

**KERN & SOHN –**  
The wide range of product champion  
that is situated in the Swabian Alb



Printed in Germany by KERN & SOHN GmbH · z4ber-hp-20231

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measuring technology from KERN online:  
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2023

BALANCES & TEST SERVICE for laboratory, industry and food industry

EN

EN

PROFESSIONAL MEASURING



# BALANCES & TEST SERVICE

for laboratory, industry and food industry

# KERN®

How do I quickly find the product I am looking for?

The tried and tested quick search system – “Quick-Finder” ahead of each product group allows you to base the search for a certain target group on weighing data you need such as readout, weighing capacity and main features for each model.

And it's as simple as that – find the product you want in 2 steps:

1. Go to the product group index on page 3
2. Pick the appropriate product group and find the product you want using the Quick-Finder.

... or use the model name and find the product quickly and efficiently using the A-Z model list:



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## KERN Pictograms

 <b>Internal adjusting:</b> Quick setting up of the balance's accuracy with internal adjusting weight (motordriven)	 <b>Network interface:</b> For connecting the scale to an Ethernet network	 <b>Suspended weighing:</b> Load support with hook on the underside of the balance
 <b>Adjusting program CAL:</b> For quick setting up of the balance's accuracy. External adjusting weight required	 <b>KERN Communication Protocol (KCP):</b> It is a standardized interface command set for KERN balances and other instruments, which allows retrieving and controlling all relevant parameters and functions of the device. KERN devices featuring KCP are thus easily integrated with computers, industrial controllers and other digital systems	 <b>Battery operation:</b> Ready for battery operation. The battery type is specified for each device
 <b>Easy Touch:</b> Suitable for the connection, data transmission and control through PC or tablet.	 <b>GLP/ISO log:</b> The balance displays weight, date and time, independent of a printer connection	 <b>Rechargeable battery pack:</b> Rechargeable set
 <b>Memory:</b> Balance memory capacity, e.g. for article data, weighing data, tare weights, PLU etc.	 <b>GLP/ISO log:</b> The balance displays weight, date and time, independent of a printer connection	 <b>Universal plug-in power supply:</b> with universal input and optional input socket adapters for A) EU, CH, GB B) EU, CH, GB, USA C) EU, CH, GB, USA, AUS
 <b>Alibi memory:</b> Secure, electronic archiving of weighing results, complying with the 2014/31/EU standard.	 <b>GLP/ISO log:</b> With weight, date and time. Only with KERN printers.	 <b>Plug-in power supply:</b> 230V/50Hz in standard version for EU, CH. On request GB, USA or AUS version available
 <b>KERN Universal Port (KUP):</b> allows the connection of external KUP interface adapters, e.g. RS-232, RS-485, SB, Bluetooth, WLAN, Analogue, Ethernet etc. for the exchange of data and control commands, without installation effort	 <b>Piece counting:</b> Reference quantities selectable. Display can be switched from piece to weight	 <b>Integrated power supply unit:</b> Integrated in balance. 230V/50Hz standard EU. More standards e.g. GB, USA or AUS on request
 <b>Data interface RS-232:</b> To connect the balance to a printer, PC or network	 <b>Recipe level A:</b> The weights of the recipe ingredients can be added together and the total weight of the recipe can be printed out	 <b>Weighing principle: Strain gauges</b> Electrical resistor on an elastic deforming body
 <b>RS-485 data interface:</b> To connect the balance to a printer, PC or other peripherals. Suitable for data transfer over large distances. Network in bus topology is possible	 <b>Recipe level B:</b> Internal memory for complete recipes with name and target value of the recipe ingredients. User guidance through display	 <b>Weighing principle: Tuning fork</b> A resonating body is electromagnetically excited, causing it to oscillate
 <b>USB data interface:</b> To connect the balance to a printer, PC or other peripherals	 <b>Totalising level A:</b> The weights of similar items can be added together and the total can be printed out	 <b>Weighing principle: Electromagnetic force compensation</b> Coil inside a permanent magnet. For the most accurate weighings
 <b>Bluetooth® data interface:</b> To transfer data from the balance to a printer, PC or other peripherals	 <b>Percentage determination:</b> Determining the deviation in % from the target value (100 %)	 <b>Weighing principle: Single cell technology:</b> Advanced version of the force compensation principle with the highest level of precision
 <b>WiFi data interface:</b> To transfer data from the balance to a printer, PC or other peripherals	 <b>Weighing units:</b> Can be switched to e.g. nonmetric units. See balance model. Please refer to KERN's website for more details	 <b>Verification possible:</b> The time required for verification is specified in the pictogram
 <b>Control outputs (optocoupler, digital I/O):</b> To connect relays, signal lamps, valves, etc.	 <b>Weighing with tolerance range:</b> (Checkweighing) Upper and lower limiting can be programmed individually, e.g. for sorting and dosing. The process is supported by an audible or visual signal, see the relevant model	 <b>DAKKS calibration possible (DKD):</b> The time required for DAKKS calibration is shown in days in the pictogram
 <b>Analogue interface:</b> to connect a suitable peripheral device for analogue processing of the measurements	 <b>Hold function:</b> (Animal weighing program) When the weighing conditions are unstable, a stable weight is calculated as an average value	 <b>Factory calibration (ISO):</b> The time required for Factory calibration is shown in days in the pictogram
 <b>Interface for second balance:</b> For direct connection of a second balance	 <b>Protection against dust and water splashes IPxx:</b> The type of protection is shown in the pictogram.	 <b>Package shipment:</b> The time required for internal shipping preparations is shown in days in the pictogram
	 <b>Pallet shipment:</b> The time required for internal shipping preparations is shown in days in the pictogram	

## KERN – Measuring technology and testing services from a single source



### Balances & Test service catalogue

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

### Medical scales catalogue

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

### Microscopes & Refractometers catalogue

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

### SAUTER measuring equipment catalogue

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

### Test service brochure

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

## Your advantages

### fast

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

### reliable

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

### competent

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

### versatile

- One-stop shopping: from pocket balances through to 12 t crane balance – everything from one supplier
- Find the product you want at lightning speed with the "Balance Quick-Finder" at [www.kern-sohn.com](http://www.kern-sohn.com)

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# WHEN DESIGN MEETS PERFORMANCE

May we introduce...? The new models from the KERNIoTLine are celebrating their debut.

Together we can enjoy the shared, advanced-looking KERNdesign, the consistent and simplified handling, the high connectivity level, and a persuasive performance that operates across all devices.



Dive into our new KERNbrand universe.



## Design

- + Trend-setting, high-quality KERN design
- + Recognisability through uniform product range
- + Reliable brand values are reflected visually and functionally in the product



## Performance

- + Cross-device functionality and protocols
- + Consistently reliable performance
- + The latest technologies
- + Cross-device functionality and protocols



## Philosophy

- + Sustainable due to high energy efficiency
- + Standardisation of design components across all units
- + Controlled value chain
- + Tested and monitored technology for maximum user safety



## Are you curious about the models in the KERN IoT range and what opportunities they offer?

Then take a look at pages 8/9, because thanks to new technologies such as KUP and KCP these models are perfectly equipped for the wide range of challenges of Industry 4.0



### User Interface

- + Uniform, simplified user guidance
- + Problem-free commissioning, use and expansion
- + Cross-model software



### Service

- + Fast and competent help from our IoT specialists
- + Even more efficient repair process
- + Accessories can be flexibly combined

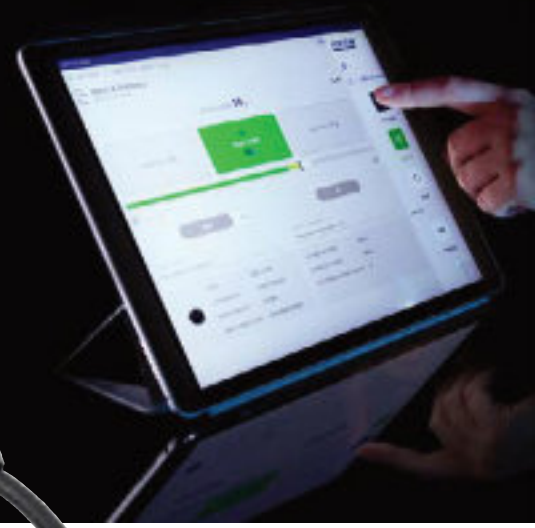
**Note:** Our KERNIoT accessories can be easily combined with all our IoT models.

Find the right printer and other practical accessories on page 169 or in our online shop [www.kern-sohn.com](http://www.kern-sohn.com)

# ARE YOU READY?

With the KERNUniversal Port (KUP) and the KERN Communication Protocol (KCP) we ensure the perfect integration of your KERNbalance into production or process chains for a complete, simplified work process.

Our products will make sure you are prepared for the future of weighing in the Internet of Things. Get IoT ready – with the IoT models from KERN.

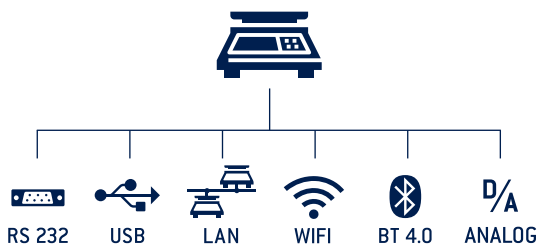


## KERN Universal Port (KUP)

The integrated KERNUniversal Port (KUP) allows the connection of external KUP interface adapters such as RS-232, USB, Bluetooth, WiFi, Analogue, Ethernet etc.

The outstanding advantage here is that the KUPinterface adapters are simply plugged in, i.e. retrofitting interfaces is conveniently possible without opening the scale housing or complicated installation.

The interface adapters enable convenient transmission of weighing data to networks, PCs, smartphones, tablets, laptops, printers etc. In addition, control commands and data inputs can also be sent to the scale via the connected devices.



**Tip:** With the KERNKUP-13extension box, up to three KUPinterface adapters can be operated in parallel on the scale.



## KERN Communication Protocol (KCP)

The KERNCommunication Protocol (KCP) permits searching and remote control of the balance through external control devices or computers using the KERNCommunication Protocol. KCP is a standardised interface command structure for KERN balances and other measuring instruments which allows you to recall and manage all relevant parameters and device functions. You can therefore simply connect KERN models with KCP to computers, industrial control systems and other digital systems.

In a large number of cases the KERN Communication Protocol is compatible with the MT-SICS protocol. KCP is available through all KUPs, and on the KERNKIB-TM display device through the interfaces available.

### KCP – EXPORT („OUTBOUND“) – THE HIGHLIGHTS

- Stable, immediate weight
- Live transfer of weights
- Storing of gross weight, tare weight, net weight, stability, date, time etc., in the tamper-proof Alibi memory
- Output of the weighing result in percent
- Output of the weighing result in pieces (piece-counting function)
- Output of the weight at freely-definable timed intervals
- and much more

### KCP – IMPORT („INBOUND“) – THE HIGHLIGHTS

- Recall of the central device data
- Setup or recall of an individual device ID number
- Setting or searching for a tare value (pre-tare value) externally
- Recall of stored weighing results from the alibi memory
- Carrying out external adjustment/linearization
- Setting the reference values in the balance externally and outputting the weighing result in percent or in pieces
- Setting a network address for the balance (IP) – also for WiFi
- and much more



# NEW IN → 2023

Innovative technology, stunning performance, improved features – all in proven KERNquality. You can see all our new additions in 2023 here – come and be inspired.



## The born stacker – happily comes back to school

→KERN EFS SCHOOL BALANCE

The uncomplicated companion for all school laboratories and other educational institutions. Easy handling, durable and robust, it can cope well with changing users. With its tremendous weighing range, it is a typical nerd and without a doubt at the top of its class. For details, see page 15



## First Class products in an IP-protected stainless steel housing

→KERN PWS PRECISION BALANCE

Resistant to fine particles and water splashes, withstands high loading. Let its high performance for reliable, high precision measurements impress you.

For details, see page 34



## Proven KERN models – now with a facelift!

Proven KERN models – now with a facelift! These KERN models feature plenty of improved technology (IoT, KUP) and a refreshed KERN look:

→KERN PCB PRECISION BALANCE  
For details, see page 26/27

→KERN 572 PRECISION BALANCE  
For details, see page 30

→KERN CKE COUNTING BALANCE  
For details, see page 85

→KERN CDS COUNTING BALANCE  
For details, see page 87

→KERN IOC PLATFORM SCALES  
For details, see page 104/105

→KERN DS PLATFORM SCALES  
For details, see page 107



## High-capacity precision balances with password-protected user administration

→KERN FES/FEJ PRECISION BALANCE

With this robust allrounder you are particularly well-equipped for the pharmaceutical industry. Here you can easily allocate and manage different users.

For details, see page 37



## Our Flagship – now with fully automatic doors

→KERN ABP-A ANALYTICAL BALANCE

Our KERN Showcase model now features a super practical innovation, making your daily laboratory life easier—singlehandedly. For details, see page 47/48



→IoT-ready models (with KUP) carry this icon

# 17

# TEST WEIGHTS

## Weights yesterday and today

For centuries now, weight pieces have been used in scales for weighing procedures. This original purpose has now almost disappeared. Today, weights are used almost exclusively for adjusting and testing = calibration of electronic balances. They are now named "test weights" as this is their contemporary purpose.

## Adjustment or calibration?

► **Adjusting** a balance means that you are intervening in the weighing system, to make sure that the display is set to show the correct nominal value. With ► **calibration** on the other hand, there is no intervention, you are testing whether the display is correct and documenting any deviation.

## Testing, the right way!

The internationally valid OIML norm R111:2004 classifies test weights hierarchically in accuracy classes, where E1 is the most accurate and M3 is the least accurate weight class. With KERN you get the whole test weight range in all OIML accuracy classes E1, E2, F1, F2, M1, M2, M3.

As the test weight only becomes an ► **ISO 9000ff**-compliant test instrument when its accuracy has been proven, we offer the appropriate ► **DAkkS Calibration certificate** or verification certificate (in connection with a box) for all KERN test weights. For further details see chapter **DAkkS Calibration Service**.







KERN offers you the appropriate test weight package for your balance, consisting of the test weight, box and DAkkS-calibration certificate, as proof of its accuracy. The best prerequisite for a correct adjustment or checking of your scales.

► **See the glossary on page 223–225**

Classes of accuracy of test weights E, F, M and their general relation to the types of balances:

- E1 Test weights for customers who require a high degree of accuracy for the most demanding applications. For high-resolution balances with  $d > 1,000,000$  Use recommended with DAkkS calibration certificate only.
- E2 Most accurate test weights for high resolution analytical balances of verification class I  $\geq 100,000$  e
- F1 Test weights for analytical balances/precision balances for verification class I/II  $\leq 100,000$  e
- F2 Test weights for precision balances of verification class II  $\leq 30,000$  e
- M1 Test weights for industrial and commercial scales of verification class III  $\leq 10,000$  e

The appropriate test weight for your new KERN balance can also be found directly in the accessories of the balance in our webshop.

KERN DAkkS delivery times & shipping type	Total weight $\leq 30$ kg (gross weight, incl. packaging)	Total weight $> 30$ kg (gross weight, incl. packaging)
DAkkS standard service Class E2–M3	 4 DAYS	 4 DAYS
DAkkS standard service Class E1, 1 mg – 500 mg and recalibration 1 g – 10 kg with a known volume	 10 DAYS	 10 DAYS
Class E1, $\geq 1$ g, incl. volume determination (new weights)	 15 DAYS	 15 DAYS
Special weights, Newton weights, heavy duty weights, weight carriers, containers for individual weight sets etc.	on request	

## Just lean back – we have just the right test weight for your measuring device

KERN offers you a large range of OIML test weights, which you can use at any time to quickly and reliably check your balance, force-measuring device, etc.. From milligram weights to tonne weights, from the classic OIML design to special weights which are specifically manufactured to your specifications, we can offer you just the right test weight, and naturally the weights have the relevant DAkkS calibration certificate or factory calibration certificate.

On the following pages you will see a selection of standard test weights for OIML error limit classes E1, E2, F1, F2, M1, M2, M3.

We will be happy to manufacture special (large) weights, weight containers, Newton weights or weights with special weight values for you on request. Our test weights product specialist will be happy to give you expert, comprehensive advice.

**Note:** In our webshop you can conveniently select test weights for your scale that have been calculated and matched to your accuracy requirements and intended use – with or without calibration. We will be happy to determine the minimum sample quantity according to USP Chapter <41> and recommend a KERN Safety Set especially designed for your scale.



### Marking – never lose track again!

With the large variety of test equipment used then it is essential that they are identified accurately. We can help you with this and mark your test weights according to your ideas by etching or with impact numbers. Whether it's letters, numbers, your logo, barcodes or something else – it's your choice. Our product specialist "Test weights" will gladly help you with any questions about this service, prices, etc.

