BL 224

User manual

Analytical Balance

220 g – 0,0001 g

Index

Precautions

The scale was built in accordance with the European Directives on electromagnetic compatibility.

Please read the following instructions carefully before operating the scale.

- Do not use in high hazard areas;
- If you are installing the balance in environments that require higher safety standards, please comply with the provisions specified in national legislation;
- Make sure that the voltage provided by the power supply is in line with the AC adapter label;
- The only way to completely turn off the balance is to unplug the power adapter;
- Use only original accessories that are compatible with the instrument in question;
- Protect the power supply from contact with liquids;
- When cleaning the scale, make sure that no liquid is entering the electrical compartment.
- Contact your authorized service department for problems.
- The scale should be used in closed and dry environments.

Before starting

Shipment and storage

Do not expose the balance to:

- Temperatures above 40 ° C and below 4 ° C;
- Airflow;
- High humidity environments;
- Shock and vibrations;

Check equipment and accessories

After opening the balance box, carefully check that there is no damage caused by the transport.
In the event of damage contact the dealer or the transport company immediately.

Store the original packaging.

If the instrument is shipped to service center **without original packaging**, the **warranty will expire**.

Layout
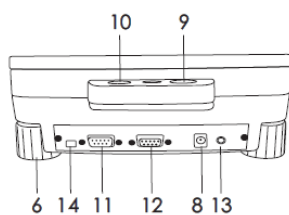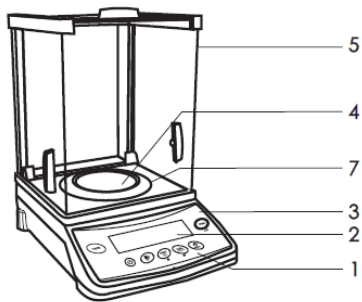
1. Keyboard
2. Display
3. Model and features
4. Plate
5. Sliding windows
6. Feet
7. Plate protection
8. Power input
9. Anti-theft ring
10. Levelling bubble
11. RS-232
12. AUX 1 (additional display)
13. AUX 2
14. Calibration switch (OIML)

Assembly
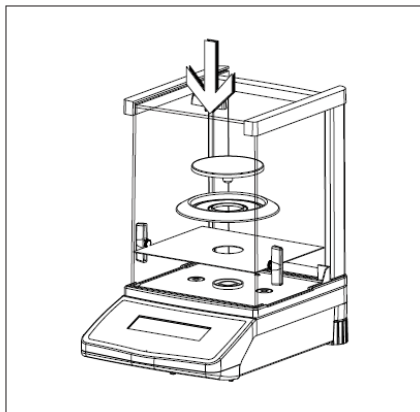
Assemble the components listed below, following the given order:

- Rectangular base
- Plate protection
- Weighing plate
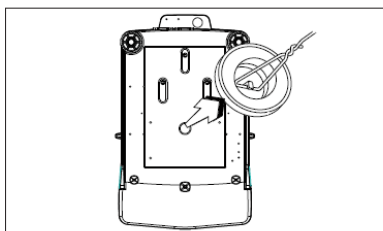
Suspended weighing
The hook for weighing under weighing is located on the underside of the scale.

- Remove protection plug
- Connect the hook

Placement and installation

Right placement
The correct positioning of the balance greatly influences the accuracy of the measurements.
It is important to ensure a stable and anti-vibration support.

To avoid
- Direct light
- Temperature fluctuations
- Dust
- Conditioners and fans

Antitheft
The balance is equipped with an anti-theft system, designed to discourage a possible attempted theft.
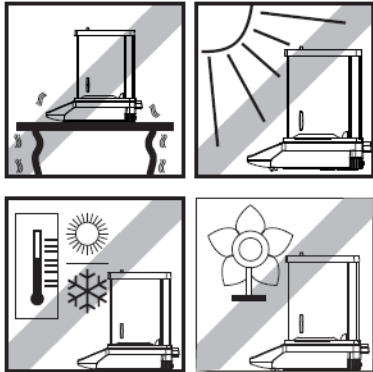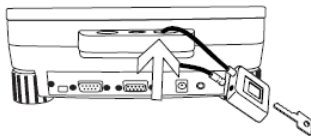The cable and the padlock are not supplied with the scale.
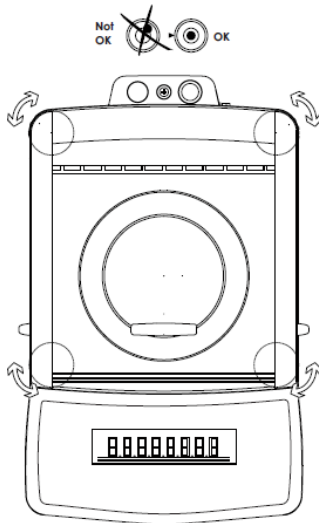
Levelling the balance

The BL 224 has a level control and adjustable feet to compensate for minor irregularities in the weighing surface.
The scale is exactly horizontal when the air bubble is in the middle of the target.

Before turning on the balance, level it by rotating the adjustable feet so that the level air bubble is in the center of the ring.
Make sure all the feet are securely fixed on the bench.
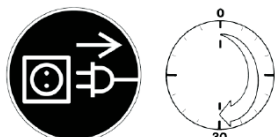
Connection of peripheral electronic devices
Turn off the balance before connecting or disconnecting a device (printer, PC).

Before performing the first measurement, the weighing sensor temperature must align with the ambient temperature in order to obtain the best results.

Warm up: **60 min.**

Keyboard
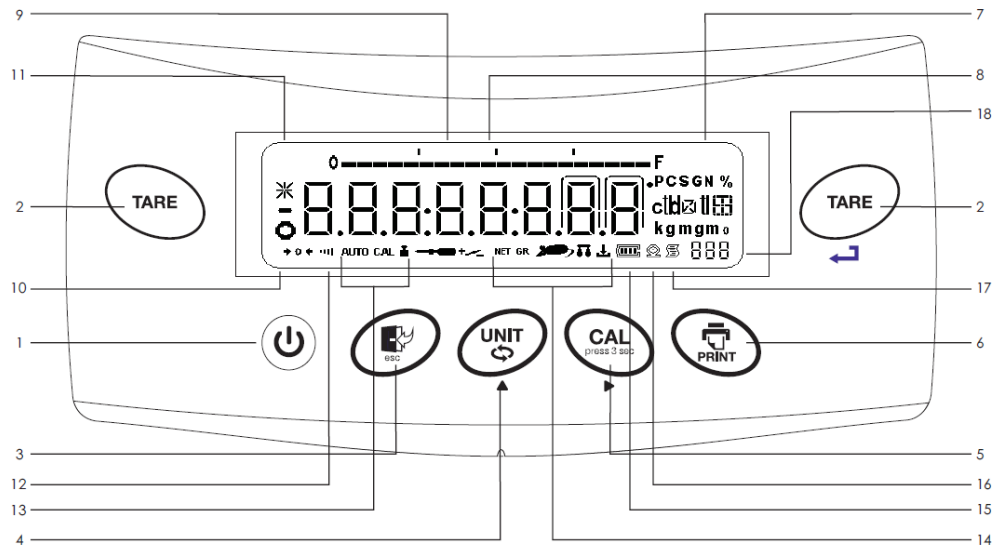
1. **On/Off**
2. **Tare**: *Press to make the tare of a container, so you can measure the net weight of a sample.*
3. **Esc**: *The button stops the current action*
4. **Unit**: *Press to change the unit of measurement. Increase values in Setup.*
5. **Cal**: *Hold down for 3 seconds to calibrate. The button also allows access to the settings menu.*
6. **Print**: *Press to send the data to the PC / printer, connected via the RS-232 mail.*
7. **Measurement unit**
8. **Measurement value**
9. *Capacity indication*: *Helps to see how much load you can apply before reaching the full scale.*
10. **Stability**: *appears when measures are stable.*
11. **Stability filter:** *The number indicates the intensity of the selected filter*.
12. Indication of **automatic or manual** calibration**.**
13. Indication of **operating mode**
14. Battery level.
15. **Printing**.
16. **GLP** activated.

