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Servicemanual
Analytical balance

KERN ADJ

Version 1.0

09/2019

GB

Importør:
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ADJ-SA-e-1910

GB

KERN ADJ

Version 1.0 07/2019

Servicemanual

Contents

1 Basic Information

The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification). The service manual is obligatory for repair work. After repair, original conditions of the device have to be restored. Only original spare parts should be used.

Instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval! After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

Detailed instructions about conformity-evaluated scales:

Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval!

After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.

2 Introdution

This service manual covers the ADJ series and is edited for the authorized servicing personnel. Note all rights are reserved. Copying any part of this manual is prohibited without our permission.
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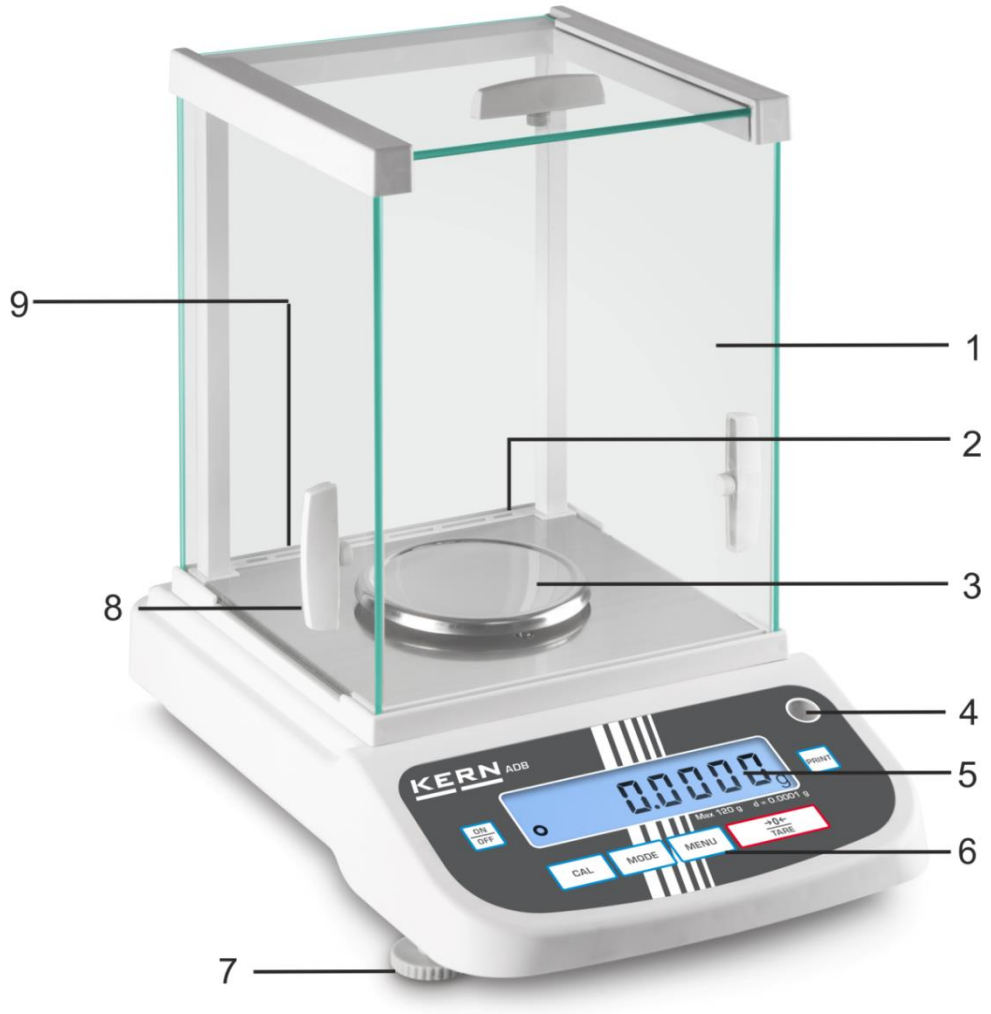
3 Device overview

3.1 Components



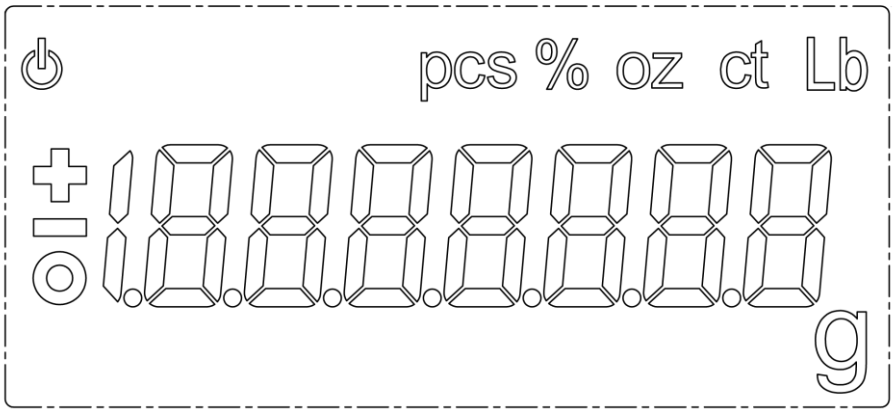
Pos.	Designation
1	Glass windshield
2	Interface RS 232
3	Weighing pan
4	Bubble level
5	Display
6	Keyboard
7	Foot screws
8	Handle for operation of the side windshield doors
9	Mains adapter connection

