prices for balances

### Reverification

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

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

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).

### Comparison of DIN EN ISO 376 and DKD-R 3-3

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

Figure 1 shows the Sauter Model FL force transducer and digital display unit. Part A is the force transducer, a metal block with two circular ports. Part B is the digital display unit, a handheld device with a screen showing '0.00' and various buttons.

► See also tables, right side

# 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

DAKKS  
Deutsches  
Institut für  
Kalibrierung  
D-12489 Berlin

Kalibrierschein  
Calibration Certificate

Sample 2023-01/1

Kalibrierzeichen  
Calibration mark

Gegenstand  
Object

Kraftmessgerät  
Force gauge  
Max. 1000 N,  $d_0 = 0,5 \text{ N}$

Hersteller  
Manufacturer

Sauter GmbH  
Zägelis 1  
72536 Balingen  
Deutschland

Type  
Type

FM 1K

Seriennummer  
Serial number

5A20-H0237

Auftraggeber  
Customer

Maschinenfirma GmbH  
Musterstraße 1  
41345 H.M.

Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf nationale Normale zur Darstellung der Einheit  $\alpha$  (Übereinstimmung mit dem internationalen Einheiten-System (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 Kalibrierzeugnisse.

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Sample

Dok.

19458-01-00

2023-01

Sample

Dok.

19458-01-00

2023-01

Messwerte (Zugkraft) / Measurement results (tension force)

| Auswertung<br>evaluation | Ausgangspunkt / initial position |          |          |          | 120°     | 180°     | 240°     |          |
|--------------------------|----------------------------------|----------|----------|----------|----------|----------|----------|----------|
| Kraft<br>force           | R1                               | R2       | R3       | R4       | R5       | R6       |          |          |
| 0,0 N                    | 0,0 N                            | 0,0 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 | -199,5 N | -200,0 N |
| 400,0 N                  | -398,5 N                         | -398,5 N | -398,5 N | -398,5 N | -398,5 N | -398,5 N | -398,5 N | -398,5 N |
| 600,0 N                  | -598,0 N                         | -598,5 N | -598,5 N | -599,5 N | -599,5 N | -599,5 N | -599,5 N | -599,5 N |
| 800,0 N                  | -798,0 N                         | -799,0 N | -799,0 N | -799,5 N | -799,5 N | -799,5 N | -799,5 N | -799,5 N |
| 1000,0 N                 | -998,5 N                         | -999,0 N | -999,0 N | -999,0 N | -999,0 N | -999,0 N | -999,0 N | -999,0 N |
| 0,0 N                    | 0,0 N                            | 0,0 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. bias:  $R_1 = 0,000\%$

Rel. Kalibrierabweichung / Rel. cal. bias:  $R_2 = 0,000\%$

$R_3 = 0,000\%$  ( $R_1$ ),  $0,000\%$  ( $R_2$ ),  $0,000\%$  ( $R_3$ ),  $0,000\%$  ( $R_4$ ),  $0,000\%$  ( $R_5$ ),  $0,000\%$  ( $R_6$ )

rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

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rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

rel. Vergleichspräzision / rel. reproducibility

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederholgenauigkeit / rel. repeatability

Wiederhol

232 DAkkS Calibration Service / Verification Service

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## Prices for DAkkS calibration of force gauges and force transducers

