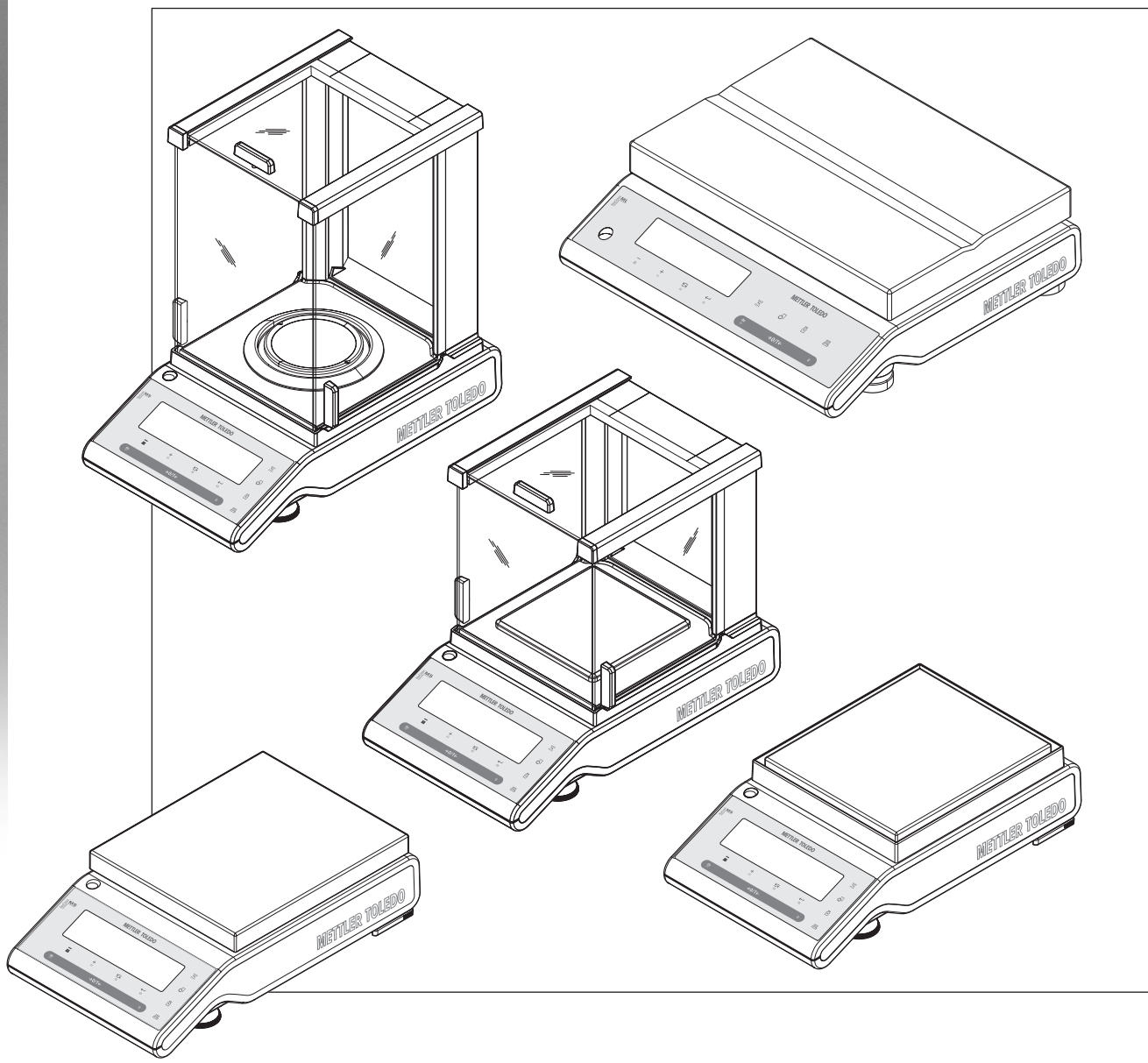
Operating Instructions

NewClassic Balances

MS-S / MS-L Models



METTLER TOLEDO

Table of contents

1 Introduction

Thank you for choosing a METTLER TOLEDO balance.

The precision balances of the NewClassic line combine a large number of weighing possibilities with easy operation.

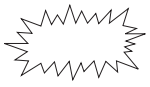
These operating instructions apply to all balance models MS-S and MS-L in the NewClassic line. However, the different models have different charcteristics regarding equipment and performance. Special notes in the text indicate where this makes a difference to operation.

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).

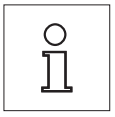
This symbol indicates press and hold key down (longer than 1.5 s).



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 the manufacturer's Operating Instructions, protection of the balance may be impaired.

It is not permitted to use the balance in hazardous environments.

Use the MS-KLIP balance model with Protection Class IP65 if: the balance is used in wet areas, wet cleaning is necessary or the balance is used in a dusty environment. Even with Protection Class IP65. Never flood the balance or immense it in liquid.

All other balance models may only be used in dry rooms.

Use only the Universal AC adapter delivered with your balance.

The L platform has a built-in power supply unit. Hazard of electric shock if the power cable is damaged! Check the power cable for damage regularly. Unplug the power cord immediately if the power cable is damaged.

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.

Disposal

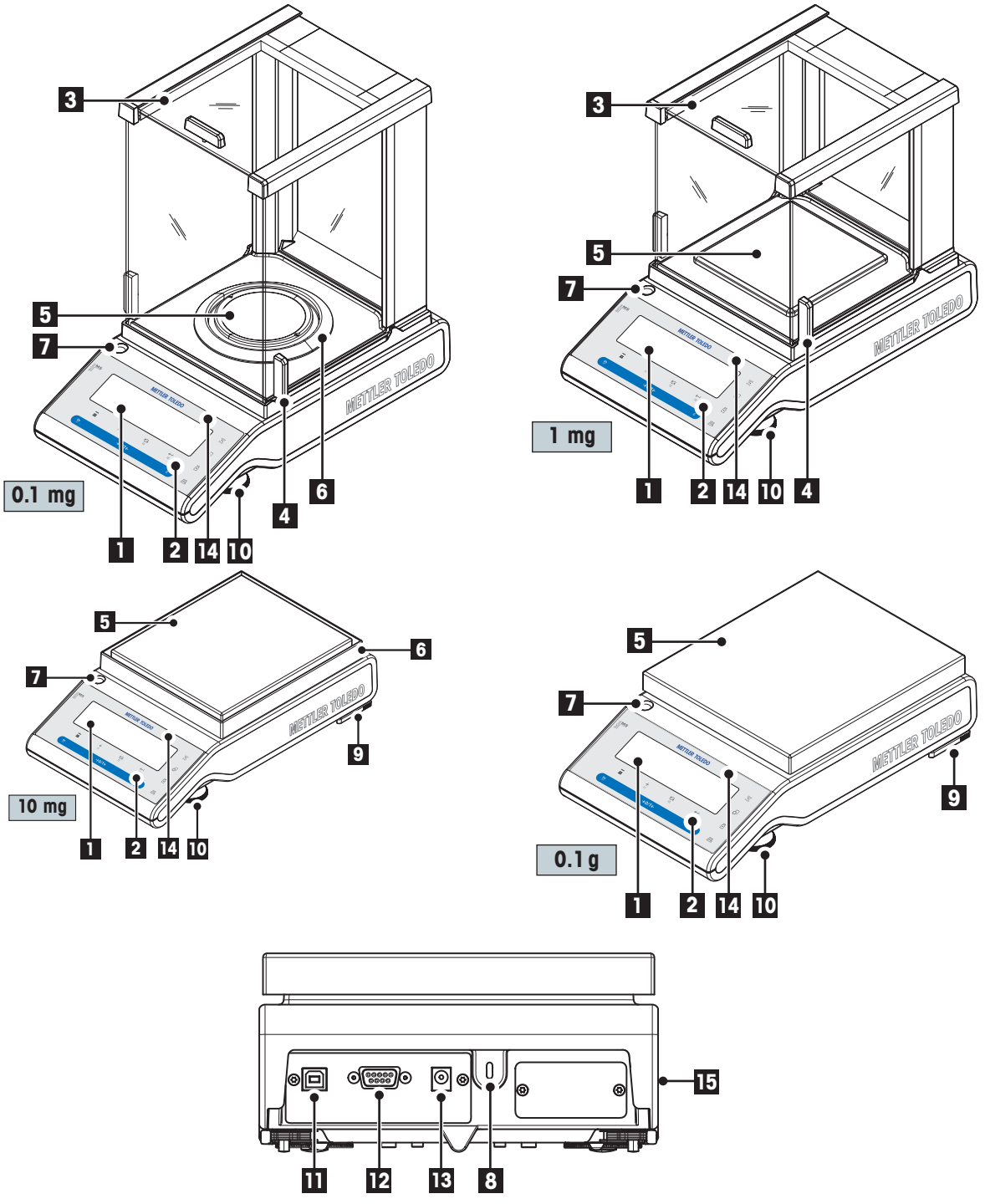
In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

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

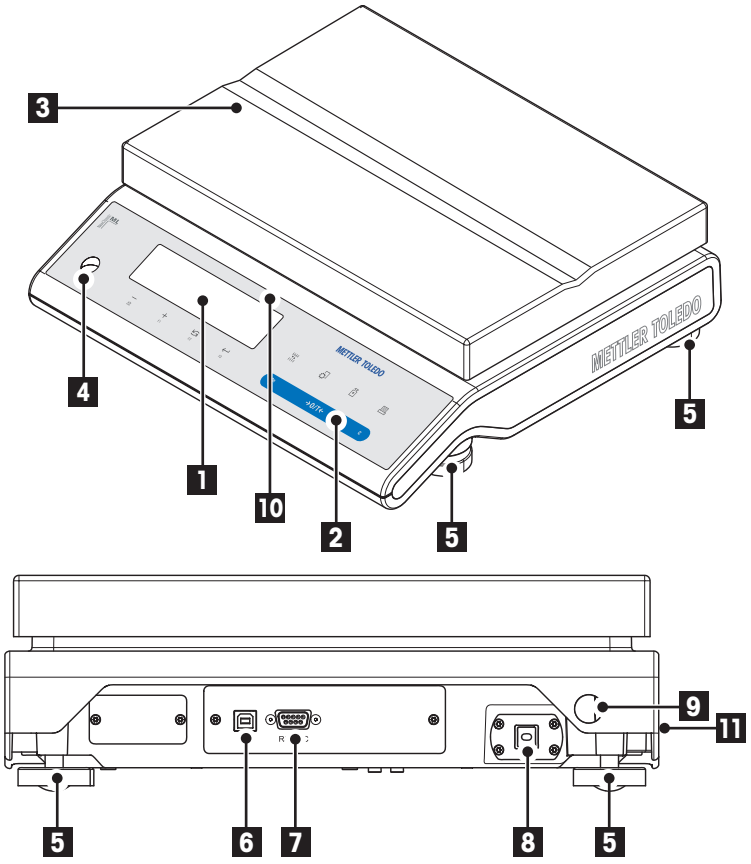
3.1 S Platform



Name and Function of Components				
1	Display		**9**	Safety feet (with 10 mg, 0.1 g S series models)

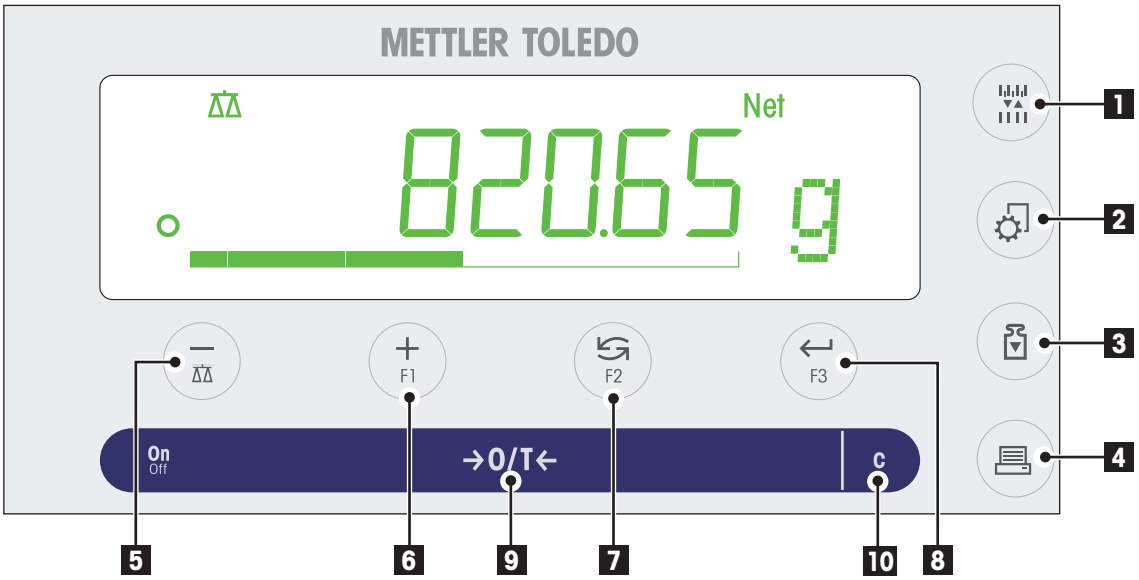
Name and Function of Components			
2	Operation keys	**10**	Leveling foot
3	Glass draftshield	**11**	USB device interface
4	Handle for operation of the draft shield door	**12**	RS232C serial interface
5	Weighing pan	**13**	Socket for AC Adapter
6	Draft shield element	**14**	Model sticker (with approved models only)
7	Level indicator	**15**	Product label
8	Kensington slot for anti-theft purposes		

3.2 L Platform



Name and Function of Components			
1	Display	**7**	RS232C serial interface
2	Operation keys	**8**	Power cord with country-specific plug
3	Weighing pan	**9**	Security slot for anti-theft purposes
4	Level indicator	**10**	Model sticker (with approved models only)
5	Leveling foot	**11**	Product label
6	USB device interface		

3.3 Operation Keys

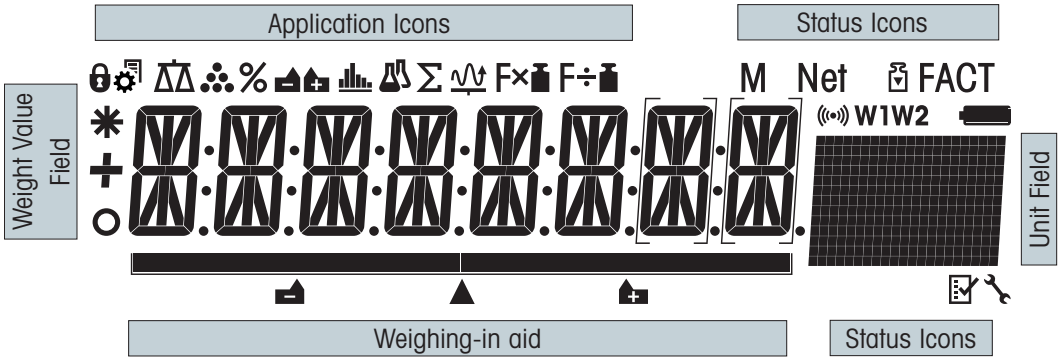


Key Functions

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	no function
2		• Enter and leave menu (Parameter settings)	no function
3		• Execute predefined adjusting (calibration) procedure	no function
4		• Printout display value • Printout active user menu settings • Transfer data	no function
5		• To navigate back (scroll up) within menu topics or menu selections (instead of using key no.7) • Decrease (numerical) parameters within menu and in applications	• To select the weighing application
6	F1	• To navigate forward (scroll down) within menu topics or menu selections • Increase (numerical) parameters within menu and in applications	• To select assigned F1 application and entering the parameter settings of application. • Default F1 application assignment: Piece counting

No.	Key	Press briefly (less than 1.5 s)	Press and hold (longer than 1.5 s)
7	F2	• 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)	• To select assigned F2 application and entering the parameter settings of application. • Default F2 application assignment: Percent weighing
8	F3	• To enter and leave menu selection (from / to menu topic) • To enter application parameter and switch to next parameter • To store parameter	• To select assigned F3 application and entering the parameter settings of application. • Default F3 application assignment: Check weighing
9	→0/T←	• Switch on • Zero/Tare	• Switch off
10	C	• Cancel and to leave menu without saving (one step back in the menu).	no function

3.4 Display Panel



Application Icons			
	Menu locked		Application "Statistics"
	Settings activated		Application "Formulation / Net-Total"
	Application "Weighing"	Σ	Application "Totaling"
	Application "Piece counting"		Application "Dynamic weighing"
%	Application "Percent weighing"	F×	Application "Multiplication factor"
	Application "Check weighing"	F÷	n.a.

Status Icons			
M	Indicates stored value (Memory)		Service reminder
Net	Indicates Net weight values		Acoustic feedback for pressed keys activated
	Adjustments (calibration) started	**W1**	Weighing range 1 (Dual Range models only)
FACT	FACT activated	**W2**	Weighing range 2 (Dual Range models only)

Status Icons			
	Applications "Diagnostics" and "Routine Test"		Charge of battery: full, 2/3, 1/3, discharged (Battery operated models only)

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

Unit Field						
	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	**bath**	bath
	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

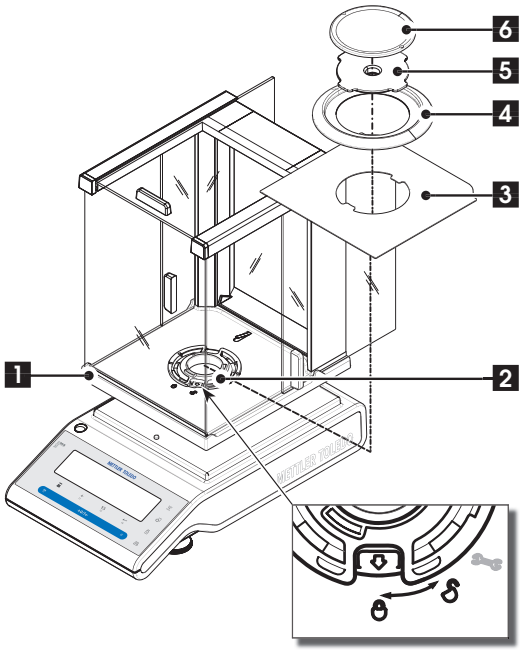
a) Open the packaging and carefully remove all components.

b) Check the delivered items.