3.2 Keyboard overview

Key	Designation	Function
ON / OFF	**ON/OFF**key	➢ Turn on/off ➢ Exit menu
CAL	**CAL**key	➢ Adjustment
→0← / TARE	**TARE**key	➢ Taring ➢ Zeroing ➢ Save setting

MODE	**MODE**key	➢ Switch-over weighing unit ➢ Selecting an application
MENU	**MENU**key	➢ How to save the reference ➢ Switch on/off background illumination of display (keep the button pressed for a long time)
PRINT	**PRINT**key	➢ Change setting in the menu ➢ Print out the displayed value

3.3 Overview of display



Display	Description
O	Stabilitydisplay
⏻	The balance is in stand-by mode
g	Weighing unit “Gram”
ct	Weighing unit „Carat“
lb	Weighing unit „Pound“
oz	Weighing unit „Ounce“
Pcs	Application parts counting
%	Application percentage determination

4 Basic Information (General)

4.1 Intended use

The balance you purchased is intended to determine the weighing value of 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 pan.As soon as a stable weighing value is reached the weighing value can be read.

4.2 Improper Use

Do not use balance for dynamic add-on weighing procedures, if small amounts of goods to be weighed are removed or added. The “stability compensation“ installed in the balance may result in displaying an incorrect measuring value!(Example: Slowly draining fluids from a container on the balance.)

Do not leave permanent load on the weighing pan. This may damage the measuring system.

Impacts and overloading exceeding the stated maximum load (max) of the balance, minus a possibly existing tare load, must be strictly avoided. Balance may be damaged by this.

Never operate balance in explosive environment. The serial version is not explosion protected.

The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the balance.

The balance may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

4.3 Warranty

Warranty claims shall be voided in case

- Our conditions in the operation manual are ignored
- The appliance is used outside the described uses
- The appliance is modified or opened
- Mechanical damage or damage by media, liquids, natural wear and tear
- The appliance is improperly set up or incorrectly electrically connected
- The measuring system is overloaded

4.4 Monitoring of Test Resources

In the framework of quality assurance the measuring-related properties of the balance and, if applicable, the testing weight, must be checked regularly. The responsible user must define a suitable interval as well as type and scope of this test. 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. In KERN's accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

5 Basic Safety Precautions

5.1 Pay attention to the instructions in the Operation Manual

Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.

5.2 Personnel training

The appliance may only be operated and maintained by trained personnel.

6 Transport and storage

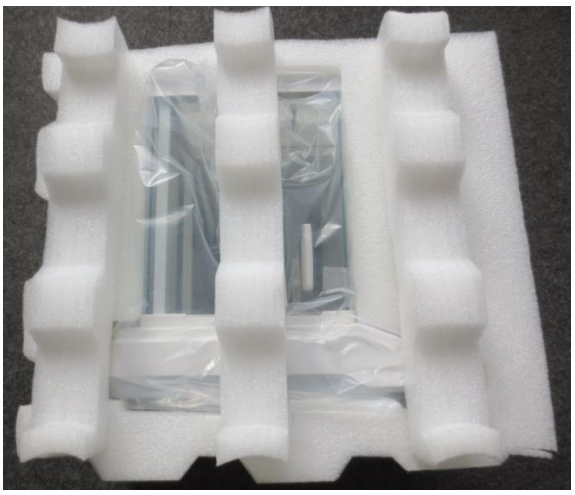
6.1 Testing upon acceptance

When receiving the appliance, please check packaging immediately, and the appliance itself when unpacking for possible visible damage.

6.2 Packaging / return transport

- ⇨ Keep all parts of the original packaging for a possibly required return.
- ⇨ Only use original packaging for returning.
- ⇨ Prior to dispatch disconnect all cables and remove loose/mobile parts.
- ⇨ Pack weighing plate + accessories and power supply unit separately.
- ⇨ Secure glass windshield against slipping (e.g. using an adhesive strip).

⇨ Secure all parts against shifting and damage as depicted.



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7 Unpacking, Setup and Commissioning

7.1 Installation Site, Location of Use

The balances are designed in a way that reliable weighing results are achieved in common conditions of use.

You will work accurately and fast, if you select the right location for your balance.

On the installation site observe the following:

- 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. Non-permitted condensation (condensation of air humidity on the appliance) may occur if a cold appliance is taken to a considerably warmer environment. In this case, acclimatize the disconnected appliance for ca. 2 hours at room temperature.
- Avoid static charge of goods to be weighed or weighing container.

If electro-magnetic fields or static charge occur, or if the power supply is unstable major deviations on the display (incorrect weighing results) are possible. In that case, the location must be changed.

7.2 Unpacking, checking and installation

Open packaging and remove all parts carefully.

Verify that there has been no damage and that all packing items are present.

Scope of delivery / serial accessories

- Balance
- Mains adapter
- Operating instructions

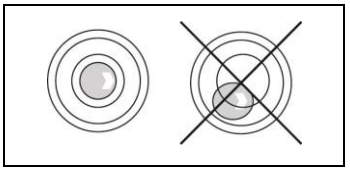
Prior to any installation and assembly works, the balance must be separated from the mains supply.