## PREMIUM<sup>+</sup> TEST WEIGHTS

**Note:** Our highly-accurate OIML test weights are also available as **PREMIUM<sup>+</sup> test weights** for that extra level of safety. Thanks to the most modern manufacturing technology, these test weights can also be adjusted within the specified error limit classes (= tolerances).

I.e. this means that these **PREMIUM<sup>+</sup> test weights** have a significantly longer service life, thanks to this guaranteed positive tolerance. This is of particular benefit with intensive use of the test weights.

For all the details on this **PREMIUM<sup>+</sup> service** please see [www.kern-lab.com/premium+](http://www.kern-lab.com/premium+) or look at the weight you want in our online shop at [www.kern-sohn.com](http://www.kern-sohn.com)





## KERNSAFETY SETS

### All the security you need!

“KERN Safety Sets” which have been specially developed, put together and contain the right test weights to test and monitor your balance. They each consist of a test weight for checking the sensitivity, i.e. the correct adjustment of your scale, and a small test weight for checking at the lower end of the weighing range, the so-called minimum sample weight. As an option, the “KERN Safety Set” has space for another test weight, for testing your balance at a weight which is relevant for you.

Useful accessories which have been selected to suit that particular “KERN Safety Set”, such as, for example, special gloves, tweezers, weight grips, brushes, etc., will assist you in handling your test weights properly. Stored in the practical protective case next to your balance, you can check and ensure the high precision of your balance at any time.

Just ask our test weight product specialist, they will be happy to recommend the right “KERN Safety Set” for your balance. You can also find the matching “KERN Safety Set” for each model on the Internet at [www.kern-sohn.com](http://www.kern-sohn.com)



## Our KERNweight cases at a glance:



### It's your choice!

To protect your test weights we can offer you an appropriate weight case. If there are no legal or normative specifications, then you have the choice between plastic, aluminium protected or wood. The available weight cases are shown as a symbol in the test weight tables on the following pages. This way you have all the materials, versions, sizes and prices at a glance, listed in a concise way.

## It's so easy to order your suitable test weight



According to your safety requirements or the specifications of your QM system, you select the test weight with the appropriate weight value and the required tolerance (see page 186/187).

We offer many test weights in different designs, giving you complete freedom to decide which test weights you want to use for your application. It goes without saying that all our test weights comply with the OIML R111:2004 directive.

To protect your high-quality test equipment, we offer you cases in various designs. From low-priced plastic weight cases to aluminium protected cases to classic, high-quality wooden weight cases.

A DAkkS calibration certificate – the auditor's favourite! With this certificate you provide the standard-compliant proof of all important values of your test equipment and are on the safe side when operating and testing your measuring equipment.

1		2		3		4							
Weight	Tol +/- mg	Individual weights, compact shape		Individual weights, knob shape		Plastic box	Aluminium protected box	Wooden box	DAkkS certificate				
		KERN	€	KERN	€	KERN	€	KERN	€	KERN	€	KERN	€
1 g	0,03	316-01	36,-	317-01	52,-	317-020-400	4,-	317-010-600	14,-	317-010-100	26,-	962-331	30,-
2 g	0,04	316-02	36,-	317-02	53,-	317-020-400	4,-	317-020-600	14,-	317-020-100	26,-	962-332	30,-
5 g	0,05	316-03	37,-	317-03	56,-	317-030-400	4,-	317-030-600	14,-	317-030-100	26,-	962-333	30,-
10 g	0,06	316-04	38,-	317-04	60,-	317-040-400	4,-	317-040-600					30,-
20 g	0,08	316-05	43,-	317-05	68,-	317-050-400							
		316-06	46,-	317-06	73,-								

1	2	3	4					
Weight	Knob shape in plastic case	Knob shape in aluminium protected case	Knob shape in wooden case	DAkkS certificate				
	KERN	€	KERN	€	KERN	€	KERN	€
1 mg - 500 mg	330-22	143,-	330-226	183,-			962-450	110,-
1 mg - 50 g	333-024	345,-	333-026	365,-	333-02	370,-	962-401	186,-
1 mg - 100 g	333-034	385,-	333-036	400,-	333-03	408,-	962-402	196,-
1 mg - 200 g	333-044	450,-	333-046	465,-	333-04	470,-	962-403	220,-
1 mg - 500 g	333-054	510,-	333-056	530,-	333-05	540,-	962-404	230,-
1 mg - 1 kg	333-064	630,-	333-066	650,-	333-06			
1 mg - 2 kg	333-074	890,-	333-076					

## Selection of the appropriate test weight for your balance

A balance can never be more accurate than the test weight that is used to adjust it, it all depends on its tolerance. **The accuracy of the test weight should correspond to the readout [d] of the balance, or rather be more precise.**

Nominal weight value is shown in adjust mode "CAL" in the balance display. Given a choice, the heaviest weight is the most suitable for accurate measurement.

Once accuracy and nominal weight value are specified, the suitable test weight is selected according to the tolerances "Tol" of the individual accuracy classes E2– M3, see column "Tol ± mg" at the respective weight and table at page 187.

### Example:






Balance with weighing range [Max] 2000 g = 2 kg  
and readout [d] = 0,01 g = 10 mg

- The accuracy of the required test weight is determined by readout [d]: max. tolerance ± 10 mg.
- Displayed weight size on "CAL" mode: 1000 g or 2000 g. The required test weight has a 2 kg weight size.
- Suitable test weights with ± 10 mg tolerance and 2 kg weight size, can be found in accuracy class F1. KERN-No326-12 or KERN-No 327-12, see page 193.

### Exception: analytical balances (readout [d] ≤ 0,1 mg):

E1 test weights are recommended. Depending on the safety requirements, E2 test weights with a DAkkS calibration certificate will also be sufficient.

## From finely turned to polished stainless steel – the right test weight for every situation

Test weight					
Features	→ Knob shape with lifting knob, polished stainless steel	→ Compact shape with carrying grip, polished stainless steel	→ Knob shape with lifting knob, polished stainless steel	→ ECOshape, polished stainless steel	→ Knob shape with lifting knob, finely turned stainless steel
Conforms to OIML:R111	↓ yes	↓ yes	↓ yes	↓ yes	↓ yes
Available classes	E1, E2	E2	F1	F1	F2, M1
Upper surface	polished	polished	polished	polished	finely turned
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Adjusting cavity	no	no	yes	yes, from 50 g, readjustment can only be carried out by KERN	yes, from 20 g
Marking (Milligram weights, generally none)	none	none	Nominal value, etched	Nominal value, etched	F2: Class + nominal value, etched; M1: Class + nominal value, adopted
Verification possible	yes (E2)	yes	yes	no	yes (M1)
Checking equipment for verification purposes	approved (E2)	approved	approved	approved	approved (M1)
Ideal as checking equipment in QM systems (e.g. ISO 9000 ff)	yes	yes	yes	yes	yes
Benefits	<ul style="list-style-type: none"> <li>• High-quality test weight for analytical and precision balances</li> <li>• Highly-refined surface</li> <li>• Ideal shape of the top for good grip</li> </ul>	<ul style="list-style-type: none"> <li>• Affordable test weight for analytical and precision balances</li> <li>• Highly refined surface</li> </ul>	<ul style="list-style-type: none"> <li>• Ideal, high-quality test weight for precision balances</li> <li>• No visible adjustment chamber</li> <li>• High long-term stability</li> <li>• Ideal shape of the top for good grip</li> </ul>	<ul style="list-style-type: none"> <li>• Affordable test weight for analytical and precision balances</li> <li>• Highly refined surface</li> <li>• Optimum shape of the top for good grip</li> </ul>	<ul style="list-style-type: none"> <li>• Ideal test weight for commercial and industrial scales</li> <li>• Ideal shape of the top for good grip</li> </ul>

## Composition table, valid for all KERN test weight sets from 1 mg

Individual weights per set	→	1	2	2	5	10	20	20	50	100	200	200	500	1	2	2	5	10	↓							
Test weight set	↓	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	g	g	g	g	g	g	g	kg	kg	kg	kg	kg	
1 mg-500 mg	Total weight	1,11 g																								
1 mg-50 g														111,11 g												
1 mg-100 g														211,11 g												
1 mg-200 g																										
1 mg-500 g																										
1 mg-1 kg																										
1 mg-2 kg																										
1 mg-5 kg																										
1 mg-10 kg																										

**The key points from the OIML norm R111:2004**

OIML (Organisation Internationale de Métrologie Légale) has established the exact metrological requirements for weights in verified applications in approx. 100 states all over the world. The OIML recommendation R111(2004 Edition) for weights relates to sizes 1 mg – 5000 kg. Statements are made on the accuracy, materials, geometric shape, marking and storage of the weights.

**Error limits for weights of classes E1 to M3**

The error limit classes are in fixed hierarchical levels in the proportion of 1:3, where E1 is the most accurate and M3 is the least accurate weight class. When testing weights with other weights, the correct test class is the next highest class.

**Error limit classes (= tolerances)**

The values given in the table below (tolerances ± ... mg) are the respective permitted fabrication tolerances. They are to be equal to the ► **measuring uncertainty** of the weight, if no ► **DAkkS calibration certificate** is available.

**Conventional mass**

The problem is the air buoyancy, which makes the weight appear lighter. In order to avoid this “distortion” in daily use, all weights are adjusted to the unit specifications as given in R111, e.g. it is accepted that: material density of the weights is 8000 kg/m<sup>3</sup>, air density is 1.2 kg/m<sup>3</sup> and measuring temperature is 20 °C.

**KERN test weights:** Unless otherwise specified, they conform to OIML R111:2004 in every detail.

► *See the glossary, page 223–225*

Nominal value	OIML R111:2004 Maximum permissible errors for weights = permissible tolerances “Tol ± mg”						
	E1	E2	F1	F2	M1	M2	M3
1 mg	± 0,003 mg	± 0,006 mg	± 0,020 mg	± 0,06 mg	± 0,20 mg	-	-
2 mg	± 0,003 mg	± 0,006 mg	± 0,020 mg	± 0,06 mg	± 0,20 mg	-	-
5 mg	± 0,003 mg	± 0,006 mg	± 0,020 mg	± 0,06 mg	± 0,20 mg	-	-
10 mg	± 0,003 mg	± 0,008 mg	± 0,025 mg	± 0,08 mg	± 0,25 mg	-	-
20 mg	± 0,003 mg	± 0,010 mg	± 0,03 mg	± 0,10 mg	± 0,3 mg	-	-
50 mg	± 0,004 mg	± 0,012 mg	± 0,04 mg	± 0,12 mg	± 0,4 mg	-	-
100 mg	± 0,005 mg	± 0,016 mg	± 0,05 mg	± 0,16 mg	± 0,5 mg	± 1,6 mg	-
200 mg	± 0,006 mg	± 0,020 mg	± 0,06 mg	± 0,20 mg	± 0,6 mg	± 2,0 mg	-
500 mg	± 0,008 mg	± 0,025 mg	± 0,08 mg	± 0,25 mg	± 0,8 mg	± 2,5 mg	-
1 g	± 0,010 mg	± 0,03 mg	± 0,10 mg	± 0,3 mg	± 1,0 mg	± 3,0 mg	± 10 mg
2 g	± 0,012 mg	± 0,04 mg	± 0,12 mg	± 0,4 mg	± 1,2 mg	± 4,0 mg	± 12 mg
5 g	± 0,016 mg	± 0,05 mg	± 0,16 mg	± 0,5 mg	± 1,6 mg	± 5,0 mg	± 16 mg
10 g	± 0,020 mg	± 0,06 mg	± 0,20 mg	± 0,6 mg	± 2,0 mg	± 6,0 mg	± 20 mg
20 g	± 0,025 mg	± 0,08 mg	± 0,25 mg	± 0,8 mg	± 2,5 mg	± 8,0 mg	± 25 mg
50 g	± 0,03 mg	± 0,10 mg	± 0,3 mg	± 1,0 mg	± 3,0 mg	± 10 mg	± 30 mg
100 g	± 0,05 mg	± 0,16 mg	± 0,5 mg	± 1,6 mg	± 5,0 mg	± 16 mg	± 50 mg
200 g	± 0,10 mg	± 0,3 mg	± 1,0 mg	± 3,0 mg	± 10 mg	± 30 mg	± 100 mg
500 g	± 0,25 mg	± 0,8 mg	± 2,5 mg	± 8,0 mg	± 25 mg	± 80 mg	± 250 mg
1 kg	± 0,5 mg	± 1,6 mg	± 5,0 mg	± 16 mg	± 50 mg	± 160 mg	± 500 mg
2 kg	± 1,0 mg	± 3,0 mg	± 10 mg	± 30 mg	± 100 mg	± 300 mg	± 1 000 mg
5 kg	± 2,5 mg	± 8,0 mg	± 25 mg	± 80 mg	± 250 mg	± 800 mg	± 2 500 mg
10 kg	± 5,0 mg	± 16 mg	± 50 mg	± 160 mg	± 500 mg	± 1 600 mg	± 5 000 mg
20 kg	± 10 mg	± 30 mg	± 100 mg	± 300 mg	± 1 000 mg	± 3 000 mg	± 10 g
50 kg	± 25 mg	± 80 mg	± 250 mg	± 800 mg	± 2 500 mg	± 8 000 mg	± 25 g
100 kg	-	± 160 mg	± 500 mg	± 1 600 mg	± 5 000 mg	± 16 g	± 50 g
200 kg	-	± 300 mg	± 1 000 mg	± 3 000 mg	± 10 g	± 30 g	± 100 g
500 kg	-	± 800 mg	± 2 500 mg	± 8 000 mg	± 25 g	± 80 g	± 250 g
1 000 kg	-	± 1 600 mg	± 5 000 mg	± 16 g	± 50 g	± 160 g	± 500 g
2 000 kg	-	-	± 10 g	± 30 g	± 100 g	± 300 g	± 1 000 g
5 000 kg	-	-	± 25 g	± 80 g	± 250 g	± 800 g	± 2 500 g

# Test weights and boxes

## Class E1



Milligram weights, wire shape



Individual weights, knob shape



Wooden box, for milligram weights



Plastic box, lined,  
for individual weights  
≤ 50 g



Plastic box, lined,  
for individual weights  
≥ 100 g



Wooden box, lined,  
for individual weights ≤ 500 g



Wooden box, lined,  
for individual weights ≥ 1 kg



Milligram weight set in plastic box (308-42)



Milligram weight set in aluminium protected box, lined (308-426)



Plastic case, lined,  
for weight sets, compact shape/  
knob shape



Aluminium protected case, lined,  
for weight sets, knob shape



Wooden case, lined, for weight sets, knob shape



### Class E1 · Milligram weights, wire shape

Test weight material: stainless steel

Weight	Tol +/- mg	Milligram weight, wire shape	Plastic box		Aluminium protected box		Wooden box		DAkkScertificate		
			KERN	€	KERN	€	KERN	€	KERN	€	
1 mg	0,003	308-31	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-251	64,-
2 mg	0,003	308-32	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-252	64,-
5 mg	0,003	308-33	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-253	64,-
10 mg	0,003	308-34	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-254	64,-
20 mg	0,003	308-35	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-255	64,-
50 mg	0,004	308-36	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-256	64,-
100 mg	0,005	308-37	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-257	64,-
200 mg	0,006	308-38	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-258	64,-
500 mg	0,008	308-39	89,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-259	64,-

### Class E1 · Individual weights, knob shape

Test weight material: stainless steel polished

Weight	Tol +/- mg	Individual weight, knob shape	Plastic box		Aluminium protected box		Wooden box		DAkkScertificate Initial calibration*		DAkkScertificate Recalibration		
			KERN	€	KERN	€	KERN	€	KERN	€	KERN	€	
1 g	0,010	307-01	101,-	317-020-400	4,80	317-010-600	15,-	317-010-100	26,-	963-231	235,-	962-231 R	72,-
2 g	0,012	307-02	110,-	317-020-400	4,80	317-020-600	18,-	317-020-100	27,-	963-232	235,-	962-232 R	72,-
5 g	0,016	307-03	113,-	317-030-400	4,80	317-030-600	16,-	317-030-100	28,-	963-233	235,-	962-233 R	72,-
10 g	0,020	307-04	122,-	317-040-400	4,80	317-040-600	16,-	317-040-100	27,-	963-234	235,-	962-234 R	72,-
20 g	0,025	307-05	129,-	317-050-400	4,80	317-050-600	16,-	317-050-100	31,-	963-335	210,-	962-235 R	72,-
50 g	0,030	307-06	153,-	317-060-400	6,-	317-060-600	15,-	317-060-100	31,-	963-236	235,-	962-236 R	72,-
100 g	0,050	307-07	192,-	317-070-400	8,-	317-070-600	15,-	317-070-100	33,-	963-237	235,-	962-237 R	72,-
200 g	0,100	307-08	235,-	317-080-400	7,70	317-080-600	15,-	317-080-100	33,-	963-238	235,-	962-238 R	72,-
500 g	0,250	307-09	310,-	317-090-400	8,50	317-090-600	20,-	317-090-100	39,-	963-239	235,-	962-239 R	72,-
1 kg	0,500	307-11	495,-	317-110-400	10,-	317-110-600	28,-	317-110-100	63,-	963-241	235,-	962-241 R	72,-
2 kg	1,000	307-12	700,-	317-120-400	13,-	317-120-600	34,-	317-120-100	65,-	963-242	520,-	962-242 R	89,-
5 kg	2,500	307-13	1200,-	317-130-400	25,-	317-130-600	56,-	317-130-100	99,-	963-243	520,-	962-243 R	89,-
10 kg	5,000	307-14	1850,-	317-140-400	25,-	317-140-600	79,-	317-140-100	115,-	963-244	520,-	962-244 R	89,-
20 kg	10,000	307-15	4960,-	-	-	317-150-600	111,-	317-150-100	630,-	963-245	1280,-	962-245 R	720,-
50 kg	25,000	307-16	8500,-	-	-	317-160-600	320,-	317-160-100	880,-	963-246	1500,-	962-246 R	800,-

\* For E1 weights > 1g at the point of initial calibration, a volume determination will be carried out in accordance with OIML:R111. When recalibrating, this is not required.

