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1 Introduction

Thank you for choosing a METTLER TOLEDO balance. The precision and analytical balances of the MS-TS line combine a large number of weighing possibilities with easy operation.

These operating instructions apply to all balance models of the MS-TS line and are based on the initially installed firmware (software) version V 3.20.

► www.mt.com/balances

1.1 Conventions and symbols used in these operating instructions

Key and button designations are indicated by a picture or text in square brackets (e.g. **[Weighing]**).

These symbols indicate an instruction:

- prerequisites
- 1 steps
- 2 ...
- ⇒ results

2 Safety Information

2.1 Definition of signal warnings and symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

WARNING	for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	for a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.
Attention	(no symbol) for important information about the product.
Note	(no symbol) for useful information about the product.



General hazard



Electrical shock

2.2 Product safety information

Intended use

Your balance is used for weighing. Use the balance exclusively for this purpose. Any other type of use and operation beyond the limits of technical specifications without written consent from Mettler-Toledo AG, is considered as not intended.



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

General safety information

This balance complies with current industry standards and the recognized safety regulations; however, it can constitute a hazard in use. Do not open the balance housing: The balance contains no user-serviceable parts. In the event of problems, please contact a METTLER TOLEDO representative.

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

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

Staff safety

These operating instructions must be read and understood before using the balance. These operating instructions must be retained for future reference.

The balance must not be altered or modified in any way. Only use METTLER TOLEDO original spare parts and accessories.

Safety notes



CAUTION

Damage to the balance

- a) Only use indoors in dry locations.
 - b) Do not use pointed objects to operate the touch screen!
The balance is of a very sturdy design, but is still a precision instrument. It must be handled with care.
 - c) Do not open the balance:
The balance contains no user-serviceable parts. In the event of problems, please contact a METTLER TOLEDO representative.
 - d) Only use METTLER TOLEDO original accessories and peripheral devices for the balance.
These are specifically designed for the balance.
-



⚠ WARNING

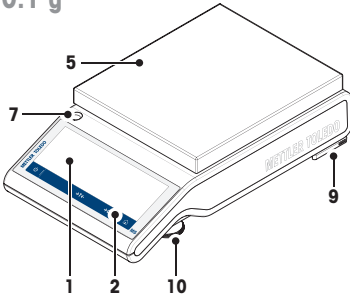
Risk of electric shock

Use only the original universal AC/DC adapter delivered with your balance, and check that the voltage printed on it is the same as your local power supply voltage. Only plug the adapter into a socket which is grounded.

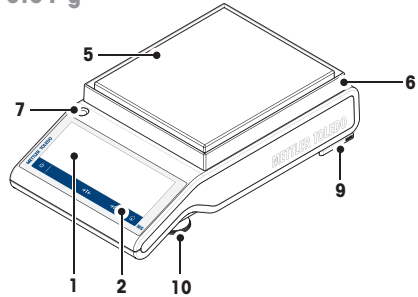
3 Design and Function

3.1 Components

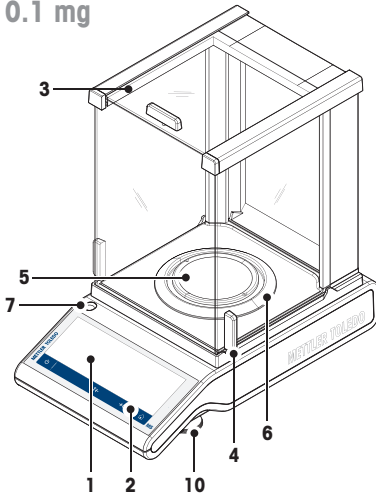
0.1 g



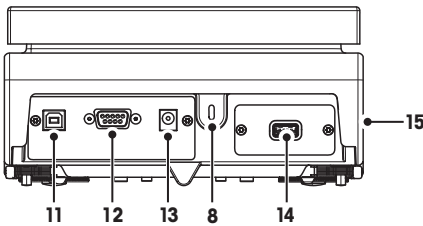
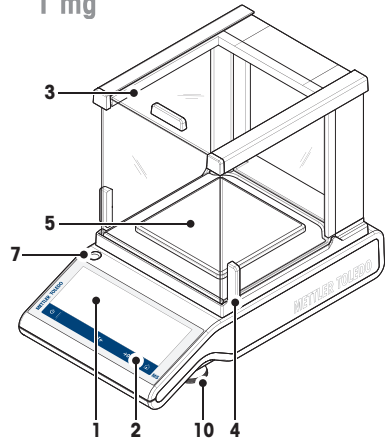
0.01 g



0.1 mg

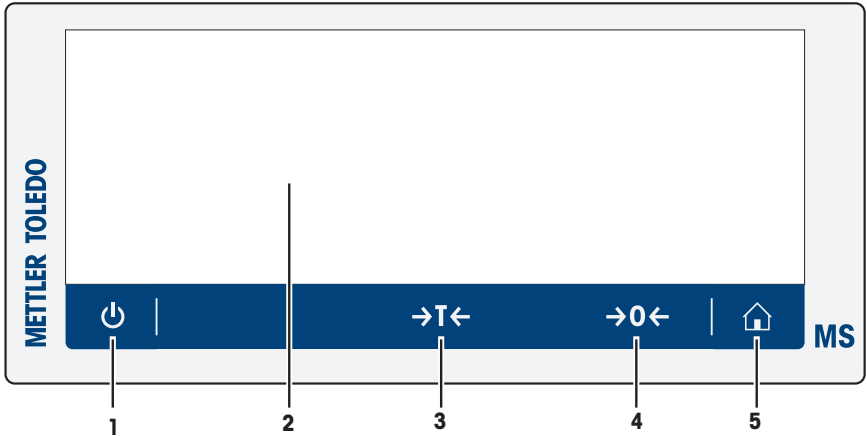






1 mg



- 1 Capacitive color TFT touch screen
- 2 Operation keys
- 3 Glass draft shield
- 4 Handle for operation of the draft shield door
- 5 Weighing pan
- 6 Draft ring
- 7 Level indicator
- 8 Kensington slot for anti-theft purposes
- 9 Safety feet (with 0.01 g and 0.1 g models)
- 10 Leveling foot
- 11 USB Device connection
- 12 RS232C serial interface
- 13 Socket for AC/DC adapter
- 14 USB Host connection
- 15 Product label

3.2 Keys on the terminal



No.	Key	Name	Explanation
1		ON/OFF	To switch the instrument on or off.
2		Capacitive color TFT touch screen	General navigation
3		Tare	To tare the scale.
4		Zero	To zero the scale.
5		Home	To return from any menu level, or other window to the application home screen.

3.3 User Interface

The screen is a capacitive color TFT touch screen. The screen not only displays information, it also allows you to enter commands by tapping on certain areas on its surface. You can choose the information displayed on the screen, change terminal settings or perform certain operations on the instrument.

Only those elements which are available for the current dialog appear on the display.




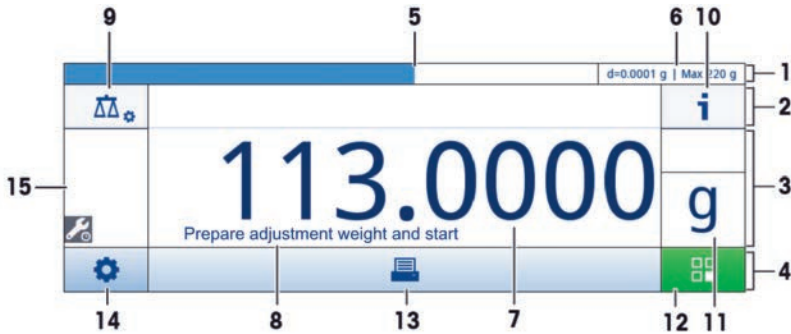
CAUTION

Do not touch the touch screen with pointed or sharp objects!

This may damage the touch screen.

3.3.1 Application home screen

The application home screen appears after the startup of the instrument. It is always the last application that was used before the balance was switched off. The application home screen is the main screen of the balance, from where every function can be accessed. You can always return to the application home screen by tapping on the home button [] in the right bottom corner.



Information and work bars

	Name	Explanation
1	Weighing information bar	Shows the weighing-in aid and general balance information.
2	Work title bar	Shows information about the current activity.
3	Value bar	Shows information about the current weighing process.
4	Main navigation	Work-related functions.

Information fields

	Name	Explanation
5	Weighing-in aid	A dynamic graphic indicator showing the used amount of the total weighing range.
6	Short balance information	Readability and maximum capacity of the balance.*
7	Weighing value field	Shows the value of the current weighing process.
8	Coach text field	Shows instructions to the current weighing process.

* For approved balances: **Min** (minimum capacity) and **e** (Verification scale interval) are shown in the left upper corner.