- Install the balance at the intended workplace.
  The right place is decisive for the accuracy of the weighing results of high-resolution analytic balances (see chap. 7.1).
- Remove the transportation lock (only models ADJ)

- Put the following parts upon in the right order
  - Carrier of weighing plate
  - Weighing pan

7.3 Levelling

- Level balance with foot screws until the air bubble of the water balance is in the prescribed circle.



Check levelling regularly.

7.4 Electric power supply

Select a country-specific mains plug.

Check, whether the voltage acceptance on the scales is set correctly. Do not connect the scales to the power grid unless the information on the instrument (sticker) matches the local mains voltage.

Only use KERN original mains adapter. Using other makes requires consent by KERN.

Important:

- Prior to commissioning check the mains cable for damage.
- Make sure that the mains adapter will not be in touch with liquids.
- The mains plug must be accessible at any time.

Connect the mains adapter to the connecting socket on the backside of the balance and to the power mains.

The display unit lights up. As soon as the balance is supplied with energy, the indicator [⏻] is displayed.

The error message <P FAIL> indicates that the balance was disconnected from power supply without pressing the ON/OFF button.

Remedy:

Press ON/OFF. The device will carry out a display test.

The balance is ready for weighing once the weight indication appears.

7.4.1 **Initial Commissioning**

In order to obtain exact results with the electronic balances, your balance must have reached the operating temperature (see warming up time chap. 1). During this warming up time the balance must be connected to the power supply (mains, accumulator or battery).

The accuracy of the balance depends on the local acceleration of gravity.

Strictly observe hints in chapter Adjustment.

7.5 Connection of peripheral devices

Before connecting or disconnecting of additional devices (printer, PC) to the data interface, always disconnect the balance from the power supply.

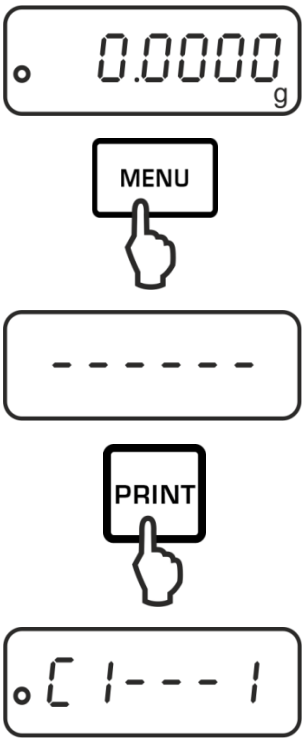
With your balance, only use accessories and peripheral devices by KERN, as they are ideally tuned to your balance.

8 Menu

8.1 Navigation in the menu

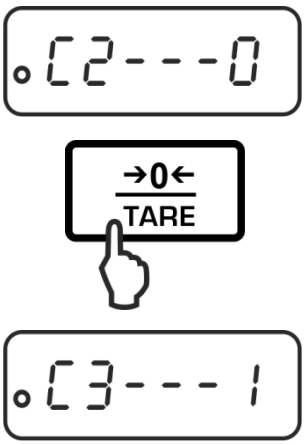
1. **Access to menu**

⇨ In weighing mode print first the **MENU** key, then the **PRINT** key. The first menu item „C1“ showing the current setting will be displayed.



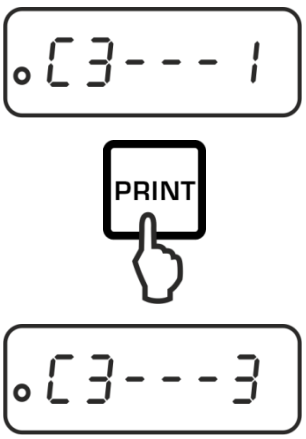
2. **Select menu items**

⇨ Press the **TARE** key to select the individual menu items showing the current settings one by one.

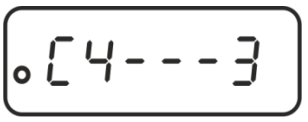


3. **Change settings**

⇨ Press the **PRINT** key to change the setting of a selected menu item. Each time the **PRINT** key is pressed the next setting will be displayed.



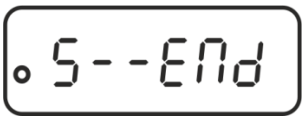
⇨ Confirm setting with **TARE** key, the next menu item will be displayed.
Either carry out more settings or exit and save menu (see step 4 or 5)



4. How to save settings and to exit the menu

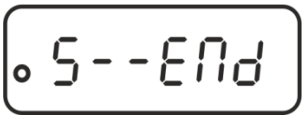
⇨ Press the **ON/OFF** key, **„SAVE**“ will be displayed.

⇨ Any changes carried out are stored by pressing the **TARE** key.The balance returns automatically into weighing mode.



5. Cancel

⇨ Press again the **ON/OFF** key, no changes will be saved. The balance returns automatically into weighing mode.