The standard scope of delivery contains the following items:

Components		**S platform**				**L platform**	
		0.1 mg	**1 mg**	**0.01 g**	**0.1 g**	**0.1g/1g**	**2g/5g**
Draft shield	237 mm	✓	–	–	–	–	–
	165 mm	–	✓	–	–	–	–
Weighing pan with pan support	Ø 90 mm	✓	–	–	–	–	–
	127 x 127 mm	–	✓	–	–	–	–
	170 x 200 mm	–	–	✓	–	–	–
	190 x 226 mm	–	–	–	✓	–	–
	246 x 351 mm	–	–	–	–	✓	✓
Draft shield element		✓	–	✓	–	–	–
Pan support		✓	✓	✓	✓	–	–
Bottom plate		✓	✓	✓	–	–	–
Protective cover		✓	✓	✓	✓	✓	✓
Universal AC adapter (country specific)		✓	✓	✓	✓	–	–
Mounted country specific power cable		–	–	–	–	✓	✓
Operating instruction (this document)		✓	✓	✓	✓	✓	✓
Quick Guide		✓	✓	✓	✓	✓	✓
EC declaration of conformity		✓	✓	✓	✓	✓	✓

4.2 Installing the Components



Balances with readability of 0.1 mg, S platform with draft shield (237 mm)

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

Note: Push the side glass back as far as will go and grasp the draft shield (1) with both hands on the bars at the top.

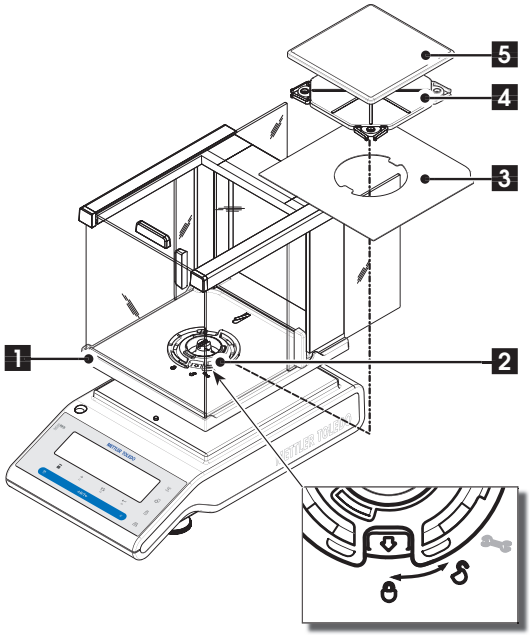
a) Turn draft shield lock (2) to position "🔓"(unlock).

b) Place draft shield on the balance.

c) Turn draft shield lock to "🔒" (lock) and place bottom plate (3).

d) Place draft shield element (4) and weighing pan (6) with pan support (5).

Note: Cleaning the draft shield see section "Maintenance and cleaning".



Balances with readability of 1 mg, S platform with draft shield (165 mm)

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

Note: Push the side glass back as far as will go and grasp the draft shield (1) with both hands on the bars at the top.

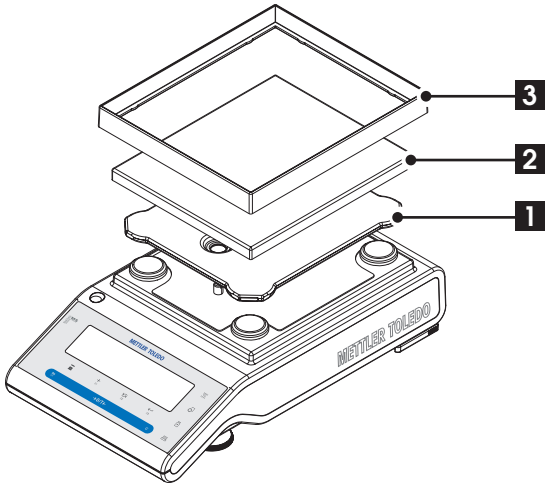
a) Turn draft shield lock (2) to position "🔓"(unlock).

b) Place draft shield on the balance.

c) Turn draft shield lock to "🔒" (lock) and place bottom plate (3).

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

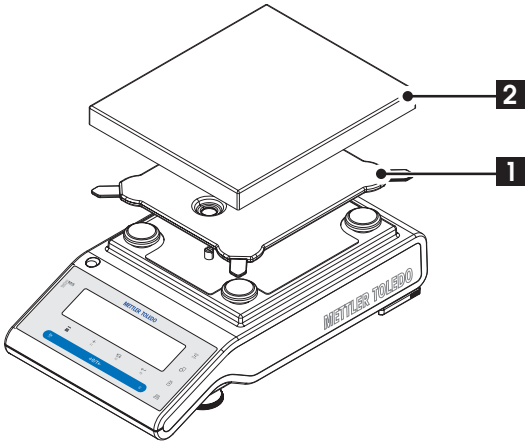
Note: Cleaning the draft shield see section "Maintenance and cleaning".



Balances with readability of 10 mg, S platform

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

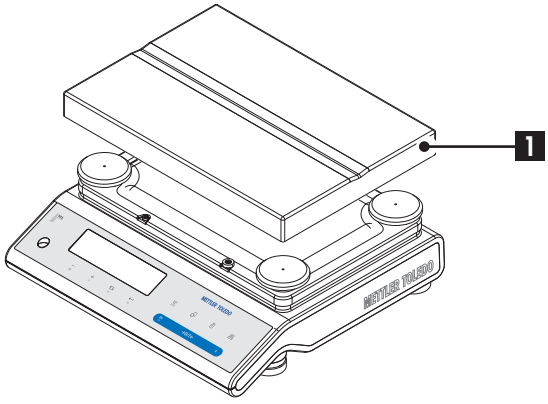
- Pan support (1)
- Weighing pan (2)
- Draft shield element (3)



Balances with readability of 0.1 g, S platform

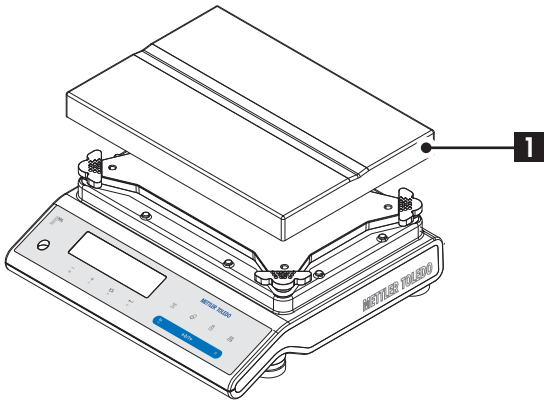
Place the following components on the balance in the specified order:

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



Balances with readability to 1 g, L platform

Place the weighing pan (1) on the balance.



Balances with readability from 2 g, L platform

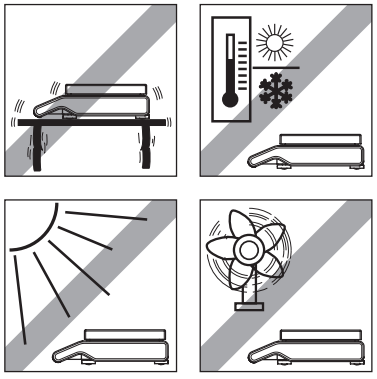
Place the weighing pan (1) on the balance.

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.

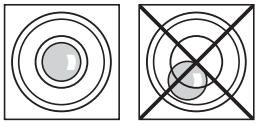


Observe ambient conditions (see Technical Data).

Avoid the following:

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

4.3.2 Leveling the Balance



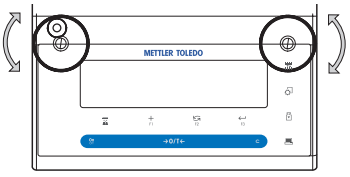
The balances have a level indicator and two (S Platform) or four (L Platform) adjustable leveling feet to compensate for slight irregularities in the surface of the weighing bench. The balance is exactly horizontal when the air bubble is in the middle of the level glass.

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

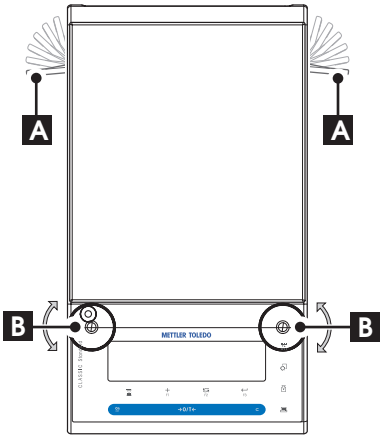
Balances with S platform and readability of 0.1 mg and 1 mg

Adjust the two 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 S platform and readability of 10 mg and 0.1 g

a) Remove the clamps (A) for the safety feet by turning them outwards. **Note:** Turn the clamps (A) outwards as far as they will go (~ 90°), so that the safety feet can move freely.

b) Now level the balance by turning both leveling screws (B) until the air bubble is in the inner circle of the level indicator (see procedure above).

c) Secure the safety feet by turning the clamps (A) inwards as far as they will go.

Balances with L platform

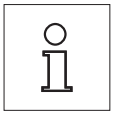
Align the balance horizontally by turning the leveling screws of the balance housing until the air bubble is in the inner circle of the level indicator.

4.4 Power Supply

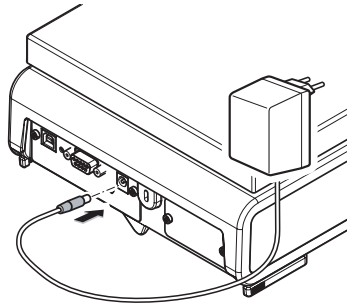
Your balance is supplied with an country-specific AC adapter or with a country-specific power cable. The power supply is suitable for all line voltages in the range: 100 - 240 VAC, 50/60 Hz (for exact specifications, see section "technical data").

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: 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!



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.



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

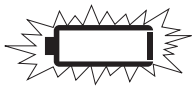
4.5 Battery Operation

Balances with a built-in rechargeable battery can, under normal operation conditions, work independently of the AC power line for about 8 hours. Immediately the AC power supply is interrupted e.g. by withdrawing the power cord 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.

fully charged

2/3 charged

1/3 charged



discharged

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.

Charging the built-in battery is indicated with filling up all 3 levels continuously. After the charging is finished the battery symbol is turned off. The battery is protected against overcharging, and the balance can therefore remain permanently connected with the AC power line.

Note: The built-in rechargeable battery can not be replaced by the user. Please contact METTLER TOLEDO customer Service.

4.6 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**.

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).

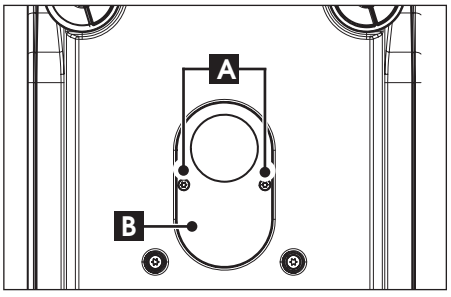
Attention:

- **Do not place the balance on the pan support location bolt** (0.1 mg and 1 mg models).
- Models with a glass draft shield: Carefully lift the draft shield from the weighing platform and put it aside.

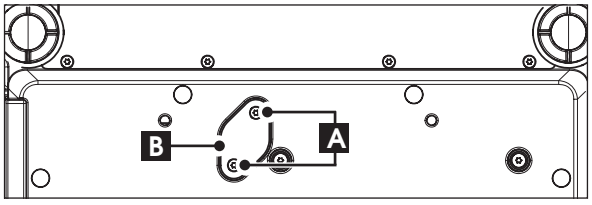
Note:

- For below-the-balance weighing with the L Platform models, you will need hook 11132565 from the accessories range.
- Weighing below the balance is not possible with "MS-KL" models.

S Platform



L Platform



a) Switch off the balance and remove the power cable and any interface cable from the balance.

b) Remove the draft shield element (10 mg models).

c) Remove the weighing pan and pan support.

d) Remove the bottom plate and unlock the draft shield (models with draft shield).

e) Remove the 2 screws (A) and the cover plate (B). The hanger is now accessible.

f) Then turn the balance to its normal position and simply reinstall all components in the reverse order.

4.8 Adjustment (Calibration)

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

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

4.8.1 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"). In this setting, you have no need worry about adjusting your balance.

The balance adjusts itself automatically:

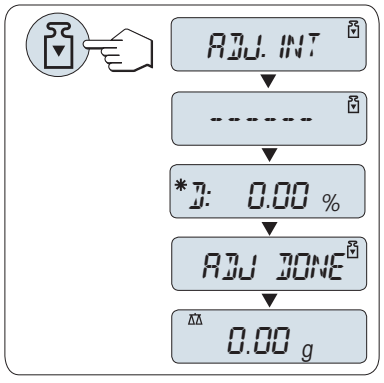
- after the warm-up phase on connection to the power supply.

- 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 approved models)

4.8.2 Manual Adjustment with Internal Weight

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

To obtain accurate results, the balance must be connected to the power supply for approximately 30 minutes (0.1 mg balances 60 minutes) in order to reach operating temperature before adjusting.



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

a) Unload weighing pan

b) Press «⊡» to execute "Internal Adjustment".

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

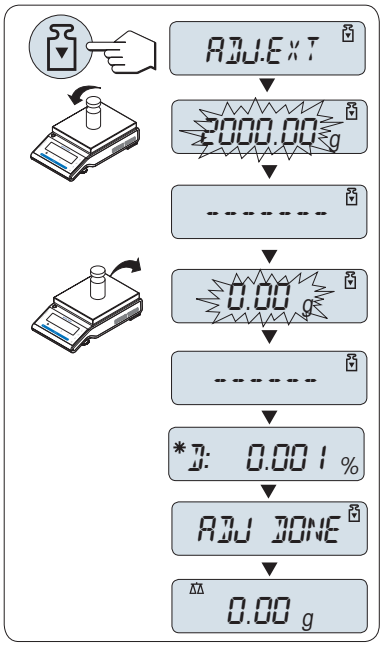
Sample adjustment printout using internal weight:

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

METTLER TOLEDO

Balance Type      MS4002S
SNR:           1234567890

Temperature       22.5 °C
Diff              0.001 %

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

4.8.3 Manual Adjustment with External Weight

Note: Because of certification legislation, the approved models cannot be adjusted with an external weight.

To obtain accurate results, the balance must be connected to the power supply for approximately 30 minutes (0.1 mg balances 60 minutes) in order to reach operating temperature before adjusting.



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

a) Have required adjustment weight ready.

b) Unload weighing pan.

c) Press «⍐» briefly to execute "External Adjustment". The required (predefined) adjustment weight value flashes in the display.

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

e) When "0.00 g" flashes, remove adjustment weight.

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

Sample adjustment printout using external weight:

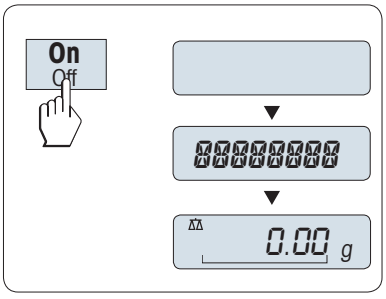
```
-- External adjustment -
21.Jan. 2009       12:56

METTLER TOLEDO

Balance Type     MS4002S
SNR:          1234567890

Temperature      22.5 °C
Nominal        4200.00 g
Actual         4199.99 g
Diff             0.001 %


Adjustment done

Signature

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

5 Weighing Made Simple

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

5.1 Switching the Balance On and Off

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



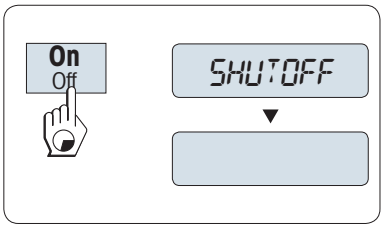
Switching On

a) Remove any load from weighing pan.

b) Press «**On**».

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

The balance is ready for weighing or for operation with the last active application.



Switching Off

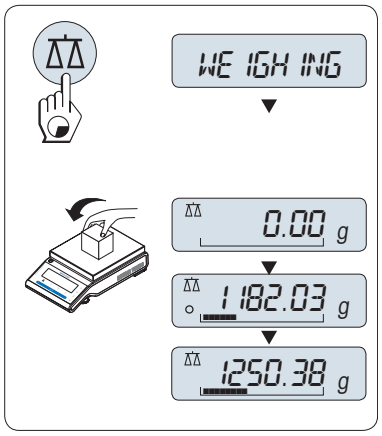
Press and hold the «**Off**» key until "SHUTOFF" appears on the display. Release the key.

After it has been switched off, your balance is in the standby mode. The display shows date, time, maximum load and readability. As your balance needs no warm-up time in the standby mode and is immediately ready for weighing.
When Quickstart "QUICK" (Advanced menu, topic "STARTUP") is selected: If you wish to perform a weighing, you need now only place the sample on the weighing pan and the balance immediately displays the result. There is no need to switch it on with the «**On/Off**» key.

Note:

- Quickstart is not possible with approved balances.
- Standby mode is available on line powered balances only.

5.2 Performing a Simple Weighing



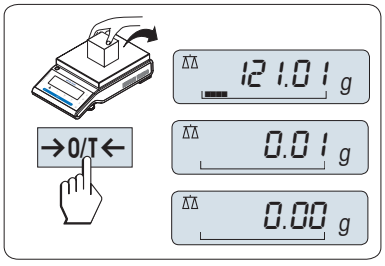
a) If your balance is not in the weighing mode, press and hold the «⚖» key down until "WEIGHING" appears in the display. Release the key. Your balance is in the weighing mode and set to zero.

b) Place weighing sample on the weighing pan.

c) Wait until the instability detector "○" disappears and the stability beep sounds.

d) Read the result.

5.3 Zeroing / Taring

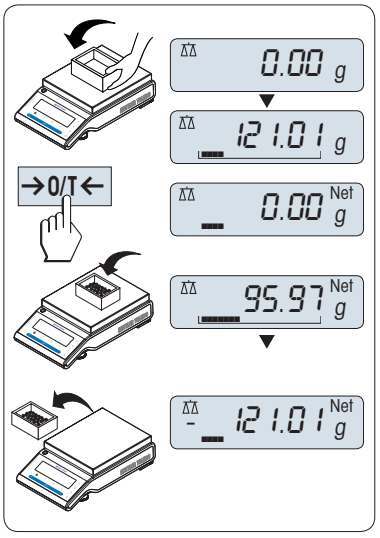


Zeroing

a) Unload the balance.

b) 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.

a) Place empty container on the balance. The weight is displayed.

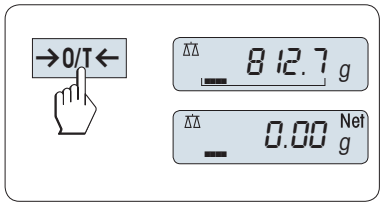
b) Press «→0/T←» to tare the balance.

"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.
- With METTLER TOLEDO DeltaRange balances (see following section), the fine range with its 10 times smaller display increments (depending on the model) is available again after every taring operation.

5.4 METTLER TOLEDO DeltaRange Balances



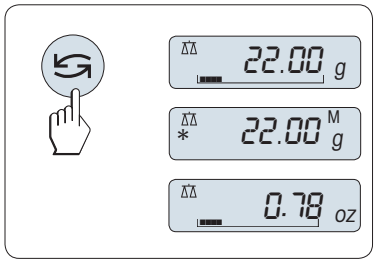
METTLER TOLEDO DeltaRange balances have a movable fine range with 10 times smaller display increments over their entire weighing range. In this fine range an additional decimal place always appears in the display.

The balance operates in the fine range

- after switching on.
- after every taring operation.

If the fine range is exceeded, the balance display automatically switches to coarser display increments.

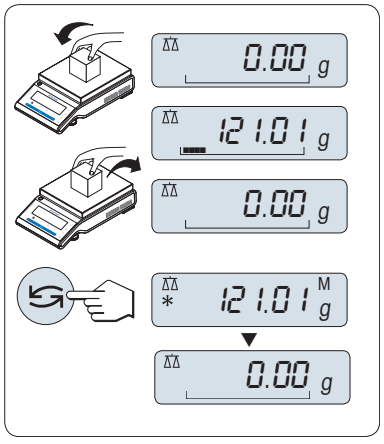
5.5 Switching Weight Units



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

5.6 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.



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

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

c) 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

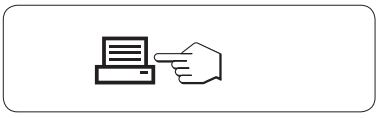
As soon a new stable weight value is displayed, the old recall value becomes replaced by the new weight value. When pressing «→0/T←», the recall value is set to 0.

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

5.7 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 when the load on the balance approaches the maximum load.

5.8 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 3 different menus and these contains 37 different **topics**, each of which allows you various **selection** possibilities.

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.
STAB.BEEP	Setting the stability beep level.
RESET	Call up of the factory settings.

Menu "ADVANCED"

Topic	Description
SERV.ICON	Switching the service icon (service reminder) on or off.
ENVIRON.	Matching the balance to the ambient conditions.
CAL	Settings for the type of adjustment (calibration).
FACT	Settings for fully automatic balance adjustment based on a selected time.
FACT PRT.	Switching the automatic FACT printout on or off.
DATE.FORM	Setting the date format.
TIME.FORM	Preselection of the time format.
RECALL	Switching the application "Recall" for storing stable weights on or off.
STARTUP	Setting the mode which the balance powers up (full or standby).
SHUTOFF	Setting the time after which the balance should be switched off automatically.
BCKLIGHT	Setting the time after which the display backlight should be switched off automatically.
DISPLAY	Adjusting the brightness and contrast of the display.
AUTOZERO	Switching the automatic zero correction (Autozero) on or off.
ZERO RNG	Setting the zero limit of the zero/tare key.
LANGUAGE	Setting the preferred language.
ASSIGN:F1	Selection of assigned F1 key application and entering their parameter settings.
ASSIGN:F2	Selection of assigned F2 key application and entering their parameter settings.
ASSIGN:F3	Selection of assigned F3 key application and entering their parameter settings.
DIAGNOSE	Starting a diagnostic application.

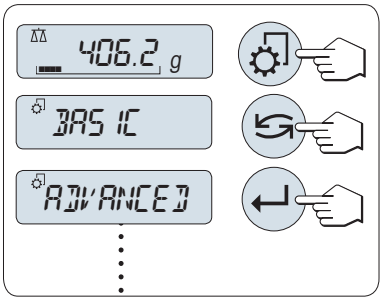
Menu "INT.FACE"

Topic	Description
RS232	Matching the serial interface RS232C to a peripheral unit.
BAUDRATE	Setting the transfer speed of the serial interface RS232C.
BIT/PAR.	Setting the character format (Bit/Parity) of the serial interface RS232C.

Topic	Description
HD.SHAKE	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.
USB	Matching the USB interface to a peripheral unit.
USB E.O.L.	Setting the end of line format of the USB interface.
USB CHAR	Setting the char set of the USB interface.
INTERVAL	Selection of the time which the balance started an automatic printout.

6.2 Menu Operation

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



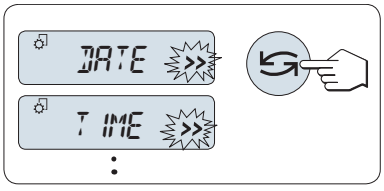
Select Menu

a) Press «☼» to activate main menu. The first menu "BASIC" is displayed (except menu protection is active).

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

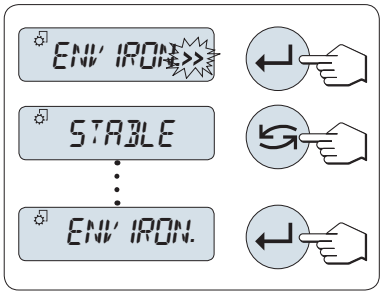
c) Press «↵» to confirm the selection.

Note: The menu selection "BASIC", "ADVANCED" or "INT.FACE" can not be saved.



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

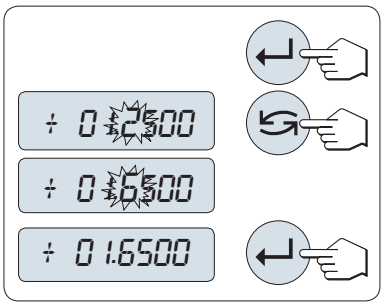
The "**>>**" flashing symbol in the display indicates selectable options available.

a) 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.

b) Press «↵», the balance executes the selected setting and returns to the menu topic.

Change Settings in a Submenu Selection

The same procedure as for menu topics.



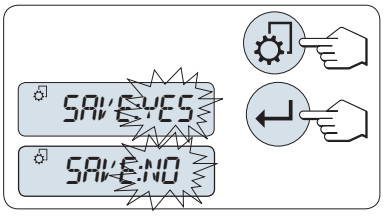
Input Principle of Numerical Values

a) Press «↵» for input of numerical values.

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

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

d) Press «↵» to confirm the input.

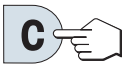


Saving Settings and Closing the Menu

a) Press «⚙» briefly to leave menu topic.

b) Press «↵» to execute "SAVE:YES". Changes are saved.

c) 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 20 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.
"ADVANCED"	The extended "ADVANCED" 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, ADVANCED and INT.FACE are not displayed.

Note:

- The menu selection "BASIC", "ADVANCED" or "INT.FACE" can not be saved.
- To activate "PROTECT" "ON" or "OFF", this selection must be saved.

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

"SET TIME"	Enter the current time.
"+1H"	Set the current time forwards by 1 hour (to adjust summer or winter time).
"-1H"	Set the current time backwards by 1 hour (to adjust summer or winter 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.
- Conversion table for weight units see chapter Appendix.

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 0.01 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". Select "NO", if you do not want to use "UNIT 2".

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

"STAB.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.

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

"RESET" – Reset Balance Settings

This menu topic allows you to cal-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

"SERV.ICON" – Service Reminder

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

"ON"	Service icon "" **switched on** (factory setting).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.
"OFF"	Service icon "" **switched off**.

"ENVIRON." – Environment Settings

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

"STANDARD"	Setting for an average working environment subject to moderate variations in the ambient conditions. (**Factory setting**)
"UNSTABLE"	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.
"200.00 g"	**Defining the external adjustment weight**: define the weight of the external adjustment weight (in grams). **Factory setting**: depends on the model.

"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"	The selected time for 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.FORM" – 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"	01.01.2009	`01.01.2009`
"MM/DD/Y"	01/01/09	`01/01/2009`
"Y-MM-DD"	09-01-01	`2009-01-01`
"D.MMM.Y"	1.JAN.09	`1.JAN.2009`
"MMM D Y"	JAN 1 09	`JAN 1 2009`

Factory setting: "DD.MM.Y"

"TIME.FORM" – 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.

"ON"	"RECALL" switched on
"OFF"	"RECALL" switched off

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

"STARTUP" – Startup Mode

You can set your balance such that it either immediately starts from the standby mode when you load a weight or it must be switched on with the «**ON/OFF**» key after which it then performs a display test.

Note: This topic in not visible with approved balances.

"FULL"	**Start with display test**: You must switch on the balance with the «**ON/OFF**» key. After it has been switched on, it performs a display test for approx. 2 sec. in which all display elements lights up, it shows "WELCOME", software version, maximum load and readability. The balance is ready for weighing. This is the **Factory setting**.
"QUICK"	**"Quickstart":** The balance can be started directly from the standby mode and is immediately ready for weighing. You can load the weight in the standby mode and the balance immediately shows the current weighing result. **Note:** Standby mode is available on line powered balances only.

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

"BCKLIGHT" – 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 pushed or the weight is changed.

"B.L. ON"	Backlight is always **on**. (**Factory setting**)
"B.L. 30" s	Automatic switch-off after **30 seconds** inactivity.
"B.L. 1" min	Automatic switch-off after **1 minute** inactivity.

"B.L. 2" min	Automatic switch-off after **2 minutes** inactivity.
"B.L. 5" min	Automatic switch-off after **5 minutes** inactivity.

"DISPLAY" – Display Settings

This menu topic allows you to adjust brightness and contrast of the display.

"BRIGHTN"	To set the brightness in 1% steps.
"50%"	Factory setting: 50%
"CONTRAST"	To set the contrast in 1% steps.
"75%"	Factory setting: 75%

"AUTOZERO" – Automatic Zero Setting

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

"ON"	"AUTOZERO" **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"	"AUTOZERO" **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.

"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.

"WEIGHT"	"4200g"	To set the upper limit of the zeroing range as weight in the definition unit of the balance.
"PERCENT"	"100%"	To set the upper limit of the zeroing range as a percent of the total range of the balance.

"LANGUAGE" – Language

Factory setting: Generally, the language of the destination country (if available) or English is set.

The following languages are available:

"ENGLISH"	English	"ITALIANO"	Italian
"DEUTSCH"	German	"POLSKI"	Polish
"FRANCAIS"	French	"CESKY"	Czech
"ESPANOL"	Spanish	"MAGYAR"	Hungarian

"ASSIGN:F1" – Assign Application Key F1

At this menu topic you can assign an application to the «**F1**» key. The following applications are available (depending on the model):

"F1:COUNT"	Piece counting (**Factory setting**)
"F1:PERC.W"	Percent weighing
"F1:CHECKW."	Checkweighing

"F1:STAT."	Statistics
"F1:FORM."	Formulation / Net-Total
"F1:TOTAL."	Totaling
"F1:DYN."	Dynamic weighing
"F1:F.MUL"	Multiplication factor

"ASSIGN:F2" – Assign Application Key F2

At this menu topic you can assign an application to the «**F2**» key. The following applications are available (depending on the model):

"F2:PERC.W"	Percent weighing (**Factory setting**)
"F2:CHECKW."	Checkweighing
"F2:STAT."	Statistics
"F2:FORM."	Formulation / Net-Total
"F2:TOTAL."	Totaling
"F2:DYN."	Dynamic weighing
"F2:F.MUL"	Multiplication factor
"F2:COUNT"	Piece counting

"ASSIGN:F3" – Assign Application Key F3

At this menu topic you can assign an application to the «**F3**» key. The following applications are available (depending on the model):

"F3:CHECKW."	Checkweighing (**Factory setting**)
"F3:STAT."	Statistics
"F3:FORM."	Formulation / Net-Total
"F3:TOTAL."	Totaling
"F3:DYN."	Dynamic weighing
"F3:F.MUL"	Multiplication factor
"F3:R.TEST"	Routine test
"F3:COUNT"	Piece counting
"F3:PERC.W"	Percent weighing

"DIAGNOSE" – Diagnostics Application

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

"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
"PROVIDER"	Service provider information
"REPEAT.T"	Repeatability test (models with internal weights only)

6.3.4 Interface Menu

"RS232" – RS232C Interface

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**.
"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.
"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).
"SEND.OFF"	Send mode switched off.(**Factory setting**)
"SEND.STB"	If the «🖶» key is pressed, the next stable weight value will be sent.
"SEND.CONT"	All weight value updates will be sent regardless of stability, without pressing the «🖶» key.
"SEND.AUTO"	Every stable weight value will be sent, without pressing the «🖶» key.
"SEND.ALL"	If the «🖶» key is pressed, the weight value will be sent regardless of stability.
"2.DISPLAY"	Connection of an **optional auxiliary display** unit (transmission parameters cannot be selected).

"BAUDRATE" – Baude rate RS232C

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

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/EVEN"	7 data bits/even parity
"7/ODD"	7 data bits/odd parity

Note:

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

"HD.SHAKE" – Handshake RS232C

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

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)

Note:

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

"RS CHAR" – Char Set RS232C

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.

"USB" – USB Interface

At this menu topic you can select the mode of the "USB Device" interface and specify how the data is transmitted.
Note: this port is not usable for printers or displays.

"USB"	Select the mode of the "USB Device" interface
"SEND.OFF"	Send mode switched off (**Factory setting**)
"SEND.STB"	If the «🖶» key is pressed, the next stable weight value will be sent.
"SEND.CONT"	All weight value updates will be sent regardless of stability, without pressing the «🖶» key.
"SEND.AUTO"	Every stable weight value will be sent, without pressing the «🖶» key.
"SEND.ALL"	If the «🖶» key is pressed, the weight value will be sent regardless of stability.

"USB E.O.L." – End of Line USB

At this menu topic you can set the "End of Line" character of the transmitted data to USB device.

"(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)

"USB CHAR" – Char Set USB

At this menu topic you can set the "Character Set" of the transmitted data to USB device.

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

"INTERVAL" – Print Key Simulation

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

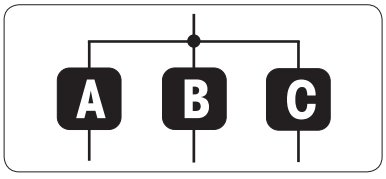
Range:	0 to 65535 seconds
0 sec:	disables the print key simulation

Factory setting: 0 sec

7 Application "Piece Counting"

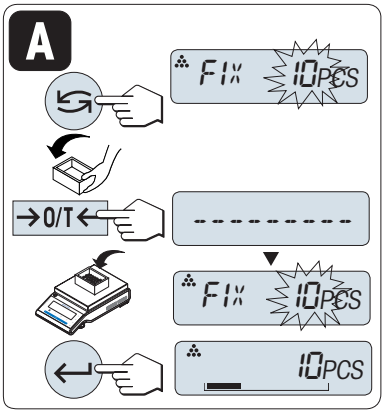
The "**Piece Counting**" application allows you to determine the number of pieces put on the weighing pan.
Requirement: The function "COUNTING" must be assigned to an «**F**x» key (see advanced menu topic "ASSIGN:Fx", factory setting: F1).

Activate function "COUNTING" by pressing and holding the appropriate assigned «Fx» key (factory setting: F1).



Piece counting needs first a reference weight, there are 3 possibilities:

A Setting the reference **by number**.
B Setting the reference **for 1 piece in weighing mode**.
C Setting the reference **for 1 piece in manual mode**.



Setting possibility

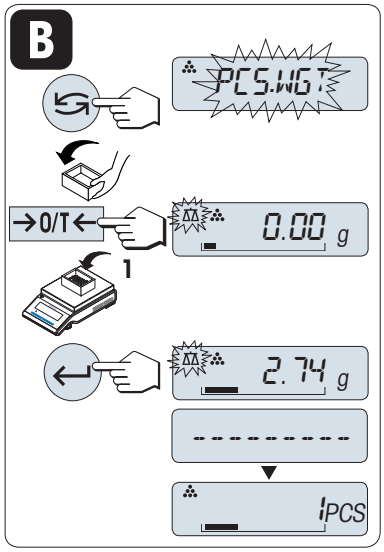
A **Setting the reference by number**

a) Select a number of reference pieces by scrolling with «↻». Possible numbers are 5, 10, 20 and 50.

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

c) Add the selected number of reference pieces to container.

d) Press «↵» to confirm.



Setting possibility

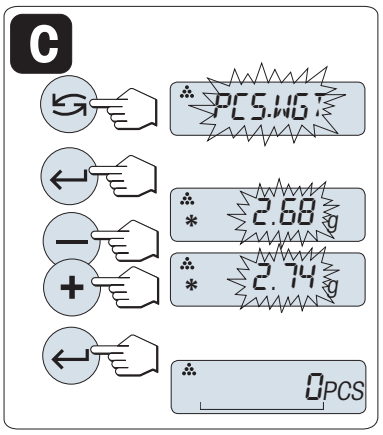
B **Setting the reference for one piece in weighing mode**

a) Select "PCS.WGT" by scrolling with «↻».

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

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

d) Press «↵» to confirm.



Setting possibility

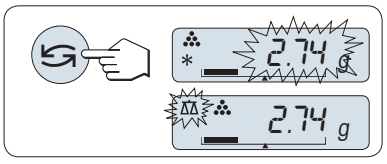
C **Setting the reference for one piece in manual mode**

a) Select "PCS.WGT" by scrolling with «↻».

b) Press «↵» to confirm.

c) Enter the final reference one piece weight by scrolling up («**+**» key) or down («**-**» key).

d) Press «↵» to confirm.



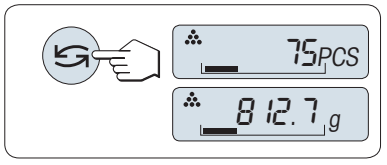
Switching between manual mode and weighing mode

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 you do not press a key for 20 seconds, the balance returns to the previous active application. Press «**C**» to cancel.

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



Switching between piece count and weight display.

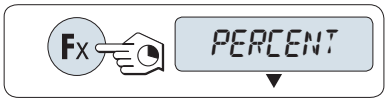
You can use the «↻» key at any time to switch the display between piece display, weighing unit "UNIT 1", "RECALL" value (if activated) and weighing unit "UNIT 2" (if different from "UNIT 1").

Note:

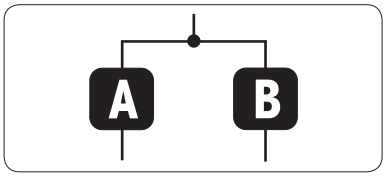
- The "RECALL" value is displayed with an asterisk (*) and icon "M" and can not be printed.
- Take into account minimum values: min. reference weight = 10d (10 digits), min. piece weight = 1d (1 digit)!
- The current reference weight remains stored until the reference setting is changed.

8 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 an «**F**x» key (see advanced menu topic "ASSIGN:Fx", factory setting: F2).



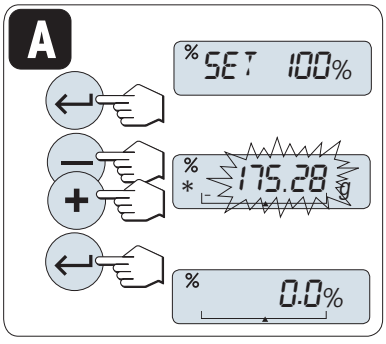
Activate function percent weighing "PERCENT" by pressing and holding the appropriate assigned «**F**x» key (factory setting: F2).



Percent weighing needs first a reference weight that should correspond to 100%, there are 2 possibilities :

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

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



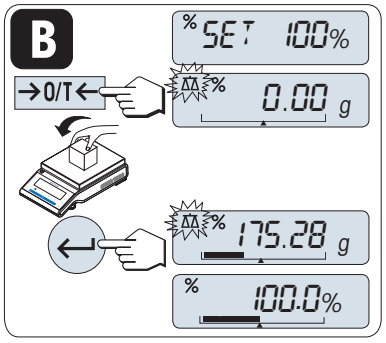
Setting possibility

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

a) Press «↵» to activate manual mode.

b) Select the reference target weight (100%) by scrolling up («**+**» key) or down («**–**» key). Progressing speed by press and hold.

c) Press «↵» to confirm.



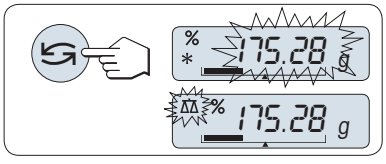
Setting possibility

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

a) Press «→0/T←» to tare the balance and to activate the weighing mode. If using: place empty container on the weighing pan first or tare again.

b) Load the reference weight (100%).

c) Press «↵» to confirm.



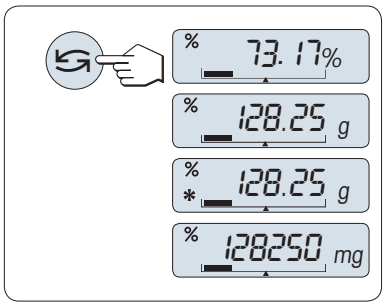
Switching between manual mode and weighing mode

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 you do not press a key for 20 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

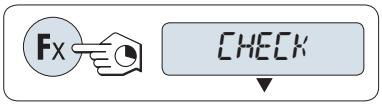
You can use the «⟲» key at any time to switch the display between percent display, weighing unit "UNIT 1", "RECALL" value (if activated) and weighing unit "UNIT 2" (if different from UNIT 1).

Note:

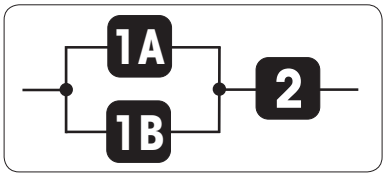
- The recall value is displayed with an asterisk (*) and can not be printed.
- The current set weight remains stored until it is redetermined.

9 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 an «**F**x» key (see advanced menu topic "ASSIGN:Fx", factory setting: F3).



Activate function "CHECK" by pressing and holding the appropriate assigned «**F**x» key (factory setting: F3).



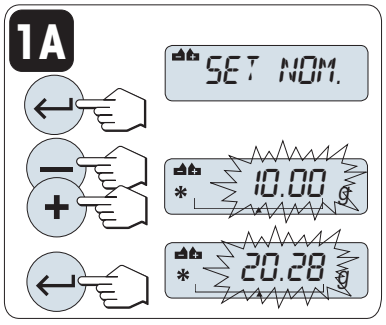
Step 1: Check weighing needs first a reference weight that should correspond to the nominal weight, there are 2 possibilities:

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:

2 Setting the **upper and lower limits**.



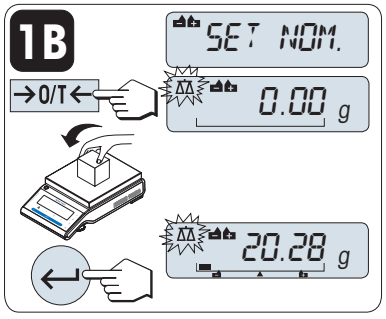
Setting possibility:

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

a) Press «↵» to activate manual mode.

b) Select the reference target weight by scrolling up («**+**» key) or down («**–**» key). Progressing speed by press and hold.

c) Press «↵» to confirm the nominal weight.



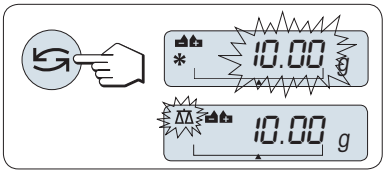
Setting possibility:

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

a) Press «→0/T←» to tare the balance and to activate the weighing mode. If using: place empty container on the weighing pan first or tare again.

b) Load the nominal weight.

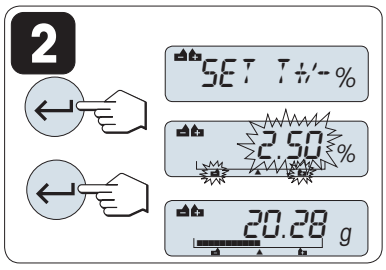
c) Press «↵» to confirm the nominal weight.



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:

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

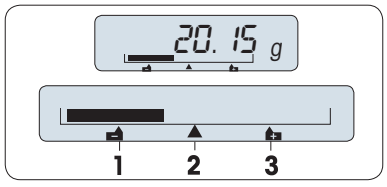
a) Press «↵» to start setting.

b) 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:

- If you do not press a key for 20 seconds, the balance returns to the previous active application. Press «**C**» to cancel.
- The nominal weight must be at least 10 digit.

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



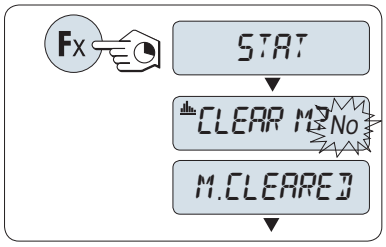
Weighing-in-Aid

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

10 Application "Statistics"

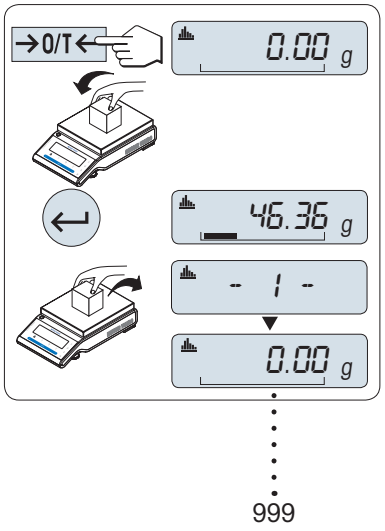
The "**Statistics**" application allows you to generate statistics of weighing values. 1 to 999 values are possible. **Requirement:** The function "STAT" must be assigned to an «**F**x» key (see advanced menu topic "ASSIGN:Fx"). Connect a printer or a PC if present.



a) Activate function "STAT" by pressing and holding the appropriate assigned «**F**x» key.

b) To continue the last statistics press «↵». For a new statistical evaluation press «⟳» to select "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:

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

b) Load the first sample weight.

c) 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 this sample.

d) 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 and the dynamic weight has changed at least 100 digits. "OUT OF RANGE" will be displayed if the sample is not accepted.

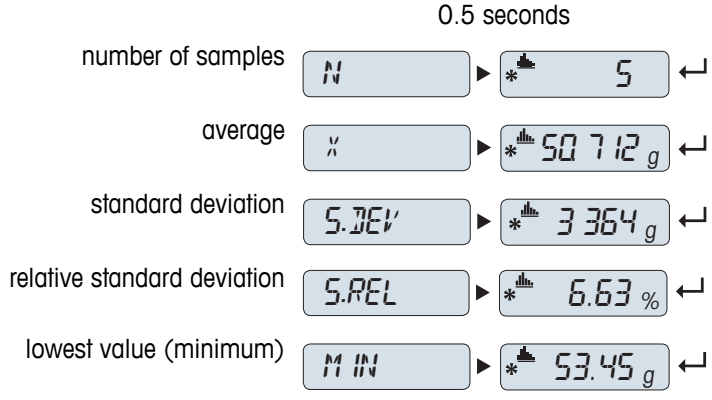
Results:

Press «🖶», the results are displayed and printed.

Displayed results:

a) Press «↵» to show the next statistical value.

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



highest value (maximum)

different between the minimum and the maximum

sum of all values

Printout:

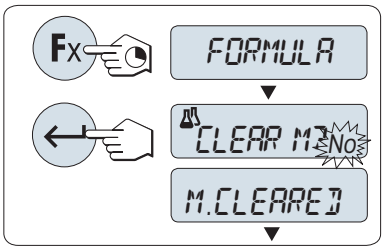
```
¦       -- Statistics --       ¦
¦ 21.Jan. 2009          12:56 ¦
¦ Balance Type        MS4002S ¦
¦ SNR              1234567890 ¦
¦   ----------------------     ¦
¦ 1                   46.36 g ¦
¦ 2                   55.81 g ¦
¦ 3                   47.49 g ¦
¦ 4                   53.28 g ¦
¦ 5                   49.71 g ¦
¦ n                         5 ¦
¦ x                  50.712 g ¦
¦ s dev               3.364 g ¦
¦ s rel                6.63 % ¦
¦ Min.                46.36 g ¦
¦ Max.                55.81 g ¦
¦ Diff                 9.45 g ¦
¦ Sum                235.56 g ¦
¦   ----------------------     ¦
```

11 Application "Formulation" (Net Total Formulation)

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

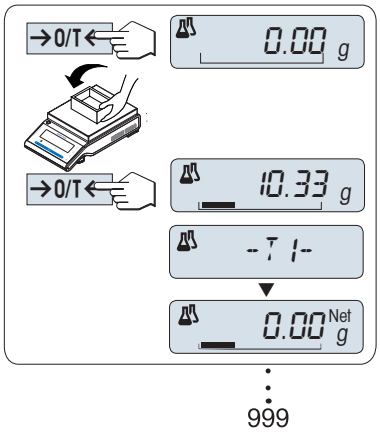
- weigh in (add and store) up to 999 individual component weights and displays the total. If a printer is connected, the component weights are printed individually and as a total.
- tare and store up to 999 container weights and displays the total. If a printer is connected, the tare weights are printed out individually and as a total.

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



a) Activate function formulation "FORMULA" by pressing and holding the appropriate assigned «**F**x» key.

b) Press «↵» to continue formulation weighing. For a new formulation press «⟳» to select "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.



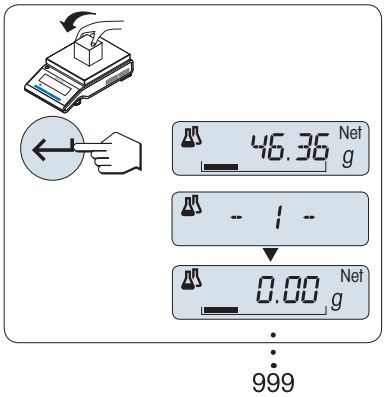
Tare container (if used):

a) Press «→0/T←» to zero the balance if needed.

b) Place the empty container on the weighing pan.

c) 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.



Weighing the first component weight:

a) Load the first component weight.

b) 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.

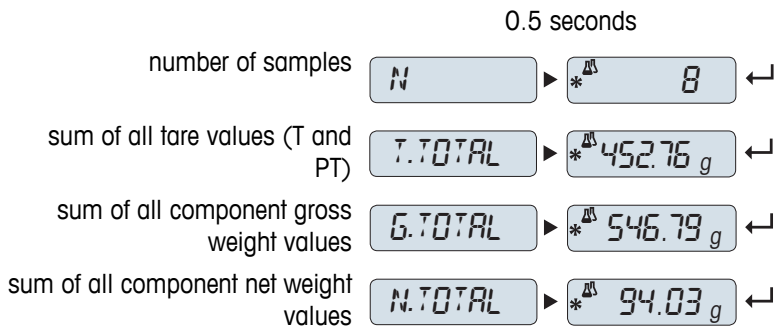
Results:

Press «🖶», the results are displayed and printed.

Displayed results:

a) Press «↵» to show the next statistical value.

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

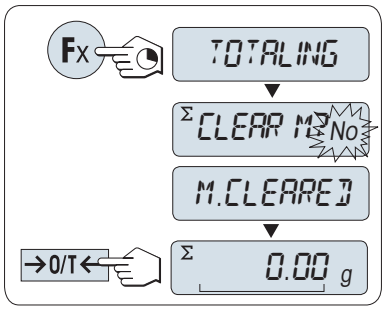


Printout:

```
¦     -- Formulation --     ¦
¦ 21.Jan.2009        12:56 ¦
¦ Balance Type     MS4002S ¦
¦ 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                999   ¦
¦   T Total       452.76 g ¦
¦   G Total       546.79 g ¦
¦                          ¦
¦   N Total        94.03 g ¦
¦ ----------------------   ¦
```

12 Application "Totaling"

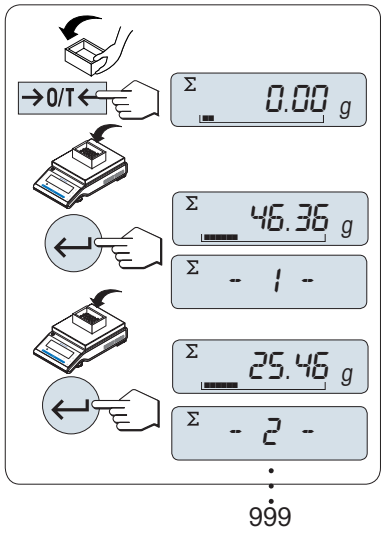
The "**TOTALING**" application allows you to weigh in different samples to add their weight values and to totalize them. 1 to 999 samples are possible.
Requirement: The function "TOTALING" must be assigned to an «**F**x» key (see advanced menu topic "ASSIGN:Fx").



a) Activate function "TOTALING" by pressing and holding the appropriate assigned «**F**x» key.

b) For a new totaling evaluation press «↻» briefly to enter "Yes" and press «↵» briefly to clear the memory.
Note: If the memory is already cleared (sample counter is 0) the memory clear question will be not displayed.

c) Press «→0/T←» to zero the balance.



Weighing in the sample weight:

a) If using a container: place empty container on the weighing pan and press «→0/T←» to zero the balance.
Note: The «→0/T←» key will always execute a zero, regardless of the menu setting.

b) Load the first sample weight.

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

d) Unload the second sample weight.

e) Press «↵». The display shows the sample count "- 2 -" and the current weight is stored. The balance is set to zero.

Weighing in further sample weights:

- 1...999 samples are possible.

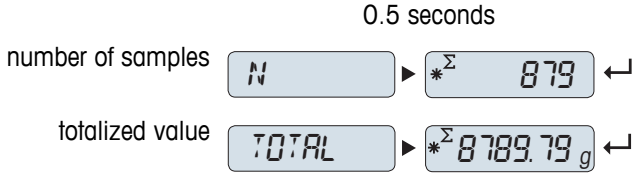
Results:

Press «🖶», the results are displayed and printed.

Displayed results:

a) Press «↵» briefly to show the totalized value.

b) Press «**C**» briefly to cancel.



Printout:

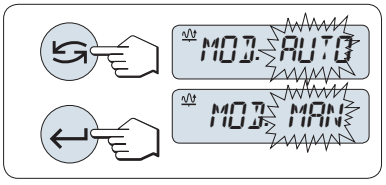
```
¦      ---- Totaling ----      ¦
```