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

| ISO 376 (8 stages)                    |                 | DKD-R 3-3 (5 stages, sequence A) |                 |
|---------------------------------------|-----------------|----------------------------------|-----------------|
| KERN                                  | Measuring range | KERN                             | Measuring range |
| <b>Tensile force:</b>                 |                 |                                  |                 |
| 963-161IV (R)                         | ≤ 500 N         | 963-161V (R)                     | ≤ 500 N         |
| 963-162IV (R)                         | ≤ 2 kN          | 963-162V (R)                     | ≤ 2 kN          |
| 963-163IV (R)                         | ≤ 5 kN          | 963-163V (R)                     | ≤ 5 kN          |
| <b>Compression force:</b>             |                 |                                  |                 |
| 963-261IV (R)                         | ≤ 500 N         | 963-261V (R)                     | ≤ 500 N         |
| 963-262IV (R)                         | ≤ 2 kN          | 963-262V (R)                     | ≤ 2 kN          |
| 963-263IV (R)                         | ≤ 5 kN          | 963-263V (R)                     | ≤ 5 kN          |
| <b>Tensile and Compression force:</b> |                 |                                  |                 |
| 963-361IV (R)                         | ≤ 500 N         | 963-361V (R)                     | ≤ 500 N         |
| 963-362IV (R)                         | ≤ 2 kN          | 963-362V (R)                     | ≤ 2 kN          |
| 963-363IV (R)                         | ≤ 5 kN          | 963-363V (R)                     | ≤ 5 kN          |

Situation B: Complete force gauge (in N)\*<sup>2</sup>

| ISO 376 (8 stages)                    |                 | DKD-R 3-3 (5 stages, sequence A) |                 |
|---------------------------------------|-----------------|----------------------------------|-----------------|
| KERN                                  | Measuring range | KERN                             | Measuring range |
| <b>Tensile force:</b>                 |                 |                                  |                 |
| 963-161I (R)                          | ≤ 500 N         | 963-161 (R)                      | ≤ 500 N         |
| 963-162I (R)                          | ≤ 2 kN          | 963-162 (R)                      | ≤ 2 kN          |
| 963-163I (R)                          | ≤ 5 kN          | 963-163 (R)                      | ≤ 5 kN          |
| <b>Compression force:</b>             |                 |                                  |                 |
| 963-261I (R)                          | ≤ 500 N         | 963-261 (R)                      | ≤ 500 N         |
| 963-262I (R)                          | ≤ 2 kN          | 963-262 (R)                      | ≤ 2 kN          |
| 963-263I (R)                          | ≤ 5 kN          | 963-263 (R)                      | ≤ 5 kN          |
| <b>Tensile and Compression force:</b> |                 |                                  |                 |
| 963-361I (R)                          | ≤ 500 N         | 963-361 (R)                      | ≤ 500 N         |
| 963-362I (R)                          | ≤ 2 kN          | 963-362 (R)                      | ≤ 2 kN          |
| 963-363I (R)                          | ≤ 5 kN          | 963-363 (R)                      | ≤ 5 kN          |

## Factory calibration for force

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

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

Situation B: Complete force gauge (in N)\*<sup>2</sup>

| ISO 376 (8 stages)                    |                 | DKD-R 3-3 (5 stages, sequence A) |                 |
|---------------------------------------|-----------------|----------------------------------|-----------------|
| KERN                                  | Measuring range | KERN                             | Measuring range |
| <b>Tensile force:</b>                 |                 |                                  |                 |
| 961-161V (R)                          | ≤ 500 N         | 961-161 (R)                      | ≤ 500 N         |
| 961-162V (R)                          | ≤ 2 kN          | 961-162 (R)                      | ≤ 2 kN          |
| 961-163V (R)                          | ≤ 5 kN          | 961-163 (R)                      | ≤ 5 kN          |
| 961-164V (R)                          | ≤ 20 kN         | 961-164 (R)                      | ≤ 20 kN         |
| 961-165V (R)                          | ≤ 50 kN         | 961-165 (R)                      | ≤ 50 kN         |
| 961-166V (R)                          | ≤ 250 kN        | 961-166 (R)                      | ≤ 250 kN        |
| <b>Compression force:</b>             |                 |                                  |                 |
| 961-261V (R)                          | ≤ 500 N         | 961-261 (R)                      | ≤ 500 N         |
| 961-262V (R)                          | ≤ 2 kN          | 961-262 (R)                      | ≤ 2 kN          |
| 961-263V (R)                          | ≤ 5 kN          | 961-263 (R)                      | ≤ 5 kN          |
| 961-264V (R)                          | ≤ 20 kN         | 961-264 (R)                      | ≤ 20 kN         |
| 961-265V (R)                          | ≤ 50 kN         | 961-265 (R)                      | ≤ 50 kN         |
| 961-266V (R)                          | ≤ 250 kN        | 961-266 (R)                      | ≤ 250 kN        |
| <b>Tensile and Compression force:</b> |                 |                                  |                 |
| 961-361V (R)                          | ≤ 500 N         | 961-361 (R)                      | ≤ 500 N         |
| 961-362V (R)                          | ≤ 2 kN          | 961-362 (R)                      | ≤ 2 kN          |
| 961-363V (R)                          | ≤ 5 kN          | 961-363 (R)                      | ≤ 5 kN          |
| 961-364V (R)                          | ≤ 20 kN         | 961-364 (R)                      | ≤ 20 kN         |
| 961-365V (R)                          | ≤ 50 kN         | 961-365 (R)                      | ≤ 50 kN         |
| 961-366V (R)                          | ≤ 250 kN        | 961-366 (R)                      | ≤ 250 kN        |