8.2 Menu overview

Menu item	Settings	Description
Adjustment mode	C1 - 0	Automatic internal adjustment (ADJ models)
	C1 – 1*	External adjustment (ADB models: always use this setting)
	C1 - 2	Manual internal adjustment (ADJ models)
Reference quantity	C2 – 0*	10
	C2 - 1	20
	C2 - 2	50
	C2 - 3	100
	C2 - 4	1000
Automatic zero point correction	C3 - 0	No Zerot Tracking
	C3 – 1	1D Zero-point Tracking
	C3 - 2	2D Zero-point Tracking
	C3 – 3*	3D Zero-point Tracking
	C3 - 4	4D Zero-point Tracking
	C3 - 5	5D Zero-point Tracking
	C3 - 6	Not documented
Baud rate	C4 - 0	1200
	C4 - 1	2400
	C4 - 2	4800
	C4 – 3*	9600
Data output	C5 - 0	Automatic output of stable weighing values
	C5 - 1	Via remote control command W (w)
	C5 - 2	Continuous data output
	C5 – 3*	Output for stable and instable weighing values after pressing **PRINT** key
Sound by pressing the button	C6 – 0*	switched on
	C6 - 1	switched off
	C7 - 0*	2 hours
	C7 - 1	3 hours

Automatic internal adjustment interval (only ADJ models)	C7 - 2	4 hours
	C7 - 3	6 hours
	C7 - 4	8 hours
Filter	C8 - 0	Low interference degree
	C8 – 1*	Medium interference degree
	C8 - 2	High interference degree
	C8 - 3	Not documented

* = factory setting

9 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 for the first commissioning, after each change of location as well as in case of fluctuating environment temperature.

To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.

Observe stable environmental conditions. A warming up time (see chapter 1) is required for stabilization. Ensure that there are no objects on the weighing pan.

9.1 ADJ Models

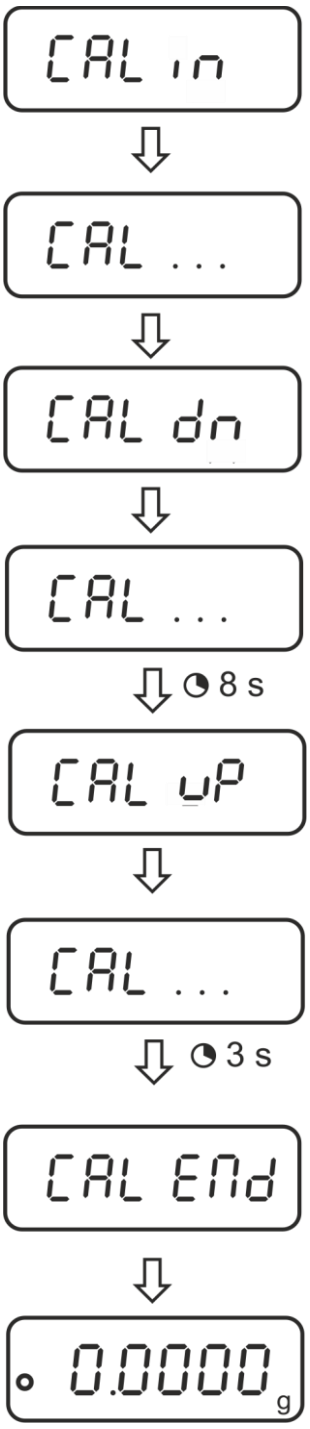
9.1.1 Automatic adjustment using a built-in weight

- Ensure menu setting **<C1-0>** see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Automatic adjustment is performed:

- having detected a change in temperature by 2°C from the previous adjustment,
- a defined time interval has elapsed, selectable 2, 3, 4, 6, 8 hours (C7-0 – C7-4, see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**).

9.2 Procedure:

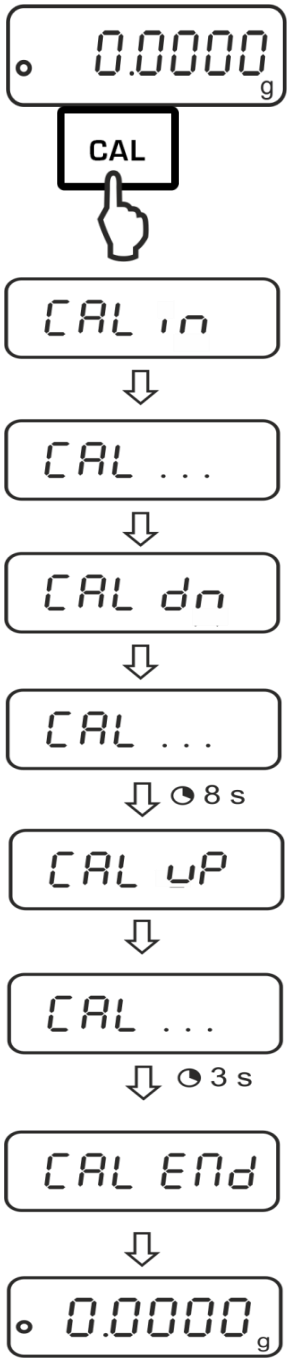


In case of the adjustment error (e.g. object on the plate) the following error message will be displayed: <CAL NO>, repeat the adjustment procedure.

9.3 Manual initiation of internal adjustment

Menu setting <**C1-2**>, see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Execution:



Press **CAL** button in the weighing mode.

The adjustment is carried out automatically.

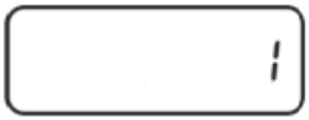
After the successful adjustment the scales will be automatically switched back to the weighing mode.

In case of the adjustment error (e.g. object on the plate) the following error message will be displayed: <CAL NO>, repeat the adjustment procedure.