```
¦ 21.Jan. 2009          12:56 ¦
¦ Balance Type        MS1602S ¦
¦ 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 ¦
¦   ------------------------   ¦
```

13 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 an «**F**x» key (see advanced menu topic "ASSIGN:Fx").
Note: "Switching Units" and "RECALL" Functions are not available in this Application.

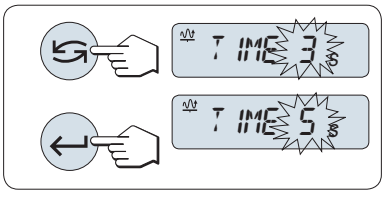
Activate function "DYNAMIC" by pressing and holding the appropriate assigned «**F**x» key.



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

a) 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"

b) Press «↵» to confirm the selection.



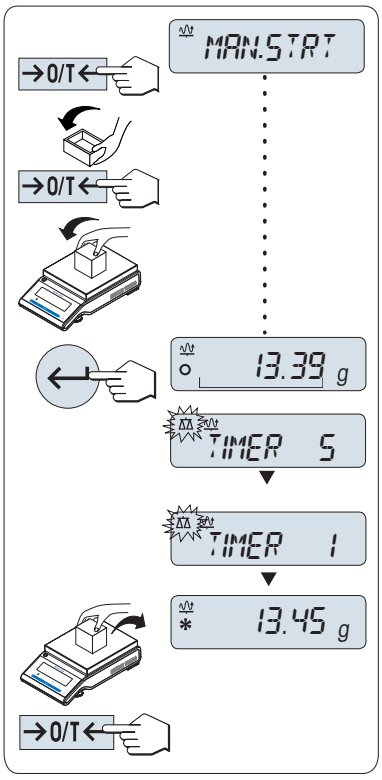
2 **Setting the weighing time:**

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

b) Press «↵» to confirm the selected time interval.

Note: If you do not press a key for 20 seconds, the balance returns to the previous active application.

Your balance is now ready for dynamic weighing:



a) Press «→0/T←» to zero if needed.

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

c) Load sample weight.

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

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

f) Unload sample weight.

g) "**Manual Start**" only, press «→0/T←» to zero and confirm the weighing.

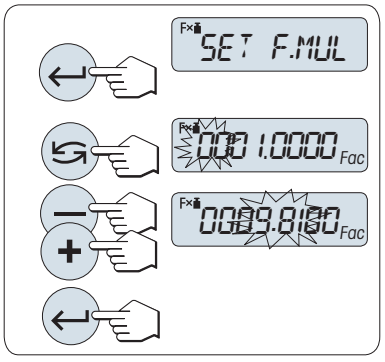
Note:

- 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 and tare key «→0/T←» is pressed ("Manual Start" only).

14 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 an «**F**x» key (see advanced menu topic "ASSIGN:Fx").

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



1 **Setting the factor value:**

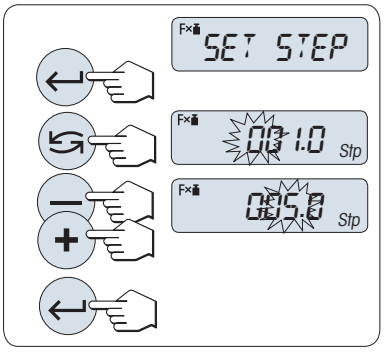
Either the factor 1 appears as default value or the factor that was saved most recently.

a) Press «↵» to execute "SET F.MUL".

b) Press «⟳» to select a digit. The selected digit is blinking.

c) For changing digits, press «**+**» to scroll up or «**–**» to scroll down.

d) Press «↵» to confirm the selected factor (no automatic acceptance).



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.

a) Press «↵» to execute "SET STEP".

b) Press «⟳» to select a digit. The selected digit is blinking.

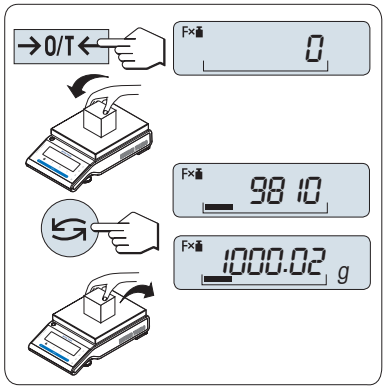
c) For changing digits, press «**+**» to scroll up or «**–**» to scroll down.

d) Press «↵» to confirm the selected step (no automatic acceptance).

Note: The allowed range for the step depends on the multiplication 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 you do not press a key for 20 seconds, the balance returns to the previous active application. Press «**C**» to cancel.

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



Weighing procedure

a) Press «→0/T←» to zero/tare.

b) Load sample weight on weighing pan.

c) 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.

d) 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").

15 Application "Routine Test"

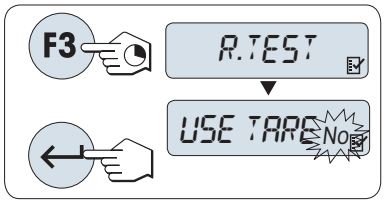
The "**Routine Test**" application allows you to determine the sensitivity of the balance. More about periodic sensitivity tests (routine tests) see: **GWP®** (Good Weighing Practice) on **www.mt.com/gwp**.
GWP gives clear recommendation for routine testing:

- 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 «**F3**» key (see advanced menu topic "ASSIGN:F3").
- It is recommended to connect a printer or a PC to the balance for showing the results.



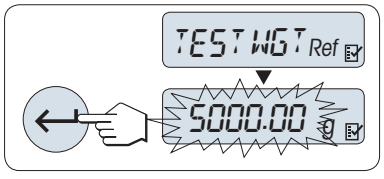
a) Activate function "R.TEST" by pressing and holding the assigned «**F3**» key.

b) Select "No" (no tare weight used).
If a tare weight is used during the test select "Yes" (use a tare weight). To toggle between "Yes" and "No" use «↻».

c) Press «↵» to confirm the selection.

Note:

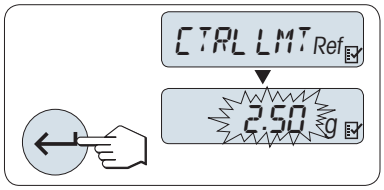
- It is recommended to test the sensitivity without tare load. (factory setting "No").
- If using tare: Make sure that tare weight plus test weight is not exceeding max. load.



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.

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

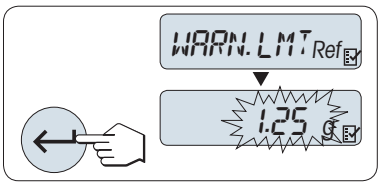
b) Press «↵» to confirm the value.



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.

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

b) Press «↵» to confirm the value.

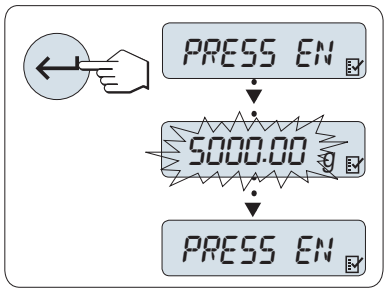


Setting the Warning Limit
The default value of the warning limit:
Warning limit = control limit / safety factor
Example: 2.5 g / 2 = 1.25 g.

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

b) 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.

a) Press «↵» to start the test.

b) 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 «⚖», «F1», «F2» for executing a new application or «F3» to restart "Routine Test".

Printout:

```
¦      -- Routine Test --      ¦
¦ 21.Jan. 2009          12:56 ¦
¦                             ¦
¦ METTLER TOLEDO              ¦
¦                             ¦
¦ Balance Type     MS6002S/01 ¦
¦ 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"

16 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.

a) Activate "ADVANCED" menu. (See section menu operation)

b) Activate function "DIAGNOSE" by pressing «↵».

c) Use «⇆» to select appropriate tests.

16.1 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.

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

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

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

d) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

Sample Printout:

```
¦   -- Repeatability Test --   ¦
¦ 21.Jan. 2009          11:34 ¦
¦                             ¦
¦ METTLER TOLEDO              ¦
¦                             ¦
¦ Balance Type     MS6002S/01 ¦
¦ SNR:             1234567890 ¦
¦ SW:                   V1.00 ¦
¦ Temperature         21.3 °C ¦
¦ No. of tests             10 ¦
¦   ------------------------  ¦
¦ 1.Value           2813.00 g ¦
¦  1. Time           00:00:00 ¦
¦  1. Temp.           21.3 °C ¦
¦  2. Value         2813.01 g ¦
¦  2. Time           00:00:04 ¦
¦  2. Temp.           21.3 °C ¦
¦  .                          ¦
¦  .                          ¦
¦  .                          ¦
¦   ------------------------  ¦
```

```
¦ Max.              2813.01 g ¦
¦  Min.             2813.00 g ¦
¦  x                2813.005 g ¦
¦  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", "STANDARD" and "UNSTABLE" setting. The setting with the fastest total time suits best for the existing environmental conditions.

16.2 Display Test

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

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

b) Press «🖹» to print the test information.

c) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

Sample Printout:

```
¦      -- Display Test --      ¦
¦ 21.Jan. 2009          11:34 ¦
¦                              ¦
¦ METTLER TOLEDO               ¦
¦                              ¦
¦ Balance Type         MS204S  ¦
¦ SNR:              1234567890 ¦
¦ SW:                    V1.00 ¦
¦ Display Test            DONE ¦
¦   ------------------------   ¦
```

16.3 Key Test

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

a) Press «↵» to start "KEYPAD T".

b) 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.

c) Second press «**C**» key to print the test information. The test procedure will be cancelled and the balance will return to the topic "DIAGNOSE". 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
«MENU»	MENU OK
«CAL»	CAL OK
«PRINT»	PRINT OK
«–»	MINUS OK
«+»	PLUS OK
«TOGGLE»	TOGGLE OK
«↵»	ENTER OK
«**C**»	C OK
«→0/T←»	0/T OK

Sample Printout:

```
¦        -- Key Test --         ¦
¦ 21.Jan. 2009          11:34  ¦
¦                               ¦
¦ METTLER TOLEDO                ¦
¦                               ¦
¦ Balance Type         MS204S   ¦
¦ SNR:              1234567890  ¦
¦ SW:                    V1.00  ¦
¦ 1/10 Key                 OK   ¦
¦ Menu Key                 OK   ¦
¦ Cal Key                  OK   ¦
¦ Print Key                OK   ¦
¦ Plus Key                 OK   ¦
¦ Toggle Key               OK   ¦
¦ Enter Key                OK   ¦
¦ Cancel Key               OK   ¦
¦ 0/T Key                  OK   ¦
¦                               ¦
¦ ------------------------      ¦
```

16.4 Motor Test

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

a) 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.

b) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

c) Press «🖶» for printout.

Sample Printout:

```
¦       -- Motor Test --       ¦
¦ 21.Jan. 2009          11:34 ¦
¦                               ¦
¦ METTLER TOLEDO                ¦
¦                               ¦
¦ Balance Type         MS204S ¦
¦ SNR:              1234567890 ¦
¦ SW:                    V1.00 ¦
¦ Motor Test                OK ¦
¦   ------------------------    ¦
```

16.5 Balance History

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

a) Press «↵» to start "BAL.HIST" .

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

c) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

d) Press «🖶» for printout.

Sample Information Displayed:

Information	Display
Operation Time (year:day:hour)	110:321:23
Total load kg (t)	1485.1345 kg
Number of weighings	999999999999
Number of key pressed	999999999999
Number of motor movements	9999999999
Backlight time (year:day:hour)	10:32:23
Next service due date	01:01:2010 dat

Sample Printout:

```
¦    -- Statistical Info --    ¦
¦ 21.Jan. 2009          11:34 ¦
¦                               ¦
¦ METTLER TOLEDO                ¦
¦                               ¦
¦ Balance Type         MS204S ¦
¦ SNR:              1234567890 ¦
¦ Balance ID:            LAB-3 ¦
¦ SW                      4.23 ¦
¦                               ¦
```

```
¦ Operating hours             ¦
¦  10y 321d 23h               ¦
¦ Total weight loaded         ¦
¦  1485.1345 t                ¦
¦ Number of weights           ¦
¦  999999999999               ¦
¦ Number of key press         ¦
¦  999999999999               ¦
¦ Motor movements             ¦
¦  9999999999                 ¦
¦ Backlight runnig hours      ¦
¦  10y 321d 23h               ¦
¦ Next service due date       ¦
¦  01.01.2010                 ¦
¦ ------------------------    ¦
```

16.6 Calibration History

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

a) Press «↵» to start "CAL.HIST".

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

c) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

d) Press «🖶» for printout.

Sample Information Displayed:

Note	Display
S = External adjusted service	06:03:09 S
I = Internal adjusted	05:03:09 I
	. . .
F = FACT	04:03:09 F
I = Internal adjusted	03:03:09 I
E = External adjusted user	02:03:09 E
I = Internal adjusted	05:03:09 I

Sample Printout:

```
¦   ------ Calibration ------   ¦
¦ 05.Mar. 2009          11:34 ¦
¦                               ¦
¦ METTLER TOLEDO                ¦
¦                               ¦
¦ Balance Type          MS204S ¦
¦ SNR:              1234567890 ¦
¦ --------------------------- ¦
```

```
¦ 01 05.Mar. 2009        11:34 ¦
¦ External                     ¦
¦ ADJ SERVICE       100.0000 g ¦
¦                       23.5°C ¦
¦ -------------------------- ¦
¦ 02 04.Mar. 2009        09:00 ¦
¦ FACT                         ¦
¦                       22.4°C ¦
¦ -------------------------- ¦
¦ .                            ¦
¦ .                            ¦
¦ .                            ¦
¦ 28 03.Mar. 2009        10:59 ¦
¦ FACT                         ¦
                        22.6°C
¦ -------------------------- ¦
¦ 29 02.Mar. 2009        16:34 ¦
¦ External                     ¦
¦ ADJ USER          100.0000 g ¦
¦                       24.6°C ¦
¦ -------------------------- ¦
¦ 30 02.Mar. 2009        18:36 ¦
¦ FACT                         ¦
¦                       22.4°C ¦
¦ -------------------------- ¦
```

16.7 Balance Information

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

a) Press «↵» to start "BAL.INFO".

b) Press «⟳» to scroll forward through the displayed list of Balance information.

c) Press «**C**» to cancel the test procedure. The balance will return to the topic "DIAGNOSE".

Sample information displayed:

Information	Display
Balance type	TYPE MS6002S
Max. load	MAX 6200 g
Software platform	PLATFORM RAINBOW
Serial number	SNR 1234567890
Type definition number	TDNR 9.6.3.411.203
Software version	SOFTWARE V1.00
Cell ID	CELL ID 1172400044
Cell type	CELL TYPE MMAI6000G2
Tolerance revision number	TOLERANCE NO2
Language	LANGUAGE ENGLISH

Sample Printout:

```
¦   -- Balance Information -   ¦
¦ 21.Jan. 2009          11:34 ¦
¦                             ¦
¦ METTLER TOLEDO              ¦
¦                             ¦
¦ Balance Type        MS6002S ¦
¦ Max. Load            6200 g ¦
¦ SNR:              1234567890 ¦
¦ SW:                    V1.00 ¦
¦ Platform             Rainbow ¦
¦ TDNR:          9.6.3.411.2- ¦
¦ Cell ID:                 03 ¦
¦ Cell Type         1172400044 ¦
¦ Tol.Rev.no.       MMAI6000G2 ¦
¦ Language                  2 ¦
                     English
¦   ------------------------  ¦
```

16.8 Service Provider Information

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

a) Press «↵» to start "PROVIDER".

b) Press «🖶». The service provider information will be printed and the balance will return to the topic "DIAGNOSE".

Sample Printout:

