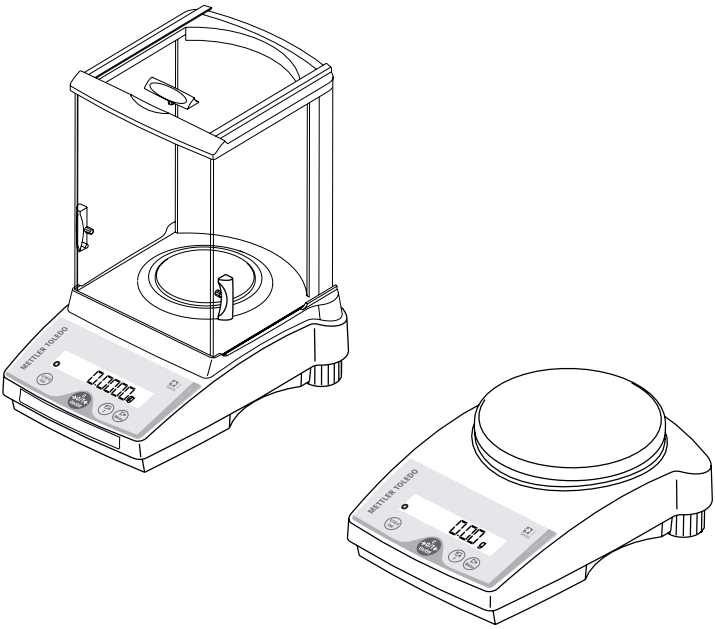
Operating Instructions

METTLER TOLEDO
L-IC Line of balances

- **AL-IC**
- **PL-IC**



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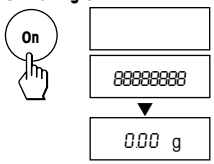
METTLER TOLEDO

Operating instructions in a nutshell

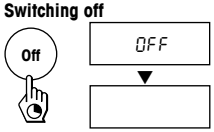
Press key **briefly** — Press and **hold key down** until the desired display appears — ▼ automatic sequence

*** These functions must be activated in the menu (section 4.3.2)**

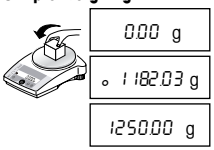
Switching on



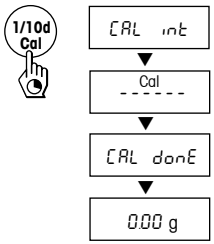
Switching off



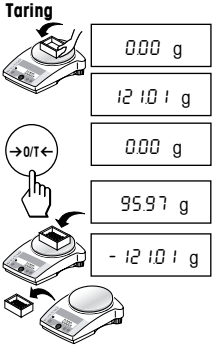
Simple weighing



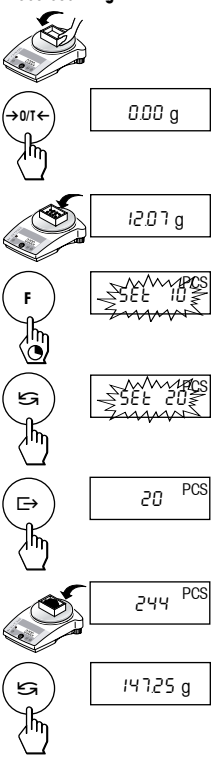
Adjusting (calibration) internal



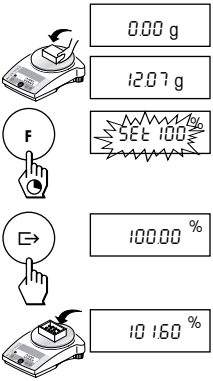
Taring



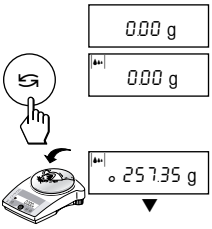
Piece counting*



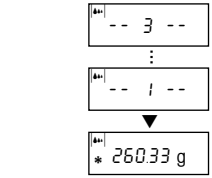
Percent weighing*



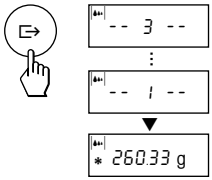
Dynamic weighing*



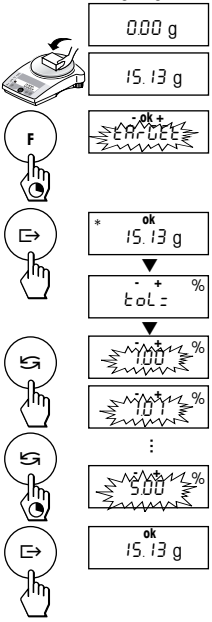
with automatic start (Dyn A)



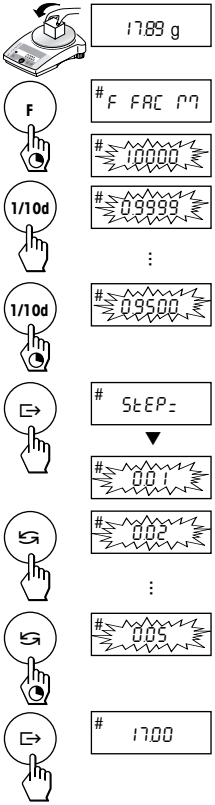
with manual start (Dyn M)



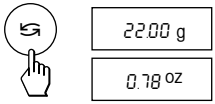
Plus-minus weighing*



Free factor / selectable display increment*



Unit switching*



Contents

1 Getting to know L-IC balances line

1.1 General

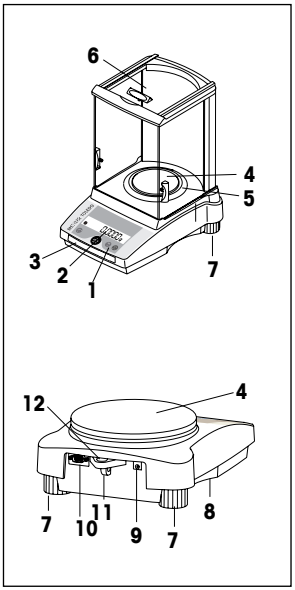
Balance features

- The L-IC balance line ranges from high-resolution analytical balances (AL-IC) with a readability of 0.1 mg through to precision balances (PL-IC) with a readability of 0.001 g to 1 g. The weighing ranges extend from 51 g to 4.1 kg.
- The operation of all theses balances is identical.
- In addition to basic operations such as **weighing**, **taring** and **adjusting** (calibration) miscellaneous functions such as **"Piece counting"**, **"Percent weighing", "Dynamic weighing", "+/- Weighing"** or **"Free factor"** can be activated.
- Several balances are fitted with a glass draft shield in the factory; with other models a draft shield is available as an optional extra.

Note

All Models are available as certified versions. Please ask your METTLER TOLEDO dealer for details.

1.2 Layout of balances



1 Keys
2 Display
3 Model plate with the following data:
"Max": maximum capacity
"d": readability
"Min": minimum capacity (recommended minimum load; **only relevant for certified balances**)
"e": verification scale interval (smallest display increment tested during certification; **only relevant for certified balances**)
4 Weighing pan
5 Draft shield element (not on all models)
6 Draft shield (supplied as standard with models with a readability of 0.1 mg and 1 mg)
7 Leveling feet
8 Hanger opening for weighing below the balance (underside of balance)
9 AC adapter socket
10 RS232C interface
11 Lug for optional antitheft device
12 Leveling control

Keys and display are identical for all L-IC balances.

1.3 Overview of key functions

The balances have two operator control levels: the **weighing mode** and the **menu**. The function of each individual key depends on the operator control level and how long the key is pressed.