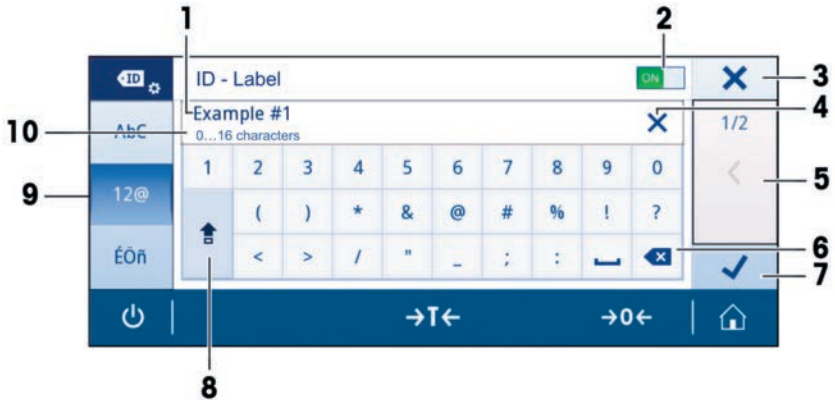
Action buttons

	Name	Explanation
9	Application main configuration	To configure the current application (e.g. Weighing).
10	Detailed balance Information	Shows detailed technical data of the balance.
11	Weighing unit	Shows the unit of the current weighing process.
12	Activities	To open the activities selection.
13	Print	To produce a print.
14	Settings/Preferences	To configure the quick settings/preferences.
15	Status information field	Shows information about the system status.

3.3.2 Input Dialogs

3.3.2.1 Entering Text and Numbers

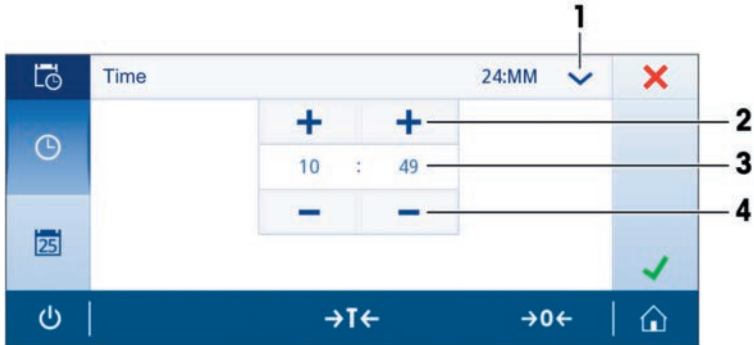
The keyboard dialog allows you to enter characters including letters, numbers and a variety of special characters.



	Name	Explanation
1	Input field	Shows the characters that have been entered.
2	Switch	If a switch appears located on the right side in the content title bar, it must be switched on for entering a value.
3	Discard	To discard the entered data and to exit the dialog.
4	Delete all	To delete every entered character.
5	Scroll	To navigate when the dialog consists of several steps.
6	Delete	To delete the last entered character.
7	Confirm	To confirm the entered data.
8	Shift	To enter lower or upper case letters.
9	Specialized tabs	To switch the keyboard mode for entering letters, numbers or special characters.
10	Explanation field	Extra information about the value to enter (e.g. the maximum number of characters).

3.3.2.2 Changing time and date

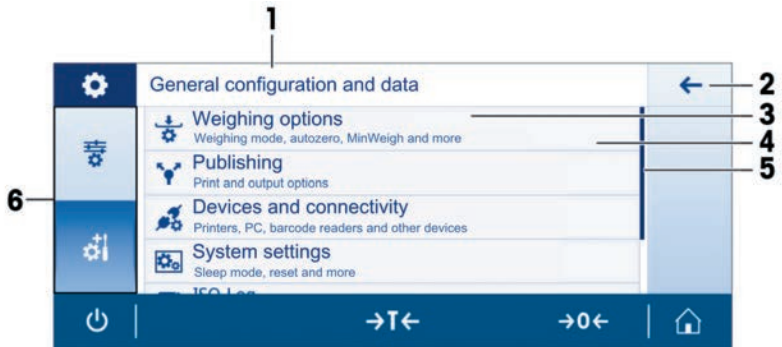
The dialog (Picker view) allows you to set the time/date.



	Name	Explanation
1	Change time/date format	Different time/date formats can be chosen.
2	Pick button	Increment
3	Picker field	Shows the chosen time/date.
4	Pick button	Decrement

3.3.3 Lists and tables

Basic elements of a simple list includes a content title and a list of the sub-elements. Tapping on an element opens a list of sub-elements or an input dialog.



	Name	Explanation
1	List title	Title of the current list
2	Back button	Goes one step back.
3	List element title	Title of the list element
4	List element description	Shows the sub-elements.
5	Scroll position	The list can be scrolled.
6	Selection bars	Shows bars of the selectable sub-categories.

4 Installation and Putting into Operation

In this section you will find information how to put your new instrument into operation.

4.1 Scope of delivery

Components		0.1 mg	1 mg	0.01 g	0.1 g
Draft shield	236 mm	✓	–	–	–
	168 mm	–	✓	–	–
Weighing pan	∅ 90 mm	✓	–	–	–
	127 x 127 mm	–	✓	–	–
	170 x 200 mm	–	–	✓	–
	190 x 226 mm	–	–	–	✓
Draft shield element		✓	–	✓	–
Pan support		✓	✓	✓	✓
Bottom plate		✓	✓	–	–
ESD plate		–	–	✓	✓
Protective cover		✓	✓	✓	✓
Universal AC/DC adapter (country specific)		✓	✓	✓	✓
AC/DC adapter (without power cable)		✓	✓	–	–
Operating instructions printed or on CD-ROM depending on the country		✓	✓	✓	✓
Quick guide		✓	✓	✓	✓
EC declaration of conformity		✓	✓	✓	✓

4.2 Installing the components

Balances with readability of 0.1 mg and draft shield (236 mm)

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

Note

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

- 1 Turn draft shield lock (2) to position "U" (unlock).
- 2 Place draft shield on the balance.
- 3 Turn draft shield lock to "L" (lock) and place bottom plate (3).
- 4 Place draft shield element (4) and weighing pan (6) with pan support (5).

Note

For cleaning the draft shield see section "Maintenance and cleaning".

Balances with readability of 1 mg and draft shield (168 mm)

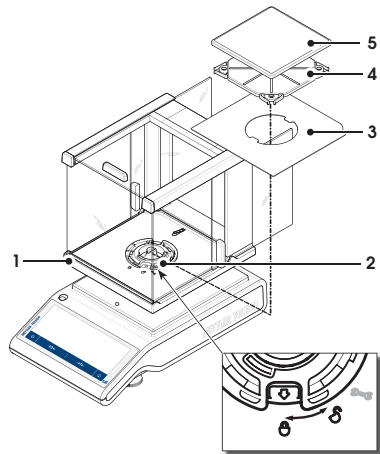
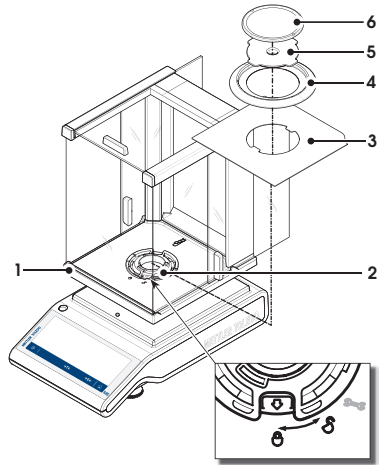
Place the following components on the balance in the specified order:

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

- 1 Turn draft shield lock (2) to position "U" (unlock).
- 2 Place draft shield on the balance.
- 3 Turn draft shield lock to "L" (lock) and place bottom plate (3).
- 4 Place weighing pan (5) with pan support (4).

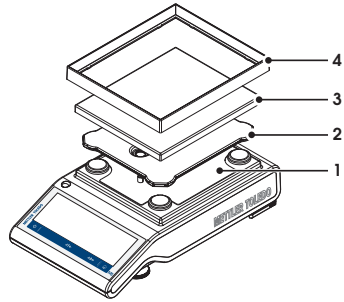
Note

For cleaning the draft shield see section "Maintenance and cleaning".



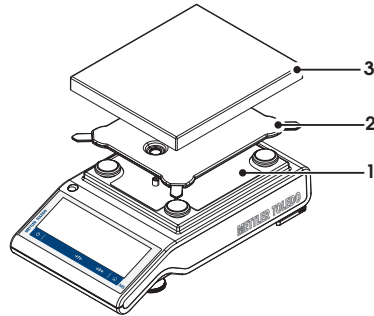
Balances with readability of 0.01 g

- Place the following components on the balance in the specified order:
 - ESD plate (1)
 - Pan support (2)
 - Weighing pan (3)
 - Draft shield element (4)



Balances with readability of 0.1 g

- Place the following components on the balance in the specified order:
 - ESD plate (1)
 - Pan support (2)
 - Weighing pan (3)



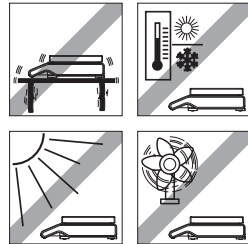
4.3 Selecting the location

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



4.4 Connecting instrument



⚠ WARNING

Risk of electric shock

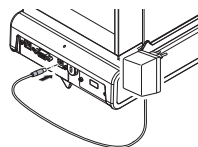
- a) To connect the balance, only use the supplied three-core power cable with equipment grounding conductor.
 - b) Only connect the balance to a three-pin power socket with earthing contact.
 - c) Only standardized extension cable with equipment grounding conductor must be used for operation of the balance.
 - d) Intentional disconnection of the equipment grounding conductor is forbidden.
-

Your balance is supplied with an country-specific AC/DC 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 detailed specifications, **see** Technical Data.

Attention:

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



Attention

- Check if your local power supply falls within this range. If this is not the case, under no circumstances connect the AC/DC adapter to the power supply, but contact a METTLER TOLEDO representative.
- The power plug must be accessible at all times.
- Prior to use, check the power cable for damage.
- Route the cable in such a way that it cannot be damaged or cause a hindrance when working.
- Ensure that no liquid comes into contact with the AC/DC adapter.