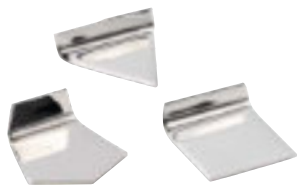
### Class E1 · Weight sets, knob shape

Test weight material: stainless steel polished

Weight set	Knob shape in plastic case		Knob shape in aluminium protected case		Knob shape in wooden case		DAkkScertificate Initial calibration*		DAkkScertificate Recalibration	
	KERN	€	KERN	€	KERN	€	KERN	€	KERN	€
1 mg–500 mg	308-42	940,-	308-426	910,-			962-250	415,-	962-250 R	465,-
1 mg–50 g	303-024	1630,-	303-026	1650,-	303-02	1680,-	963-201	1330,-	962-201 R	770,-
1 mg–100 g	303-034	1820,-	303-036	1820,-	303-03	1870,-	963-202	1450,-	962-202 R	790,-
1 mg–200 g	303-044	2140,-	303-046	2160,-	303-04	2190,-	963-203	1670,-	962-203 R	870,-
1 mg–500 g	303-054	2470,-	303-056	2490,-	303-05	2520,-	963-204	1770,-	962-204 R	910,-
1 mg–1 kg	303-064	3090,-	303-066	3180,-	303-06	3050,-	963-205	1890,-	962-205 R	980,-
1 mg–2 kg	303-074	4370,-	303-076	4350,-	303-07	4460,-	963-206	2460,-	962-206 R	1040,-
1 mg–5 kg	303-084	5570,-	303-086	5610,-	303-08	5770,-	963-207	2750,-	962-207 R	1080,-
1 mg–10 kg	-	-	303-096	7540,-	303-09	7690,-	963-208	3130,-	962-208 R	1120,-
1 g–50 g	304-024	900,-	304-026	920,-	304-02	950,-	963-215	960,-	962-215 R	340,-
1 g–100 g	304-034	1070,-	304-036	1090,-	304-03	1120,-	963-216	1050,-	962-216 R	370,-
1 g–200 g	304-044	1490,-	304-046	1510,-	304-04	1540,-	963-217	1280,-	962-217 R	445,-
1 g–500 g	304-054	1800,-	304-056	1820,-	304-05	1850,-	963-218	1390,-	962-218 R	490,-
1 g–1 kg	304-064	2210,-	304-066	2230,-	304-06	2290,-	963-219	1520,-	962-219 R	520,-
1 g–2 kg	304-074	3570,-	304-076	3590,-	304-07	3650,-	963-220	2130,-	962-220 R	600,-
1 g–5 kg	304-084	4670,-	304-086	4690,-	304-08	4790,-	963-221	2500,-	962-221 R	620,-
1 g–10 kg	-	-	304-096	6490,-	304-09	6610,-	963-222	2910,-	962-222 R	670,-

# Test weights and boxes

## Class E2



Milligram weights, flat polygonal sheet



Individual weights, compact shape



Individual weights, knob shape



Plastic box, lined, for individual weights  $\leq 50$  g



Plastic box, lined, for individual weights  $\geq 100$  g



Aluminium protected box, lined, for individual weights



Wooden box, lined, for individual weights  $\leq 500$  g



Wooden box, lined, for individual weights  $\geq 1$  kg



Milligram weight set in plastic box (318-22)



Milligram weight set in aluminium protected box, lined (318-226)



Plastic case, lined, for weight sets, compact shape/ knob shape






Aluminium protected case, lined, for weight sets, compact shape/ knob shape



Wooden case, lined, for weight sets, compact shape/ knob shape




### Class E2 · Milligram weights, flat polygonal sheet

Test weight material: stainless steel

Weight	Tol +/- mg	Milligram weight, flat polygonal sheet		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 mg	0,006	318-01	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-351	31,-
2 mg	0,006	318-02	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-352	31,-
5 mg	0,006	318-03	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-353	31,-
10 mg	0,008	318-04	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-354	31,-
20 mg	0,010	318-05	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-355	31,-
50 mg	0,012	318-06	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-356	31,-
100 mg	0,016	318-07	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-357	31,-
200 mg	0,020	318-08	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-358	31,-
500 mg	0,025	318-09	29,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-359	31,-





### Class E2 · Individual weights, compact shape or knob shape

Test weight material: stainless steel polished

Weight	Tol +/- mg	Individual weights, compact shape		Individual weights, knob shape		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 g	0,03	316-01	39,-	317-01	59,-	317-020-400	4,80	317-010-600	15,-	317-010-100	26,-	962-331	31,-
2 g	0,04	316-02	39,-	317-02	60,-	317-020-400	4,80	317-020-600	18,-	317-020-100	27,-	962-332	31,-
5 g	0,05	316-03	40,-	317-03	63,-	317-030-400	4,80	317-030-600	16,-	317-030-100	28,-	962-333	31,-
10 g	0,06	316-04	41,-	317-04	67,-	317-040-400	4,80	317-040-600	16,-	317-040-100	27,-	962-334	31,-
20 g	0,08	316-05	47,-	317-05	76,-	317-050-400	4,80	317-050-600	16,-	317-050-100	31,-	962-335	31,-
50 g	0,10	316-06	51,-	317-06	80,-	317-060-400	6,-	317-060-600	15,-	317-060-100	31,-	962-336	31,-
100 g	0,16	316-07	57,-	317-07	88,-	317-070-400	8,-	317-070-600	15,-	317-070-100	33,-	962-337	39,-
200 g	0,30	316-08	67,-	317-08	114,-	317-080-400	7,70	317-080-600	15,-	317-080-100	33,-	962-338	39,-
500 g	0,80	316-09	108,-	317-09	193,-	317-090-400	8,50	317-090-600	20,-	317-090-100	39,-	962-339	39,-
1 kg	1,60	316-11	159,-	317-11	285,-	317-110-400	10,-	317-110-600	28,-	317-110-100	63,-	962-341	39,-
2 kg	3,00	316-12	275,-	317-12	440,-	317-120-400	13,-	317-120-600	34,-	317-120-100	65,-	962-342	48,-
5 kg	8,00	316-13	455,-	317-13	660,-	317-130-400	25,-	317-130-600	56,-	317-130-100	99,-	962-343	48,-
10 kg	16,00	316-14	700,-	317-14	990,-	317-140-400	25,-	317-140-600	79,-	317-140-100	115,-	962-344	48,-
20 kg	30,00	-	-	317-15	2570,-	-	-	317-150-600	111,-	317-150-100	630,-	962-345	62,-
50 kg	80,00	-	-	317-16	5390,-	-	-	317-160-600	320,-	317-160-100	880,-	962-346	71,-

### Class E2 · Weight sets, compact shape or knob shape

Test weight material: Milligram weights stainless steel, individual weights: polished stainless steel

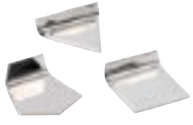
Weight sets	Compact shape in plastic case		Knob shape in plastic case		Knob shape in aluminium protected case		Knob shape in wooden case		DAkkS certificate	
	KERN 	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 mg - 500 mg	318-22	365,-	-	-	318-226	420,-	-	-	962-350	215,-
1 mg - 50 g	-	-	313-024	930,-	313-026	940,-	313-02	970,-	962-301	350,-
1 mg - 100 g	-	-	313-034	1010,-	313-036	1020,-	313-03	1060,-	962-302	380,-
1 mg - 200 g	-	-	313-044	1220,-	313-046	1240,-	313-04	1270,-	962-303	445,-
1 mg - 500 g	-	-	313-054	1360,-	313-056	1380,-	313-05	1480,-	962-304	470,-
1 mg - 1 kg	-	-	313-064	1690,-	313-066	1710,-	313-06	1790,-	962-305	500,-
1 mg - 2 kg	-	-	313-074	2560,-	313-076	2590,-	313-07	2650,-	962-306	550,-
1 mg - 5 kg	-	-	313-084	3220,-	313-086	3260,-	313-08	3410,-	962-307	590,-
1 mg - 10 kg	-	-	-	-	313-096	4360,-	313-09	4500,-	962-308	630,-
1 g - 50 g	312-024	425,-	314-024	610,-	314-026	630,-	314-02	650,-	962-315	145,-
1 g - 100 g	312-034	485,-	314-034	680,-	314-036	700,-	314-03	740,-	962-316	173,-
1 g - 200 g	312-044	600,-	314-044	870,-	314-046	890,-	314-04	940,-	962-317	230,-
1 g - 500 g	312-054	710,-	314-054	1070,-	314-056	1090,-	314-05	1160,-	962-318	260,-
1 g - 1 kg	312-064	970,-	314-064	1370,-	314-066	1390,-	314-06	1470,-	962-319	290,-
1 g - 2 kg	312-074	1350,-	314-074	2250,-	314-076	2280,-	314-07	2340,-	962-320	355,-
1 g - 5 kg	312-084	1790,-	314-084	2910,-	314-086	2950,-	314-08	3100,-	962-321	405,-
1 g - 10 kg	-	-	-	-	314-096	4020,-	314-09	4190,-	962-322	440,-

#### Note

Our highly-accurate OIML test weights are also available as **Premium +** weights for that extra level of safety. See all details page 183 or on [www.kern-lab.com/premium+](http://www.kern-lab.com/premium+)

# Test weights and boxes

## Class F1



Milligram weights,  
flat polygonal sheet



Individual weights/  
Weight sets,  
ECOshape



Individual weights/  
Weight sets,  
knob shape



Test weights (10–50 kg),  
polished stainless steel,  
KERN327-141 ff, optional:  
Wooden box



Block weight,  
polished stainless steel



Plastic box,  
lined, for  
individual  
weights  
≤ 200 g



Plastic box,  
lined, for  
individual  
weights  
≥ 500 g



Aluminium protected box, lined,  
for individual weights



Wooden box, lined,  
for individual weights ≤ 500 g



Wooden box, lined,  
for individual weights ≥ 1 kg



Milligram weight  
set in plastic box  
(328-22)



Milligram weight  
set in aluminium  
protected box,  
lined (328-226)



Plastic case, lined  
for weight sets, ECOshape/  
knob shape



Aluminium protected case, lined,  
for weight sets ECOshape/  
knob shape






Wooden case, lined,  
for weight sets ECOshape/  
knob shape

## Test weights class F1




### Class F1 · Milligram weights, flat polygonal sheet

Test weight material: stainless steel

Weight	Tol +/- mg	Milligram weight, flat polygonal sheet		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 mg	0,020	328-01	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-451	20,-
2 mg	0,020	328-02	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-452	20,-
5 mg	0,020	328-03	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-453	20,-
10 mg	0,025	328-04	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-454	20,-
20 mg	0,03	328-05	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-455	20,-
50 mg	0,04	328-06	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-456	20,-
100 mg	0,05	328-07	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-457	20,-
200 mg	0,06	328-08	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-458	20,-
500 mg	0,08	328-09	13,-	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-459	20,-


### Class F1 · Individual weights, ECOshape or knob shape

Test weight material: stainless steel polished

Weight	Tol +/- mg	Individual weight, ECO shape		Individual weight, knob shape		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 g	0,10	326-01	34,-	327-01	39,-	347-030-400	2,-	317-010-600	15,-	317-010-100	26,-	962-431	20,-
2 g	0,12	326-02	34,-	327-02	39,-	347-030-400	2,-	317-020-600	18,-	317-020-100	27,-	962-432	20,-
5 g	0,16	326-03	36,-	327-03	40,-	347-030-400	2,-	317-030-600	16,-	317-030-100	28,-	962-433	20,-
10 g	0,20	326-04	36,-	327-04	44,-	347-050-400	2,-	317-040-600	16,-	317-040-100	27,-	962-434	20,-
20 g	0,25	326-05	38,-	327-05	50,-	347-050-400	2,-	317-050-600	16,-	317-050-100	31,-	962-435	20,-
50 g	0,30	326-06	44,-	327-06	58,-	347-070-400	2,-	317-060-600	15,-	317-060-100	31,-	962-436	20,-
100 g	0,50	326-07	49,-	327-07	63,-	347-070-400	2,-	317-070-600	15,-	317-070-100	33,-	962-437	22,-
200 g	1,00	326-08	59,-	327-08	85,-	347-080-400	2,-	317-080-600	15,-	317-080-100	33,-	962-438	22,-
500 g	2,50	326-09	98,-	327-09	137,-	347-090-400	3,-	317-090-600	20,-	317-090-100	39,-	962-439	22,-
1 kg	5,00	326-11	130,-	327-11	173,-	347-110-400	3,80	317-110-600	28,-	317-110-100	63,-	962-441	22,-
2 kg	10	326-12	215,-	327-12	270,-	347-120-400	5,-	317-120-600	34,-	317-120-100	65,-	962-442	29,-
5 kg	25	326-13	290,-	327-13	405,-	347-130-400	11,-	317-130-600	56,-	317-130-100	99,-	962-443	29,-
10 kg	50	326-14	540,-	327-14	740,-	347-140-400	16,-	317-140-600	79,-	317-140-100	115,-	962-444	29,-
20 kg	100	-	-	327-15	1990,-	-	-	317-150-600	111,-	317-150-100	630,-	962-445	32,-
50 kg	250	-	-	327-16	4430,-	-	-	317-160-600	320,-	317-160-100	880,-	962-446	44,-


### Class F1 · Blockweights

Block weight material: stainless steel polished

Weight	Tol +/- mg	Block weight		Aluminium protected case		DAkkS certificate	
		KERN	€	KERN 	€	KERN	€
5 kg	25	326-36	1050,-	346-060-600	84,-	962-443	29,-
10 kg	50	326-37	1540,-	346-070-600	110,-	962-444	29,-
20 kg	100	326-38	2120,-	346-080-600	160,-	962-445	32,-
50 kg	250	326-39	5250,-	346-090-600	180,-	962-446	44,-

### Class F1 · Test weights, stackable

Test weight material: stainless steel polished

Weight	Tol +/- mg	Test weight		Wooden case		DAkkS certificate	
		KERN	€	KERN 	€	KERN	€
10 kg	50	327-141	1400,-	337-141-100	340,-	962-444	29,-
20 kg	100	327-151	1800,-	337-151-100	370,-	962-445	32,-
50 kg	250	327-161	4220,-	337-161-100	570,-	962-446	44,-

## Class F1 · Weight sets, ECOshape

Test weight material: Milligramm weights stainless steel, Individual weights: polished stainless steel

Weight sets	ECOshape in plastic case		ECOshape in aluminium protected case		ECO shape in wooden case		DAkkScertificate	
	KERN	€	KERN	€	KERN	€	KERN	€
1 mg - 500 mg	328-22	194,-	328-226	240,-	-	-	962-450	112,-
1 mg - 50 g	325-024	550,-	325-026	560,-	325-022	600,-	962-401	188,-
1 mg - 100 g	325-034	600,-	325-036	620,-	325-032	650,-	962-402	200,-
1 mg - 200 g	325-044	690,-	325-046	710,-	325-042	740,-	962-403	225,-
1 mg - 500 g	325-054	790,-	325-056	810,-	325-052	910,-	962-404	235,-
1 mg - 1 kg	325-064	1010,-	325-066	1020,-	325-062	1060,-	962-405	245,-
1 mg - 2 kg	325-074	1300,-	325-076	1320,-	325-072	1370,-	962-406	280,-
1 mg - 5 kg	325-084	1560,-	325-086	1620,-	325-082	1740,-	962-407	295,-
1 mg - 10 kg	-	-	325-096	2340,-	325-092	2320,-	962-408	320,-
1 g - 50 g	326-024	375,-	326-026	390,-	326-022	440,-	962-415	75,-
1 g - 100 g	326-034	420,-	326-036	440,-	326-032	490,-	962-416	87,-
1 g - 200 g	326-044	520,-	326-046	540,-	326-042	600,-	962-417	110,-
1 g - 500 g	326-054	610,-	326-056	630,-	326-052	750,-	962-418	122,-
1 g - 1 kg	326-064	830,-	326-066	850,-	326-062	900,-	962-419	134,-
1 g - 2 kg	326-074	1110,-	326-076	1140,-	326-072	1220,-	962-420	169,-
1 g - 5 kg	326-084	1390,-	326-086	1420,-	326-082	1600,-	962-421	187,-
1 g - 10 kg	-	-	326-096	2070,-	326-092	2160,-	962-422	205,-

