KERN & Sohn GmbH
Ziegelei 1
D-72336 Balingen
E-Mail: info@kern-sohn.com
Tel: +49-[0]7433- 9933-0
Fax: +49-[0]7433-9933-149
Internet: www.kern-sohn.com

Operating instruction
Moisture analyzer

KERN MLB

Version 1.1
09/2004
GB

GB

KERN MLB

Version 1.1 09/2004

Operating instruction

Moisture analyzer

Table of contents:

1 Technical data

	KERN MLB 50-3
Maximum load rating (max.)	50 g
Minimum for drying	0.02 g
Temperature range	50°C-160°C
Setting the temperature	in 1°C stages
Pre-heating stage (boost)	No
Read off (d)	0.001g /0.01%
Repeatability in weighing (=standard divergence)	0.001 g
Repeatability during drying (=standard divergence) **Initial weight 1g** **Initial weight 10g**	 0.2% 0.02% Please note: recommended minimum weight 2g
Adjusting weight	not added 50g (F2)
Ambient conditions	15°C ... 35°C ambient temperature max. 80% air humidity; not condensing
Shutdown criterion	Automatic: End of drying if the results do not alter during 3 strobe intervals (=heating intervals). If a time limit has been set drying will shut down after this period expires. Adjustable strobe interval: 1 s – 59 s Manual: According to set time (10 min to 590 min [=9h 50 min]) (without strobe interval)
Display after drying	**Mode 1 – 7** (incl. mode 3 ATRO) Result displayed as "%" Not possible to display result in "g"
Sampling trays included	10
Protective working cover	no
Type of projector	2 halogen quartz projectors 200 watts each
Display	LED display / digit height 15mm 3 displays for: - drying status (depending on configuration) - temperature - drying time

2 Declaration of conformity

KERN & Sohn GmbH
Ziegelei 1 *Tel: 0049-[0]7433- 9933-0*
D – 72336 Balingen *Fax: 0049-[0]7433-9933-149*
E-Mail: info@kern-sohn.com *Internet: www.kern-sohn.com*

Declaration of conformity

Declaration of conformity for apparatus with CE mark
Konformitätserklärung für Geräte mit CE- Zeichen
Déclaration de conformité pour appareils portant la marque CE
Declaración de conformidad para aparatos con disitintivo CE
Dichiarazione di conformitá per apparecchi contrassegnati con la marcatura CE

English We hereby declare that the product to which this declaration refers conforms with the following standards.

Deutsch Wir erklären hiermit, dass das Produkt, auf das sich diese Erklärung bezieht, mit den nachstehenden Normen übereinstimmt.

Français Nous déclarons avec cela responsabilité que le produit, auquel se rapporte la présente déclaration, est conforme aux normes citées ci-après.

Español Manifestamos en la presente que el producto al que se refiere esta declaración est´´a de acuerdo con las normas siguientes

Italiano Dichiariamo con ciò che il prodotto al quale la presente dichiarazione si riferisce è conforme alle norme di seguito citate.

Moisture Balance: KERN MLB 50-3

Mark applied	EU Directive	Standards
CE	73/23EEC Low voltage	EN 60950
CE	89/336EEC EMC	EN 50081-1 EN 50082-1

Date: 08.09.2004 **Signature:**

Gottl. KERN & Sohn GmbH
Management

3 Fundamental information (general)

3.1 Intended use

The balance you have acquired serves to determine the weighing value of the material to be weighed. It is intended to be used as a “non-automatic“ balance, i.e. the material to be weighed is manually and carefully placed in the centre of the weighing plate. The weighing value can be read off after a stable weighing value has been obtained.

3.2 Inappropriate use

Do not use the balance for dynamic weighing. In the event that small quantities are removed or added to the material to be weighed, incorrect weighing results can be displayed due to the “stability compensation“ in the balance. (Example: Slowly draining fluids from a container on the balance.)
Do not leave a permanent load on the weighing plate. This can damage the measuring equipment.
Be sure to avoid impact shock and overloading the balance in excess of the prescribed maximum load rating (max.), minus any possible tare weight that is already present. This could cause damage to the balance.
Never operate the balance in hazardous locations. The series design is not explosion-proof.
Structural alterations may not be made to the balance. This can lead to incorrect weighing results, faults concerning safety regulations as well as to destruction of the balance.
The balance may only be used in compliance with the described guidelines. Varying areas of application/planned use must be approved by KERN in writing.

3.3 Protective measures

The moisture analyser of Safety Class 1 may only be connected through a carefully installed socket with protective earth (PE). The protective effect must not be cancelled out by the use of an extension lead without earth wire. For power supplies from mains not provided with a protective earth, an equivalent protection meeting the valid installation regulations must be provided by a qualified electrician.

