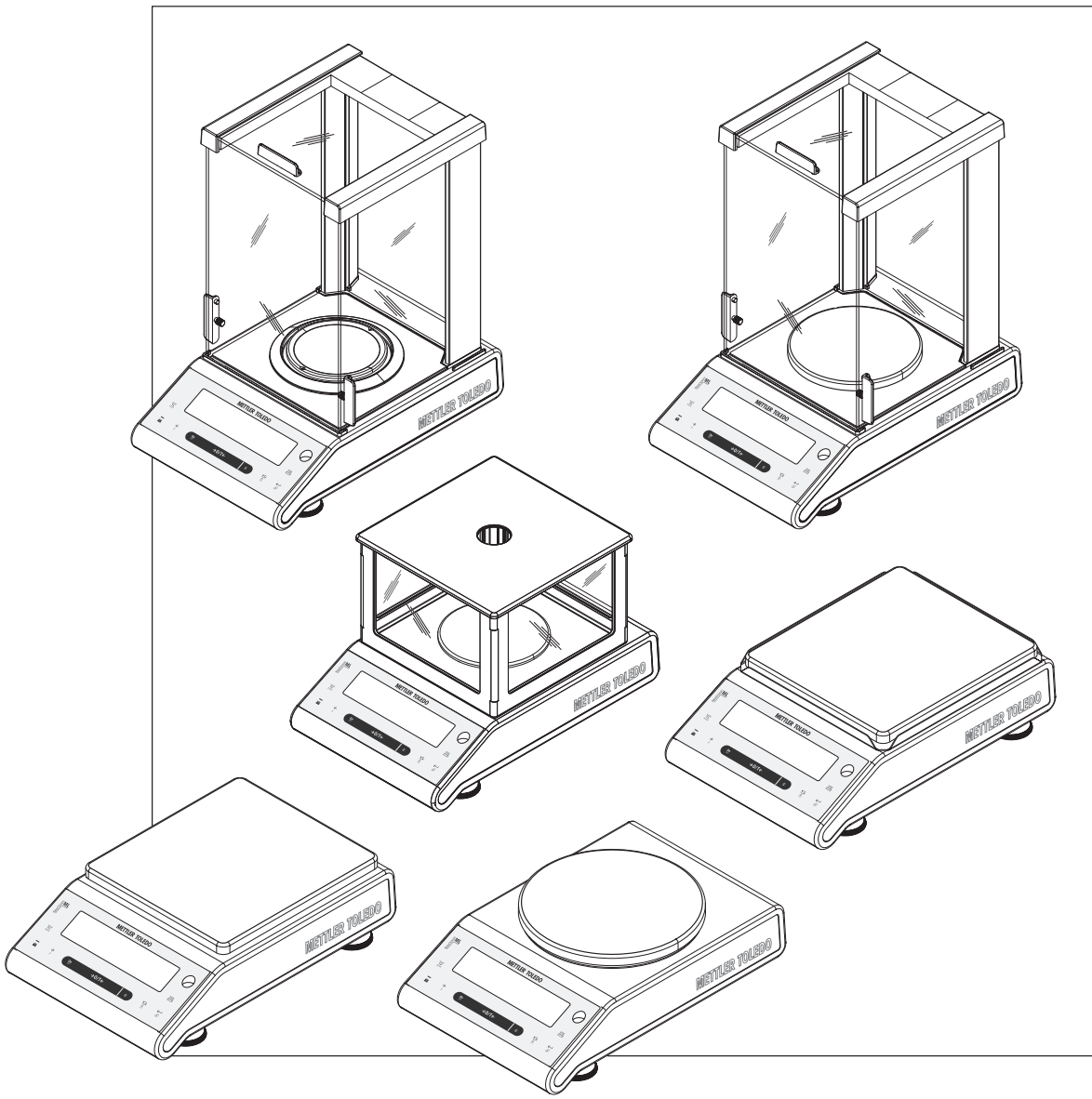
Operating Instructions

NewClassic Balances

ML Models



METTLER TOLEDO

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1 Introduction

Thank you for choosing a METTLER TOLEDO balance. The balances of the NewClassic line combine a large number of weighing possibilities with easy operation.

These operating instructions apply to ML models in the NewClassic line and are based on the initially installed firmware (software) version V 2.20.

▶ www.mt.com/newclassic

1.1 Conventions and Symbols Used in These Operating Instructions

Key designations are indicated by double angular brackets (e.g. «⊟»).

This symbol indicates press key briefly (less than 1.5 s).

This symbol indicates press and hold key down (longer than 1.5 s).

This symbol indicates a flashing display.

▼ This symbol indicates an automatic sequence.

These symbols indicate safety notes and hazard warnings which, if ignored, can cause personal danger to the user, damage to the balance or other equipment, or malfunctioning of the balance.

This symbol indicates additional information and notes. These make working with your balance easier, as well as ensuring that you use it correctly and economically.

2 Safety Precautions

Always operate and use your balance only in accordance with the instructions contained in this manual. The instructions for setting up your new balance must be strictly observed.

If the balance is not used according to these Operating Instructions, protection of the balance may be impaired and METTLER TOLEDO assumes no liability.

It is not permitted to use the balance in explosive atmosphere of gases, steam, fog, dust and flammable dust (hazardous environments).

For use only in dry interior rooms.

Do not use sharply pointed objects to operate the keyboard of your balance! Although your balance is very ruggedly constructed, it is nevertheless a precision instrument. Treat it with corresponding care.

Do not open the balance: It does not contain any parts which can be maintained, repaired, or replaced by the user. If you ever have problems with your balance, contact your METTLER TOLEDO dealer.

Use only balance accessories and peripheral devices from METTLER TOLEDO; they are optimally adapted to your balance.

Use only the original universal AC adapter delivered with your balance.

Disposal

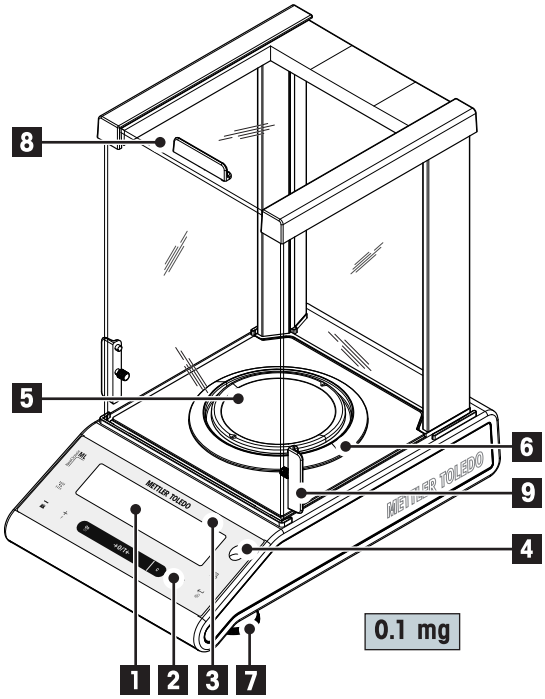
In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

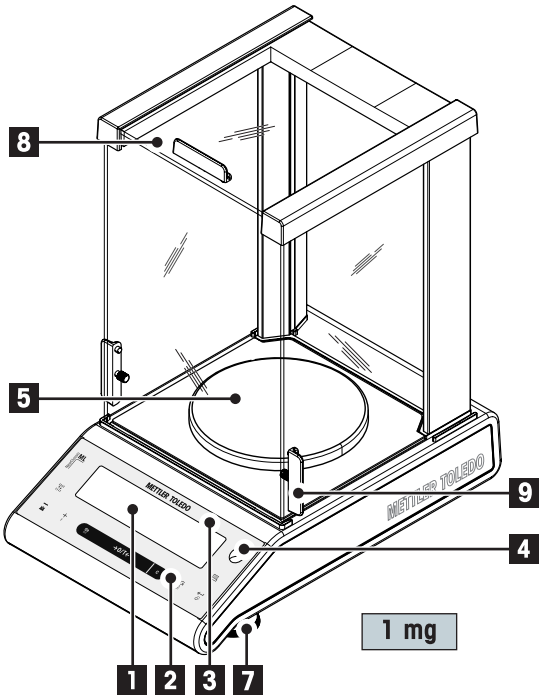
Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

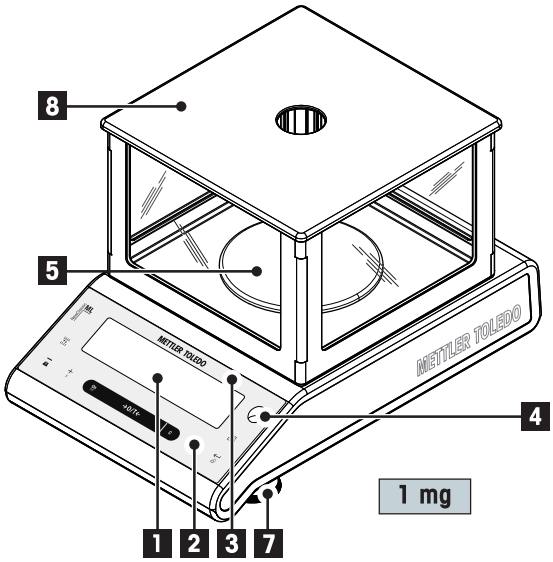
Thank you for your contribution to environmental protection.

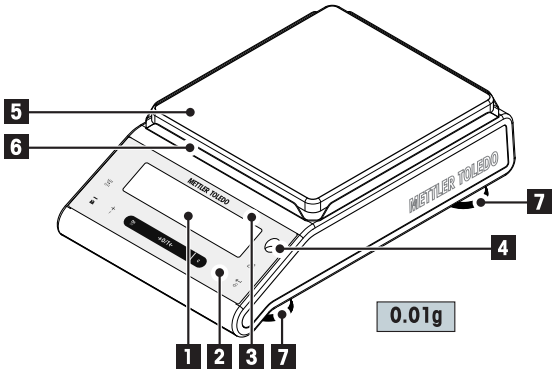
3 Overview

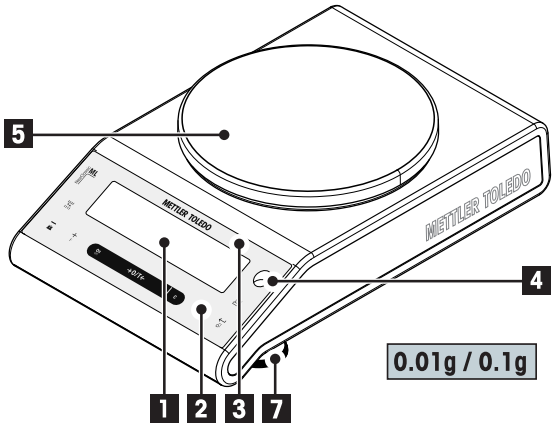
3.1 Components

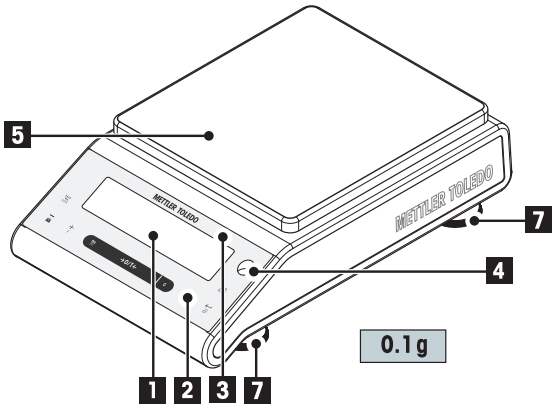


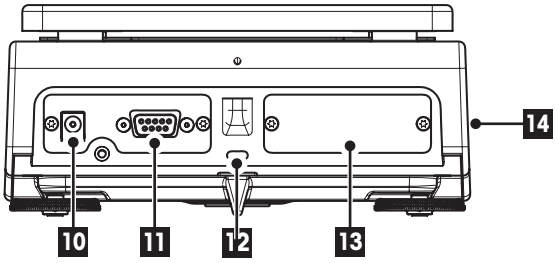






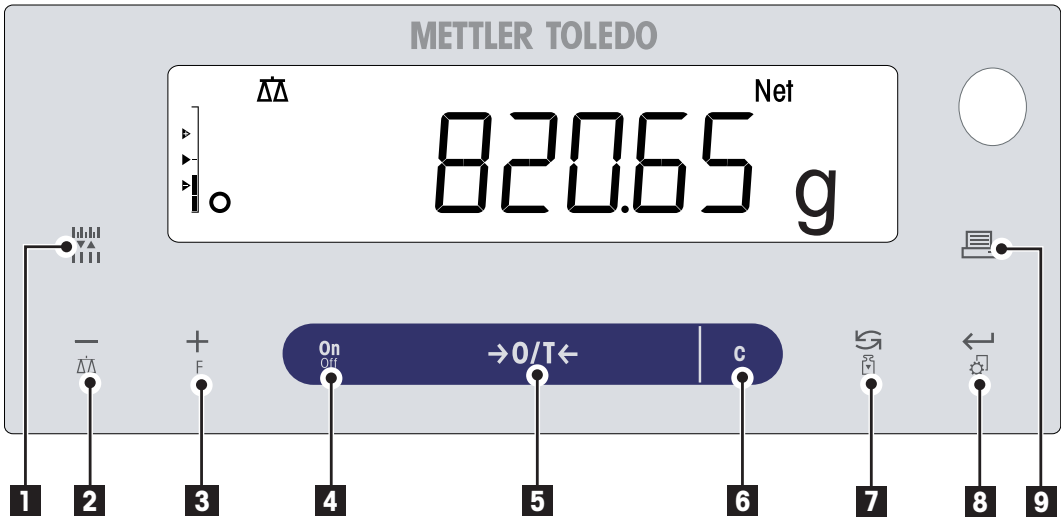






Name and Function of Components			
1	Display	**8**	Glass draftshield
2	Operation keys	**9**	Handle for operation of the draft-shield door
3	Model sticker (with approved models only)	**10**	Socket for AC Adapter
4	Level indicator	**11**	RS232C serial interface
5	Weighing pan	**12**	Kensington slot for anti-theft purposes
6	Draft shield element	**13**	Slot for second interface (optional)
7	Leveling foot	**14**	Product label

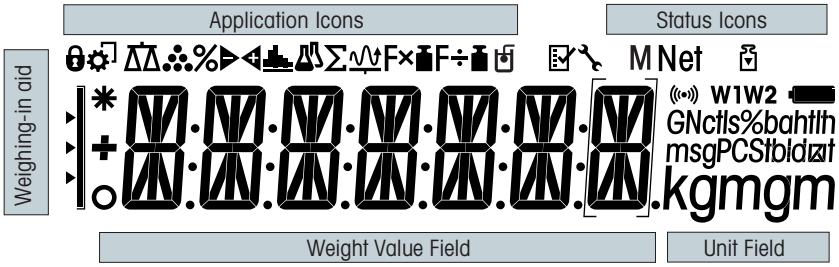
3.2 Operation Keys



Key Functions

No.	Key	Press briefly (less than 1.5 s)	Press and hold (longer than 1.5 s)
1		• To change display resolution (1/10d function) while application is running **Note:** not available with approved models in selected countries.	no function
2		• To navigate back (scroll up) within menu topics or menu selections • Decrease (numerical) parameters within menu and in applications	• To select the weighing application • Decrease (numerical) parameters quickly within menu and in applications
3	F	• To navigate forward (scroll down) within menu topics or menu selections • Increase (numerical) parameters within menu and in applications	• To select assigned application and entering the parameter settings of application. • Default application assignment: Piece counting • Increase (numerical) parameters quickly within menu and in applications
4	**ON**//OFF	• Switch on	• Switch off
5	→0/T←	• Zero/Tare	• Switch off
6	C	• Cancel and to leave menu without saving (one step back in the menu).	no function
7		• With entries: scroll down • To navigate through menu topics or menu selections • To toggle between unit 1, recall value (if selected), unit 2 (if different from unit 1) and the application unit (if any)	• Execute predefined adjusting (calibration) procedure
8		• To enter or leave menu selection (from / to menu topic) • To enter application parameter or switch to next parameter • To confirm parameter	• Enter or leave menu (Parameter settings) • Save parameters
9		• Printout display value • Printout active user menu settings • Transfer data	

3.3 Display Panel



Application Icons			
	Menu locked		Application ″Formulation / Net-Total″
	Menu setting activated		Application ″Totaling″
	Application "Weighing"		Application ″Dynamic weighing″
	Application "Piece counting"		Application ″Multiplication factor″
	Application "Percent weighing"		Application ″Division factor″
	Application "Check weighing"		Application ″Density″
	Application "Statistics"		

Note
While an application is running, the corresponding application icon appears at the top of the display.

Status Icons			
M	Indicates stored value (Memory)		Acoustic feedback for pressed keys activated
Net	Indicates Net weight values	W1	Weighing range 1 (Dual Range models only)
	Adjustments (calibration) started	W2	Weighing range 2 (Dual Range models only)
	Applications "Diagnostics" and ″Routine Test″		Charge of battery: full, 2/3, 1/3, discharged (Battery operated models only)
	Service reminder		

Weight Value Field and Weighing-in aid			
–	Indicates negative values	[ ]	Brackets to indicate uncertified digits (approved models only)
O	Indicates unstable values	▶	Marking of nominal or target weight
*	Indicates calculated values	▶+	Marking of tolerance limit T+
		▶–	Marking of tolerance limit T-

Unit Field						
GNctls%bahtlh msgPCStbldozt kgmgm	**g**	gram	**ozt**	troy ounce	**tls**	Singapore taels
	kg	kilogram	**GN**	grain	**tlt**	Taiwan taels
	mg	milligram	**dwt**	pennyweight	**tola**	tola
	ct	carat	**mom**	momme	**baht**	baht
	lb	pound	**msg**	mesghal		
	oz	ounce	**tlh**	Hong Kong taels		

4 Setting up the Balance

The balance must be disconnected from the power supply when carrying out all setup and mounting work.

4.1 Unpacking and Delivery Inspection

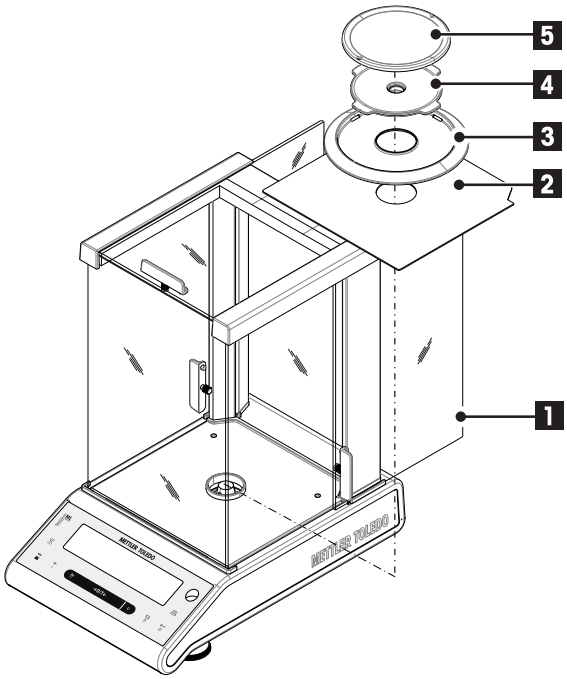
1 Open the packaging and carefully remove all components.

2 Check the delivered items.

The standard scope of delivery contains the following items:

Components		**Balances with round weighing pan**					**Balances with square weighing pan**	
		0.1 mg	**1 mg**		**0.01 g**	**0.1 g**	**0.01 g**	**0.1 g**
Draft shield	235 mm	✓	✓	–	–	–	–	–
Flex draft shield	105 mm	–	–	✓	–	–	–	–
Weighing pan	Ø 90 mm	✓	–	–	–	–	–	–
	Ø 120 mm	–	✓	✓	–	–	–	–
	Ø 160 mm	–	–	–	✓	✓	–	–
	170 x 190 mm	–	–	–	–	–	✓	✓
Draft shield element		✓	–	–	–	–	✓	–
Pan support		✓	✓	✓	✓	✓	✓	✓
Bottom plate		✓	✓	–	–	–	–	–
Protective cover		✓	✓	✓	✓	✓	✓	✓
Universal AC adapter (country specific)		✓	✓	✓	✓	✓	✓	✓
Operating instructions printed or on CD-ROM depending on the country		✓	✓	✓	✓	✓	✓	✓
Quick Guide		✓	✓	✓	✓	✓	✓	✓
EC declaration of conformity		✓	✓	✓	✓	✓	✓	✓

4.2 Installing the Components

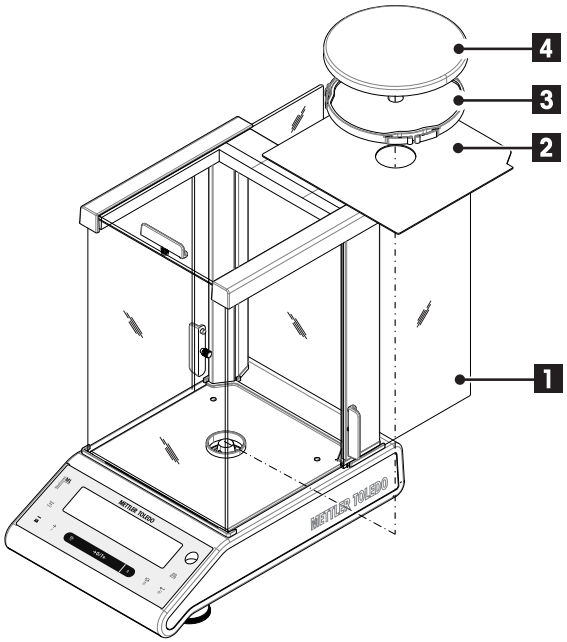


Balances with readability of 0.1 mg, with draft shield (235 mm)

– Place the following components on the balance in the specified order:

Note: Push the side glass door (1) back as far as will go.

- Bottom plate (2)
- Draft shield element (3)
- Pan support (4)
- Weighing pan (5)

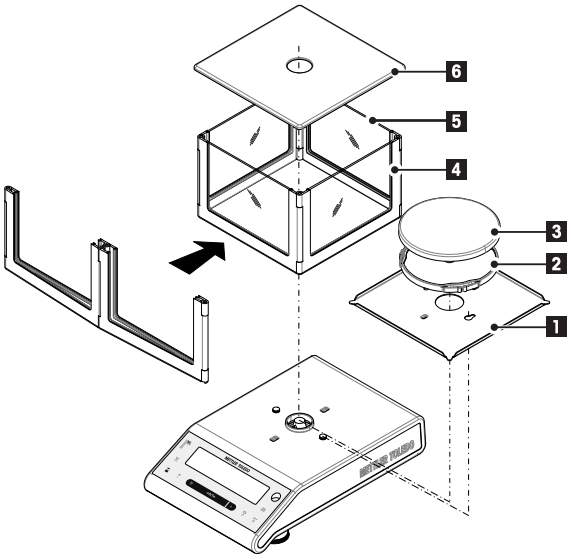


Balances with readability of 1 mg, with draft shield (235 mm)

– Place the following components on the balance in the specified order:

Note: Push the side glass door (1) back as far as will go.

- Bottom plate (2)
- Pan support (3)
- Weighing pan (4)



Balances with readability of 1 mg, with flex draft shield (105 mm)

Place the following components on the balance in the specified order:

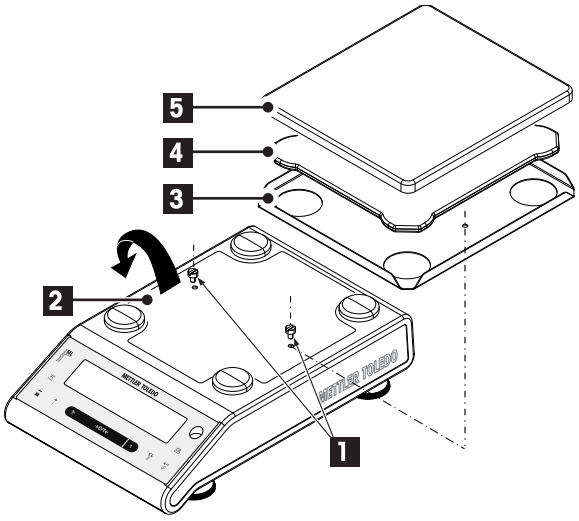
1 Place bottom plate (1) (push and turn)

2 Place pan support (2) with weighing pan (3).

3 Unfold the draft shield frame (4) and place it correctly.

4 Insert the glass panels (5) into the draft shield frame.

5 Place draft shield top (6)



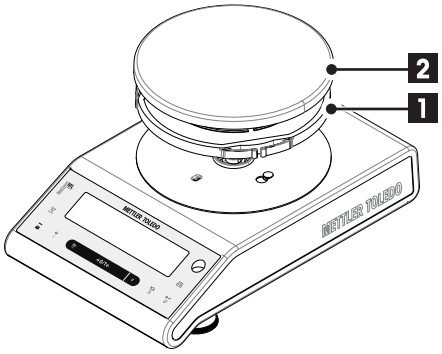
Balances with readability of 10 mg with square weighing pan and draft shield element

1 Remove the two screws (1)

2 Remove the plate (2) and retain it.

3 Place draft shield element (3) and fix it with the two screws.

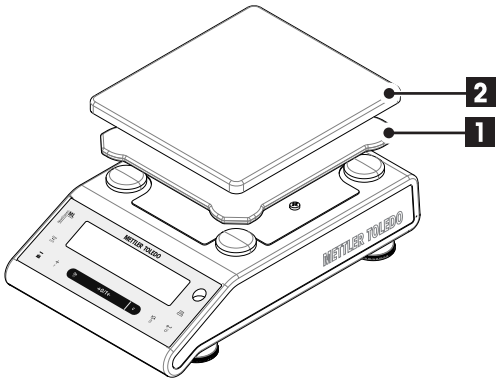
4 Place pan support (4) with weighing pan (5).