Weighing mode

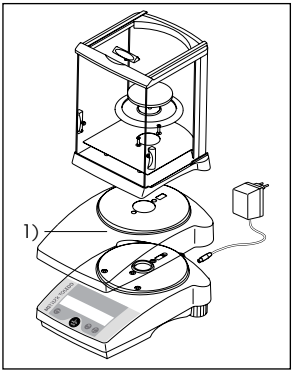
Menu

Key functions in weighing mode			
Press briefly		**Press and hold down**	
1/10d	• Reduce readability	**Cal**	• Adjust (calibrate)
On **→0/T←** **C**	• Switch on • Zero/tare • Cancel function	**Off**	• Switch off
⇆	• Switch • Change settings	**F**	• Call function; A function must be activated in the menu, otherwise "F nonE" appears in the display
⇨	• Transfer weighing data via interface with activated printer • Confirm settings	**Menu**	• Show menu (hold key down until MENU appears)

Key functions in menu mode			
Press briefly		**Press and hold down**	
1/10d	• Change settings • Reduce value by 1 step	**1/10d**	• Reduce value rapidly
C	• Close menu (without saving changes)		–
⇆	• Change settings • Increase value by 1 step	⇆	• Increase value rapidly
⇨	• Select next menu item	**Menu**	• Save changes and close menu

2 Startup

2.1 Unpacking / standard equipment



The standard equipment for every balance comprises:

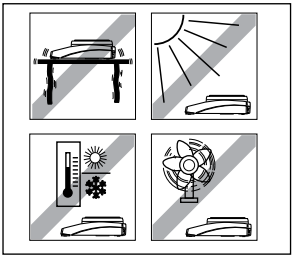
- **AC adapter**, to national standard
- **Weighing pan, Weighing pan support, draft shield element** (depending on model)
- **Draft shield** standard supply with models of 0.1 /1 mg readability (for other models available as an optional extra)
- **Operating Instructions**

1) In-use covers are available as optional extras (Section 6.4).

2.2 Cautionary notes

- L-IC balances must **not** be operated in **hazardous areas** with the standard-supply AC adapter.
- Before connecting the AC adapter, verify that the voltage printed on it corresponds to the local AC power supply voltage. If this is not the case, please contact your local METTLER TOLEDO dealer.
- L-IC balances may only be used indoors in a dry environment.
- For use with CSA Certified (or equivalent approved) power source, which must have a limited and SELV circuit output.

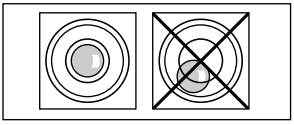
2.3 Setting up, leveling, preparations for weighing below the balance



The optimum location
The correct location makes an important contribution to the accuracy of the weighing results of high-resolution analytical and precision balances.

- Stable, vibration-free position as horizontal as possible
- No direct sunlight
- No excessive temperature fluctuations
- No drafts

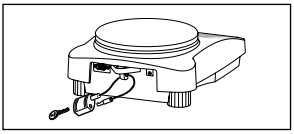
The best location is on a stable bench in a corner protected against drafts, as far away as possible from doors, windows, radiators or the louvers of air conditioners.



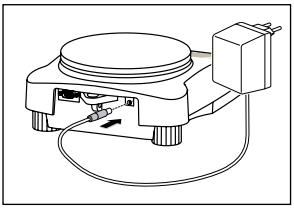
Leveling
All models are equipped with a level glass and two leveling feet to compensate for minor irregularities in the surface on which the balance stands. The balance is exactly horizontal when the air bubble is in the middle of the level glass.

Note: The balance should be leveled each time it is moved to a new location.

Preparations for weighing below the balance
To carry out weighing operations below the balance, get rid of the special cover on the underside of the balance. **(Note: never put the balance without the protective cover over its cone down on its head, only on its side!)**. This exposes the opening for the hanger, making weighing below the balance possible.



Antitheft device
All models are provided with a lug for attaching an antitheft device (see optional equipment in Section 6.4).



Power supply

→ Plug the AC adapter into the AC adapter socket on the balance, and connect to the power supply.

→ The balance performs a self-test. This test is finished when "OFF" appears.

→ Press the «**On**» key briefly: the balance is in operational readiness. Before any work is performed with the balance, it must be adjusted (Section 2.4).

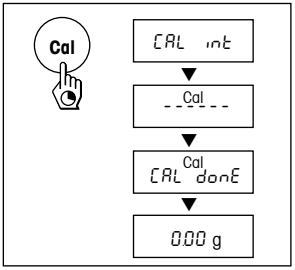
Notes
To achieve accurate results with analytical balances (AL-IC), they must be left switched on for at least 60 minutes to reach operating temperature before carrying out the first weighing operation.

2.4 Adjusting (calibration)

To obtain accurate weighing results, the balance must be adjusted to match the gravitational acceleration at its location.

Adjusting is necessary
- before the balance is used for the first time
- at regular intervals during weighing service
- after a change of location

To obtain accurate results, the balance must be left switched on for 60 minutes to reach operating temperature before starting the adjustment procedure.



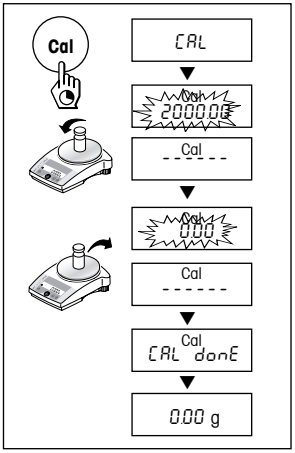
Adjusting with internal weight

→ To carry out tis operation, in the second menu option (Adjustment) select "CAL int" (= factory setting) (section 4.1).

→ Unload weighing pan.

→ Press and hold the «**Cal**» key down until "CAL" appears in the display, then release key.

→ The balance adjusts itself automatically.
The adjusting is finished when the message «Cal done» appears briefly in the display, followed by "0.00 g". The balance is again in weighing mode and ready for operation.



Adjusting with external weight

→ Have required adjusting weight ready.

→ Unload weighing pan.

→ Press and hold the «**Cal**» key down until "CAL" appears in the display. Release key.

The required adjustment weight value flashes in the display.

→ Place adjustment weight in centre of pan. The balance adjusts itself auto-matically.

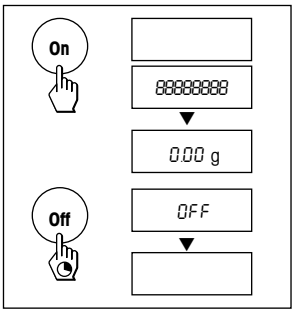
→ When "0.00 g" flashes, remove adjustment weight.

The adjusting is finished when the message "CAL done" appears briefly in the display, followed by "0.00 g". The balance is again in weighing mode and ready for operation.

Notes
- This adjustment procedure can be terminated at any time with the «**C**» ("Cancel") key. The balance reverts to weighing mode.

3 Weighing

3.1 On/Off switching



Switching on

→ Remove any load from weighing pan and press «**On**» key briefly.

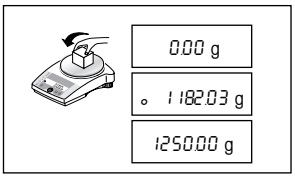
The balance performs a display test (all segments in the display light up briefly).

When zero is displayed, the balance is ready for operation.

Switching off

→ Press and hold the «**Off**» key down until "OFF" appears in the display. Release the key.

3.2 Simple weighing



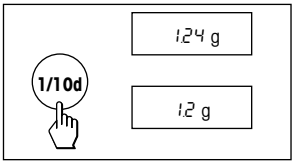
→ Place weighing sample on the weighing pan.

→ Wait until the stability detector "∘" disappears.

→ Read the result.

3.3 Faster weighing with reduced readability

The balance has the facility for speeding up the weighing operation by reducing its readablity (number of decimal places):

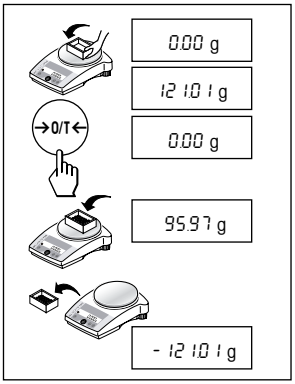


→ The balance is operating with its **normal readability and speed**.