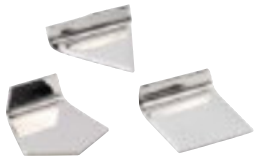
## Class F1 · Weight sets, knob shape

Test weight material: Milligramm weights stainless steel, Individual weights: polished stainless steel

Weight sets	Knob shape in plastic case		Knob shape in aluminium protected case		Knob shape in wooden case		DAkkScertificate	
	KERN	€	KERN	€	KERN	€	KERN	€
1 mg - 500 mg	328-22	194,-	328-226	240,-	-	-	962-450	112,-
1 mg - 50 g	323-024	610,-	323-026	630,-	323-02	640,-	962-401	188,-
1 mg - 100 g	323-034	670,-	323-036	690,-	323-03	700,-	962-402	200,-
1 mg - 200 g	323-044	820,-	323-046	840,-	323-04	880,-	962-403	225,-
1 mg - 500 g	323-054	970,-	323-056	990,-	323-05	1090,-	962-404	235,-
1 mg - 1 kg	323-064	1240,-	323-066	1240,-	323-06	1290,-	962-405	245,-
1 mg - 2 kg	323-074	1640,-	323-076	1670,-	323-07	1730,-	962-406	280,-
1 mg - 5 kg	323-084	2020,-	323-086	2060,-	323-08	2200,-	962-407	295,-
1 mg - 10 kg	-	-	323-096	2940,-	323-09	3040,-	962-408	320,-
1 g - 50 g	324-024	430,-	324-026	440,-	324-02	480,-	962-415	75,-
1 g - 100 g	324-034	490,-	324-036	510,-	324-03	560,-	962-416	87,-
1 g - 200 g	324-044	650,-	324-046	670,-	324-04	720,-	962-417	110,-
1 g - 500 g	324-054	780,-	324-056	810,-	324-05	930,-	962-418	122,-
1 g - 1 kg	324-064	1060,-	324-066	1070,-	324-06	1130,-	962-419	134,-
1 g - 2 kg	324-074	1460,-	324-076	1490,-	324-07	1570,-	962-420	169,-
1 g - 5 kg	324-084	1840,-	324-086	1940,-	324-08	2040,-	962-421	187,-
1 g - 10 kg	-	-	324-096	2790,-	324-09	2870,-	962-422	205,-

# Test weights and boxes

## Class F2



Milligram weights, flat polygonal sheet



Individual weights/ Weight sets, knob shape



Block weight, stainless steel



Test weights (10–50 kg), finely turned stainless steel KERN 337-141 ff, optional: Wooden box



Plastic box, lined, for individual weights  $\leq 200$  g



Plastic box, lined, for individual weights  $\geq 500$  g



Aluminium protected box, lined, for individual weights



Wooden box, not lined for individual weights  $\leq 500$  g



Wooden box, not lined, for individual weights  $\geq 1$  kg



Milligram weight set in plastic box (338-22)



Milligram weight set in aluminium protected box, lined (338-226)



Plastic case, lined, for weight sets, knob shape



Aluminium protected case, lined, for weight sets, knob shape



Wooden case, for weight sets, knob shape

## Test weights class F2

### Class F2 · Milligram weights, flat polygonal sheet

Test weight material: stainless steel

Weight	Tol+/- mg	Milligram weight, flat polygonal sheet		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN	€	KERN	€	KERN	€
1 mg	0,06	338-01	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-451	20,-
2 mg	0,06	338-02	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-452	20,-
5 mg	0,06	338-03	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-453	20,-
10 mg	0,08	338-04	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-454	20,-
20 mg	0,10	338-05	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-455	20,-
50 mg	0,12	338-06	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-456	20,-
100 mg	0,16	338-07	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-457	20,-
200 mg	0,20	338-08	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-458	20,-
500 mg	0,25	338-09	9,70	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-459	20,-

### Class F2 · Individual weights, knob shape

Test weight material: finely turned stainless steel

Weight	Tol+/- mg	Individual weight, knob shape		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN	€	KERN	€	KERN	€
1 g	0,3	337-01	23,-	347-030-400	2,-	317-010-600	15,-	337-010-200	21,-	962-431	20,-
2 g	0,4	337-02	24,-	347-030-400	2,-	317-020-600	18,-	337-020-200	17,-	962-432	20,-
5 g	0,5	337-03	26,-	347-030-400	2,-	317-030-600	16,-	337-030-200	18,-	962-433	20,-
10 g	0,6	337-04	28,-	347-050-400	2,-	317-040-600	16,-	337-040-200	18,-	962-434	20,-
20 g	0,8	337-05	29,-	347-050-400	2,-	317-050-600	16,-	337-050-200	18,-	962-435	20,-
50 g	1,0	337-06	32,-	347-070-400	2,-	317-060-600	15,-	337-060-200	20,-	962-436	20,-
100 g	1,6	337-07	36,-	347-070-400	2,-	317-070-600	15,-	337-070-200	24,-	962-437	22,-
200 g	3,0	337-08	48,-	347-080-400	2,-	317-080-600	15,-	337-080-200	25,-	962-438	22,-
500 g	8,0	337-09	71,-	347-090-400	3,-	317-090-600	20,-	337-090-200	26,-	962-439	22,-
1 kg	16	337-11	103,-	347-110-400	3,80	317-110-600	28,-	337-110-200	42,-	962-441	22,-
2 kg	30	337-12	163,-	347-120-400	5,-	317-120-600	34,-	337-120-200	47,-	962-442	29,-
5 kg	80	337-13	295,-	347-130-400	11,-	317-130-600	56,-	337-130-200	78,-	962-443	29,-
10 kg	160	337-14	570,-	347-140-400	16,-	317-140-600	79,-	337-140-200	82,-	962-444	29,-
20 kg	300	337-15	860,-	-	-	317-150-600	111,-	337-150-200	390,-	962-445	32,-
50 kg	800	337-16	1520,-	-	-	317-160-600	320,-	337-160-200	610,-	962-446	44,-

### Class F2 · Test weights

Test weight material: finely turned stainless steel

Weight	Tol+/- mg	Test weight		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN	€
10 kg	160	337-141	650,-	337-141-200	360,-	962-444	29,-
20 kg	300	337-151	790,-	337-151-200	390,-	962-445	32,-
50 kg	800	337-161	2130,-	337-161-200	610,-	962-446	44,-

### Class F2 · Block weights




Block weight material: stainless steel glass bead blasted

Weight	Tol+/- mg	Block weight		Aluminium protected case		DAkkS certificate	
		KERN	€	KERN	€	KERN	€
5 kg	80	336-36	610,-	346-060-600	84,-	962-443	29,-
10 kg	160	336-37	860,-	346-070-600	110,-	962-444	29,-
20 kg	300	336-38	1180,-	346-080-600	160,-	962-445	32,-
50 kg	800	336-39	3080,-	346-090-600	180,-	962-446	44,-



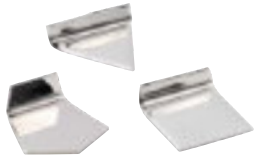
**Class F2 · Weight sets, knob shape**

Test weight material: Milligramm weights stainless steel, individual weights finely turned stainless steel

Weight	Knob shape in plastic case		Knob shape in aluminium protected case		Knob shape in wooden case		DAkkScertificate	
	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 mg - 500 mg	338-22	151,-	338-226	200,-	-	-	962-450	112,-
1 mg - 50 g	333-024	390,-	333-026	410,-	333-02	410,-	962-401	188,-
1 mg - 100 g	333-034	435,-	333-036	450,-	333-03	455,-	962-402	200,-
1 mg - 200 g	333-044	510,-	333-046	520,-	333-04	520,-	962-403	225,-
1 mg - 500 g	333-054	580,-	333-056	600,-	333-05	610,-	962-404	235,-
1 mg - 1 kg	333-064	730,-	333-066	750,-	333-06	760,-	962-405	245,-
1 mg - 2 kg	333-074	1030,-	333-076	1050,-	333-07	1060,-	962-406	280,-
1 mg - 5 kg	333-084	1380,-	333-086	1420,-	333-08	1420,-	962-407	295,-
1 mg - 10 kg	-	-	333-096	2060,-	333-09	2080,-	962-408	320,-
1 g - 50 g	334-024	255,-	334-026	275,-	334-02	270,-	962-415	75,-
1 g - 100 g	334-034	300,-	334-036	315,-	334-03	320,-	962-416	87,-
1 g - 200 g	334-044	395,-	334-046	415,-	334-04	415,-	962-417	110,-
1 g - 500 g	334-054	470,-	334-056	490,-	334-05	490,-	962-418	122,-
1 g - 1 kg	334-064	610,-	334-066	620,-	334-06	630,-	962-419	134,-
1 g - 2 kg	334-074	890,-	334-076	940,-	334-07	940,-	962-420	169,-
1 g - 5 kg	334-084	1210,-	334-086	1300,-	334-08	1290,-	962-421	187,-
1 g - 10 kg	-	-	334-096	1940,-	334-09	1950,-	962-422	205,-

# Test weights and boxes

## Class M1



Milligram weights, flat polygonal sheet



Individual weights/weight sets, knob shape, finely turned stainless steel



Hook weights, finely turned stainless steel



Slotted weights, finely turned stainless steel



Plastic box, for individual weights ≤ 200 g, for hook weights and slotted weights ≤ 50 g



Plastic box, lined, for individual weights ≥ 500 g, for hook weights and slotted weights ≥ 100 g



Aluminium protected box, lined, for individual weights



Wooden box, not lined, for individual weights ≤ 500 g



Wooden box, not lined, for individual weights ≥ 1 kg



Milligram weight set in plastic box (348-22)

Milligram weight set in aluminium protected box, lined (348-226)



Plastic case, lined, for weight sets, knob shape, finely turned stainless steel



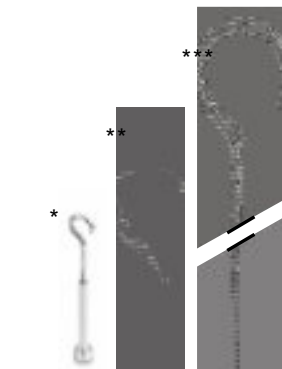
Aluminium protected case, lined, for weight sets, knob shape, finely turned stainless steel



Wooden case, for weight sets, knob shape, finely turned stainless steel



Test weights (10–50 kg), finely turned stainless steel KERN 347-141 ff, optional: Wooden box



Beambars, for fixing slotted weights, aluminium or finely turned stainless steel




\* | \*\* | \*\*\* see page 201



Block weights, lacquered cast iron/stainless steel glass bead blasted, optional: Aluminium protected case, lined




### Class M1 · Milligram weights, flat polygonal sheet

Test weight material: stainless steel

Weight	Tol+/- mg	Milligram weight, flat polygonal sheet		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 mg	0,20	348-01	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-651	16,-
2 mg	0,20	348-02	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-652	16,-
5 mg	0,20	348-03	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-653	16,-
10 mg	0,25	348-04	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-654	16,-
20 mg	0,30	348-05	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-655	16,-
50 mg	0,40	348-06	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-656	16,-
100 mg	0,50	348-07	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-657	16,-
200 mg	0,60	348-08	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-658	16,-
500 mg	0,80	348-09	5,10	347-009-400	2,-	317-009-600	15,-	338-090-200	27,-	962-659	16,-


### Class M1 · Individual weights, knob shape

Test weights material: stainless steel

Weight	Tol+/- mg	Individual weight		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 g	1,0	347-01	8,40	347-030-400	2,-	317-010-600	15,-	337-010-200	21,-	962-631	16,-
2 g	1,2	347-02	8,80	347-030-400	2,-	317-020-600	18,-	337-020-200	17,-	962-632	16,-
5 g	1,6	347-03	8,90	347-030-400	2,-	317-030-600	16,-	337-030-200	18,-	962-633	16,-
10 g	2,0	347-04	9,60	347-050-400	2,-	317-040-600	16,-	337-040-200	18,-	962-634	16,-
20 g	2,5	347-05	14,-	347-050-400	2,-	317-050-600	16,-	337-050-200	18,-	962-635	16,-
50 g	3,0	347-06	16,-	347-070-400	2,-	317-060-600	15,-	337-060-200	20,-	962-636	16,-
100 g	5,0	347-07	20,-	347-070-400	2,-	317-070-600	15,-	337-070-200	24,-	962-637	18,-
200 g	10	347-08	25,-	347-080-400	2,-	317-080-600	15,-	337-080-200	25,-	962-638	18,-
500 g	25	347-09	41,-	347-090-400	3,-	317-090-600	20,-	337-090-200	26,-	962-639	18,-
1 kg	50	347-11	64,-	347-110-400	3,80	317-110-600	28,-	337-110-200	42,-	962-641	18,-
2 kg	100	347-12	120,-	347-120-400	5,-	317-120-600	34,-	337-120-200	47,-	962-642	19,-
5 kg	250	347-13	270,-	347-130-400	11,-	317-130-600	56,-	337-130-200	78,-	962-643	19,-
10 kg	500	347-14	520,-	347-140-400	16,-	317-140-600	79,-	337-140-200	82,-	962-644	19,-


### Class M1 · Blockweights

Block weight material: lacquered cast iron, surface and edges machined or unmachined (ECO)

Weight	Tol+/- g	Block weight		ECOBlock weight		Aluminium protected case		DAkkS certificate	
		KERN	€	KERN	€	KERN 	€	KERN	€
5 kg	0,25	346-86	76,-	346-76	61,-	346-060-600	84,-	962-643	19,-
10 kg	0,50	346-87	132,-	346-77	102,-	346-070-600	110,-	962-644	19,-
20 kg	1,00	346-88	245,-	346-78	188,-	346-080-600	160,-	962-645	24,-
50 kg	2,50	346-89	590,-	346-79	455,-	346-090-600	180,-	962-646	27,-

### Class M1 · Blockweights

Block weight material: stainless steel glass bead blasted

Weight	Tol+/- g	Block weight		Aluminium protected case		DAkkS certificate	
		KERN	€	KERN 	€	KERN	€
5 kg	0,25	346-06	410,-	346-060-600	84,-	962-643	19,-
10 kg	0,50	346-07	550,-	346-070-600	110,-	962-644	19,-
20 kg	1,00	346-08	740,-	346-080-600	160,-	962-645	24,-
50 kg	2,50	346-09	1970,-	346-090-600	180,-	962-646	27,-

### Class M1 · Test weights, stackable

Test weight material: finely turned stainless steel

Weight	Tol+/- g	Test weight		Wooden box		DAkkScertificate	
		KERN	€	KERN	€	KERN	€
10 kg	0,5	347-141	650,-	337-141-200	360,-	962-644	19,-
20 kg	1,0	347-151	800,-	337-151-200	390,-	962-645	24,-
50 kg	2,5	347-161	2130,-	337-161-200	610,-	962-646	27,-

### Class M1 · Heavy duty weights, stackable

Heavy duty weight material: lacquered cast iron

Designed to be lifted with forklift trucks or cranes, delivery time is approx. 6–8 weeks

Dimensions: see internet on [www.kern-sohn.com](http://www.kern-sohn.com)

Weight	Tol+/- g	Heavy duty weight		DAkkScertificate	
		KERN	€	KERN	€
100 kg	5	346-81	2420,-	962-691	70,-
200 kg	10	346-82	3520,-	962-692	70,-
500 kg	25	346-83	6290,-	962-693	70,-
1000 kg	50	346-84	9870,-	962-694	153,-
2000 kg	100	346-85	18060,-	962-695	280,-



### Note

We also offer a large range of heavy-duty weights in other materials, (e.g. stainless steel) and in other forms (e.g. discs) or individual weight containers, please ask for details.