Balances with readability of 0.01 g / 0.1 g with round weighing pan

– Place the following components on the balance in the specified order:

- Pan support (1)
- Weighing pan (2)



Balances with readability of 0.1 g with square weighing pan

– Place the following components on the balance in the specified order:

- Pan support (1)
- Weighing pan (2)

4.3 Selecting the Location and Leveling the Balance

Your balance is a precision instrument and will thank you for an optimum location with high accuracy and dependability.

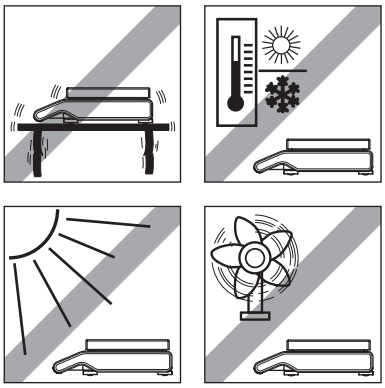
4.3.1 Selecting the Location

Select a stable, vibration-free position that is as horizontal as possible. The surface must be able to safely carry the weight of a fully loaded balance.

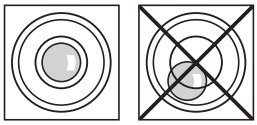
Observe ambient conditions (see Technical Data).

Avoid the following:

- Vibrations
- Excessive temperature fluctuations
- Direct sunlight
- Powerful drafts (e.g. from fans or air conditioners)

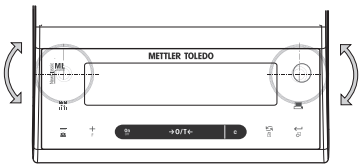


4.3.2 Leveling the Balance



The balances have a level indicator and two or four adjustable leveling feet to compensate for slight irregularities in the surface of the weighing bench. The balance is exactly horizontal when the air bubble is in the middle of the level glass.

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



Balances with 2 leveling feet

– Adjust the two front leveling feet appropriately until the air bubble comes to rest exactly in the middle of the glass:

Air bubble at	"12 o'clock"	turn both feet clockwise
Air bubble at	"3 o'clock"	turn left foot clockwise, right foot counterclockwise
Air bubble at	"6 o'clock"	turn both feet counterclockwise
Air bubble at	"9 o'clock"	turn left foot counterclockwise, right foot clockwise

Balances with 4 leveling feet

1 First turn the two **rear** leveling feet all the way in.

2 Adjust the two **front** leveling feet as previously described.

3 Turn the **rear** leveling feet down onto the surface for extra stabilizing safety, so the balance cannot tilt over under eccentric loads.

4.4 Power Supply

Allow your balance to warm up for 30 minutes (0.1 mg models 60 minutes) to enable it to adapt itself to the ambient conditions.

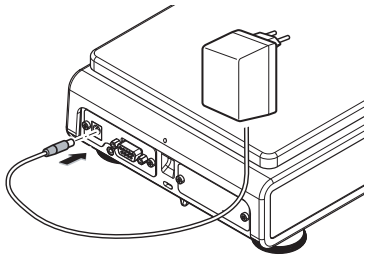
4.4.1 AC Operation

Your balance is supplied with an country-specific AC adapter or with a country-specific power cable. The power supply is suitable for all line voltages in the range: 100 - 240 VAC, 50/60 Hz (for exact specifications, see section "technical data").

First, check the local line voltage is in the range 100 - 240 VAC, 50/60 Hz and whether the power plug fits your local power supply connection. **If this is not the case, on no account connect the balance or the AC adapter to the power supply**, but contact the responsible METTLER TOLEDO dealer.

Important:

- Before operating, check all cables for damage.
- Guide the cables so that they cannot become damaged or interfere with the weighing process!
- Take care that the AC adapter cannot come into contact with liquids!
- The power plug must be always accessible.



Connect the AC adapter to the connection socket on the back of your balance (see figure) and to the power line.

4.4.2 Battery Operation

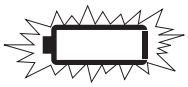
The Balance can also operate with batteries. Under normal operation conditions, the balance works independently of the AC power line for about 8 to 15 hours (using alkaline batteries). Immediately after the AC power supply is interrupted e.g. by withdrawing the power plug or if there is a power failure, the balance switches automatically to battery operation. Once the AC power supply is restored, the balance reverts automatically to AC operation.

Note: It is also possible to use rechargeable batteries. Charging batteries inside the balance is not possible.

battery full

2/3 full

1/3 full



battery empty

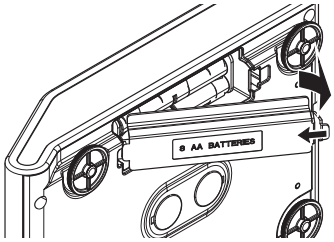
When the balance is operating on its batteries, the battery symbol in the display lights up. The number of segments that are lit is an indicator of battery condition (3 = fully charged, 0 = discharged). When the batteries are almost completely discharged, the battery symbol flashes.

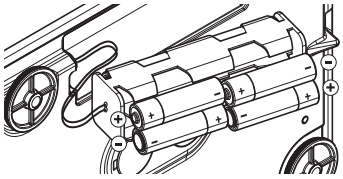
Inserting / Replacing Batteries

The balance must be disconnected from the power supply when carrying out all setup and mounting work.

- Make sure that the balance is off before removing or inserting batteries.
- **Do not place the balance on the pan support location bolt.**
- **Battery Warnings:** Read and follow all warnings and instructions supplied by the battery manufacturer.
- Do not mix different types or brands of batteries. Performance of batteries can vary very greatly depending on the manufacturer.
- If you don't operate the balance with batteries for an extended period, it is recommended to remove the batteries from the balance.
- Batteries must be disposed of in an environmentally responsible manner. No attempt must be made to incinerate or disassemble item.

Your balance uses 8 standard AA (LR6) batteries (alkaline batteries preferred)





1 Remove weighing pan, pan support and draft shield element or draft shield "100 mm" if present.
2 Turn the balance carefully on its side.
3 Open and remove the battery-chamber cover.
4 Insert / replace the batteries with the correct polarity as shown in the battery holder.
5 Insert and close the battery-chamber cover.
6 Turn the balance carefully to its normal position.
7 Reinstall all components in the reverse order.

4.5 General Requirements

4.5.1 Switching on the Balance

Before working with the balance, it must be warmed up in order to obtain accurate weighing results. To reach operating temperature, the balance must be connected to the power supply for at least

- 30 minutes on balances with a readability of 0.001 g (0.01 ct) to 0.1 g.
- 60 minutes on balances with a readability of 0.1 mg (0.001 ct) and better.

See also

- Adjusting the Balance (page 19)

4.5.2 Adjusting the Balance

To obtain accurate weighing results, the balance must be adjusted to match the gravitational acceleration at its location and depending on the ambient conditions. After reaching the operation temperature, adjusting is necessary

- before the balance is used for the first time.
- when the balance (readability of 0.1 mg) was disconnected from the power or switched off in battery operation or in case of power failure.
- after a change of the location.
- at regular intervals during weighing service.

See also

- Switching on the Balance (page 18)

4.6 Adjustment (Calibration)

Attention
Before adjusting the balance, it must be warmed up.

See also

- General Requirements (page 18)

4.6.1 Fully Automatic Adjustment FACT

Note: On models with FACT only.

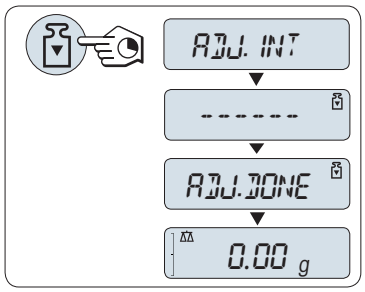
The **factory setting** is fully automatic adjustment **FACT** (**F**ully **A**utomatic **C**alibration **T**echnology) with the internal weight (see also section "The Menu").

The balance adjusts itself automatically:

- after the warm-up phase on connection to the power supply.
- when a change in the ambient conditions, e.g. the temperature, could lead to a noticeable deviation in the measurement.
- on a predefined time. (see menu topic "FACT")
- time interval. (with OIML accuracy class II approved models)

4.6.2 Adjustment with Internal Weight

Note: On models with internal weight only (see technical data).



Requirement: To carry out this operation, in the menu topic "**CAL**" (Adjustment) of advanced menu "**ADJ.INT**" must be selected.

1 Unload weighing pan

2 Press and hold «⊡» to execute "Internal Adjustment".

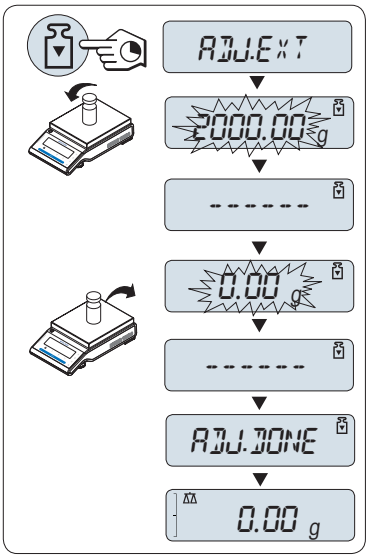
The balance adjusts itself automatically. The adjusting is finished when the message "**ADJ.DONE**" appears briefly on the display. The balance returns to the last active application and is ready for operation.

Sample adjustment printout using internal weight:

```
- Internal Adjustment --
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890

Temperature      22.5 °C
Diff               3 ppm

Adjustment done
-----------------------
```

4.6.3 Adjustment with External Weight

Note: Because of certification legislation, the approved models cannot be adjusted with an external weight * (depend on selected countries' certification legislation).
* except OIML accuracy class I approved models.



Requirement: To carry out this operation, in the menu topic "**CAL**" (Adjustment) " of advanced menu **ADJ.EXT**" must be selected.

1 Have required adjustment weight ready.

2 Unload weighing pan.

3 Press and hold «⊡» to execute "External Adjustment". The required (predefined) adjustment weight value flashes in the display.

4 Place adjustment weight in center of pan. The balance adjusts itself automatically.

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

The adjusting is finished when the message "**ADJ.DONE**" appears briefly on the display. The balance returns to the last active application and is ready for operation.

Sample adjustment printout using external weight:

```
- External Adjustment --
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890

Temperature      22.5 °C
Nominal        2000.00 g
Actual         1999.99 g
Diff               5 ppm

Adjustment done

Signature


.......................
-----------------------
```

4.6.4 Customer fine adjustment

Attention

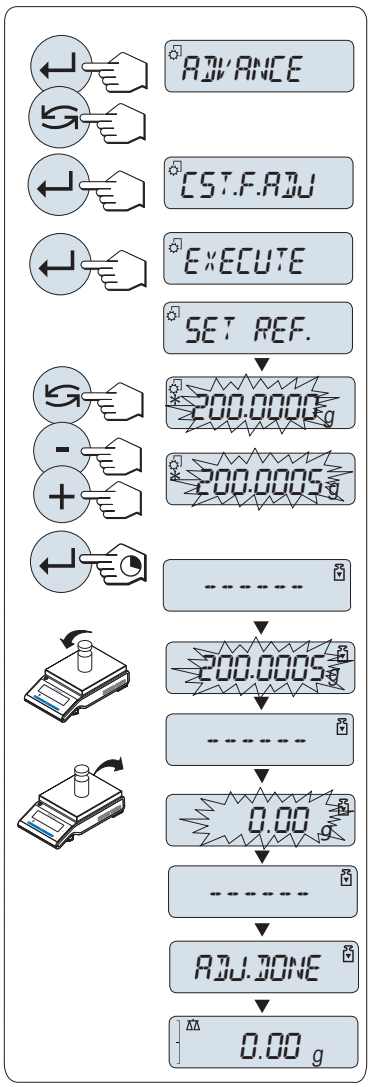
This function should be executed only by trained personnel.

The function customer fine adjustment "**CST.F.ADJ**" allows you to adjust the value of the internal adjustment weight with your own adjustment weight. The adjustable range of the adjustment weight is possible only in a very small range. Customer fine adjustment impacts the function of internal adjustment. The customer fine adjustment can be deactivated at any time.

Note

- This feature is available on models with internal weight only.
- Because of certification legislation, approved models cannot be adjusted with customer fine adjustment (depending on selected countries' certification legislation).
- Use certificated weights.
- Balance and test weight have to be on operating temperature.
- Observe the correct environmental conditions.

Execute customer fine adjustment



▶ The balance is under measuring condition.

1 Have required adjustment weight ready.

2 Unload weighing pan

3 Select in the menu "**ADVANCE.**": **CST.F.ADJ**

4 Confirm "**CST.F.ADJ**" with «↵».

5 To carry out this operation select "**EXECUTE**"

6 Start Adjustment with «↵»

⇨ "**SET REF.**" appears briefly.

⇨ The last saved value flashes on the display.

7 Select the target adjustment weight.
• For coarse setting, press «⟲» to change the value.
• For fine setting, press «**+**» to increase the value or press "**-**" to decrease the value.

8 Press and hold «↵» to confirm and execute "**CST.F.ADJ**".

⇨ The required adjustment weight value flashes in the display. This could take some time.

9 Place required adjustment weight in center of pan.

10 Remove adjustment weight when zero is flashing.

11 Wait until "**ADJ.DONE**" briefly appears.

⇨ The adjusting is finished when the message "**ADJ.DONE**" appears briefly on the display. The balance returns to the last active application and is ready for operation

⇨ If the error message "**WRONG ADJUSTMENT WEIGHT**" appears, the weight is not within the allowed value range and could not be accepted. "**CST.F.ADJ**" could not be executed.

Note
Storing the adjustment is not required.

Deactivate customer fine adjustment

1 Select in the menu "**ADVANCE.**": "**CST.F.ADJ**".

2 Confirm "**CST.F.ADJ**" with «↵».

3 To carry out this operation select "**RESET**"

4 Start **RESET** by pressing «↵»

⇨ "**NO?**" appears.

5 Select "**YES?**" and confirm with«↵».

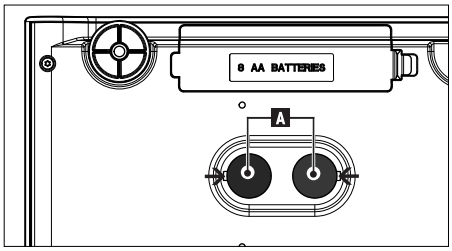
⇨ The adjusting is finished when the message "**ADJ.DONE**" appears briefly on the display. The balance returns to the last active application and is ready for operation with initial adjustment.

4.7 Weighing Below the Balance

The balances are equipped with a hanger for carrying out weighings below the work surface (weighing below the balance).

Attention:

- **Do not place the balance on the pan support location bolt.**



1 Switch off the balance and remove the power cable and any interface cable from the balance.
2 Remove weighing pan, pan support and draft shield element or "Easy draft shield" if present.
3 Turn the balance carefully on its side.
4 Remove one of the caps (A) depending on the models.
5 Then turn the balance to its normal position and simply reinstall all components in the reverse order.

4.8 Transporting the Balance

Switch off the balance and remove the power cable and any interface cable from the balance. Refer to the notes in Section "Selecting the location" regarding the choice of an optimal location.

Transporting Over Short Distances

For balances with a draft shield: Observe the following instructions to transport your balance over a short distance to a new location: **Never lift the balance using the glass draft shield. The draft shield is not sufficiently fastened to the balance.**

Transporting Over Long Distances

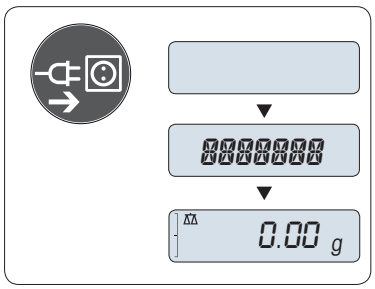
If you would like to transport or send your balance over long distances, **use the complete original packaging**.

5 Weighing Made Simple

This section shows you how to perform simple weighing and how you can accelerate the weighing process.

5.1 Switching the Balance On and Off

Switching on



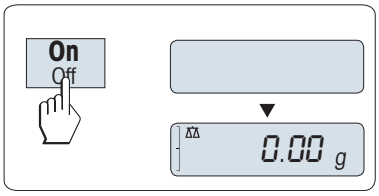
Connecting to the mains

1 Remove any load from weighing pan.

2 Connect balance via AC adapter to the mains.

The balance performs a display test (all segments in the display light up briefly), "**WELCOME**", Software version, **Maximum load** and **Readability** appears briefly.

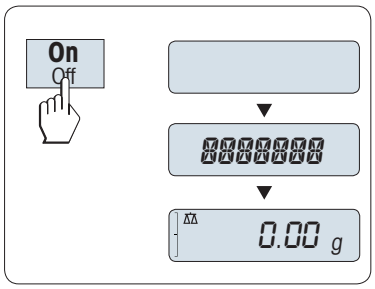
After the warm-up time, the balance is ready for weighing or for operation with the last active application, **see** General Requirements (page 18).



Mains operated (standby mode)

– Press «**On**».

The balance is ready for weighing or for operation with the last active application. Approved balances will execute an initial zero.



Battery operated

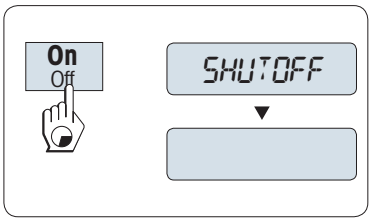
1 Remove any load from weighing pan.

2 Press and hold «**On**».

The balance performs a display test (all segments in the display light up briefly), "**WELCOME**", Software version, **Maximum load** and **Readability** appears briefly.

After the warm-up time, the balance is ready for weighing or for operation with the last active application, **see** General Requirements (page 18).

Switching off



– Press and hold the «**Off**» key until "**SHUTOFF**" appears on the display. Release the key.

⇨ Mains operated balances switch into standby mode.

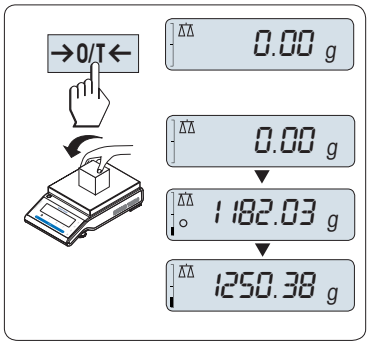
⇨ Battery operated balances switch off completely.

Note:

- After switching on from standby mode, your balance needs no warm-up time and is immediately ready for weighing.
- Standby mode is not possible with approved balances (only available in selected countries).

- If your balance has been switched off after a preselected time, the display is dimly lit and shows date, time, maximum load and readability.
- If your balance has been switched off manually, the display is off.
- To completely switch off mains operated balances, they must be disconnected from the power supply.

5.2 Performing a Simple Weighing



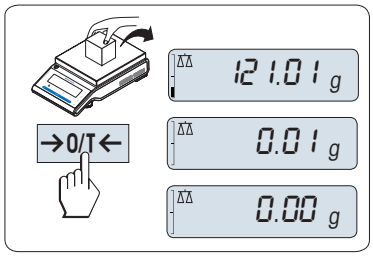
1 Press «→0/T←» to zero the balance.
Note: If your balance is not in the weighing mode, first press and hold the «⚖» key until "**WEIGH**" appears in the display. Release the key. Your balance is in the weighing mode.

2 Place weighing sample on the weighing pan.

3 Wait until the instability detector "o" disappears and the stability beep sounds.

4 Read the result.

5.3 Zero Setting / Taring

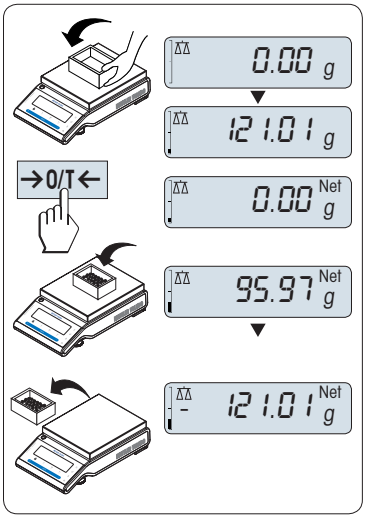


Zero setting

1 Unload the balance.

2 Press «→0/T←» to set the balance to zero. All weight values are measured in relation to this zero point (see menu topic "**ZERO.RNG**").

Note: Use the «→0/T←» zeroing key before you start with a weighing.



Taring
If you are working with a weighing container, first set the balance to zero.

1 Place empty container on the balance. The weight is displayed.

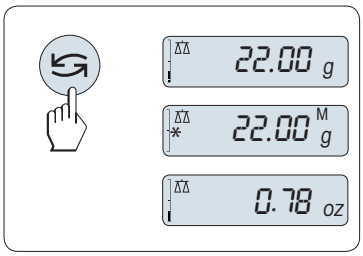
2 Press «→0/T←» to tare the balance.

"0.00 g" and "**Net**" appears in the display. "**Net**" indicates that all weight values displayed are net values.

Note:

- 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.

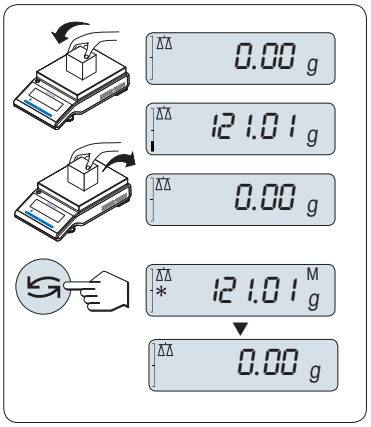
5.4 Switching Weight Units



The «⟲» key can be used at any time to toggle between weight unit "**UNIT 1**","**RECALL**" value (if selected), weight unit "**UNIT 2**" (if different from weight unit 2) and the application unit (if any).

5.5 Recall / Recall Weight Value

Recall stores stable weights with an absolute display value bigger than 10d.
Requirement: The function "**RECALL**" must be activated in the menu.



1 Load weighing sample. The display shows weight value and stores stable value.

2 Remove weighing sample. When the weight is removed the Display shows zero.

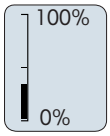
3 Press «⟲». The display shows last stored stable weight value for 5 seconds together with asterisk (*) and Memory (M) symbols. After 5 seconds the display goes back to zero. This can be repeated unlimited times.

Delete last weight value

As soon a new stable weight value is displayed, the old recall value becomes replaced by the new weight value. When pressing «→0/T←», the recall value is set to 0.

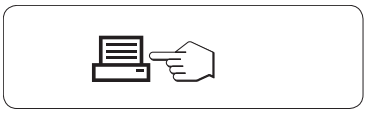
Note: If the power is switched off, the recall value is lost. The recall value can not be printed.

5.6 Weighing with the Weighing-in Aid



The weighing-in aid is a dynamic graphic indicator which shows the used amount of the total weighing range. You can thus recognize at a glance whether the load on the balance approaches the maximum load.

5.7 Print / Transmit Data



Pressing the «⎙» key transmits the weighing results over the interface e.g. to a printer or a PC.

6 The Menu

6.1 What is in the Menu ?

The Menu allows you to match your balance to your specific weighing needs. In the menu you can change the settings of your balance and activate functions. The main menu has 4 different menus and these contains up to 38 different **topics**, each of which allows you various **selection** possibilities. For Menu "**PROTECT**" see chapter "Description of menu topics" section "Main menu".

Note: See Quick Guide for the graphical overview of the menu (Menu Map) with all setting possibilities.

Menu "BASIC"

Topic	Description
DATE	Setting the current date.
TIME	Setting the current time.
UNIT 1	Specification of the 1st weight unit in which the balance should show the result.
UNIT 2	Specification of the 2nd weight unit in which the balance should show the result.
KEY.BEEP	Setting the key beep level.
STB.BEEP	Setting the stability beep level.
RESET	Call up of the factory settings.

Menu "ADVANCE."

Topic	Description
WEIG.MOD	Adapting the balance to the weighing mode.
ENVIRON.	Adapting the balance to the ambient conditions.
CAL	Settings for the type of adjustment (calibration).
CST.F.ADJ	Executing customer fine adjustment.
FACT	Settings for fully automatic balance adjustment.
FACT.PRT	Switching the automatic FACT printout on or off.
DATE.FRM	Setting the date format.
TIME.FRM	Preselection of the time format.
RECALL	Switching the application "Recall" for storing stable weights on or off.
SHUTOFF	Setting the time after which the balance should be switched off automatically.
B.LIGHT	Setting the time after which the display backlight should be switched off automatically.
A.ZERO	Switching the automatic zero correction (Autozero) on or off.
ZERO.RNG	Setting the zero limit of the zero/tare key.
ASSIGN:F	Selection of assigned F key application and entering their parameter settings.
DIAGNOS.	Starting a diagnostic application.
SRV.ICON	Switching the service reminder (service icon) on or off.
SRV.D.RST	Reset service date and hours (service reminder)

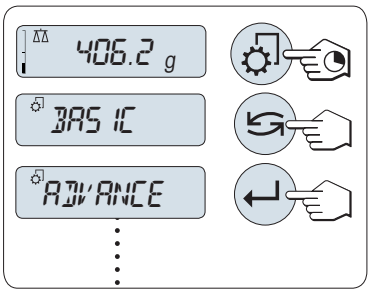
Menu "INT.FACE"

Topic	Description
RS232	Matching the serial interface RS232C to a peripheral unit.
HEADER	Setting the header for printout of individual values.
SINGLE	Setting the information for printout of individual values.
SIGN.L	Setting the footer for printout of individual values.
LN.FEED	Setting line feed for printout of individual values.
ZERO.PRT	Setting the auto print function for printing zero.
COM.SET	Setting the data communication format of the serial interface RS232C.
BAUD	Setting the transfer speed of the serial interface RS232C.

Topic	Description
BIT.PAR.	Setting the character format (Bit/Parity) of the serial interface RS232C.
STOPBIT	Setting the character format (stop bit) of the serial interface RS232C.
HD.SHK	Setting the transfer protocol (Handshake) of the serial interface RS232C.
RS E.O.L.	Setting the end of line format of the serial interface RS232C.
RS.CHAR	Setting the char set of the serial interface RS232C.
INTERVL.	Selection of the time interval for the simulated print key press.