→ Press the «**1/10d**» key and …

→ … the balance operates with reduced readability (one decimal place less), but displays the weighing result quicker. Pressing the «**1/10d**» key briefly again toggles the balance back to its full readability.

3.4 Taring



→ Place empty container on the balance.

→ The weight is displayed.

→ Press the «**→0/T←**» key briefly.

→ Add weighing sample to container. The net weight is now displayed.

If the container is removed from the balance, the tare weight will be shown as a negative value.

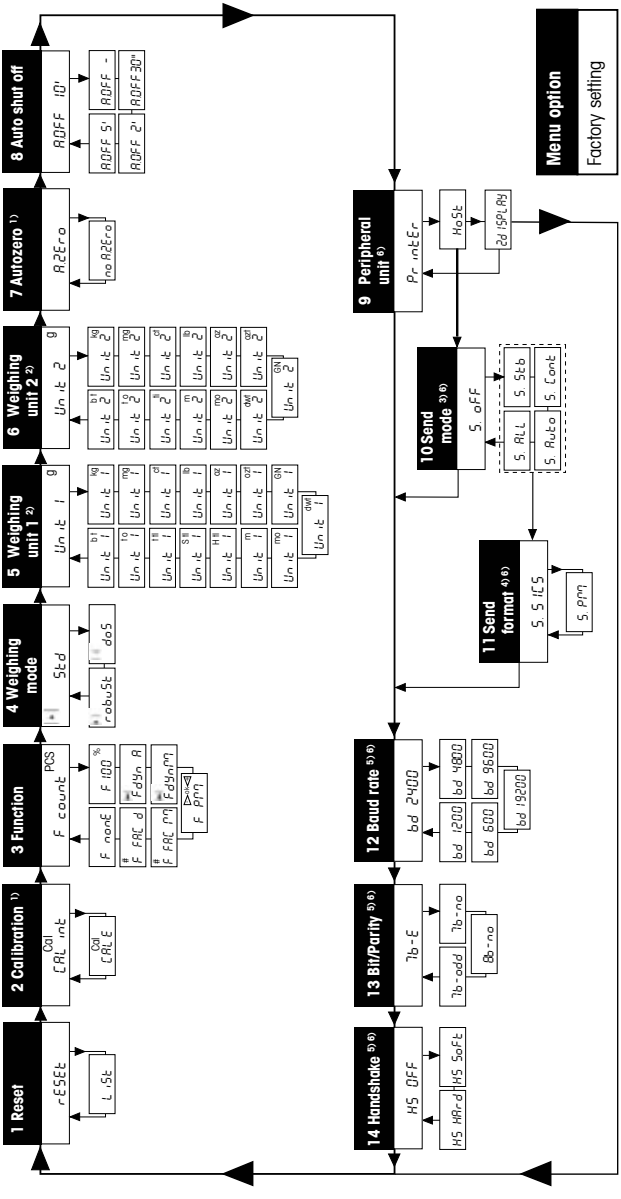
The tare weight remains stored until the «**→0/T←**» key is pressed again or the balance is switched off.

4 Menu

4.1 Overview

In the menu you can change the weighing unit (for certified balances, only if national weights and measures legislation allows), select additional functions and carry out various settings. A description of the individual menu options is given in Section 4.3.

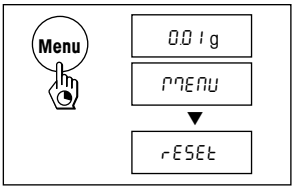
Overview of menu



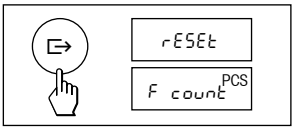
Notes

1) With certified balances, this menu option has a fixed setting and cannot be changed.
2) With certified balances, only those weighing units allowed by the appropriate national weights and measures legislation may be selected.
3) This menu option is only shown if "Host" has been selected in menu option 8 (Peripheral unit).
4) This menu option is only shown if "S.oFF" has not been selected in menu option 9 (Send mode).
5) These menu options are only shown if "Host" or "Printer" has been selected in menu option 8 (Peripheral unit).
6) Only displayed if the optional interface has been installed.

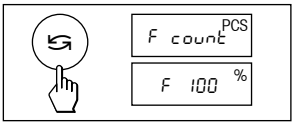
4.2 Menu operation



Opening the menu
In weighing mode, press and hold down the «**Menu**» key until "MENU" appears in the display. Release the key: the 1st menu option is displayed.

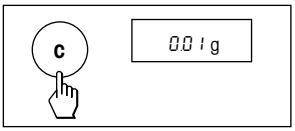


Select menu options
The «⊏→» key is used to select individual menu options with their current settings one after the other.



Change settings
Pressing the «⇆» key displays the next setting; pressing the «**1/10d**» key displays the previous one. Once the desired setting appears in the display, the next menu option can be selected («⊏→») or you can close the menu (see following Section).

Saving settings and closing the menu
Hold the «**Menu**» key down until "StorEd" appears in the display. Release the key and the balance reverts to weighing mode. All changes are saved.



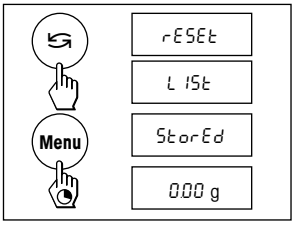
Abort
Press the «**C**» key briefly. The balance reverts to weighing mode. Changes are **not** saved.

Note
If no entry is made within 45 seconds, the balance reverts to weighing mode. Changes are **not** saved.

4.3 Description of menu options

4.3.1 Reset or recording of balance settings (1st menu option "RESET")

Reset balance settings
→ Select "Reset", press and hold down the «**Menu**» key until the message "r donE" confirms that all menu settings have been reset. The balance then reverts to weighing mode and works with the factory settings (Section 4.1).

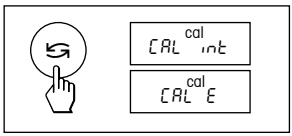


Recording balance settings
→ Select "List" and hold down the «**Menu**» key until the message "StorEd" is displayed.

The current balance settings are transmitted to the peripheral device connected to the optional RS232C interface. To do this the setting "Printer" must always be selected at the 8th menu option (Peripheral unit). The current balance settings are saved at the same time.

4.3.2 Adjustment (2nd menu option)

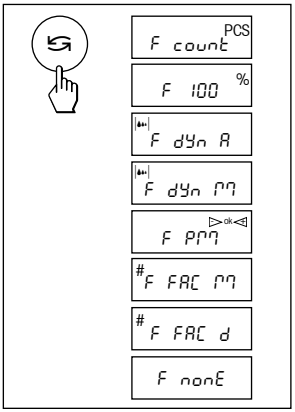
In this menu option you can select whether you wish to adjust the balances using the internal or the extternal adjustment weight:



CAL int	Adjusting with internal adjustment weight (factory setting)
CAL E	Adjusting with external adjustment weight

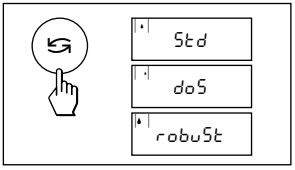
4.3.3 Functions (3rd menu option / see Section 5 for their use)

In addition to simple weighing, the following functions can be selected with the «↻» key:



F count	Piece counting
F 100 %	Percent weighing
F dYn A	Dynamic weighing with automatic start
F dYn M	Dynamic weighing with manual start
F PM	Plus-minus weighing
F FAC M	Multiply free factor value by weight, change size of display increment
F FAC d	Divide free factor value by weight, change size of display increment
F non E	No function, simple weighing

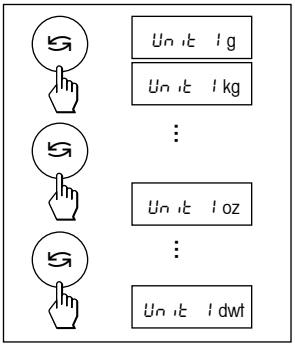
4.3.4 Weighing mode (4th menu option)



This setting allows you to adapt the balance to the weighing mode. Select "Std" (standard) for all normal weighing processes. With "doS" (dosing) - for dispensing substances in liquid or powder form - the balance reacts very rapidly to the slightest changes of weight. With "robuSt" (absolute weighing) the balance only reacts to more significant changes in weight, so that the weighing result is very stable.