### Class M1 · Weight sets, knob shape

Test weight material: Milligramm weights stainless steel, individual weights finely turned stainless steel

Weight	Knob shape, in plastic case		Knob shape, in aluminium protected case		Knob shape, in wooden case		DAkkScertificate	
	KERN	€	KERN	€	KERN	€	KERN	€
1 mg - 500 mg	348-22	94,-	348-226	159,-	-	-	962-650	70,-
1 mg - 50 g	343-024	265,-	343-026	240,-	343-02	240,-	962-601	119,-
1 mg - 100 g	343-034	280,-	343-036	260,-	343-03	270,-	962-602	125,-
1 mg - 200 g	343-044	325,-	343-046	305,-	343-04	315,-	962-603	141,-
1 mg - 500 g	343-054	360,-	343-056	350,-	343-05	360,-	962-604	147,-
1 mg - 1 kg	343-064	550,-	343-066	450,-	343-06	520,-	962-605	154,-
1 mg - 2 kg	343-074	740,-	343-076	690,-	343-07	730,-	962-606	170,-
1 mg - 5 kg	343-084	990,-	343-086	980,-	343-08	1040,-	962-607	180,-
1 mg - 10 kg	-	-	343-096	1500,-	343-09	1560,-	962-608	188,-
1 g - 50 g	344-024	178,-	344-026	171,-	344-02	143,-	962-615	47,-
1 g - 100 g	344-034	197,-	344-036	191,-	344-03	176,-	962-616	55,-
1 g - 200 g	344-044	240,-	344-046	235,-	344-04	225,-	962-617	68,-
1 g - 500 g	344-054	280,-	344-056	275,-	344-05	275,-	962-618	76,-
1 g - 1 kg	344-064	465,-	344-066	380,-	344-06	415,-	962-619	83,-
1 g - 2 kg	344-074	650,-	344-076	610,-	344-07	630,-	962-620	100,-
1 g - 5 kg	344-084	900,-	344-086	920,-	344-08	930,-	962-621	108,-
1 g - 10 kg	-	-	344-096	1440,-	344-09	1450,-	962-622	116,-

### Class M1 · Hook weights

Hook weight material: finely turned stainless steel

Weight	Tol +/- mg	Hook weight		Plastic box, lined		DAkkScertificate	
		KERN	€	KERN	€	KERN	€
1 g	1,0	347-016	24,-	347-030-400	2,-	962-631	16,-
2 g	1,2	347-026	24,-	347-030-400	2,-	962-632	16,-
5 g	1,6	347-036	24,-	347-030-400	2,-	962-633	16,-
10 g	2,0	347-046	25,-	347-050-400	2,-	962-634	16,-
20 g	2,5	347-056	27,-	347-050-400	2,-	962-635	16,-
50 g	3,0	347-066	33,-	347-070-400	2,-	962-636	16,-
100 g	5,0	347-076	35,-	347-090-400	3,-	962-637	18,-
200 g	10,0	347-086	41,-	347-090-400	3,-	962-638	18,-
500 g	25,0	347-096	78,-	347-110-400	3,80	962-639	18,-
1 kg	50,0	347-116	107,-	347-120-400	5,-	962-641	18,-
2 kg	100,0	347-126	176,-	347-130-400	11,-	962-642	19,-
5 kg	250,0	347-136	345,-	347-140-400	16,-	962-643	19,-
10 kg	500,0	347-146	570,-	–	–	962-644	19,-

### Class M1 · Slotted weights

Slotted weight material: finely turned stainless steel

Weight	Tol +/- mg	Slotted weight		Plastic box, lined		DAkkScertificate	
		KERN	€	KERN	€	KERN	€
1 g	1,0	347-015	24,-	347-030-400	2,-	962-631	16,-
2 g	1,2	347-025	22,-	347-030-400	2,-	962-632	16,-
5 g	1,6	347-035	25,-	347-030-400	2,-	962-633	16,-
10 g	2,0	347-045	26,-	347-030-400	2,-	962-634	16,-
20 g	2,5	347-055	27,-	347-080-400	2,-	962-635	16,-
50 g	3,0	347-065	30,-	347-080-400	2,-	962-636	16,-
100 g	5,0	347-075	33,-	347-090-400	3,-	962-637	18,-
200 g	10	347-085	45,-	347-090-400	3,-	962-638	18,-
500 g	25	347-095	70,-	347-110-400	3,80	962-639	18,-
1 kg	50	347-115	126,-	347-130-400	11,-	962-641	18,-
2 kg	100	347-125	187,-	347-130-400	11,-	962-642	19,-
5 kg	250	347-135	325,-	347-140-400	16,-	962-643	19,-
10 kg	500	347-145	590,-	347-140-400	16,-	962-644	19,-

### Class M1 · Beam bars, for fixing slotted weights

Beam bars material: 10 g: aluminium, 100 g–1 kg: finely turned stainless steel

Own weight beam bar	Maximum total load <sup>(1)</sup>	Largest slotted weight possible	Material	Length	Beam bar		DAkkScertificate	
					KERN	€	KERN	€
10 g	200 g	100 g	Aluminium	117,5	347-445-100*	35,-	962-634	16,-
100 g	2 kg	1 kg	Stainless steel	238	347-075-100**	58,-	962-637	18,-
500 g	20 kg	10 kg	Stainless steel	639	347-095-100***	92,-	962-639	18,-
1 kg	40 kg	10 kg	Stainless steel	1020	347-115-100***	148,-	962-641	18,-

<sup>(1)</sup> is exclusive of the own weight of the beam bar, e.g. the maximum possible total weight is calculated from "Maximum total load" + "own weight beam bar";

\* | \*\* | \*\*\* see page 198

### Newton weights (N)

All hook and slotted weights as well as beam bars are available with N adjustment according to M1 tolerances, additional price € 8,-/pc. We need to know the location of use and postal code.

**DAkkScalibration certificate for N weights:** identical to DAkkS prices for individual weights M1, additional price € 8,-

# Test weights and boxes

## Classes M2 - M3



Individual weights/ Weight sets,  
knob shape, stainless steel



Individual weights/ Weight sets,  
knob shape, lacquered cast iron



Block weights,  
lacquered cast iron



Plastic box, lined,  
for individual weights



Aluminium protected box,  
lined, for individual weights



Wooden box, not lined, for  
individual weights  $\leq 500$  g,  
not appropriate for  
cast iron weights



Wooden box, not lined, for  
individual weights  $\geq 1$  kg,  
not appropriate for  
cast iron weights



Aluminium protected case,  
lined, for block weights



Aluminium protected case, lined, for weight  
sets knob shape, finely turned stainless steel,  
not appropriate for cast iron weights






Wooden case, for weight sets, knob shape,  
finely turned stainless steel



Wooden block, for weight sets, knob shape,  
lacquered cast iron


### Class M2 · Individual weights, knob shape

Test weight material: finely turned stainless steel

Weight	Tol+/- mg	Individual weight, knob shape		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN 	€	KERN 	€	KERN 	€	KERN	€
1 g	3	357-01	8,40	347-030-400	2,-	317-010-600	15,-	337-010-200	21,-	962-631	16,-
2 g	4	357-02	8,70	347-030-400	2,-	317-020-600	18,-	337-020-200	17,-	962-632	16,-
5 g	5	357-03	8,90	347-030-400	2,-	317-030-600	16,-	337-030-200	18,-	962-633	16,-
10 g	6	357-04	9,60	347-050-400	2,-	317-040-600	16,-	337-040-200	18,-	962-634	16,-
20 g	8	357-05	14,-	347-050-400	2,-	317-050-600	16,-	337-050-200	18,-	962-635	16,-
50 g	10	357-06	16,-	347-070-400	2,-	317-060-600	15,-	337-060-200	20,-	962-636	16,-
100 g	16	357-07	20,-	347-070-400	2,-	317-070-600	15,-	337-070-200	24,-	962-637	18,-
200 g	30	357-08	24,-	347-080-400	2,-	317-080-600	15,-	337-080-200	25,-	962-638	18,-
500 g	80	357-09	41,-	347-090-400	3,-	317-090-600	20,-	337-090-200	26,-	962-639	18,-
1 kg	160	357-11	64,-	347-110-400	3,80	317-110-600	28,-	337-110-200	42,-	962-641	18,-
2 kg	300	357-12	120,-	347-120-400	5,-	317-120-600	34,-	337-120-200	47,-	962-642	19,-
5 kg	800	357-13	270,-	347-130-400	11,-	317-130-600	56,-	337-130-200	78,-	962-643	19,-
10 kg	1600	357-14	520,-	347-140-400	16,-	317-140-600	79,-	337-140-200	82,-	962-644	19,-



### Class M2 · Block weights

Block weight material: lacquered cast iron, surface and edges machined or unmachined (ECO)

Weight	Tol+/- g	Block weight		ECOblock weight		Aluminium protected box		DAkkScertificate	
		KERN	€	KERN	€	KERN 	€	KERN	€
5 kg	0,8	356-86	66,-	356-76	61,-	346-060-600	84,-	962-643	19,-
10 kg	1,6	356-87	132,-	356-77	102,-	346-070-600	110,-	962-644	19,-
20 kg	3,0	356-88	245,-	356-78	188,-	346-080-600	160,-	962-645	24,-
50 kg	8,0	356-89	590,-	356-79	455,-	346-090-600	180,-	962-646	27,-

### Class M2 · Weight sets, knob shape

Test weight material: finely turned stainless steel

Weight	Knob shape, in aluminium protected case		Knob shape, in wooden case		DAkkScertificate	
	KERN 	€	KERN 	€	KERN	€
1 g – 50 g	354-026	137,-	354-02	108,-	962-615	47,-
1 g – 100 g	354-036	152,-	354-03	138,-	962-616	55,-
1 g – 200 g	354-046	192,-	354-04	179,-	962-617	68,-
1 g – 500 g	354-056	235,-	354-05	240,-	962-618	76,-
1 g – 1 kg	354-066	340,-	354-06	380,-	962-619	83,-
1 g – 2 kg	354-076	580,-	354-07	600,-	962-620	100,-
1 g – 5 kg	354-086	920,-	354-08	920,-	962-621	108,-
1 g – 10 kg	354-096	1530,-	354-09	1530,-	962-622	116,-

### Class M3 · Individual weights, knob shape

Test weight material: finely turned stainless steel

Weight	Tol+/- mg	Individual weight, knob shape		Plastic box		Aluminium protected box		Wooden box		DAkkS certificate	
		KERN	€	KERN	€	KERN	€	KERN	€	KERN	€
1 g	10	367-01	8,40	347-030-400	2,-	317-010-600	15,-	337-010-200	21,-	962-631	16,-
2 g	12	367-02	8,50	347-030-400	2,-	317-020-600	18,-	337-020-200	17,-	962-632	16,-
5 g	16	367-03	8,60	347-030-400	2,-	317-030-600	16,-	337-030-200	18,-	962-633	16,-
10 g	20	367-04	9,10	347-050-400	2,-	317-040-600	16,-	337-040-200	18,-	962-634	16,-
20 g	25	367-05	12,-	347-050-400	2,-	317-050-600	16,-	337-050-200	18,-	962-635	16,-
50 g	30	367-06	14,-	347-070-400	2,-	317-060-600	15,-	337-060-200	20,-	962-636	16,-
100 g	50	367-07	18,-	347-070-400	2,-	317-070-600	15,-	337-070-200	24,-	962-637	18,-
200 g	100	367-08	23,-	347-080-400	2,-	317-080-600	15,-	337-080-200	25,-	962-638	18,-
500 g	250	367-09	39,-	347-090-400	3,-	317-090-600	20,-	337-090-200	26,-	962-639	18,-
1 kg	500	367-11	62,-	347-110-400	3,80	317-110-600	28,-	337-110-200	42,-	962-641	18,-
2 kg	1000	367-12	119,-	347-120-400	5,-	317-120-600	34,-	337-120-200	47,-	962-642	19,-

### Class M3 · Individual weights, knob and cylindrical shape

Test weight material: lacquered cast iron

Weight	Tol+/- g	Individual weight, knob and cylindrical shape		DAkkS certificate	
		KERN	€	KERN	€
100 g*	0,05	366-91	25,-	962-637	18,-
200 g*	0,10	366-92	29,-	962-638	18,-
500 g**	0,25	366-93	40,-	962-639	18,-
1 kg**	0,50	366-94	47,-	962-641	18,-
2 kg**	1,0	366-95	80,-	962-642	19,-
5 kg**	2,5	366-96	145,-	962-643	19,-
10 kg**	5,0	366-97	265,-	962-644	19,-



### Class M3 · Blockweights

Block weight material: lacquered cast iron, surface and edges machined or unmachined (ECO)

Weight	Tol+/- g	Block weight		ECOblock weight		Aluminium protected box		DAkkS certificate	
		KERN	€	KERN	€	KERN	€	KERN	€
5 kg	2,5	366-86	66,-	366-76	61,-	346-060-600	84,-	962-643	19,-
10 kg	5,0	366-87	110,-	366-77	102,-	346-070-600	110,-	962-644	19,-
20 kg	10	366-88	196,-	366-78	188,-	346-080-600	160,-	962-645	24,-
50 kg	25	366-89	490,-	366-79	455,-	346-090-600	180,-	962-646	27,-

### Class M3 · Weight sets, knob and cylindrical shape

Test weight material: ≤ 50 g stainless steel, ≥ 100 g lacquered cast iron

Weight	Knob and cylindrical shape, in wooden block		DAkkS certificate	
	KERN	€	KERN	€
1 g – 1 kg	362-96	250,-	962-619	83,-
1 g – 2 kg	362-97	400,-	962-620	100,-
1 g – 5 kg	362-98	510,-	962-621	108,-
1 g – 10 kg	362-99	720,-	962-622	116,-



Individual weights ≤ 50 g

Individual weights 100 g and 200 g

Individual weights ≥ 500 g



**Tweezers, weight grips, gloves, dusting brush**



**Tweezers**

to be able to safely grip small test weights

For class	For weight	Length	Version	KERN	€
E1 - M3	1 mg – 200 g	105 mm	1 Stainless steel with silicone-coated tips	315-243	15,-
E1 - M3	500 g – 2 kg	250 mm	1 Stainless steel with silicone-coated tips	315-245	60,-
E1 - M3	≤ 5 g	130 mm	2 Stainless steel, curved, high-quality plastic tips	315-246	23,-
E1 - M3	≤ 5 g	136 mm	3 Stainless steel, straight, high quality plastic tips	315-247	23,-
E1 - M3	≤ 200 g	225 mm	4 Stainless steel, straight, high-quality plastic tips, with a special shape for gripping weights of various shapes and sizes	315-248	38,-
F2 – M3	1 mg – 200 g	100 mm	5 Stainless steel	335-240	17,-
E1 – M3	1 mg – 200 g	100 mm	6 Plastic	315-242	8,-

**Weight grip**  
plastic coated

For class	Fork knob shaped weights	KERN	€
E1 - M3	2 kg	315-273	35,-
E1 - M3	5 kg	315-274	40,-
E1 - M3	10 kg	315-275	45,-
E1 - M3	20 kg	315-276	68,-



! not appropriate for cast iron weights



**Gloves**

Cotton, 1 pair. Help to protect the test weights when being used daily, from grease from fingers, damp etc.  
Suitable for test weights up to 2 kg.

KERN	€
317-280	2,50



**Gloves**

Leather/cotton, 1 pair. Help to protect the test weights when being used daily, from grease from fingers, damp etc.  
Ideal for test weights from 2 kg.

KERN	€
317-290	6,90



**Premium gloves**

Nylon, 1 pair. Particularly elastic, one size fits all, with special fingertip coating to ensure a safe grip. Helps to protect the test weights in everyday use from grease from fingers, damp etc.  
Ideal for all test weights.