```
¦ -- Service Provider --    ¦
¦ 21.Jan. 2009        11:34 ¦
¦                           ¦
¦ METTLER TOLEDO            ¦
¦ Im Langacher              ¦
¦ CH-8606 Greifensee        ¦
¦ Switzerland               ¦
¦ (+41) 044 944 22 11       ¦
¦                           ¦
¦ ------------------------  ¦
```

17 Error and Status Messages

17.1 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.	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.
⌜-------⌝	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.
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 allow range.	Select a new step.
OUT OF RANGE	Sample weight is outside the allow range.	Unload the pan and load a new sample weight.
BELOW ZERO RANGE	Below zero range.	Check that the weighing pan is positioned correctly.

17.2 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 "SERV.ICON")

18 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.

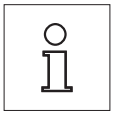
To thoroughly clean the draft shield glass panels, remove the draft shield from the balance. When reinstalling the draft shield, ensure that it is in the correct position.

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 clean the IP65 protected models using high-pressure or high-temperature water.



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.

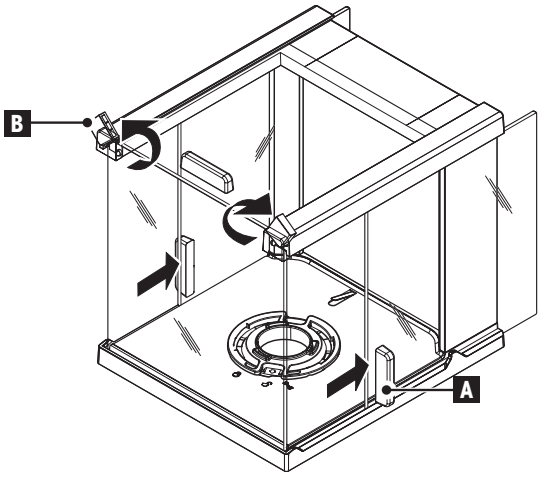
18.1 Cleaning the Glass Draft Shield (0.1 mg and 1 mg Models)

1 **Remove the following parts:**

a) Remove weighing pan, draft shield element (0.1 mg models) and pan support.

b) Remove the bottom plate.

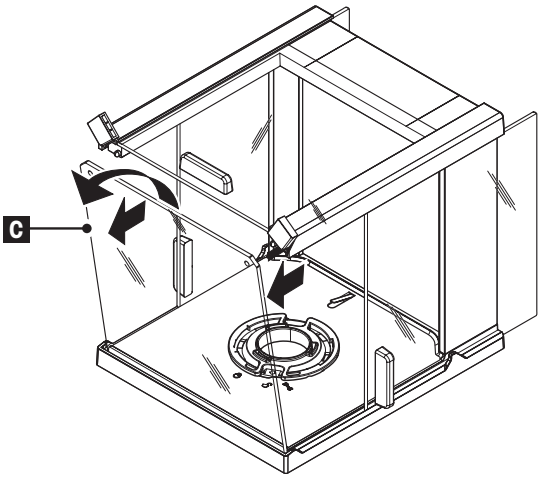
c) Unlock the draft shield, lift it off the balance and place it on a clean surface.



2

a) Push the **glass doors** (**A**) back.

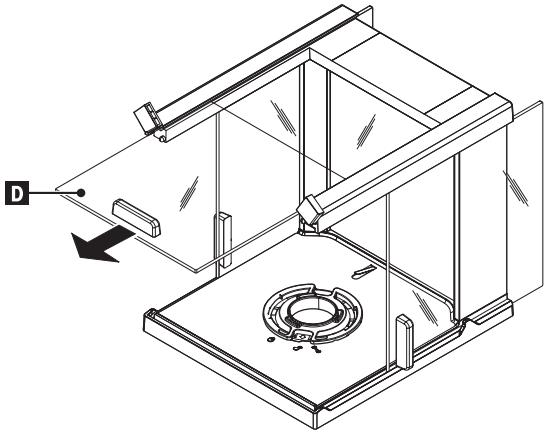
b) Turn the two **lock covers** (**B**) on the front far as they will go.



3

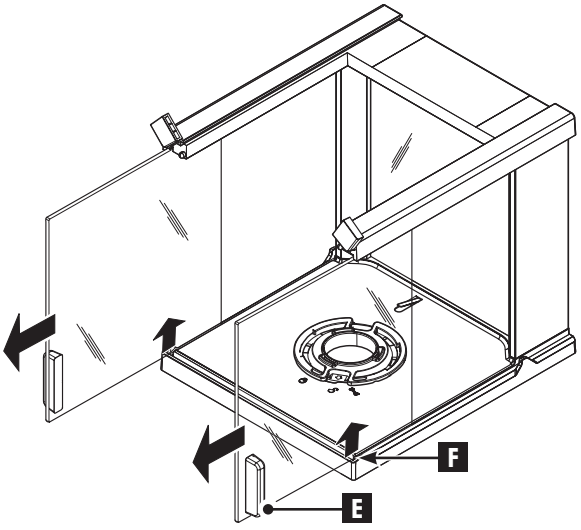
a) Tilt the **front glass** (**C**) forward.

b) Remove the front glass.



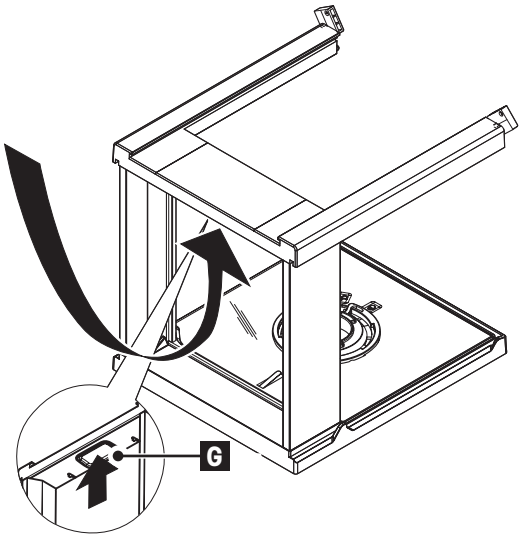
4

Pull the **top glass door** (**D**) out from the front.



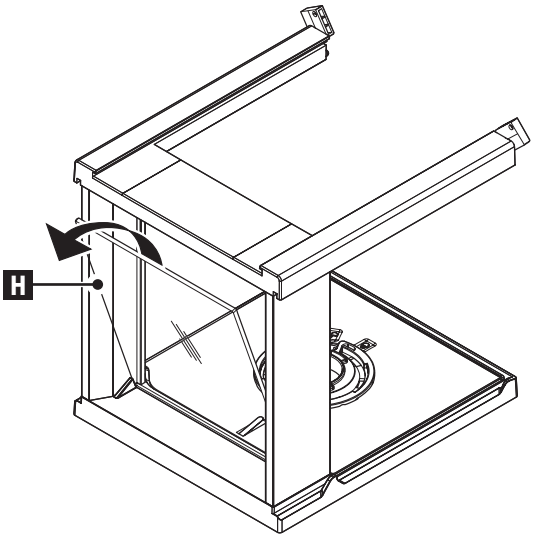
5

Lift the **side glass doors** (**E**) at (**F**) and pull them out from the front.



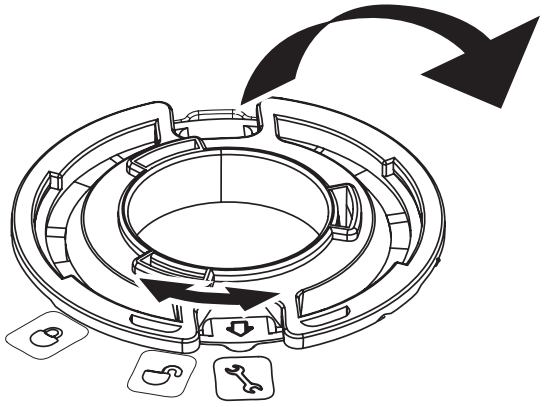
6

Push the lock button (**G**) to release the **rear glass**.



7

Remove the rear glass (**H**).



8

a) Turn the **draft shield lock** to the "🔧" (Service) position.

b) Remove the draft shield lock.

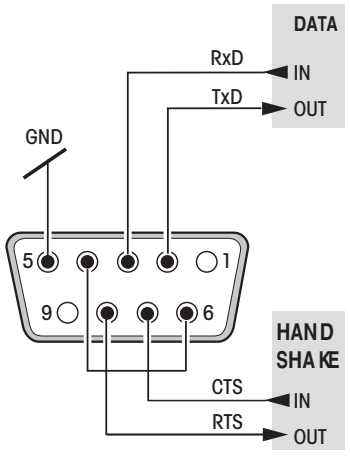
9

After cleaning reinstall all components in the reverse order. For balance mounting see chapter "Setting up the Balance – Installing the Components".

19 Interface Specification

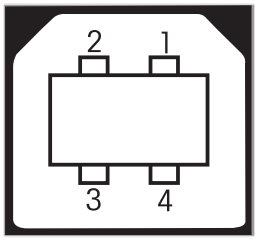
19.1 RS232C Interface

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	300, 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)

19.2 USB Device Interface

Each balance is equipped with an "USB Device" Interface as standard for the attachment of a peripheral device (e.g. computer).
Note: This interface is not suitable to communicate with a Printer.

Schematic	Item	Specification
	Standard	In conformity with USB Specification Revision 1.1
	Speed	Full speed 12 Mbps (requires shielded cable)
	Function	CDC (Communication Device Class) serial port emulation
	Power usage	Suspended device: Max 10 mA
	Connector	Type B

1	VBUS (+5 VDC)
2	D– (Data –)
3	D+ (Data +)
4	GND (Ground)
Shield	Shield

19.3 MT-SICS Interface Commands and Functions

Many of the balances and scales 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.

Basic information on data interchange with the balance

The balance receives commands from the system and acknowledges the command with an appropriate response.

Command formats

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

- Enter commands only in uppercase.
- The possible parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec., in this description represented as ␣).
- The possible input for "text" is a sequence of characters of the 8-bit ASCII character set from 32 dec to 255 dec.
- Each command must be closed by C_RL_F (ASCII 13 dec., 10 dec.). The characters C_RL_F, which can be inputted using the Enter or Return key of most entry keypads, are not listed in this description, but it is essential they be included for communication with the balance.

Example

S – Send stable weight value

Command	`S`	Get the current stable net weight value.
Response	`S␣S␣WeightValue␣Unit`	Current stable weight value in unit actually set under unit 1.

S␣I	Command not executable (balance is currently executing another command, e.g. taring, or time-out as stability was not reached).
S␣+	Balance in overload range.
S␣-	Balance in underload range.

Example

Command	S	Query a stable weight value.
Response	S␣S␣␣␣␣␣100.00␣g	The current stable weight value is 100.00 g.

The available MT-SICS commands are listed in the table. For further information please refer to the Reference Manual "MT-SICS 11780711" downloadable from the Internet under **www.mt.com/sics-newclassic**.

	Description		Description
@	Cancel (Reset)	**M31**	Mode after restart
C0	Query/Set adjustment settings	**M46**	Print interval
C1	Start adjustment according to current settings	**PW**	Piece counting: Query/Set piece weight
C2	Start adjustment with external weight	**PWR**	Power on/off (PWR 0 means switch off completely, if balance is powered by battery)
C3	Start adjustment with internal weight	**S**	Send stable weight value
D	Display text sent to balance	**SI**	Send weight value immediately
DAT	Date query/set	**SIR**	Send weight value immediately and repeat
DW	Display weigh	**SIRU**	Send weight value with currently displayed unit immediately and repeat
I0	Commands implemented	**SIU**	Send weight value with currently displayed unit immediately
I1	MT-SICS level and MT-SICS versions	**SM0**	Dynamic weighing: cancel all SMx commands
I2	Balance data	**SM1**	Dynamic weighing: Start immediately and send the result
I3	Software version, type definition number	**SM2**	Dynamic weighing: start after a minimum load is exceeded and send result
I4	Query serial number (SNR)	**SM3**	Dynamic weighing: start after a minimum load is exceeded, send result and repeat
I5	Query SW-identification number	**SM4**	Dynamic weighing: query/set time interval
I10	Query balance ID	**SNR**	Send stable weight value and repeat on weight change
I11	Query balance type	**SNRU**	Send stable weight valuewith currently displayed unit and repeat on weight change
I14	Query balance information	**SR**	Send weight value on weight change
K	Keys: set configuration	**SRU**	Send stable weight value with currently displayed unit on weight change
M02	Query/set environment	**ST**	Send stable weight value on pressing (print) key
M03	Query/set AutoZero	**SU**	Send stable weight value with currently displayed unit
M08	Display brightness	**T**	Tare
M09	Display contrast	**TA**	Get/Set tare weight value
M11	Beeper: Query/set volume	**TAC**	Clear tare value
M14	List available language	**TI**	Tare immediately

	Description		Description
M15	Query/set language	**TIM**	Query/set time
M17	FACT: query/set single time criteria (no possibility to set "weekday", 0 and 127)	**TST0**	Query/set test function settings
M22	Custom unit definition remarks: only one custom unit available, no possibility to set "name" of unit	**TST1**	Start test function according to current settings
M25	Get application list	**TST2**	Start test function with external weight
M26	Get/set current application	**TST3**	Start test function with internal weight
M27	Adjustment history	**UPD**	Query/set update rate of the host interface
M30	+/- settings with nominal and tolerance	**Z**	Zero
		ZI	Zero immediately

20 Technical Data

20.1 General Data

Power Supply

• S Platform:	AC/DC Adapter Primary: 100V–240V, 50/60Hz, 0.3 A Secondary: 12VDC, 0.84A (with electronic overload protection) Power supply to the balance: 11–20VDC, 10W ⚠ Use only with a tested AC Adapter with SELV output current. Ensure correct polarity ⊖—●—⊕
• L Platform:	Power supply 100V–240V, 50/60Hz, 0.3 A Power cable 2-core with country-specific plug MS-KL models: Built-in rechargeable NiMH battery (nickel-metal hydride)

Protection and Standards

• Overvoltage category:	Class II
• Degree of pollution:	2
• Degree of Protection:	Protected against dust and water Models with S + L Platform: IP54 in use with weighing pan MS-KLIP models: IP65
• Standards for safety and EMC:	See Declaration of Conformity
• Range of application:	For use only in enclosed interior rooms

Environmental conditions

• Height above mean sea level:	up to 4000 m
• Ambient temperature range:	10 to 30 °C (S platform) 5 to 40 °C (L platform, MS-L models) -10 to 40 °C (L platform, MS-KL models)
• Relative air humidity:	10% to 80 % at 31 °C, linearly decreasing to 50 % at 40 °C, noncondensing

Materials

• Housing:	Die-cast aluminum, lacquered
• Weighing pan:	Stainless steel X2CrNiMo 17-12-3 (1.4404) 245 x 351 mm: Stainless steel X5CrNiMo 18-10 (1.4301)
• Draft shield element:	with 0.1 mg models: Stainless steel X2CrNiMo 17-12-3 (1.4404) with 10 mg models: Plastic (PBT)
• Draft shield:	Plastic (PBT), glass