4.3.5 Weighing unit 1 (5th menu option "UNIT 1")

Depending on requirements, the balance can operate with the following units (possible with certified balances only if permitted by national weights and measures legislation):



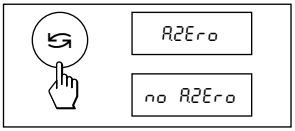
Unit	Conversion factor	Comments
g gram		factory setting
kg kilogram	1 kg = 1000 g	not with 0.1 mg and 1 mg balances
mg milligram	1 mg = 0.001 g	with 0.1 mg and 1 mg balances
ct carat	1 ct = 0.2 g	
lb pound	1 lb = 453.59237 g	not with 0.1 mg balances
oz ounce	1 oz = 28.349523125 g	
ozt troy ounce	1 ozt = 31.1034768 g	
G N grain	1 GN = 0.06479891 g	not with 1 g balances
dwt pennyweight	1 dwt = 1.55517384 g	
mo momme	1 mom = 3.75 g	
m Mesghal	1 msg ≈ 4.6083 g	
H tl Hong Kong tael	1 tlh = 37.429 g	
S tl Singapore tael	1 tls ≈ 37.79934666667 g	The Malaysian tael has the same value
t tl Taiwan tael	1 ttt = 37.5 g	
t o tola	1 tola = 11.6638038 g	
b t baht	1 baht = 15.16 g	

4.3.6 Weighing unit 2 (6th menu option "UNIT 2")

If it is required to show the weighing result in weighing mode in an additional unit by pressing the «⟲» key, the desired second weighing unit can be selected in this menu option. The same weighing units are available as under "UNIT 1", with the exception of the tael units ("H tl", "S tl" and "t tl").

4.3.7 Autozero (7th menu option / see overview and notes in Section 4.1)

This menu option allows you to switch the automatic zero correction on or off.

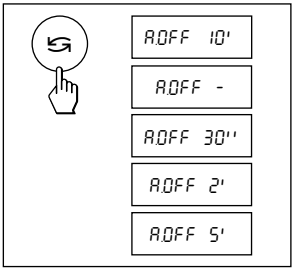


Autozero switched on
The zero point is automatically corrected (e.g. if drift occurs or the weighing pan becomes dirty). Certified balances, however, have a fixed zero point.

Autozero switched off
The zero point is **not** automatically corrected. This setting is advantageous for special applications (e.g. evaporation measurements).

4.3.8 Auto shut off

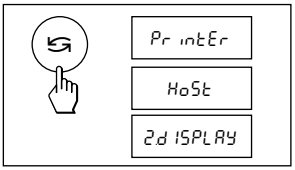
If the automatic shut off function is activated, the balance automatically switches itself off after a selected period of inactivity (i.e. with no key being pressed or changes of weight occurring):



A.OFF 10'	Automatic shutoff after 10 minutes inactivity
A.OFF -	Automatic shutoff **not** activated
A.OFF 30"	Automatic shutoff after 30 seconds inactivity
A.OFF 2'	Automatic shutoff after 2 minutes inactivity
A.OFF 5'	Automatic shutoff after 5 minutes inactivity

4.3.9 Peripheral unit (9th menu option / see overview and notes in Section 4.1)

The balance automatically saves the appropriate settings (Sections 4.3.10 – 4.3.14) for every peripheral device.

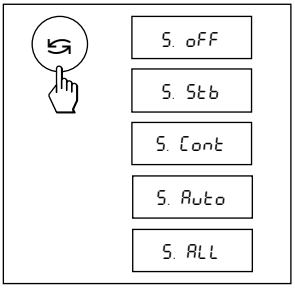


Printer	Connected to a printer.
Host	Connection to any desired peripheral device.
Aux. display	Connection of an optional auxiliary display unit (communications parameters cannot be selected).

4.3.10 Send mode (10th menu option / see overview and notes in Section 4.1)

Note: This menu option is only available if the "Host" setting was selected in the 8th menu option (Peripheral unit)!

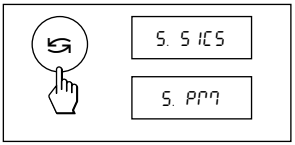
It specifies how a value is transferred to a peripheral device.



S. oFF	Send mode switched off.
S. Stb	The next possible stable value will be transferred after the «⮆» key has been pressed.
S. Cont	All values are transferred automatically.
S. Auto	Only stable values are transferred automatically.
S. All	The current value is transferred after the «⮆» key has been pressed.

4.3.11 Send format (11th menu option / see overview and notes in Section 4.1)

Note: This menu option is only available if the "S.oFF" setting was **not** selected in the 9th menu option ("Send mode")!



It sets the data transfer format.

"S. SICS": The MT-SICS data transfer formats are used. Please refer to the "Reference Manual MT-SICS B-S/L/L-S balances 11780447", available from your METTLER TOLEDO dealer or downloaded from the Internet **(www.mt.com/sics-classic**).

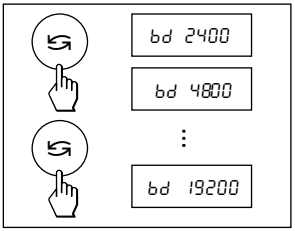
More Information please find in the Section 6.3.

"S. PM"*: The following PM balance data transfer formats are used:

S.Stb: ␣␣␣␣␣1.67890␣g
S.Cont: S␣␣␣␣␣1.67890␣g SD␣␣␣␣1.39110␣g
S.Auto: S␣␣␣␣␣1.67890␣g
S.All: ␣␣␣␣␣1.67890␣g
␣D␣␣␣␣1.39110␣g

* unidirectional, no MT-SICS commands are accepted.

4.3.12 Baud rate (12th menu option / see overview and notes in Section 4.1)



Note: This menu option is only available if the "Printer" or "Host" setting was selected in the 8th menu option (Peripheral unit)!

The baud rate (data transfer rate) determines the speed of transmission via the serial interface. The unit is the baud (bd) = 1 bit/second.

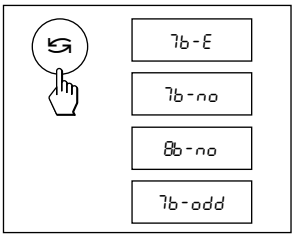
The following settings are available: 600 bd, 1200 bd, 2400 bd, 4800 bd, 9600 bd and 19200 bd.

For problem-free data transmission the sending and receiving devices must be set at the same value.

4.3.13 Bit/Parity (13th menu option / see overview and notes in Section 4.1)

Note: This menu option is only available if the "Printer" or "Host" setting was selected in the 9th menu option (Peripheral unit)!

It sets the character format for the peripheral device connected to the balance.

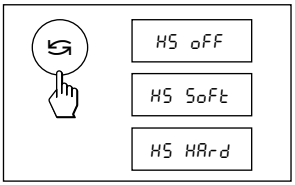


7b–E	7 data bits/even parity
7b–no	7 data bits/no parity
8b–no	8 data bits/no parity
7b–odd	7 data bits/odd parity

4.3.14 Handshake (14th menu option / see overview and notes in Section 4.1)

Note: This menu option is only available if the "Printer" or "Host" setting was selected in the 9th menu option (Peripheral unit)!

This function is used to select the data transfer mode to suit different serial devices.