10 Linearity calibration

10.1 Check count value

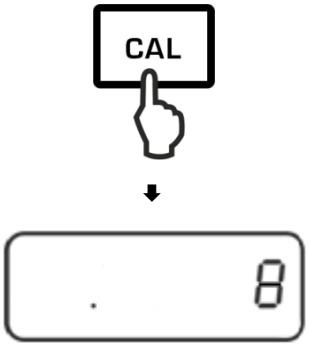
Press ON/OFF to shut down the scale.



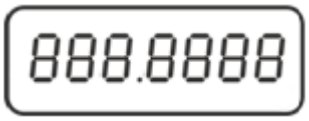
Press **CAL** and the screen displays 1

Press **TARE** and the screen displays 2

Press **CAL** and **TARE** by turns until the screen displays 8



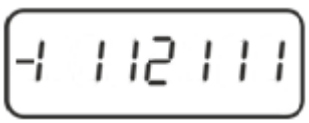
Press ON/OF the screen displays 8888888



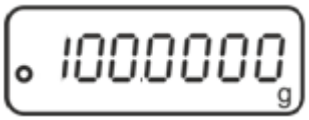
Press **TARE** and the screen displays 200.0000 or 120.0000

Press **TARE** and the screen displays -1 112111

or -1 1612111



Press **CAL** and the screen displays a zero-point count value, such as 397



Put a 100g and a 200 g standard weight (class E2) in the center of the weighing pan respectively, read and record the count value.

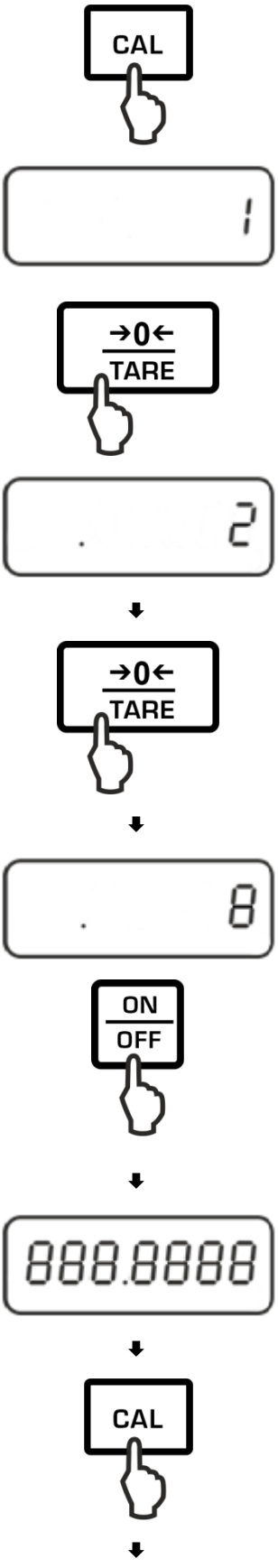
The count value range of the balance is shown below

Zero point	100g	200g
350~450	7800~7950	15250~15550

Exit the count value inspection, by pressing **ON/OFF** twice to reboot the balance.

10.2 Procedure linear calibration

Press ON/OFF to shut down the scale.

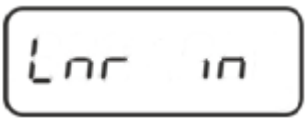


Press **CAL** and the screen displays 1

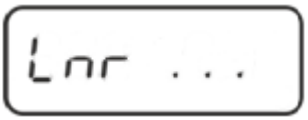
Press **TARE** and the screen displays 2

Press **CAL** and **TARE** by turns until the screen displays 8

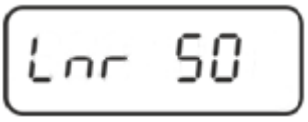
Press ON/OFF the screen displays 8888888



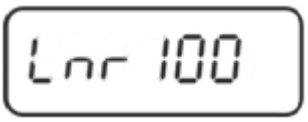
Press **CAL** key and the screen displays Lnr in and Lin ... successively (at this time the balance goes through zero-point correction).



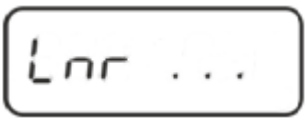
3 sec

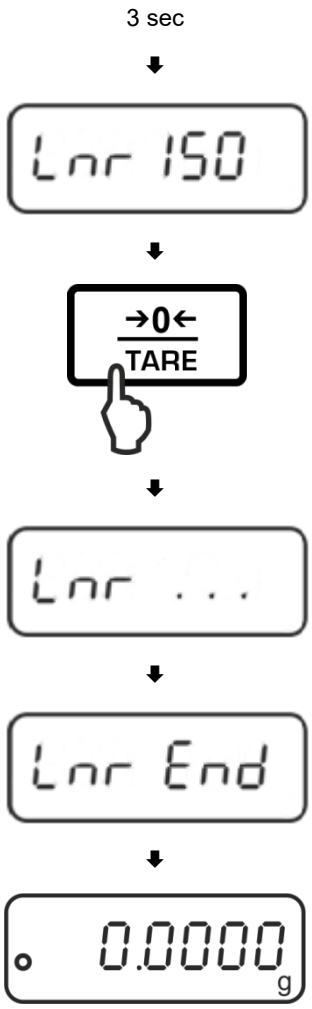


Put a 50 g (class E2) standard weight, press **TARE** and the screen displays Lin 100



Remove the 50g weight, and load a 100g (class E2) weight on the center of the weighing pan





Add a 50g (class E2) weight on the center of the weighing pan. 150g in total.