4.5 Leveling the balance

Exact horizontal positioning and stable installation are prerequisites for repeatable and accurate results.

Note

To compensate for small irregularities or inclinations ($\pm 2\%$) at the location, the instrument must be leveled and adjusted each time it is moved to a new location.

The balance can be levelled with the leveling assistant and/or with the level indicator on top of terminal. There are two adjustable leveling feet to compensate for slight irregularities in the surface of the weighing bench.

4.5.1 Levelling the balance with the level indicator

Every balance has a level indicator with an air bubble to level the balance manually.

Leveling balances with readability of 0.1 mg and 1 mg

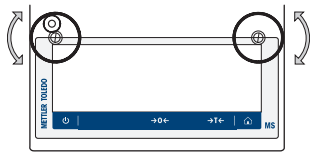
- Adjust the two leveling feet appropriately until the air bubble comes to rest exactly in the middle of the glass:

Air bubble at "12 o'clock" turn both feet clockwise.

Air bubble at "3 o'clock" turn left foot clockwise, right foot counterclockwise.

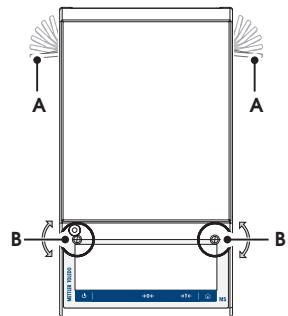
Air bubble at "6 o'clock" turn both feet counterclockwise.

Air bubble at "9 o'clock" turn left foot counterclockwise, right foot clockwise.





Leveling balances with readability of 0.01 g and 0.1 g

- Remove the clamps (A) for the safety feet by turning them outwards.
- Turn the clamps (A) outwards as far as they will go ($\sim 90^\circ$), so that the safety feet can move freely.
- 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).
- Secure the safety feet by turning the clamps (A) inwards as far as they will go.



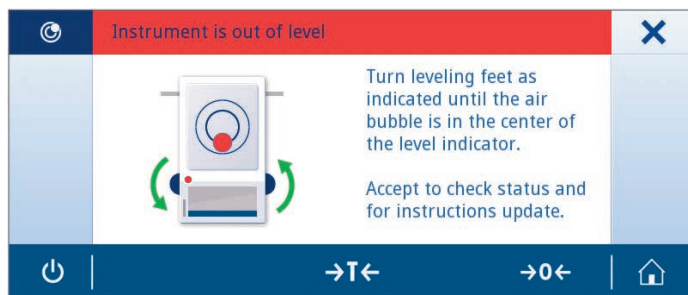
4.5.2 Leveling the balance with the leveling assistant

When the balance was switched on at its new location, the symbol  **The instrument is out of level** appears in the status information field at the left side of the screen.

- 1 Tap on [].
⇒ The window **Notifications** opens.
- 2 Select **The instrument is out of level**.
⇒ The function **Leveling assistant** opens.

The function **Leveling assistant** is a step-by-step guidance that helps you leveling your balance.

Navigation: [] **Quick settings/Preferences** > [] **Leveling assistant**



When the instruction is done and accepted, the leveling assistant will proceed with the next steps. Follow the steps until the balance is levelled again.

Note

Always use the air bubble of the level indicator as reference indicator, see section Levelling the balance with the level indicator (page 20)).

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



CAUTION

For balances with a draft shield:

Never lift the balance by the glass draft shield. The draft shield is not sufficiently fastened to the balance.

Transporting over long distances



CAUTION

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

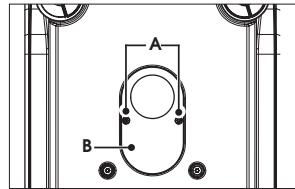
4.7 Weighing below the balance

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

CAUTION

- 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.

- 1 Switch off the balance and remove the power cable and any interface cable from the balance.
- 2 Remove the draft shield element (10 mg models).
- 3 Remove the weighing pan and pan support.
- 4 Remove the bottom plate and unlock the draft shield (models with draft shield). Carefully lift the draft shield from the weighing platform and put it aside.
- 5 Turn the balance carefully on its side.
- 6 Remove and retain the 2 screws (A) and the cover plate (B). The hanger is now accessible.
- 7 Then turn the balance to its normal position and simply reinstall all components in the reverse order.



4.8 General requirements

4.8.1 Warming up the balance

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

- 30 minutes on balances with a readability of 1 mg (0.01 ct) to 5 g.
- 60 minutes on balances with a readability of 0.1 mg (0.001 ct) and better.

4.8.2 Adjusting the balance

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

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

5 Weighing made simple

This section describes how to make a simple weighing. In addition to that, the basic concept of the navigation and the basic functions of the balance will be explained.

5.1 Switching on the balance

- 1 Remove any load from the weighing pan.
- 2 Connect the balance via AC/DC adapter to the mains.
⇒ After the start screen disappeared, the balance starts with the application home screen.

Note

When the balance is switched on for the first time, the application home screen of **Weighing** opens. If the balance is switched on again, it always starts with the home screen of the application that was used before switching off.

5.2 Switching off the balance

- 1 Tap on [⏻] until the switch off dialogue appears on the screen.
- 2 Tap on [✓].
⇒ the balance switches off and goes into standby mode.

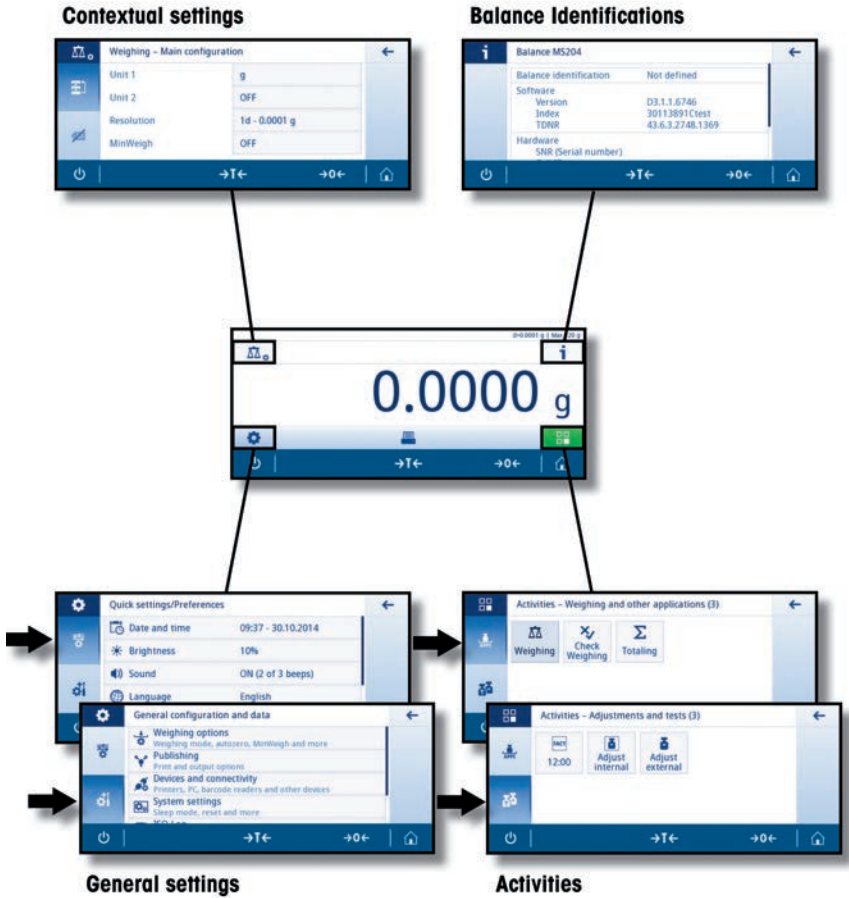
Note

- After switching on from standby mode, your balance needs no warm-up time and is immediately ready for weighing.
- If the balance has been switched off after a preselected time, the display is dimly lit and shows the time and the date.
- If the balance has been switched off manually, the display is off.

To completely switch off the balance, it must be disconnected from the power supply.

5.3 Main settings and activities at a glance

This picture gives you an overview of the main settings within an application (e.g. **Weighing**). Depending on the application, the content of the selectable options can differ. Every application is based on this concept.

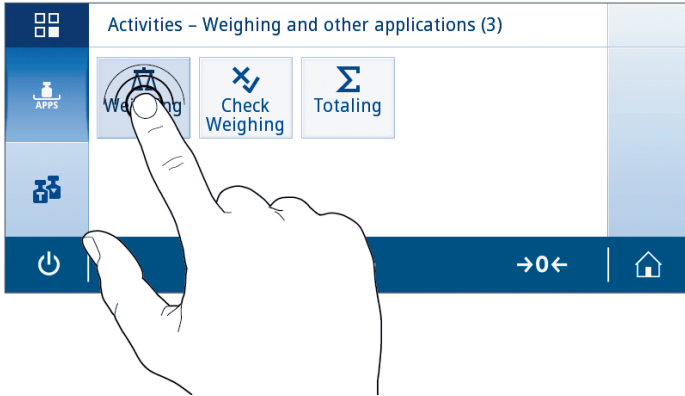


5.4 Navigation on the touch screen

To interact with the balance, use the screen and the operating keys at the bottom of the screen. The navigation on the screen is similar to the navigation of a smart phone or a tablet.