3.4 Warning

Individual parts of the housing (e.g. ventilation grille ...) can become very hot during operation. Avoid touching the apparatus except by the handles provided for this purpose.

Sample materials which produce corrosive vapours (e.g. acids) can cause problems of corrosion of components. The MLB50-3 should be used primarily for drying hydrous substances.

The MLB50-3 must not be used to analyse highly inflammable samples which present an explosion hazard.

3.5 Guarantee

The guarantee is not valid following

- non-observation of our guidelines in the operating instructions
- use outside the described applications
- alteration to or opening of the device
- mechanical damage and damage caused by media, liquids
- natural wear and tear
- inappropriate erection or electric installation
- overloading of the measuring equipment

3.6 Monitoring the test substances

The metrology features of the balance and any possible available adjusting weight must be checked at regular intervals within the scope of quality assurance. For this purpose, the answerable user must define a suitable interval as well as the nature and scope of this check. Information is available on KERN's home page (www.kern-sohn.com) with regard to the monitoring of balance test substances and the test weights required for this. Test weights and balances can be adjusted quickly and at a reasonable price in KERN's accredited DKD calibration laboratory (return to national normal).

4 Fundamental safety information

4.1 Observe the information in the operating instructions

Please read the operating instructions carefully before erecting and commissioning, even if you already have experience with KERN balances.

4.2 Staff training

The device may only be operated and looked after by trained members of staff.

5 Transport and storage

5.1 Acceptance check

Please check the packaging immediately upon delivery and the device during unpacking for any visible signs of external damage.

5.2 Packaging

Please retain all parts of the original packaging in case it should be necessary to return items at any time.
Only the original packaging should be used for return consignments.
Before despatch, disconnect all attached cables and loose/movable parts.
Apply any intended transport security devices. Secure all parts, e.g. glass windshield, weighing plate, power unit etc., to prevent slipping and damage.

6 Unpacking, installation and commissioning

6.1 Place of installation, place of use

The balance is constructed in such a way that reliable weighing results can be achieved under normal application conditions.
By selecting the correct location for your balance, you will be able to work quickly and precisely.

Therefore please observe the following at the place of installation:

- Place the balance on a firm, level surface;
- Avoid extreme heat as well as temperature fluctuation caused by installing next to a radiator or in the direct sunlight;
- Protect the balance against direct draughts due to open windows and doors;
- Avoid jarring during weighing;
- Protect the balance against high humidity, vapours and dust;
- Do not expose the device to extreme dampness for longer periods of time. Inadmissible bedewing (condensation of air moisture on the device) can occur if a cold device is taken into a significantly warmer environment. In this case, please acclimatise the device for approx. 2 hours at room temperature after it has been disconnected from the mains.
- Avoid static charging of the material to be weighed, weighing container and windshield.

Major display deviations (incorrect weighing results) are possible if electromagnetic fields occur as well as due to static charging and instable power supply. It is then necessary to change the location.

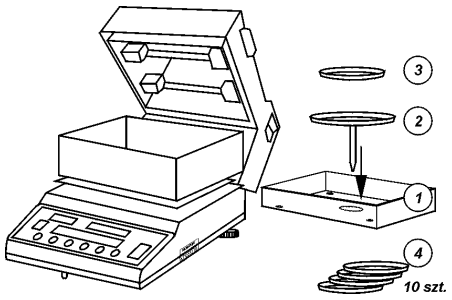
6.1.1 Installation

Use the foot screws to level the balance until the air bubble in the bubble level is in the prescribed circle.

6.1.2 List of items supplied

Standard accessories:

- Balance including humidity identifier attachment
- Tray holder
- 10 sampling trays
- Mains cable



6.2 Mains supply

A mains cable is used for the electric power supply.
Please check whether the balance voltage intake has been set correctly. The balance may only be connected to the mains supply if the details on the balance (label) and the customary on-site mains voltage are identical.

Important:
Does the designation (220 V 50 Hz) comply with the customary on-site mains voltage?

- Do not connect if there are differences in the mains voltage!
- The balance may be connected if in compliance.

6.3 Connecting peripheral equipment

The balance must be disconnected from the mains before connecting or disconnecting additional equipment (printer, PC) to or from the data interface.

Only use KERN accessories and peripheral equipment with your balance. These have been ideally coordinated to your balance.

6.4 Initial start-up

The accuracy of the balance depends on the local acceleration of the fall.
Please be sure to observe the information in the chapter on “adjusting”.

Use the main switch (above the power plug) to switch on the balance. ”**tEmP** “
will appear.

You have two choices:

1. Press the TARE STOP key, the balance will run through a ”**tEst** “ mode. “**0.000** “ will appear on the display screen after a few seconds. A short warm-up period of approx. 10 minutes is advisable for stabilisation purposes.

