Digital Force Gauge

FH

PROFESSIONAL MEASURING

English Version

Operating instructions digital force gauge

Version 3.0
2024-01
en
FH-BA-e-2430

English

SAUTER FH

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Operating instructions digital force gauge

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Table of contents:

1 Technical data

1.1 Technical data FH with internal load cell up to 500N

Model	FH 2	FH 5	FH 10	FH 20	FH 50	FH 100	FH 200	FH 500
Type	TFH 2-B	TFH 5-B	TFH 10-B	TFH 20-B	TFH 50-B	TFH 100-B	TFH 200-B	TFH 500-B
Capacity	2N	5N	10N	20N	50N	100N	200N	500N
Measurement uncertainty	±0.5% of max (measuring range)							
Labour temperature	10°C to 30°C							
Relative humidity	15% to 80% humidity							
Weight	Approx. 582 g							
Dimensions Display unit (LxWxH)	225x66x36mm							
Thread	M6							
Accessories	Standard attachments Core AC 43							

1.2 Technical data FH with external load cell up to 500N

Model	FH 50 ext	FH 100 ext	FH 200 ext	FH 500 ext
Type	TFH 50 EXT-B	TFH 100 EXT-B	TFH 200 EXT-B	TFH 500 EXT-B
Capacity	50N	100N	200N	500N
Measurement uncertainty	±0.5% of max (measuring range)			
Labour temperature	10°C to 30°C			
Relative humidity	15% to 80% humidity			
Display unit weight	Approx. 480 g			
Display unit dimensions (LxWxH)	225x66x36 mm			
Thread	M6			
Accessories	Standard attachments Core AC 43			

1.3 Technical data FH with external load cell from 1kN

Model	FH 1k	FH 2k	FH 5k	FH 10k	FH 20k	FH 50k	FH 100k
Type	TFH 1K-B	TFH 2K-B	TFH 5K-B	TFH 10K-B	TFH 20K-B	TFH 50K-B	TFH 100K-B
Capacity]	1000N	2000N	5000N	10000N	20000N	50000N	100000 N
Measurement uncertainty	±0.5% of max (measuring range)						
Working temperature	10°C to 30°C						
Relative humidity	15% to 80% humidity						
Display unit weight	Approx. 480 g						
Display unit dimensions (LxWxH)	225x66x36 mm						

1.4 Technical data external load cell (from 1kN)

Maximum load	LxWxH	Thread type	Cable length
1 kN	76x51x19mm	M12	Approx. 2.5m
2 kN	76x51x19mm	M12	
5 kN	76x51x28mm	M12	
10 kN	76x51x28mm	M12	
20 kN	76x51x28mm	M12	
50 kN	108x76x25.5mm	M18x1.5	
100 kN	178x125x51mm	M30x2.0	

2 Declaration of Conformity

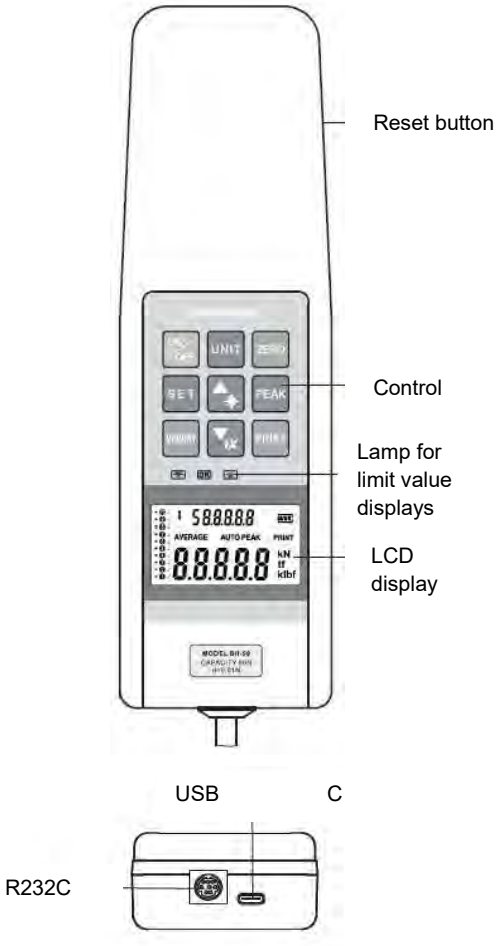
The current EC/EU Declaration of Conformity can be found online at
https://www.kern-sohn.com/shop/de/DOWNLOADS/