Power on

Connect the scale to the supplied power supply (use only original power supplies) and press the **<ON/OFF>**. button

Are shown:

- Software versions
- Countdown
- Loading (1 → 100%)
- Standby mode (time)

Stand-by mode

- Press the **on/off** button to switch from standby mode to measurement mode.
- Press the **on/off** button to switch from measurement mode to standby mode

The following table describes the key functions in simple (standard) metering mode.
By activating different functions, the same buttons may take on different features.
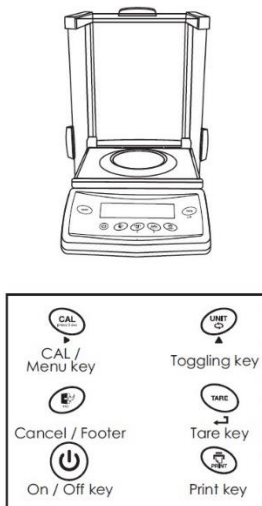
Measurement mode			
Fast press		Long press	
On/Off			
Change measurement unit			
Increase digit			
		Calibration	
		Setup Menu	
Print			
Tare		Confirm settings	
Exit			

Simple weighing

Simple weighing is always accessible, and can be used in combination with other functions (counters - animal weighing - statistics - etc.)
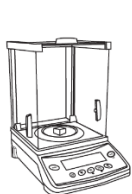
Simple weighing

- Tare the scale
- Place the sample on the pan
- Wait for the stability
- Take the result

Tare

- Place an empty container on the pan
- Wait for the stability, and press **<TARE>**
  display shows *"0,0000"*
- Place the sample inside the container
- Take the measurement

Removing the container from the dish will display a negative value on the display.

If you press the <TARE> key before stabilizing, the display will show "----------" until the measurement is stable

Measurement unit

The balance can convert the result into 3 different measurement units.
Default settings
- unit 1 = **gm**
- unit 2 = **ct**
- unit 3 = **gm**

Press **<UNIT> key** switch from unit 1 to unit 2, from 2 to 3 ecc.

In the **setup menu**, Is possible to choose the 3 units to use.

Calibration

To get the best possible results, Balance must be calibrated in the place of use.

Calibration is necessary:
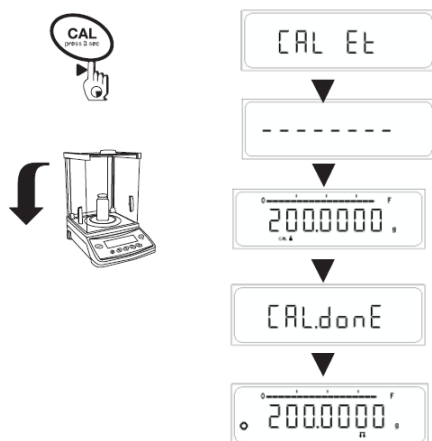- At the first use;
- at regular intervals over time;
- After a change of placement.

For homologated scales, the calibration can be deactivated during installation, as required by national regulations.

Is possible to stop the calibration at any time by pressing **<ESC>** key.
Display shows "*Abort*".

External calibration

- Switch on and wait for the warm-up time
- Make sure there is no weight on the plate
- Close the sliding windows
- Display shows "*0,0000*" g
- Keep pressed **<CAL>** key for 3 seconds = "*Cal Et*"
- The display shows the weight to use to calibrate.
- Place the weight for calibration at the center of the weighing pan.
  The weight must be in the appropriate accuracy class.
- Wait until display shows "*CAL donE*".

The balance returns to measurement mode, ready for sample weighing.
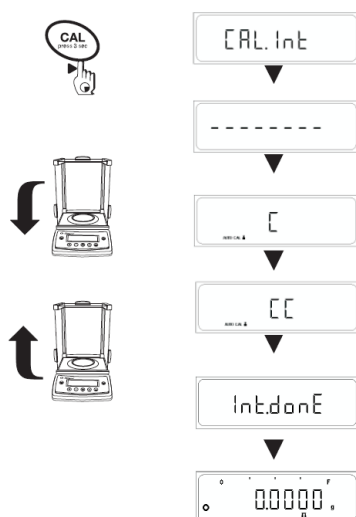
Internal calibration

- Switch on and wait for the warm-up time
- Make sure there is no weight on the plate
- Close the sliding windows
- Display shows "*0,0000*" g
- Keep pressed **<CAL>** key for 3 seconds = "*Cal Int*"

It starts the **automatically internal calibration** procedure.
"C" appears on the display when the internal weight is loaded.
When removed, "CC" appears.

When "*Int Done*" appears, the process is completed, and the balance returns to measurement mode.

User Menu

- **Access the User Menu:** In the measurement mode, hold down the <CAL> key until "MENU" appears. The first item displayed is "*F none*".
- **Switch to the next parameter**: All menu items (F none → Unit 1 →Unit 2→ Unit 3 → Stability Filter → ecc ...) are scrolled with a fast press of the <CAL> key.
- **Change the parameter:** To set a different value to the parameter, press the <UNIT> key until the desired value is displayed.
- **Setting Confirmation:** When the correct option is displayed, press the <TARE> key to confirm. The symbol "O" appears on the upper left of the display.
- **Parameter Saving:** Press and hold the <TARE> key until "*StorED*" appears.
- **Abort**: Pressing the <ESC> button exits the User Menu without saving the changes
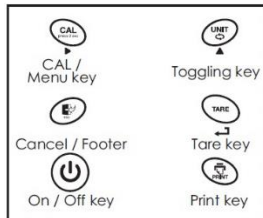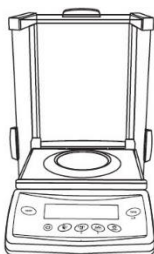
The following table shows the key functions in the User Menu.

Menu (called up with (CAL) 👉)		
Pressione veloce 👉	Pressione lenta 👉	
(On/Off) On/Off		
(UNIT) Modify the parameter		
(UNIT) Increase digit		
(CAL) Switch to next parameter		
(CAL) Change position (right direction)		
(TARE) Confirm	(TARE) Save and exit	
(PRINT) Print the menu		
(ESC) Exit without saving		

User menu view

Weighing Mode

W. Application	Weighing Unit 1	Weighing Unit 2	Weighing Unit 3	Stability Filter	Calibration Menu	Calibration Test
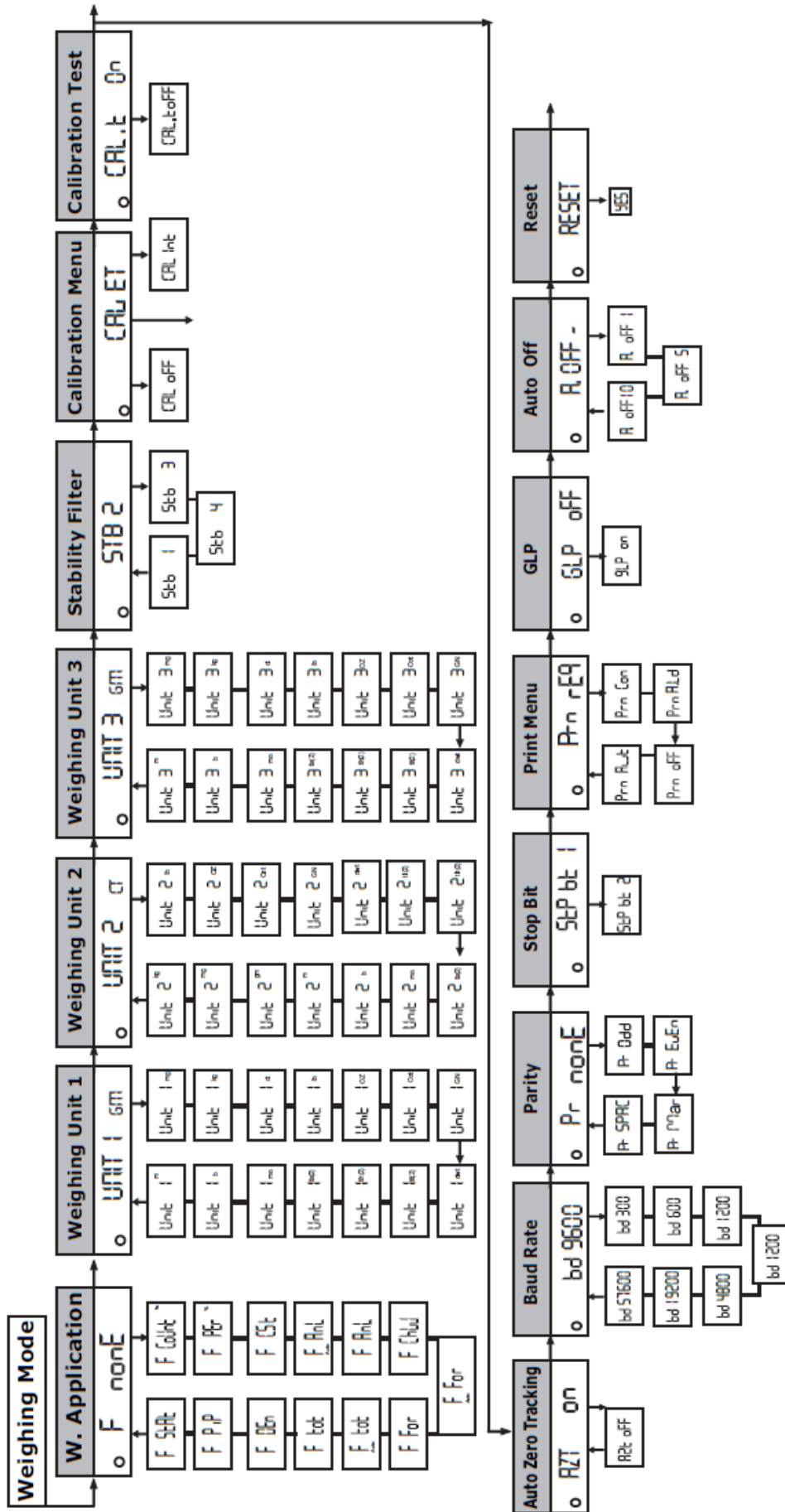
Application menu