6.2 Menu Operation

In this Section you will learn how to work with the menu.

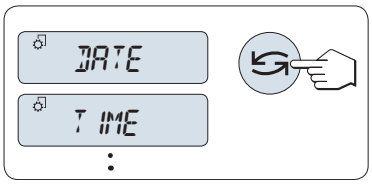


Select Menu

1 Press and hold «⚙» to activate main menu. The first menu "**BASIC**" is displayed (except menu protection is active).

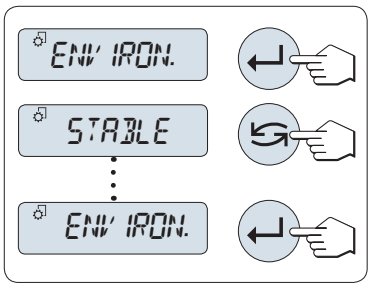
2 Press «⟲» repeatedly to change menu (Scrolling down/up «+» / «–» keys).

3 Press «↵» to confirm the selection.



Select Menu Topic

– Press «⟲». The next menu topic appears in the display. Each time the «⟲» or the «+» key is pressed, the balance switches to the next menu topic; the «–» key to the previous menu topic.



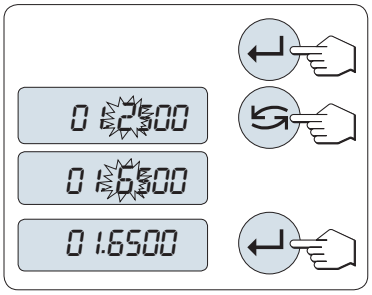
Change Settings in a Selected Menu Topic

1 Press «↵».The display shows the current setting in the selected menu topic. Each time «⟲» or «+» is pressed, the balance switches to the next selection; press «–» to the previous selection. After the last selection, the first is shown again.

2 Press «↵» to confirm the setting. For store the setting see section **Saving Settings and Closing the Menu**.

Change Settings in a Submenu Selection

The same procedure as for menu topics.



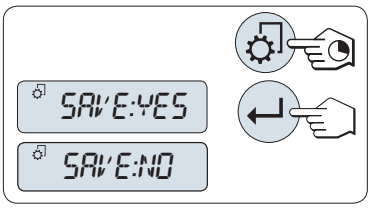
Input Principle of Numerical Values

1 Press «↵» for input of numerical values.

2 Press «⟲» to select a digit or a value (depending on the application). The selected digit or the selected value is blinking.

3 For changing digits or values, press «+» to scroll up or «–» to scroll down.

4 Press «↵» to confirm the input.

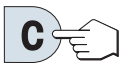


Saving Settings and Closing the Menu

1 Press and hold «⚙» to leave menu topic.

2 Press «↵» to execute "**SAVE:YES**". Changes are saved.

3 Press «↵» to execute "**SAVE:NO**". Changes are not saved. To toggle between "**SAVE:YES**" and "**SAVE:NO**" press «⟲».



Cancel

– For leaving menu topic or menu selection without saving press «**C**» (one step back in the menu).

Note: If no entry is made within 30 seconds, the balance reverts to last active application mode. Changes are not saved. If changes are made, the balance asks "**SAVE:NO**".

6.3 Description of Menu Topics

In this Section you will find information regarding the individual menu topics and the available selections.

6.3.1 Main Menu

Selecting the menu.

"**BASIC**"	The small "**BASIC**" menu for simple weighing is displayed.
"**ADVANCE.**"	The extended "**ADVANCE.**" menu for further weighing settings is displayed.
"**INT.FACE**"	The menu "**INT.FACE**" for all interface parameter settings for peripheral devices e.g. printer is displayed.
"**PROTECT**"	Menu protection. Protection of balance configurations against unmeant manipulation.
"**OFF**"	Menu protection is off. (**Factory setting**)
"**ON**"	Menu protection is on. The menu **BASIC**, **ADVANCE.** and **INT.FACE** are not displayed. This is indicated with "🔒" in the display.

6.3.2 Basic Menu

"DATE" – Date

Setting the current date according to date format.

Note: A reset of the balance will not change this setting.

"TIME" – Time

Setting the current time according to time format

"**+1H**"	Set the current time forwards by 1 hour (to adjust summer or winter time). **(Factory setting)**
"**-1H**"	Set the current time backwards by 1 hour (to adjust summer or winter time).
"**SET.TIME**"	Enter the current time.

Note: A reset of the balance will not change this setting.

"UNIT 1" – Weight Unit 1

Depending on requirements, the balance can operate with the following units (depending on the model)

- Only those weight units allowed by the appropriate national legislation are selectable.
- With approved balances, this menu topic has a fixed setting and cannot be changed.

Units:

g [1]	Gram	**dwt**	Pennyweight
kg [2]	Kilogram	**mom**	Momme
mg [3]	Milligram	**msg**	Mesghal
ct	Carat	**tlh**	Tael Hong Kong
lb	Pound	**tls** [4]	Tael Singapore
oz	Ounce (avdp)	**tlt**	Tael Taiwan
ozt	Ounce (troy)	**tola**	Tola
GN	Grain	**baht**	Baht

[1] factory setting
[2] not with 0.1 mg and 1 mg balances
[3] with 0.1 mg and 1 mg balances
[4] the Malaysian tael has the same value

"UNIT 2" – Weight Unit 2

If it is required to show the weighing results in weighing mode in an additional unit, the desired second weight unit can be selected in this menu topic (depending on the model). Units see "**UNIT 1**".

Note: Only those weight units allowed by the appropriate national legislation are selectable.

"KEY.BEEP" – Key Beep

This menu topic allows you to select the volume of the key beep. The according key beep is emitted during the setting.

"**MED**"	**Medium** level (**Factory setting**)
"**HIGH**"	**High** level
"**OFF**"	Beep switched off
"**LOW**"	**Low** level

"STB.BEEP" – Stability Beep

If the unstable symbol disappears, the stability beep becomes active. This menu topic allows you to preselect the volume of the stability beep.

"**LOW**"	**Low** level (**Factory setting**)
"**MED**"	**Medium** level
"**HIGH**"	**High** level
"**OFF**"	Beep switched off

"RESET" – Reset Balance Settings

This menu topic allows you to call-up the factory settings.

To toggle between "**YES**?" and "**NO**?" press «↺».

Note: A reset of the balance will not change the "**DATE**" and "**TIME**" settings.

6.3.3 Advanced Menu

"WEIG.MOD" – weighing mode settings

This setting can be used to to adapt the balance to the weighing mode.

"**UNIVERS.**"	For all standard weighing applications. (**Factory setting**)
"**DOSING**"	For dosing liquid or powdery products. With this setting, the balance responds very quickly to the smallest changes in weight.

"ENVIRON." – Environment Settings

This setting can be used to match your balance to the ambient conditions.

"**STD.**"	Setting for an average working environment subject to moderate variations in the ambient conditions. (**Factory setting**)
"**UNSTAB.**"	Setting for a working environment where the conditions are continuously changing.
"**STABLE**"	Setting for a working environment which is practically free from drafts and vibrations.

"CAL" – Adjustment (calibration)

In this menu topic you can preselect the function of the «⚖» key. Your balance can be adjusted with internal or external weights by pressing the «⚖» key. If you have attached a printer to your balance, the data of the adjustment (calibration) are printed out.

"**ADJ.OFF**"	The adjustment is **switched off**. The «⚖» key has no function.
"**ADJ.INT**"	**Internal** adjustment: adjustment is performed at a keystroke with the built-in weight (depending on the model, see technical data).
"**ADJ.EXT**"	**External** adjustment: adjustment is performed at a keystroke with a selectable external weight. **Note:**This function is not available for approved balances * (depend on selected countries' certification legislation). * except OIML accuracy class I approved models.
"200.00 g"	**Defining the external adjustment weight**: define the weight of the external adjustment weight (in grams). **Factory setting**: depends on the model.

"CST.F.ADJ" – Customer Fine Adjustment

This function allows you to adjust the value of the internal adjustment weight with your own adjustment weight. This feature is available on models with internal weight only. For more information, see Chapter Adjustment.

"**EXECUTE**"	Executes customer fine adjustment (**Factory setting**)
"**RESET**"	Sets adjustment back to initial adjustment. **NO?**: Abort reset function **YES?**: Execute reset function

"FACT" – Fully Automatic Adjustment

Fully automatic internal adjustment (calibration) **FACT** (**F**ully **A**utomatic **C**alibration **T**echnology) provides fully automatic balance adjustment based on temperature criteria and on preselected time. (depending on the model, see technical data)

"**TIME**"	Execute FACT (with selected time).
"12:00"	Specify the time for a fully automatic adjustment to take place every day. **Factory setting**: 12:00 (according to time format)
"**OFF**"	FACT is **switched off**.

"FACT.PRT" – Protocol Trigger for Fact

This setting specifies whether an adjustment report should be printed automatically.
Note: This menu topic does not affect the printing of adjustments with an internal or external adjustment weight.

"**OFF**"	**Protocol switched off**: if the balance adjusts automatically (FACT), a protocol is not printed out.
"**ON**"	Protocol switched on: a record is printed out after every automatic adjustment of the balance (FACT). **Note:** The protocol is printed out without a line for signatures.

"DATE.FRM" – Date Format

This menu topic allows you to preselect the date format.

The following date formats are available:

	Display examples	**Printing examples**
"**DD.MM.Y**"	01.02.09	01.02.2009
"**MM/DD/Y**"	02/01/09	02/01/2009
"**Y-MM-DD**"	09-02-01	2009-02-01
"**D.MMM Y**"	1.FEB.09	1.FEB 2009
"**MMM D Y**"	FEB.1.09	FEB 1 2009

Factory setting: "**DD.MM.Y**"

"TIME.FRM" – Time Format

This menu topic allows you to preselect the time format.

The following date formats are available:

	Display examples
"**24:MM**"	15:04
"**12:MM**"	3:04 PM
"**24.MM**"	15.04
"**12.MM**"	3.04 PM

Factory setting: "**24:MM**"

"RECALL" – Recall

This menu topic allows you to switch the "**RECALL**" function on or off. When it is switched on recall stores the last stable weight if the absolute display value was bigger than 10d.

"**OFF**"	"**RECALL**" switched off **(Factory setting)**
"**ON**"	"**RECALL**" switched on

Note: The recall value is displayed with an asterisk and cannot be printed.

"SHUTOFF" – Automatic Shutoff

If the automatic shutoff function is activated, the balance automatically switches itself off after a preselected time of inactivity (i.e. with no key being pressed or changes of weight occurring etc.) and is switched to the standby mode.

"**A.OFF**:10' "	Automatic shutoff after **10 minutes** of inactivity. (**Factory setting**)
"**A.OFF** – "	Automatic shutoff **not** activated.
"**A.OFF**:2' "	Automatic shutoff after **2 minutes** of inactivity.
"**A.OFF**:5' "	Automatic shutoff after **5 minutes** of inactivity.

"B.LIGHT" – Backlight

Under this menu topic, the display backlight can be switched off automatically. If the automatic switch-off is activated, the backlight will turn off automatically after the selected period of inactivity has elapsed. The backlight is reactivated when a key is pressed or the weight is changed.

"**B.L. ON**"	Backlight is always **on**. (**Factory setting**)
"**B.L. OFF**"	Backlight is always **off**.
"**B.L.** 30" "	Automatic switch-off after **30 seconds** inactivity.
"**B.L.** 1' "	Automatic switch-off after **1 minute** inactivity.
"**B.L.** 2' "	Automatic switch-off after **2 minutes** inactivity.
"**B.L.** 5' "	Automatic switch-off after **5 minutes** inactivity.

"A.ZERO" – Automatic Zero Setting

This menu topic allows you to switch the automatic zero setting on or off.

"**ON**"	"**A.ZERO**" **switched on** (factory setting). The automatic zero setting continuously corrects possible variations in the zero point that might be caused through small amounts of contamination on the weighing pan.
"**OFF**"	"**A.ZERO**" **switched off**. The zero point is not automatically corrected. This setting is advantageous for special applications (e.g. evaporation measurements).

Note: With approved balances, this setting is not available (only available in selected countries).

"ZERO.RNG" – Zero Range

This menu topic allows you to set a zero limit for the «→0/T←» key. Up to and including this limit the «→0/T←» key will execute a zero. Above this limit the «→0/T←» key will execute a tare.

"21g"	To set the upper limit of the zeroing range as weight in the definition unit of the balance. (**Factory setting:** 0.5% of weighing range) **Note:** With approved balances, this setting is not available and fixed to 3e (only available in selected countries).

Note: A reset of the balance will not change this setting.

"ASSIGN:F" – Assign Application Key F

At this menu topic you can assign an application to the «**F**» key. The following applications are available (depending on the model):

"**COUNT**"	Piece counting (**Factory setting**)
"**PERCENT**"	Percent weighing
"**CHECK**"	Checkweighing
"**STAT**"	Statistics
"**FORMULA**"	Formulation / Net-Total
"**TOTAL**"	Totaling
"**DYNAMIC**"	Dynamic weighing
"**FACTOR.M**"	Multiplication factor
"**FACTOR.D**"	Division factor
"**DENSITY**"	Density
"**R.TEST**"	Routine test

"DIAGNOS." – Diagnostics Application

At this menu topic you can start a diagnostic application. For more information see chapter application "Diagnostics".
The following diagnostics are available:

"**REPEAT.T**"	Repeatability test (models with internal weights only)
"**DISPLAY**"	Display test
"**KEYPAD.T**"	Key test
"**CAL.MOT.T**"	Motor test (models with internal weights only)
"**BAL.HIST**"	Balance history
"**CAL.HIST**"	Calibration history
"**BAL.INFO**"	Balance information
"**SRV.PROV**"	Service provider information

"SRV.ICON" – Service Reminder

This menu topic allows you to switch the service reminder "🔧" on or off.

"**ON**"	Service reminder "🔧" **switched on**.You will be informed after one Year or 8000 operating hours to call service for recalibration. This will be indicated by the flashing service icon: "🔧". **(Factory setting)**
"**OFF**"	Service reminder "🔧" **switched off**.

"SRV.D.RST" – Service Date Reset

This menu topic allows you to reset service date and hours.
Note: This menu topic is only available if ″**SRV.ICON**″ setting ″**ON**″ was selected.

To toggle between ″**YES**?″ and ″**NO**?″ press «↻».

6.3.4 Interface Menu

"RS232" – RS232C Interface [1)]

At this menu topic you can select the peripheral device connected to the RS232C interface and specify how the data is transmitted.

"**PRINTER**"	Connection to a **printer**. (**Factory setting**) **Note:** • Only one printer possible. • See recommended printer settings found in section "Appendix", as well as the printer-specific user's manual.
"**PRT.STAB**"	If the «🖶» key is pressed, the next stable weight value will be printed. (**Factory setting**)
"**PRT.AUTO**"	Every stable weight value will be printed, without pressing the «🖶» key.
"**PRT.ALL**"	If the «🖶» key is pressed, the weight value will be printed regardless of stability.
"**PC-DIR.**"	Connection to a **PC**: the balance can send data (as a Keyboard) to the PC used for PC applications e.g. Excel. **Note:** The balance sends the weight value without the unit to the PC.
"**PRT.STAB**"	If the «🖶» key is pressed, the next stable weight value will be sent followed by an enter. (**Factory setting**)
"**PRT.AUTO**"	Every stable weight value will be sent followed by an enter, without pressing the «🖶» key.
"**PRT.ALL**"	If the «🖶» key is pressed, the weight value will be sent followed by an enter regardless of stability.
"**HOST**"	Connection to a **PC**, Barcode Reader etc.: the balance can send data to the PC and receive commands or data from the PC. **Note:** The balance sends the complete MT-SICS answer to the PC (see chapter "MT-SICS Interface Commands and Functions".
"**SND.OFF**"	Send mode switched off.(**Factory setting**)
"**SND.STB**"	If the «🖶» key is pressed, the next stable weight value will be sent.
"**SND.CONT**"	All weight value updates will be sent regardless of stability, without pressing the «🖶» key.
"**SND.AUTO**"	Every stable weight value will be sent, without pressing the «🖶» key.
"**SND.ALL**"	If the «🖶» key is pressed, the weight value will be sent regardless of stability.
"**2.DISP**"	Connection of an **optional auxiliary display** unit. **Note:** The transmission parameters cannot be selected. Settings are automatically set.
⚠	**Attention:** If you select 2nd Display "**2.DISP**", first make sure that no other device is connected at COM1 as an auxiliary display. Other devices could be damaged because of the voltage on connector Pin 9. Necessary for powering the display (see Chapter "Interface Specification").

"HEADER" – Options for the Printout Header of individual values

This menu topic allows you to specify the information that is to be printed at the top of the printout for every individual weighing results (after pressing «🖶»).
Note: This menu topic is only available if ″**PRINTER**″ setting was selected.

"**NO**"	The header is not be printed (**Factory setting**)
"**DAT/TIM**"	Date and time are printed
"**D/T/BAL**"	Date, time and balance information (Balance type, SNR, Balance ID) are printed. **Note:** Balance ID only if set.

"SINGLE" – Options for Printing out the Result of individual values

This menu topic allows you to specify the information that is to be printed for every individual weighing result (after pressing «🖶»).
Note: This menu topic is only available if ″**PRINTER**″ setting was selected.

"**NET**"	The value of the Net weight from the current weighing is printed (**Factory setting**)
"**G/T/N**"	The values of the Gross weight, the Tare weight and the Net weight are printed

"SIGN.L" – Options for the Printout Footer for Signature Line of individual values

This menu topic allows you to set a footer for signature at the bottom of the printout for every individual weighing result (after pressing «🖶»).
Note: This menu topic is only available if ″**PRINTER**″ setting was selected.

"**OFF**"	The signature footer is not be printed. (**Factory setting**)
"**ON**"	The signature footer is printed

"LN.FEED" – Options for Complete the Printout of individual values

This menu topic allows you to specify the number of blank lines to complete the printout (line feed) for every individual weighing result (after pressing «🖶») .
Note: This menu topic is only available if ″**PRINTER**″ setting was selected.

"0"	Possible numbers of blank lines: 0 to 99 (**Factory setting = 0**)

"ZERO.PRT" – Options for "PRT.AUTO" [1)]

This menu topic allows you to specify the auto print function ″**PRT.AUTO**″ for printing zero "**YES**" or "**NO**".

"**OFF**"	Zero is not be printed (Zero +/- 3d) (**Factory setting**)
"**ON**"	Zero is always printed

Note: This menu topic is only available if "**PRT.AUTO**" function of the "**PRINTER**" or "**PC-DIR.**" was selected.

"COM.SET" – Options for the Data Communication Format (RS232C)("HOST")

This menu topic allows you to set the data format depending on which peripheral device is connected.
Note: This menu topic is only available if ″**HOST**″ setting was selected.

"**MT-SICS**"	The MT-SICS data transfer formats is used. (**Factory setting**) For more information see section ″MT-SICS Interface Commands and Functions″.
"**MT-PM**"	The following PM balance commands are supported: S Send value SI Send immediate value SIR Send immediate value and repeat SR Send value and repeat SNR Send next value and repeat

T	Tare
TI	Tare immediately
B	Base *)
MI	Modify ambient vibration
MZ	Modify Auto Zero
M	Modified settings reset
ID	Identify
CA	Calibrate
D	Display (only symbol N and G available)

*) Limitation:

- Negative values are limited up to the current tare value.
- B command is additive.
- The sum of the B values plus the previous tare value, before a "TA","T" or "Z" is sent, must be less than the total weighing range.

"**SART**"

The following Sartorius commands are supported:

K	Ambient conditions: very stable
L	Ambient conditions: stable
M	Ambient conditions: unstable
N	Ambient conditions: very unstable
O	Block keys
P	Print key (print, auto print; activate or block)
Q	Acoustic signal
R	Unblock keys
S	Restart/self-test
T	Tare key
W	Calibration/adjustment (depending on the menu setting) *)
Z	Internal calibration/adjustment **)
f0_	Function key (F)
f1_	Function key (CAL)
s3_	C key
x0_	Perform internal calibration **)
x1_	Print balance/scale model
x2_	Print weighing cell serial number
x3_	Print software version

*) may be inaccessible on verified balances/scales

**) only on models with built-in motorized calibration weight

Functionality mapping

"**HOST**" settings:	**Sartorius printer settings:**
"**SND.OFF**"	not applicable
"**SND.STB**"	manually print with stability
"**SND.ALL**"	manually print without stability
"**SND.CONT**"	automatically print without stability

"**SND.AUTO**"	similar applicable to automatically print when load is changed

"BAUD" – Baud rate RS232C [1)]

This menu topic allows you to match the data transmission to different serial RS232C receivers. The baud rate (data transfer rate) determines the speed of transmission via the serial interface. For problem-free data transmission the sending and receiving devices must be set at the same value.

The following settings are available:
600 bd, 1200 bd, 2400 bd, 4800 bd, 9600 bd, 19200 and 38400 bd. (default: **9600 bd**)

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"BIT.PAR." – Bit/Parity RS232C [1)]

At this menu topic you can set the character format for the attached RS232C serial peripheral device.

"**8/NO**"	8 data bits/no parity (**Factory setting**)
"**7/NO**"	7 data bits/no parity
"**7/MARK**"	7 data bits/mark parity
"**7/SPACE**"	7 data bits/space parity
"**7/EVEN**"	7 data bits/even parity
"**7/ODD**"	7 data bits/odd parity

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"STOPBIT" – Stop Bits RS232C [1)]

At this menu topic you can set the stop bits of the transmitted data to different RS232C serial receivers.

"**1 BIT**"	1 Stop bit (**Factory setting**)
"**2 BITS**"	2 Stop bits

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"HD.SHK" – Handshake RS232C [1)]

This menu topic allows you to match the data transmission to different RS232C serial receivers.

"**XON.XOFF**"	Software handshake (XON/XOFF) (**Factory setting**)
"**RTS.CTS**"	Hardware handshake (RTS/CTS)
"**OFF**"	No handshake

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"RS E.O.L." – End of Line RS232C [1)]

At this menu topic you can set the "End of Line" character of the transmitted data to different RS232C serial receivers.

"**CR LF**"	<CR><LF> Carriage Return followed by Line feed (ASCII-Codes 013+010) (**Factory setting**)
"**CR**"	<CR> Carriage Return (ASCII-Code 013)

"**LF**"	<LF> Line feed (ASCII-Code 010)
"**TAB**"	<TAB> Horizontal tab (ASCII-Code 011), only settable if **PC-DIR.** is selected.

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"RS.CHAR" – Char Set RS232C [1)]

At this menu topic you can set the "Character Set" of the transmitted data to different RS232C serial receivers.

"**IBM.DOS**"	Char Set IBM/DOS (**Factory setting**)
"**ANSI.WIN**"	Char Set ANSI/WINDOWS

Note:

- Not visible for 2nd display.
- Each device has separate settings.

"INTERVL." – Print Key Simulation

At this menu topic you can activate a simulation of the «🖶» key. "**INTERVL.**" simulates a print key press every x seconds.

Range:	0 to 65535 seconds
0 sec:	disables the print key simulation

Factory setting: 0 sec

Note: The executed action is according to the configuration of the print key. (see interface setting)

---

1) Note for 2nd RS232C Interface (COM2)

- If a second interface is installed, the menu topic is displayed for each interface, e.g
  "**BAUD**.1" for standard interface (COM1)
  "**BAUD**.2" for 2nd interface (COM2)
- Only one printer can be set if two RS232 interfaces are existing.

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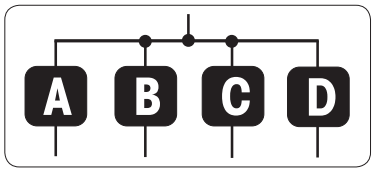
7 Applications

7.1 Application "Piece Counting"

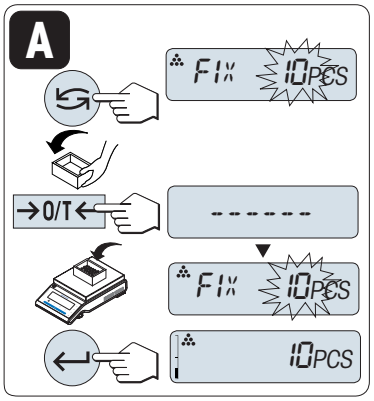
The "**Piece Counting**" application allows you to determine the number of pieces put on the weighing pan.
Requirement: The function "**COUNT**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**", factory setting).

– Activate function "**COUNT**" by pressing and holding the «F» key.



Piece Counting first requires the setting of a reference weight, there are 4 possibilities:

A Setting the reference **by multiple pieces with fix reference values**.
B Setting the reference **by multiple pieces with variable reference values**.
C Setting the reference **for 1 piece in weighing mode**.
D Setting the reference **for 1 piece in manual mode**.