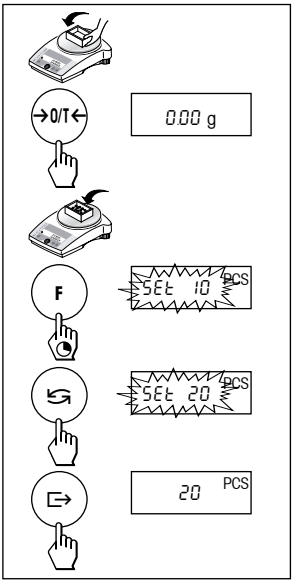


HS oFF	No handshake
HS SoFt	Software handshake (XON/XOFF)
HS HArd	Hardware handshake (RTS/CTS)

5 Functions

Settings and values saved under a given function are retained until they are replaced or another function is selected. The «**C**» key can be used to cancel the procedure currently in progress.

5.1 Piece counting



Requirement
The function "F count" must be activated in the menu (Section 4).

→ Place empty container on the balance and tare by briefly pressing the «→0/T←» key.

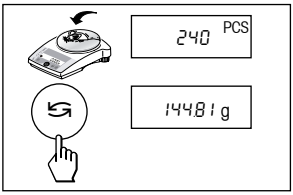
Setting the reference: a reference weight must first be entered for piece counting:

→ Add a number of reference pieces to container. Possible numbers are 5, 10, 20, 50, 100 and "no" (piece counting deactivates).
Note that the minimum weight = 10d (d: display increment), and the minimum unit weight = 1d!

→ Hold the «**F**» key down until "SEt ... PCS" is displayed.

→ Repeatedly press the «⇆» key until the display equals the number of reference pieces entered.

→ Confirm the number of reference pieces with the «⇥» key or automatic acceptance after 7 seconds. The current number of pieces (PCS = pieces) is displayed.



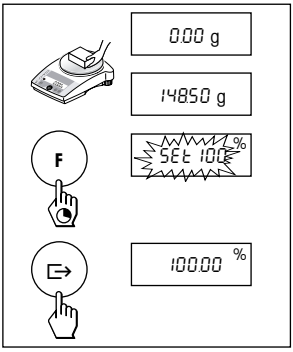
Switching between piece count and weight display

→ Place the items to be counted in the container. The number of pieces is displayed.

→ Press the «⇆» key. The weight is displayed (in unit 1, and if the key is pressed again, in unit 2, provided this function is activated).

→ Return to the piece count display by pressing the «⇆» key again.

5.2 Percent weighing



Requirement
The function "F 100 %" must be activated in the menu (Section 4).

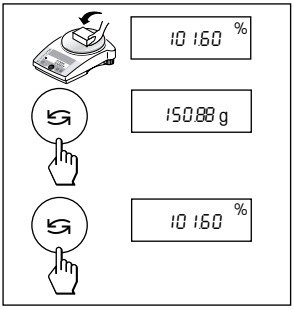
Set target weight

→ Target weight (Reference weight, which corresponds to 100 %) in centre of pan.
Note that the minimum weight = 10d (d: display increment).

→ Hold the «**F**» key down until "SEt 100 %" is displayed.

→ Press the «⇆» key to select "SEt 100 %" or "SEt no %" (Percent weighing deactivated).

→ The «⇥» key can be used briefly to confirm or automatic acceptance after 7 seconds.



Switching between percent weighing and weight display

→ Place weighing sample in centre of pan.
The weight of the sample is displayed as a percentage of the target weight.

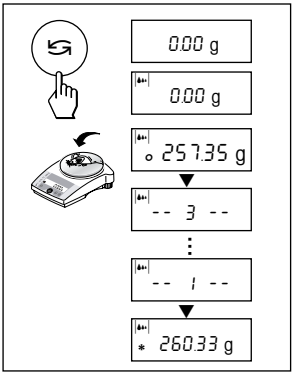
→ Press the «⇆» key. The weight is displayed (in unit 1, and if the key is pressed again, in unit 2, provided this function is activated).

→ Return to display in percent: pressing the «⇆» key again.

5.3 Dynamic weighing

Dynamic weighing is suitable for the weighing of unstable weighing samples. The mean value of the weighing results is determined over a specified time period (weighing time). The more unstable the weighing sample, the longer the selected weighing time.

Requirement
"F dYn A" for automatic start or "F dYn M" for manual start must be activated in the menu (Section 4). Factory setting is a weighing time of 3 seconds (t = 3").

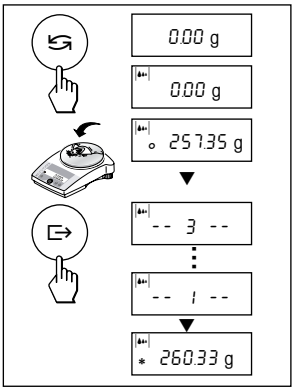


Dynamic weighing with automatic start (F dYn A)

→ The «⇆» key can be used select the dynamic weighing. The display shows the symbol |⇤|.

→ Load weighing sample. As soon as the balance is relatively stable, weighing starts automatically.
During the weighing time, a "count down" runs in the display.

→ Read off result.
The result of the dynamic weighing is displayed with ✱ (= calculated value) and remains in the display until the weighing sample is removed from the weighing pan or the container.



Dynamic weighing with manual start (F dYn M)

→ The «⇆» key can be used select the dynamic weighing. The display shows the symbol ⇤.

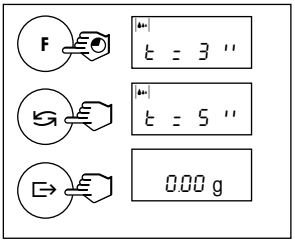
→ Load weighing sample.

→ Start weighing with the «⇨» key.
During the weighing time, a "count down" runs in the display.

→ Read off result.
The result of the dynamic weighing is displayed with ✱ (= calculated value) and remains in the display until the weighing sample is removed from the weighing pan or the container.

Notes

- The weighing cycle with the same weighing sample can be restarted with the «⇨» key.
- The «⇆» key can be used to switch between dynamic weighing and normal weighing.
- For weighing goods below 5 g the weighing must be started manually with the «⇨» key, even for dynamic weighing with automatic start.



Changing the weighing time

→ Press and hold the «**F**» key, until "t = 3" appears in the display.

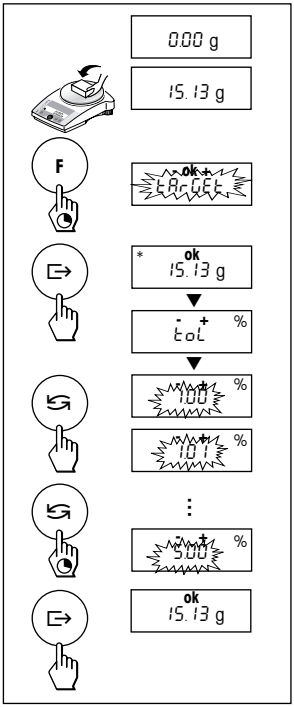
→ Repeatedly press the «⇆» key, until the desired weighing time appears.
Possible values are 3", 5", 10", 20", 1", 2".

→ election with the «⇨» key briefly to confirm or by automatic acceptance after 3 seconds.

5.4 Plus-minus weighing

The plus-minus weighing function enables the parts or quantities dispensed on the weighing pan to be compared with a target weight and tolerances set by the user. Symbols in the display (▷ok◁) help the operator to assess the weighing result quickly.

Requirement
The function "F PM" must be activated in the menu (Section 4).



Setting target weight and tolerances (+/-)

→ Place the target weight on the weighing pan. Minimum weight = 10d (display increment)

→ Hold down the «**F**» key until "tArGEt" appears.

→ Press the «↻» key to select "tArGEt" and "notArGEt" (Plus-minus weighing deactivated).

→ Confirm this with the «⊏→» key; the target weight is adopted automatically after 7 seconds if no action is taken.