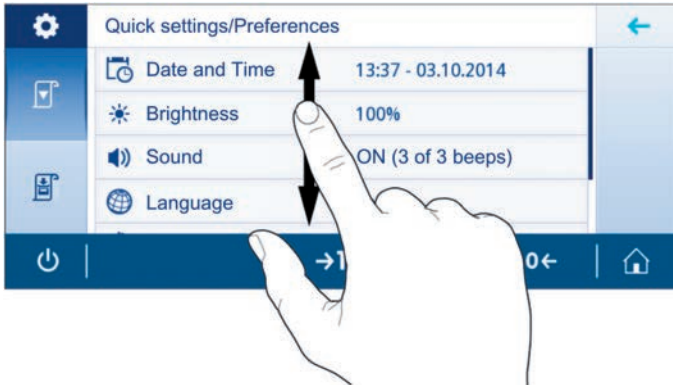
5.4.1 Opening an application

To open settings or applications, tap with your finger on the symbol of the application (e.g. [⚖️] **Weighing**).



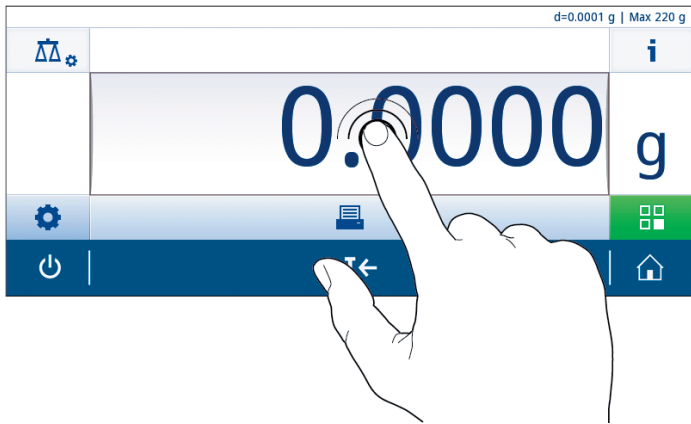
5.4.2 Scrolling

When the options are too numerous to be shown on one screen, a blue bar on the right side appears. That means you can scroll up and down. For scrolling, put your finger somewhere in the list and drag it up or down.



5.4.3 Using shortcuts

To simplify the navigation on the capacitive color TFT touch screen, there are a few shortcuts that allow quick access to the most important areas of the balance. The weighing value field on the application home screen for example works as shortcut (see picture below), so does the weighing unit next to the weighing value field. Depending on the activity, there are other shortcuts, that can be used.



Note

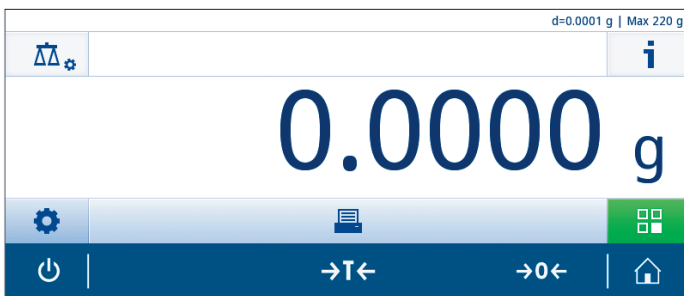
Every setting that can be changed directly via shortcut, can also be changed in the contextual settings of the current activity.

5.5 Performing a simple Weighing

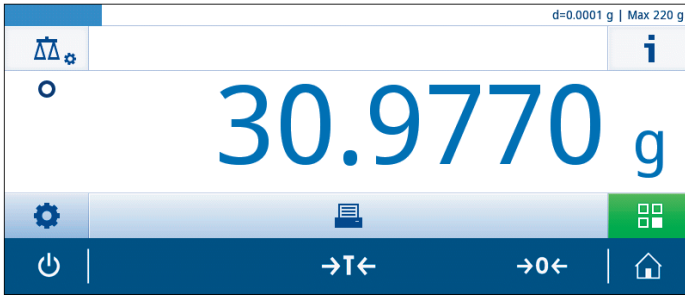
When you switch on the balance for the first time, the application home screen of **Weighing** opens automatically. When the balance was switched on already, the last used application before the balance was switched off opens. If another activity is running, end this activity and restart **Weighing**.

Navigation: [☰] > **Activities – Weighing and other applications** > [⚖️] **Weighing**

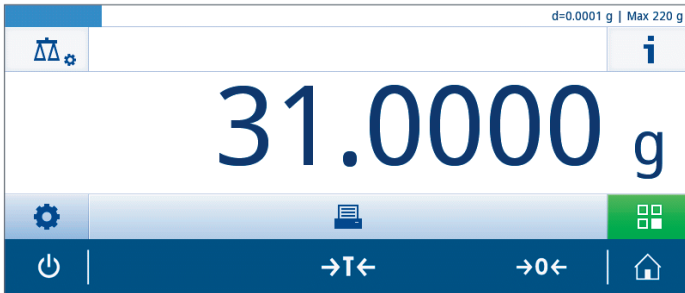
- 1 Tap on [→0←] to zero the balance or [→T←] to tare the balance.
⇒ The initial screen looks like follows:



- 2 Place a weighing sample on the weighing pan.
⇒ The instability detector symbol ○ appears and the value in the weighing value field becomes light blue.



⇒ After a short period of time, the weighing pan is stable. The unstability detector symbol **O** disappears and the value in the weighing value field becomes dark blue again.



⇒ The weighing process is finished. The result appears on the screen.

5.6 Switching the weighing unit

There are several weighing units available. The default value is country-specific.

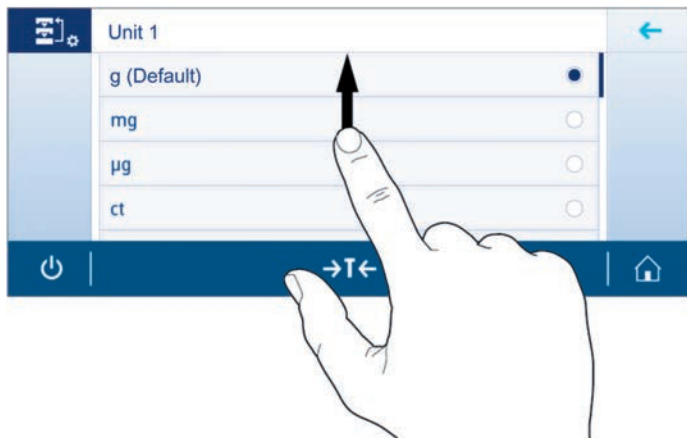
The weighing unit can be chosen via the contextual settings of the current application or via shortcut. This example describes how to change the weighing unit via shortcut.

- 1 Tap on the weighing process unit (shortcut) **gram 'g'**.

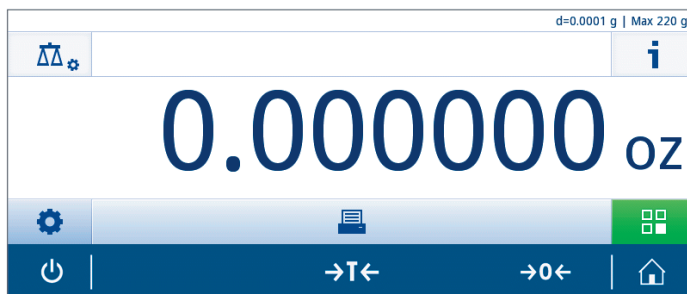


⇒ the screen **Unit 1** opens.

- Put your finger somewhere in the list and drag up to scroll down.



- Choose another weighing unit (e.g. **ounce 'oz'**) by tapping on it.
- Tap on [✓] to confirm the chosen weighing unit or tap on [✗] to dismiss the chosen weighing unit.



⇒ The weighing unit **gram 'g'** has been changed to **ounce 'oz'**.

Note

With approved balances, this menu topic has a fixed setting and cannot be changed.

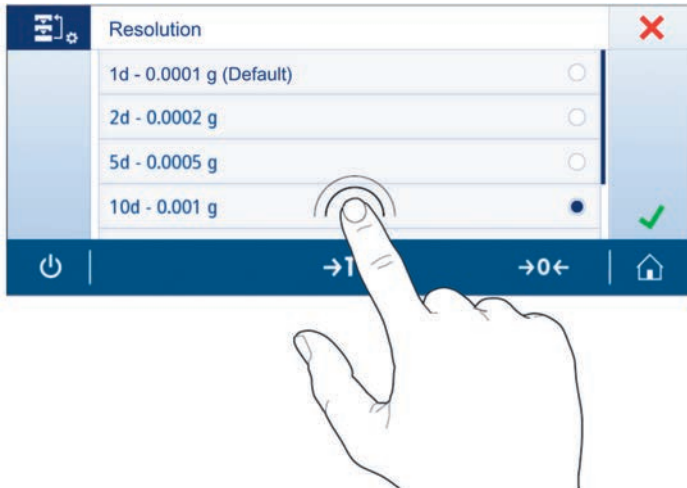
5.7 Changing the resolution

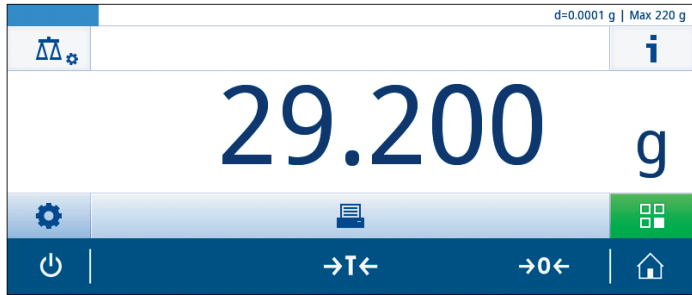
There are several resolutions available. The default resolution is device-specific. The resolution can be changed as follows:

- 1 Tap on the **Weighing value field**



- 2 Tap on **10d - 0.001 g**
- 3 Confirm the chosen resolution with ✓.