2. It is possible to start up a pre-heating process that pre-heats the weighing region to a reasonable drying process temperature. This pre-heating process is only practical before initial drying if there are to be several consecutive drying procedures.

This procedure can be triggered whilst “**tEmP** “ is on the display screen by operating the START key. The balance switches automatically to weighing mode after a few
minutes.
Use the TARE STOP key to enter weighing mode.

6.5 Adjustment

As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated – in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory). This adjustment process must be carried out during the initial start-up, after change in location and variation of surrounding temperature. It is also recommendable to adjust the balance periodically during weighing operation in order to obtain exact measured values.

6.6 Adjusting

Using a precision weight, the accuracy of the balance can be checked at any time and adjusted.

Method of approach when adjusting:

Ensure sound ambient conditions.

Use the main switch (above the power plug) to switch on the balance. "**tEmP** " will appear on the display screen. Press the TARE/STOP key, the balance will run through a "**tEst** " mode. "**0.000** " will appear on the display screen after a few seconds. A short warm-up period of approx. 10 minutes is advisable for stabilisation purposes.

Please be sure to observe during calibration:

In calm environmental conditions calibration can be carried out when the cover is open.

In the event that it proves to be practical to close the cover, please be sure to observe the following:

Under no circumstances is there be contact between the component parts of the weighing area cover and the calibration weight.

Start up the adjusting process by operating the TARE/STOP key. "**----------** " will appear on the display screen for a few seconds.

The F key must be pressed whilst "**----------**" is on the display screen.

Subsequently, "**noCAL**" will appear on the display screen . "-**LoAd**-" will appear on the display screen after a few seconds, followed by the nominal value of the adjusting weight.

The calibration process can be aborted during this period by pressing the TARE/STOP key.

Now apply the adjusting weight and calibration will take place (please wait).

" **CAL** " will appear on the display screen, followed by " **rELoAd** " a few seconds later.

Now remove the adjusting weight from the weighing plate.

The adjusting process is completed. The adjusting weight can be re-applied in order to check the calibration. If the displayed value is not correct, adjusting should be repeated.

7 Moisture determination

7.1 Use

The rapid determination of moisture content is of enormous significance wherever moisture has to be added to or removed from a product during manufacture. For innumerable products, the moisture content is both a measure of quality and also an important cost factor. When trading in industrial or agricultural products, as well as in products in the chemical or foodstuffs field, firm limits for moisture content, defined by sales agreements and standards, often apply.

7.2 Sample material

Samples with the following properties can usually be determined satisfactorily:

- Granular or powdery, floatable solids.
- thermally stable materials, which readily give off the moisture to be determined without volatilising other constituents.
- Liquids, which evaporate to dryness without forming a skin.

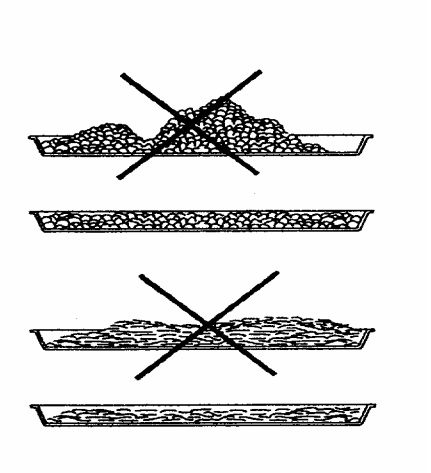
The determination can be difficult in samples which:

- are viscous/sticky liquids.
- tend to form a crust or skin readily on drying.
- tend to decompose easily or liberate different constituents on heating.

7.3 Sample preparation

Special preparation of the samples is, in many cases, not required. Large solid bodies, e.g. kernels and grains, should, however, be ground. Both the drying time and the accuracy which can be achieved will be greatly influenced by the sample distribution. The result is that there are two contradictory requirements:
The lighter the load being weighed, the shorter the drying times which can be achieved and the heavier the load, the more accurate will be the result.

Sample distribution:



Solid material

Distribute powdered and granular samples evenly over the balance pan. Reduce the size of coarse samples (grind, mortar)

Liquids

Apply tough and sticky products thinly. the use of circular glass-fibre filters or quartz-sand is recommended.

Weight loss through spattering can be prevented by covering the sample with a circular glass fibre filter. If circular glass-fibre filters or quartz-sand are used the weight must be subtract by tarring.

7.4 Drying temperature

Consideration should be given to the following influencing factors when setting the drying temperature:

Sample surface:
Contrary to powdery and granular samples, fluid and spreadable samples have a smaller surface that tends to transfuse heat energy.
The use of a glass fibre filter improves heat insertion.