3 Device overview

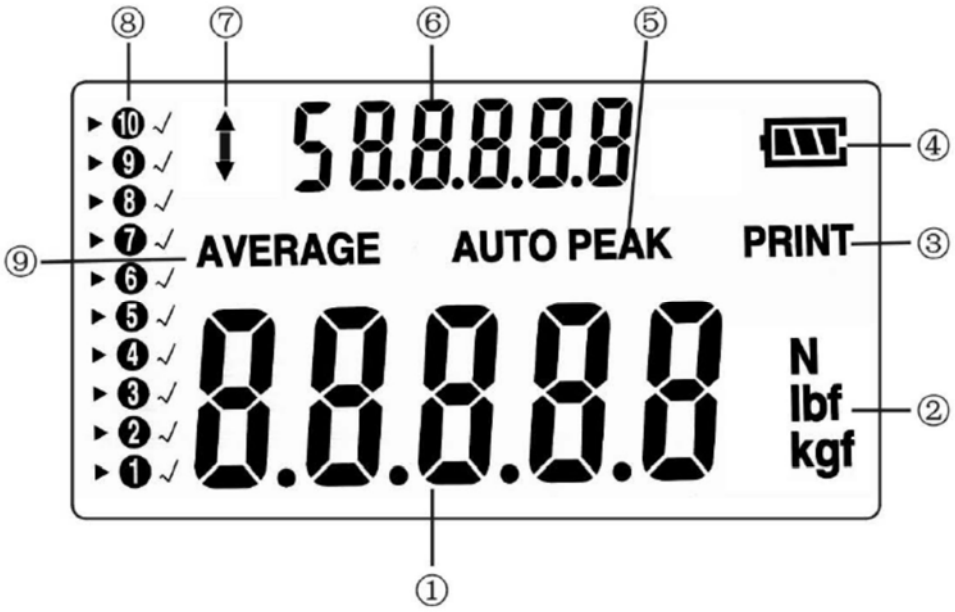
3.1 Scope of delivery

- SAUTER FH, incl. internal battery
- Transport case
- Plug-in power supply
- 5 M3 x 8 screws for mounting on SAUTER test stands
- USB Type-C cable
- Operating instructions
- Standard attachment 6-piece AC 43

3.2 Operating and display elements

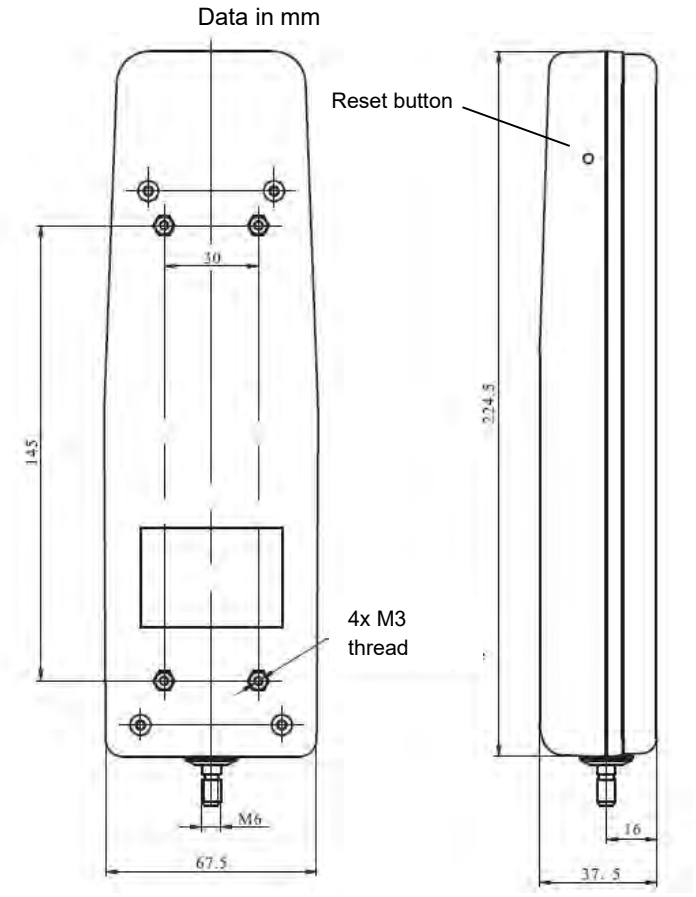


3.2.1 Display indication



Position	Description of the
1	Measurement result
2	Display unit of the measurement result
3	Activating the print function
4	Battery charge level indicator
5	PEAK indicates that peak hold mode is activated. AUTO PEAK only holds the peak value in the display for a defined time
6	Average value or single peak value
7	Display of the direction of force
8	Assignment of the memory locations
9	AVERAGE or memory mode

3.2.2 Dimensions



4 Basic information (general)

4.1 General information on warning notices

Warnings are used in these operating instructions to warn you of possible personal injury or damage to property in certain situations.