The BL 224 can do more than simply weigh. The many features in the software expand its capabilities and facilitate your daily work.

Below we will explain all the features and applications that is possible to use.

Preselection of a function

In the Functions menu you can select a particular function, which can then be used during measurement mode.

Piece counting
The balance counts the items that are added or removed from the container placed on the balance plate.

Percent Weighing
Determinate the percentage difference in weight

Custom Unit
It allows to weigh using a user-defined Custom Unit

Animal Weighing
It allows you to accurately weigh a moving sample, like a live animal.

Check Weighing
It allows to see if the weight of a sample falls within a certain acceptable range, defined by the user.

Formulation / Toatalization
Allows to obtain a total result of the sum of several individual weights.

Density Determination
Determine the density of a solid

Pipette Calibration
Allows the calibration of the pipettes used in the laboratory

Statistics
Displays the statistical data for each weighing performed.

No Function (F none)
Simple weighing (**default setting**)

Measurement unit

In the user menu, you can preset 3 different measurement units (Unit 1 - Unit 2- Unit 3), which can then be easily recalled in the measurement mode.

Is possible to choose from the following preset units:

Unit		Conversion factor		
g	gram	1		
kg	kilogram	1 kg	=	1000g
lb	pound	1 lb	=	453.59237g
oz	ounce	1 oz	=	28.349523125g
ozt	troy ounce	1 ozt	=	31.1034768g
GN	grain	1 GN	=	0.06479891 g
dwt	pennyweight	1 dwt	=	1.555173843g
ct	carat	1 ct	=	0.2g
mg	Milligram	1 mg	=	0.001g
mo	momme	1 mo	=	3.749999953 g
m	mesghal	1 m	=	4.6083162
H tl	Hong Kong taels	1 Htl	=	37,42900 g
S tl	Singapore taels	1 S tl	=	37.799366256g
t tl	Taiwan taels	1 t tl	=	37.499995313g
b	baht	1 b	=	15.1999998438g

Stability filter

It is possible to set the stability filter to adjust the balance to external conditions, in order to obtain the best possible result.

Stability filter value:

- **1** = Very good external conditions;
  Very fast, but very sensitive to external influences (vibration, etc.)
- **2** = "Normal" conditions **(default settings)**
- **3** = Unstable external conditions
  The balance is slower but less sensitive to external influences
- **4** = Extremely unstable external conditions;
  Slow but less sensitive to external influences

Calibration settings
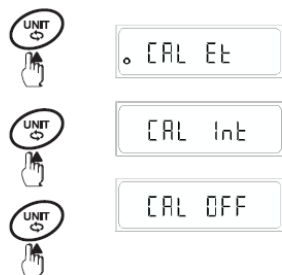
 ₒ CAL Et

Is possible to choose:

 CAL Int

 CAL OFF

- **CAL Et** = External Calibration, using a certified external sample mass.
- **CAL Int** = Internal calibration, using the sample mass inside the balance
- **Cal Off** = no calibration.

Calibration test

 ₒ CALtOFF

 CALt On

Is possible to enable or disable the Calibration Test function.
If enabled, the calibration test will be performed both for internal calibration and for external calibration.

Auto Zero Tracking

 ₒ AZt On

This menu item allows you to enable or disable the Auto Zero tracking function.

Auto Zero tracking: If the scale detects small variations from 0,0000, for example due to powder particles, it corrects it automatically and returns to 0,0000.

 AZt OFF

Print Menu
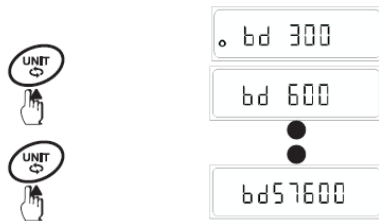
		Baud Rate
	`○ bd 300`	This setting determines the speed of data transmission.
	`bd 600`	
	`●`	1 Baud [Bd] = 1 bit/sec
	`●`	
	`bd57600`	

Parity Bit Setting

`○ Pr nonE`
`Pr odd`
`Pr EuEn`
`Pr MAr`
`Pr SPAC`
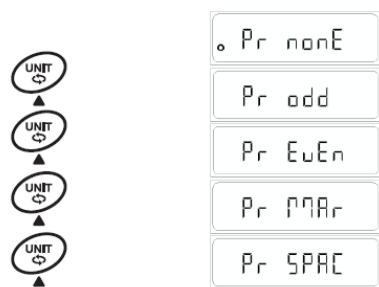
- None (default setting)
- Odd
- Even
- Mark
- Space

Stop Bit

`○ StPbt 1`
`StPbt 2`

Allows you to select the data transmission stop bit:

- Stop bit 1 (default setting)
- Stop bit 2
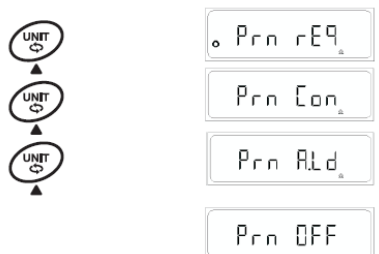
Print Mode
Menu for selecting a data transfer mode to a device (RS 232 printer/PC).

`○ Prn rEq`
`Prn Con`
`Prn ALd`
`Prn OFF`

- **Prn. Req** : Press the Print button to print the value when it is stable.
- **Prn. Con** : The measurements are printed continuously, independent of stability.
- **Prn. Off** : Print deactivated.
- **Prn. Aut** : The measurement is printed automatically when a 1 digit weight difference is recorded and the measurement is stable.
- **Prn A.Ld** : The measurement is printed automatically when a difference of ± 10 digits is recorded and the measurement is stable.

GLP

GLP activation

. 9LP OFF

9LP On .

GLP Off (default setting):;
Data printing is not compliant ISO/GLP/GMP
GLP On:
Data printing is compliant ISO/GLP/GMP

Example of print with GLP and without GLP.

```
            GLP ON                              GLP OFF

------------------------------------
21-Dec-15            03:46PM
           ABC Co. Ltd.
Model                BL224          App            :     F Per
Ser.no.            9930508          Unit1          :        g
Ver.no.            R0.1.04          Unit2          :       ct
ID                 1234567          Unit3          :        g
------------------------------------Stb            :        2
App            :     F Per          Cal            :      Ext
Unit1          :        g           Cal test       :      Off
Unit2          :       ct           Azt            :       On
Unit3          :        g           Baudrate       :     9600
Stb            :        2           Parity         :     None
Cal            :      Ext           Stop bit       :        1
Cal test       :      Off           Print          : Request
Azt            :       On           GLP            :       On
Baudrate       :     9600           Auto Off       :      Off
Parity         :     None
Stop bit       :        1
Print          : Request
GLP            :       On
Auto Off       :      Off
------------------------------------
21-Dec-15            03:46PM
Name:        ...............
------------------------------------
```

Auto Off

. A.OFF -

A.OFF 1

A.OFF 5

A.OFF 10

Automatic power off

- You can set how many minutes the balance enters Standby mode automatically
- **A.Off -** : No power off
- **A.Off 1**   : power off after 1 minute
- **A.Off 5**   : power off after 5 minutes
- **A.Off 10** : power off after 10 minutes

Factory reset

. rESEt

YES

StorEd

Restoring factory settings

- Press **<UNIT>** key to choose "*Yes*".
- Press **<TARE>** to confirm.
- Display shows "*Stored*".