Colour of the sample:
Pale samples reflect more heat radiation than dark samples and therefore require a higher drying temperature.

Availability of volatile matter:
The better and faster water or other volatile matter is available, the lower the setting for the drying temperature. If the availability of water is poor (e.g. in plastics), the water must be calcinated at a high temperature (the higher the temperature, the higher the water vapour pressure).
Similar results can be achieved using other humidity identification methods (e.g. cabinet dryer) by experimental optimisation of the setting parameters such as temperature, heating grade and shut-down criteria.

7.5 Application table (recommendations)

Preparation of the standard sample:

- Reduce the sample to small pieces and distribute evenly on the aluminium tray.

Preparation of special samples:

- A glass fibre filter can be used if the test material is sensitive or difficult to distribute (e.g. mercury).
- Apply the sample evenly to the glass fibre filter and cover with a second glass fibre filter.
- The glass fibre filter can also be used for protection against material splashes (every splash adulterates the final result).

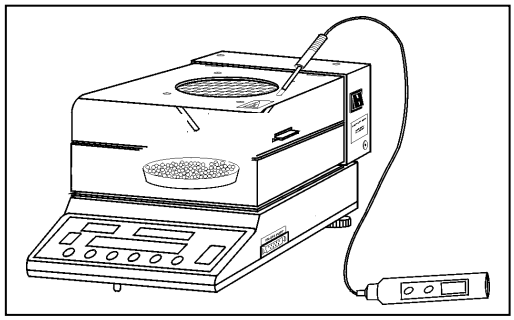
MATERIAL	Weight of test item (g)	Drying temperature (º C)	Date query interval (s)	% humidity or % solid body	Drying time (min)
Dry piece of apple	5-8	100	10	76.5	10-15
Moist apple	5-8	100	10	7.5	5-10
Butter	2-5	138	15	16.3	4.5
Mustard	2-3	130	20	76.4	10
Ground coffee	2-3	106	5	2.8	4
Cornflakes	2-4	120	15	9.7	5-7
Yogurt	2-3	110	15	86.5	4.5-6.5
Cocoa powder	2-3	106	20	0.1	2
Margarine	2-4	90	15	16	6
Powdered milk	3-5	100	15	5	15-20
Red wine	10-14	138	20	97.4	2
Sunflower oil	4-5	138	15	0.1	10
Sugar	2-3	120	15	11.9	6-8
Milk	8-10	130	10	88	4-5
Flour	8-12	138	15	12.5	4-5
Cement	2-4	106	20	0.8	10
Paper	2-2,5	130	10	6.4	10-12

7.6 Temperature calibration / adjustment

The temperature can be checked and re-adjusted if necessary using the optional temperature calibration set (MLB-A03).

Temperature calibration

- The balance is in normal weighing mode.
- Insert the temperature sensor through the balance cover opening and push in close to the weighing plate (see the grafic).



- Press the TARE/STOP key and then press the PRINT and TARE/STOP keys simultaneously.
  A **"Code"** is now queried on the display screen.
- Use the arrow keys to enter the correct code ("**002003**").

↑	Numerical entry from 0-9
→	For changing the entry point on the display screen

- Press the F key. "**St_tE** " will appear on the display screen - the temperature sensor setting programme.
- Press the F key. The temperature inside the weighing region will now appear. If this is not 20°C, please use the arrow keys to alter the temperature.
- Press the F key. If a temperature of 20°C is entered, a number of approximately 4000 will appear on the display screen.
- The F key is now used to start temperature calibration. The balance will now heat up to 50% of its total power.
- The balance should not be moved during this procedure in order to achieve a stable result. The balance will have achieved a stable temperature value after approx. 15 minutes.
- The temperature in the weighing region should now have reached approx. 80°C.
- Press the F key. **"opEn"** will appear on the display screen.
- The cover can now be opened. + 2°C is now added on to the actual temperature, e.g. if the thermometer is at 79°C, 79°C + 2°C = 81°C is entered. 2°C must be added to every temperature value.
- The thermometer can now be removed from the weighing region.
- The procedure is completed.

8 Setting the parameters

The following keys are used to set and select the parameters:

	Function key – selects the parameters and adopts settings
	Used to run through the various parameter settings, numerical entry from 0-9
	Used to change the entry point on the display screen

Parameter selection:

- The balance is in weighing mode. Press the  key and **"SubSt"** will appear on the display screen**.**
  (Details chapter: Temperature correction on "**SubSt** " test object)
- Press the  key again and **"modE"** will appear on the display screen.
  (Details chapter: Mode "**modE** ").
- Press the  key again and " **intEr** " will appear on the display screen.
  (Details chapter: Maximum drying time "**IntEr** "). Please note: This menu item only appears in modes 4 - 7.
- Press the  key again and **"tEmP"** will appear on the display screen.
  (Details chapter: Drying temperature " **tEmP** ")
- Press the  key again and "**Strob** " will appear on the display screen.
  (Details chapter: Data query interval)

8.1 Temperature correction on “SubSt“ test object

Certain materials give off more heat than is imported from outside.
Correction is necessary in this case in order to achieve an accurate measurement result.
This setting allows the user to correct differences between the set humidity identifier temperature and the actual temperature measured on the test item.
The balance is able to store 9 different correction factors.
These can be determined, set and selected as follows:
In order to set the appropriate correction factor it is necessary to carry out a drying procedure and to measure the temperature in the interior of the test item.