Signal word	Description of the
DANGER	Failure to observe the instructions will lead directly to serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
WARNING	Failure to observe the instructions may result in serious injury, permanent impairment (e.g. loss of a limb) or death of the user or third parties
CAUTION	Failure to observe the instructions may result in minor injuries or temporary damage to the user or third parties (e.g. minor cuts)
NOTE	Failure to observe the instructions may result in damage to property

Symbols in warning notices :

Symbol	Meaning
Warning signs	Warning signs warn you of dangers that may lead to personal injury. The symbol indicates the type of hazard.
	Indicates general hazards or a danger point
	Warning of electrical voltage
	Warning of flammable substances
	Warning of explosive substances

4.2 Intended use

Only use the device to measure tensile and compressive forces within the measuring ranges specified in the technical data.
To use the device as intended, only use accessories or spare parts tested by SAUTER. SAUTER offers optional software and accessories to make the measuring device more versatile in use. Please ask SAUTER or the SAUTER supplier for more information or visit our website www.sauter.eu

4.3 Improper use

Do not use the measuring device for medical weighing.
If small quantities of the material to be measured are removed or added, incorrect measurement results may be displayed due to the "stability compensation" in the measuring device! (Example: Liquids flowing slowly out of a container suspended from the measuring cell).
Do not apply a continuous load to the measuring device with external measuring cell.
Do not use the device in potentially explosive atmospheres or for measurements in liquids or on live parts.
Unauthorised structural changes, additions or conversions to the appliance are prohibited.

4.4 Guarantee

Warranty expires with

- Non-compliance with our specifications in the operating instructions
- Use outside the described applications
- Modifying or opening the device
- Mechanical damage and damage caused by media, liquids, natural wear and tear
- Improper set-up or electrical installation
- Overload of the measuring unit
- Improper assembly or electrical installation
- Overloading the measuring cell

5 Basic warnings and safety instructions

1.1 Observe the notes in the operating instructions

Read the operating instructions carefully before commissioning/using the appliance, even if you already have experience with SAUTER appliances. Always keep the instructions in the immediate vicinity of the appliance.

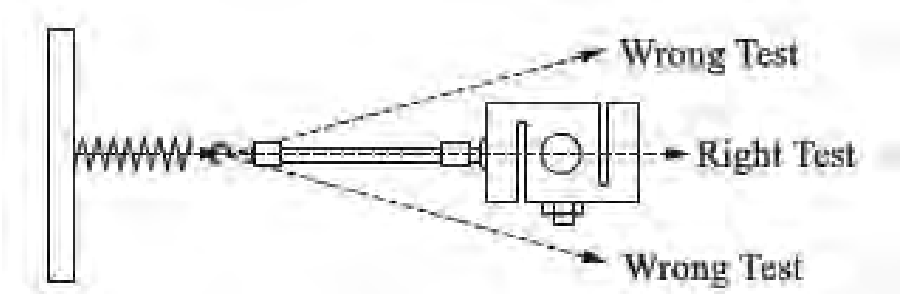
1.2 Staff training

The appliance may only be used by persons who have read and understood the operating instructions, in particular the chapter on safety.

1.3 Security

Incorrectly performed force measurements can lead to serious injury to persons and damage to objects and must therefore only be carried out by trained and experienced personnel.
In particular, it must be avoided that forces act on the purchased measuring device that exceed the maximum device load (Max) or do not act axially on the device via the external load cell; or if high impulse forces act on the measuring device.

Avoid twisting the load cell, otherwise it could be damaged and the measuring accuracy will be reduced in any case.



Please prevent the measuring device from being overloaded beyond the specified maximum load (Max), minus any existing tare load. This can damage the measuring device (risk of breakage!).