All balance parameters returns to the factory settings, and the scale returns in measurement mode.

PCS function (conta-pezzi)
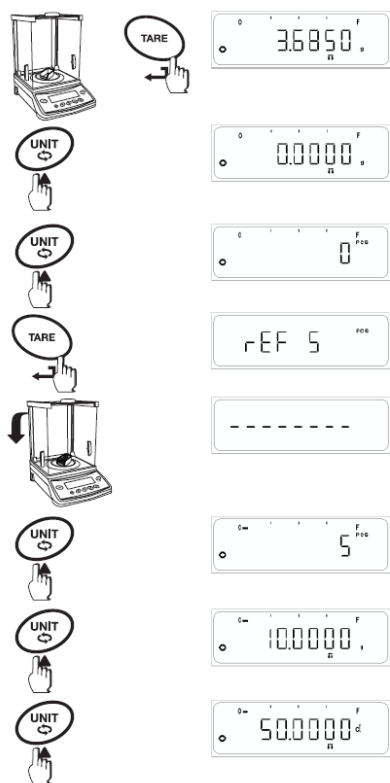
Procedure

1. Make sure you have activated the "F count" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <TARE> key.
4. Press the <UNIT> key until "pcs" appears on the display.
5. A reference quantity is now required.
   Holding down the ▲ key gives you access to the reference number.
   Always with the ▲ key you can change the number, selectable between 5, 10, 20, 50, 100 pieces, Free, wref, Update)

6. After placing the exact quantity of pieces corresponding to the selected reference number inside the container, press the <TARE>
   As soon as the measure is stable, the average weight of each piece will be calculated, and the quantity will be shown.
7. You can now add the remaining pieces to count.

Note:

Is possible to switch between the amount display and the weight display at any time by pressing the <UNIT> key.

It is advisable to use the highest possible reference quantity, so that the scale can have a very large reference from which to calculate the average.

The pieces you want to count must have the same weight.

The settings remain in memory until a new reference weight is determined.
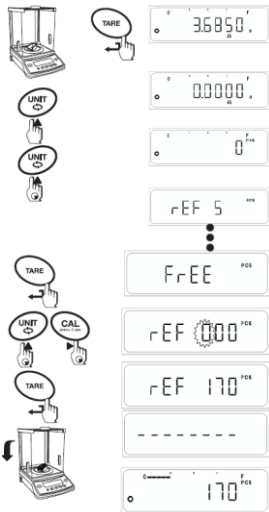
FREE (reference setting)

This option allows you to use a reference number for the function counts pieces other than the preset ones (maximum possible value = 999)

Procedure

1. Follow the standard procedure until **point 5**
2. Select "Free" and press **<TARE>** key
3. The last set value flashes. Use the ▲ and> keys to set the desired number.
4. Place the correct number of pieces inside the container, and press **<TARE>** key.
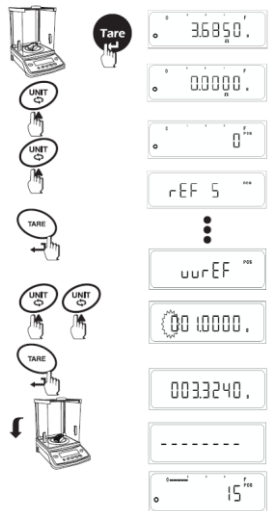
wRef (reference settings)

If we know the weight of the sample to be counted, we can enter it directly.

Procedura

1. Follow the standard procedure until **point 5**
2. Select "wRef" and press **<TARE>** key
3. The value of the last set sample weight flashes on the display. Use the ▲ and ▶ keys to set the weight of the reference sample.
4. Press **<TARE>** to confirm.
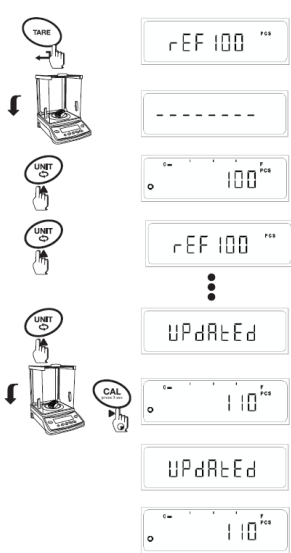
Update

The Update option allows you to improve the score of the pieces count.
By increasing the amount of reference samples inside the plate, and by recalculating the mean weighing weight, the count results will be more accurate.

1. Select"Update", palce the other samples on the pan and press <**CAL**> key.
2. Display shows "Update"

Percentage Weighing

The "Percentage Weighing" function allows to weigh a default value (1, 10,20,50, 100%, free, 100R, 100L, AtroM, AtroD) and determine the differences from the reference value.
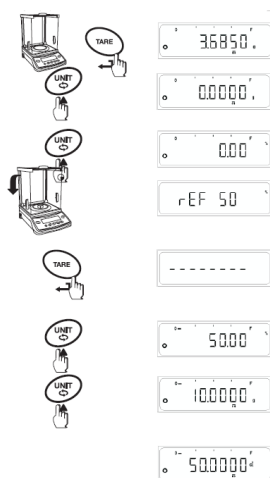
Procedure

1. Make sure you have selected the "F for" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <TARE> key.
4. Press the <UNIT> key until "PER (%)" appears on the display.
5. A reference quantity is now required.
   Holding down the ▲ key opens the selection of the reference.
   Always with the ▲ key you can change the reference, selectable between 1, 10, 20, 50, 100%, Free, 100r, 100L, OtherM, OtherD)
6. Place the reference sample inside the container and press the <TARE> key
   Once the measure is stable, the reference percentage will be determined
7. It is now possible to weigh the percentage.

Note:

It is possible to switch between the percentage display and the weight display at any time by pressing the <UNIT> key.

The settings remain in memory until a new percentage determination is made.
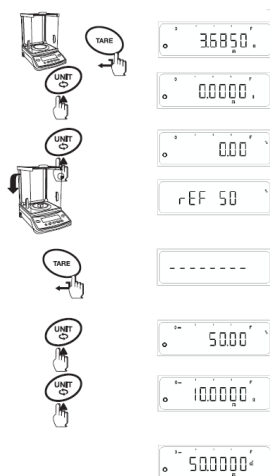
FREE (reference setting)

The Free option allows you to use a reference percentage other than the preset ones.

Procedure

1. Follow the standard procedure until **point 5**
2. Select "Free" and press **<TARE>** key
3. The last set value flashes. Use the ▲ and ▶ keys to set the desired value.
4. Place the reference sample inside the container, and press **<TARE> key**.

Differential weighing

The differential weighing is used to determine the weight variation of one or more samples.
The first step is to determine the initial weight of the sample.
Following operations such as scratching, centrifuging, filtering, vaporization, etc. The sample is weighed again, and the difference is determined with respect to the initial value.
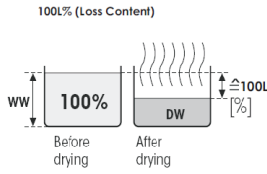
100L (Loss)

The moisture content is displayed as a percentage of the initial sample.
The humidity value is shown with a negative sign, and with a unit of measure 100L%

example: -11.35 100.00L%
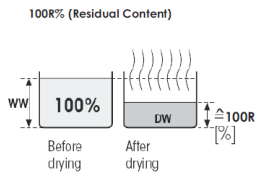
100R (residue)

The dry content content is displayed as a percentage of the initial sample.
The dry residue value is shown with a positive sign, and with a unit of measurement 100R
example: +8.25 100.00R%

AtroM (Humidity content)

Atro's moisture content is the percentage value of moisture relative to the dry residue.
The ATRO humidity value is shown with negative sign, and with AtroM unit of measure%
example: -255.33AtroM%%
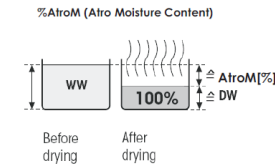
$$\text{AtroM} [0...-1000\%] = \frac{\text{Dry weight } DW - \text{Wet weight } WW}{\text{Dry weight } DW} *100\%$$
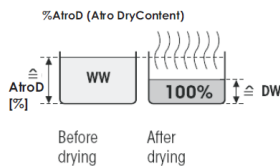
AtroD (Dry content)