Procedure:
The balance is in normal weighing mode. Apply a test quantity to the weighing plate. Insert a thermo sensor into the test item.
The set drying parameters are:

- SubSt = 0
- modE = 7
- IntEr = 30:00 minutes or longer
- tEmP = a typical value for the sample
- Strob = 20 seconds

Press the START key in order to display the parameters. Press the START key again to start the test. Calculation of the correction factor can be carried out if the temperature in the test item proves to be stable after a certain period of time.

Formula:

$$\text{Correction} = \frac{T(\text{measured}) - T(\text{set})}{T(\text{set})}$$

Example: The measured temperature amounts to 121°C, the temperature is set at 110°C, the correction is 0.10.

Typical materials with high temperature radiation:

Material	**Set temperature**	**Measured temperature**	**Correction factor**
Flour	100°C	103.7°C	0.04
Coal dust	100°C	122°C	0.22
Damp tea leaves	100°C	120.5°C	0.20
Dry tea leaves	100°C	108.5°C	0.08
Cement	100°C	121°C	0.21

8.1.1 Setting the correction factor

The balance is in weighing mode. Press the F key and " **Subst** " will appear on the display screen.

Use the ↑ key to select the correction factors (1-9).

Use the F key to confirm selection. " **SubCoF** " will now appear on the display screen and the temperature display flashes.

Now use the ↑ and → keys to enter the determined correction factor. Use the F key to accept entry.

If the entered correction factor is > 0.99, "**FALSE** " will appear on the display screen and the entry will not be adopted. Repeat the entry using a new factor (<1) .

If you now activate the stored correction factor during testing, this will be allowed for.

8.2 Modes “modE“

The following keys are used to set and select the parameters:

	Function key – selects the parameters and adopts settings
	Used to run through the various parameter settings, numerical entry from 0-9
	Used to change the entry point on the display screen

The KERN MLB50-3 moisture analyser offers 7 different mode types
These differ in shutdown criteria and type of calculation.

Mode 1:
Moisture as a percentage (%)
Weight loss as against output value
Calculation:

$$W\,(\%) = \frac{\text{weight loss}}{\text{start-up weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged, drying will be terminated.

Mode 2:
Dry matter as a percentage (%) as against output value

Calculation:

$$W\,(\%) = \frac{\text{residual weight}}{\text{start-up weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged, drying will be terminated.

Mode 3: (ATRO)*
Moisture as a percentage as against solid body
Calculation:

$$W\,(\%) = \frac{\text{weight loss}}{\text{residual weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged, drying will be terminated.

Mode 4:
Moisture as a percentage (%)
Weight loss as against output value
Calculation:

$$W\,(\%) = \frac{\text{weight loss}}{\text{start-up weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged or if the time limit has expired, drying will be terminated.

Mode 5:
Weight value as a percentage (%) as against output value
Calculation:

$$W\,(\%) = \frac{\text{residual weight}}{\text{start-up weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged or if the time limit has expired, drying will be terminated.

Mode 6:
Moisture as a percentage as against solid body
Calculation:

$$W\,(\%) = \frac{\text{weight loss}}{\text{residual weight}} \times 100\%$$

If the weighing result of 3 time intervals in succession remains unchanged or if the time limit has expired, drying will be terminated.

Mode 7:
Moisture as a percentage (%)
Weight loss as against output value
Calculation:

$$W\,(\%) = \frac{\text{weight loss}}{\text{start-up weight}} \times 100\%$$

If the time limit has expired, drying will be terminated.

***Explanations for ATRO (Mode 3)**
The ATRO unit is required exclusively in the wood industry.
In practice, wood contains different amounts of water, which can change continuously. The water content affects the combustion performance of the wood and the heat value. The water evaporates during drying. When wood is stored in the open air, it reaches the so-called air-dried status (A.D.) of 15% to 20% water content. The moisture is completely removed from the wood by heating the wood to temperatures over 100°C. This condition is called absolutely dry (abs.dry).
The wood moisture (*ATRO*) is the amount of water contained in the wood, expressed in terms of the percentage of the mass of the water-free wood and is calculated from the difference between the fresh weight and the dry weight .