⚠ WARNING	
	**Read all safety information and instructions.** Failure to observe the safety information and instructions may result in electric shock, fire and/or serious injury. **Keep all safety information and instructions for future reference.** ● Make sure that there are never people or objects under the load, as they could be injured or damaged! ● The design of the measuring device must not be modified. This can lead to incorrect measurement results, safety-related defects and the destruction of the measuring device

	● Do not operate the appliance in potentially explosive rooms or areas and do not install it there. ● Do not operate the device in an aggressive atmosphere. ● Do not immerse the appliance in water. Do not allow any liquids to penetrate the inside of the appliance. ● The device may only be used in a dry environment and under no circumstances in rain or at a relative humidity above the operating conditions. ● Protect the device from permanent direct sunlight. ● Do not expose the appliance to strong vibrations. ● Do not remove any safety signs, stickers or labels from the appliance. Keep all safety signs, stickers and labels in a legible condition ● Do not open the device

⚠ WARNING	
	**Risk of injury from electric shock!** ● There is a risk of short circuit due to liquids penetrating the housing! ● Do not immerse the appliance and accessories in water. Ensure that no water or other liquids get into the housing. ● Work on electrical components may only be carried out by an authorised specialist company!

⚠ WARNING	
	**Choking hazard!** Do not leave the packaging material lying around carelessly. It could become a dangerous toy for children. ● The appliance is not a toy and does not belong in the hands of children. ● This appliance can be dangerous if it is used improperly or not as intended by untrained persons! Observe the personnel qualifications!

⚠ WARNING	
 	Improper use of rechargeable or non-rechargeable batteries can cause them to catch fire, explode, emit toxic vapours or release corrosive liquids. The following therefore applies to rechargeable and non-rechargeable batteries: ● Protect from fire and heat. ● Never expose to high pressure or microwaves. ● Do not bring into contact with liquids or chemicals. ● Never bring the electrical contacts of rechargeable batteries and batteries into contact with metal objects or short-circuit them. ● Never modify rechargeable batteries, batteries and chargers. ● Batteries must never be charged. ● Never use or charge a defective, damaged or deformed battery.

CAUTION

Keep a sufficient distance from heat sources.

NOTE

● To prevent damage to the device, do not expose it to extreme temperatures, extreme humidity or moisture.
● Do not use harsh cleaning agents, abrasive cleaners or solvents to clean the appliance.

6 Transport and storage

6.1 Note

If you store or transport the device improperly, the device may be damaged. Observe the information on transporting and storing the appliance.

6.2 Transport

When transporting the appliance, use the transport case included in the scope of delivery to protect the appliance from external influences.

6.3 Storage

Observe the following storage conditions when the appliance is not in use:

- dry and protected from frost and heat
- protected from dust ingress in the transport case
- the storage temperature corresponds to the technical data

6.4 Packaging/return transport

Returns are only possible within the limits of the general terms and conditions Keep all parts of the original packaging for any necessary return transport.

- Only the original packaging is to be used for return transport.
- Disconnect all connected cables and loose/movable parts before despatch.
- Refit any transport locks provided.
- Secure all parts against slipping and damage.

7 Unpacking and commissioning

7.1 Unpacking

In the event of a return, please observe the instructions in the chapter "Packaging/return transport

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On receipt of the appliance, you should first check that no damage has occurred in transit, that the outer packaging, the housing, other parts or even the appliance itself have not been damaged. If any damage is evident, please notify SAUTER GmbH immediately.

1.4 Initial commissioning

To ensure that the force gauge functions properly, it must be charged using the charging cable before use.

8 Basic operation

8.1 ON / OFF 

- On / Off button (press button for approx. 1 s)

8.2 UNIT 

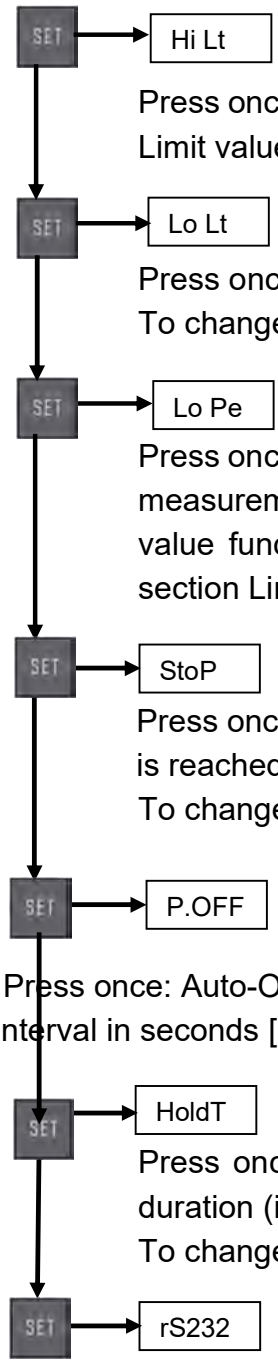
- Press the button briefly: Selection between N, kg and lb
- Press the button for at least 2 seconds: Reverse display