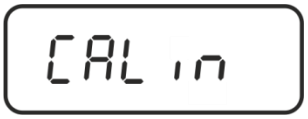
After a few seconds the screen shows 0.0000g. Linearity calibration is completed and the balance returns to normal weighing mode.

10.3 External weight calibration

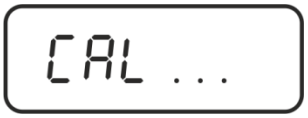
10.3.1 Factory External Weight Calibration

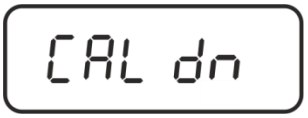
Before calibration, please make sure you have preheated the balance for 30 minutes and adjusted the level.

Press **CAL** again, you will see the indication <CAL in>.

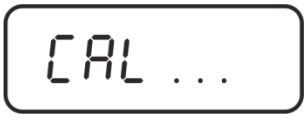


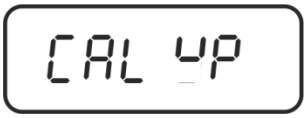
No objects may be left on the weighing plate.



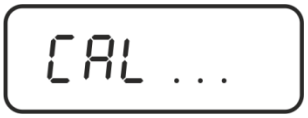


Wait until the <CAL dn>, indication, then carefully set the adjustment weight 100 g, in the centre of the weighing plate and close the windshield door.





When the adjustment is successfully completed, you will see the <CAL up> indication.

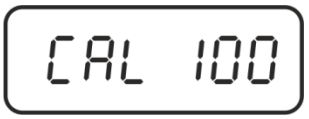


Remove the weight, and the screen displays CAL... and CAL END successively

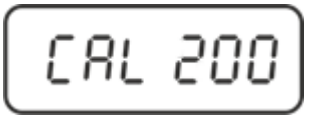
Thecalibrationisover.Thebalancereturnautomaticallytostandardweighingmode.

10.3.2 **User ExternalWeightCalibration(user modeC3------0)**

Before calibration, please make sure you have preheated the balance for 30 minutes and adjusted the level.

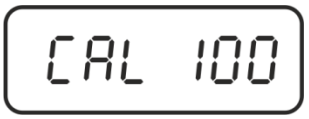


Press CAL key and the screen displaysCAL100

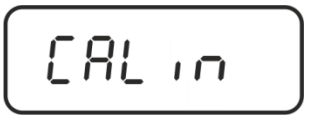


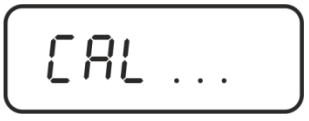
Press TARE key and the screen displays CAL 200 (only valid for balances whose capacity exceeds 200 grams).

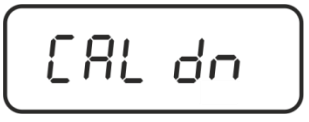
Press TARE key until the corresponding range of the calibration point is displayed, for example, CAL 100



Press CAL key and the screen displays CAL IN and CAL .... successively.







After a few seconds, the screen displays CAL DN. Put a 100g weight on the center of the weighing pan

The screen shows CAL..... After a few seconds, it displays CAL UP

Remove the weight and the screen displays CAL END

The calibration is over and the balance displays 0.0000g

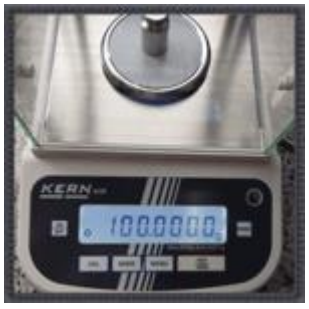
If the balance displays CAL NO, this indicates the balance is not yet correctly calibrated. Please press ON/OFF key to reboot the balance and re-calibrate.

There are several reasons why the balance could not be calibrated:
a. Unstable displayed value of the balance (faulty sensor or Main PCB or interference between the sensor and its peripheral devices).
b. The count value of the balance falls outside the specification range.
c. Inaccurate calibration weight or deviation.

11 Adjust theCornerError

11.1 Corner Error Inspection

Before checking the corner error of the balance, please adjust the level first.

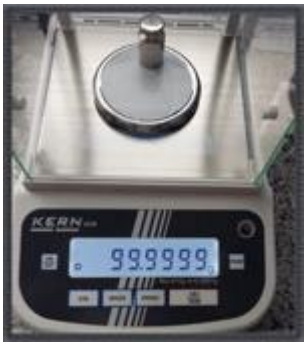


Put a 100 g weight (half the capacity of the balance) on the center of the weighing pan, read and record the displayed value.

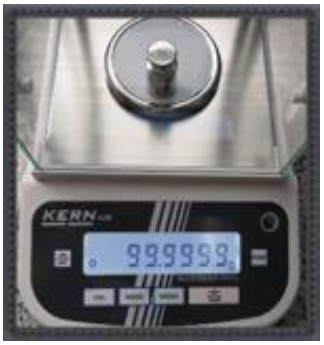
Move the weight to around 2/3diameterof the weighing pan, and record four displayed values when the balance is

loaded with weight on the four corners respectively.