8.3 Maximum drying time “IntEr“

Drying modes 4 – 7 allow predefinition of the maximum drying period. This can be predefined between 10 minutes and 9 hours 50 minutes.

Setting the drying duration:

Repeatedly press the F key.
The pre-set time will start to flash.

Now use the ↑ and → keys to enter the desired time up until termination of the drying process.

The set time is saved by repeatedly pressing the F key.

8.4 Drying temperature “tEmP“

The drying temperature can be selected between 50°C and 160°C.

Setting the temperature:

Repeatedly press the F key.
The pre-set temperature value will start to flash in the temperature display.

The desired temperature value can now be entered using the ↑ and → keys.

The set temperature value is saved by repeatedly pressing the F key.

8.5 Time interval of the “strob“ data query

The **“strob“** interval time is the time period between two data transfers of query results via the RS-232 interface.
When using 1-6 mode the test is terminated if 3 query results are the same. This is the case if no or very little moisture escapes from the sample and there is thus no change in weight.

Setting the interval time:

Repeatedly press the F key.
The pre-set interval time will start to flash.

The desired time period can now be entered using the ↑ and → keys.

The set time period is saved by repeatedly pressing the F key.

Information:
Use the following keys to set and select the parameters (chapter 8.3–8.5):

F	Function key – selects the parameters and adopts settings
↑	Used to run through the various parameter settings, numerical entry from 0-9
→	Used to change the entry point on the display screen

9 Operation

9.1 Control elements

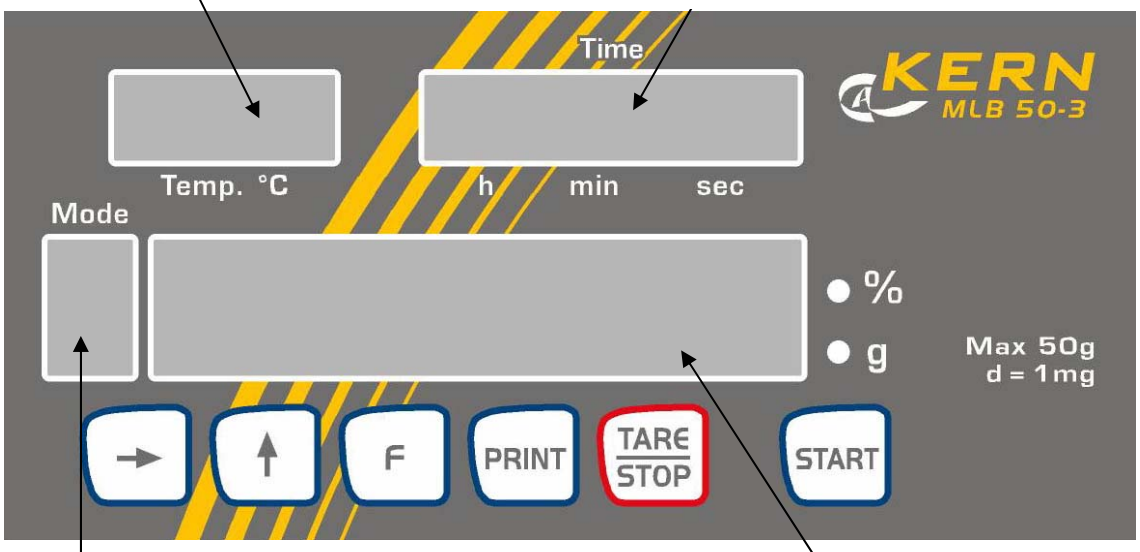
9.1.1 Overview of the keyboard

F	Function key – selects the parameters and adopts settings
↑	Used to run through the various parameter settings, numerical entry from 0-9
→	Used to change the entry point on the display screen
PRINT	Transmits the test or weighing results to a printer via the RS-232 interface.
START	Starts the drying procedure.
TARE STOP	Sets the display to zero in weighing mode. The drying process can be aborted by pressing the stop key.

9.1.2 Overview of the display screen

Indicator for:
- Temperature selection
- Process temperature
- Entry of correction factor

Indicator for:
- Set time
- Test time



Indicator for :
- Drying mode selection (**"modE"**)
- Correction factor selection (**"subCoF"**)

Main display :
- Function display
- Error messages
- Play back result
- Adjusting functions etc.

9.2 Operation

9.2.1 Weighing

Use the main switch (above the power plug) to switch on the balance. A short warm-up period of approx. 10 minutes is advisable for stabilisation purposes.
Press the TARE/STOP key and wait for the **"0"** indication. Now it is ready for use.

Important: If the display does not show "0" press the TARE/STOP key.