Atro's moisture content is the percentage value of moisture relative to the dry residue.
The ATRO humidity value is shown with negative sign and with AtroM unit of measure%.
example; 312.56 AtroD%%

$$\text{AtroD} [100...1000\%] = \frac{\text{Wet weight } WW}{\text{Dry weight } DW} *100\%$$

100L% (Loss Content)

(Treat the sample & Re-Weigh it)
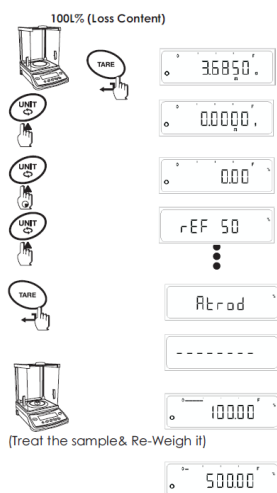
Percentage weighing (100R / 100L / AtroM / AtroD)

Procedure

1. Repeat the standard procedure to step 5
2. Select one of the entries "100R / 100L / AtroM / AtroD"
3. Place the reference sample (initial weight) on the plate.
4. Press the <**TARE**> key.
   The display shows "-------" while calculating the reference.
   When "--------" disappears, the scale is ready for weighing.
5. Now you can perform sample analysis, scratching, centrifugation, filtering, vaporization, etc. After finishing the analysis, weigh the sample again (residual weight).
6. The balance determines the difference between initial weight and residual weight, and returns the required percentage.

Note:

Is possible to switch between the amount display and the weight display at any time by pressing <UNIT> key.

If the display shows "---- Or ----", it means that the measured value is greater or less than the predefined limits (± 999.99%).

Custom Unit

If the 16 pre-set units are not enough, you can set a user-defined custom measurement unit.

Procedure
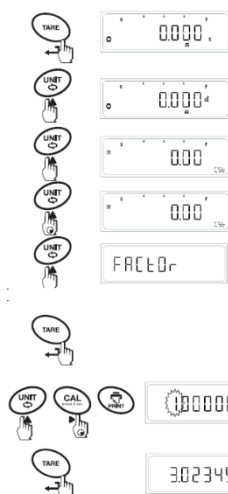
1. Make sure you have activated the "F Cust" function in the menu
2. Calibrate the scale
3. Press the <**UNIT**> button until the "Cst" display appears.
   The balance now requires a conversion factor, accuracy and LSD.
4. Hold down the ▲ key to access the Custom Drive menu.
   The last saved value for factor, accuracy, and LSD will be displayed.
5. Press the <**TARE**> key to enter the desired setting.

Conversion Factor Settings

1. Enter in the conversion factor settings on menu
2. Use the ▲ and ▶ keys to set the desired number
3. Once the factor is set, press the <**TARE**> key

Nota:
Il fattore di conversione può assumere qualunque valore eccetto lo 0.

Accuracy settings

Accuracy does not affect the calculation and conversion in the custom drive, but it determines the displayed results.

1. Press <**TARE**> to access the "Acc" section.
2. Use the ▲ key to scroll through the available accuracy standards
3. Select the desired accuracy standard by pressing the <**TARE**> key

The **available standards** are:
0.000001, 0.00001, 0.0001, 0.001, 0.01, 0.1, 1, 10, 100, 1000

The stability indicator on the left side of the display indicates which accuracy is selected.

LSD (Least significant Digit)

1. 1. Press <**TARE**> to access the "LSD" section.
2. 2. Use the ▲ key to scroll through the available accuracy standards
3. 3. Select the desired LSD standard by pressing the <**TARE**> key
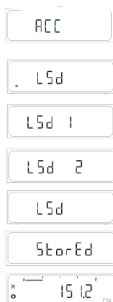
The **available standards** are:
1, 2, 5, 10, 20, 50, 100

The stability indicator on the left side of the display indicates which LSD standard is selected.

Once all three parameters have been set, hold down the <**TARE**> key to save the data and return to the measurement mode.

Factory default:
Factor = 1,0000
Accuracy = 0,01
LSD = 1

Dynamic weighing

This function allows you to weigh a moving sample (live animal).
The weight is calculated as the average of a defined number of weights of the same sample.

Manual dynamic weighing
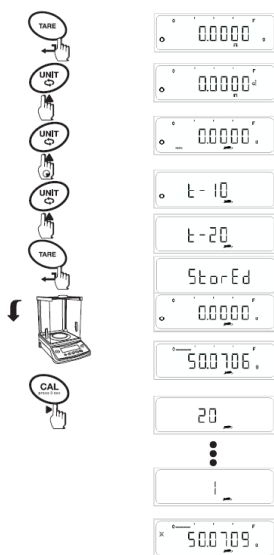
Procedure
1. Make sure you have selected the "**F Anl**" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> button until the symbol " " appears in the display.
5. Now you need to set a countdown value (Number of measurements). Holding down the ▲ key enters the countdown selection. Press the ▲ key until you find the countdown you want, and press <**TARE**> to confirm. The stability indicator on the left side indicates the currently selected value.
6. Place the animal on the plate, and press the <**CAL**> key to begin the measurement process.
7. At the end of the countdown, the weight of the sample will be displayed.

Countdown selection:
- t-5
- t-10 (default)
- t-20
- t-50
- t-100

AUTO dynamic weighing

Procedure
1. Make sure you have selected the function "**F Anl AUTO**" in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until " " and "**AUTO**" appear on the display.
5. Now you need to set a **countdown value** (See previous procedure)
6. Place the sample on the dish, the balance automatically starts the measuring process
7. At the end of the countdown, the weight of the sample will be displayed.

At the end of the measurement, press the <**ESC**> key to return to simple measurement mode.
It is possible at any time to move from the display of animal weight to measurement Unit 2 and 3 by pressing the <**UNIT**> key.

Formulation

This feature allows to have the sum of so many individual measurements.

The maximum limit is 99 individual measurements.
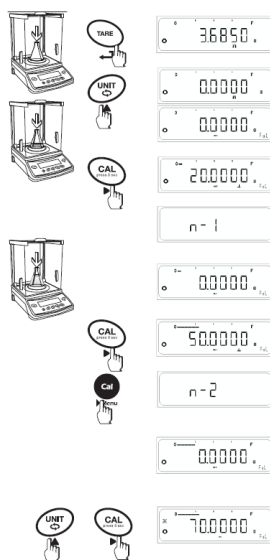
Manual Formulation

Procedure
1. Make sure you have selected the "**F Form**" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until "**Fol**" appears on the display
5. Place the sample on the plate. When the "⤓" symbol appears, the measurement is ready to be added to the total.
6. Press the <**CAL**> key to save the data.
   The display shows "n-1" indicating that the 1st data has been stored.
7. Repeat the operation for each sample we want to add.
8. To display the total press simultaneously the <**UNIT**> and <**CAL**> keys
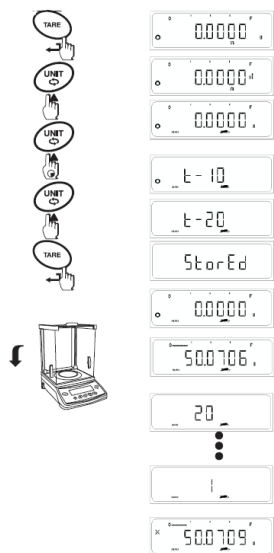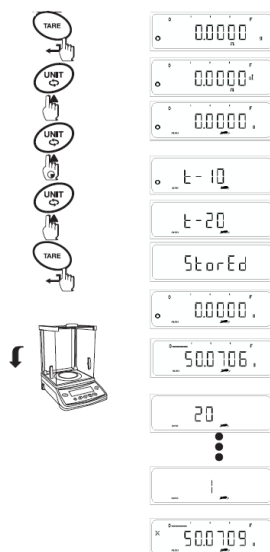

AUTO Formulation

Procedure
1. Make sure you have selected the "**F Form AUTO**" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until "**Fol Auto**" appears on the display
5. 5. Place the sample on the plate. When the "⤓" symbol appears, the measurement is ready to be added to the total.
6. When the stability is reached, the data will be stored.
   "N-1" appears on the display to indicate that the first data has been saved.
7. Repeat the operation for each sample we want to add.
8. To display the total press simultaneously the <**UNIT**> and <**CAL**> keys

With this mode, **the data is stored automatically when achieve stability.**

Note

An element can be added only if it is larger than 20 digits from the previous one.