• In-use-cover:	Plastic (PBT)

20.2 Model-Specific Data

20.2.1 Balances with Readability of 0.1 mg, S Platform with Draft Shield

Technical Data

Model	MS104S	M204S	MS304S
Maximum load	120 g	220 g	320 g
Maximum load, fine range	–	–	–
Readability	0.1 mg	0.1 mg	0.1 mg
Readability, fine range	–	–	–
Taring range	0...120 g	0...220 g	0...320 g
Repeatability (sd)	0.1 mg	0.1 mg	0.1 mg
Repeatability (sd), fine range	–	–	–
Linearity	0.2 mg	0.2 mg	0.3 mg
Linearity, fine range	–	–	–
Sensitivity temperature drift (10...30°C)	1.5 ppm/°C	1.5 ppm/°C	1.5 ppm/°C
Internal adjustment	yes, FACT	yes, FACT	yes, FACT
Adjustment range with external weights	50...120 g	100...220 g	100...320 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 100 g / F2/4 5 g / E2/2	 200 g / F2/4 10 g / F1/3	 200 g / F2/4 10 g / F1/3
Minimum weight (acc. to USP)	0.3 g	0.3 g	0.3 g
Minimum weight (U=1%, k=2)	0.02 g	0.02 g	0.02 g
Minimum weight (OIML)	0.01 g	0.01 g	0.01 g
Settling time, typ.	2 s	2 s	3 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Usable height of draft shield [mm]	237	237	237
Weighing pan dimensions (WxD) [mm]	Ø 90	Ø 90	Ø 90
Balance dimensions (WxDxH) [mm]	204x347x345	204x347x345	204x347x345
Net Weight [kg]	6.5	6.5	6.5

20.2.2 Balances with Readability of 1 mg, S Platform with Draft Shield

Technical Data

Model	MS303S	MS303SE	MS403S
Maximum load	320 g	320 g	420 g
Maximum load, fine range	–	–	–
Readability	0.001 g	0.001 g	0.001 g
Readability, fine range	–	–	–
Taring range	0...320 g	0...320 g	0...420 g
Repeatability (sd)	0.001 g	0.001 g	0.001 g
Repeatability (sd), fine range	–	–	–
Linearity	0.002 g	0.002 g	0.002 g
Linearity, fine range	–	–	–
Sensitivity temperature drift (10...30°C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Internal adjustment	yes, FACT	no, EXT ADJ	yes, FACT

Model	MS303S	MS303SE	MS403S
Adjustment range with external weights	100...320 g	100...320 g	100...420 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 200 g / F2/4 10 g / F1/3	 200 g / F2/4 10 g / F1/3	 200 g / F2/4 20 g / F1/3
Minimum weight (acc. to USP)	3 g	3 g	3 g
Minimum weight (U=1%, k=2)	0.2 g	0.2 g	0.2 g
Minimum weight (OIML)	0.02 g	0.02 g	0.02 g
Settling time, typ.	1.5 s	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Usable height of draft shield [mm]	165	165	165
Weighing pan dimensions (WxD) [mm]	127x127	127x127	127x127
Balance dimensions (WxDxH) [mm]	204x347x280	204x347x280	204x347x280
Net Weight [kg]	6.2	6.2	6.2

Model	MS603S	MS1003S
Maximum load	620 g	1020 g
Maximum load, fine range	–	–
Readability	0.001 g	0.001 g
Readability, fine range	–	–
Taring range	0...620 g	0...1020 g
Repeatability (sd)	0.001 g	0.001 g
Repeatability (sd), fine range	–	–
Linearity	0.002 g	0.002 g
Linearity, fine range	–	–
Sensitivity temperature drift (10...30°C)	3 ppm/°C	3 ppm/°C
Internal adjustment	yes, FACT	yes, FACT
Adjustment range with external weights	100...620 g	500...1020 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 500 g / F2/4 20 g / F1/3	 1000 g / F2/4 50 g / F2/4
Minimum weight (acc. to USP)	3 g	3 g
Minimum weight (U=1%, k=2)	0.2 g	0.2 g
Minimum weight (OIML)	0.02 g	0.02 g
Settling time, typ.	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc
Usable height of draft shield [mm]	165	165
Weighing pan dimensions (WxD) [mm]	127x127	127x127
Balance dimensions (WxDxH) [mm]	204x347x280	204x347x280
Net Weight [kg]	6.2	6.9

20.2.3 Balances with Readability of 0.01 g, S Platform

Technical Data

Model	MS1602S	MS1602SE	MS3002S
Maximum load	1620 g	1620 g	3200 g
Maximum load, fine range	–	–	–
Readability	0.01 g	0.01 g	0.01 g

Model	MS1602S	MS1602SE	MS3002S
Readability, fine range	–	–	–
Taring range	0...1620 g	0...1620 g	0...3200 g
Repeatability (sd)	0.01 g	0.01 g	0.01 g
Repeatability (sd), fine range	–	–	–
Linearity	0.02 g	0.02 g	0.02 g
Linearity, fine range	–	–	–
Sensitivity temperature drift (10...30°C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Internal adjustment	yes, FACT	no, EXT ADJ	yes, FACT
Adjustment range with external weights	1000...1620 g	1000...1620 g	1000...3200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 1000 g / F2/4 50 g / F2/4	 1000 g / F2/4 50 g / F2/4	 1000 g / F2/4 100 g / F2/4
Minimum weight (acc. to USP)	30 g	30 g	30 g
Minimum weight (U=1%, k=2)	2 g	2 g	2 g
Minimum weight (OIML)	0.5 g	0.5 g	0.5 g
Settling time, typ.	1.5 s	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Weighing pan dimensions (WxD) [mm]	170x200	170x200	170x200
Balance dimensions (WxDxH) [mm]	194x347x97	194x347x97	194x347x97
Net Weight [kg]	5.5	5.5	5.5

Model	MS3002SE	MS4002S	MS4002SDR
Maximum load	3200 g	4200 g	4200 g
Maximum load, fine range	–	–	820 g
Readability	0.01 g	0.01 g	0.1 g
Readability, fine range	–	–	0.01 g
Taring range	0...3200 g	0...4200 g	0...4200 g
Repeatability (sd)	0.01 g	0.01 g	0.06 g
Repeatability (sd), fine range	–	–	0.01
Linearity	0.02 g	0.02 g	0.2 g
Linearity, fine range	–	–	0.02 g
Sensitivity temperature drift (10...30°C)	3 ppm/°C	3 ppm/°C	3 ppm/°C
Internal adjustment	no, EXT ADJ	yes, FACT	yes, FACT
Adjustment range with external weights	1000...3200 g	1000...4200 g	1000...4200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 1000 g / F2/4 100 g / F2/4	 2000 g / F2/4 200 g / F2/4	 2000 g / F2/4 200 g / F2/4
Minimum weight (acc. to USP)	30 g	30 g	30 g
Minimum weight (U=1%, k=2)	2 g	2 g	2 g
Minimum weight (OIML)	0.5 g	0.5 g	0.5 g
Settling time, typ.	1.5 s	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Weighing pan dimensions (WxD) [mm]	170x200	170x200	170x200
Balance dimensions (WxDxH) [mm]	194x347x97	194x347x97	194x347x97
Net Weight [kg]	5.5	5.5	5.5

Model	MS6002S	MS6002SDR
Maximum load	6200 g	6200 g
Maximum load, fine range	–	1200 g
Readability	0.01 g	0.1 g
Readability, fine range	–	0.01 g
Taring range	0...6200 g	0...6200 g
Repeatability (sd)	0.01 g	0.06 g
Repeatability (sd), fine range	–	0.01 g
Linearity	0.02 g	0.2 g
Linearity, fine range	–	0.02 g
Sensitivity temperature drift (10...30°C)	3 ppm/°C	3 ppm/°C
Internal adjustment	yes, FACT	yes, FACT
Adjustment range with external weights	2000...6200 g	2000...6200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 5000 g / F2/4 200 g / F2/4	 5000 g / F2/4 200 g / F2/4
Minimum weight (acc. to USP)	30 g	30 g
Minimum weight (U=1%, k=2)	2 g	2 g
Minimum weight (OIML)	0.5 g	0.5 g
Settling time, typ.	1.2 s	1.2 s
Weighing technology	MonoBloc	MonoBloc
Weighing pan dimensions (WxD) [mm]	170x200	170x200
Balance dimensions (WxDxH) [mm]	194x347x97	194x347x97
Net Weight [kg]	5.3	5.3

20.2.4 Balances with Readability of 0.1 g, S Platform

Technical Data

Model	MS6001S	MS8001S	MS8001SE
Maximum load	6200 g	8200 g	8200 g
Maximum load, fine range	–	–	–
Readability	0.1 g	0.1 g	0.1 g
Readability, fine range	–	–	–
Taring range	0...6200 g	0...8200 g	0...8200 g
Repeatability (sd)	0.1 g	0.1 g	0.1 g
Repeatability (sd), fine range	–	–	–
Linearity	0.2 g	0.2 g	0.2 g
Linearity, fine range	–	–	–
Sensitivity temperature drift (10...30°C)	5 ppm/°C	5 ppm/°C	15 ppm/°C
Internal adjustment	yes, FACT	yes, FACT	no, EXT ADJ
Adjustment range with external weights	2000...6200 g	2000...8200 g	2000...8200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 5000 g / F2/4 200 g / F2/4	 5000 g / F2/4 200 g / F2/4	 5000 g / F2/4 200 g / F2/4
Minimum weight (acc. to USP)	300 g	300 g	300 g
Minimum weight (U=1%, k=2)	20 g	20 g	20 g
Minimum weight (OIML)	5 g	5 g	5 g

Model	MS6001S	MS8001S	MS8001SE
Settling time, typ.	1 s	1 s	1 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Weighing pan dimensions (WxD) [mm]	190x226	190x226	190x226
Balance dimensions (WxDxH) [mm]	194x347x97	194x347x97	194x347x97
Net Weight [kg]	5.6	5.6	5.6

20.2.5 Balances with Readability of 0.1 g to 1 g, L Platform

Technical Data

Model	MS12001L	MS16001L	MS16001LE
Maximum load	12200 g	16200 g	16200 g
Maximum load, fine range	–	–	–
Readability	0.1 g	0.1 g	0.1 g
Readability, fine range	–	–	–
Taring range	0...12200 g	0...16200 g	0...16200 g
Repeatability (sd)	0.1 g	0.1 g	0.1 g
Repeatability (sd), fine range	–	–	–
Linearity	0.2 g	0.2 g	0.2 g
Linearity, fine range	–	–	–
Sensitivity temperature drift (10...30°C)	5 ppm/°C	5 ppm/°C	15 ppm/°C
Internal adjustment	yes, FACT	yes, FACT	no, EXT ADJ
Adjustment range with external weights	5000...12200 g	5000...16200 g	5000...16200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 10000 g / F2/4 500 g / F2/4	 10000 g / F2/4 500 g / F2/4	 10000 g / F2/4 500 g / F2/4
Minimum weight (acc. to USP)	300 g	300 g	300 g
Minimum weight (U=1%, k=2)	20 g	20 g	20 g
Minimum weight (OIML)	5 g	5 g	5 g
Settling time, typ.	2 s	2 s	2 s
Weighing technology	MonoBloc	MonoBloc	MonoBloc
Built-in battery	no	no	no
Weighing below the balance (with optional hook)	yes	yes	yes
Weighing pan dimensions (WxD) [mm]	351x245	351x245	351x245
Balance dimensions (WxDxH) [mm]	363x346x118	363x346x118	363x346x118
Net Weight [kg]	10.7	10.7	10.7

Model	MS32001L	MS32001LE
Maximum load	32200 g	32200 g
Maximum load, fine range	–	–
Readability	0.1 g	0.1 g
Readability, fine range	–	–
Taring range	0...32200 g	0...32200 g
Repeatability (sd)	0.1 g	0.1 g
Repeatability (sd), fine range	–	–
Linearity	0.3 g	0.3 g
Linearity, fine range	–	–

Model	MS32001L	MS32001LE
Sensitivity temperature drift (10…30°C)	5 ppm/°C	15 ppm/°C