⇒ The resolution has been changed.

5.8 Zero setting

- 1 Unload the balance.
- 2 Tap on [→0←] to set the balance to zero.

All weight values are measured in relation to the zero point.


Note

Tap on [→0←] before you start with the weighing process.

5.9 Taring

- 1 Tap on [→0←] to set the balance to zero.
- 2 Place the empty container on the balance.
⇒ The weight is displayed.
- 3 Tap on [→T←] to tare the balance.
⇒ The display shows **Net** and **0.000 g**.

5.10 Closing an application

A current application can simply be closed by choosing another application or activity. Therefore, tap on  **Activities**.

5.11 Working with IDs

Identifications (IDs) must be defined in the contextual settings of an application. How the ID is used and which parameters of the ID can be defined differs depending on the application in which the ID is used.

Navigation:  > Open an application (e. g. **Weighing**) > Open the contextual settings of the application >  **Identifications**

Define an ID

- 1 Activate the function with the switch in the title bar.
- 2 Tap on [ID 1]
 - ⇒ The input dialog **ID 1** opens.
- 3 Activate the dialog with the switch in the title bar.
 - ⇒ The title bar shows **ID - Label**.
 - ⇒ Define **ID - Label**.
- 4 Confirm the definition by tapping on [✓].
 - ⇒ The input dialog **ID 1 - Value** opens.
- 5 Define **ID 1 - Value**.
- 6 Confirm the definition by tapping on [✓].
 - ⇒ The **Identifications** window opens showing the defined ID.
- 7 Tap on [✓] to accept the defined IDs.



Note

The maximal length of an ID is 16 characters.

5.11.1 Autoincrement


Autoincrement specifies some part of the ID that is being incremented with each use of that ID. There are two basic functions depending on how the ID is defined:

- If there is no counter in the ID, the system automatically adds a counter to the ID starting by -1 (e.g. the ID **Process** will be **Process-1** in the next use).
- If a counter is part of the ID, the system automatically increments the ID starting at that counter (e.g. the ID **Process 1** will be **Process 2** in the next use).

Note

- The counter must be set at the end of the ID, otherwise the system doesn't recognize the number as a counter (e.g. in **567Apple** the system doesn't recognize **567** as a counter).
- If the ID has no counter and a maximal length of 16 characters, the last few characters will be overwritten by the counter.

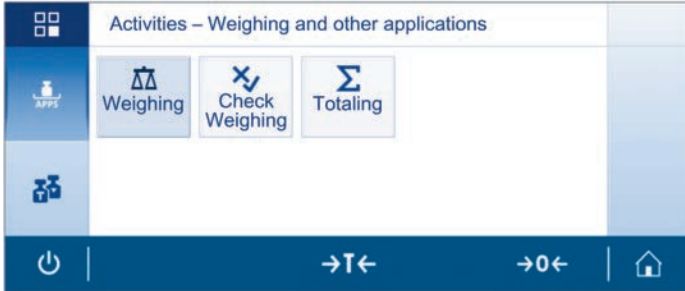
6 Activities

The **Activities** can be opened by tapping on  **Activities**. The icon is placed between the weighing process unit and the home button in the right corner of the current home application screen.

The **Activities** have the following two sub-sections:

- **Activities – Weighing and other applications**
- **Activities – Adjustments and tests**

6.1 Activities - Weighing and other applications



Activities – Weighing and other applications implies the following applications:

- **Weighing** see at section Weighing made simple (page 24)
- **Check Weighing** see at section Check Weighing (page 35)
- **Totaling** see at section Totaling (page 39)

6.1.1 Check Weighing

The application **Check Weighing** allows to check the deviation of a sample weight within a tolerance limit to a reference target weight. The target weight can be determined manually or by weighing, the tolerance limit must be defined manually.

Navigation: [☰] > **Activities – Weighing and other applications** > [⌘] **Check Weighing**

Before performing a Check Weighing

When the application is starting for the first time, the weighing value field is all red. That is because the relevant parameters haven't been defined yet. Before performing a check weighing, the following parameters must be defined first:

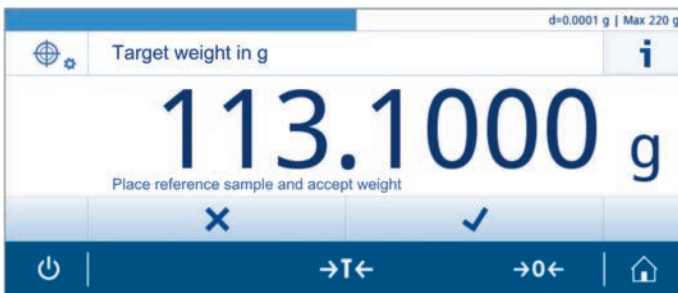
- **Target weight**
- **± Tolerance limits**

Defining the target weight manually by entering the nominal weight

- 1 Tap on [⌘] **Check weighing - Main configuration**.
- 2 Tap on [**Target, tolerance**].
- 3 Tap on [⊕] **Target weight**.
- 4 Delete the default value by tapping on [✕].
- 5 Enter the nominal weight.
⇒ Tap on [✓] to confirm the defined nominal weight.

Defining the target weight by weighing

- 1 Tap on [⌘] **Check weighing - Main configuration**.
- 2 Tap on [**Target, tolerance**].
- 3 Tap on [⊕] **Target weight**.
- 4 Tap on [⚖] to open the weighing dialog.
- 5 Place the reference weight on the weighing pan and wait until the unstability detector symbol ○ disappears.
- 6 Tap on ✓ to accept the defined target weight.



Defining the lower and upper limits manually by entering a percentage value or weight

- 1 Tap on [%] **Check weighing - Main configuration.**
- 2 Tap on [**Target, tolerance**].
- 3 Tap on [] **± Tolerance limits**
- 4 Delete the default value by tapping on [X].
- 5 Enter the tolerance limit.
- 6 Tap on [✓] to accept the new tolerance limit.

Performing Check Weighing

After defining the target weight and the tolerance limits, **Check Weighing** can be performed. The weighing-in aid at the top bar visualizes, if the weight sample is within the defined tolerances.

In this example, the defined target weight is 100.000 g, the tolerance limit is $\pm 2.5\%$. The sample weight is 97.0000 g.

- Put the target weight on the weighing pan.
 - ⇒ The weight is stable and the instability detector symbol \odot disappears.
 - ⇒ The value is out of tolerance, the weighing-in aid bar and the weighing value field are red.



In this example, the defined target weight is still 100.000 g and the tolerance limit is $\pm 2.5\%$. The sample weight is 99.0000 g.

- Place the sample weight on the weighing pan.
 - ⇒ The weight is stable and the instability detector symbol \odot disappears.
 - ⇒ The value is within tolerances, the weighing-in aid bar and the weighing value field are green.



Check weighing - Main configuration

You can define the following parameters:

Parameter	Explanation	Values
Target, tolerance	Defines the target weight in the defined unit and its tolerance limits in %.	Target weight: 100 g* ± Tolerance limits: 0.10...100 (2.5 %*)
Within tolerance beeps	Defines the acoustic signal when the result is within the tolerance.	OFF* ON
Unit 1	Defines the unit of the weighing process.	g* mg µg ct N oz ozt GN dwt mom msg tth tis tft tcl tola baht lb:oz
Resolution	Defines the resolution of the weighing process.	1d - 0.0001 g* 2d - 0.0002 g 5d - 0.0005 g 10d - 0.001 g 100d - 0.01 g 1000d - 0.1 g

* Factory setting

Note

Unit 1: The selectable weighing units can differ depending on the balance model.

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

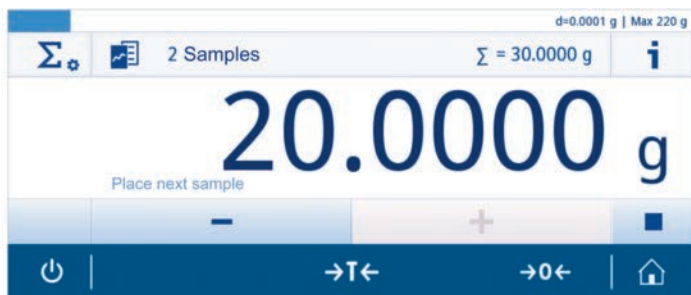
6.1.2 Totaling

Totaling allows to weigh different samples to add their weight values and to totalize them.

Navigation: [☰] **Activities** > [Activities – Weighing and other applications] > [Σ] **Totaling**

Performing Totaling

- 1 Tap on [→0←] to zero the balance.
- 2 If using a container: Place empty container on the weighing pan and tap on [→T←] to tare the balance.
- 3 Place the first weight on the weighing pan.
- 4 Wait until the unstability detector symbol ○ disappears.
⇒ When the balance is stable, the weighing value becomes dark-blue.
- 5 Tap on [+] to accept the weight and to start the procedure.
- 6 Place next sample weight on the weighing pan.
- 7 Tap on + to accept the second sample weight.
⇒ The work title bar shows the number of samples (2 samples) and the total weight of the samples ($\Sigma = 30.0000$ g).