Check Weighing

This function allows to control whether a given sample's weight falls within a certain range of values, or if it reaches a certain target value.

Check weighing

Procedure
1. Make sure you have selected the "*F CHw*" function in the user menu.
2. Adjust the scale by pressing the <**TARE**> key.
3. Press the <**UNIT**> key until "*CW*" appears on the display
   Now the balance needs to know the tolerance interval and the target value

---

Tolerance interval and the target value settings

1. Press and hold the ▲ key to enter the setup menu
2. Use the ▲ button to scroll through the **TARGET, HI, LOW** items
3. Press the <**TARE**> key on the parameter you want to change
4. Use the ▲ and ▶ keys to set the desired number.
5. Press the <**TARE**> key to confirm
6. Press and hold <**TARE**> to save the settings and return to size.
7. 7Place the sample on the plate, the display will show the result in accordance with the inserted interval and target settings.

- If the **LL** sign appears, the sample weight is below the minimum limit of the set interval.
- If **HH** appears, the sample weight is greater than the maximum limit of the set interval.
- In addition to LL or HH, if the sample weight is outside the set range, the balance **will sound**.
- To display the weight of the sample when the scale shows LL or HH, press the <**CAL**> key

Totalization

The totalization function allows you to make the sum of several independent piece counting sessions.
The result is expressed in PCS. (Quantity of items)
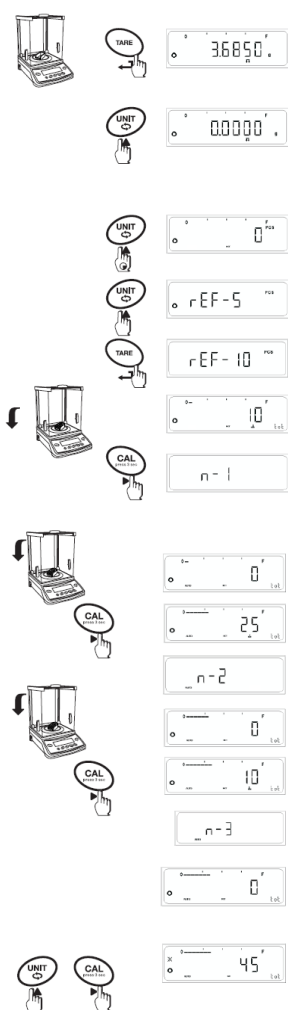Max 99 different quantities.

Manual Totalization

Procedura

1. Make sure you have selected the "*F CHw*" function in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until the word "tot" appears in the display.
   Now you need to set a reference quantity.
5. Press and hold the ▲ key to enter the reference quantity menu.
   The last used value can be displayed, editable using the ▲ key.
   (5,10,20,50,100 pieces).
6. Place the corresponding number of elements on the plate, and press the <**TARE**> key
   Once the stability is reached, the balance will have calculated the average reference weight.
7. Add the items to be counted on the plate, when the "⤓" symbol appears, the scale is ready to add the values.
8. Press the <**CAL**> key to store the data. The display shows "n-1" indicating that the first data has been saved.
9. Proceed by adding additional elements, and pressing <**CAL**> to sum up and save the data.

- Press the <**UNIT**> and <**CAL**> keys **simultaneously** to display the total.

AUTO Totalization

Procedure

1. Make sure you have selected "*F CHw AUTO*" in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until "*tot Auto*" appears on the display.
5. Repeat steps 5, 6 and 7 as in the manual procedure
6. When stability is achieved, the data is stored, and "n-1" appears on the display.
7. Proceed by adding new samples to count, and wait for stability.

- Press the <**UNIT**> and <**CAL**> keys **simultaneously** to display the total.

Density

"A body immersed in a fluid receives a push from the bottom up, equal to the weight of the volume of fluid displaced."

By leveraging the Archimedes principle, the balance can determine the density of an element.
Gold purity can also be verified with the same principle**.**

Density determination

- For density calculation, it is necessary to know the **type and temperature** of the liquid in which the sample is immersed.

Procedure

1. Make sure you have selected the "***F Den***" function in the user menu.
2. Press the <**UNIT**> key until "***Den***" appears on the display.
3. Hold down the <**UNIT**> button to open the Temperature-Liquid setting menu.
   Setting the temperature
4. Press the ▲ key to go to "Temp", press <**TARE**> to confirm.
5. Use the ▲ and ▶ keys to set the liquid temperature value, and press <**TARE**> to confirm.
   Liquid Selection
6. Use the ▲ key to go to "Liquid", and press <**TARE**> to confirm.
7. Scroll through the various options using the ▲ key
   (H2O - Ethanol - Other)
   And select the correct one with the <**TARE**> key
   Mode Selection
8. Use the ▲ key to go to "**Mode**" and press <**TARE**> to confirm.
9. Scroll through the various options using the ▲ key:
   (Compensated - Uncompensated - Purity of Gold)
   And select the desired one with the <**TARE**> key
10. 10. Press and hold <**TARE**> to save the settings and return to size
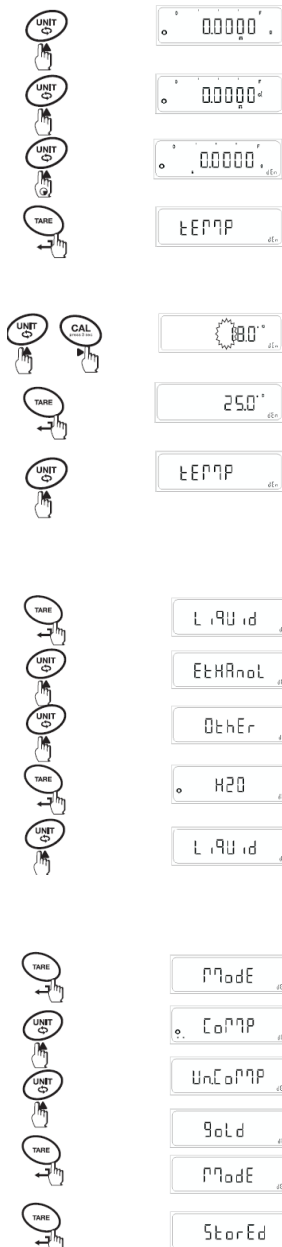
Note

- *Factory default: T= **25 °C - H2O - Compensated***
- *Gold purity is expressed in carats*
- *The temperature setting is only active if the liquid is set to H2O or Ethanol. Temperature can't be set for other types of liquids.*
- ***For the density determination, you need the optional accessory**.*
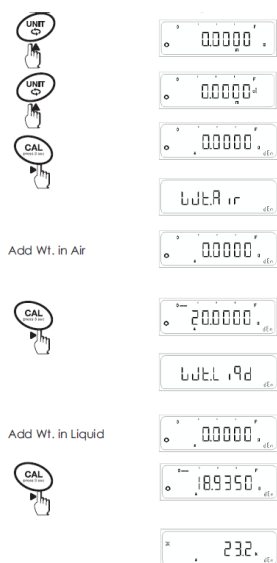
Procedure

1. Fit the density kit to the balance.
2. Adjust the scale by pressing the **<TARE>** key.
3. Press the **<UNIT>** button until the "Den" appears in the display.
4. Press the **<CAL>** key to start the density determination procedure.
5. The balance asks for the weight of the sample in the air (Wt.Air)
   Place the sample on the density kit kit plate, and when the measurement is stable, press **<CAL>** to confirm.
6. Now the weight of the sample is required in liquid (Wt.Liqd)
   Immerse the sample in the liquid, and when the measurement is stable confirm with the **<CAL>** key.
7. The scale shows the result according to the selected mode (Plywood - not plywood - gold purity).

Density calculation with air density compensation

$$\rho = \frac{A * (\rho 0 - \rho l)}{(A - B)} + \rho l$$

p = Density of the sample
A = Weight of the sample (in air)
B = Weight of the sample (in liquid)
p0 = Density of the liquid
pl = Density of the air (0,0012 g/cm^3)

Density calculation without air density compensation

$$\rho = \frac{A}{(A - B)} * \rho 0$$

Pipette calibration

In the lab, where pipettes are used for analysis and experimentation, it is important that they are correctly calibrated.