Internal adjustment	yes, FACT	no, EXT ADJ
Adjustment range with external weights	10000...32200 g	10000...32200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 10000 g / F2/4 500 g / F2/4	 10000 g / F2/4 500 g / F2/4
Minimum weight (acc. to USP)	300 g	300 g
Minimum weight (U=1%, k=2)	20 g	20 g
Minimum weight (OIML)	5 g	5 g
Settling time, typ.	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc
Built-in battery	no	no
Weighing below the balance (with optional hook)	yes	yes
Weighing pan dimensions (WxD) [mm]	351x245	351x245
Balance dimensions (WxDxH) [mm]	363x346x118	363x346x118
Net Weight [kg]	10.7	10.7

Model	MS32000L	MS32000LE
Maximum load	32200 g	32200 g
Maximum load, fine range	–	–
Readability	1 g	1 g
Readability, fine range	–	–
Taring range	0...32200 g	0...32200 g
Repeatability (sd)	0.5 g	0.5 g
Repeatability (sd), fine range	–	–
Linearity	1 g	1 g
Linearity, fine range	–	–
Sensitivity temperature drift (10…30°C)	5 ppm/°C	15 ppm/°C
Internal adjustment	yes, FACT	no, EXT ADJ
Adjustment range with external weights	10000...32200 g	10000...32200 g
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 20000 g / F2/4 1000 g / F2/4	 20000 g / F2/4 1000 g / F2/4
Minimum weight (acc. to USP)	1500 g	1500 g
Minimum weight (U=1%, k=2)	100 g	100g
Minimum weight (OIML)	50 g	50 g
Settling time, typ.	1.5 s	1.5 s
Weighing technology	MonoBloc	MonoBloc
Built-in battery	no	no
Weighing below the balance (with optional hook)	yes	yes
Weighing pan dimensions (WxD) [mm]	351x245	351x245
Balance dimensions (WxDxH) [mm]	363x346x118	363x346x118
Net Weight [kg]	10.7	10.6

20.2.6 Balances with Readability of 2 g to 5 g, L Platform

Technical Data

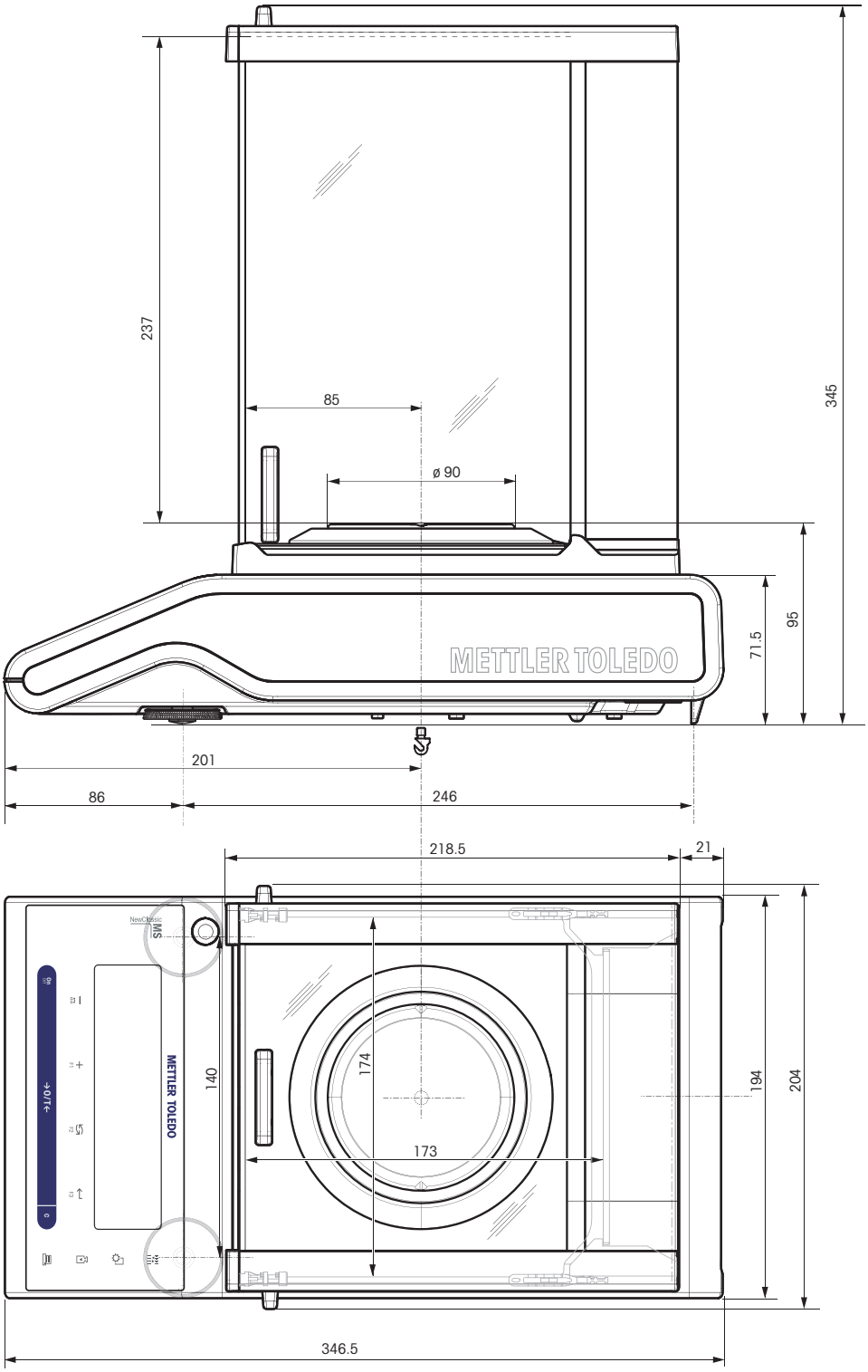
Model	MS15KLE	MS15KLIPE
Maximum load	15 kg	15 kg
Readability	2 g	2 g
Weighing range (approved version)	6 kg / 15 kg	6 kg / 15 kg
Readability (approved version)	2 g / 5 g	2 g / 5 g
Taring range	0...15 kg	0...15 kg
Repeatability (sd)	1 g	1 g
Linearity	2 g	2 g
Internal adjustment	no, EXT ADJT	no, EXT ADJ
Adjustment range with external weights	5...15 kg	5...15 kg
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 10 kg / F2/4 500 g / F2/4	 10 kg / F2/4 500 g / F2/4
Settling time, typ.	1 s	1 s
Weighing technology	Strain Gauge	Strain Gauge
Weighing pan dimensions (WxD) [mm]	351x245	351x245
Built-in battery	yes	yes
IP Protection	IP 54 in use	IP 65
Weighing below the balance (with optional hook)	no	no
Balance dimensions (WxDxH) [mm]	363x346x122	363x346x122
Net Weight [kg]	9.9	9.9

Model	MS24KLIPE	MS30KLE
Maximum load	24 kg	30 kg
Readability	2 g	2 g
Weighing range(approved version)	15 kg / 24 kg	15 kg / 30 kg
Readability(approved version)	5 g / 10 g	5 g / 10 g
Taring range	0...24 kg	0...30 kg
Repeatability (sd)	2 g	2 g
Linearity	2 g	2 g
Internal adjustment	no, EXT ADJT	no, EXT ADJ
Adjustment range with external weights	10...24 kg	10...30 kg
Weights for routine testing Large Weight/Class OIML/ASTM Small Weight/Class OIML/ASTM	 20 kg / F2/4 1000 g / F2/4	 20 kg / F2/4 1000 g / F2/4
Settling time, typ.	1 s	1 s
Weighing technology	Strain Gauge	Strain Gauge
Weighing pan dimensions (WxD) [mm]	351x245	351x245
Built-in battery	yes	yes
IP Protection	IP 65	IP 54 in use
Weighing below the balance (with optional hook)	no	no
Balance dimensions (WxDxH) [mm]	363x346x122	363x346x122
Net Weight [kg]	9.9	9.9

20.3 Dimensions

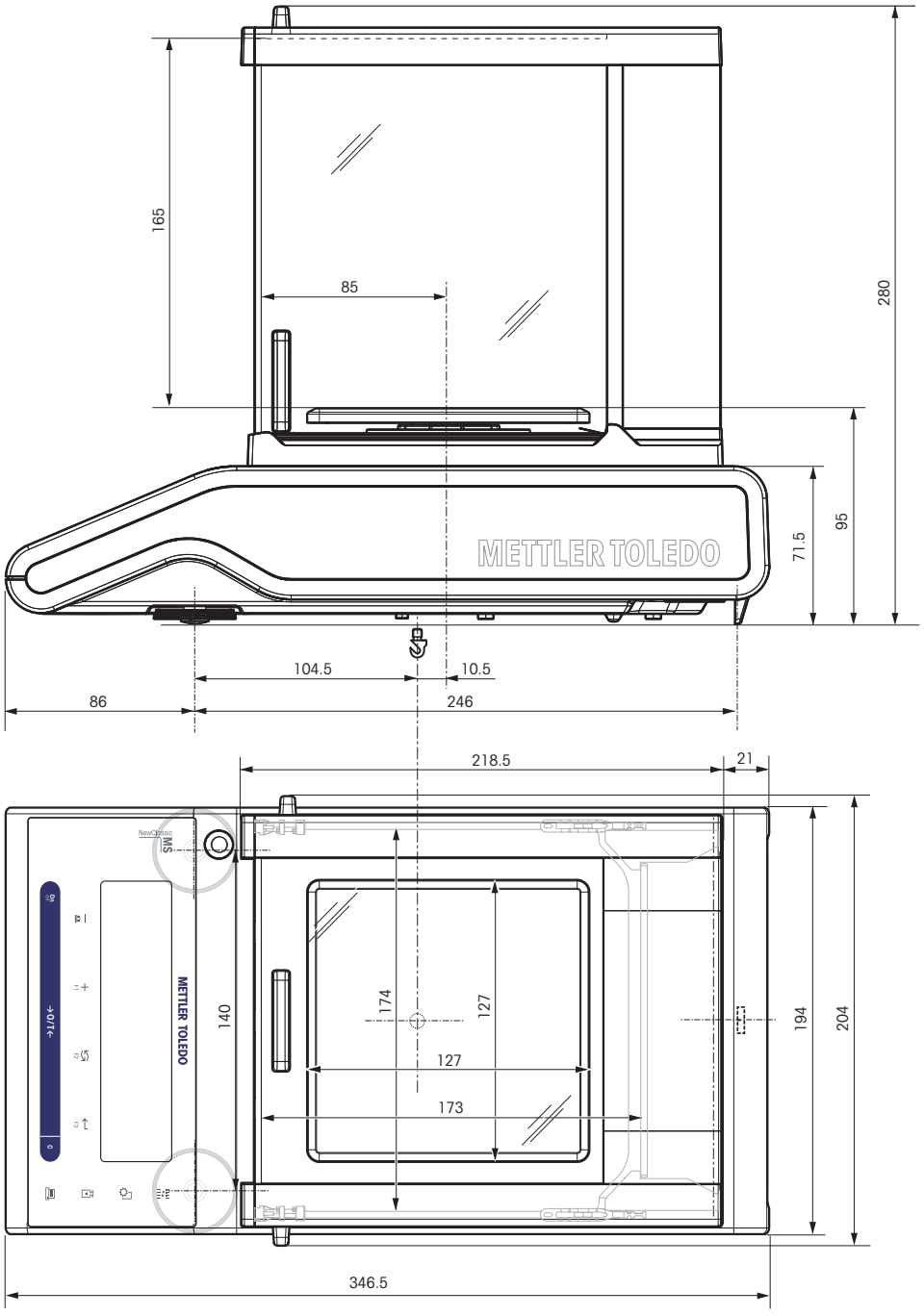
20.3.1 Balances with Readability of 0.1 mg, S Platform With Draft Shield

Models:
MS104S
MS204S
MS304S



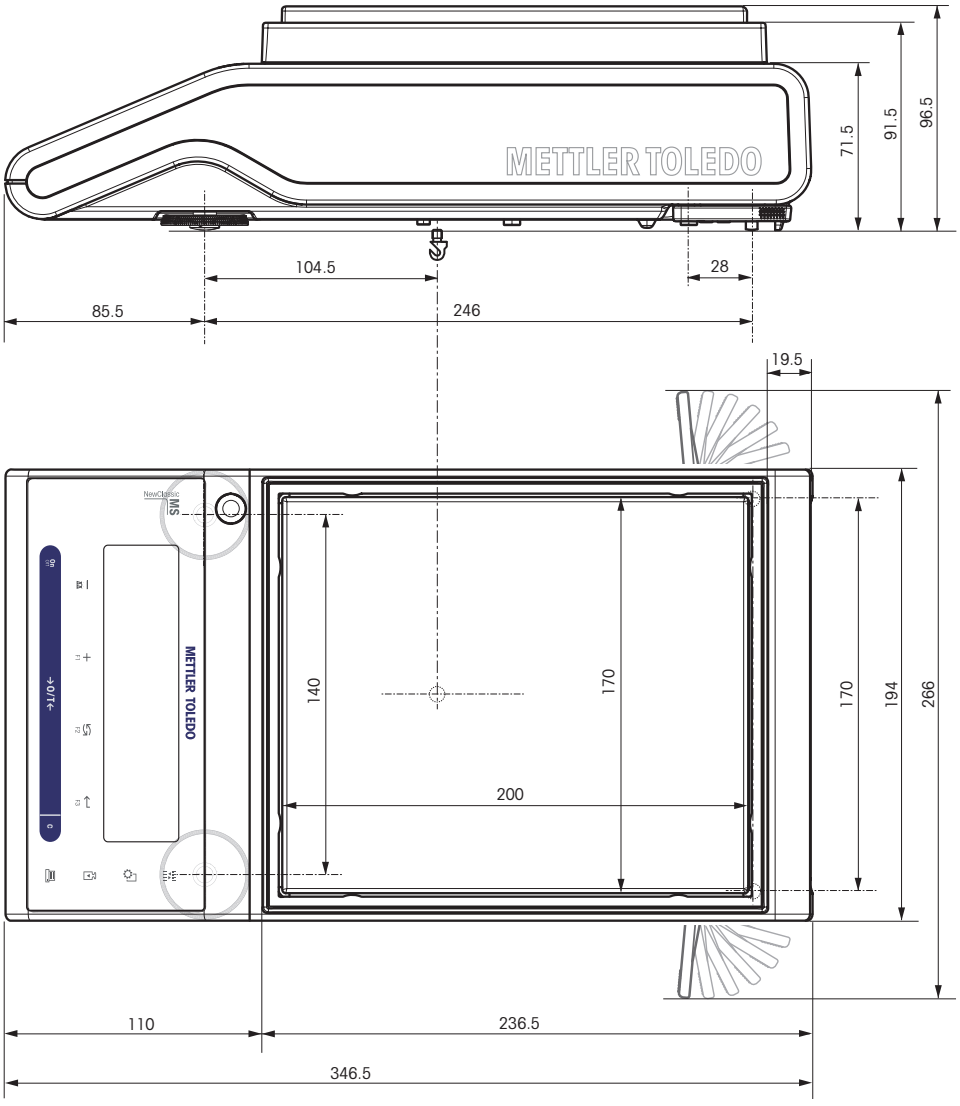
20.3.2 Balances with Readability of 1 mg, S Platform With Draft Shield

Models:
MS303S
MS303SE
MS403S
MS603S
MS1003S



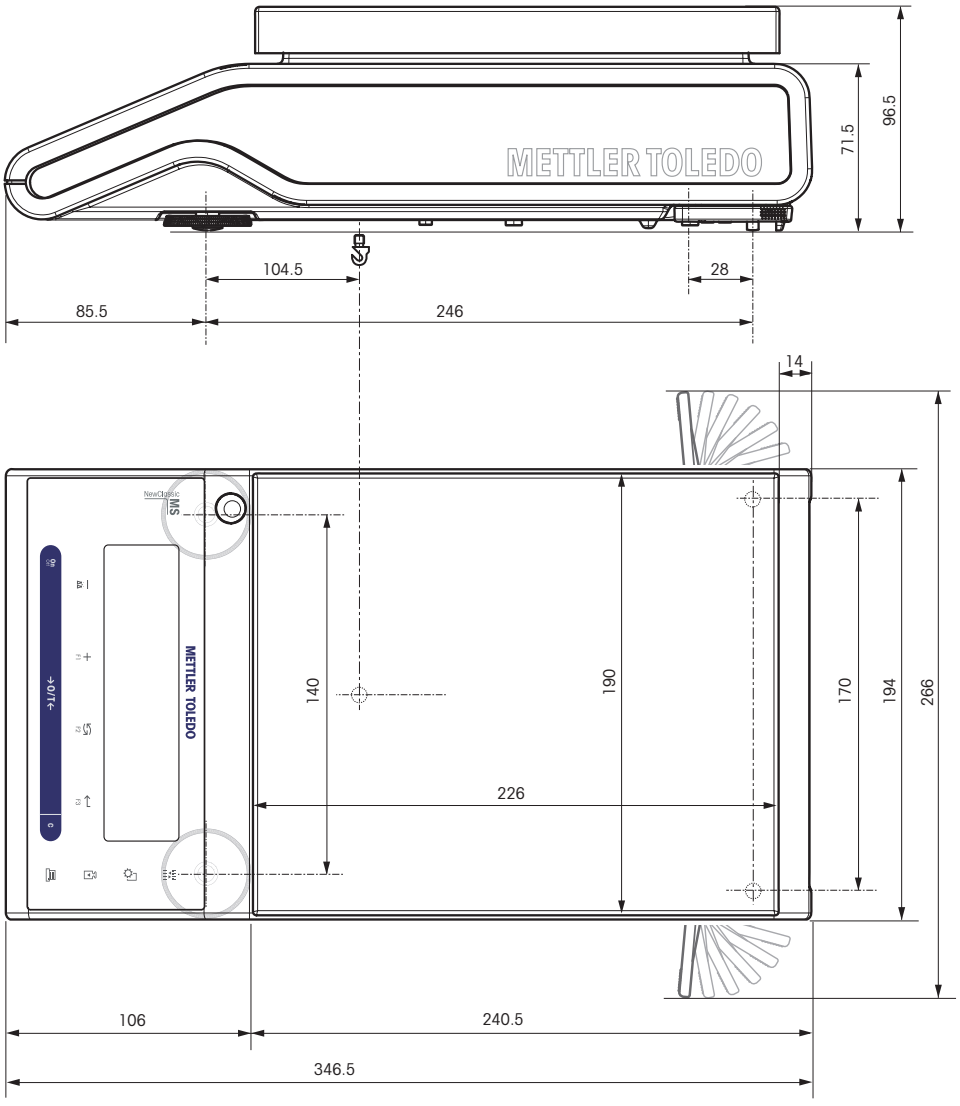
20.3.3 Balances with Readability of 0.01 g, S Platform

Models:
MS1602S
MS1602SE
MS3002S
MS3002SE
MS4002S
MS4002SDR
MS6002S
MS6002SDR



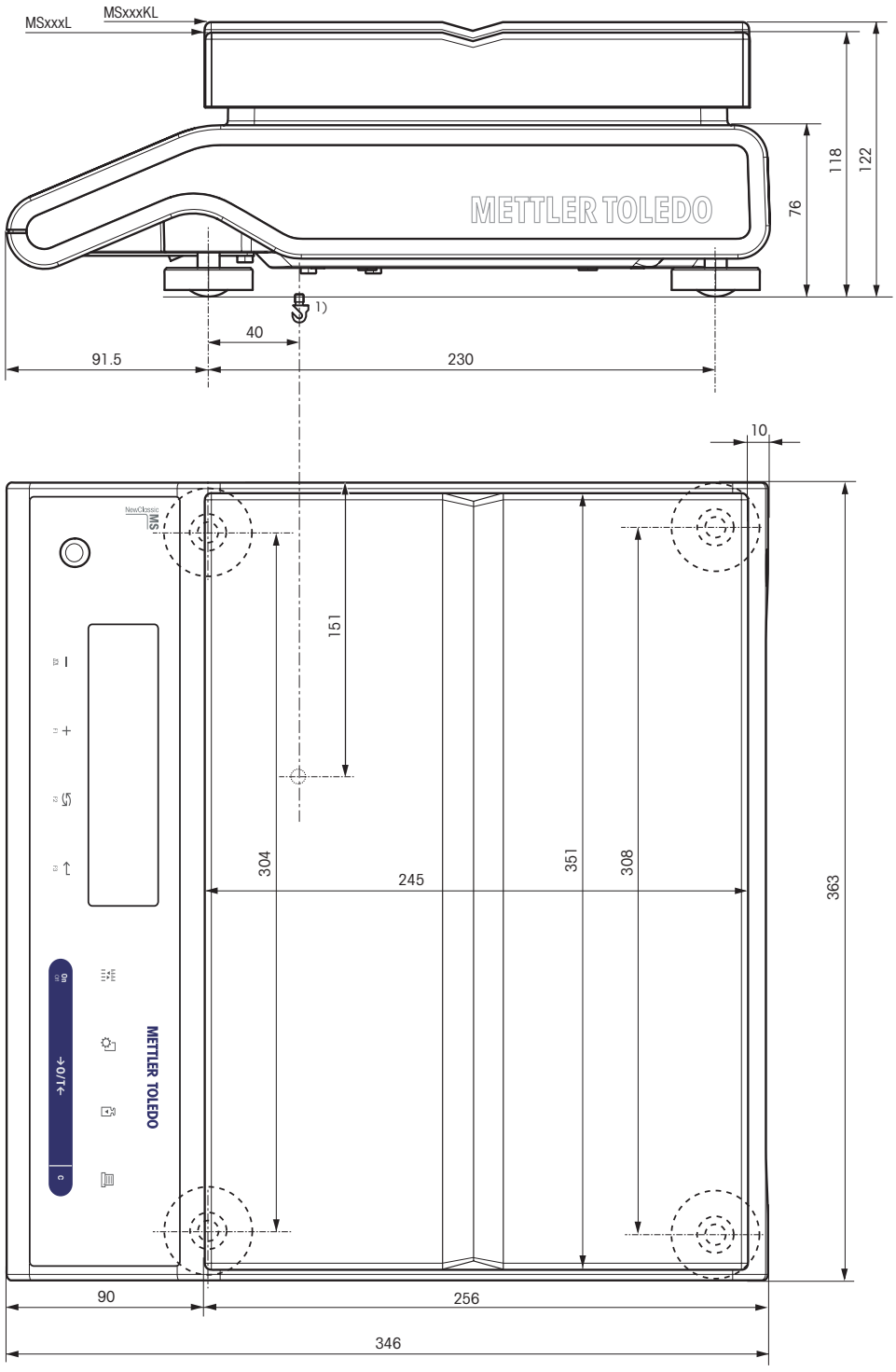
20.3.4 Balances with Readability of 0.1 g, S Platform

Models:
MS6001S
MS8001S
MS8001SE



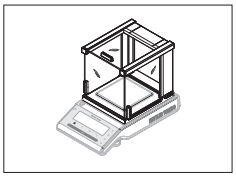
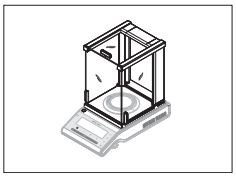
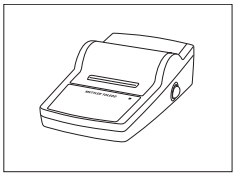
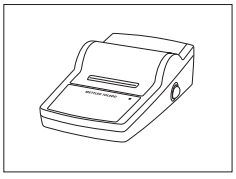
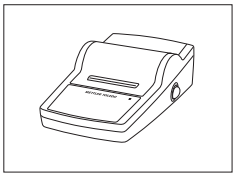
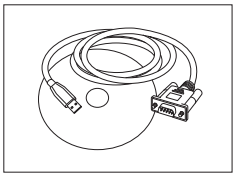
20.3.5 Balances with Readability of 0.1 g to 5 g, L Platform

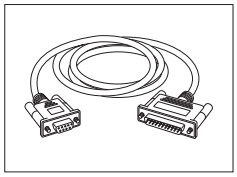
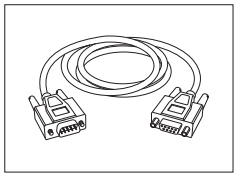
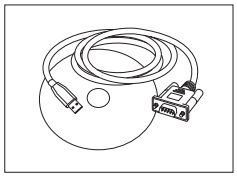
Models:
MS12001L
MS16001L
MS16001LE
MS32001L
MS32001LE
MS30000LE
MS32000LE
MS15KLE
MS15KLIPE
MS24KLIPE
MS30KLE



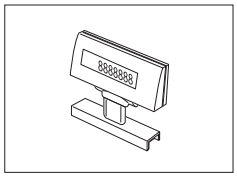
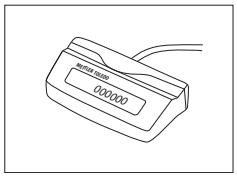
21 Accessories and Spare Parts

21.1 Accessories

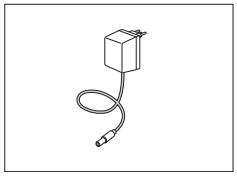
	Description	Part No.
Draft Shields		
	Draft shield with sliding doors "mg" (165 mm)	12122405
	Draft shield with sliding doors "0.1 mg" (237 mm)	12122404
Printers		
	RS-P25 printer with RS232C connection to balance	11124300
	RS-P26 printer with RS232C connection to balance (with date and time)	11124303
	RS-P28 printer with RS232C connection to balance (with date, time and applications	11124304
Cables for RS232C Interface		
	RS232 - USB converter – intelligent expansion module for connection to PC	11103691

	RS9 – RS25 (m/f): connection cable for PC, length = 2 m	11101052
	RS9 – RS9 (m/m): connection cable for devices with DB9 (f) socket, length = 1 m	21250066
	RS232 - USB converter – intelligent expansion module for connection to PC	11103691

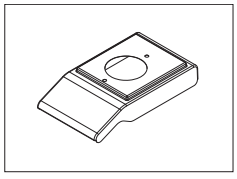
Auxiliary Displays

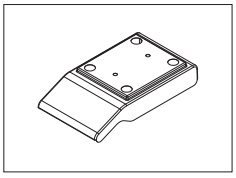
	LC/RS-BLD auxiliary display on bench stand, backlit (incl. RS cable and separate AC adapter)	00224200
	RS232 auxiliary display	12120057

AC Adapters

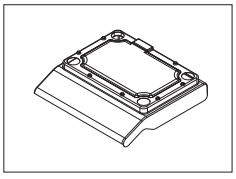
	AC universal adapter (EU, USA, AU, UK) 100–240 VAC, 50/60HZ, 0.3 A, 12 V 0.84 A	11120270

Protective Covers

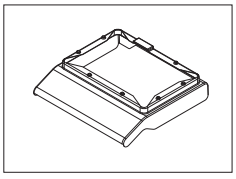
	Protective cover for models MS-S with draft shield	12121850



Protective cover for models MS-S without draft shield 12121851

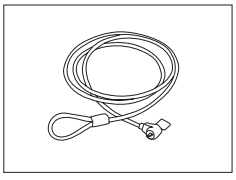


Protective cover for models MS-L up to "1 g" 12121852



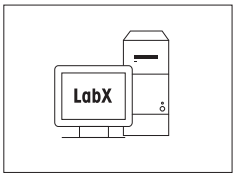
Protective cover for models MS-L "2–5 g" 12121853

Anti-theft Devices



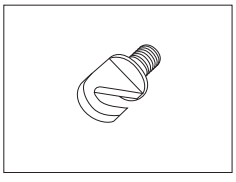
Steel cable 11600361

Software



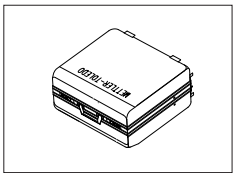
LabX direct balance (simple data transfer) 11101052

Weighing Below the Balance



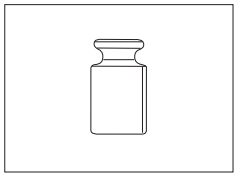
Hook for Platform L 11132565

Transport Cases



Transport case for S platform balances 11124245

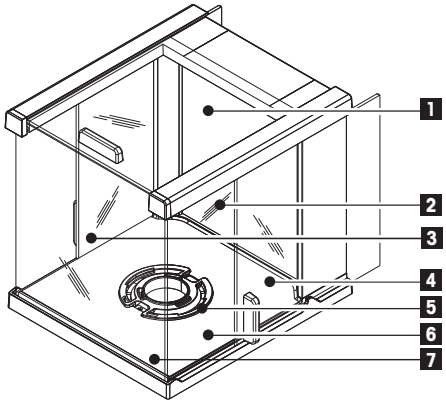
Adjustment Weights



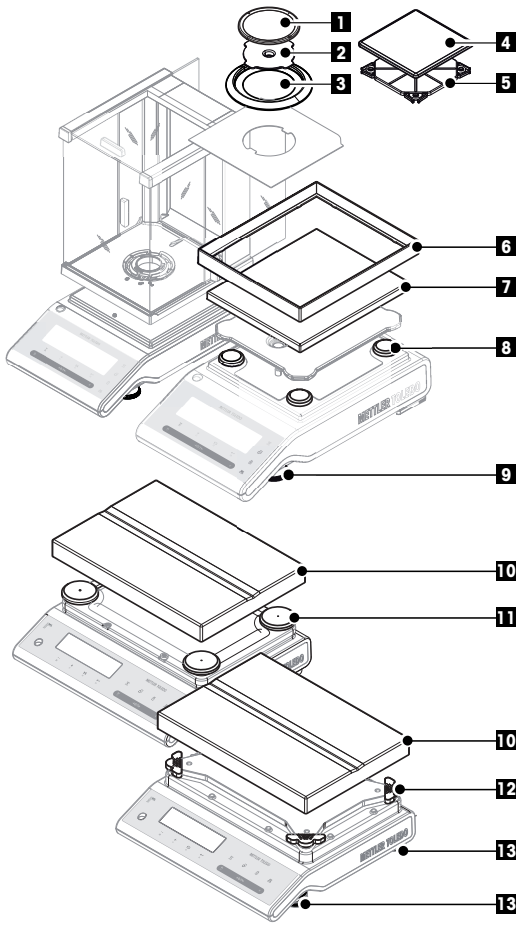
OIML / ASTM Weights (with calibration certificate) see **www.mt.com/weights**

21.2 Spare Parts

Draft Shield

Drawing	Pos	Description	Part No.
	5	Draft shield lock	12122013
	6	Bottom plate	12122019
	Draft Shield "165 mm"		
	1	Top glass with handle	12121884
	2	Rear glass low	12122015
	3	Side glass door left low with handle	12121881
	4	Side glass door right with handle	12121883
	5	Front glass low	12122014
	Draft Shield "237 mm"		
	1	Top glass with handle	12121884
	2	Rear glass high	12122012
	3	Side glass door left high with handle	12121880
	4	Side glass door right high with handle	12121882
	5	Front glass high	12122011

Weighing Pans / Draft Shield Elements / Support

Drawing	Pos	Description		Part No.
	**For S platform**			
	1	0.1 mg	Weighing pan Ø 90 mm	12122010
	2	0.1 mg	Pan support	12122007
	3	0.1 mg	Draft shield element	12122008
	4	1 mg	Weighing pan 127x127 mm	12122009
	5	1 mg	Pan support for models up to 999 g	12122017
	5	1 mg	Pan support for models from 1000 g	12122016
	6	10 mg	Draft shield element	12122018
	7	10 mg	Weighing pan 170x200 mm	12122003
	7	0.1 g	Weighing pan 190x226 mm	12122004
	8	from 10 mg	Pan support caps	12122005
	9	Leveling foot		12122002
	For L platform			
	10	Weighing pan 246x352 mm		12122020
	11	to 1 g	Pan support caps	12122001
	12	from 2 g	Pan support caps	12122006
	13	Leveling foot		12122000

22 Appendix

22.1 Conversion Table for Weight Units

Kilogram	1 kg	=	1000.0	g	1 g	=	0.001	kg
Milligram	1 mg	=	0.001	g	1 g	=	1000.0	mg
Microgram	1 µg	=	0.000001	g	1 g	=	1000000.0	µg
Carat	1 ct	=	0.2	g	1 g	=	5.0	ct
Pound	1 lb	=	453.59237	g	1 g	≈	0.00220462262184878	lb
Ounce (avdp)	1 oz	=	28.349523125	g	1 g	≈	0.0352739619495804	oz
Ounce (troy)	1 ozt	=	31.1034768	g	1 g	≈	0.0321507465686280	ozt
Grain	1 GN	=	0.06479891	g	1 g	≈	15.4323583529414	GN
Pennyweight	1 dwt	=	1.55517384	g	1 g	≈	0.643014931372560	dwt
Momme	1 mom	=	3.75	g	1 g	≈	0.266666666666667	mom
Mesghal	1 msg	≈	4.6083	g	1 g	≈	0.217	msg
Tael Hong Kong	1 tlh	=	37.429	g	1 g	≈	0.0267172513291833	tlh
Tael Singapore (Malaysia)	1 tls	≈	37.7993641666667	g	1 g	≈	0.0264554714621853	tls
Tael Taiwan	1 tlt	=	37.5	g	1 g	≈	0.0266666666666667	tlt
Tola	1 tola	=	11.6638038	g	1 g	≈	0.0857353241830079	tola
Baht	1 baht	=	15.16	g	1 g	≈	0.0659630606860158	baht

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- comply with the most common regulatory requirements

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Subject to technical changes
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