(R): Recalibration

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

\*<sup>1</sup> Compatibility with our amplifiers required

\*<sup>2</sup> Installation in our measuring equipment required

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DAkkS Calibration Service/Verification Service

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- Mechanical balances (spring balances, etc.)
- Force-measuring devices up to 250 kN (see also page 221)
- Measuring devices for layer thickness 0  $\mu\text{m}$  – 2000  $\mu\text{m}$
- Hardness testing devices in accordance with Leeb tests
- Ultrasonic material thickness testing device 25 mm - 300 mm

**For up-to-date information on test services for further measuring variables please see p. 231**

| KERN                | Measuring device                                  | Measuring range                                      |
|---------------------|---|--|
| Factory calibration |   |  |
| 961-110             | Coating thickness                                 | ≤ 2000 μm<br>F or N                                  |
| 961-112             | Coating thickness                                 | ≤ 2000 μm<br>FN                                      |
| 961-113             | Wall thickness<br>(ultra sound)                   | ≤ 300 mm<br>(in stainless steel)                     |
| 961-114             | Wall thickness<br>(Test blocks)                   | ≤ 300 mm   |
| 961-170             | Hardness comparison<br>plate (Shore)              | For sets up to<br>7 plates                           |
| 961-131             | Hardness tester (Leeb)                            | 400 – 800 HLD  |
| 961-132             | Hardness comparison<br>plate (Leeb)               | Hardness<br>comparison plate<br>(for Leeb durometer) |
| 961-270             | Hardness (UCI)                                    | 200 - 800 HV   |
| 961-150             | Length  | ≤ 300 mm   |
| 961-190             | Light   | ≤ 200000 lx  |
| 961-100             | Mechanical balances/<br>spring balances           | ≤ 5 kg   |
| 961-101             | Mechanical balances/<br>spring balances           | > 5 – 50 kg  |
| 961-102             | Mechanical balances/<br>spring balances           | > 50 – 350 kg  |
| 961-103             | Mechanical balances/<br>spring balances           | > 350 – 1500 kg                                      |
| 961-102K            | Digital dynamometer<br>KERN MAP                   | ≤ 130 kg   |
| 961-120 (R)         | Torque wrench test<br>devices                     | 1 Nm - 200 Nm  |
| 964-305             | Temperature calibration<br>for moisture analyzer* |  |
| Additional services |   |  |
| 962-116             | Express service with<br>48 hour delivery          |  |

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

DAB 100-3, DAB 200-2, DBS 60-3, DLB 160-3A, DLT 100-3N,  
MLS 50-3D, MLS 50-3C, MLB 50-3C, MLB 50-3N, MLB 50-3,  
MLS 50-3.