Setting possibility

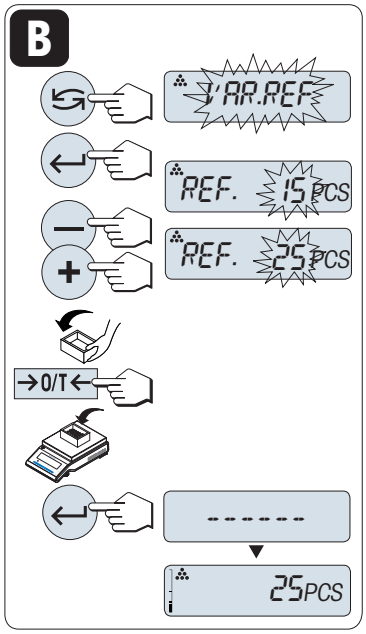
A **Setting the reference by multiple pieces with fix reference values.**

1 Select a number of reference pieces by scrolling with «↻». Possible numbers* are 5, 10, 20 and 50.
* with approved balances in selected countries: min 10

2 Press «→0/T←» to zero/tare. If needed: place empty container on the weighing pan and zero/tare again.

3 Add the selected number of reference pieces to container.

4 Press «↵» to confirm.



Setting possibility

B **Setting the reference by multiple pieces with variable reference values**

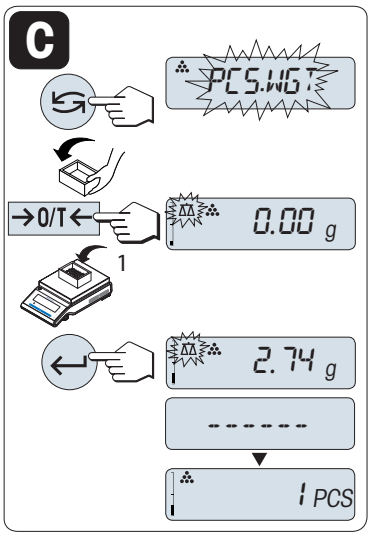
1 Select "**VAR.REF**" by scrolling with «↻». Press «↵» to confirm.

2 Select a number of reference pieces by scrolling up («+» key) or down («-» key). Speed up by press and hold. Possible numbers* are 1 to 999.
* with approved balances in selected countries: min 10

3 Press «→0/T←» to zero/tare. If using: place empty container on the weighing pan first or tare again.

4 Add the selected number of reference pieces to container.

5 Press «↵» to confirm.



Setting possibility

C **Setting the reference for one piece in weighing mode**

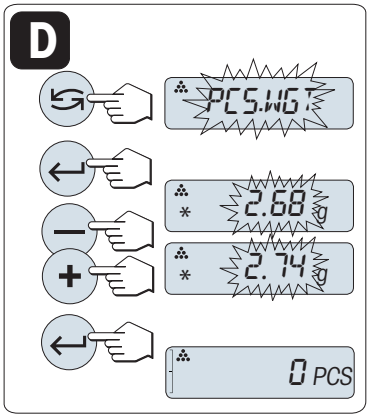
1 Select "**PCS.WGT**" by scrolling with «⟲».

2 Press «→0/T←» to zero/tare. If needed: place empty container on the weighing pan and zero/tare again.

3 Add one reference piece to container. The weight of one piece is displayed.

4 Press «↵» to confirm.

Note: With approved balances, this setting is not available in selected countries.



Setting possibility

D **Setting the reference for one piece in manual mode**

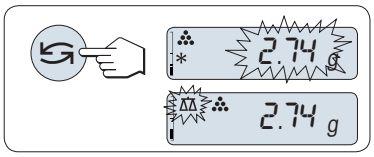
1 Select "**PCS.WGT**" by scrolling with «⟲».

2 Press «↵» to confirm.

3 Enter the final reference one piece weight by scrolling up («**+**» key) or down («**-**» key). Speed up by press and hold.

4 Press «↵» to confirm.

Note: With approved balances, this setting is not available in selected countries.



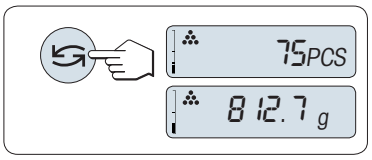
Switching between manual mode and weighing mode

– Press «⟲» to switch between manual and weighing mode.

Note: By switching from weighing mode to manual mode the weight value will be transferred and can be changed manually.

Note: If without any key press within 60 seconds, the balance returns to the previous active application. Press «**C**» to cancel and returns to the previous active application.

On completion of the setting procedure, your balance is ready for piece counting.



Switching between piece count and weight display.

You can use the «⟲» key at any time to switch the display between piece display, weighing unit "**UNIT 1**", "**RECALL**" value (if activated) and weighing unit "**UNIT 2**" (if different from "**UNIT 1**").

Note:

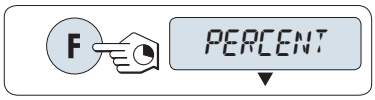
- The "**RECALL**" value is displayed with an asterisk (*) and icon "M" and can not be printed.
- Take into account minimum values: min. reference weight = 10d (10 digits), min. piece weight* = 1d (1 digit)!
  * with approved balances in selected countries: min 3e
- The current reference weight remains stored until the reference setting is changed.

Terminate the application

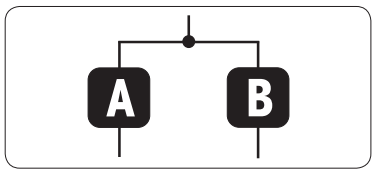
Press and hold «⚖» to terminate the application and to return to the weighing application.

7.2 Application "Percent Weighing"

The "**Percent Weighing**" application allows you to check a sample weight as percentage to a reference target weight.
Requirement: The function "**PERCENT**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**".



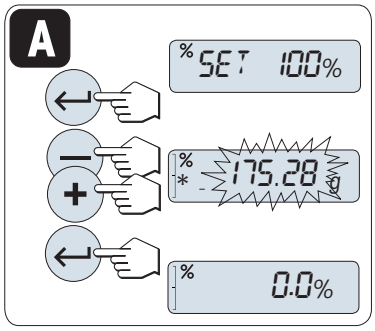
– Activate function percent weighing "**PERCENT**" by pressing and holding the «**F**» key.



Percent Weighing first requires the setting of a reference weight that should corresponds to 100%, there are 2 possibilities:

A Setting the reference **in manual mode (enter 100%)**.

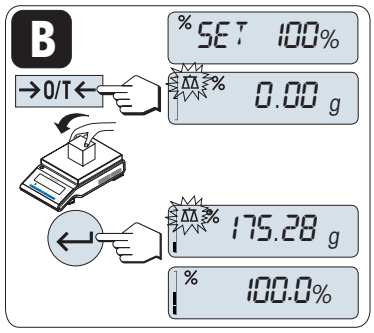
B Setting the reference **in weighing mode (weigh 100%)**.



Setting possibility

A **Setting the reference by manual mode (enter 100%)**

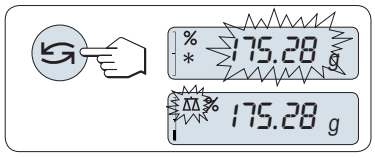
1 Press «↵» to activate manual mode.
2 Select the reference target weight (100%) by scrolling up («**+**» key) or down («**–**» key). Speed up by press and hold.
3 Press «↵» to confirm.



Setting possibility

B **Setting the reference in weighing mode (weigh 100%)**

1 Press «→0/T←» to zero/tare the balance and to activate the weighing mode. If needed: place empty container on the weighing pan and zero/tare again.
2 Load the reference weight (100%).
Note: Reference weight must be at least +/- 10d.
3 Press «↵» to confirm.



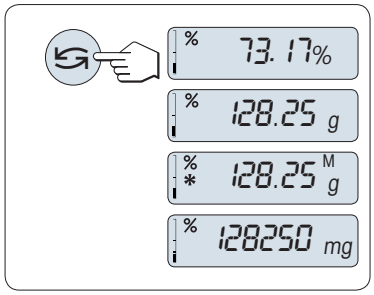
Switching between manual mode and weighing mode

– Press «⇆» to switch between manual and weighing mode.

Note: By switching from weighing mode to manual mode the weight value will be transferred and can be changed manually.

Note: If without any key press within 60 seconds, the balance returns to the previous active application.

On completion of the weighing-in procedure, your balance is ready for percent weighing.



Switching between percent and weight display

You can use the «⟲» key at any time to switch the display between percent display, weighing unit "**UNIT 1**", "**RECALL**" value (if activated) and weighing unit "**UNIT 2**" (if different from **UNIT 1**).

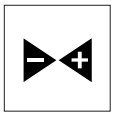
Note:

- The recall value is displayed with an asterisk (*) as well as icon "M" and can not be printed.
- The current set weight remains stored until it is redetermined.

Terminate the application

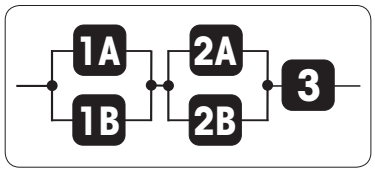
Press and hold «⚖» to terminate the application and to return to the weighing application.

7.3 Application "Check Weighing"



The "**Check weighing**" application allows you to check the deviation of a sample weight within a tolerance limit to a reference target weight.
Requirement: The function "**CHECK**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**".

– Activate function "**CHECK**" by pressing and holding the «**F**» key.



Step 1: Check Weighing first requires the setting of a reference weight that should corresponds to the nominal weight, there are 2 possibilities:

1A Setting the reference **in manual mode** (enter nominal weight).

1B Setting the reference **in weighing mode** (weigh nominal weight).

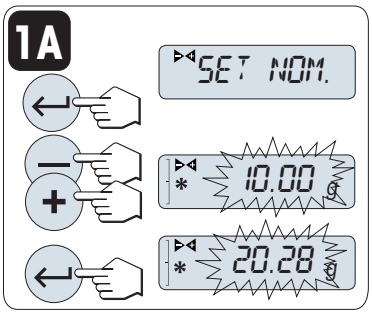
Step 2: Check weighing needs the upper and lower limits, there are 2 possibilities::

2A Setting the **upper and lower limits in percentage**.

2B Setting the **upper and lower limits by weight**.

Step 3: Setting tolerance beep

3 Activate or deactivate **tolerance beep**.



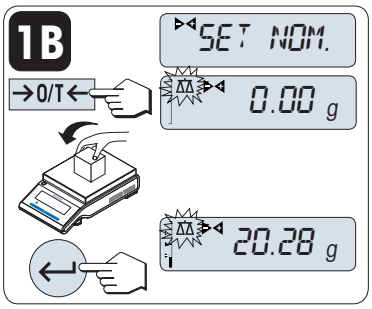
Setting possibility:

1A **Setting the reference in manual mode** (enter nominal weight)

1 Press «↵» to activate manual mode.

2 Select the reference target weight by scrolling up («+» key) or down («–» key). Speed up by press and hold.

3 Press «↵» to confirm the nominal weight.



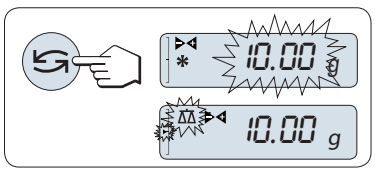
Setting possibility:

1B **Setting the reference in weighing mode** (weigh nominal weight)

1 Press «→0/T←» to zero/tare the balance and to activate the weighing mode. If needed: place empty container on the weighing pan and zero/tare again.

2 Load the nominal weight.

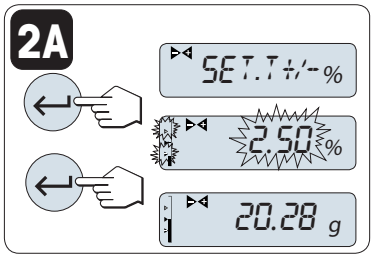
3 Press «↵» to confirm the nominal weight.



Switching between manual mode and weighing mode

– Press «⇆» to switch between manual mode and weighing mode.

Note: By switching from weighing mode to manual mode the weight value will be transferred and can be changed manually.



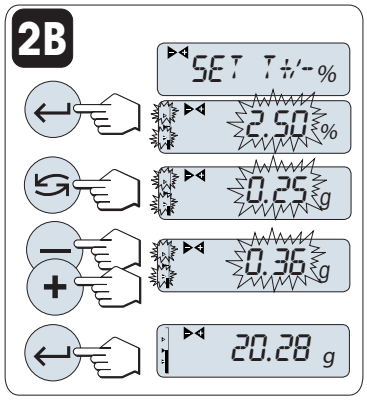
Step 2, setting possibility:

2A **Setting the upper and lower limits** (in percentage):

1 Press «↵» to start setting.

2 Press «↵» to confirm the default limit of +/- 2.5 % or enter the limit value by scrolling up («**+**» key) or down («**–**» key). Press «↵» to confirm the limits.

Note: Press «⇆» to switch between "**UNIT 1**" and Unit "**%**".



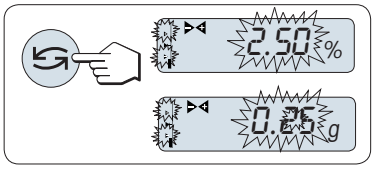
Step 2, setting possibility:

2B **Setting the upper and lower limits by weight:**

1 Press «↵» to start setting.

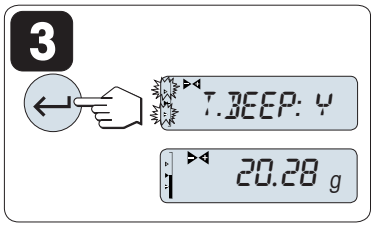
2 Press «⇆» to switch to **UNIT 1**.

3 Press «↵» to confirm the default limit or enter the limit value by scrolling up («**+**» key) or down («**–**» key). Press «↵» to confirm the limits.



Switching between percentage and weight unit 1

– Press «⇆» to switch between setting in percentage and setting by weight .



Step 3:

3 **Setting tolerance beep:**

The tolerance beep indicates whether the weighing sample lies within the tolerance by beeping three times.

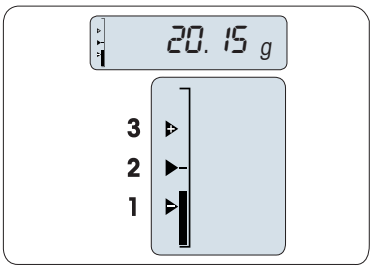
Note: The beep level corresponds to the setting in menu topic "**STB.BEEP**" (Basic menu). If "**STB.BEEP**" is set to "**OFF**", the tolerance beep level is medium.

– To activate tolerance beep press «↵». To deactivate tolerance beep press «⇆» to select "N" and press «↵».

Note:

- If without any key press within 60 seconds, the balance returns to the previous active application. Press «**C**» to cancel and returns to the previous active application.
- The nominal weight must be at least 10 digit.

On completion of the setting procedure, your balance is ready for checkweighing.



Weighing-in-Aid

The Weighing-in-Aid helps you quickly determine the position of the sample weight regarding the tolerance.

1 Lower limit
2 Target weight
3 Upper limit

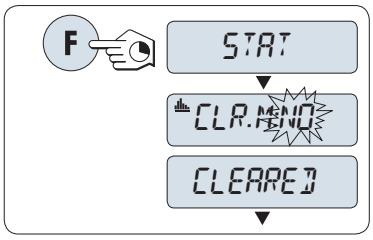
Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.4 Application "Statistics"

The "**Statistics**" application allows you to generate statistics of a series of weighing values. 1 to 999 values are possible.

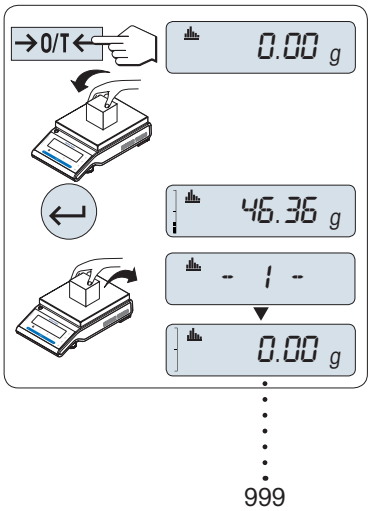
Requirement: The function "**STAT.**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**"). Connect a printer or a PC if present.



1 Activate function "**STAT.**" by pressing and holding the «**F**» key.

2 To continue the last statistics press «↵». For a new statistical evaluation press «⟲» (or «+», «–») to select "**CLR.M:YES**" and press «↵» to clear the memory.

Note: If the memory is already cleared (sample counter is 0) the memory clear question will be not displayed.



Weighing the first sample weight:

1 Press «→0/T←» to zero/tare the balance if needed.

2 Load the first sample weight.

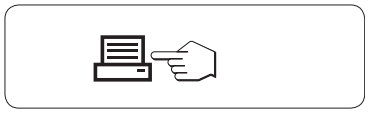
3 Press «↵». The display shows the sample count "- 1 -" and the current weight is stored as sample and the weight is printed out.
Note: When the sample counter is displayed you may press «**C**» to undo (drop) this sample.

4 Unload the first sample weight.

Weighing further sample weights:

The same procedure as for the first sample weight.

- 1…999 samples are possible.
- The next value will be accepted if the sample weight is in the range 70% –130% of the current average value. "**OUT OF RANGE**" will be displayed if the sample is not accepted.



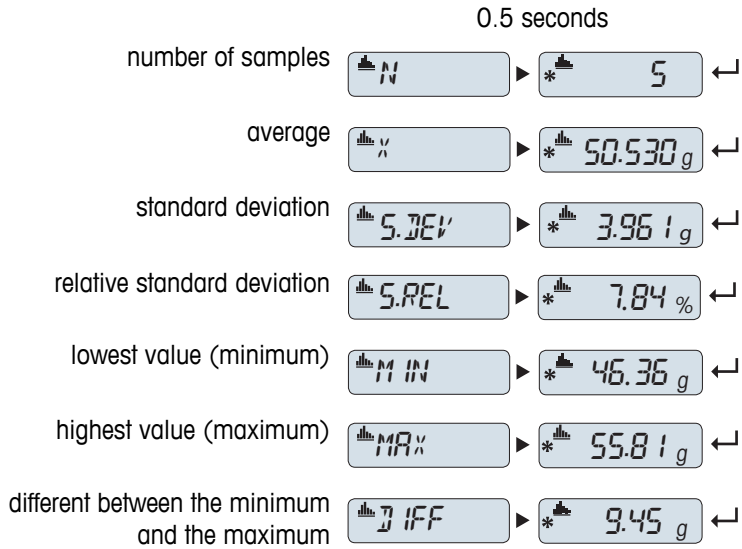
Results:

– If the numbers of sample are greater than or equal to 2, press «🖶», the results are displayed and printed.

Displayed results:

1 Press «↵» to show the next statistical value.

2 Press «**C**» to cancel displaying results and to continue weighing next sample.



Displayed results:

1 Press «↵» to show the next statistical value.

2 Press «**C**» to cancel displaying results and to continue weighing next sample.

sum of all values

Printout:

```
------ Statistics ------
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890
------------------------
1                46.36 g
2                55.81 g
3                47.49 g
4                53.28 g
5                49.71 g
n                     5
x               50.530 g
s dev            3.961 g
s rel             7.84 g
Min.             46.36 g
Max.             55.81 g
Diff              9.45 g
Sum             252.65 g
------------------------
```

Terminate the application

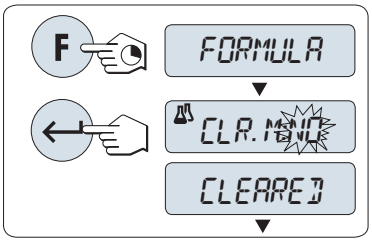
Press and hold «⚖» to terminate the application and to return to the weighing application.

7.5 Application "Formulation" (Net Total Formulation)

The "**Formulation**" (Net Total) application allows you to

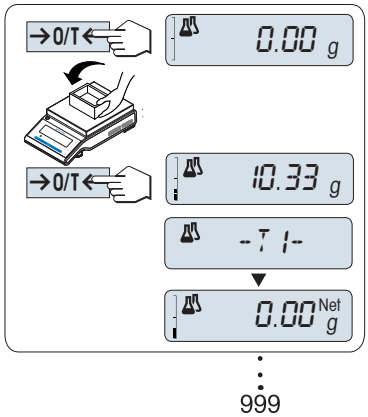
- weigh in (add and store) up to 999 individual component weights and displays the total. If a printer is connected, the component weights are printed individually and as a total.
- tare/pre-tare and store up to 999 container weights and displays the total. If a printer is connected, the tare weights are printed out individually and as a total.
- fill up the sum of all component net weight values by adding a further component to a higher value.

Requirement: The function "**FORMULA.**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**"). Connect a printer or a PC if present.



1 Activate function formulation "**FORMULA.**" by pressing and holding the «**F**» key.

2 Press «↵» to continue formulation weighing. For a new formulation press «⟲» (or «**+**» or «**-**») to select "**CLR.M:YES**" and press «↵» to clear the memory.
Note: If the memory is already cleared (sample and tare/pre-tare counter is zero) the memory clear question will be not displayed.



Tare container (if used):

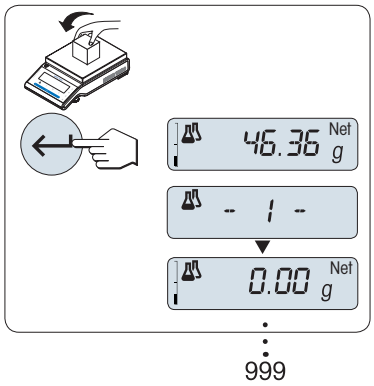
1 Press «→0/T←» to zero or tare the balance if needed.

2 Place the empty container on the weighing pan.

3 Press «→0/T←» . The container is tared and the tare count "- T1 -" is displayed and the tare weight is printed.

Note:

- If you pre-tare via MT-SICS (e.g. bar code reader) "- PT1 -" is displayed.
- Zero range setting (menu topic "**ZERO.RNG**") has no effect. The zero-limit is less than or equal 10d.



Weighing the first component weight:

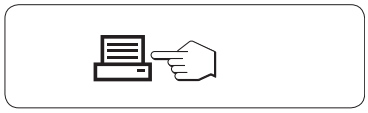
1 Load the first component weight.

2 Press «↵». The display briefly shows the component count "- 1 -" , the current weight is stored as sample and the component weight is printed. The display is set back to zero.

Weighing further component weights:

The same procedure as for the first component weight with the same or new container).

- 1…999 sample values are possible.
- max 999 tare values are possible.
- max 999 pre-tare values are possible.



Results:

– If the numbers of sample are greater than or equal to 2, press «🖶», the results are displayed and printed.

Displayed results:

1 Press «↵» to show the next statistical value.

2 Press «**C**» to cancel displaying results and to continue weighing next component.

0.5 seconds

number of samples — N ▶ * 8 ↵

sum of all tare values (T and PT) — T.TOTAL ▶ * 452.76 g ↵

sum of all component gross weight values — G.TOTAL ▶ * 546.79 g ↵

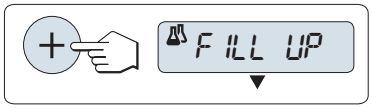
sum of all component net weight values — N.TOTAL ▶ * 94.03 g ↵

Printout:

```
------ Formulation -----
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890
------------------------
1 T              10.33 g
1 N               8.85 g
2 N               9.23 g
2 T              10.84 g
3 N               7.43 g
.
.
n                    8
T Total         452.76 g
G Total         546.79 g

N Total          94.03 g
------------------------
```

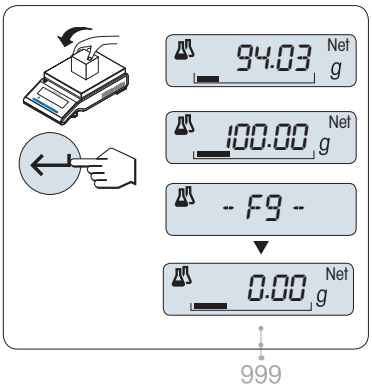
Function "FILL UP"

This function allows you to add an additional component weight to the total weight of all components to reach a desired target weight (Fill up).



Starting the fill up function.

– Activate function "**FILL UP**" by pressing «+».
Deactivate function "**FILL UP**" by pressing «–».



Filling up with an additional component weight:

▶ The last total of the component weights is displayed.

1 Add component weight until the desired target weight is reached.

2 Press «↵» to confirm.

⇨ The display briefly shows the next component count marked with "F ", the current weight is stored as sample and the component weight is printed. The display is set back to zero.

Filling up further additional component weights:

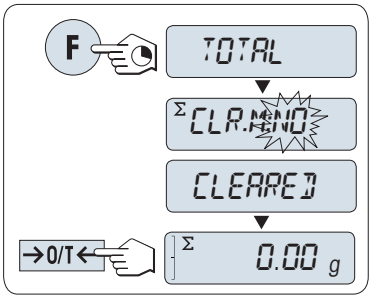
The same procedure, beginning with starting up the "**FILL UP**" function.

Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.6 Application "Totaling"

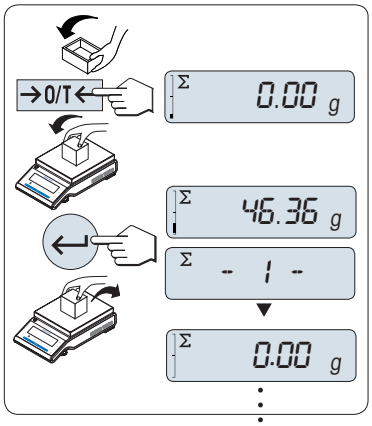
The "**TOTALING**" application allows you to weigh in different samples to add their weight values and to totalize them. 1 to 999 samples are possible.
Requirement: The function "**TOTAL**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**").



1 Activate function "**TOTAL**" by pressing and holding the «**F**» key.

2 For a new totaling evaluation press «⟲» (or «**+**» or «**–**») to enter "**CLR.M:YES**" and press «↵» to clear the memory.
Note: If the memory is already cleared (sample counter is 0) the memory clear question will be not displayed.

3 Press «→0/T←» to zero or tare the balance.



Weighing in the sample weight:

1 If using a container: place empty container on the weighing pan and press «→0/T←» to zero or tare the balance.

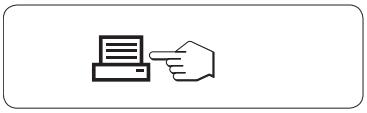
2 Load the first sample weight.

3 Press «↵». The display shows the sample count "- 1 -" and the current weight is stored.
Note: When the sample counter is displayed you may press «**C**» to undo (drop) this sample.

4 Unload the first sample weight. The display shows zero.

Weighing in further sample weights:
The same procedure as for the first sample weight.

- 1…999 samples are possible.



Results:

– If the numbers of sample are greater than or equal to 2, press «🖶», the results are displayed and printed.