KERN	€
317-281	9,-



**Dusting brush**

to clean the weights

KERN	€
318-270	7,20



**Bellows**

for cleaning weights

KERN	€
318-271	9,60



**Microfibre cloth**

for cleaning weights

KERN	€
318-272	6,90

**Boxes for individual weights**



For weights ≤ 500 g, OIML class E1–F1  
 For weights ≥ 1 kg, OIML class E1–F1

Casematerial: Wood, lined, suitable for single weights, KERNNos. 307, 316, 317, 326, 327



For weights ≤ 500 g, OIML class F2–M3  
 For weights ≥ 1 kg, OIML class F2–M3

Casematerial: Wood, not lined, suitable for single weights, KERNNos. 337, 347, 357, 367  
 ■ not suitable for cast iron weights



For test weights ≥ 10 kg, OIML class F1–M1

Casematerial: Wood, lined/not lined, suitable for single weights, KERNNos. 327, 337, 347  
 ■ not suitable for cast iron weights

**Wooden box, lined**  
 for single weights E1–F1

For weights	KERN	€
-	-	-
1 g	317-010-100	26,-
2 g	317-020-100	27,-
5 g	317-030-100	28,-
10 g	317-040-100	27,-
20 g	317-050-100	31,-
50 g	317-060-100	31,-
100 g	317-070-100	33,-
200 g	317-080-100	33,-
500 g	317-090-100	39,-
1 kg	317-110-100	63,-
2 kg	317-120-100	65,-
5 kg	317-130-100	99,-
10 kg	317-140-100	115,-
20 kg	317-150-100	630,-
50 kg	317-160-100	880,-

**Wooden box, not lined**  
 for single weights F2–M3


For weights	KERN	€
mg	338-090-200	27,-
1 g	337-010-200	21,-
2 g	337-020-200	17,-
5 g	337-030-200	18,-
10 g	337-040-200	18,-
20 g	337-050-200	18,-
50 g	337-060-200	20,-
100 g	337-070-200	24,-
200 g	337-080-200	25,-
500 g	337-090-200	26,-
1 kg	337-110-200	42,-
2 kg	337-120-200	47,-
5 kg	337-130-200	78,-
10 kg	337-140-200	82,-
20 kg	337-150-200	390,-
50 kg	337-160-200	610,-

**Wooden box, not lined**  
 for test weights F1–M1

For weights	KERN	€
10 kg	337-141-200	360,-
20 kg	337-151-200	390,-
50 kg	337-161-200	610,-

**Wooden box, lined**  
 for test weights F1–M1

For weights	KERN	€
10 kg	337-141-100	340,-
20 kg	337-151-100	370,-
50 kg	337-161-100	570,-




For weights ≤ 5 kg, OIML class E1–M3

Casematerial: Aluminium protected, lined, suitable for mg and single weights, KERNNos. 307, 308, 316, 317, 318, 326, 327, 328, 337, 338, 347, 348, 357, 367  
 ■ not suitable for cast iron weights

**Aluminium protected box, lined**  
 for individual weights, knob and compact shape, class E1–M3

For weights	KERN	€
mg	317-009-600	15,-
1 g	317-010-600	15,-
2 g	317-020-600	18,-
5 g	317-030-600	16,-
10 g	317-040-600	16,-
20 g	317-050-600	16,-
50 g	317-060-600	15,-
100 g	317-070-600	15,-
200 g	317-080-600	15,-
500 g	317-090-600	20,-
1 kg	317-110-600	28,-
2 kg	317-120-600	34,-
5 kg	317-130-600	56,-



For weights ≤ 10 kg, OIML class E1–M3

Casematerial: Aluminium protected, lined, suitable for single weights, KERNNos. 307, 316, 317, 326, 327, 337, 347, 357, 367  
 ■ not suitable for cast iron weights

**Aluminium protected box, lined**  
 for individual weights, knob and compact shape, class E1–M3

For weights	KERN	€
10 kg	317-140-600	79,-
20 kg	317-150-600	111,-
50 kg	317-160-600	320,-



For block weight ≥ 5 kg, OIML class F1–M3

Casematerial: Aluminium protected, lined, suitable for block weights, KERNNos. 326, 336, 346, 356, 366

**Aluminium protected case, lined**  
 for individual weights F1–M3

For weights	KERN	€
5 kg	346-060-600	84,-
10 kg	346-070-600	110,-
20 kg	346-080-600	160,-
50 kg	346-090-600	180,-

## Carrying cases/boxes for individual weight sets

### Individual weight sets:

You can create your own "tailor-made" individual weight sets yourself. KERN will customise your own personal wooden box/plastic carrying case. The largest individual weight which will fit is given in the table.

### Sample order:


Your individual weight set (class F1):  
1 × 50 g, 2 × 100 g, 1 × 500 g, 2 × 1 kg, 1 × 2 kg.

The correct individual box is **KERN No. 313-080-400** (plastic) or **KERN No. 315-070-100** (wood, lined)




#### Plastic case

for individual weight sets classes E1–M3, not appropriate for cast iron weights


Largest possible weight	KERN		€
≤ 500 g	313-050-400		166,-
≤ 5 kg	313-080-400		320,-

#### Wooden case

lined, for individual weight sets classes E1–F1  
\* with side handles

Largest possible weight	KERN		€
≤ 200 g	315-040-100		245,-
≤ 1 kg	315-060-100		345,-
≤ 2 kg	315-070-100		425,-
≤ 5 kg*	315-080-100		540,-
≤ 10 kg*	315-090-100		560,-

Wooden case not lined, for individual weight set classes F2–M3, not appropriate for cast iron weights  
\* with side handles

Largest possible weight	KERN		€
≤ 200 g	335-040-200		141,-
≤ 500 g	335-050-200		141,-
≤ 1 kg	335-060-200		200,-
≤ 2 kg	335-070-200		225,-
≤ 5 kg*	335-080-200		315,-
≤ 10 kg*	335-090-200		330,-

## Carrying cases for standard weight sets




Fig. shows 313-010-600

Aluminium protected case for safe storage and transportation under harsh industrial conditions.


#### Plastic case for weight sets

with standard denomination classes E1–M3, not appropriate for cast iron weights

Largest possible weight	KERN		€
≤ 500 g	313-052-400		100,-
≤ 5 kg	313-082-400		205,-

#### Aluminium protected case

for weight sets with standard denomination classes E1–M2  
\*1 front handle; \*\*2 side handles; \*\*\*no handle

For weights	For class	KERN		€
1 mg - 500 mg	E1 - M1	313-010-600*		97,-
1 mg - 50 g	E1 - M1	313-020-600*		99,-
1 mg - 100 g	E1 - M1	313-030-600*		108,-
1 mg - 200 g	E1 - M1	313-040-600*		115,-
1 mg - 500 g	E1 - M1	313-050-600*		139,-
1 mg - 1 kg	E1 - M1	313-060-600*		169,-
1 mg - 2 kg	E1 - M1	313-070-600**		199,-
1 mg - 5 kg	E1 - M1	313-080-600***		265,-
1 mg - 10 kg	E1 - M1	313-090-600***		345,-
1 g - 50 g	E1 - M2	314-020-600*		94,-
1 g - 100 g	E1 - M2	314-030-600*		103,-
1 g - 200 g	E1 - M2	314-040-600*		110,-
1 g - 500 g	E1 - M2	314-050-600*		134,-
1 g - 1 kg	E1 - M2	314-060-600*		164,-
1 g - 2 kg	E1 - M2	314-070-600*		194,-
1 g - 5 kg	E1 - M2	314-080-600***		260,-
1 g - 10 kg	E1 - M2	314-090-600***		345,-

**Weight containers for rectangular weights or other test weights, stainless steel glass bead blasted, adjusted to OIML class M1**

Preconfigured weight containers for testing high-load floor scales, pallet scales, pallet truck scales, crane scales, etc. This can also be used for storing the weights. This means the weight container and the weights can be placed on the balance in one go, saving you time and money. The weight container is adjusted to OIML accuracy class M1. Other OIML accuracy classes are also available, please ask.

Weight of the weight container, OIML class M1	Tol +/- g	Possible equipment, rectangular weights, OIML class M1	Maximum total weight (weight container incl. weights)	Price (weight container excluding weights)	
				KERN	€
20 kg	1,0	5 × 20 kg	120 kg	346-022-005	1690,-
40 kg	1,5	8 × 20 kg	200 kg	346-042-008	2180,-
50 kg	2,5	10 × 20 kg	250 kg	346-052-010	2180,-
50 kg	2,5	4 × 50 kg	250 kg	346-055-004	2180,-
50 kg	2,5	9 × 50 kg	500 kg	346-055-009	2180,-
60 kg	3,0	8 × 50 kg and 2 × 20 kg	500 kg	346-065-009	2370,-



Weight of the weight container, OIML class M1	Tol +/- g	Possible equipment, test weights, OIML class M1	Maximum total weight (weight container incl. weights)	Price (weight container excluding weights)	
				KERN	€
20 kg	1,0	max. 10 × 10 kg or 5 × 20 kg	120 kg	347-022-005	1690,-
40 kg	2,0	max. 16 × 10 kg or 8 × 20 kg	200 kg	347-042-008	1990,-
50 kg	2,5	max. 20 × 10 kg or 10 × 20 kg	250 kg	347-052-010	2180,-
60 kg	3,0	max. 22 × 20 kg	500 kg	347-062-022	2370,-



**Individual weight containers for rectangular weights or other test weights, calibrated to OIML class M1**

Individual weight carriers for testing high capacity floor scales, pallet scales, pallet truck scales, crane scales, etc. This can also be used for storing the weights. This means the weight container and the weights can be placed on the scale in one go, saving time and money.

The weight container can be calibrated to OIML accuracy classes M1 – M3. On request, KERN will make you a “tailor-made” weight carrier to your specifications.

Example:

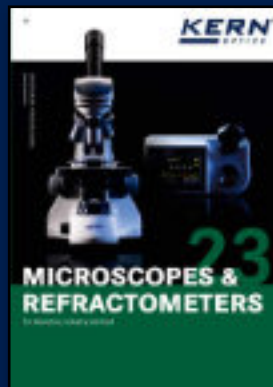
3 block weights	each 50 kg, class M1 =	150 kg
1 weight container	each 50 kg, class M1 =	50 kg
Total		= 200 kg

Weight of the weight container, OIML class M1	Price	
	KERN	€
Individual weight container for rectangular weights	346-000-000	Price on request
Individual weight container for test weights	347-000-000	Price on request



Example illustration

# ASSORTMENT RANGE LEADER AND HIDDEN CHAMPION IN THE REGION: KERN WEIGHING & MEASURING TECHNOLOGY



# 18

## 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 at [www.kern-lab.com](http://www.kern-lab.com)

### DAkkS calibration

**Why?** DAkkS calibration is always necessary when checking equipment (balance or test weight) is to be used in a QM process (e.g. to ISO 9000ff, GS 9000, TS 16949, VDA 6.1, FDA, GLP, GMP, GMP etc.)

**What?** Any checking equipment in proper condition can be DAkkS calibrated

**How?** Determination of accuracy throughout the world by a laboratory which is accredited to DIN EN ISO 17025. Traceability to internationally recognised standards. The DAkkS calibration certificate confirms both the measurement characteristics of the checking equipment and the general requirements for the control of checking equipment.

**Where?** Internationally recognised – this is monitored by ILAC (International Laboratory Accreditation Cooperation) and e.g. DAkkS (German calibration service) in Germany

**When?** The operator controls the use of checking equipment and periodic recalibration time intervals themselves

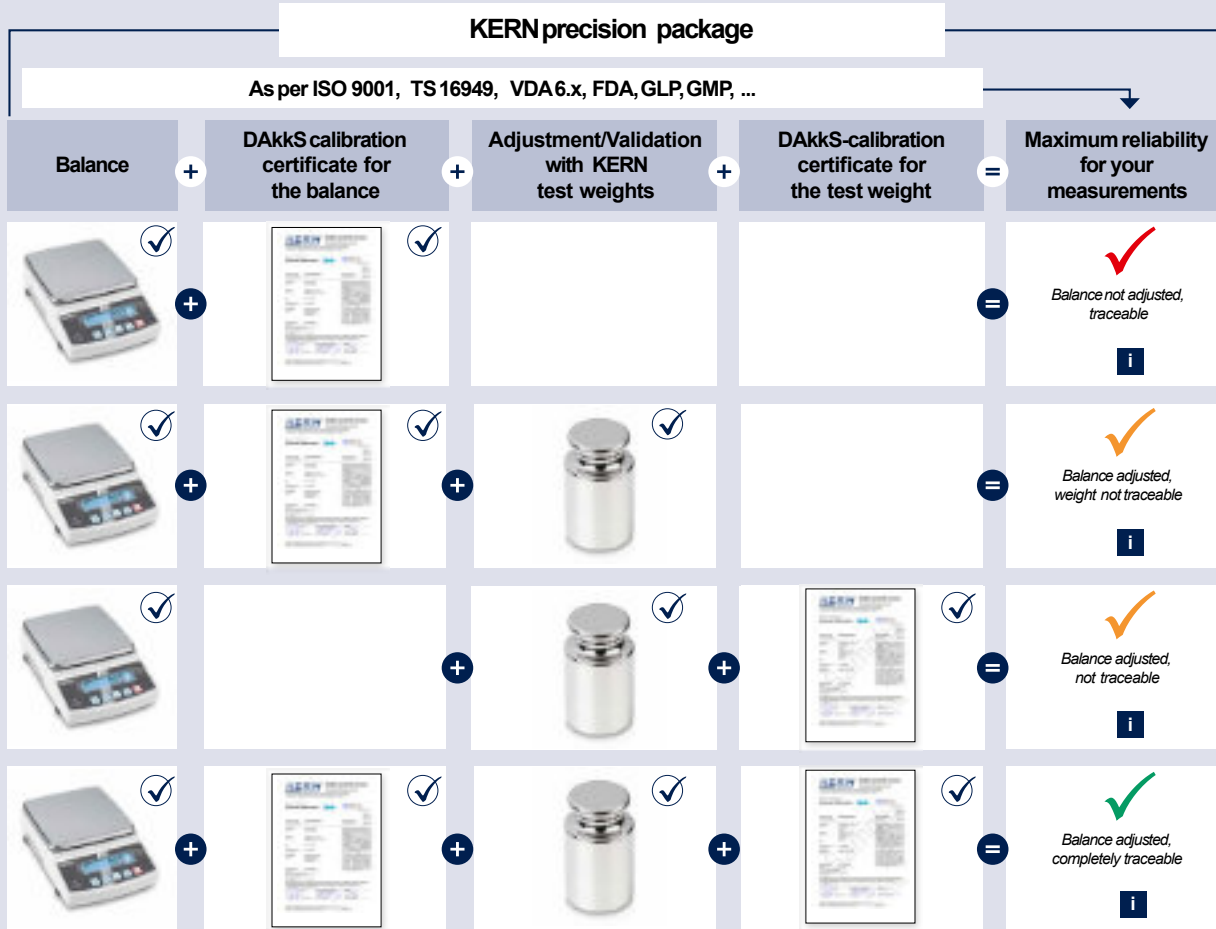
### Range of services:

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

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

## Balance & weight in the quality management system

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



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

### The KERNcalibration laboratory (D-K-19408-01-00)

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

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

### We offer the following services:

#### Waagen:

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

#### 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 DAKK S 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

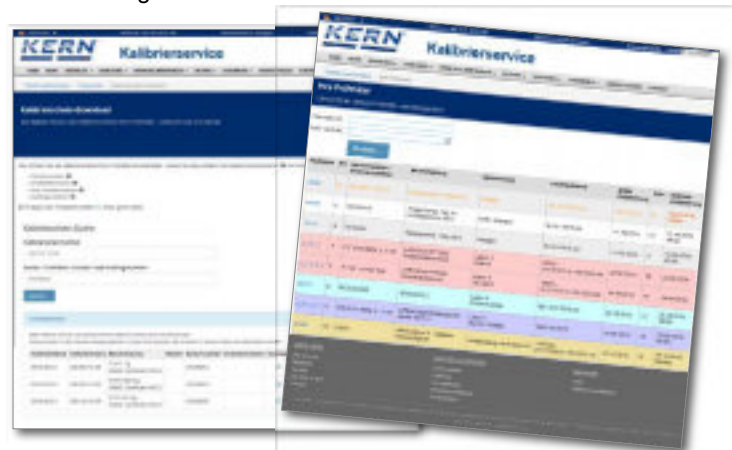
Information on your test equipment which has been calibrated by us is stored in our database. In this way it is possible to make trend calculations. You will therefore get an overview about the long-term stability and trend behaviour of your test equipment as well as the necessary recalibration period 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 THE KERN ON-SITE CALIBRATION:

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



#### 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.

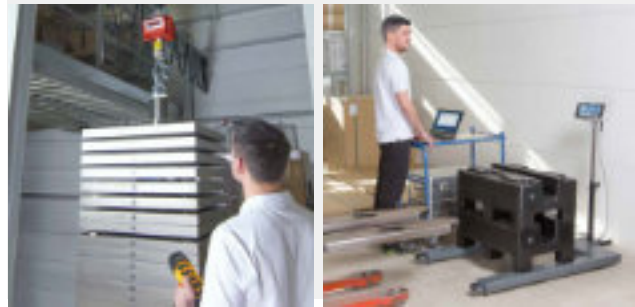
**This KERN calibration service is also independent of the brand.**

Please feel free to contact us at Phone +49 7433 9933-400 or E-Mail: [testservices-onsite@kern-sohn.com](mailto:testservices-onsite@kern-sohn.com)



### THE ADVANTAGES OF USING THE KERN IN-HOUSE CALIBRATION:

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



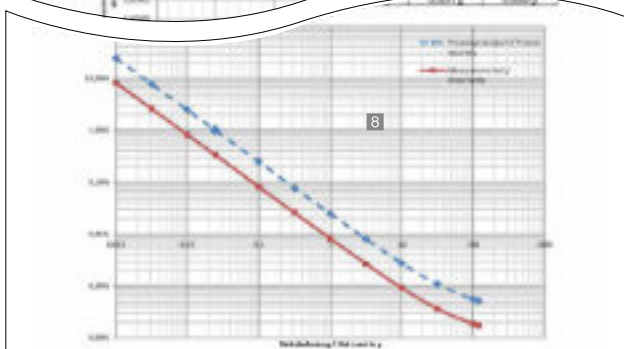
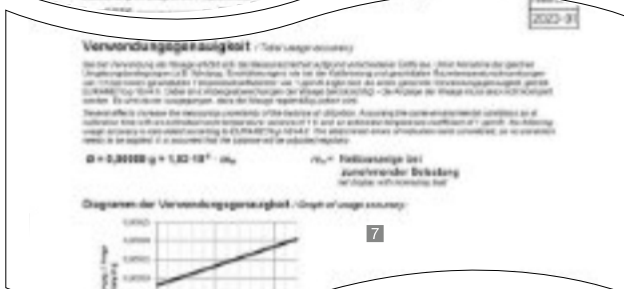
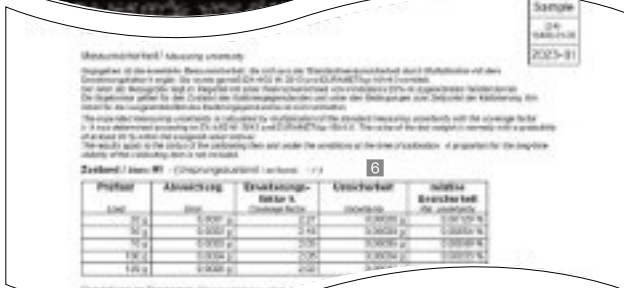
#### b) Calibration at the KERN factory (you send your balance to us)

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.