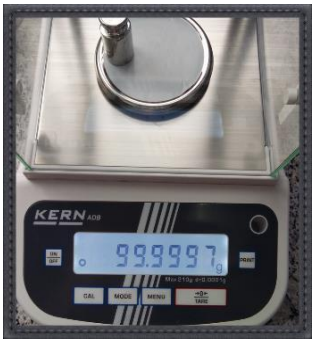
Corner A: Up



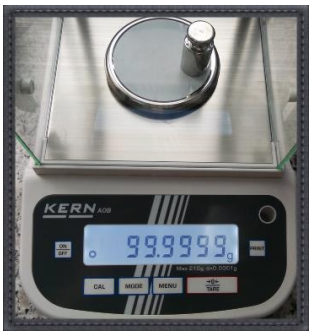
Corner B: Down



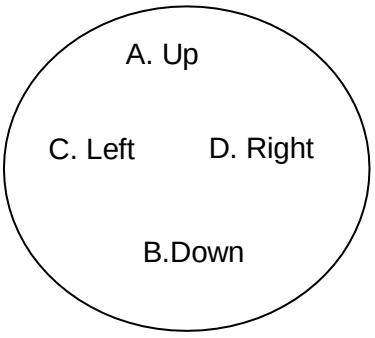
Corner C: Left



Corner D: Right



C. The corner error of the balance should not exceed 3D. Please refer to the below table.



4.2 Adjust Corner Error

If the corner error of the balance falls outside the specification range, the four corners of the balance needs to be adjusted

	Remove the windshield of the balance: Loosen the 3-M3 cross flat head screws and remove the windshield.
	
	Install the weighing pan and weighing pan support, power on.
	Put a 100g standard weight on the upper-right corner of the weighing pan (E)

	Press TARE key, the balance displays 0.0000
	Move the weight to the lower-left corner (F) and record the displayed value of the balance.
	If it is a positive value, rotate the adjust screw at Position 1 with socket clockwise. If the value is negative, rotate the adjust screw at Position 1 counterclockwise
	Move the weight to the upper-left corner (G) and record the displayed value of the balance. If it is a positive value, rotate the adjust screw at Position 2 with socket clockwise. If the value is negative, rotate the adjust screw at Position 2 counterclockwise.

	Move the weight to the lower-right corner (H) and record the displayed value of the balance. If it is a positive value, rotate the adjust screw at Position 2 with socket clockwise. If the value is negative, rotate the adjust screw at Position 2 counterclockwise.
	Repeat C~ F procedures until the corner error falls within the specification range. Install the windshield properly with a Phillips screwdriver.

12 Adjustment of zero count and full capability count value

12.1 Adjustment of zero count value：

- Remove 2*M4 inner Hexagon Sockets at the back of the balance with an Allen wrench, and open the top cover of the balance.
- Open the inner cover of the balance core（4*M3inner Hexagon Sockets).
- Increase or decrease the additional weight at the front end of the balance core, zero count value is as close as possible to 450.
- Reinstall the inner cover of the adjusted balance.

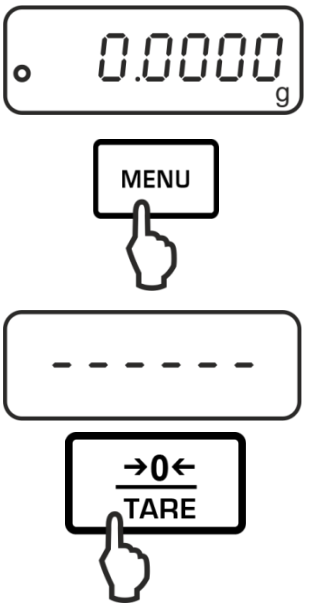
12.2 Adjustment of Full capability count value：

- Put 100g standard weight on the weighing pan to view Full capability count value. The value should be 7800 to 8000.
- If Full capability count value is not in this range, an external resistor box must be connected at R25. Full capability count value will be within this range by the corresponding resistors in parallel.

13 Adjust Internal calibration weight value

Reference：For internal calibration balances, the internal weights class should be more accurate than E2or F1，the error should be greater than the tolerance of the balance. In order to eliminate the difference between internal weight and external weight, set to calibrate the data.

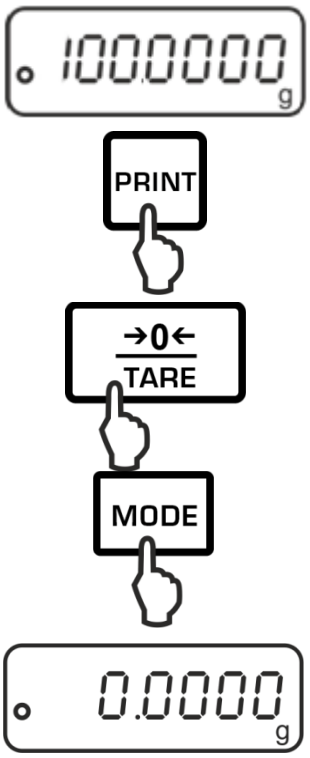
Note：The setting is only for internal calibration balances. If the weighing indications difference between internal weight calibration and external weight calibration exceeds 3d, it needs to adjust internal weight value.