Displayed results:

1 Press «↵» briefly to show the totalized value.

2 Press «**C**» briefly to cancel.

0.5 seconds

number of samples: Σ N ▶ *Σ 879 ↵

totalized value: Σ TOTAL ▶ *Σ 8789.79 g ↵

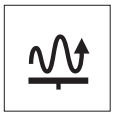
Printout:

```
------- Totaling -------
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML1602
SNR           1234567890
------------------------
1                46.36 g
2                55.81 g
3                47.49 g
4                53.28 g
5                49.71 g
6                53.93 g
.
.
.
n                    879
Total          8789.79 g
-----------------------
```

Terminate the application

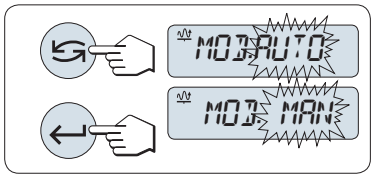
Press and hold «⚖» to terminate the application and to return to the weighing application.

7.7 Application "Dynamic Weighing"



The "**Dynamic Weighing**" application allows you to determine the weights of unstable samples or to determine weights under unstable ambient conditions. The balance calculates the weight as the average of a number of weighing operations over a defined time.
Requirement: The function "**DYNAMIC**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**").
Note: "Switching Units" and "**RECALL**" Functions are not available in this Application.

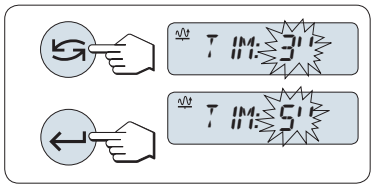
– Activate function "**DYNAMIC**" by pressing and holding the «**F**» key.



1 Setting "Auto Start" or "Manual Start":

1 Press «⇆» to select the mode:
– "**Auto Start** ""**MOD.AUTO**" (default value). The weighing starts automatically on relative stability. However, the weighing sample must weigh at least 5 grams. For weighing samples below 5 g the weighing must be started manually.
– "**Manual Start**" "**MOD. MAN**"

2 Press «↵» to confirm the selection.



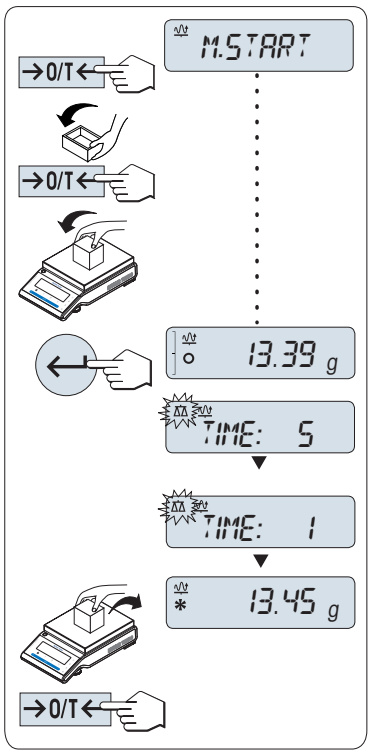
2 Setting the weighing time:

1 Press «⇆» to select one of the available time intervals: 3 (default value), 5, 10, 20, 60 and 120 seconds.

2 Press «↵» to confirm the selected time interval.

Note: If without any key press within 60 seconds, the balance returns to the previous active application. Press «**C**» to cancel and returns to the previous active application.

Your balance is now ready for dynamic weighing:



1 Press «→0/T←» to zero if needed.

2 If using a container: place empty container on weighing pan and press «→0/T←» to tare the balance.

3 Load sample weight.

4 – If you have selected function "**Manual Start**" "**M.START**", press «↵» to start the weighing.
– If you have selected function "**Auto Start**" "**A.START**", the weighing starts automatically on relative stability. For weighing samples below 5 g the weighing must be started manually by pressing «↵».

5 Read off result. The result of the dynamic weighing is displayed with an asterisk (* = calculated value).

6 Unload sample weight.

7 "**Manual Start**" only, press «→0/T←» to zero and go back to "**M.START**".

Note:

- The remaining weighing time (in seconds) is displayed continuously. You can cancel the countdown by pressing «**C**».
- The weight value remains in the display until the sample weight is removed from weighing pan ("Auto Start" only) or «→0/T←» is pressed.

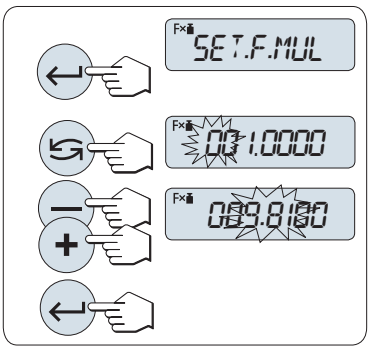
Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.8 Application "Multiplication Factor Weighing"

The "**Multiplication Factor Weighing**" application allows you to multiply the weight value (in grams) by a predefined factor (result = factor * weight) and have it calculated to a predefined number of decimal places.
Requirement: The function "**FACTOR.M**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**").

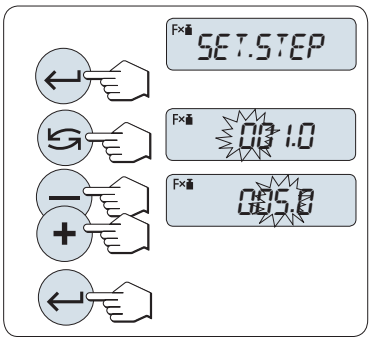
– Activate function "**FACTOR.M**" by pressing and holding the «**F**» key.



1 Setting the factor value:

1 Press «↵» to execute "**SET.F.MUL**". Either the factor 1 appears as default value or the factor that was saved most recently.
2 Press «⟲» to select a digit. The selected digit is blinking.
3 For changing digits, press «**+**» to scroll up or «**–**» to scroll down.
4 Press «↵» to confirm the selected factor (no automatic acceptance).

Note: Zero for multiplication factor value is outside the allowed range, the error message "**FACTOR OUT OF RANGE**" will be displayed.



2 Setting the step value:

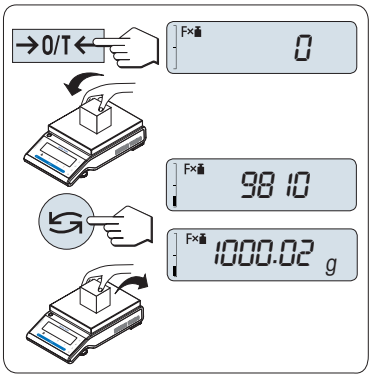
"**SET.STEP**" appears in the display, and the program changes automatically to allow the display increments to be entered. The smallest possible display increment appears as default value, or the last value that was saved.

1 Press «↵» to execute "**SET.STEP**".
2 Press «⟲» to select a digit. The selected digit is blinking.
3 For changing digits, press «**+**» to scroll up or «**–**» to scroll down.
4 Press «↵» to confirm the selected step (no automatic acceptance).

Note: The allowed range for the step depends on the factor and the resolution of the balance. If it is outside the allowed range the error message "**STEP OUT OF RANGE**" will be displayed.

Note: If without any key press within 60 seconds, the balance returns to the previous active application. Press «**C**» to cancel and returns to the previous active application.

On completion of the setting procedure, your balance is ready for multiplication factor weighing.



Weighing procedure

1 Press «→0/T←» to zero/tare.

2 Load sample weight on weighing pan.

3 Read the result. The appropriate calculation is then made using the weight of sample and the selected factor, the result being displayed with the selected display step.
Note: No units are displayed.

4 Unload sample weight.

Toggling between displaying the calculated value and the measured weight:
You can use the «⟲» key to toggle between the calculated Value, weight value "**UNIT 1**", "**RECALL**" value (if selected) and weight value "**UNIT 2**" (if different from "**UNIT 1**").

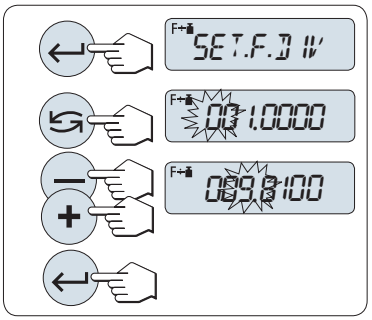
Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.9 Application "Division Factor Weighing"

The "**Division Factor Weighing**" divide a predefined factor by the weight value (in grams) (result = factor / weight) and have it rounded to a predefined number of decimal places.
Requirement: The function "**FACTOR.D**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**").

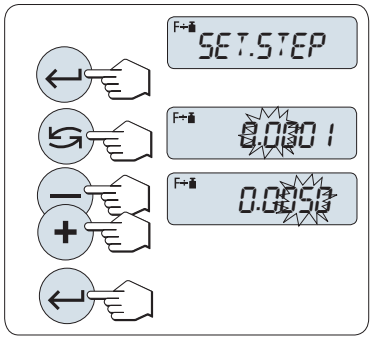
– Activate function "**FACTOR.D**" by pressing and holding the «**F**» key.



1 **Setting the Factor Value:**

1 Press «↵» to execute "**SET.F.DIV**". Either the factor 1 appears as default value or the factor that was saved most recently.
2 Press «⟲» to select a digit. The selected digit is blinking.
3 For changing digits, press «**+**» key to scroll up or «**–**» to scroll down.
4 Press «↵» briefly to confirm the selected factor (no automatic acceptance).

Note: Zero for division factor value is outside the allowed range, the error message "**FACTOR OUT OF RANGE**" will be displayed.



2 **Setting the step value:**

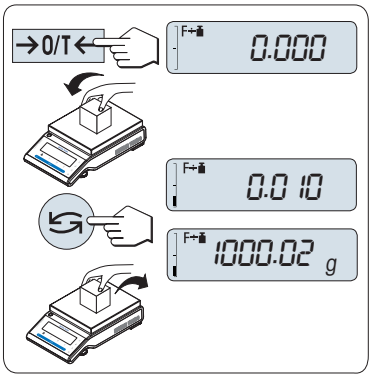
"**SET.STEP**" appears in the display, and the program changes automatically to allow the display increments to be entered. The smallest possible display increment appears as default value, or the last value that was saved.

1 Press «↵» to execute "**SET.STEP**".
2 Press «⟲» to select a digit. The selected digit is blinking.
3 For changing digits, press «**+**» to scroll up or «**–**» to scroll down.
4 Press «↵» to confirm the selected step (no automatic acceptance).

Note: The allowed range for the step depends on the factor and the resolution of the balance. If it is outside the allowed range the error message "**STEP OUT OF RANGE**" will be displayed.

Note: If without any key press within 60 seconds, the balance returns to the previous active application. Press «**C**» to cancel and returns to the previous active application.

On completion of the setting procedure, your balance is ready for division factor weighing.



Weighing procedure

1 Press «→0/T←» to zero/tare.

2 Load sample weight on weighing pan.

3 Read the result. The appropriate calculation is then made using the weight of sample and the selected factor, the result being displayed with the selected display step.
Note: No units are displayed. To avoid a division by zero, the factor division is not calculated at zero.

4 Unload sample weight.

Toggling between displaying the calculated value and the measured weight:
You can use the «⟲» key to toggle between the calculated Value, weight value "**UNIT 1**", "**RECALL**" value (if selected) and weight value "**UNIT 2**" (if different from "**UNIT 1**").

Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.10 Application "Density"

The "**Density**" application allows you to determine the density of solid bodies and liquids. Determination of the density uses **Archimedes' principle** according to which a body immersed in a fluid undergoes an apparent loss in weight which is equal to the weight of the fluid it displaces.

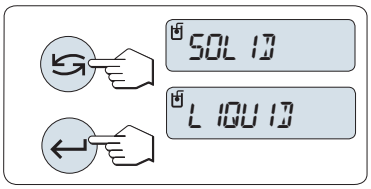
To determine the density of solid bodies, we recommend you to work with the optional density kit which contains all the attachments and aids needed for convenient and precise density determination. To determine the density of liquids, you additionally need a sinker which you can also obtain from your METTLER TOLEDO dealer.

Note for performing of density determinations:

- You can also use the hanger for weighing below the balance which belongs to your balance.
- We recommend you to consult the operating instructions enclosed with the density kit.
- If a METTLER TOLEDO printer is attached to your balance, the settings will be automatically recorded.

Requirement: The function "**DENSITY**" must be assigned to the «**F**» key (see advanced menu topic "**ASSIGN:F**"). Density kit is installed.

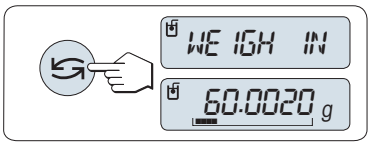
– Activate function "**DENSITY**" by pressing and holding the appropriate assigned «F» key.



Setting the method for density determination

1 Select:
"**SOLID**", the function for the density determination of solids, or
"**LIQUID**", the function for the density determination of liquids with a sinker.

2 Press «↵» to confirm the selection



Switching the display between user guidance and weighing

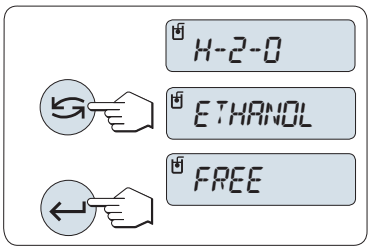
– Press «⟲» to toggle the display between user guidance and weighing.

Terminate the application

Press and hold «⚖» to terminate the application and to return to the weighing application.

7.10.1 Density Determination of Solids

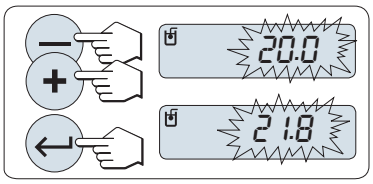
Requirement: The method "**SOLID**" is set.



Setting the parameter of the auxiliary liquid

1 Select the auxiliary liquid by scrolling with «⟲» (or «-» up / «+» down):
"**H-2-O**" for distilled water , "**ETHANOL**" or "**FREE**" for a freely definable auxiliary liquid.

2 Press «↵» to confirm the selection.

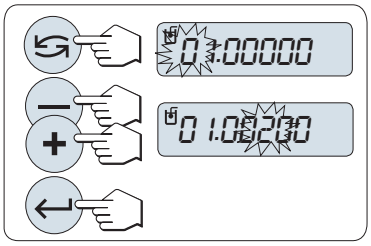


If you have selected water or ethanol as the auxiliary liquid:

1 Enter the current temperature of the auxiliary liquid (read off on thermometer). Change the value by scrolling up «+» or down «-». The temperature ranges from 10 °C to 30.9 °C.

2 Press «↵» to confirm the value.

Note: The densities of distilled water and ethanol in the range 10 °C to 30.9 °C are stored in the balance.



If you have selected a freely definable auxiliary liquid:

Enter the density of the auxiliary liquid at the current temperature (read off on thermometer).

1 Press «⟲» to select a digit. The selected digit is blinking.

2 For changing digits, press «+» to scroll up or «-» to scroll down.

3 Press «↵» to confirm the selected value.

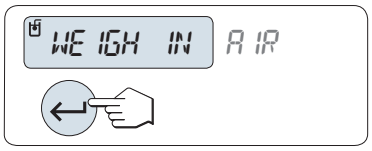
Note: If without any key press within 60 seconds or by pressing «**C**», the balance returns to the previous active application.

On completion of the settings, your balance is ready for performing the density determination of liquids.

Note: Taring the balance is possible at any time.

The balance prompts you: "**PRESS ENTER TO START**".

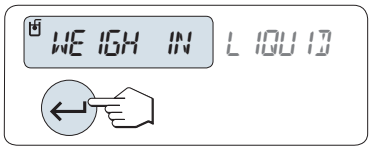
– Press «↵» to start. Tare/Zero is executed.



The balance prompts you to weigh the solid in air "**WEIGH IN AIR**".

1 Load the solid.

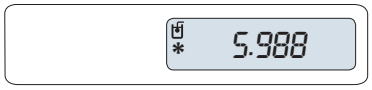
2 Press «↵» to initiate the measurement.



The balance prompts you to weigh the solid in the auxilliary liquid "**WEIGH IN LIQUID**".

1 Load the solid.

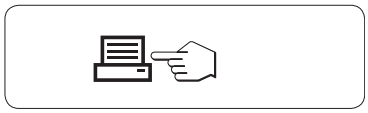
2 Press «↵» to initiate the measurement.



The balance now shows the determined density of the solid in g/cm^3.

Note:

- This result has already been corrected for the air buoyancy. The buoyancy caused by the two immersed wires (Ø 0.6 mm) can be neglected.
- By pressing «**C**», the balance returns to "**PRESS ENTER TO START**".



Result:

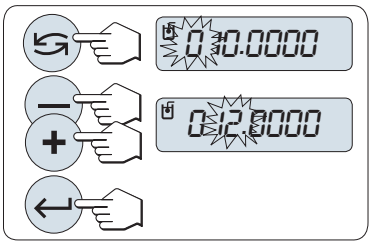
Press «🖶», the result will be printed.

Sample printout:

```
---- Density Solid -----
18.Mar 2010        20:14
Balance Type       ML204
SNR           1234567890
------------------------

ID:     ................

Liquid:
H-2-O      0.99822 g/cm3
Temp.         20.0 °C
Weight in air:
           60.0020 g
Weight in liquid:
           49.9997 g
Volume of solid:
             1.625 cm3

Density:     5.988 g/cm3
             ===========

Signature

.........................
------------------------
```

7.10.2 Density Determination of Liquids

Requirement: The method "**LIQUID**" is set.



Setting the displacement volume of your sinker

Press «↵» to confirm the default value of 10.0 cm^3 or change it if needed:

1 Press «⟲» to select a digit. The selected digit is blinking.

2 For changing digits, press «+» to scroll up or «-» to scroll down

3 Press «↵» to confirm the selected value.

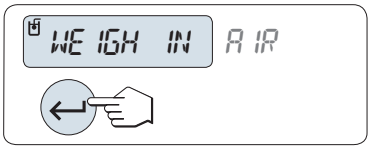
Note: If without any key press within 60 seconds or by pressing «**C**», the balance returns to the previous active application.

On completion of the settings, your balance is ready for performing the density determination of liquids.

Note: Taring the balance is possible at any time.

The balance prompts you: "**PRESS ENTER TO START**".

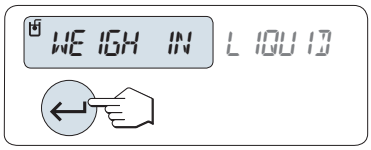
– Press «↵» to start.



The balance prompts you to weigh the sinker in air "**WEIGH IN AIR**".

1 Position the sinker.

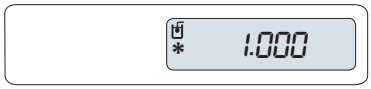
2 Press «↵» to initiate the measurement.



The balance prompts you to weigh the sinker in the liquid "**WEIGH IN LIQUID**".

1 Pour the liquid into the beaker. Make sure that the sinker is immersed by al least 1 cm in the liquid, and that there are no air bubbles in the container.

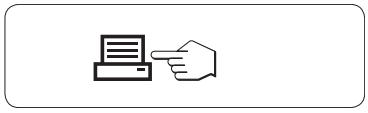
2 Press «↵» to initiate the measurement.



The balance now shows the determined density of the liquid at the current temperature (read off on the thermometer).

Note:

- This result has already been corrected for the air buoyancy. The buoyancy caused by the immersed wire (Ø 0.2 mm) of the sinker can be neglected.
- By pressing «**C**», the balance returns to "**PRESS ENTER TO START**".



Result:

Press «🖶», the result will be printed.

Sample printout:

```
---- Density Liquid -----
18.Mar 2010        20:14
Balance Type       ML204
SNR           1234567890
------------------------

ID:     ................

Temp. of liquid:
            ............

Displaced liquid:
           10.0023 g

Density:     1.000 g/cm3
             ===========

Signature

.......................
------------------------
```

7.10.3 Formulae Used to Calculate Density

The "**DENSITY**" Application is based on the formulae listed below.

Formulae for determining the density of solids with compensation for air density

$$\rho = \frac{A}{A-B}(\rho_0 - \rho_L) + \rho_L$$

$$V = \alpha \frac{A - B}{\rho_0 - \rho_L}$$

ρ = Density of the sample

A = Weight of the sample in air

B = Weight of the sample in the auxiliary liquid

V = Volume of the sample

ρ_0 = Density of the auxiliary liquid

ρ_L = Density of Air (0.0012 g/cm^3)

α = Weight correction factor (0.99985), to take the atmospheric buoyancy of the adjustment weight into account

Formula for determining the density of liquids with compensation for air density

$$\rho = \alpha \frac{P}{V} + \rho_L$$

ρ = Density of the liquid

P = Weight of the displaced liquid

V = Volume of the sinker

ρ_L = Density of air (0.0012 g/cm^3)

α = Weight correction factor (0.99985), to take the atmospheric buoyancy of the adjustment weight into account

Density Table for Distilled Water

T/°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10.	0.99973	0.99972	0.99971	0.99970	0.99969	0.99968	0.99967	0.99966	0.99965	0.99964
11.	0.99963	0.99962	0.99961	0.99960	0.99959	0.99958	0.99957	0.99956	0.99955	0.99954
12.	0.99953	0.99951	0.99950	0.99949	0.99948	0.99947	0.99946	0.99944	0.99943	0.99942
13.	0.99941	0.99939	0.99938	0.99937	0.99935	0.99934	0.99933	0.99931	0.99930	0.99929
14.	0.99927	0.99926	0.99924	0.99923	0.99922	0.99920	0.99919	0.99917	0.99916	0.99914
15.	0.99913	0.99911	0.99910	0.99908	0.99907	0.99905	0.99904	0.99902	0.99900	0.99899
16.	0.99897	0.99896	0.99894	0.99892	0.99891	0.99889	0.99887	0.99885	0.99884	0.99882
17.	0.99880	0.99879	0.99877	0.99875	0.99873	0.99871	0.99870	0.99868	0.99866	0.99864
18.	0.99862	0.99860	0.99859	0.99857	0.99855	0.99853	0.99851	0.99849	0.99847	0.99845
19.	0.99843	0.99841	0.99839	0.99837	0.99835	0.99833	0.99831	0.99829	0.99827	0.99825
20.	0.99823	0.99821	0.99819	0.99817	0.99815	0.99813	0.99811	0.99808	0.99806	0.99804
21.	0.99802	0.99800	0.99798	0.99795	0.99793	0.99791	0.99789	0.99786	0.99784	0.99782
22.	0.99780	0.99777	0.99775	0.99773	0.99771	0.99768	0.99766	0.99764	0.99761	0.99759
23.	0.99756	0.99754	0.99752	0.99749	0.99747	0.99744	0.99742	0.99740	0.99737	0.99735
24.	0.99732	0.99730	0.99727	0.99725	0.99722	0.99720	0.99717	0.99715	0.99712	0.99710
25.	0.99707	0.99704	0.99702	0.99699	0.99697	0.99694	0.99691	0.99689	0.99686	0.99684
26.	0.99681	0.99678	0.99676	0.99673	0.99670	0.99668	0.99665	0.99662	0.99659	0.99657
27.	0.99654	0.99651	0.99648	0.99646	0.99643	0.99640	0.99637	0.99634	0.99632	0.99629
28.	0.99626	0.99623	0.99620	0.99617	0.99614	0.99612	0.99609	0.99606	0.99603	0.99600
29.	0.99597	0.99594	0.99591	0.99588	0.99585	0.99582	0.99579	0.99576	0.99573	0.99570
30.	0.99567	0.99564	0.99561	0.99558	0.99555	0.99552	0.99549	0.99546	0.99543	0.99540

Density Table for Ethanol

T/°C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10.	0.79784	0.79775	0.79767	0.79758	0.79750	0.79741	0.79733	0.79725	0.79716	0.79708
11.	0.79699	0.79691	0.79682	0.79674	0.79665	0.79657	0.79648	0.79640	0.79631	0.79623
12.	0.79614	0.79606	0.79598	0.79589	0.79581	0.79572	0.79564	0.79555	0.79547	0.79538
13.	0.79530	0.79521	0.79513	0.79504	0.79496	0.79487	0.79479	0.79470	0.79462	0.79453
14.	0.79445	0.79436	0.79428	0.79419	0.79411	0.79402	0.79394	0.79385	0.79377	0.79368
15.	0.79360	0.79352	0.79343	0.79335	0.79326	0.79318	0.79309	0.79301	0.79292	0.79284
16.	0.79275	0.79267	0.79258	0.79250	0.79241	0.79232	0.79224	0.79215	0.79207	0.79198
17.	0.79190	0.79181	0.79173	0.79164	0.79156	0.79147	0.79139	0.79130	0.79122	0.79113
18.	0.79105	0.79096	0.79088	0.79079	0.79071	0.79062	0.79054	0.79045	0.79037	0.79028
19.	0.79020	0.79011	0.79002	0.78994	0.78985	0.78977	0.78968	0.78960	0.78951	0.78943
20.	0.78934	0.78926	0.78917	0.78909	0.78900	0.78892	0.78883	0.78874	0.78866	0.78857
21.	0.78849	0.78840	0.78832	0.78823	0.78815	0.78806	0.78797	0.78789	0.78780	0.78772
22.	0.78763	0.78755	0.78746	0.78738	0.78729	0.78720	0.78712	0.78703	0.78695	0.78686
23.	0.78678	0.78669	0.78660	0.78652	0.78643	0.78635	0.78626	0.78618	0.78609	0.78600
24.	0.78592	0.78583	0.78575	0.78566	0.78558	0.78549	0.78540	0.78532	0.78523	0.78515
25.	0.78506	0.78497	0.78489	0.78480	0.78472	0.78463	0.78454	0.78446	0.78437	0.78429
26.	0.78420	0.78411	0.78403	0.78394	0.78386	0.78377	0.78368	0.78360	0.78351	0.78343
27.	0.78334	0.78325	0.78317	0.78308	0.78299	0.78291	0.78282	0.78274	0.78265	0.78256
28.	0.78248	0.78239	0.78230	0.78222	0.78213	0.78205	0.78196	0.78187	0.78179	0.78170
29.	0.78161	0.78153	0.78144	0.78136	0.78127	0.78118	0.78110	0.78101	0.78092	0.78084
30.	0.78075	0.78066	0.78058	0.78049	0.78040	0.78032	0.78023	0.78014	0.78006	0.77997

Density of C_2H_5OH according to the "American Institute of Physics Handbook".