Only now (!) place object on the weighing pan. Make sure that the weighing object does not stripe or touch the housing or base. Now the weight will be indicated.
If the object should be heavier than the weighing range allowance, **"FULL"** (overload) will appear on the display.

9.2.2 Taring (TARE/STOP key)

Use the main switch (above the power plug) to switch on the balance. A short warm-up period of approx. 10 minutes is advisable for stabilisation purposes.
Press the TARE/STOP key and wait for the **"0"** indication.
Place the jiffy on the weighing pan and press the TARE/STOP key. Display again shows **"0".** Now the weight of the jiffy is memorised internally.
By pressing the TARE/STOP key after a weighing procedure, **"0"** will appear on the display again.

The taring procedure can be repeated continuously, for instance when mixing several components. The limit is reached when the full weighing range is overlaid.
After having removed the jiffy the total weight will appear flashing as a minus indication.

9.3 Determination of humidity

Use the main switch (above the power plug) to switch on the balance. "**tEmP**" will appear on the display screen.

You have two choices:

1. Press the TARE/STOP key, the balance will run through a "**tEst** " mode. "**0.000** " will appear on the display screen after a few seconds. A short warm-up period of approx. 10 minutes is advisable for stabilisation purposes.

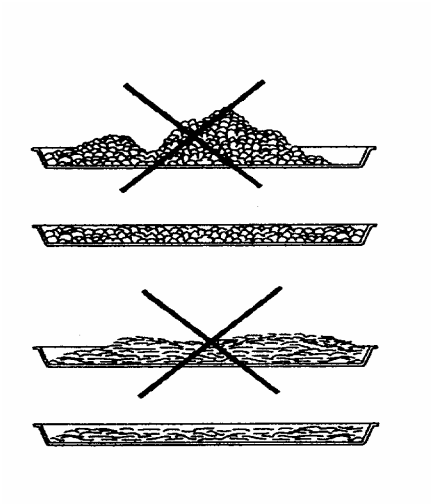
2. It is possible to start up a pre-heating process that pre-heats the weighing region to a reasonable drying process temperature. This pre-heating process is only practical before initial drying if there are to be several consecutive drying procedures.

This procedure can be triggered whilst "**tEmP** " is on the display screen by operating the START key. The balance switches automatically to weighing mode after a few minutes.

Use the TARE/STOP key to enter weighing mode.

Apply an empty sampling tray. Press the TARE/STOP key, place the sample quantity on the tray (see diagram 1) and close the cover.

Sample distribution:



Solids
Distribute powdery and granular samples evenly on the sampling tray.
Reduce coarse grained samples to small pieces (grind, mortar)

Fluids
Apply viscous and gluey samples in thin layers. It is advisable to use a glass fibre filter.

Avoid weight loss due to splashes by covering the sample with a glass fibre filter. Remember to tare off the weight of the glass fibre filter.

Diagram 1

There should be ample distance between the sample material and the cover when closing the cover. (Diagram 2).

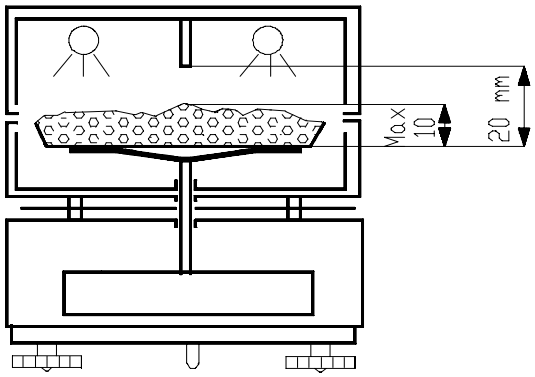


Diagram 2

Note:
Double-check that only the sample material is displayed as a load. The sampling tray must be tared.

Press the START key to start up the humidity determination process.
The set parameters can be seen on the display screen.

The drying process is started by pressing the START key again. This process can be aborted at any time by pressing the TARE/STOP key.

The drying process duration depends on the set mode.
Mode 1-3 checks any alteration in the weighing result (details ”mode“ chapter)
Mode 4-7 is time-dependent (details function type “mode“ chapter)

9.3.1 Test accuracy

The size of the sample has a great influence on the accuracy of the test procedure.
A larger sample provides a more exact test result. However, the drying procedure duration increases with the size of the sample.
The test result can be adulterated to a great degree if the test samples are too small (light). If samples are used that dry out very quickly, it should be ensured that the drying parameters (temperature, time interval) are set in an appropriate fashion.

It is very important to apply the test material evenly to the sampling tray (see diagram 1 chapter 9.3).

If you wish to ensure that the time interval between two data transfers has been selected correctly, it is necessary to carry out an additional test using longer time intervals. In the event that a significant divergence is determined when comparing both humidity values, the time interval should be extended.