- 8 To open the result view, tap on [☰] in the work title bar or tap on [■] and then tap on [☰] **View result**
⇒ The list shows every sample that has been weighted within the weighing process. The list can be published by tapping on the Printer symbol in the right bottom corner.

Totaling – Main configuration

The following parameter can be defined:

Parameter	Explanation	Values
Unit 1	Defines the unit of the weighing process.	g* mg µg ct N oz ozt GN dwt mom msg tlh tfs tft tcl tola bahf lb:oz
Resolution	Defines the resolution of the weighing process.	1d - 0.0001 g* 2d - 0.0002 g 5d - 0.0005 g 10d - 0.001 g 100d - 0.01 g 1000d - 0.1 g

* Factory settings

Note

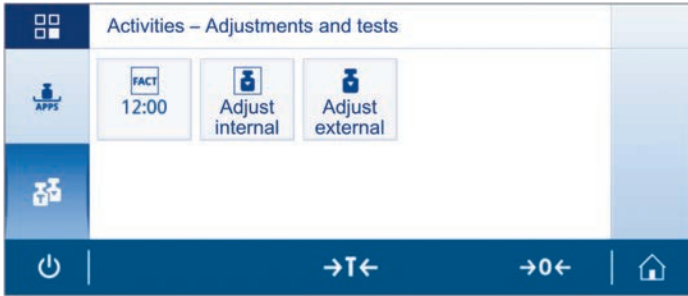
Unit 1: The selectable weighing units can differ depending on the balance model.

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

Terminate the application

- 1 Tap on [■].
- 2 Tap on [✕] **Discard data** or tap on [✓] **Finish and discard data (Autoprint)**.
⇒ The home screen of the application **Totaling** appears.

6.2 Activities - Adjustments and tests



Activities – Adjustments and tests contains the following elements:

- **FACT** see at section FACT Fully automatic adjustment (page 42)
- Internal Adjustment see at section Internal Adjustment (page 43)
- External Adjustment see at section External Adjustment (page 44)

6.2.1 FACT Fully automatic adjustment

FACT stands for **Fully Automatic Calibration Technology**. It is activated as default value.

FACT means, that the balance adjusts itself:

- in case the conditions change (temperature difference $> 2^{\circ}\text{C}$), which could lead to a noticeable deviation in the measurement.
- on a predefined day time set by the user.

Setting FACT

You can define the day time of FACT as follows:

- 1 Tap on **FACT** in the **Activities – Adjustments and tests** overview.
- 2 Activate **Fully automatic adjustment** with the switch at the right top corner.
 - ⇒ The **Fully automatic adjustment** dialog opens.
- 3 Select the time (hours : minutes) with the pick buttons.
- 4 Tap on [✓] to confirm the defined time.
 - ⇒ The time underneath **FACT** has been updated and shows the time of the daily adjustment.

6.2.2 Internal Adjustment

Note

The Internal Adjustment is available for models with internal weight only (see technical data).

Proceed an internal adjustment

- 1 Tap on [**Adjust internal**].
 - ⇒ The internal adjustment procedure starts. The coach text field shows **Adjustment ongoing, please wait...**



- ⇒ When the internal adjustment procedure is successfully completed, the results of the internal adjustment appear.
- 2 Tap on [**✓**] to confirm the results.

Note

If the balance is configured and connected to a printer, the results of the adjustment process are printed automatically.

See also

- Publishing (page 48)

6.2.3 External Adjustment

Note

Because of certification legislation, the approved balances can not be adjusted with an external weight (depending on the certification legislation of the selected country).

Performing an external adjustment

- 1 Tap on **Adjust external** in the **Activities – Adjustments and tests** overview.
⇒ The External Adjustment screen opens.
- 2 Tap on [↻] to define the adjustment weight according to the weight certificate.
- 3 Confirm the adjustment weight by tapping on [✓].
- 4 Prepare the adjustment weight and tap on [▶] to start the adjustment process.
- 5 Load the adjustment weight in the center of the weighing pan.
- 6 Unload the adjustment weight from the weighing pan.
⇒ After the adjustment process, The result screen is showing date and time and other information about the external adjustment.



7 General settings

This section describes, how to define the general settings.
The **General settings** are divided into two sub-sections:

- **Quick settings/Preferences**
- **General configuration and data**

7.1 Quick setting/Preferences

7.1.1 Date and time

In this menu topic, date and time can be defined. Switch between **Time** and **Date** by tapping on the bars on the left side. Tap on [☺] for **Time** and tap on [📅] for **Date**.

The following parameters can be defined:

Parameter	Explanation	Values
Time	Defines the time.	Hours Minutes
Time format	Defines the time format.	24:MM* 12:MM 24.MM 12.MM
Date	Defines the date.	Day Month Year
Date format	Defines the date format.	MMM DD YYYY* D.MMM YYYY MM/DD/YYYY MMM DD YYYY

* Factory setting

7.1.2 Brightness

In this menu topic the brightness can be defined.

Parameter	Explanation	Values
Brightness	Defines the level of brightness.	10...100 % (50 %*)

* Factory setting

7.1.3 Sound

In this menu topic, the sound can be defined.

Parameter	Explanation	Values
Stability beep	Notifies when an unstable weight becomes stable.	OFF Low Medium High
Workflow feedback beep	Notifies when zero/tare bar actions are not available, provides additional feedback in case of input errors, messages and status notifications.	OFF Low Medium High
Touch beep	Notifies every touch of interactive elements on touch display and zero/tare bar.	OFF Low Medium High

7.1.4 Language

The following languages can be chosen:

English
Deutsch
Français
Español
Italiano

Русский
Polski
Česky
Magyar
Nederlands

Português BRA.
中文
日本語
한국어/조선말

7.1.5 Glove mode

With the **Glove Mode** activated, the touch-screen is more sensitive and better to navigate when wearing gloves.

Parameter	Explanation	Values
Glove mode	Activate or deactivate the Glove mode .	ON OFF*

* Factory setting

7.1.6 Leveling assistant

The **Leveling assistant** helps to adjust the balance (e.g. when the balance has changed its location).

For more information, see section Leveling the balance with the leveling assistant (page 21).

7.2 General configuration and data

The following options are available:

- **Weighing options**
- **Publishing**
- **Devices and connectivity**
- **System settings**
- **ISO-log**
- **Access protection**

7.2.1 Weighing options

The following parameters can be defined:

Parameter	Explanation	Values
Weighing mode	Defines the weighing mode.	Universal* = for standard weighing applications Dosing = for dosing liquid or powdery samples
Environment	Adapts the balance to the environmental circumstances.	Standard* = for standard environments Unstable = for unstable environments Stable = for stable environments
Autozero	This menu topic allows to switch the automatic zero on or off.	ON* = Autozero is switched on. 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 is switched off. The zero point is not automatically corrected. This setting is advantageous for special applications (e.g. evaporation measurements).

* Factory setting

Note

Autozero is generally not available for approved balances (except some selected countries).

MinWeigh

MinWeigh notifies when a measurement value is not fulfilling the required weighing accuracy. The usage of MinWeigh is application-specific (contextual settings).

Defining the MinWeigh method

- 1 Tap on **MinWeigh**.
⇒ The dialog **MinWeigh configuration** opens.
- 2 Tap on **MinWeigh method**.
⇒ The dialog **MinWeigh method** opens.
- 3 Select method and confirm by tapping on [✓].

Depending on the chosen method, the selectable options in the dialog **MinWeigh configuration** vary.

The following methods are available:

- OIML
- Customized
- Certificate

7.2.2 Publishing

In this section, the print and output options can be defined.

Print

This option can be activated or deactivated with the switch in the work title bar.

The following parameters can be defined:

Parameter	Values
Single values	Manual, stable* = Print next stable weight at will Manual, all values = Print any stable or unstable weight at will Automatic, stable = Print next stable weight automatically
Workflow reports	Automatic* = Print on finishing Manual = Print at will and finish
FACT report	ON* OFF

* Factory setting

Printouts data (Weighing applications only)

The following parameter can be defined:

Parameter	Explanation	Values
Date, time	To add date and time.	ON OFF*
Balance information	To add information about the balance.	ON OFF*
Gross/Tare	To add gross/tare to single values.	ON OFF*
Signature line	To add the signature line.	ON OFF*
Empty lines	To add empty lines.	ON OFF*

* Factory setting

Send weight value

The option can be activated or deactivated with the switch in the work title bar.

The following parameters can be chosen:

Parameter	Description
Manual, stable	Send next stable weight at will
Manual, all values	Send any stable or unstable weight at will
Automatic, stable	Send next stable weight automatically
'Automatic, continuous'	'Send any stable or unstable weight automatically'

* Factory setting

Autopublish

The option **Autopublish** can be activated or deactivated with the switch in the work title bar.

A numerical value for the **Autopublish** can be defined.

7.2.3 Devices and connectivity

RS232

The following parameters can be defined:

Parameter	Values
Allocated device	RS-P2X P5X Printer Host* PC-Direct Second display
Baudrate	600 1200 2400 4800 9600* 19200 38400 57600 115200
Bit/Parity	8/No* 7/No 7/Mark 7/Space 7/Even 7/Odd
Stop bits	1 bit* 2 bits
Handshake	Xon/Xoff* RTS/CTS None
Character set	IBM/DOS* ANSI/WIN UTF-8

* Factory setting

USB Device

The following parameters can be defined:

Parameter	Values
Allocated device	Host* PC-Direct
Command set	MT-SICS* MT-PM Sartorius 16 Sartorius 22

* Factory setting

7.2.4 System settings

7.2.5 ISO-log

In this section, detailed history information about performed adjustments, intensity of use and settings can be displayed.