7.11 Application "Routine Test"

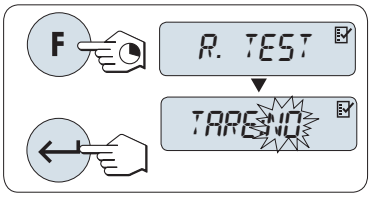
The "**Routine Test**" application allows you to determine the sensitivity of the balance. More about periodic sensitivity tests (routine tests) see: **GWP®** (Good Weighing Practice) on **www.mt.com/gwp**.
GWP gives clear recommendation for routine testing:

- how should I test my balance?
- how often?
- where can I reduce efforts?

More about test weights see **www.mt.com/weights**.

Requirement:

- The function "**R.TEST**" must be assigned to «**F**» key (see advanced menu topic "**ASSIGN:F**").
- It is recommended to connect a printer or a PC to the balance for showing the results.



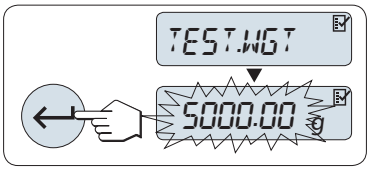
1 Activate function "**R.TEST**" by pressing and holding the assigned «**F**» key.

2 Select "**TARE:NO**" (no tare weight used).
If a tare weight is used during the test select "**TARE:YES**" (use a tare weight). To toggle between "**TARE:YES**" and "**TARE:NO**" use «⟲» (or «**+**» or «**–**»).

3 Press «↵» to confirm the selection.

Note:

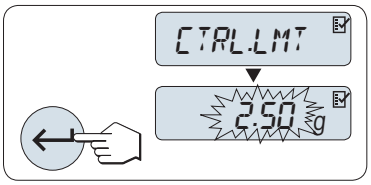
- It is recommended to test the sensitivity without tare load. (factory setting "**TARE:NO**").
- If using tare: Make sure that tare weight plus test weight is not exceeding max. load.



Setting the reference test weight value
The default value of the test weight: Next smaller OIML weight than the maximum load of your balance according to the GWP® recommendation.

1 For changing the value, press «**+**» to scroll up or «**–**» to scroll down. Progressing speed by press and hold.

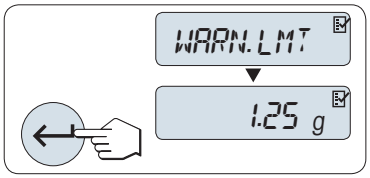
2 Press «↵» to confirm the value.



Setting the Control Limit
The default value of the control limit:
Test weight x weighing process tolerance / 2
Example: 5000 g x 0.1% / 2 = 2.50 g.

1 For changing the value, press «**+**» to scroll up or «**–**» to scroll down. Progressing speed by press and hold.

2 Press «↵» to confirm the value.

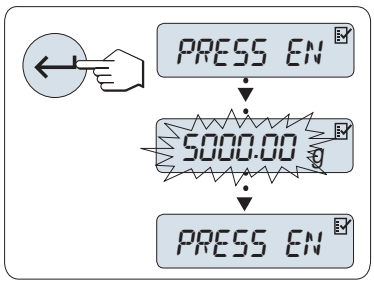


Setting the Warning Limit
The default value of the warning limit:
Warning limit = control limit / safety factor
Example: 2.5 g / 2 = 1.25 g.

1 For changing the value, press «**+**» to scroll up or «**–**» to scroll down. Progressing speed by press and hold.

2 Press «↵» to confirm the value.

Note: The default values of control limit and the warning limit are evaluated according the GWP recommendation. These are based under the assumption that the weighing process tolerance is 0.1% and the safety factor is 2.



On completion of the setting procedure, your balance is ready for the routine test procedure.
Note: The test weight must be acclimatized to the ambient temperature of the balance.

1 Press «↵» to start the test.

2 Follow the instructions on the display. If the test weight value is flashing: Load the test weight (displayed value).

The printout starts after the weighing pan is unloaded.

Exit the current test procedure:

– Press and hold «⚖» for executing a new application.

Printout:

```
----- Routine Test -----
21.Jan 2009        12:56

METTLER TOLEDO

Balance Type      ML6001
SNR           1234567890

Sensitivity:
Test weight    5000.00 g
Value          5000.11 g
Warning L.        1.25 g
Control L.        2.50 g
Warning L.            OK
Control L.            OK

Signature

.......................
------------------------
```

What if Warning Limit or Control Limit are "FAILED"?

The "SOP for Periodic Sensitivity Tests (Routine Tests)" provides information about measures when routine tests fail. Find a download version of these SOPs on **www.mt.com/gwp**, link "**GWP® The Program / Routine Operation**".

Content of SOP:

- Preparation
- Test procedure

- Evaluation
- Deviation
  - If Warning Limit "**FAILED**"
  - If Control Limit "**FAILED**"

7.12 Application "Diagnostics"

The "**Diagnostics**" application allows you to carry out predefined diagnostics tests and to view or print predefined sets of balance information. This diagnostics tool helps you find errors faster and more efficiently.
Requirement: A printer or a PC is connected to the balance for showing the results.

1 Activate "**ADVANCE.**" menu. (See section menu operation)

2 Activate function "**DIAGNOS.**" by pressing «↵».

3 Use «⟲» to select appropriate tests.

7.12.1 Repeatability Test

The repeatability test allows you to repeat tests with internal weight for a given number of times.
Note: On models with internal weights only.

1 Press «↵» to activate repeatability test "**REPEAT.T**". "**R.TST.** 10" appears on the Display.

2 Enter the number of times (blinking) by pressing «**+**» or «**–**». Possible values are 5, 10 (default), 20, 50, 100 times.

3 Press «↵» to start the test. The message "**RUNNING REPEAT TEST**" is displayed till the tests are completed.

4 Press «🖶» to print the test information..

5 Press «↵» to scroll forward through the displayed list.

6 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample Information Displayed:

Displayed for 0.5 s	Display
"**S DEV**"	* 0.004 g
"**MAX.TEMP**"	21.2 °C
"**MIN.TEMP**"	21.0 °C
"**AVG.TEMP**"	21.1 °C
"**TOT.TIME**"	00:01:26

Sample Printout:

```
-- Repeatability Test --
21.Jan 2009        11:34

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890
SW                 V1.00
Temperature      21.3 °C
No. of tests          10
------------------------
1. Time         00:00:00
1. Temp          21.3 °C
2. Time         00:00:04
2. Temp          21.3 °C
.
.
.
------------------------
s Dev            0.004 g
Max Temp         21.3 °C
Min Temp         21.3 °C
Mean Temp        21.3 °C
Total Time      00:00:44
------------------------
```

Examples:

Repeatability test is a tool to do functional check with the balance. It may be performed:

- **To check function of balance**
  - during installation to store print out with installation documents.
  - after preventative maintenance to store print out with installation maintenance report.
  - when remarkable decrease of weighing performance occurs, so that you can email/fax print out to service support provider for diagnose purposes.
- **To develop the optimal environment settings** (see menu topic "**ENVIRON.**").
  Measure the time you need to perform repeatability test with each "**STABLE**", "**STD.**" and "**UNSTAB.**" setting.
  The setting with the fastest total time suits best for the existing environmental conditions.

7.12.2 Display Test

The display test allows you to test the display of the balance.

1 Press «↵» to start "**DISPLAY**".
  All possible segments and icons on the display will illuminate.

2 Press «🖶» to print the test information.

3 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample Printout:

```
----- Display Test -----
21.Jan 2009        11:34

METTLER TOLEDO

Balance Type       ML204
SNR           1234567890
SW                 V1.00
Display Test        DONE
------------------------
```

7.12.3 Key Test

The key test allows you to test the keys of the balance.

1 Press «↵» to start "**KEYPAD.T**".

2 The message "**KEY TEST - PRESS KEY TO BE TESTED**" is displayed scrolling during the duration of the key test. Press every Key briefly. Each press of a key beeps and echoes with "**OK**" on the display.

3 Second press «**C**» key to print the test information. The test procedure will be cancelled and the balance will return to the topic "**DIAGNOS.**". If a key has not been tested before printing, then the test results will be indicated with a "----" line.

Sample Information Displayed:

Key	Display
«1/10»	**1/10.D.OK**
«🖶»	**PRINT.OK**
«–»	**MINUS.OK**
«+»	**PLUS OK**
«⇄»	**TOGGL.OK**
«↵»	**ENTER.OK**
«**C**»	**C OK**
«→0/T←»	**0/T OK**

Sample Printout:

```
------- Key Test -------
21.Jan 2009        11:34

METTLER TOLEDO

Balance Type       ML204
SNR           1234567890
SW                 V1.00
1/10 d Key            OK
Print Key             OK
Minus Key             OK
Plus Key              OK
Toggle Key            OK
Enter Key             OK
Zero/Tare Key         OK
Cancel Key            OK
------------------------
```

7.12.4 Motor Test

The motor test allows you to test the calibration motor of the balance.
Note: On models with internal weight only.

1 Press «↵» to start "**CAL.MOT.T**".
"**RUNNING**" is displayed during the Motor Test. A motor test is deemed successful when all the motor positions have been successfully tested. At the end of the test, the test information will be printed.

2 Press «🖶» for printout.

3 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample Printout:

```
------ Motor Test ------
21.Jan 2009        11:34

METTLER TOLEDO

Balance Type       ML204
SNR           1234567890
SW                 V1.00
Motor Test            OK
------------------------
```

7.12.5 Balance History

The balance history function allows you to view and print the history of the balance.

1 Press «↵» to start "**BAL.HIST**" .

2 Press «↵» to scroll forward through the displayed list of balance history information.

3 Press «🖶» for printout.

4 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample Information Displayed:

Information	Display
Operation Time (year:day:hour)	00:018:04
Total load kg (t)	115.7191 kg
Number of weighings	1255
Number of key pressed	4931
Number of motor movements	1012
Backlight time (year:day:hour)	00:018:04
Next service due date	01:01:10

Sample Printout:

```
--- Statistical Info ---
21.Jan 2009        11:34

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890
SW                 V1.00
------------------------
Operating time   18d 23h
Total weight loaded
             115.7191 kg
Number of weighings
                     1255
Number of key presses
                     4931
Motor movements
                     1012
Backlight operating time
                  18d 4h
Next service due date
              01.01.2010
------------------------
```

7.12.6 Calibration History

The "Calibration History" function allows you to view and print information of the last 30 (thirty) balance adjustment. Adjustments made by a service technician and normal user are counted together.

1 Press «↵» to start "**CAL.HIST**".

2 Press «🖶» for printout.

3 Press «↵» key to scroll forward through the displayed list of Adjustments history information.

4 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample Information Displayed:

Note	Display	
S = External adjusted service	05:03:S	01
	-3 PPM	
I = Internal adjusted	04:03:I	02
	2 PPM	
	. . .	. . .
I = Internal adjusted	03:03:I	28
	-1 PPM	
E = External adjusted user	02:03:E	29
	4 PPM	
I = Internal adjusted	02:03:I	30
	1 PPM	

Sample Printout:

```
----- Calibration ------
05.Mar 2010        11:34

METTLER TOLEDO

Balance Type       ML204
SNR           1234567890
------------------------
01 05.Mar 2010     11:34
External ADJ SERVICE
                  23.5°C
Diff               -3ppm
------------------------
02 04.Mar 2010     09:00
Internal ADJ
                  22.4°C
Diff                2ppm
------------------------
.
.
.
28 03.Mar 2010     10:59
Internal ADJ
                  22.6°C
Diff               -1ppm
------------------------
29 02.Mar 2010     16:34
External ADJ USER
                  24.6°C
Diff                4ppm
------------------------
30 02.Mar 2010     18:36
Internal ADJ
                  22.4°C
Diff                1ppm
------------------------
```

7.12.7 Balance Information

The balance information function allows you to view and print information about your balance.

1 Press «↵» to start "**BAL.INFO**".

2 Press «🖶» for printout.

3 Press «↵» to scroll forward through the displayed list of Balance information.

4 Press «**C**» to cancel the test procedure. The balance will return to the topic "**DIAGNOS.**".

Sample information displayed:

Information	Display
Balance type	**TYPE** ML4002
Max. load	**MAX** 4200 g
Software platform	**PLATFORM** RAINBOW
Serial number	**SNR** 1234567890
Type definition number	**TDNR** 9.6.3.411
Software version	**SOFTWARE** V1.00
Cell ID	**CELL ID** 1172400044
Cell type	**CELL TYPE** MMAI4000G2

Information	Display
Tolerance revision number	**TOLERANCE** NO2
Language	**ENGLISH**

Sample Printout:

```
-- Balance Information -
05.Mar 2009        11:34

METTLER TOLEDO

Balance Type      ML4002
SNR           1234567890
SW                 V1.00
Max               4200 g
Platform         Rainbow
TDNR           9.6.3.411
Cell ID       1172400044
Cell Type     MMAI4000G2
Tolerance Rev.no.      2
Language         English
------------------------
```

7.12.8 Service Provider Information

The service provider Information function allows you to print information about your service provider.

1 Press «↵» to start "**SRV.PROV**". The service provider information will be displayed.

2 Press «🖶». The service provider information will be printed and the balance will return to the topic "**DIAGNOS.**".

Sample Printout:

```
--- Service Provider ---
21.Jan 2009        11:34

METTLER TOLEDO
Im Langacher
CH-8606 Greifensee
Switzerland
(+41) 044 944 22 11
------------------------
```

8 Communication with Peripheral Devices

8.1 Function PC-Direct

The numerical value displayed at the balance can be transferred to the cursor position in Windows Applications (e.g. Excel, Word) as by typing with the keyboard.

Note: The units will not be transferred.

Requirements

- PC with one of the Microsoft Windows® operating system 32bit/64bit: XP (SP3), Vista (SP2), Win 7 (SP1) or Win 8.
- Serial interface RS232 or USB.
- Administrator rights for installing software (for USB not required).
- Windows Application (e.g. Excel).
- Balance to PC connection with cable RS232 or USB.

Settings at the balance:

Attention

- DISCONNECT THE USB CONNECTION FROM THE BALANCE PRIOR TO CHANGE THE SETTINGS.
- USB does not work with keyboards where the "Shift" key must be pressed for entering numbers.

Balance Interface Settings (see Interface Menu):

- Topic "**RS232**" or "**USB**": set "**PC-DIR.**" and select the most appropriate option for the desired weighing result.
- Topic "**RS.TX.E.O.L.**"/"**RS E.O.L.**" or "**USB E.O.L.**"/"**USB E.O.L**":
  – set **<TAB>** to write into the same row (e.g. in Excel).
  – set **<CR><LF>** to write into the same column (e.g. in Excel).
- Save changes.

Settings at the PC:

Installing SerialPortToKeyboard

Operation of PC-Direct via serial port RS232 requires the installation of **SerialPortToKeyboard** on your host computer.

Using CD-ROM

1 Insert the product CD in the CD/DVD drive of the host computer.

2 Double click the folder **SerialPortToKeyboard**.

Using internet

1 Go to the site http://www.mettler-toledo-support.com.

2 Log in to the METTLER TOLEDO Balance Support Site (registration with the serial number of a METTLER TOLEDO instrument required).

3 Click **Customer Support**

4 Click appropriate product folder and save the program file **SerialPortToKeyboard.exe** on your specified storage location.

Installing procedure

1 Right-click on **SerialPortToKeyboard.exe** and select **Run as Administrator** from the menu.

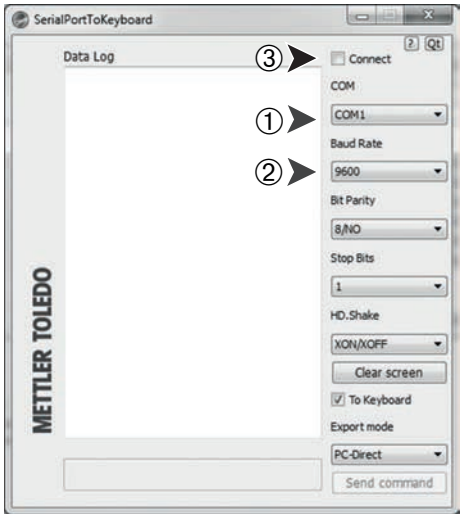
2 Follow the installer's instructions.

Settings for SerialPortToKeyboard

1 Select the serial port (COM) to be used for connection with the balance.

2 Set the baud rate to 9600.

3 Activate "Connect"



Note

- The window can be minimized.
- Closing of the window terminates the session.

Checking Operation

1 Start **SerialPortToKeyboard** (RS232)

2 Start Excel (or another application) at the PC.

3 Activate a cell in Excel.

According to your selected "**PC-DIR.**" option, the displayed values will appear e.g. in the column one after the other one in the different rows.

9 Firmware (Software) Updates

METTLER TOLEDO is continuously improving its balance firmware (software) for the benefit of customers, so that the customer can benefit quickly and easily from further developments, METTLER TOLEDO makes the latest firmware versions available on the Internet. The firmware made available on the Internet has been developed and tested by Mettler-Toledo AG using processes that meet the guidelines of ISO 9001. Mettler-Toledo AG does not, however, accept liability for consequences that might arise from using the firmware.

9.1 Operating Principle

You will find all the relevant information and updates for your balance on the METTLER TOLEDO website at the following address:

www.mettler-toledo-support.com

A program known as the "**e-Loader II**" is loaded onto your computer together with the firmware update. You can use this program to download the firmware to the balance. The "e-Loader II" can also save the settings in your balance before the new firmware is downloaded to it. You can reload the saved settings into the balance manually or automatically after the software is downloaded.

If the selected update includes an application that is not described in these instructions (or that has been updated in the meantime) you can download the corresponding instructions in Adobe Acrobat® PDF format.

Note

New applications might not be visible unless the type data are updated by a service technician.

Requirements

The minimum requirements for obtaining applications from the Internet and downloading them into your balance are as follows:

- PC with one of the following Microsoft Windows® operating system:
  - Microsoft® Windows® XP Home or Professional with Service Pack 3 (32 bit)
  - Microsoft® Windows Vista® Home Premium, Business, Ultimate, or Enterprise with Service Pack 2 (32 bit and 64 bit)
  - Microsoft® Windows 7 with Service Pack 1 Home Premium, Professional, Ultimate, or Enterprise (32 bit and 64 bit)
- Administrator rights for installing software.
- PC to balance connection cable (e.g. No. 11101051 see chapter accessories)

9.2 Update Procedure

Installing the "e-Loader II" software from the Internet onto the PC.

1 Connect to the Internet.

2 Go to the site http://www.mettler-toledo-support.com.

3 Log in to the **METTLER TOLEDO Balance Support Site** (registration with the serial number of a METTLER TOLEDO instrument required).

4 Click **Customer Support**.

5 Click appropriate product folder.

6 Click the firmware version (e-Loader II) you need and save it on your specified storage location.

7 Right-click on the **firmware SNxxx.exe** and select **Run as Administrator** from the menu.

8 Follow the installer's instructions.

Loading the new firmware into the balance.

1 Right-click on **METTLER TOLEDO e-Loader II** and select Run as Administrator from the menu.

2 Follow the instructions, which will take you step-by-step through the installation.

10 Error and Status Messages

10.1 Error Messages

Error messages in the display draw your attention to incorrect operation or that the balance could not execute a procedure properly.

Error Message	Cause	Rectification
NO STABILITY	No stability.	Ensure more stable ambient conditions. If not possible, check settings for environment.
WRONG ADJUSTMENT WEIGHT	Wrong adjustment weight on pan or none at all.	Place required adjustment weight in center of pan.
REFERENCE TOO SMALL	Reference for piece counting too small.	Increase reference weight.
EEPROM ERROR - PLEASE CONTACT CUSTOMER SERVICE	• EEPROM (memory) error. • Excessive mains voltage fluctuation or strong glitches occurred.	Please contact METTLER TOLEDO customer service.
WRONG CELL DATA - PLEASE CONTACT CUSTOMER SERVICE	Wrong cell data.	Please contact METTLER TOLEDO customer service.
NO STANDARD ADJUSTMENT - PLEASE CONTACT CUSTOMER SERVICE	No standard calibration.	Please contact METTLER TOLEDO customer service.
PROGRAM MEMORY DEFECT - PLEASE CONTACT CUSTOMER SERVICE	Program memory defect.	Please contact METTLER TOLEDO customer service.
TEMP SENSOR DEFECT - PLEASE CONTACT CUSTOMER SERVICE	Temperature sensor defect.	Please contact METTLER TOLEDO customer service.
WRONG LOAD CELL BRAND - PLEASE CONTACT CUSTOMER SERVICE	Wrong load cell brand.	Please contact METTLER TOLEDO customer service.
WRONG TYPE DATA SET - PLEASE CONTACT CUSTOMER SERVICE	Wrong type data set.	Please contact METTLER TOLEDO customer service.
BATTERY BACKUP LOST - CHECK DATE TIME SETTINGS	Backup battery is empty. This battery ensures that the date and time are not lost when the balance is disconnected from power.	Connect the balance to the power supply for charging the battery (e.g. during the night) or contact METTLER TOLEDO customer service.
┌- - - - - - -┐	Overload - The weight on the pan exceeds the weighing capacity of the balance.	Reduce the weight on the weighing pan.
└- - - - - - -┘	Underload	Check that the weighing pan is positioned correctly.
ABOVE INITIAL ZERO RANGE	Wrong weighing pan or pan is not empty.	Mount correct weighing pan or unload weighing pan.
BELOW INITIAL ZERO RANGE	Wrong weighing pan or pan is missing.	Mount correct weighing pan.
MEM.FULL	Memory full.	Clear the memory and start a new evaluation.
FACTOR OUT OF RANGE	Factor is outside the allow range.	Select a new factor.
STEP OUT OF RANGE	Step is outside the allowed range.	Select a new step.

Error Message	Cause	Rectification
OUT OF RANGE	Sample weight is outside the allowed range.	Unload the pan and load a new sample weight.

Attention

In some countries, excessive mains voltage fluctuations and strong glitches may occur. This may affect the balance functions or damage the software. If this is the case, we recommend using the PowerPac-M-12V for stabilizing.

10.2 Status Messages

Status messages are displayed by means of small icons. The status icons indicate the following:

Status Icon	Signification
	Service Reminder Your balance is due for servicing. Contact your dealer's customer service department as soon as possible to have a technician service your balance. (See menu topic "**SRV.ICON**")

11 Cleaning and Service

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

Please observe the following notes:

- The balance must be disconnected from the power supply
- 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.

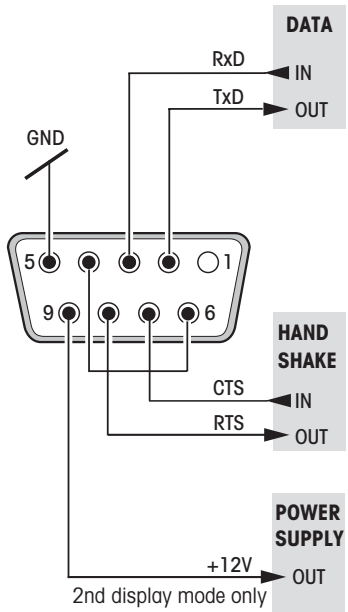
- On no account use cleaning agents which contain solvents or abrasive ingredients, as this can result in damage to the operation panel overlay.
- Do not use wet, but only damp cloth for cleaning.

Please contact your METTLER TOLEDO dealer for details of the available service options. Regular servicing by an authorized service engineer ensures constant accuracy for years to come and prolongs the service life of your balance.

12 Interface Specification

12.1 RS232C Interface

Each balance is equipped with an RS232C Interface as standard for the attachment of a peripheral device (e.g. printer or computer).

Schematic	Item	Specification
	Interface type	Voltage interface according to EIA RS-232C/DIN66020 CCITT V24/V.28)
	Max. cable length	15 m
	Signal level	Outputs: +5 V … +15 V (RL = 3–7 kΩ) –5 V … –15 V (RL = 3–7 kΩ) Inputs: +3 V … +25 V –3 V … -25 V
	Connector	Sub-D, 9-pole, female
	Operating mode	Full duplex
	Transmission mode	Bit-serial, asynchronous
	Transmission code	ASCII
	Baud rates	600, 1200, 2400, 4800, 9600, 19200, 38400 (software selectable)
	Bits/parity	7-bit/none, 7-bit/even, 7-bit/odd, 8-bit/none (software selectable)
	Stop bits	1 stop bit
	Handshake	None, XON/XOFF, RTS/CTS (software selectable)
	End-of-line	<CR><LF>, <CR>, <LF> (software selectable)
	Power supply for 2nd display	+ 12 V, max 40 mA (software selectable, 2nd display mode only)

12.2 MT-SICS Interface Commands and Functions

Many of the instruments and 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 depending on the functionality of the balance.