The target weight is displayed again for a further two seconds, following which the display changes ("toL="), prompting you to enter the tolerances as a percentage of the target weight.

The displayed default value can be changed:

→ Pressing the «↻» key increases the tolerance.
Pressing the «**1/10d**» reduces the tolerance.

Pressing the key once changes the value by one increment. If the key is held down, the value changes increasingly rapidly.

→ Confirm the selected tolerance with the «⊏→» key; it is adopted automatically after 7 seconds if no action is taken. The target weight and the tolerances have now been set.

Displayed weighing results

The display indicates the weighing status as follows:

"▷" lights up: The weight on the pan is less than the set lower tolerance.

"▷" and "ok" light up: The weight on the pan is within the set tolerances, but below target weight.

"ok" lights up: The weight on the pan is exactly equal to the target weight.

"ok" and "◁" light up: The weight on the pan is within the set tolerances but greater than the target weight.

"◁" lights up: The weight on the pan is greater than the set upper tolerance.

Toggling between plus-minus weighing with weight display and percent display

→ Place the sample on the weighing pan. Its weight is shown in unit 1.

→ Press the «↻» key. The weight is then displayed as a percentage (provided the balance is activated for unit 2 and the key is pressed again).

→ To return to the plus-minus weighing display: press the «↻» key again.

5.5 Weighing with free factor and/or selectable display increments

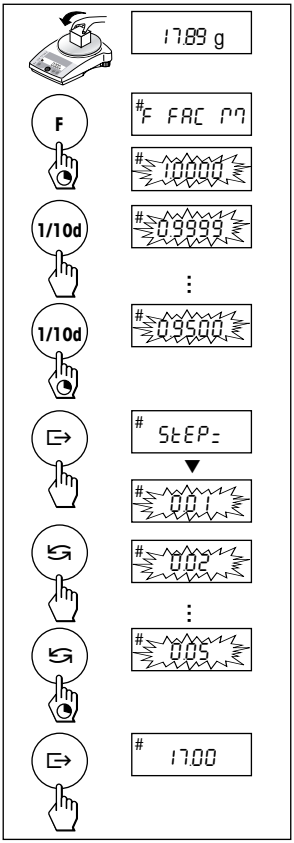
In this menu option a custom "free factor" can be defined at will.

This value is then either multiplied ("F FAC M") by the weighing result (in grams), i.e. reading = factor * weight, or it is divided ("F FAC d") by the weight, i.e. reading = factor / weight. The range over which this factor can be selected depends on the weighing range and the readability of the model concerned.

The "free factor" (FAC M) function can, for example, be used to calculate the price of the material weighed directly or to calculate the weight per defined unit of surface area. It can also be used to convert the weight into any desired alternative unit. This facility for dividing the factor by the weight (FAC d) is required for instance in the textile industry to determine yarn count.

The ability to select the display increments makes it possible to specify how the weighing result is to be presented, the choice of display increments being limited by the set factor and the resolution of the balance model itself.

Requirement
The function "F FAC M" or "F FAC d" must be activated in the menu (Section 4).



Entering the free factor and/or the display increments

→ Hold the «**F**» key down until "F FAC M" or "F FAC d" appears in the display.

→ Press the «↻» key to select "FAC M" / "FAC d" or "noFAC M" / "noFAC d" (Function deactivated).

→ Release the key. Either the factor 1 appears as default value or the factor that was saved most recently.

This value can now be changed:

→ Pressing the «↻» key increases the factor.
Pressing the «**1/10d**» key reduces the factor.

Pressing the key once changes the value by one increment. If the key is held down, the value changes increasingly rapidly.

Confirm the selected factor with the «⇥» key (it will not be saved automatically). "StEP=" appears in the display, and the program changes auto-matically to allow the display increments to be entered. The smallest possible display increment appears as default value, or the last value that was saved.

→ This value can be changed in the same way as for the free factor (see above).

Confirm the selected display increment with the «⇥» key (it will not be saved automatically).

The appropriate calculation is then made using the weight on the pan in grams and the selected factor, the result being displayed with the selected display increment. **No units are displayed**, the symbol "**#**" being displayed instead. The calculation is always based on the weight in grams.

Note

- If you only want to change the display increments, set the free factor at exactly 1.

Toggling between displaying the calculated value and the measured weight

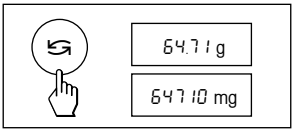
Place the sample on the weighing pan. The appropriate calculation is then made using the weight of the sample and the selected factor, the result being displayed with the selected display increment.

Press the «↻» key. The weight is displayed (in unit 1, and if the key is pressed again in unit 2, provided that this option is activated).

→ Press the «↻» key again to return to the calculated value.

5.6 Switching weight units

Requirement
Different weight units must be activated in the menu for unit 1 and unit 2 (Section 4).



→ The «↻» key can be used at any time to toggle between the two weighing units selected in the menu ("UNIT 1" and "UNIT 2").

Notes

- Switching between weight units may be blocked with **certified balances**, depending on national weights and measures legislation.
- This function is not available with dynamic weighing.

6 Technical data, options, optional equipment

6.1 Technical data

Standard equipment of L-IC balances

- AC adapter to national standard
  100–240 VAC/50–60 Hz, 0.3 A
  12 VDC, 0.84 A

  Balance power input 6-14,5VAC, 50/60Hz, 4VA or 7-20VDC, 4W
- Draft shield (on models with 0.1 / 1 mg resolution)
- All models can weigh below balance

Materials

- Housing base: die-cast aluminum, painted
- Top housing: plastic (ABS/PC)
- Weighing pan: 18/10 chromium-nickel steel

Protection

- Protected against dust and water
- Pollution degree: 2
- Installation category: class II
- EMC: see declaration of conformity

Ambient conditions

The technical data are valid under the following ambient conditions:

- Heigh above mean sea level: Up to 2000 m
- Ambient temperature: 10 °C … 30 °C
- Relative humidity: 10 % to 80 % at 31 °C, linear decreasing to 50 % at 40 °C

  noncondensing

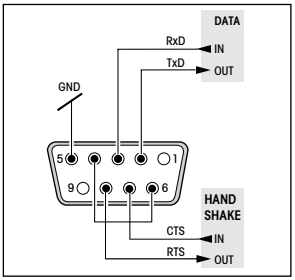
Operability is assured at ambient temperatures between 5 and 40 °C.

	AL54-IC	AL104-IC	AL204-IC	AL304-IC
Max. capacity	51 g	110 g	220 g	320 g
Readability	0.0001 g	0.0001 g	0.0001 g	0.0001 g
Repeatability (sd)	0.0001 g	0.0001 g	0.0001 g	0.0001 g
Linearity	0.0002 g	0.0002 g	0.0002 g	0.0002 g
Sensitivity temperature drift (10 °C … 30 °C)	2.5 ppm/°C	2.5 ppm/°C	2.5 ppm/°C	2.5 ppm/°C
Settling time, typical	4 s	4 s	4 s	4 s
Adjustment weight internal	yes	yes	yes	yes
External dimensions of balance (W/D/H) in mm	238x335x364	238x335x364	238x335x364	238x335x364
External dimensions of packaging (W/D/H) in mm	520x385x555	520x385x555	520x385x555	520x385x555
Weighing pan	ø 90 mm	ø 90 mm	ø 90 mm	ø 90 mm
Usable height of draft shield	225 mm	225 mm	225 mm	225 mm
Net weight (with packaging) kg	5.8 (8.4)	5.8 (8.4)	5.8 (8.4)	5.8 (8.4)
Level indicator	yes	yes	yes	yes
Number of leveling screws	2	2	2	2