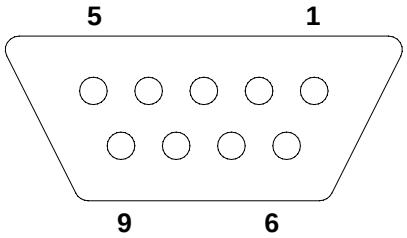
10 RS-232 serial interface

The balance can be operated with a printer that is connected to the RS-232 interface. The final results can be printed off in English or German. Language selection is described in chapter 10.2.

Type of data transfer
The baud rate and parity of the balance must be concordant with those of the peripheral device in order to guarantee data transfer from the balance to the peripheral device by means of the RS232 interface.

The balance interface parameters are:
4800 baud
8 data bit
no parity
1 stop bit
no handshaking

Pin assignment of the balance output plug socket (front view)



Pin 3: Receive data
Pin 5: Signal ground
no handshaking

10.1 Print format

The print format (print-out) is also in “g” when in weighing format.
When in drying format the value displayed on the display screen is transmitted via the interface as “%“. The print-out is also in “%” format.

A) Display format in weighing mode

A value can be transmitted via the RS-232 interface during weighing procedure by pressing the PRINT key.

The format of this signal is:

+xxx.xxx g<CR><LF>
xxx.xxx The current weight is displayed.

B) Display format in test mode

The results are transmitted via the RS-232 interface according to the set time intervals during the test procedure (chapter 8.5 time interval of the **”Strob“** data query).
The format of this signal is:

xxx.xx %<CR><LF> xxx.xx The current result is displayed.

Example:

0.00 %
2.03 %
5.00 %
7.39 %
10.82 %
15.43 %
21.17 %
26.21 %
29.91 %
30.86 %
30.86 %
31.65 %
31.65 %
31.65 %

C) Final result print-out

This function is used to print out the completed test procedure result including all important metered values and is triggered by operating the PRINT key.

The printout documents the following measurement readings:

MODE	1.
WEIGHT REDUCTION	31.65 %
START WEIGHT	33.44 g
RESIDUAL WEIGHT	10.52 g
FINAL TEMPERATURE	106 º C .
DRYING TIME	0:04:20.
Time interval	20 s.

The result is shown on the display screen once the test procedure has been completed.

This value can be printed off by using the PRINT key. Print-out is not possible once the value has been deleted from the display screen.

10.2 Changing languages

Use the main switch to switch the balance on.
The balance starts up using the language last selected. To change languages switch the balance off and on again.
The balance displays the **"PAs ??"** software version, followed by **"tEst"** for a few seconds. Press the START key during **"tEst"** is being displayed.
Either **"Lan En"** for English or **"Lan dE"** for German will appear on the display screen to set the balance.

Use the ↑ key to change between the languages.

Use the F key to accept the setting.

"EntEr" will now appear on the display screen**.** Use the TARE/STOP key to confirm the setting. The balance will run through a "**tEst"** mode. "**0.000**" will appear on the display screen after a few seconds.

11 Maintenance, upkeep, disposal

11.1 Cleaning

Please disconnect the device from the operating voltage before cleaning.

Only use a cloth dampened with mild suds and not aggressive cleaning agents (solvents or similar).
Please ensure that fluids are not able to get into the device and rub off using a clean, soft cloth.
Loose sample residue/powder can be removed carefully using a brush or hand vacuum cleaner.
Remove any spilt material to be weighed immediately.

11.2 Maintenance, upkeep

The device may only be opened by trained service engineers authorised by KERN.
Disconnect from the mains supply before opening.

11.3 Disposal

The operating company shall dispose of the packaging and the device in compliance with the valid national or regional law of the operating location.

12 Troubleshooting

The balance should be switched off for a short time following an interruption in the programme sequence and disconnected from the mains supply. It is then necessary to repeat the weighing process from the beginning.

Help:

Interruption	***Possible cause***
Weight display is not illuminated.	• *The balance is not switched on.* • *The mains supply connection has been interrupted (mains cable not plugged in/faulty).* • *Power supply interrupted. .*
The weight display changes continually	• *Draught/air movement* • *Table/floor vibrations* • *The weighing plate is in contact with foreign matter.* • *Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)*
The weighing result is obviously incorrect	• *The balance display is not set to zero* • *Adjustment is no longer correct.* • *Great fluctuations in temperature.* • *Electromagnetic fields / static charging (choose different location/switch off interfering device if possible)* • *Check set parameters*
Error message appears on the balance display during adjustment	• *Incorrect calibration weight* • *Temperature sensor is on the calibration weight*

Switch the balance off if other error messages should appear and then switch on again. Contact the manufacturer if the error message does not disappear.