Parameters settings

1. Make sure you have selected the "**F Pip**" function in the user menu.
2. Adjust the scale by pressing the <**TARE**> key
3. Hold down the <**UNIT**> key for two seconds to enter the "**F Pip**" function menu.
   Count Cycles
4. Use the ▲ key to go to the "**COUNT**" entry, and press <**TARE**> to enter.
5. The display shows n-5, where "n" is the number of cycles it wants to perform to calibrate the pipette. (It can be set from 5 to 15)
6. Use the ▲ key to change the value and confirm with <**TARE**>.
   Temperature setting
7. Use the ▲ key to go to "**tEMP**", and press <**TARE**> to enter.
8. Use the ▲ key to select the desired temperature, between 15 ° C and 30 ° C, with a step of 0.5 ° C. Press <**TARE**> to confirm.
   Pressure setting
9. Use the ▲ key to go to "**PrES**" and press <**TARE**> to enter.
10. Use the ▲ key to select the desired pressure, between 800 hPa and 1050 hPa, with a step of 50 hPa. Press <**TARE**> to confirm.
    Initial Volume Setting
11. Use the ▲ key to go to "V 0" and press <**TARE**> to enter.
12. Use the ▲ and ▶ keys to set the pipette volume volume, and press <**TARE**> to confirm.
    Central Volume Setting
13. Use the ▲ key to go to "V Half" and press <**TARE**> to enter.
14. Use the ▲ and ▶ keys to set the center volume of the pipette, and press <**TARE**> to confirm.
    Final Volume Setting
15. Use the ▲ key to go to "V Full" and press <**TARE**> to enter.
16. Use the ▲ and ▶ keys to set the total volume of the pipette, and press <**TARE**> to confirm.

Pipette calibration procedure

1. The procedure will be repeated *n* times, where *n* is the number of cycles set to the "**COunt**" parameter.
2. Press the <**CAL**> key to start the procedure.
3. The balance will first require V0: place the liquid quantity corresponding to the initial volume set in the parameters on the plate and press <**CAL**> to proceed. The data will be stored as "**PLACE 1**".
4. Repeat the procedure from "Place 1" to Place "n".
5. Next, the central volume and the final volume will be required in succession.
6. Repeat the procedure until the writing appears: "**PiP done**".
   At this point the calibration is finished.

Stats

This function allows you to obtain statistical data on the measurements made.

Details are provided including number of readings, average, minimum and maximum value, standard deviation, etc..

Stats recording

1. Make sure you have selected "**F Stat**" in the user menu.
2. Place an empty container on the plate.
3. Adjust the scale by pressing the <**TARE**> key.
4. Press the <**UNIT**> key until "**FStat**" appears in the display.
5. Place the sample on the weighing pan. Wait for stability and press <**CAL**> to store the first data ("n-1").
6. The display shows "**rmv**": remove the sample from the plate.
   You will only be able to record the next value if the measurement returns to 0.0000 g.
7. After taking sample 1 from the plate, place the second sample ("n-2") and press <**CAL**> to record it.
8. Repeat for all required samples.

Stats reading

To view recorded stats, press and hold <UNIT> for 2 seconds.
The symbol * appears on the display to indicate that you are in static reading mode.

The following values will be displayed in order:

- **Number of readings**
- **Average**
- **Minimum value**
- **Maximum value**
- **Standard deviation**
- **Difference**
- **Variance.**

Press the ▲ key to move from one parameter to the next
Press the <**ESC**> key to return to the desired extent.

Stats Delete

Pressing the <**TARE**> key for 2 seconds will delete all registered stats.

Date and Time

Date and time settings

To access, press the <**ON / OFF**> button and hold down the <**PRINT**> button for 2 seconds.

They will be required in the order:

- • **Time**
  Will be required now, minutes and seconds, and format AM, PM or 24 h

- • **Date (date)**
  Will be required day, month and year.

Time

The current time is displayed.
The flashing digits are the editable digits.

- With level ▲ you change the value, use the ▶ key to move to the next digit. Press the <**PRINT**> button to select AM, PM or 24 h format
- Once the correct time has been set, press the <**TARE**> key to confirm, and switch to the date.

Date

After confirming the time with the <**TARE**> key, the current date (dd / mm / yyyy) is displayed.

- With level ▲ you change the value, use the ▶ key to move to the next digit.
- •Once the correct date has been set, press the <**TARE**> key to confirm.

ID and LID settings

ID and LID settings

To access, press the <**ON / OFF**> button and quickly press the <**PRINT**> button.

Will be required in the order:
- **ID**
  Serial number
- **LID**
  Production Batch number

Procedure
- With level ▲ you change the value, use the ▶ key to move to the next digit.
- •Once the desired value has been entered, press the <**TARE**> key to confirm, and move to the next parameter.

Automatic Calibration

Automatic calibration can works based on:

- Time
  Automatic calibration after a set time;
- Temperature
  Automatic calibration when the temperature changes;
- Calibration when power on
  Automatic calibration every power on
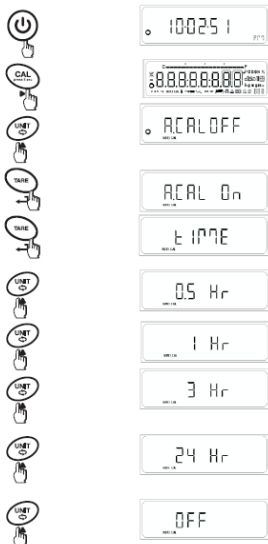
Auto Cal Time setting

- Press the <**ON / OFF**> key, and during the ignition press the <**CAL**> key
- The display shows "**A.CAL OFF**", use the ▲ key to move to "**A.CAL On**", and press <**TARE**> to confirm.
- "**TIME**" appears, press <**TARE**> to enter.
- • The <**UNIT**> key scrolls through the possible values, with <**TARE**> selects the desired one:

Time selection:
- 0,5 h (30 minutes)
- 1 h
- 2 h
- 3 h
- 24 h
- Off (function deactivated)
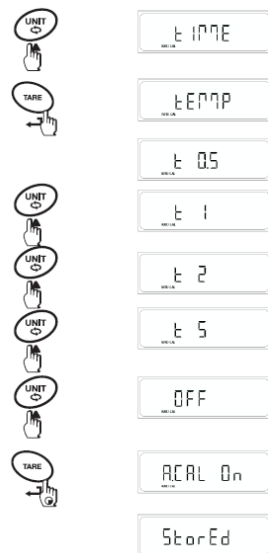
Auto Cal Temperature settings

Following the same procedure as above, select "***A.CAL On***", and using the ▲ key select "**Temp**".

Temperature selections:

- 0,5 °C
- 1 °C
- 2 °C
- 5 °C
- Off (function deactivated)

Power on AUTO Cal

Following the same procedure as above, when "**A.CAL On**" or "**A.CAL Off**" appears, press the <CAL> key to enter the calibration settings at power up.

When "**P.Cal On**" is selected, the balance will be calibrated automatically at each power-up.

Data Interface and Serial Communication

The scale is equipped with a serial port for connection to a PC or an external printer.

- Typology: RS 232 serial interface
- Operational method: Full duplex
- Standard: RS-232
- Transmission rates: 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 57,600
- Equality: Mark, Space, Odd, Even, none
- Format: 1 start bit, 8-bit ASCII, 1 or 2 bit stop.
- Output format: 26 characters.