When the balance stand by, display0.0000

Press MENU key

press TARE key



display the value around 100.0000

If the value>100.0000,press the PRINT key, until the value correct to 100.0000

If the value < 100.0000, press TARE key, until the value correct to 100.0000.

Press Mode keyto save the value, display SAVE…

Display 0.0000, back to the weighing situation.

Note：Before linearity calibration, be sure to restore the internal weight set value to system default100.0000.After calibration, readjust internal calibration weight correction value.

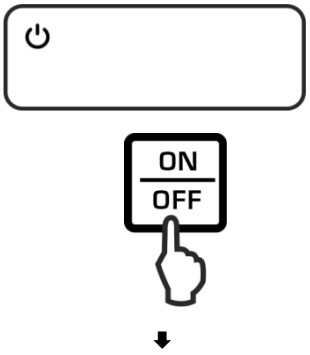
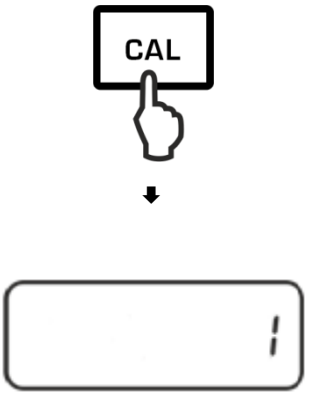
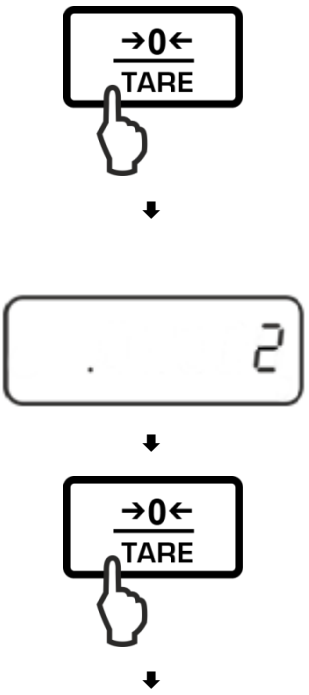
14 Restoresystemsetting

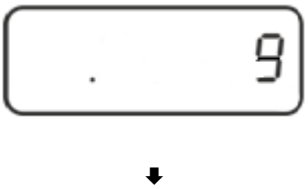
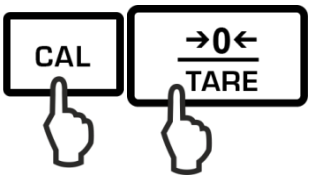
Reference：

- If the balance setting is confusing, it will be not working properly or the weighing is not accurate.
- 2. If it is necessary to repeat linearity calibration and avoid the calibration effect be disturbed by other data setting (for example, internal calibration weight correction value), can restore system initial setting and then repeat linearity calibration.

This operation will restore the system's initial settings, factory settings will be lost.

Therefore, be careful before operating.

	Press **ON/OFF** to shut down the scale.
	Press **CAL** and the screen displays 1
	Press **TARE** and the screen displays 2 Press **CAL** and **TARE** by turns until the screen displays 9

	
	Press **ON/OFF** the screen displays 8888888
	Press **TARE** key，display corresponding balance model
	Press **CAL** key repeatedly，press **TARE** key to select balance model as desired. The setting is completed. Display“-1 112111”
	Switch on the balance

Remark：
There are ten inner models of this type balance: 200，180，120，60，H200，H180，H120，H60，600c，150c.
After selecting the corresponding model, the balance will return to the factory status by default, and the internal settings return to factory settings, which needs to reset. And must repeat linearity calibration.(view the following for linearity calibration method)

15 Servicing and Maintenance

Serial number	fault phenomenon	Causes	Trouble shooting
1	Incomplete characters or broken code on LCD display	1. The chips on PCB board of the display are not completely welded 2. Data cable （that connects the display panel to main PCB or LCD board) comes loose 3. LCD display is defective	1. Check the IC pins and re-weld, and check again to avoid insufficient solder or continuous welding 2. Unplug and replug the data cable or replace it 3. Unplug and replug LCD pin or replace it 4. Replace the PCB board on
2	Keyboard failure ： no response after pressing any key (except the ON/OFF key), whether the sound on key press is on or not	1. Buttons failure. 2. Data cable (that connects the keyboard and the LCD board of the display) come loose.	1. Replace the keyboard (make sure not to bend the keyboard and endeavor to place the new keyboard on the response positions of the upper cover while replacing the keyboard). 2. Unplug and replug the data cable
3.	Cannot power on, the balance displays shutdown icon after power on, no response after pressing ON/OFF key	1. A weighing pan, which is light in weight or not installed, may result in rather low zero-point count value. 2. The sensor of the balance is unstable, and there is interference between the sensor and its outer shell. 3. The sensor is defective.	1. Check and make sure the weighing pan assembly is installed. If you still could not power on, load a 100g weight on the weighing pan and reboot. 2. Check and make sure there is no interference between the weighing pan assembly and the outer shell of the balance. 3. Adjust the count value of the balance until it falls within the specification range.
4	No display after power on	1. AC/DC Power adaptor is defective. 2. Faulty power panel. 3. The data cable which	1. Use a multimeter to check whether or not the power supply has a stable output