For further information please refer to the Reference Manual MT-SICS downloadable from the Internet under

▶ www.mt.com/sics-newclassic

13 Technical Data

13.1 General Data

Power Supply	
• AC operation:	AC/DC Adapter Primary: 100V–240V, ±10%, 50/60Hz, 0.3 A Secondary: 12VDC, 0.84A (with electronic overload protection) Power supply to the balance: 8–20VDC, 10W ⚠ Use only with a tested AC Adapter with SELV output current. Ensure correct polarity ⊖—●—⊕
• Power consumption in standby mode:	< 1 W (**MT.GREEN**)
• Battery operation:	8 standard AA (LR6) batteries (alkaline) for 8–15 hours of use.
Protection and Standards	
• Overvoltage categorie:	III
• Degree of pollution:	2
• Protection:	Protected against dust and water.
• Standards for safety and EMC:	See Declaration of Conformity
• Range of application:	For use only in dry interior rooms
Environmental conditions	
• Height above mean sea level:	up to 4000 m
• Ambient temperature range::	10 to 30 °C
• Relative air humidity::	10% to 80 % up to 31 °C, linearly decreasing to 50 % at 40 °C, non-condensing
• Warm-up time	After connecting the balance to the power supply or switched on in battery operation at least • 30 minutes on balances with a readability of 0.001 g (0.01 ct) to 0.1 g. • 60 minutes on balances with a readability of 0.1 mg (0.001 ct) and better.
Materials	
• Housing:	Top Housing: Plastic (ABS) Bottom housing: Die-cast aluminum, lacquered
• Weighing pan:	Stainless steel X2CrNiMo 17-12-2 (1.4404)
• Draft shield element:	with 0.1 mg models: Stainless steel X2CrNiMo 17-12-2 (1.4404)
• Draft shield:	Plastic (ABS), glass
• In-use-cover:	Plastic (ABS)

13.2 Model-Specific Data

13.2.1 Balances with Readability of 0.1 mg with Draft Shield

Technical Data

	ML54	ML104	ML204
Limit values			
Maximum capacity	52 g	120 g	220 g
Readability	0.1 mg	0.1 mg	0.1 mg
Repeatability (sd)	0.1 mg	0.1 mg	0.1 mg
Linearity deviation	0.2 mg	0.2 mg	0.2 mg
Sensitivity temperature drift (10…30 °C)	2 ppm/°C	2 ppm/°C	2 ppm/°C
Typical values			
Repeatability (at nominal load)	0.08 mg	0.08 mg	0.08 mg
Linearity deviation	0.06 mg	0.06 mg	0.06 mg
Minimum sample weight (acc. to USP)	0.16 g	0.16 g	0.16 g
Minimum sample weight (U=1%, k=2))	0.016 g	0.016 g	0.016 g
Minimum sample weight OIML	0.01 g	0.01 g	0.01 g
Settling time	2 s	2 s	2 s
Adjustment	Int. Cal/FACT	Int. Cal/FACT	Int. Cal/FACT
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions W x D x H)	193x290x331 mm	193x290x331 mm	193x290x331 mm
Weighing pan dimensions	Ø 90 mm	Ø 90 mm	Ø 90 mm
Usable heigh of draft shield	235 mm	235 mm	235 mm
Weight of balance	4.1 kg	4.1 kg	4.1 kg
Weights for routine testing			
OIML CarePac	#11123003	#11123002	#11123001
Weights	50 g F2, 2 g E2	100 g F2, 5 g E2	200 g F2, 10 g F1
ASTM CarePac	#11123103	#11123102	#11123101
Weights	50 g 1, 2 g 1	100 g 1, 5 g 1	200 g 1, 10 g 1

13.2.2 Balances with Readability of 1 mg with Draft Shield

Technical Data

	ML203	ML203E	ML303
Limit values			
Maximum capacity	220 g	220 g	320 g
Readability	0.001 g	0.001 g	0.001 g
Repeatability (sd)	0.001 g	0.001 g	0.001 g
Linearity deviation	0.002 g	0.002 g	0.002 g
Sensitivity temperature drift (10…30 °C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.7 mg	0.7 mg	0.7 mg
Linearity deviation	0.6 mg	0.6 mg	0.6 mg
Minimum sample weight (acc. to USP)	1.4 g	1.4 g	1.4 g
Minimum sample weight (U=1%, k=2))	0.14 g	0.14 g	0.14 g
Minimum sample weight OIML	0.02 g	0.02 g	0.02 g
Settling time	1.5 s	1.5 s	1.5 s
Adjustment	Int. Cal/FACT	Ext. Cal	Int. Cal/FACT
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions (W x D x H)	193x290x331 mm	184x290x188 mm	193x290x331 mm
Weighing pan dimensions	Ø 120 mm	Ø 120 mm	Ø 120 mm
Usable heigh of draft shield	230 mm	101 mm	230 mm
Weight of balance	4.2 kg	2.8 kg	4.2 kg
Weights for routine testing			
OIML CarePac	#11123001	#11123001	#11123001
Weights	200 g F2, 10 g F1	200 g F2, 10 g F1	200 g F2, 10 g F1
ASTM CarePac	#11123101	#11123101	#11123101
Weights	200 g 1, 10 g 1	200 g 1, 10 g 1	200 g 1, 10 g 1

	ML303E	ML503
Limit values		
Maximum capacity	320 g	520 g
Readability	0.001 g	0.001 g
Repeatability (sd)	0.001 g	0.001 g
Linearity deviation	0.002 g	0.002 g
Sensitivity temperature drift (10…30 °C)	3 ppm/°C	3 ppm/°C
Typical values		
Repeatability (at nominal load)	0.7 mg	0.7 mg
Linearity deviation	0.6 mg	0.6 mg
Minimum sample weight (acc. to USP)	1.4 g	1.4 g
Minimum sample weight (U=1%, k=2))	0.14 g	0.14 g
Minimum sample weight OIML	0.02 g	0.02 g
Settling time	1.5 s	1.5 s
Adjustment	Ext.. Cal	Int. Cal/FACT
Interfaces	1 RS232	1 RS232
Balance dimensions (W x D x H)	184x290x188 mm	193x290x331 mm
Weighing pan dimensions	Ø 120 mm	Ø 120 mm

	ML303E	ML503
Usable heigh of draft shield	101 mm	230 mm
Weight of balance	2.8 kg	4.2 kg
Weights for routine testing		
OIML CarePac	#11123001	#11123007
Weights	200 g F2, 10 g F1	500 g F2, 20 g F1
ASTM CarePac	#11123101	#11123107
Weights	200 g 1, 10 g 1	500 g 1, 20 g 1

13.2.3 Balances with Readability of 0.01 g

Technical Data

	ML802	ML802E	ML1502E
Limit values			
Maximum capacity	820 g	820 g	1520 g
Readability	0.01 g	0.01 g	0.01 g
Repeatability (sd)	0.01 g	0.01 g	0.01 g
Linearity deviation	0.02 g	0.02 g	0.02 g
Sensitivity temperature drift (10…30 °C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.007 g	0.007 g	0.007 g
Linearity deviation	0.006 g	0.006 g	0.006 g
Minimum sample weight (acc. to USP)	14 g	14 g	14 g
Minimum sample weight (U=1%, k=2))	1.4 g	1.4 g	1.4 g
Minimum sample weight OIML	0.5 g	0.5 g	0.5 g
Settling time	1 s	1 s	1 s
Adjustment	Int. Cal/FACT	Ext. Cal	Ext. Cal
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions (W x D x H)	184x290x84 mm	184x290x84 mm	184x290x84 mm
Weighing pan dimensions	170x190 mm	Ø 160 mm	Ø 160 mm
Weight of balance	3.6 kg	2.2 kg	2.2 kg
Weights for routine testing			
OIML CarePac	#11123007	#11123007	#11123008
Weights	500 g F2, 20 g F1	500 g F2, 20 g F1	1000 g F2, 50 g F2
ASTM CarePac	#11123107	#11123107	#11123108
Weights	500 g 1, 20 g 1	500 g 1, 20 g 1	1000 g 1, 50 g 1

	ML1602	ML3002	ML3002E
Limit values			
Maximum capacity	1620 g	3200 g	3200 g
Readability	0.01 g	0.01 g	0.01 g
Repeatability (sd)	0.01 g	0.01 g	0.01 g
Linearity deviation	0.02 g	0.02 g	0.02 g
Sensitivity temperature drift (10…30 °C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.007 g	0.007 g	0.007 g
Linearity deviation	0.006 g	0.006 g	0.006 g
Minimum sample weight (acc. to USP)	14 g	14 g	14 g
Minimum sample weight (U=1%, k=2))	1.4 g	1.4 g	1.4 g
Minimum sample weight OIML	0.5 g	0.5 g	0.5 g
Settling time	1 s	1 s	1 s
Adjustment	Int. Cal/FACT	Int. Cal/FACT	Ext. Cal
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions (W x D x H)	184x290x84 mm	184x290x84 mm	184x290x84 mm
Weighing pan dimensions	170x190 mm	170x190 mm	170x190 mm
Weight of balance	3.6 kg	3.6 kg	3.4 kg

	ML1602	ML3002	ML3002E
Weights for routine testing			
OIML CarePac	#11123008	#11123009	#11123009
Weights	1000 g F2, 50 g F2	2000 g F2, 100 g F2	2000 g F2, 100 g F2
ASTM CarePac	#11123108	#11123109	#11123109
Weights	1000 g 1, 50 g 1	2000 g 1, 100 g 1	2000 g 1, 100 g 1

	ML4002	ML4002E	ML6002
Limit values			
Maximum capacity	4200 g	4200 g	6200 g
Readability	0.01 g	0.01 g	0.01 g
Repeatability (sd)	0.01 g	0.01 g	0.01 g
Linearity deviation	0.02 g	0.02 g	0.02 g
Sensitivity temperature drift (10…30 °C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.007 g	0.007 g	0.007 g
Linearity deviation	0.006 g	0.006 g	0.006 g
Minimum sample weight (acc. to USP)	14 g	14 g	14 g
Minimum sample weight (U=1%, k=2))	1.4 g	1.4 g	1.4 g
Minimum sample weight OIML	0.5 g	0.5 g	0.5 g
Settling time	1 s	1 s	1 s
Adjustment	Int. Cal/FACT	Ext. Cal	Int. Cal/FACT
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions (W x D x H)	184x290x84 mm	184x290x84 mm	184x290x84 mm
Weighing pan dimensions	170x190 mm	170x190 mm	170x190 mm
Weight of balance	3.6 kg	3.4 kg	3.6 kg
Weights for routine testing			
OIML CarePac	#11123010	#11123010	#11123011
Weights	2000 g F2, 200 g F2	2000 g F2, 200 g F2	5000 g F2, 200 g F2
ASTM CarePac	#11123110	#11123110	#11123111
Weights	2000 g 4, 200 g 4	2000 g 4, 200 g 4	5000 g 4, 200 g 4

13.2.4 Balances with Readability of 0.1 g

Technical Data

	ML601E*	ML1501E*	ML3001E* ◊
Limit values			
Maximum capacity	620 g	1520 g	3200 g
Readability	0.1 g	0.1 g	0.1 g
Repeatability (sd)	0.1 g	0.1 g	0.1 g
Linearity deviation	0.1 g	0.1 g	0.2 g
Sensitivity temperature drift (10…30 °C)	5 ppm/°C	5 ppm/°C	5 ppm/°C
Typical values			
Repeatability (at nominal load)	0.07 g	0.07 g	0.07 g
Linearity deviation	0.06 g	0.06 g	0.06 g
Minimum sample weight (acc. to USP)	140 g	140 g	140 g
Minimum sample weight (U=1%, k=2))	14 g	14 g	14 g
Minimum sample weight OIML	5 g	5 g	5 g
Settling time	1 s	1 s	1 s
Adjustment	Ext. Cal	Ext. Cal	Ext. Cal
Interfaces	1 RS232	1 RS232	1 RS232
Balance dimensions (W x D x H)	184x290x84 mm	184x290x84 mm	184x290x84 mm
Weighing pan dimensions	Ø 160 mm	Ø 160 mm	Ø 160 mm
Weight of balance	2.3 kg	2.3 kg	2.3 kg
Weights for routine testing			
OIML CarePac	#11123007	#11123008	#11123009
Weights	500 g F2, 20 g F1	1000 g F2, 50 g F2	2000 g F2, 100 g F2
ASTM CarePac	#11123107	#11123108	#11123109
Weights	500 g 1, 20 g 1	1000 g 1, 50 g 1	2000 g 1, 100 g 1

* Only available in selected countries.

◊ Approved version not available.

	ML2001	ML4001	ML6001
Limit values			
Maximum capacity	2200 g	4200 g	6200 g
Readability	0.1 g	0.1 g	0.1 g
Repeatability (sd)	0.1 g	0.1 g	0.1 g
Linearity deviation	0.2 g / 0.1 g[1)]	0.2 g / 0.1 g[1)]	0.2 g
Sensitivity temperature drift (10…30 °C)	5 ppm/°C	5 ppm/°C	5 ppm/°C
Typical values			
Repeatability (at nominal load)	0.07 g	0.07 g	0.07 g
Linearity deviation	0.06 g	0.06 g	0.06 g
Minimum sample weight (acc. to USP)	140 g	140 g	140 g
Minimum sample weight (U=1%, k=2))	14 g	14 g	14 g
Minimum sample weight OIML	5 g	5 g	5 g
Settling time	1 s	1 s	1 s
Adjustment	Int. Cal/FACT	Int. Cal/FACT	Int. Cal/FACT
Interfaces	1 RS232	1 RS232	1 RS232

	ML2001	ML4001	ML6001
Balance dimensions (W x D x H)	184x290x84 mm	184x290x84 mm	184x290x84 mm
Weighing pan dimensions	170x190 mm	170x190 mm	170x190 mm
Weight of balance	3.3 kg	3.3 kg	3.3 kg
Weights for routine testing			
OIML CarePac	#11123010	#11123010	#11123011
Weights	2000 g F2, 200 g F2	2000 g F2, 200 g F2	5000 g F2, 200 g F2
ASTM CarePac	#11123110	#11123110	#11123111
Weights	2000 g 4, 10 g 4	2000 g 4, 50 g 4	5000 g 4, 200 g 4

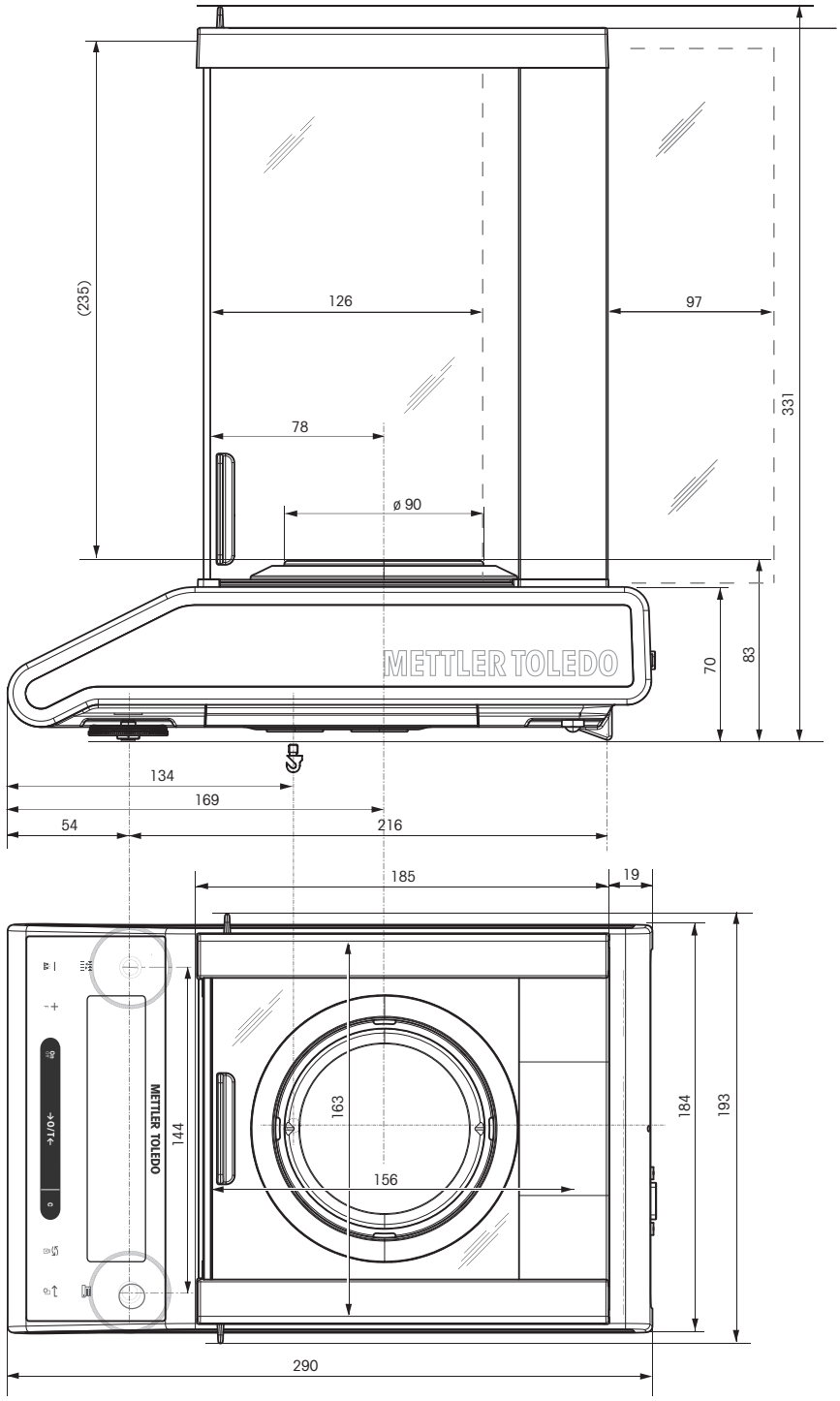
1) approved version (OIML)

	ML6001E
Limit values	
Maximum capacity	6200 g
Readability	0.1 g
Repeatability (sd)	0.1 g
Linearity deviation	0.2 g
Sensitivity temperature drift (10…30 °C)	5 ppm/°C
Typical values	
Repeatability (at nominal load)	0.07 g
Linearity deviation	0.06 g
Minimum sample weight (acc. to USP)	140 g
Minimum sample weight (U=1%, k=2))	14 g
Minimum sample weight OIML	5 g
Settling time	1 s
Adjustment	Ext. Cal
Interfaces	1 RS232
Balance dimensions (W x D x H)	184x290x84 mm
Weighing pan dimensions	Ø 160 mm
Weight of balance	2.3 kg
Weights for routine testing	
OIML CarePac	#11123011
Weights	5000 g F2, 200 g F2
ASTM CarePac	#11123111
Weights	5000 g 4, 200 g 4

13.3 Dimensions

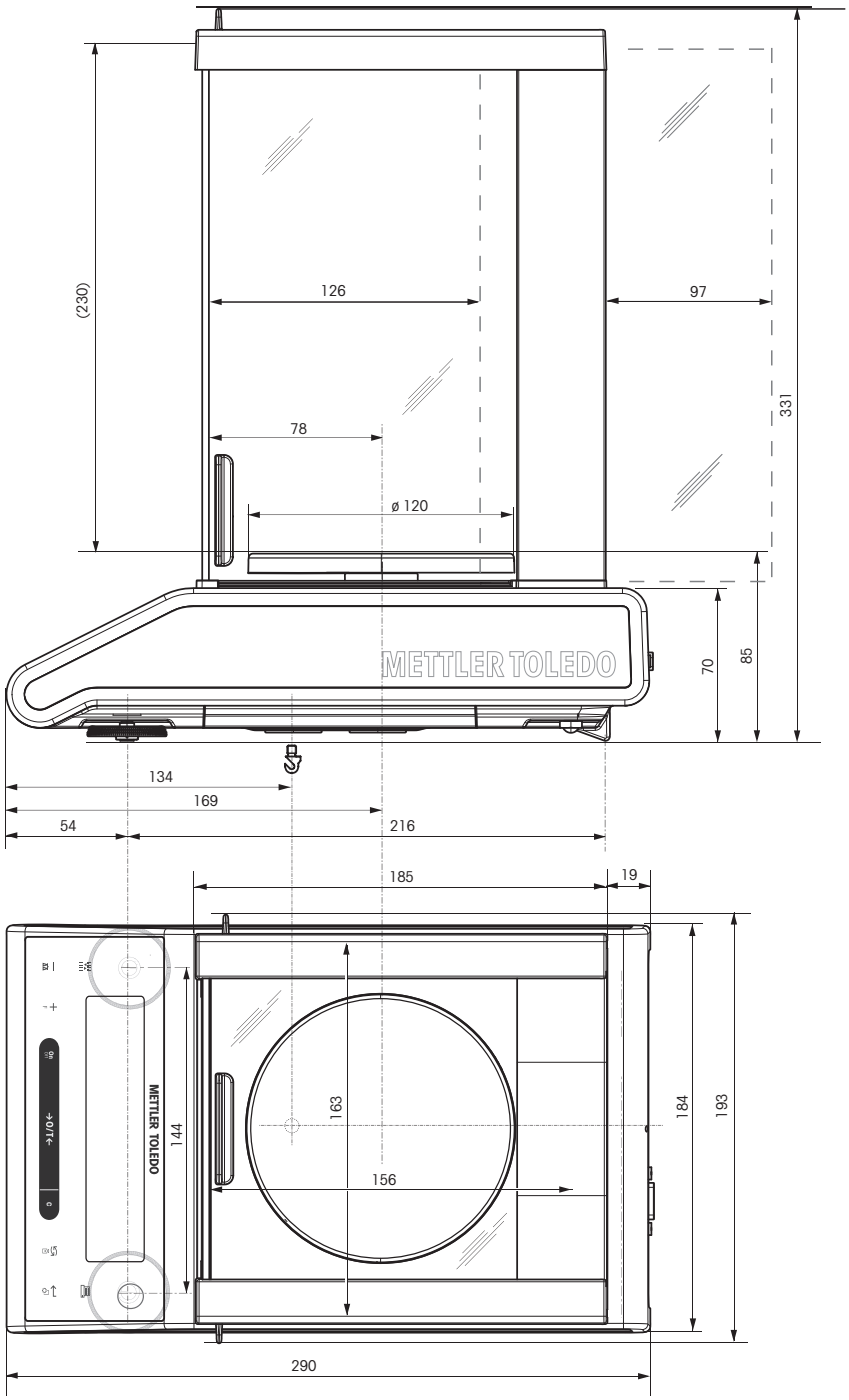
13.3.1 Balances with Readability of 0.1 mg with Draft Shield (235 mm)

Models:
ML54
ML104
ML204



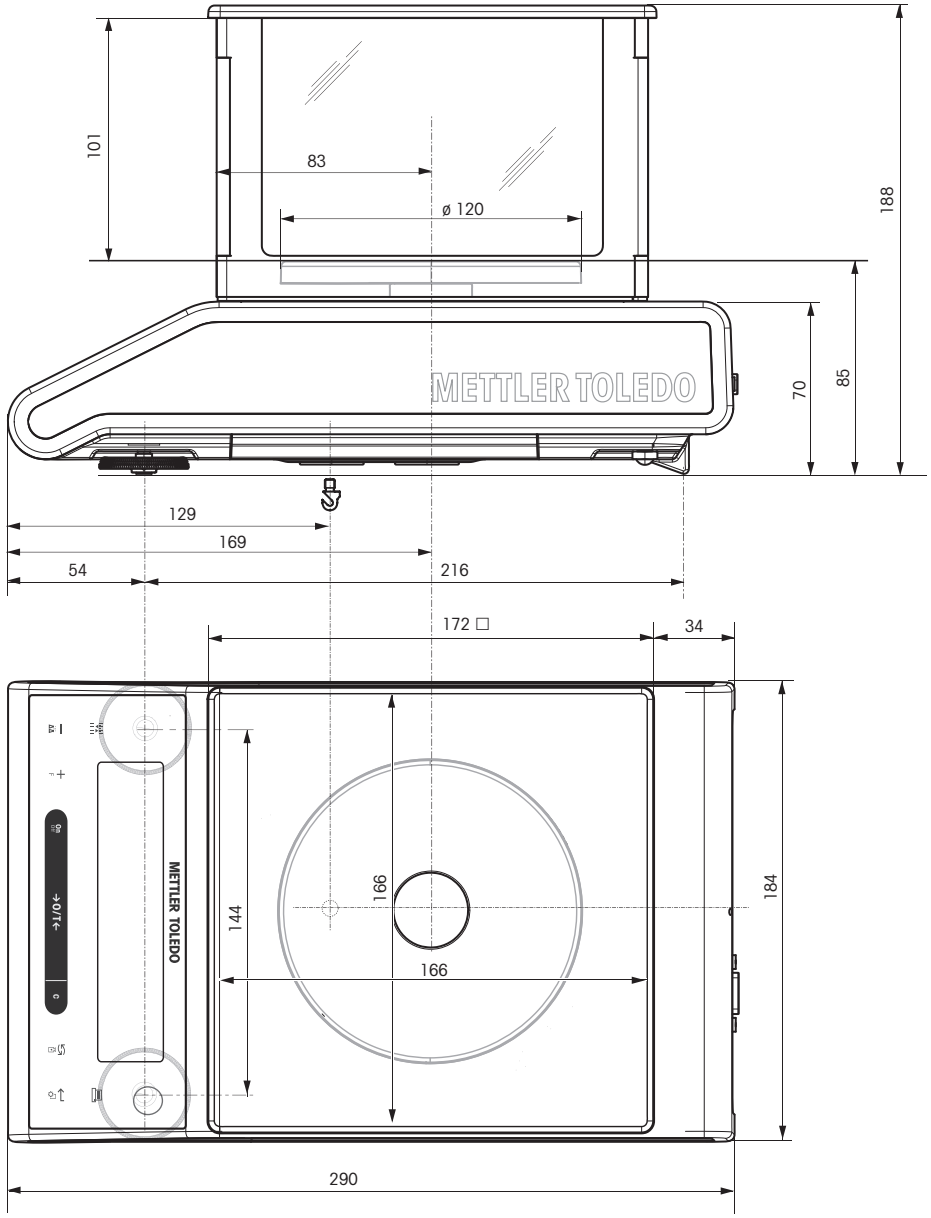
13.3.2 Balances with Readability of 1 mg with Draft Shield (235 mm)