	PL203-IC	PL-303-IC	PL-403-IC
Max. capacity	210 g	310 g	410 g
Readability	0.001 g	0.001 g	0.001 g
Repeatability (sd)	0.001 g	0.001 g	0.001 g
Linearity	0.002 g	0.002 g	0.002 g
Sensitivity temperature drift (10 °C … 30 °C)	6 ppm/°C	6 ppm/°C	6 ppm/°C
Settling time, typical	3 s	3 s	3 s
Adjustment weight internal	yes	yes	yes
External dimensions of balance (W/D/H) in mm	238x335x287	238x335x287	238x335x287
External dimensions of packaging (W/D/H) in mm	520x385x555	520x385x555	520x385x555
Weighing pan	ø 100 mm	ø 100 mm	ø 100 mm
Usable height of draft shield	150 mm	150 mm	150 mm
Net weight (with packaging) kg	5.1 (7.9)	5.1 (7.9)	5.1 (7.9)
Level indicator	yes	yes	yes
Number of leveling screws	2	2	2

	PL2002-IC	PL3002-IC	PL4002-IC
Max. capacity	2100 g	3100 g	4100 g
Readability	0.01 g	0.01 g	0.01 g
Repeatability (sd)	0.01 g	0.01 g	0.01 g
Linearity	0.02 g	0.02 g	0.02 g
Sensitivity temperature drift (10 °C … 30 °C)	6 ppm/°C	6 ppm/°C	6 ppm/°C
Settling time, typical	3 s	3 s	3 s
Adjustment weight internal	yes	yes	yes
External dimensions of balance (W/D/H) in mm	238x335x111	238x335x111	238x335x111
External dimensions of packaging (W/D/H) in mm	520x385x360	520x385x360	520x385x360
Weighing pan	ø 180 mm	ø 180 mm	ø 180 mm
Usable height of draft shield	–	–	–
Net weight (with packaging) kg	4 (6.4)	4 (6.4)	4 (6.4)
Level indicator	yes	yes	yes
Number of leveling screws	2	2	2

6.2 RS232C interface



Every balance is equipped with an optional RS232C interface for connection to a peripheral device (e.g. printer, auxiliary display or PC with a 9-pin male connector, see Section 6.4). The balance must then configured to suit the peripheral device in a menu dialog (Sections 4.3.9 – 4.3.12).

A detailed description of the available interface commands is given in the "Reference Manual MT-SICS for L/L-S balances 11780447". This can be downloaded from the Internet (**www.mt.com/sics-classic**) and is only available in English.

The wide range of features of the L-IC balances regarding documentation of the results can be utilized by connecting to a printer, e.g. the RS-P26 or LC-P45 from METTLER TOLEDO. Printed results then make a decisive contribution to simplifying GLP/GMP-compliant work.

6.3 MT-SICS Interface commands and functions

Many of the balances used have to be capable of integration in a complex computer or data acquisition system.
To enable you to integrate balances in your system in a simple manner and utilize their capabilities to the full, most balance functions are also available as appropriate commands via the data interface.
All new METTLER TOLEDO balances launched on the market support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS). The commands available depend on the functionality of the balance.

Basic information on data interchange with the balance
The balance receives commands from the system and acknowledges the command with an appropriate response.

Command formats
Commands sent to the balance comprise one or more characters of the ASCII character set. Here, the following must be noted:

- Enter commands only in uppercase.
- The possible parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec., in this description represented as ␣).
- The possible input for "text" is a sequence of characters of the 8-bit ASCII character set from 32 dec to 255 dec.
- Each command must be closed by CRLF (ASCII 13 dec., 10 dec.).

The characters C_RL_F, which can be inputted using the Enter or Return key of most entry keypads, are not listed in this description, but it is essential they be included for communication with the balance.

Example
S – Send stable weight value

Command	`S`	Send the current stable net weight value.
Response	`S␣S␣WeightValue␣Unit`	
		Current stable weight value in unit actually set under unit 1.
	`S␣I`	Command not executable (balance is currently executing another command, e.g. taring, or timeout as stability was not reached).
	`S␣+`	Balance in overload range.
	`S␣-`	Balance in underload range.

Example

Command	`S`	Send a stable weight value.
Response	`S␣S␣␣␣␣␣␣100.00␣g`	
		The current, stable weight value is 100.00 g.

The MT-SICS commands listed below is a selected list of available commands. For additional commands and further information please refer to the Reference Manual "MT-SICS for B-S/L/L-S balances 11780447" downloadable from the Internet under **www.mt.com/sics-classic**.

S – Send stable weight value

Command	**S**	Send the current stable net weight value.

SI – Send value immediately

Command	**SI**	Send the current net weight value, irrespective of balance stability.

SIR – Send weight value immediately and repeat

Command	**SIR**	Send the net weight values repeatedly, irrespective of balance stability.

Z – Zero

Command	**Z**	Zero the balance.

@ – Reset

Command	@	Resets the balance to the condition found after switching on, but without a zero setting being performed.

SR – Send weight value on weight change (Send and Repeat)

Command	**SR**	Send the current stable weight value and then send continuously the stable weight value after every weight change. The weight change must be at least 12.5 % of the last stable weight value, minimum = 30d.

ST – Send stable weight after pressing ⇨ (transfer) key

Command	**ST**	Inquiry of actual status of the ST function.

SU – Send stable weight value with currently displayed unit

Command	**SU**	As the "**S**" command, but with the currently displayed unit.

6.4 Optional equipment

AC adapter
AC adapter universal (EU, USA, AU, UK) 11120270
100–240 VAC/50–60 Hz, 0.3 A
12 VDC, 0.84 A

AccuPac B-S
Rechargeable external power source for
15 hours weighing operation independent
of AC power supply 21254691

Adjustment weights
Available as OIML weights (E1, E2, F1,
with calibration certificate); for further details see
METTLER TOLEDO Weights brochure 11795461
or see **www.mt.com/weights**

Antitheft device
Cable with lock (for all models) 00590101

Auxiliary display [1)]
- Auxiliary display including RS cable and seperate AC adapter 00224200
- Auxiliary display with switchbox 12120057

Draft shields
- For "0.1 mg" balances (225 mm) 12106720
- For "mg" balances (150 mm) 12105346

Interface cable
- RS9–RS25: (m/f), length 2 m 11101052
- RS9–RS9: (m/f), length 1 m 11101051
- RS9–RS9: (m/m), length 1 m 21250066
- RS232–USB converter cable 11103691

In-use cover 12102970

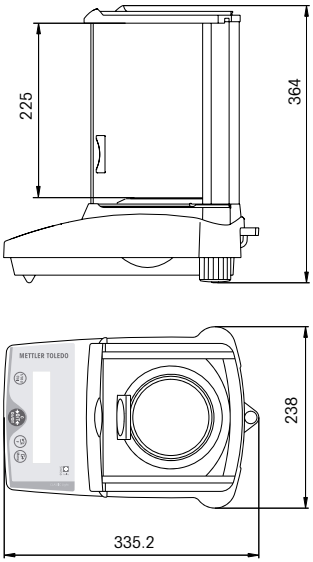
Printer, Application printer (LC-P45)
Plain-paper printer, 24 characters, with
additional functions (time, date, statistic,
multiplier etc.) 00229119

Printer, Report printer (RS-P26) [1)] 12120788
Plain-paper printer, 24 characters, with
additional functions (date and time).