Information type	Explanation
Adjustments	Shows detailed information about the performed adjustments.
Balance	Shows detailed information about the balance history.
Settings	Shows detailed information about changes of the settings.

7.2.6 Access protection

With the function **Access protection**, certain functionalities of the balance can be protected by a numerical passcode.

The following parameters can be defined:

Parameter	Explanation	Values
Applications	To protect the application.	ON OFF*
Adjustments and tests	To protect adjustments and tests.	ON OFF*
Settings	To protect all settings.	ON OFF*
Passcode	To define the passcode by the user.	1....9 (1-16 digits)

* Factory setting

User passcode

The user passcode can be defined by the user. The default value is 12345678 and will automatically be reset after a factory reset. The length of the freely changeable user passcode is restricted to 16 digits.

Service passcode

The service passcode is a fixed passcode that can be obtained from the Mettler Toledo Balance support site or from a Mettler Toledo representative. It is used when the user passcode has been lost.

8 Communication with Peripheral Devices

8.1 Function PC-Direct

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

Note: The units will not be transferred.

Requirements

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

Settings at the balance:

CAUTION

Disconnect the USB connection from the balance prior to change the settings.

Balance Interface Settings (see Interface Menu):

- Topic **RS232** or **USB Device**: set **PC-Direct** and select the most appropriate option for the desired weighing result.
- Topic **End of line** (transmitted end of line character):
 - set **<TAB>** to write into the same row (e.g. in Excel).
 - set **<CR><LF>** to write into the same column (e.g. in Excel).
- Save changes.

Settings at the PC:

Installing SerialPortToKeyboard

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

Using CD-ROM

- 1 Insert the product CD in the CD/DVD drive of the host computer.
- 2 Double click the folder **SerialPortToKeyboard**.

Using internet

- 1 Go to the site <http://www.mettler-toledo-support.com>.
- 2 Log in to the METTLER TOLEDO Balance Support Site (registration with the serial number of a METTLER TOLEDO instrument required).
- 3 Click **Customer Support**
- 4 Click appropriate product folder and save the program file **SerialPortToKeyboard.exe** on your specified storage location.

Installation procedure

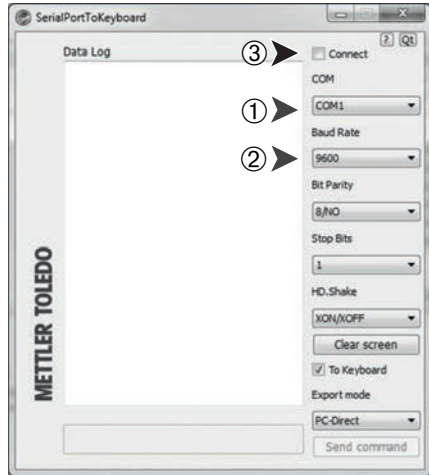
- 1 Right-click on **SerialPortToKeyboard.exe** and select **Run as Administrator** from the menu.
- 2 Follow the installer's instructions.

Settings for SerialPortToKeyboard

- 1 Select the serial port (COM) to be used for connection with the balance.
- 2 Set the baud rate to 9600.
- 3 Activate "Connect"

Note

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



Checking operation

- 1 Start **SerialPortToKeyboard** (RS232)
- 2 Start Excel (or another application) at the PC.
- 3 Activate a cell in Excel.

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

8.2 USB Device Interface

To perform the functionality **USB HOST** with a PC equipped only with a USB Interface, you have to assign an appropriate USB Driver on the PC first.

Requirements

- Balance with USB Device Interface.
- PC with one of the Microsoft Windows® operating system 32bit/64bit: XP (SP3), Vista (SP2), Win 7 (SP1) or Win 8.
- Administrator rights for installing software.
- PC to balance USB connection cable.

Installing USB driver on the PC:

Using CD-ROM

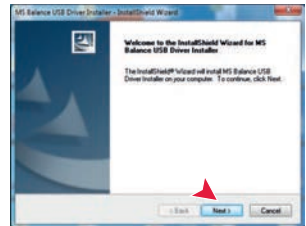
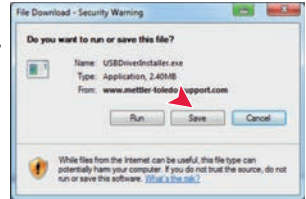
- 1 Insert the product CD in the CD/DVD drive of the host computer.
- 2 Double click the folder **USB Driver**.
- 3 Click **USBDriverInstaller.exe**.

Using internet

- 1 Connect to the Internet
- 2 Go to the site <http://www.mettler-toledo-support.com>.
- 3 Log in to the METTLER TOLEDO Balance Support Site (registration with the serial number of a METTLER TOLEDO instrument required).
- 4 Click **Customer Support**.
- 5 Click appropriate product folder.
- 6 Click **USB Driver**.
- 7 Click **USBDriverInstaller.exe**.

Installing procedure

- 1 Click **Save** to download to your specified location.
- 2 Right-click on the downloaded install program: **USBDriverInstaller.exe** and select **Run as Administrator** from the menu.
- 3 If a safety warning appears, allow Windows to install.
- 4 Click **Next** and follow the installer's instructions.

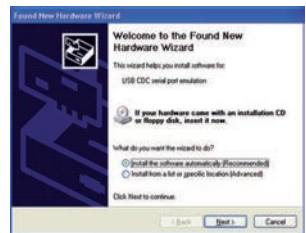


Installing instrument

- 1 Switch the balance **off**.
- 2 Connect the balance to the preferred USB Port on the PC.
- 3 Switch the balance **on**.
- 4 Follow the instructions of the Wizard and install the software automatically (recommended)

Note: The wizard appears again for each USB port, either on your PC or if another balance is connected.

Warning: Do not click **Cancel** as for the connected USB port, it might not be possible anymore to perform the installation process.



9 Firmware (Software) Updates

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

9.1 Operating principle

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

www.mettler-toledo-support.com

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

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

Note

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

Requirements

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

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

9.2 Update procedure

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

- 1 Connect to the Internet.
- 2 Go to the site <http://www.mettler-toledo-support.com>.
- 3 Log in to the **METTLER TOLEDO Balance Support Site** (registration with the serial number of a METTLER TOLEDO instrument required).
- 4 Click **Customer Support**.
- 5 Click appropriate product folder.
- 6 Click the firmware version (e-Loader II) you need and save it on your specified storage location.
- 7 Right-click on the **firmware SNxxx.exe** and select **Run as Administrator** from the menu.
- 8 Follow the installer's instructions.

Loading the new firmware into the balance.

- 1 Right-click on **METTLER TOLEDO e-Loader II** and select Run as Administrator from the menu.
- 2 Follow the instructions, which will take you step-by-step through the installation.

10 Maintenance



⚠ WARNING

Risk of electric shock

- The instrument must be disconnected from the power supply, before cleaning or other maintenance work to be performed.
- Use only the power cord from METTLER TOLEDO, if it needs replacing.

Please observe the following notes:

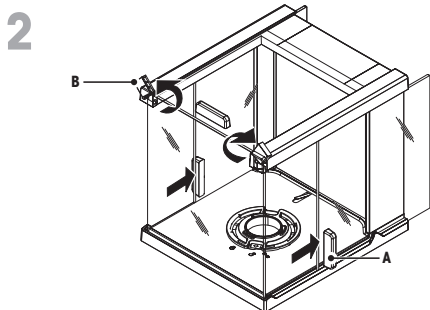
Note

On no account use cleaning agents which contain solvents or abrasive ingredients, as this can result in damage to the touch screen.

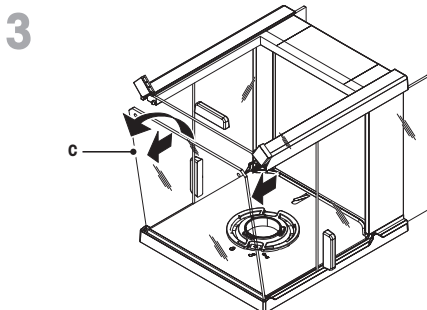
10.1 Cleaning the glass draft shield (0.1 mg and 1 mg models)

1 Remove the following parts:

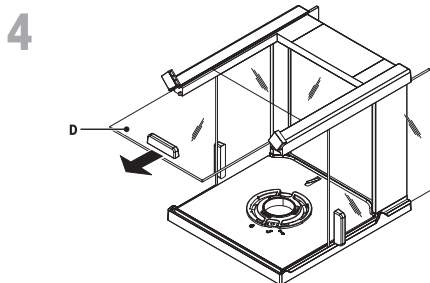
- 1 Remove weighing pan, draft shield element and pan support.
- 2 Remove the bottom plate.
- 3 Unlock the draft shield, lift it off the balance and place it on a clean surface.



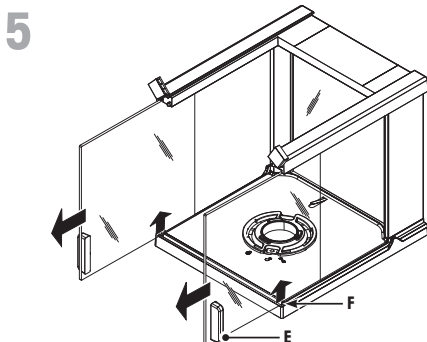
- 1 Push the **glass doors (A)** back.
- 2 Turn the two **lock covers (B)** on the front as far as they will go.