Please feel free to contact us at Phone +49 7433 9933-400 or E-Mail: [recalibration-balances@kern-sohn.com](mailto:recalibration-balances@kern-sohn.com)



DAkkScalibration certificate for balances (extract)

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

**Recalibration**

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



Initial calibration and recalibration of balance at the KERNfactory	KERN	Price excl. of VAT ex works €
<b>Weighing capacity</b>		
<b>Analytical balances</b>		
[Max] ≤ 5 kg	963-101	182,-
[Max] > 5 kg	963-102	230,-
<b>Precision balances/Industrial scales</b>		
[Max] ≤ 5 kg	963-127	93,-
[Max] > 5 kg – 50 kg	963-128	112,-
[Max] > 50 kg – 350 kg	963-129	139,-
[Max] > 350 kg – 1500 kg	963-130	196,-
[Max] > 1500 kg – 2900 kg <sup>1)</sup>	963-131	260,-
[Max] > 2900 kg – 6000 kg <sup>1)</sup>	963-132	520,-
[Max] > 6000 kg – 12000 kg <sup>1)</sup>	963-133	590,-
<b>Hanging scales/Crane scales</b>		
[Max] ≤ 5 kg	963-127H	93,-
[Max] > 5 kg – 50 kg	963-128H	112,-
[Max] > 50 kg – 350 kg	963-129H	131,-
[Max] > 350 kg – 1500 kg	963-130H	235,-
[Max] > 1500 kg – 2900 kg	963-131H	355,-
[Max] > 2900 kg – 6000 kg	963-132H	590,-
[Max] > 6000 kg – 12000 kg <sup>3)</sup>	963-133H	830,-
<b>Preparation for recalibration</b> (cleaning, adjustment, function test)	969-003R	24,-
<b>Additional services</b>		
<b>Minimum weight of sample (for details see page 215)</b>	969-103	10,-
Additional measurement points (as part of the) weighing test	963-140	5,20/ measurement point
Additional measurement points (as part of the) repeatability testing	963-140	5,20/ each further measurement point
DAkkS Express service with delivery time 48 hours (only on initial purchase, details see p. 210)	962-116	52,-/ scale
Express shipping: Express supplement for guaranteed delivery on the next working day (if ready for shipment before 12:00 noon)	962-115 <small>(in GERonly (other countries on request))</small>	21,-/ parcel

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

- |                              |  |   |
|------------------------------|--|---|
| 1 Official document          | 4 Identification/Applicant                 | 7 Application accuracy, see page 223          |
| 2 Item to be calibrated      | 5 Metrological component                   | 8 Minimum weight of sample (additional price) |
| 3 Traceability, see page 225 | 6 Uncertainty of measurement, see page 225 |   |

## 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.

## 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.

## 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:

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.

### Pricing table for adjustment at the location of installation

Weighing capacity	KERN	Price excl. of VAT ex works €
[Max] ≤ 5 kg	961-247	39,-
[Max] > 5 – 50 kg	961-248	48,-
[Max] > 50 – 350 kg	961-249	56,-
[Max] > 350 – 1500 kg	961-250	90,-
[Max] > 1500 – 2900 kg	961-251	119,-
[Max] > 2900 – 6000 kg	961-252	240,-
[Max] > 6000 – 12000 kg	961-253	270,-

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.

Conformity evaluation on the basis of the:	KERN	Price excl. of VAT ex works €
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 (Details see [www.kern-lab.com](http://www.kern-lab.com))

### 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: |[Deviation]| + [extended measuring uncertainty] ≤ [tolerance]

## Documented quality of your balances in the log book

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

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

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

### Our proposal: Count on our support!

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

We give you advice already when selecting a new device, for example KERNADB/ADJ, ALS/ALJ, ABS/ABJ, ACJ, ABT, ABP, PLS/PLJ, PNS/PNJ, EG-N, PBS/PBJ, PES/PEJ, about the options of device qualification, as required and will be happy to set up an appointment for qualification at the place of installation. We offer individual calibration and maintenance agreements for the periodically required requalification.

Further information can be found at [www.kern-lab.com](http://www.kern-lab.com)



## 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.



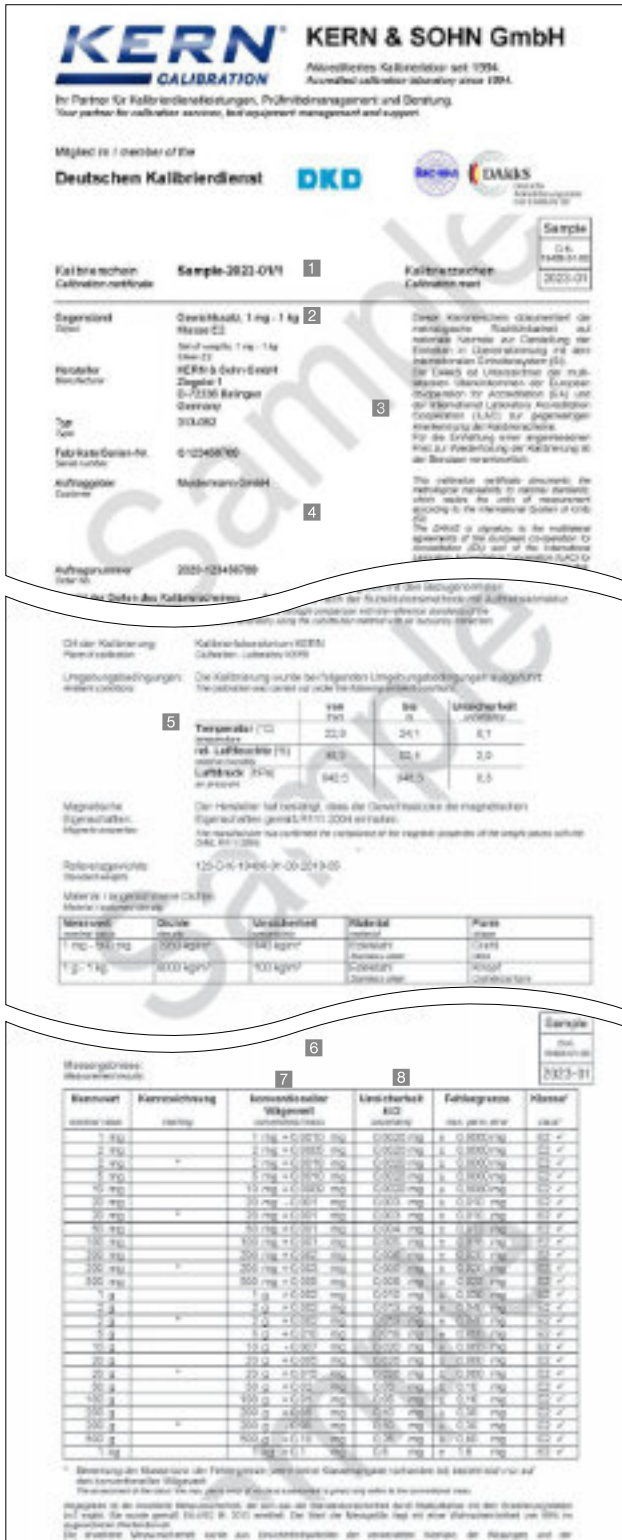
### Performance qualification (PQ)

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). If the balance or weighing system is "merely" to be used for weighing it will not be necessary to carry out a PQ as the ability to function has already been proven during the metrological test (OQ).



### Maintenance qualification (MQ)

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



**DAkkScalibration certificate for test weights (extract).**  
For more details on our calibration service and other useful information, please see the internet at [www.kern-lab.com](http://www.kern-lab.com)

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

## Traceable KERNtest weights –

### Calibration of test weights

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

### KERNwill calibrate your test weights

- In all classes with permissible error limits E1–M3 according to OIML R111:2004 (for tolerance tables, see page 180), in sizes 1 mg to 2500 kg.
- With free nominal value
- Newton (N)
- Independent of design (special designs)

### The advantages of using the KERNin-house calibration

You send your test weights to us.

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

### The advantages of using the KERNon-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

# Recalibration price of test weights (DAkkS calibration)

Class acc.	→ E1 with volume determination	E1 without volume determination	E2	F1/F2 * F2 only	M1/M2/M3					
Nominal value ↓	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works	KERN	Price € excl. of VAT ex works
1 mg	–	–	962-251R	72,-	962-351R	32,-	962-451R	21,-	962-651R	17,-
2 mg	–	–	962-252R	72,-	962-352R	32,-	962-452R	21,-	962-652R	17,-
5 mg	–	–	962-253R	72,-	962-353R	32,-	962-453R	21,-	962-653R	17,-
10 mg	–	–	962-254R	72,-	962-354R	32,-	962-454R	21,-	962-654R	17,-
20 mg	–	–	962-255R	72,-	962-355R	32,-	962-455R	21,-	962-655R	17,-
50 mg	–	–	962-256R	72,-	962-356R	32,-	962-456R	21,-	962-656R	17,-
100 mg	–	–	962-257R	72,-	962-357R	32,-	962-457R	21,-	962-657R	17,-
200 mg	–	–	962-258R	72,-	962-358R	32,-	962-458R	21,-	962-658R	17,-
500 mg	–	–	962-259R	72,-	962-359R	32,-	962-459R	21,-	962-659R	17,-
1 g	963-231	235,-	962-231R	72,-	962-331R	32,-	962-431R	21,-	962-631R	17,-
2 g	963-232	235,-	962-232R	72,-	962-332R	32,-	962-432R	21,-	962-632R	17,-
5 g	963-233	235,-	962-233R	72,-	962-333R	32,-	962-433R	21,-	962-633R	17,-
10 g	963-234	235,-	962-234R	72,-	962-334R	32,-	962-434R	21,-	962-634R	17,-
20 g	963-235	235,-	962-235R	72,-	962-335R	32,-	962-435R	21,-	962-635R	17,-
50 g	963-236	235,-	962-236R	72,-	962-336R	32,-	962-436R	21,-	962-636R	17,-
100 g	963-237	235,-	962-237R	72,-	962-337R	40,-	962-437R	23,-	962-637R	19,-
200 g	963-238	235,-	962-238R	72,-	962-338R	40,-	962-438R	23,-	962-638R	19,-
500 g	963-239	235,-	962-239R	72,-	962-339R	40,-	962-439R	23,-	962-639R	19,-
1 kg	963-241	235,-	962-241R	72,-	962-341R	40,-	962-441R	23,-	962-641R	19,-
2 kg	963-242	520,-	962-242R	89,-	962-342R	49,-	962-442R	29,-	962-642R	20,-
5 kg	963-243	520,-	962-243R	89,-	962-343R	49,-	962-443R	29,-	962-643R	20,-
10 kg	963-244	520,-	962-244R	89,-	962-344R	49,-	962-444R	29,-	962-644R	20,-
20 kg	963-245	1280,-	962-245R	720,-	962-345R	64,-	962-445R	33,-	962-645R	25,-
50 kg	963-246	1500,-	962-246R	800,-	962-346R	74,-	962-446R	45,-	962-646R	27,-
100 kg	–	–	–	–	–	–	962-591R*	134,-	962-691R	72,-
200 kg	–	–	–	–	–	–	962-592R*	134,-	962-692R	72,-
500 kg	–	–	–	–	–	–	962-593R*	134,-	962-693R	72,-
1000 kg	–	–	–	–	–	–	–	–	962-694R	158,-
2000 kg	–	–	–	–	–	–	–	–	962-695R	290,-
1 mg–500 mg	–	–	962-250R	465,-	962-350R	220,-	962-450R	116,-	962-650R	72,-
1 mg–50 g	963-201	1330,-	962-201R	770,-	962-301R	360,-	962-401R	193,-	962-601R	123,-
1 mg–100 g	963-202	1450,-	962-202R	790,-	962-302R	395,-	962-402R	205,-	962-602R	129,-
1 mg–200 g	963-203	1670,-	962-203R	870,-	962-303R	455,-	962-403R	230,-	962-603R	145,-
1 mg–500 g	963-204	1770,-	962-204R	910,-	962-304R	485,-	962-404R	240,-	962-604R	151,-
1 mg–1 kg	963-205	1890,-	962-205R	980,-	962-305R	520,-	962-405R	250,-	962-605R	159,-
1 mg–2 kg	963-206	2460,-	962-206R	1040,-	962-306R	570,-	962-406R	290,-	962-606R	175,-
1 mg–5 kg	963-207	2750,-	962-207R	1080,-	962-307R	610,-	962-407R	305,-	962-607R	185,-
1 mg–10 kg	963-208	3130,-	962-208R	1120,-	962-308R	650,-	962-408R	330,-	962-608R	193,-
1 g–50 g	963-215	960,-	962-215R	340,-	962-315R	149,-	962-415R	78,-	962-615R	48,-
1 g–100 g	963-216	1050,-	962-216R	370,-	962-316R	178,-	962-416R	89,-	962-616R	57,-
1 g–200 g	963-217	1280,-	962-217R	445,-	962-317R	235,-	962-417R	113,-	962-617R	70,-
1 g–500 g	963-218	1390,-	962-218R	490,-	962-318R	270,-	962-418R	126,-	962-618R	79,-
1 g–1 kg	963-219	1520,-	962-219R	520,-	962-319R	300,-	962-419R	138,-	962-619R	85,-
1 g–2 kg	963-220	2130,-	962-220R	600,-	962-320R	370,-	962-420R	174,-	962-620R	103,-
1 g–5 kg	963-221	2500,-	962-221R	620,-	962-321R	415,-	962-421R	192,-	962-621R	111,-
1 g–10 kg	963-222	2910,-	962-222R	670,-	962-322R	450,-	962-422R	210,-	962-622R	120,-

Additional costs for preparation, overhaul and adjustment before the calibration	KERN	Price excl. of VAT ex works €
<b>Preparation of weights (e.g. cleaning, etc.)</b>		
Single weight	969-001R	5,-
Weight set	969-002R	20,-
<b>Subsequent services are carried out after confirmation</b>		
Continued overhaul of weights (e.g. wet-cleaning, markings, repair, special packaging, adjustment E1 (DAkkS only), E2 ...)	969-005R	<b>T &amp; M basis</b>
Adjustment, per weight only available for weights with adjustment chamber (F1–M3)	969-010R	15,-
<b>Second calibration after adjustment or substitution, per weight</b>		
Class E1	969-210R	63,-
Class E1 incl. volume determination	969-211R	230,-
Class E2	969-310R	30,-
Class F1/F2	969-410R	20,-
Class M1–M3	969-610R	16,-
<b>Testing of magnetic properties according to OIML R111:2004, per weight</b>	961-115(R)	15,-
<b>Calibration of NON-OIML test weights, additional price per weight</b>	–	8,-

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



**DAkkS Express service in 48 hours** except for class E1

- Urgent order is received at KERN by 12:00 noon at the latest
- Ready for shipping at KERN within two working days, at 12:00 noon
- Return by standard parcel service or express shipping (Costs and processing time on request)
- Additional cost for DAkkS Express Service, for each KERN test weight KERN 962-115 € 21,-
- For Express shipping, see page 214