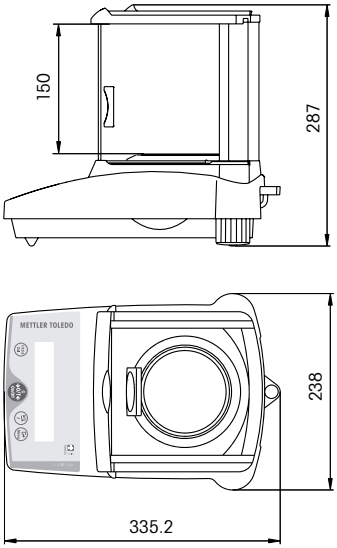
Software [1)]
LabX direct balance 11120340
(software for easy data transfer to PC)

6.5 Dimensional drawings (in mm)

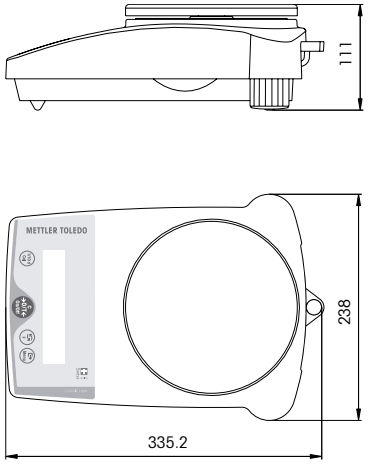
AL-IC with "0,1" mg draft shield (235 mm)



PL-IC with "mg" draft shield (150 mm)



PL-IC without draft shield



7 Appendix

7.1 Typical printouts from METTLER TOLEDO RS-P26 and LC-P45 printers

Function: **Adjusting**

```
-BALANCE  CALIBRATION-
04.07.2002      09:50:18

METTLER TOLEDO
Type:          PL3002-IC
SNR:          1120053108
SW:
 1.0

Weight ID: ............
Weight:   2000.00 g

External Cal. done

Signature:

.........................
--------- END ----------
```

Function: **Piece counting**
Printout with reference weight

```
---- PIECE COUNTING ----
APW:          0.99 g
Out of:         10    PCS

            27.00 g
               27 PCS
```

Function: **Percent weighing**

```
----- % - WEIGHING -----
Ref.        10.008 g
           100.00 %

             60.01 g
           599.59 %
```

Function: **Dynamic weighing**

```
--- DYNAMIC WEIGHING ---
Weigh Time:      2 s

         DW 49.999 g
```

Function: **Plus-minus weighing**

```
----- +/- WEIGHING -----
Nominal:      9.68 g
+/-Tol:       1.04 %

             16.21 g
above range
```

Function: **Free factor**

```
- FREE FACTOR WEIGHING -
Formula: factor * weight
Factor:      12.73
Step:         0.01

              49.94 #
```

Function: **List**
Printout of the current balance settings

```
--- LIST OF SETTINGS ---
04.07.2002      09:55:10

METTLER TOLEDO
Type:           PL403-IC
SNR:          1120053108
SW:                  1.0
TDNR:     7.17.1.286.108
------------------------
Application:
 Count
------------------------
Weighing Parameters:
 Weighing Mode Standard
 Unit 1                g
 Unit 2               mg
 A.Zero               On
------------------------
System Parameters:
 Auto off          10 min
------------------------
Peripheral Devices:
P.Device          Printer
 Baud                2400
 Bit/Parity      7b-even
 Handshake          Off

P.Device             Host
 Sendmode            Off
Baud                9600
 Bit/Parity       8b-no
 Handshake
Soft
--------- END ----------
```

Function: **Verification of the calibration (adjustment) with external weight.**
Only possible with LC-P45. Function is triggered via the printer.

```
----- BALANCE TEST -----
04.07.2002      09:52:12

METTLER TOLEDO
Type:          PL3002-IC
SNR:          1120053108
SW:
 1.0

Weight ID: ............

Target : ..............
Actual : .......199.98 g
Diff   : ..............

External test done

Signature:

.........................
--------- END ----------
```

Function: **Statistics**
Only possible with LC-P45. Function is triggered via the printer.

```
04.07.2002      10:44:07
ID                   666
SNR:          1118015657
1          1100.15 g
2          1600.10 g
3          1699.95 g
n                     3
x          1466.733 g
s           321.372 g
srel          21.91 %
min.       1100.15 g
max.       1699.95 g
dif.        599.80 g
--------- END ----------
```

Function: **Multiplier**
Only possible with LC-P45. Function is triggered via the printer.

```
04.07.2002      08:23:22
ID                   242
SNR:          1118015657

Factor        1.65
            588.43 g
*         970.9095
```

Notes
The operating instructions for the LC-P45 include a description of the functions that are triggered via that printer.

The **RS-P26** prints all reports in **English**. This applies also to the **LC-P45** reports that originate in the balance. In the case of reports triggered by the **LC-P45**, the following languages may be selected: **German, English, French, Spanish** or **Italian**.

7.2 What if ...?

Error/Error message	Cause	Rectification
⌜------⌝	Overload	→ Remove sample from weighing pan, zero again (tare).
⌞------⌟	Underload	→ Check whether weighing pan is positioned properly.
Error 1	No stability • in taring or adjusting (calibration) • when reference weight for piece counting is placed on pan	→ Wait for stability before pressing key. → Ensure more stable ambient conditions. → Remove weighing pan and clean if necessary
Error 2	Wrong adjustment weight on pan or none at all	→ Place required adjustment weight in centre of pan.
Error 3	Reference weight (Piece counting, Percent weighing, Plus-minus weighing) too small	→ Increase reference weight.
Error 4	Internal fault	→ Contact METTLER TOLEDO customer service.
0.000 g	Wrong weighing pan or pan missing or not empty	→ Place correct pan or empty pan on balance.
Abort	Adjustment aborted with the «**C**» key	
	No display • AC adapter not plugged in • Batteries discharged (only with compact models)	→ Check AC power supply. Plug AC adapter into power supply. → Replace batteries; if using rechargeables connect instrument to AC power supply.

7.3 Maintenance and cleaning

Service
Regular servicing of your balance by a service technician prolongs its working life. Ask your METTLER TOLEDO dealer for details of servicing options.

Cleaning
Every now and then, clean the weighing pan, draftshield element, draftshield (depending on the model) and housing of your balance using a damp cloth. Your balance is made of high-quality, durable materials and can therefore be cleaned with a standard, mild cleaning agent.

Please observe the following notes

- On no account use cleaning agents, which contain solvents or abrasive ingredients, as this can result in damage to the terminal overlay.
- After working with chemicals, it is advisable to wash or clean the weighing pan and the bottom plate (if draft shield fitted).
- Although all materials are of high quality, corrosion may occur if corrosive substances are deposited on chrome steel for an extended period of time (and if air is excluded, for example by a coating of grease).
- Ensure that no liquid comes into contact with the balance or the AC adapter!
- Never open the balance or AC adapter – they contain no components, which can be cleaned, repaired or replaced by the user.
- Soiled protective covers can be replaced on all balance types (see Optional equipment).

Disposal
In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements. Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

7.4 Declaration of conformity

The undersigned declare on behalf of

Mettler-Toledo AG
Im Langacher
CH-8606 Greifensee

that the balances **METTLER TOLEDO AL...-IC / PL...-IC** to which this declaration relates (serial number specified on the product) are in compliance with the below mentioned EEC Directives (including all amendments)

73/23/EEC Low Voltage Directive

89/336/EEC Electromagnetic compatibility

and that following standards have been applied

IEC/EN61010-1:2001,
EN61326:1997+ A1:98+A2:01+A3:03 (class B)
EN61326:1997+ A1:98+A2:01+A3:03 (Minimal requirements)

for Canada, USA and Australia
CAN/CSA-C22.2 No.61010-1-04, UL Std. No.61010A-1, FCC, Part 15, class A,
AS/NZS CISPR 22, AS/NZS 61000.4.3

Balances in certified version additionally compliy with **90/384/EEC** Non-automatic weighing instruments and standard **EN45501**.

EC type approval No: – AL-IC balances: D06-09-004
– PL-IC balances: D06-09-004

Greifensee, 03.10.2007

Mettler-Toledo AG
Laboratory & Weighing Technologies

René Lenggenhager
General Manager

Marcel Strotz
Manager SBU LAB Basic Weighing

To protect your METTLER TOLEDO product's future:
METTLER TOLEDO Service assures the quality, measuring accuracy and preservation of value of all METTLER TOLEDO products for years to come.
Please send for full details about our attractive terms of service.
Thank you.

Subject to technical changes and to the availability of the accessories supplied with the instruments.

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