8.3 ZERO 

Assignment with three functions

- Zero setting of the display (tare function)
- Zeroing the peak value (Peak)
- Saving a setting (in SET mode)

8.4 SET



Press once: Upper limit value [HidT / Hi Lt]. To change: ▲ or ▼ (see section Limit value display)

Press once: Lower limit value [LodT].
To change: ▲ or ▼ (see section Limit value display)

Press once: Lower limit value to activate the memory function for peak value measurements (peak). [LE.SET / Lo Pe] (see also section Minimum limit value function) To change: ▲ or ▼ (only activated in "Peak mode", see section Limit value display)

Press once: Auto-stop function to switch off the test stand when a limit force is reached. Setting the limit force.
To change: Press ▲ or ▼.

Press once: Auto-Off function, switch-off when not in use after an adjustable time interval in seconds [P.OFF]. To change: ▲ or ▼ (only activated in battery mode)

Press once: Result hold time [PE.2E / A.PE / HoldT]: Setting the display duration (in seconds) of the peak value (Peak).
To change: ▲ or ▼

Press once: Optional transmission of the output signal [rS232] to PC (PC) or printer (print) or (in version U 5.3) to the test stand (stand)
To change: ▲ or ▼

Note: During the settings, you can save the settings and return to the operating status by pressing the ZERO button.

8.5 Backlight 

8.6 PEAK 

Assignment with three functions:

- Track mode (continuous measurement)
- Peak mode (peak value recording)
- Auto-peak mode, like peak function, but without minimum limit function

8.7 MEMORY 

- Saves the peak value for calculating the average value of the measurement results (see section Saving peak values)

8.8 Delete function 

- Deleting memory values (only in "Memory" mode)

8.9 PRINT 

- Output of the memory contents to PC or printer

8.10 Limit value display Good / Bad

LED display for good / bad tests

▼ Below the lower limit value
● Indicates when the STOP value has been reached
▲ Exceeding the upper limit value

An upper and a lower limit value can be programmed. The measuring device compares the measurement result with the limit values and displays the result in red or green light diodes and with an acoustic signal.
For setting the limit values, see SET menu under "Buttons"

8.11 Simple measurement

Display (pos. 1) of the currently acting force and direction of force (pos. 7; arrow)
Zero setting through: 

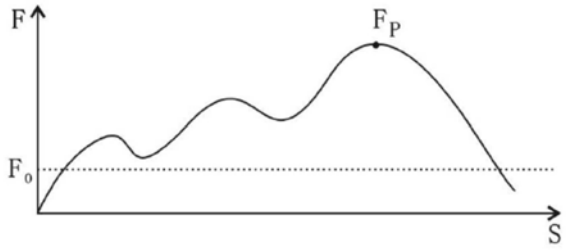
8.12 Peak hold function

Switch by pressing: 

8.13 Auto peak hold mode

Switch by pressing: 

8.14 Minimum limit value function for activating measured value storage



This function is used for measurements in which undesired "pre-peaks" occur that are below the desired peak value (Fp). The adjustable limit value (Fo) prevents the measuring device from storing the "pre-peaks".
Minimum limit value function is only possible in "Peak mode"

For setting the minimum limit value function, see SET menu under "Control buttons"

Important notes:
The RESET button (on the right-hand side of the housing) can be used to reset or delete individual settings and saved values, for example to restart the device after incorrect operation.
The **description of how to attach all force gauges to SAUTER test stands can be** found in the operating instructions for the respective test stands

8.15 Storage of peak values and average value calculation

(from up to 10 measured values)

Storage of peak values in the measuring device

- Activation of the "AUTO PEAK function" via the PEAK button 

- Deactivating the "Average function" via the MEMORY button 

- All peak values are now automatically transferred to the device memory.
- The ▲ and ▼ arrow keys can be used to call up individual peak values again (shown in the upper display segment) 
- The average value can be called up using the MEMORY button (then visible in the upper display segment) 