Models:
ML203
ML303
ML503



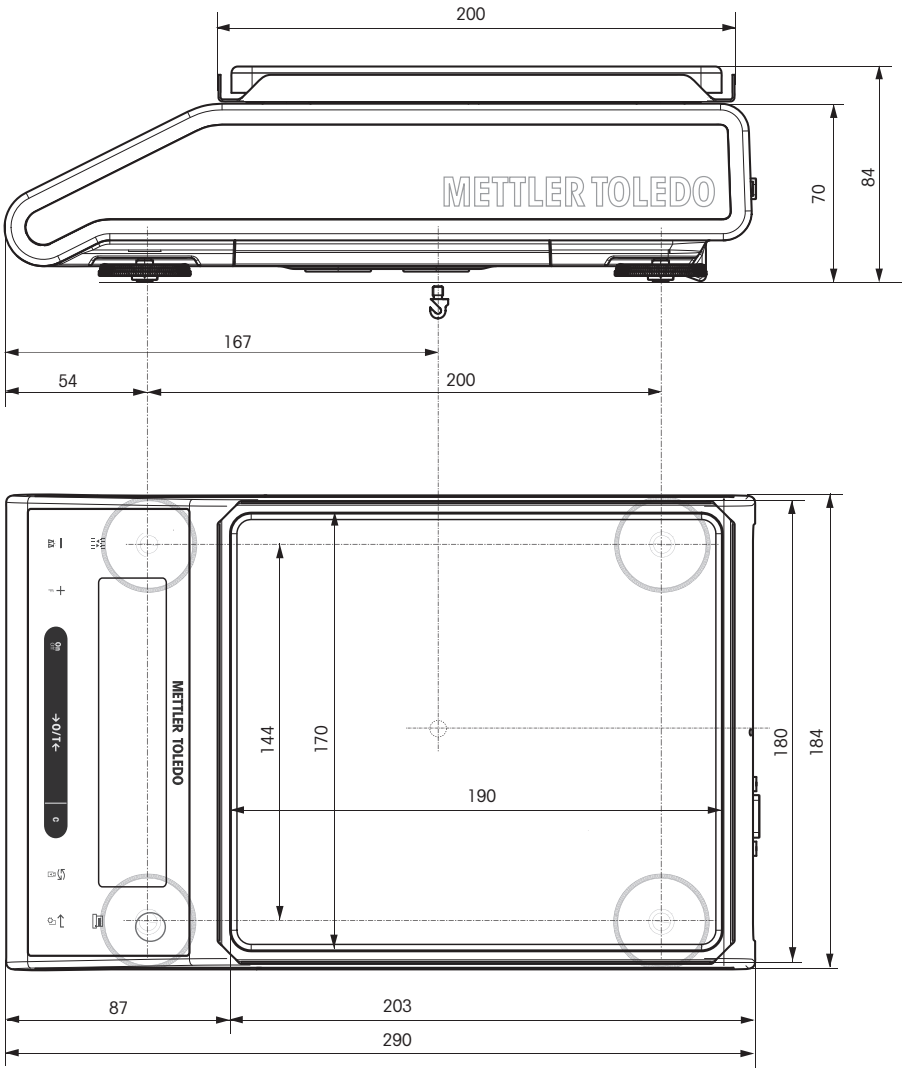
13.3.3 Balances with Readability of 1 mg with "Flex" Draft Shield (105 mm)

Models:
ML203E
ML303E



13.3.4 Balances with Readability of 0.01 g with Square Weighing Pan and Draft Shield Element

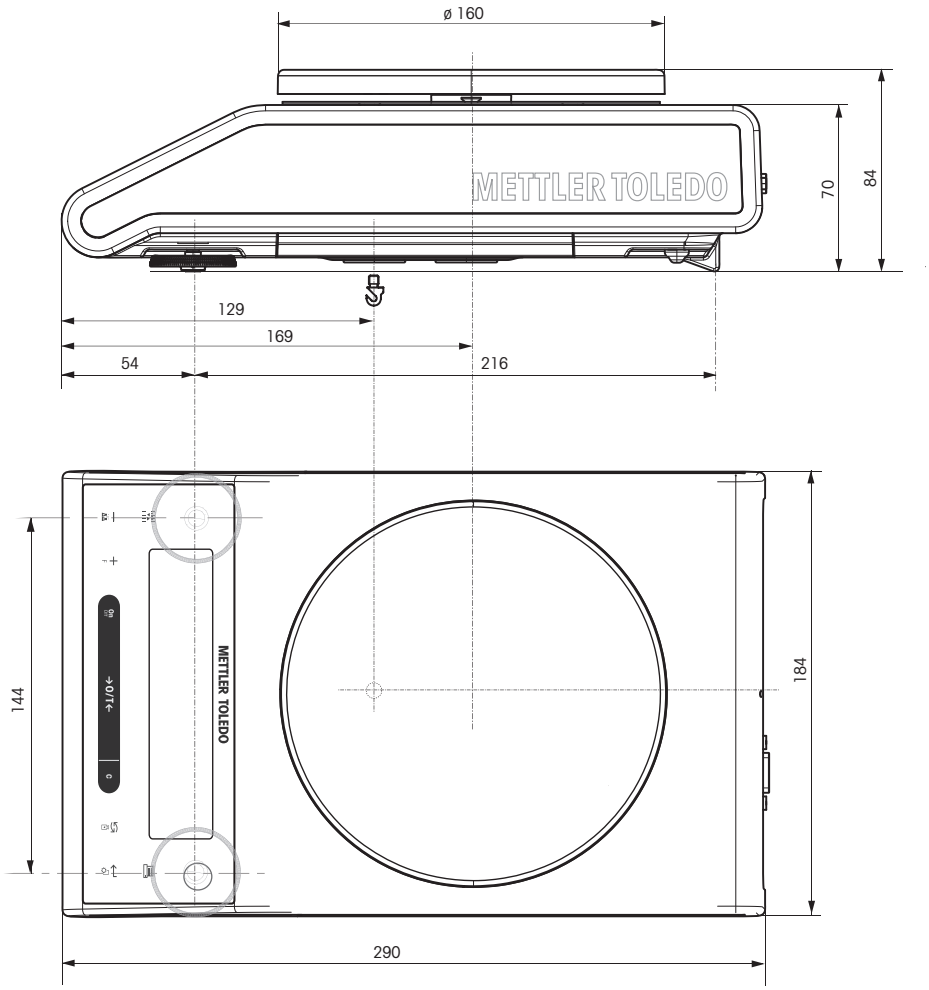
Models:
ML802
ML1602
ML3002
ML3002E
ML4002
ML4002E
ML 6002
ML 6002E



13.3.5 Balances with Readability of 0.01 g / 0.1 g with Round Weighing Pan

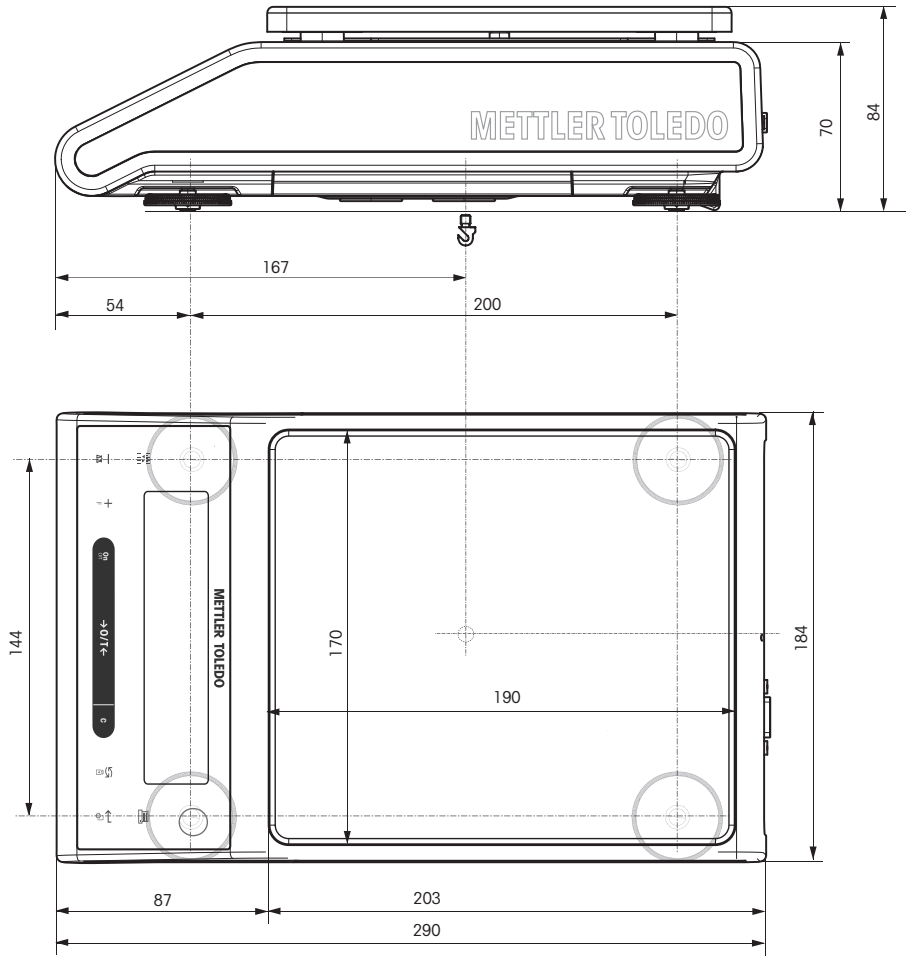
Models:
ML802E
ML1502E

ML601E
ML1501E
ML3001E
ML6001E



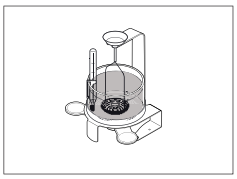
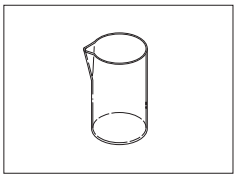
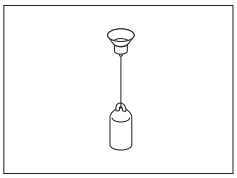
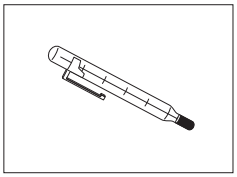
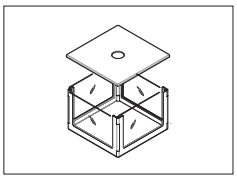
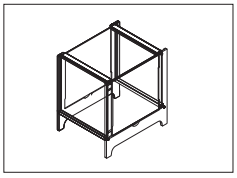
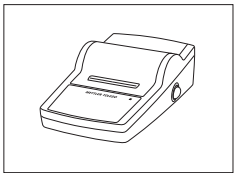
13.3.6 Balances with Readability of 0.1 g with Square Weighing Pan

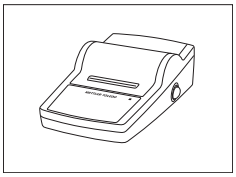
Models:
ML2001
ML4001
ML6001



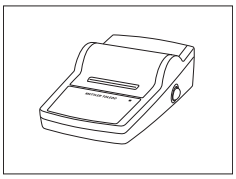
14 Accessories and Spare Parts

14.1 Accessories

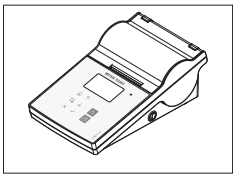
	Description	Part No.
Density determination		
	Density kit ML-DNY-43 for NewClassic ML Balances (d = 0.1 mg/1 mg)	11142144
	Glass beaker, height 100 mm, Ø 60 mm	00238167
	Sinker for density of liquids in conjunction with Density Kit	00210260
	Calibrated (sinker + certificate)	00210672
	Recalibrated (new certificate)	00210674
	Calibrated thermometer with certificate	11132685
Draft shields		
	"Flex" draft shield for models without internal weight and readability of 1 mg (usable heigh 105 mm)	12122420
	Draft shield ML-DS-21 for models with readability of 0.1 g up to 0.01 g.	12121015
Printers		
	RS-P25 printer with RS232C connection to instrument	11124300
	Paper roll, set of 5 pcs	00072456
	Paper roll, self-adhesive, set of 3 pcs	11600388
	Ribbon cartridge, black, set of 2 pcs	00065975



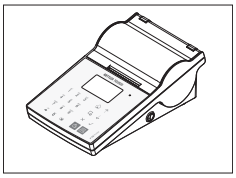
RS-P26 printer with RS232C connection to instrument (with date and time)	11124303
Paper roll, set of 5 pcs	00072456
Paper roll, self-adhesive, set of 3 pcs	11600388
Ribbon cartridge, black, set of 2 pcs	00065975



RS-P28 printer with RS232C connection to instrument (with date, time and applications	11124304
Paper roll, set of 5 pcs	00072456
Paper roll, self-adhesive, set of 3 pcs	11600388
Ribbon cartridge, black, set of 2 pcs	00065975

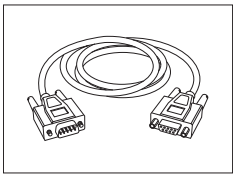


P-56RUE Thermal Printer with RS232C, USB and Ethernet connections, simple printouts, Date and Time, Label printing (limited).	30094673
Paper roll, white, set of 10 pcs	30094723
Paper roll, white, self-adhesive, set of 10 pcs	30094724
Paper roll, white, self-adhesive labels, set of 6 pcs	30094725

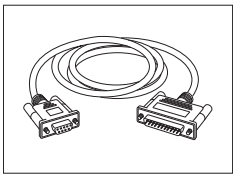


P-58RUE Thermal Printer with RS232C, USB and Ethernet connections, simple printouts, Date and Time, Label printing, Balance applications: Statistics, Formulation, Totaling,	30094674
Paper roll, white, set of 10 pcs	30094723
Paper roll, white, self-adhesive, set of 10 pcs	30094724
Paper roll, white, self-adhesive labels, set of 6 pcs	30094725

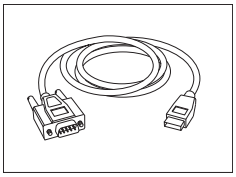
Cables for RS232C interface



RS9 – RS9 (m/f): connection cable for PC, length = 1 m	11101051

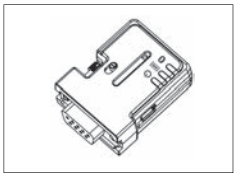


RS9 – RS25 (m/f): connection cable for PC, length = 2 m	11101052



RS232 - USB converter cable – Cable with converter to connect a balance (RS232) to a USB port	64088427

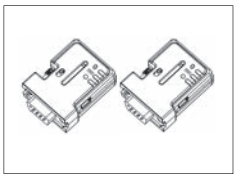
Cable replacement (wireless)



Bluetooth RS232 Serial Adapter ADP-BT-S for wireless connection between **printer** and Excellence balance* or between **balance** and PC*. Fits printers P-56 / P-58 and the following balance models (SW V2.20 or higher required): MS, MS-S/L, ML, PHS, JP, JS.
* Bluetooth interface required

- 1 Bluetooth RS232 Serial Adapter (slave)
- 1 MT-DB9 male to female connector
- 1 MT-DB9 male to male connector

30086494

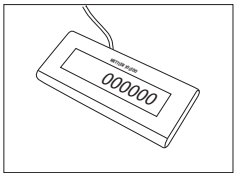


Bluetooth RS232 Serial Adapter set ADP-BT-P for wireless connection between printer and balance. Fits printers P-56 / P-58 and the following balance models (SW V2.20 or higher required): MS, MS-S/L, ML, PHS, JP, JS.

- 2 Bluetooth RS232 Serial Adapter paired (slave/master)
- 1 MT-DB9 male to female connector
- 1 MT-DB9 male to male connector

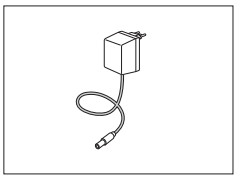
30086495

Auxiliary displays

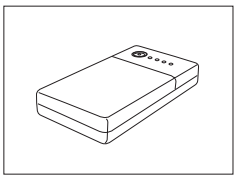


RS232 auxiliary display AD-RS-M7 — 12122381

Power supplies

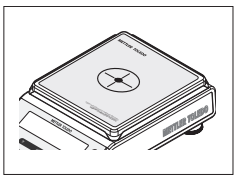


AC/DC universal adapter (EU, USA, AU, UK) 100–240 VAC, 50/60 Hz, 0.3 A, 12 VDC 0.84 A — 11120270



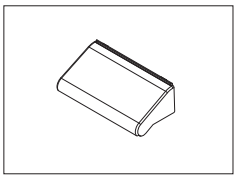
PowerPac-M-12V, for mains independent operation of balances, 12 VDC/1 A — 12122363

Pan protections

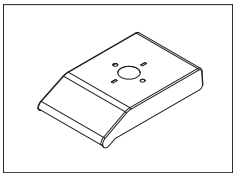


Protective foils, 164x184 mm, set of 20 pcs, pan protection for weighing pan 170x190 mm — 30113801

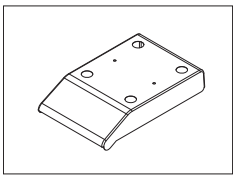
Protective covers



Protective cover for models with draft shield "165/235 mm" — 12122030

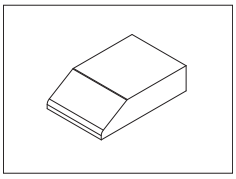


Protective cover for models with round weighing pan 12122032



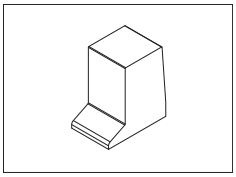
Protective cover for models with square weighing pan 12122031

Dust covers



ML-DC-85 30028926

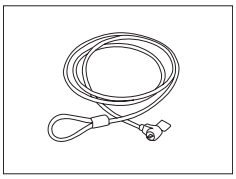
Dust cover for models without draft shield



ML-DC-330 30028928

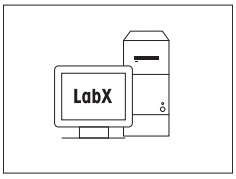
Dust cover for models with draft shield high (235 mm)

Anti-theft devices



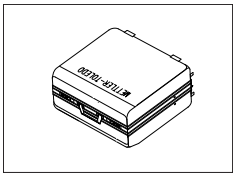
Steel cable 11600361

Software



LabX direct balance (simple data transfer) 11120340

Transport cases



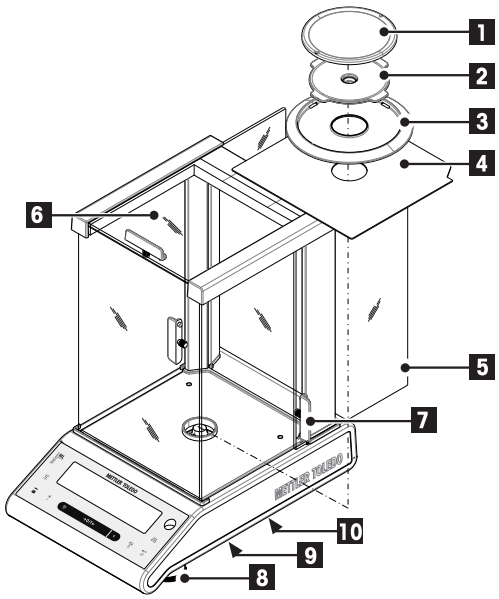
Transport case 11124240

Adjustment weights

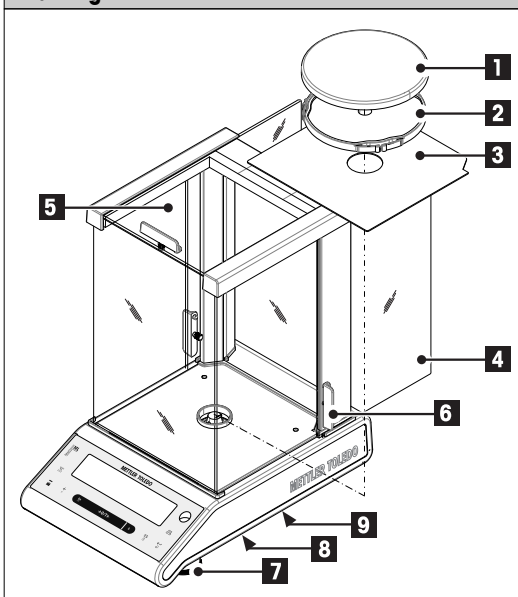
OIML / ASTM Weights (with calibration certificate) see **www.mt.com/weights**

14.2 Spare Parts

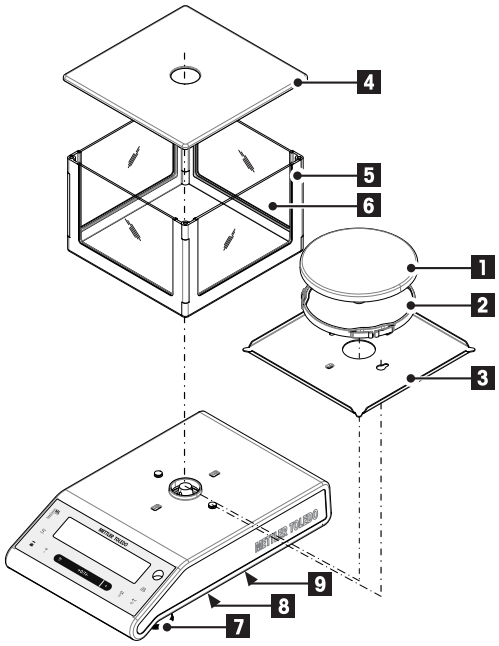
Balances with readability of 0.1 mg, with draft shield (235 mm)

Drawing	Pos	Description	Part No.
	1	Weighing pan Ø 90 mm	12122010
	2	Pan support	12122042
	3	Draft shield element	12122043
	4	Bottom plate	12122044
	5	Side glass door	12122036
	6	Top glass door	12122033
	7	Pair of handles	12122035
	8	Leveling foot	12122040
	9	Battery-chamber cover	12122041
	10	Weighing below balance cap	12122029

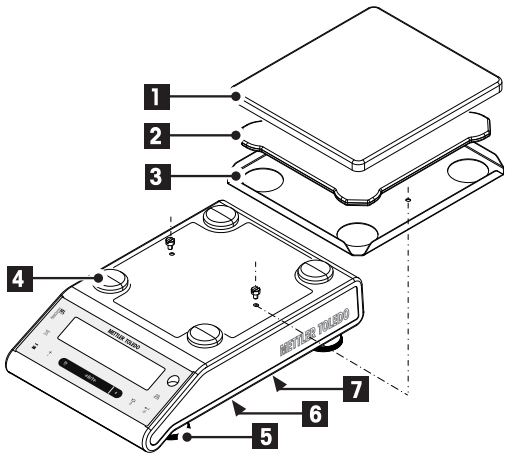
Balances with readability of 1 mg, with draft shield (235 mm)

Drawing	Pos	Description	Part No.
	1	Weighing pan Ø 120 mm	12122037
	2	Pan support	12122045
	3	Bottom plate	12122044
	4	Side glass door	12122036
	5	Top glass door	12122033
	6	Pair of handles	12122035
	7	Leveling foot	12122040
	8	Battery-chamber cover	12122041
	9	Weighing below balance cap	12122029

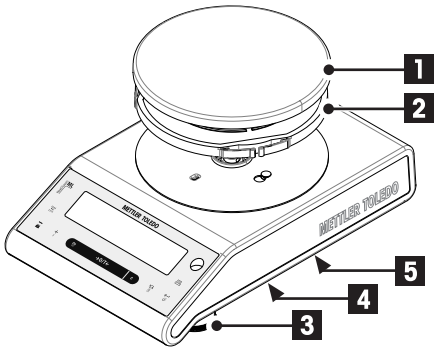
Balances with readability of 1 mg, with flex draft shield (105 mm)

Drawing	Pos	Description	Part No.
	1	Weighing pan Ø 120 mm	12122037
	2	Pan support	12122045
	3	Bottom plate	12122047
	4	Draft shield top cover	12122046
	5	Draft shield frame	12122039
	6	Draft shield glass panels	12122038
	7	Leveling foot	12122040
	8	Battery-chamber cover	12122041
	9	Weighing below balance cap	12122029

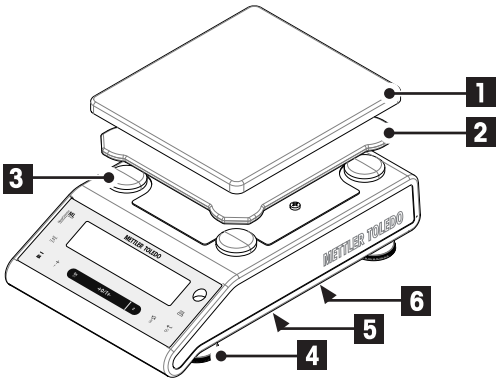
Balances with readability of 10 mg with square weighing pan and draft shield element

Drawing	Pos	Description	Part No.
	1	Weighing pan 170 mm x 190 mm	12122048
	2	Pan support	12122049
	3	Draft shield element	12122050
	4	Pan support cap	11131029
	5	Leveling foot	12122040
	6	Battery-chamber cover	12122041
	7	Weighing below balance cap	12122029

Balances with readability of 0.01 g / 0.1 g with round weighing pan

Drawing	Pos	Description	Part No.
	1	Weighing pan Ø 160 mm	12102941
	2	Pan support	12122052
	3	Leveling foot	12122040
	4	Battery-chamber cover	12122041
	5	Weighing below balance cap	12122029

Balances with readability of 0.1 g with square weighing pan

Drawing	Pos	Description	Part No.
	1	Weighing pan 170 mm x 190 mm	12122048
	2	Pan support	12122049
	3	Pan support cap	11131029
	4	Leveling foot	12122040
	5	Battery-chamber cover	12122041
	6	Weighing below balance cap	12122029

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The global weighing guideline GWP® reduces risks associated with your weighing processes and helps to

- choose the appropriate balance
- reduce costs by optimizing testing procedures
- comply with the most common regulatory requirements

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For more information

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