## Verification prices for test weights and (crane) scales

Class acc. OIMLR111:2004	→ E2 with verification certificate		F1 with verification certificate		M1 with verification certificate	
	Nominal value ↓	KERN	Price excl. of VAT ex works €	KERN	Price excl. of VAT ex works €	KERN
1 mg	952-351	51,-	952-451	44,-	952-651	30,-
2 mg	952-352	51,-	952-452	44,-	952-652	30,-
5 mg	952-353	51,-	952-453	44,-	952-653	30,-
10 mg	952-354	51,-	952-454	44,-	952-654	30,-
20 mg	952-355	51,-	952-455	44,-	952-655	30,-
50 mg	952-356	51,-	952-456	44,-	952-656	30,-
100 mg	952-357	51,-	952-457	44,-	952-657	30,-
200 mg	952-358	51,-	952-458	44,-	952-658	30,-
500 mg	952-359	51,-	952-459	44,-	952-659	30,-
1 g	952-331	51,-	952-431	44,-	952-631	30,-
2 g	952-332	51,-	952-432	44,-	952-632	30,-
5 g	952-333	51,-	952-433	44,-	952-633	30,-
10 g	952-334	51,-	952-434	44,-	952-634	30,-
20 g	952-335	51,-	952-435	44,-	952-635	30,-
50 g	952-336	51,-	952-436	44,-	952-636	30,-
100 g	952-337	57,-	952-437	44,-	952-637	30,-
200 g	952-338	57,-	952-438	46,-	952-638	30,-
500 g	952-339	57,-	952-439	46,-	952-639	30,-
1 kg	952-341	57,-	952-441	46,-	952-641	30,-
2 kg	952-342	65,-	952-442	51,-	952-642	32,-
5 kg	952-343	65,-	952-443	51,-	952-643	32,-
10 kg	952-344	65,-	952-444	51,-	952-644	40,-
20 kg	952-345	75,-	952-445	53,-	952-645	46,-
50 kg	-	-	952-446	64,-	952-646	48,-
1 mg-500 mg	952-350	255,-	952-450	134,-	952-650	84,-
1 mg-50 g	952-301	420,-	952-401	220,-	952-601	140,-
1 mg-100 g	952-302	455,-	952-402	240,-	952-602	149,-
1 mg-200 g	952-303	510,-	952-403	265,-	952-603	166,-
1 mg-500 g	952-304	550,-	952-404	275,-	952-604	174,-
1 mg-1 kg	952-305	570,-	952-405	290,-	952-605	183,-
1 mg-2 kg	952-306	660,-	952-406	330,-	952-606	200,-
1 mg-5 kg	952-307	710,-	952-407	355,-	952-607	215,-
1 mg-10 kg	952-308	750,-	952-408	380,-	952-608	220,-
1 g-50 g	952-315	168,-	952-415	97,-	952-615	64,-
1 g-100 g	952-316	200,-	952-416	103,-	952-616	68,-
1 g-200 g	952-317	260,-	952-417	131,-	952-617	81,-
1 g-500 g	952-318	300,-	952-418	145,-	952-618	90,-
1 g-1 kg	952-319	325,-	952-419	159,-	952-619	99,-
1 g-2 kg	952-320	405,-	952-420	200,-	952-620	118,-
1 g-5 kg	952-321	450,-	952-421	220,-	952-621	129,-
1 g-10 kg	952-322	495,-	952-422	245,-	952-622	138,-

## KERN verification delivery time

Standard verification service Class E2-M1 6 working days

**Additional costs** KERN Price excl. of VAT ex works €  
for preparation, overhaul and adjustment before the verification

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

Single weight	969-008R	5,-
Weight set	969-009R	19,-

### Subsequent services are carried out after confirmation

Continued overhaul of weights (e.g. wet-cleaning, markings, repair, special packaging, adjustment E2 ...)	969-005R	T & M basis
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Adjustment, per weight only available for weights with adjustment chamber (F1/F2-M1)	969-010R	15,-
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### Verification after adjustment or substitution, per weight

Class E2	969-310R	30,-
Class F1/F2	969-410R	20,-
Class M1	969-610R	16,-

## Verification prices for balances

Accuracy class I (precision balances) <sup>1)</sup>	Reverification KERN	Price excl. of VAT ex works €
[Max] ≤ 5 kg <sup>1)</sup>	950-101R	225,-
[Max] > 5 kg <sup>1)</sup>	950-102R	290,-
<b>Accuracy class II (precision balances) <sup>1)</sup></b>		
[Max] ≤ 5 kg <sup>1)</sup>	950-116R	114,-
[Max] > 5 kg - 50 kg <sup>1)</sup>	950-117R	139,-
[Max] > 50 kg - 350 kg <sup>1)</sup>	950-118R	215,-
<b>Accuracy class III-IV <sup>1)</sup></b>		
<b>Bench scales and industrial scales (excl. crane scales)</b>		
[Max] ≤ 5 kg <sup>1)</sup>	950-127R	109,-
[Max] > 5 kg - 50 kg <sup>1)</sup>	950-128R	109,-
[Max] > 50 kg - 350 kg <sup>1)</sup>	950-129R	175,-
[Max] > 350 kg - 1500 kg <sup>1)</sup>	950-130R	255,-
[Max] > 1500 kg - 2900 kg <sup>1)</sup>	950-131R	355,-
[Max] > 2900 kg - 6000 kg <sup>1)</sup>	950-132R	550,-
<b>Crane scales</b>		
[Max] > 50 kg - 350 kg <sup>1)</sup>	950-129HR	190,-
[Max] > 350 kg - 1500 kg <sup>1)</sup>	950-130HR	315,-
[Max] > 1500 kg - 2900 kg <sup>1)</sup>	950-131HR	455,-
[Max] > 2900 kg - 6000 kg <sup>1)</sup>	950-132HR	690,-
[Max] > 6000 kg - 12000 kg <sup>1)</sup>	950-133HR	1100,-

<sup>1)</sup> Processing time 4 working days, <sup>2)</sup> Processing time 15 working days, <sup>12)</sup> Preparation of reverification of balances, 969-006R, € 24,-

The force gauge

## Accredited calibration with DAkkS calibration certificate for force gauges

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

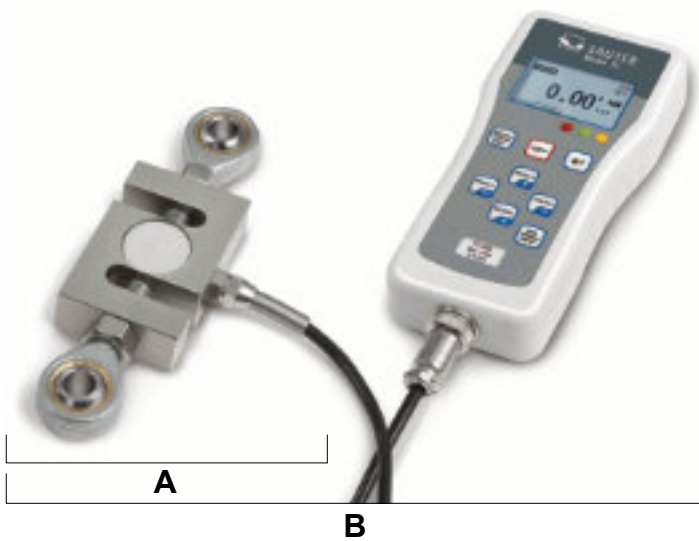
From the transducer to the full measuring chain, we are happy to take care of traceable calibration of your test equipment for you. Our accreditation includes the calibration of tensile and pressure force up to 5 kN according to the standards DIN EN ISO 376 and DKD-R3-3, each with the Newton (N) display 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-R3-3

	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 Standard is sequence A B, C and D are reduced sequences, relevant previous knowledge is necessary
<b>Summary</b>	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

You can find further information on this topic at: [www.kern-lab.com](http://www.kern-lab.com)



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



## 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-R3-3 (5 stages, sequence A)		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
<b>Tensile force:</b>					
963-161IV (R)	≤ 500 N	225,-	963-161V (R)	≤ 500 N	210,-
963-162IV (R)	≤ 2 kN	270,-	963-162V (R)	≤ 2 kN	250,-
963-163IV (R)	≤ 5 kN	350,-	963-163V (R)	≤ 5 kN	325,-
<b>Compression force:</b>					
963-261IV (R)	≤ 500 N	225,-	963-261V (R)	≤ 500 N	210,-
963-262IV (R)	≤ 2 kN	270,-	963-262V (R)	≤ 2 kN	250,-
963-263IV (R)	≤ 5 kN	350,-	963-263V (R)	≤ 5 kN	325,-
<b>Tensile and Compression force:</b>					
963-361IV (R)	≤ 500 N	375,-	963-361V (R)	≤ 500 N	350,-
963-362IV (R)	≤ 2 kN	450,-	963-362V (R)	≤ 2 kN	420,-
963-363IV (R)	≤ 5 kN	600,-	963-363V (R)	≤ 5 kN	550,-

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

ISO 376 (8 stages)			DKD-R3-3 (5 stages, sequence A)		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
<b>Tensile force:</b>					
963-161I (R)	≤ 500 N	186,-	963-161 (R)	≤ 500 N	168,-
963-162I (R)	≤ 2 kN	225,-	963-162 (R)	≤ 2 kN	205,-
963-163I (R)	≤ 5 kN	310,-	963-163 (R)	≤ 5 kN	285,-
<b>Compression force:</b>					
963-261I (R)	≤ 500 N	186,-	963-261 (R)	≤ 500 N	168,-
963-262I (R)	≤ 2 kN	225,-	963-262 (R)	≤ 2 kN	205,-
963-263I (R)	≤ 5 kN	310,-	963-263 (R)	≤ 5 kN	285,-
<b>Tensile and Compression force:</b>					
963-361I (R)	≤ 500 N	335,-	963-361 (R)	≤ 500 N	305,-
963-362I (R)	≤ 2 kN	415,-	963-362 (R)	≤ 2 kN	375,-
963-363I (R)	≤ 5 kN	560,-	963-363 (R)	≤ 5 kN	500,-

## Factory calibration for force

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

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

Situation A: Force transducer (voltage ratio, in mV/V) <sup>*1,2</sup>			Situation B: Complete force gauge (in N) <sup>*2</sup>		
KERN	Measuring range	Price € ex works excl. of VAT	KERN	Measuring range	Price € ex works excl. of VAT
<b>Tensile force:</b>					
961-161V (R)	≤ 500 N	210,-	961-161 (R)	≤ 500 N	168,-
961-162V (R)	≤ 2 kN	250,-	961-162 (R)	≤ 2 kN	205,-
961-163V (R)	≤ 5 kN	325,-	961-163 (R)	≤ 5 kN	285,-
961-164V (R)	≤ 20 kN	415,-	961-164 (R)	≤ 20 kN	370,-
961-165V (R)	≤ 50 kN	415,-	961-165 (R)	≤ 50 kN	370,-
961-166V (R)	≤ 250 kN	445,-	961-166 (R)	≤ 120 kN	410,-
<b>Compression force:</b>					
961-261V (R)	≤ 500 N	210,-	961-261 (R)	≤ 500 N	168,-
961-262V (R)	≤ 2 kN	250,-	961-262 (R)	≤ 2 kN	205,-
961-263V (R)	≤ 5 kN	325,-	961-263 (R)	≤ 5 kN	285,-
961-264V (R)	≤ 20 kN	415,-	961-264 (R)	≤ 20 kN	370,-
961-265V (R)	≤ 50 kN	415,-	961-265 (R)	≤ 50 kN	370,-
961-266V (R)	≤ 250 kN	445,-	961-266 (R)	≤ 120 kN	410,-
<b>Tensile and Compression force:</b>					
961-361V (R)	≤ 500 N	350,-	961-361 (R)	≤ 500 N	305,-
961-362V (R)	≤ 2 kN	420,-	961-362 (R)	≤ 2 kN	375,-
961-363V (R)	≤ 5 kN	550,-	961-363 (R)	≤ 5 kN	500,-
961-364V (R)	≤ 20 kN	590,-	961-364 (R)	≤ 20 kN	550,-
961-365V (R)	≤ 50 kN	590,-	961-365 (R)	≤ 50 kN	550,-
961-366V (R)	≤ 250 kN	650,-	961-366 (R)	≤ 120 kN	600,-

(R): Recalibration

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

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

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

## Factory calibration certificates

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

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

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

**For up-to-date information on test services for further measuring variables please see p. 221 or visit our website [www.kern-lab.com](http://www.kern-lab.com)**

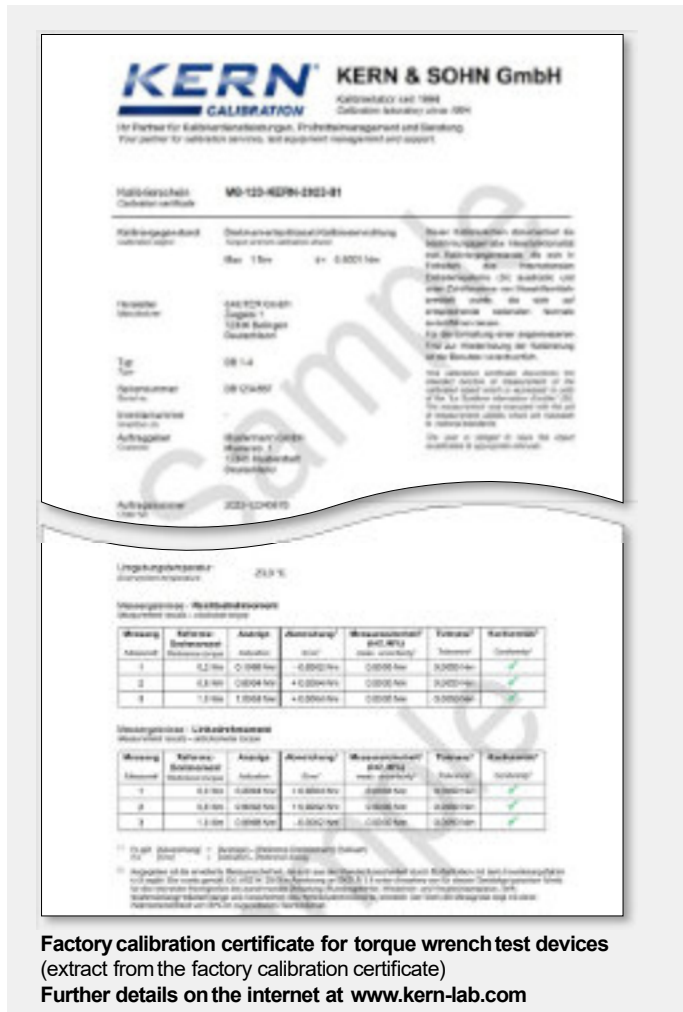
KERN	Measuring device	Measuring range	Price excl. of VAT ex works €
<b>Factory calibration</b>			
961-110	Coating thickness	≤ 2000 µm F or N	150,-
961-112	Coating thickness	≤ 2000 µm FN	210,-
961-113	Wall thickness (ultra sound)	≤ 300 mm (in stainless steel)	150,-
961-114	Wall thickness (Test blocks)	≤ 300 mm	187,-
961-170	Hardness comparison plate (Shore)	For sets up to 7 plates	119,-
961-131	Hardness tester (Leeb)	400–800 HLD	150,-
961-132	Hardness comparison plate (Leeb)	Hardness comparison plate (for Leeb durometer)	150,-
961-270	Hardness (UCI)	200 - 800 HV	325,-
961-150	Length	≤ 300 mm	150,-
961-190	Light	≤ 200000 lx	205,-
961-100	Mechanical balances/ spring balances	≤ 5 kg	89,-
961-101	Mechanical balances/ spring balances	> 5–50 kg	110,-
961-102	Mechanical balances/ spring balances	> 50–350 kg	131,-
961-103	Mechanical balances/ spring balances	> 350–1500 kg	205,-
961-102K	Digital dynamometer KERN MAP	≤ 130 kg	150,-
961-120 (R)	Torque wrench test devices	1 Nm - 200 Nm	210,-
964-305	Temperature calibration for moisture analyzer*		174,-
<b>Additional services</b>			
962-116	Express service with 48 hour delivery		52,-/ instrument

(R): Recalibration

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

\*Calibration available for the following models:

DAB 100-3, DAB 200-2, DBS-60-3, DLB 160-3A, MLS 150-2A, MLS 65-3A, MLB 50-3N, MLB 50-3C, MLB 50-3, DLT 100-3N, MLS 50-3D, MLS 50-3C



**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 DKD calibration certificate.

**ATEX**

Derived from **AT**mosphère **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 DKD/DAkkS**

See product group 18 "Calibration service"

**Calibration or verification**

**DAkkS-Calibration** is possible for every balance in perfect condition. DAkkS 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 ▶ **DAkkS calibration (DKD)** 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/m<sup>3</sup>, air density is 1.2 kg/m<sup>3</sup> 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 DKD/DAkkS**

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 weighing 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).

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

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

$\rho$  = Density of sample

A = Weight of sample in air

B = Weight of sample in auxiliary liquid

$\rho_0$  = Density of the auxiliary liquid

## Glossary

Applications:

- Pre-packaged goods control, whenever a product is sold according to its volume [cm<sup>3</sup>]. This volume is calculated with weight [g] : density [g/cm<sup>3</sup>].
- 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: 50g = balance display 100%. After drying 40g = 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 6000g, Tare (= container) 470g, available weighing range 5530g.

**Test weight, external (previously calibration weight)**

For adjusting or checking the balance accuracy **►Adjusting the weighing range.** The external test weight can be DAkkS calibrated 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.** 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:

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

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

**Verification of a balance with adjusting program CAEXT**

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 CALINT**

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.