- Delete the memory contents by pressing the ▼ button in AVERAGE mode 

9 Adjustment

1. switch on the device	Press the ON/OFF button	The green light goes on
2. switch to calibration mode	Immediately after pressing the ON/OFF button, press the PEAK and PRINT buttons simultaneously, several times **in quick succession,** until the left-hand red light comes on.	The left red light goes on
3. device type	Press SET immediately after the red light comes on.	The maximum Newton value of the device is displayed and can now be set.
3a) *(Back in normal mode???)*	*(If you have now returned to normal mode, switch off the device and start again from step 1. Press the buttons faster if necessary)*	
4. select device	Use the ▼▲ buttons to select the maximum load (N) of the respective device.	The appropriate value for the device is shown in the display.
5. save settings	Press SET	
6. switch to calibration	Press MEMORY	The right red light comes on
7. specify the available calibration weight	Press UNIT and enter the calibration weight in Newtons with ▼▲. (X kg * 9.81)	The weight in newtons is shown in the display
8. save	Press SET and UNIT at the same time	
9. attach weight	Hang the weight on the device and hold it as still as possible. Then press ZERO	The device switches back to normal mode and is calibrated

10 Battery operation / power supply

⚠ WARNING

Risk of fire and explosion due to incorrect charging or defective battery

Fire or explosion can lead to serious injuries

- ⇨ Please be sure to observe the notes on rechargeable batteries and batteries in the chapter security.
- ⇨ Never recharge batteries. Only rechargeable batteries are suitable for recharging.

The battery should be fully charged before first use. Use the mains adapter supplied for this purpose.

Optionally available in mains or battery operation

Mains operation:

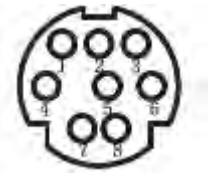
- Connection to mains via mains adapter
- Simultaneous charging of the integrated battery

Battery operation for mobile use:

- Type: Ni-MH 3.7V / 1200 mAh
- Charging time: approx. 2 hours. As soon as the device is connected to the mains via the charging cable supplied, the integrated battery is charged.
- Battery life: between 24 and 50 hours
- Service life of the battery ≥300x

11 Interfaces

11.1 Assignment of the RS 232 data interface



SUB-D 8-pin female

Pin	Signal	Illustration
2	GND	Earthing
3	OK	Input for control signal
4	NG ↑	Upper limit value
5	TXD	RS 232 output
6	NG ↓	Lower limit value
7	GND	Earthing
8	RXD	RS 232 input

11.2 Interface protocol

RS-232C parameters

- Baud rate: 9600
- Data bit: 8
- Parity: none
- Stop bit: 1

The measured value is requested by the ASCII character "9".

The measured value returned looks like this:

e.g. 0011.70 means -11.70 Newton, if Newton is set
|_____> first character describes the sign (0 = minus = push; 1 = plus = pull)

|--------|____> the remaining 6 digits describe the measured value as an ASCII character string

or: 1021.15 means +21.15 N (tensile force)

12 Test equipment monitoring

As part of quality assurance, the metrological properties of the measuring device and any test weight must be checked at regular intervals. The responsible user must define a suitable interval as well as the type and scope of this check.
Information regarding the test equipment monitoring of measuring devices and the test weights required for this are available on the SAUTER homepage (www.sauter.eu). The weights and measuring instruments can be checked and adjusted quickly and at favourable prices in KERN's accredited DAkkS laboratory (traceability to the national standard).

13 Maintenance, servicing and disposal

Disconnect the appliance from the power supply before carrying out any maintenance, cleaning or repair work.

13.1 Cleaning

Clean the device with a damp, soft, lint-free cloth. Ensure that no moisture penetrates the housing. Do not use sprays, solvents, alcohol-based cleaners or abrasive cleaners, but only clear water to moisten the cloth.

13.2 Maintenance and repair

Do not make any changes to the appliance and do not install any spare parts. Contact the manufacturer for repair or device inspection.

13.3 Waste disposal

Old appliances and accessories should not be disposed of with household waste.

The operator must dispose of the packaging and appliance in accordance with the applicable national or regional legislation at the place of use.

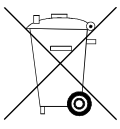
The device consists of various components and materials, such as

- Electronic components (circuit boards, electrical cables)
- Plastic (housing)
- Metal (hook)

Improper disposal of the appliance can have harmful effects on people and the environment.

Proper and environmentally friendly disposal can prevent harmful effects and recover raw materials.

Disposal of rechargeable batteries and batteries:



Rechargeable batteries and batteries do not belong in household waste.

The disposal of rechargeable batteries and batteries must be carried out by the operator in accordance with the applicable national or regional law of the place of use.