Link Diagram

To connect the scale to your PC or external device, be sure to use a bundle as shown below:
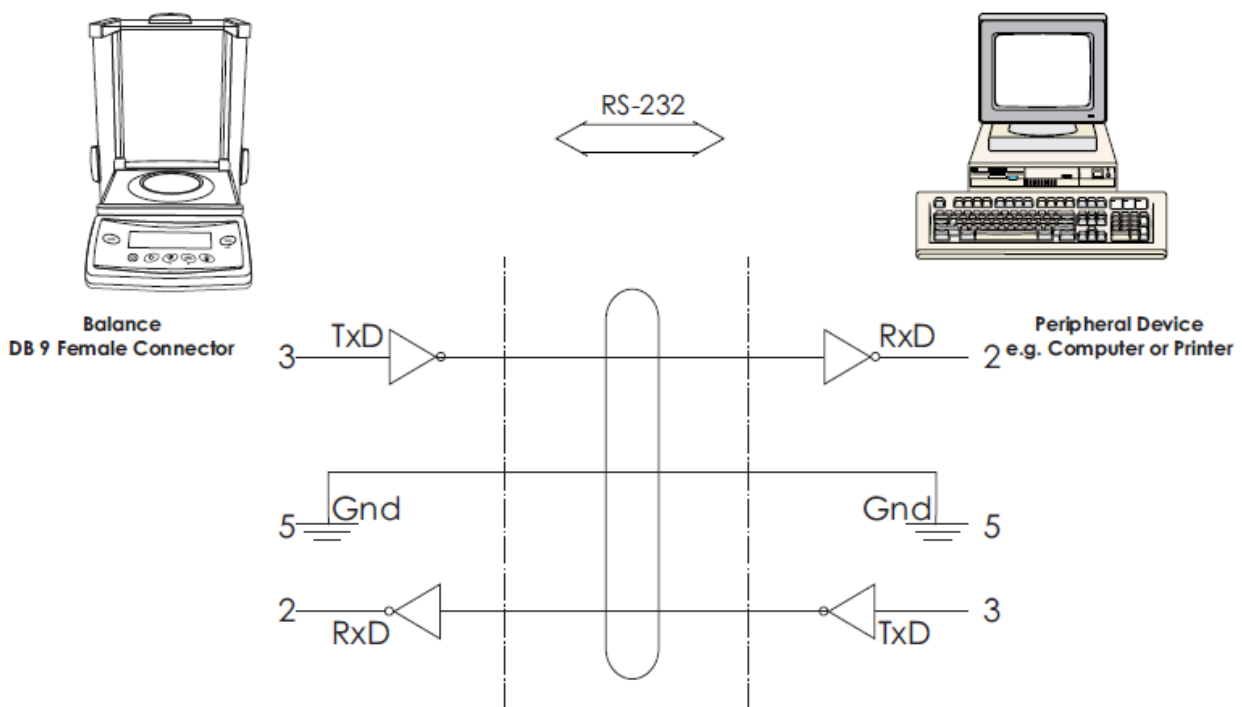
Errors

| Message	Cause	Solution
--OL--	Excessive load	Remove the excess load from the weighing pan.
--UL--	Load too low	Make sure the plate is well positioned.
Error 1	Value too low to be used As reference in PCS mode, %, custom unit or check weighing.	Increase the amount of sample on the plate.
Error 2	During calibration, a sample of at least 10% of the maximum scale capacity is present on the plate.	Turn off the scale and turn it on again making sure you have removed the weight from the dish.
Error 3	External calibration • No weight placed on the plate within 60 sec. • Weight on the plate is out of tolerance.	Place the correct sample weight on the scale.
Error 4	GLP enabled, and the user attempts to enter the menu before completing the printing.	Press the <**ESC**> key to print the GLP closure. Once printed, you can access the user menu.
Error 6	The display shows a value other than 0.0000, and the user has started the calibration process.	Adjust the scale and remove any sample on the weighing pan. When the display shows 0.0000 g, you can proceed to calibration.
Error 7	Incorrect date or time value.	Enter the correct date and time value.
Error 8	The user attempts to activate the GLP function, with print mode set AUTO or CONTINUOUS.	Change the print mode to REQUEST, and then activate the GLP mode.
Error : • *9* • *29* • *39*	RTC + CAL Error	Contact your service center.

Datasheet

Capacity	*220 g*
Resolution	*0,1 mg*
Accuracy	*1 mg*
Tare range	*-220 g*
Repeatability	*0,1 mg*
Linearity	*± 0,2 mg*
Precision Class	*I*
Response time	*3 sec.*
Temperature Range	*18°C -- 30°C*
Calibration	*Internal automatic*
Net weight	*8 Kg*
Pan dimension	*Ø 90 mm*
Chamber High	*228,5 mm*
Dimension (L x l x H)	*342,5 x 212 x 341*
Power supply	*Power adapter DC ; input 100 – 240 V output 13 V – 1,5 A*
Freq	*50/60 Hz*
Average consumption	*9 VA – Max 18 VA*
Measuring units	*G, Kg, Pound, Once, Troy Once, Grain, Pennyweight, Carato, Milligrammo, Momme, Mesghal, Hong Kong tales, Singapore tales, Taiwan tales, Baht*
Communication	*Serial RS-232*

Dimensions
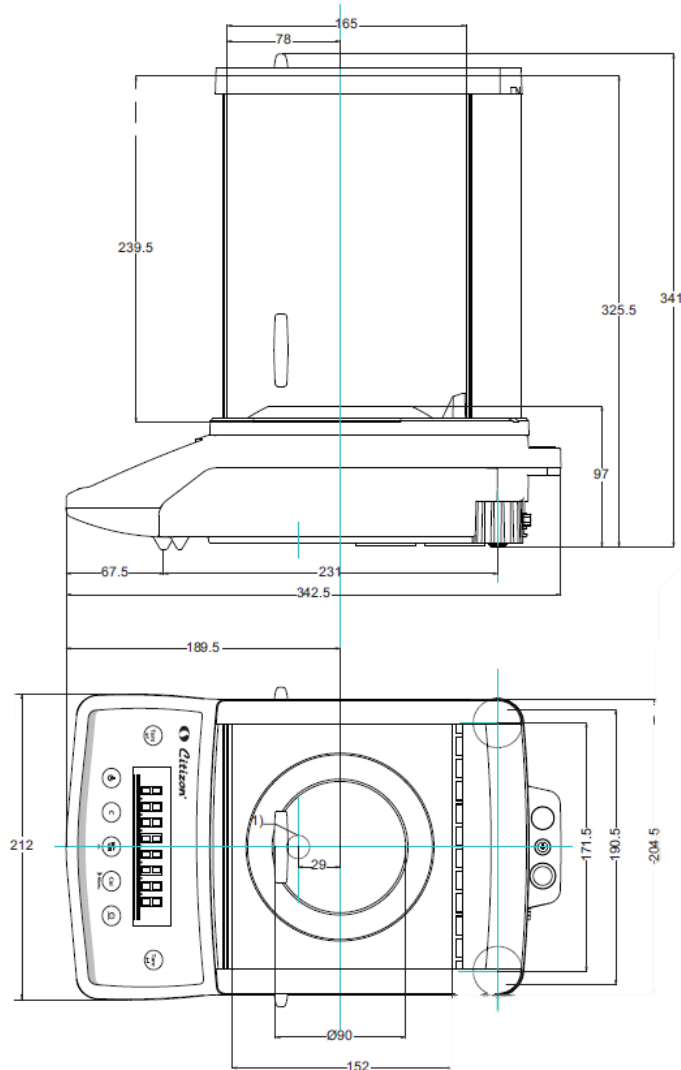
Care and maintenance

Regular maintenance by a technician / reseller will extend the scales life and will ensure performance.

The optimum maintenance interval depends on the operating conditions.

Repair

Any repair work must be carried out by qualified personnel.
Any attempt by non-trained personnel to perform repairs may worsen the condition of the instrument until it becomes irreparable.

Cleaning

We recommend that you clean the balance as often as possible, following the advice:

- Disconnect the DC Adapter from the wall outlet (Mains Power).
  If you have an interface cable connected to the RS-232 port, unplug it.
- Make sure no liquid enters the weighing chamber below the dish
- Do not use aggressive detergents (solvents or the like)
- Clean the scale with a piece of wet cloth with a mild detergent (soap)
- After cleaning, dry with a soft, dry cloth.

Warranty

The BL 224 scale is guaranteed by defects in construction or workmanship from the date of delivery for the duration of the warranty period.

During the warranty period, the supplier undertakes to repair or replace any component, which proves to be defective, provided that the product is returned, prepaid, to the supplier.

The warranty does not apply if the product has been accidentally damaged or improperly used, if exposed to radioactive or corrosive materials, or as a result of unauthorized personnel assistance.

Because warranty terms may vary from country to country, please contact your dealer for further clarification.

The warranty covers only the balance purchased from an authorized channel, does not cover accessories such as battery, adapters, RS-232 cable, and non-original accessories.

The warranty terms expire in case the serial number is modified or rendered illegible, or if the protective adhesive removed from the back of the balance is removed.

For warranty repair, the balance must be sent to your dealer or authorized service department, complete with all parts and using the original packing. Use of unsuitable packaging will not cover the warranty coverage.

Electrical and electronic equipment with this symbol can not be disposed of in public landfills.

In accordance with EU Directive 2002/96 / EC, European users of electrical and electronic equipment have the possibility to return to the Distributor or to the Producer the equipment used when purchasing a new one. The abusive disposal of electrical and electronic equipment Electronic is punished by monetary administrative penalty