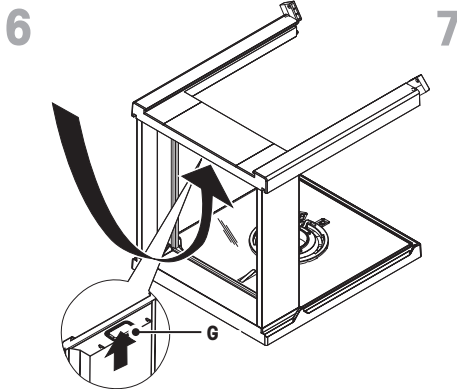
- 1 Tilt the **front glass (C)** forward.
- 2 Remove the front glass.



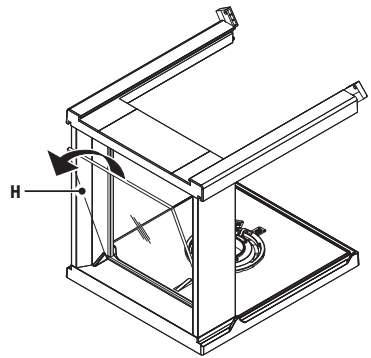
- Pull the **top glass door (D)** out from the front.



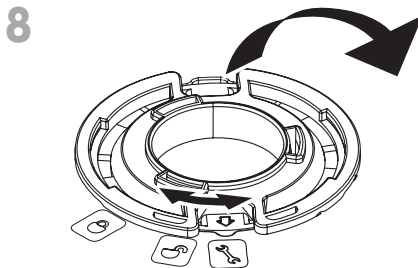
- Lift the **side glass doors (E)** at **(F)** and pull them out from the front.



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



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



- 1 Turn the **draft shield lock** to the "Service" position.
- 2 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".

10.2 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.



11 Interface Specification

11.1 RS232C interface

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

Schematic	Item	Specification
	Interface type	Voltage interface according to EIA RS-232C/DIN66020 CCITT V24/V.28)
	Max. cable length	15 m
	Signal level	Outputs: +5 V ... +15 V (RL = 3–7 kΩ) –5 V ... –15 V (RL = 3–7 kΩ) Inputs: +3 V ... +25 V –3 V ... –25 V
	Connector	Sub-D, 9-pole, female
	Operating mode	Full duplex
	Transmission mode	Bit-serial, asynchronous
	Transmission code	ASCII
	Baud rates	600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 (software selectable)
	Bits/parity	7-bit/none, 7-bit/even, 7-bit/odd, 8-bit/none (software selectable)
	Stop bits	1 stop bit
	Handshake	None, XON/XOFF, RTS/CTS (software selectable)
	End-of-line	<CR><LF>, <CR>, <LF> (software selectable)
	Power supply for 2nd display	+ 12 V, max 40 mA (software selectable, 2nd display mode only)

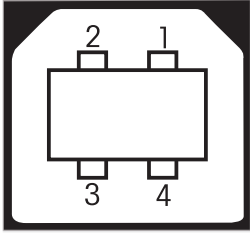
11.2 USB host

Schematic	Item	Specification	
	Standard	In conformity with USB Specification Revision 1.0/1.1	
	Speed	Full speed 12 Mbps (requires shielded cable)	
	Power usage	Max. 500 mA	
	Connector	Type A	
	Pin assignment	1	VBUS (+5 V DC)
		2	D- (Data -)
		3	D+ (Data +)
	4	GND (Ground)	
	Shell	Shield	

11.3 USB device

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										
 <table border="1" data-bbox="210 528 493 691"> <tbody> <tr> <td>1</td> <td>VBUS (+5 VDC)</td> </tr> <tr> <td>2</td> <td>D- (Data -)</td> </tr> <tr> <td>3</td> <td>D+ (Data +)</td> </tr> <tr> <td>4</td> <td>GND (Ground)</td> </tr> <tr> <td>Shield</td> <td>Shield</td> </tr> </tbody> </table>	1	VBUS (+5 VDC)	2	D- (Data -)	3	D+ (Data +)	4	GND (Ground)	Shield	Shield	Standard	In conformity with USB Specification Revision 1.1
	1	VBUS (+5 VDC)										
	2	D- (Data -)										
	3	D+ (Data +)										
	4	GND (Ground)										
	Shield	Shield										
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											

11.4 MT-SICS interface commands and functions

Many of the instruments and balances used have to be capable of integration in a complex computer or data acquisition system.

To enable you to integrate balances in your system in a simple manner and utilize their capabilities to the full, most balance functions are also available as appropriate commands via the data interface.

All new METTLER TOLEDO balances launched on the market support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS). The commands available depending on the functionality of the balance.



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

► www.mt.com/sics-newclassic

12 Technical Data

12.1 General data

Power supply

- AC/DC adapter
Primary: 100 V–240 V, $\pm 10\%$, 50/60 Hz, 0.3 A
Secondary: 12 V DC, 0.84 A (with electronic overload protection)
Power supply to the balance: 12 V DC, 10 W
 Use only with a tested AC/DC Adapter with SELV output current.
Ensure correct polarity 
- Power supply to the balance 12 V DC, 10 W

Protection and standards

- Overvoltage category II, III
- Degree of pollution 2
- Degree of protection Protected against dust and water
- 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
- Relative air humidity 10% up to 80% at 31 °C, linearly decreasing to 50% at 40 °C, noncondensing
- Warm-up time
After connecting the balance to the power supply or switched on in battery operation at least
 - 30 minutes on balances with a readability of 0.001 g (0.01 ct) to 5 g.
 - 60 minutes on balances with a readability of 0.1 mg (0.001 ct) and better.

Materials

- Housing Die-cast aluminum, lacquered
- Weighing pan Stainless steel X2CrNiMo 17-12-2 (1.4404)
245 x 351 mm: Stainless steel X5CrNiMo 18-10 (1.4301)
- Draft shield element with 0.1 mg models: Stainless steel X2CrNiMo 17-12-2 (1.4404)
with 10 mg models: Plastic (PBT)
- Draft shield Plastic (PBT), glass
- In-use-cover Plastic (PET)

12.2 Model-specific data

Note

The definition of the model-specific data in this section is still in progress and may change to the final software version.

12.2.1 Balances with readability of 0.1 mg, S platform with draft shield

	MS104TS	MS204TS
Limit values		
Maximum capacity	120 g	220 g
Readability	0.1 mg	0.1 mg
Repeatability (at nominal load)	0.1 mg	0.1 mg
Linearity deviation	0.2 mg	0.2 mg
Sensitivity temperature drift	1.5 ppm/°C	1.5 ppm/°C
Typical values		
Repeatability (at nominal load)	0.08 mg	0.08 mg
Linearity deviation	0.06 mg	0.06 mg
Minimum sample weight (acc. to USP)	0.16 g	0.16 g
Minimum sample weight (U=1 %, k=2)	0.016 g	0.016 g
Minimum sample weight OIML	0.01 g	0.01 g
Settling time	2 s	2 s
Adjustment	Int.Cal / FACT	Int.Cal / FACT
Balance dimensions (W x D x H)	204x347x348 mm	204x347x348 mm
Weighing pan dimensions	ø 90 mm	ø 90 mm
Usable height of draft shield	236 mm	236 mm
Weight of balance	5.9 kg	5.9 kg
Weights for routine testing		
OIML CarePac	#11123002	#11123001
Weights	100 g F2, 5 g E2	200 g F2, 10 g E2
ASTM CarePac	#11123102	#11123101
Weights	100 g 1, 5 g 1	200 g 1, 10 g 1

		MS304TS
Limit values		
Maximum capacity		320 g
Readability		0.1 mg
Repeatability (at nominal load)		0.1 mg
Linearity deviation		0.2 mg
Sensitivity temperature drift		1.5 ppm/°C
Typical values		
Repeatability (at nominal load)		0.08 mg
Linearity deviation		0.06 mg
Minimum sample weight (acc. to USP)		0.16 g
Minimum sample weight (U=1 %, k=2)		0.016 g
Minimum sample weight OIML		0.01 g
Settling time		2 s
Adjustment		Int.Cal / FACT
Balance dimensions (W x D x H)		204x347x348 mm
Weighing pan dimensions		∅ 90 mm
Usable height of draft shield		236 mm
Weight of balance		5.9 kg
Weights for routine testing		
OIML CarePac		#11123001
	Weights	200 g F2, 10 g E2
ASTM CarePac		#11123101
	Weights	200 g 1, 10 g 1

12.2.2 Balances with readability of 1 mg, S platform with draft shield

	MS303TS	MS403TS
Limit values		
Maximum capacity	320 g	420 g
Readability	1 mg	1 mg
Repeatability (at nominal load)	1 mg	1 mg
Linearity deviation	2 mg	2 mg
Sensitivity temperature drift	3 ppm/°C	3 ppm/°C
Typical values		
Repeatability (at nominal load)	0.7 mg	0.7 mg
Linearity deviation	0.6 mg	0.6 mg
Minimum sample weight (acc. to USP)	1.4 g	1.4 g
Minimum sample weight (U=1 %, k=2)	0.14 g	0.14 g
Minimum sample weight OIML	0.02 g	0.02 g
Settling time	1.5 s	1.5 s
Adjustment	Int. Cal / FACT	Int. Cal / FACT
Balance dimensions (W x D x H)	204x347x283 mm	204x347x283 mm
Weighing pan dimensions	127x127 mm	127x127 mm
Usable height of draft shield	168 mm	168 mm
Weight of balance	5.6 kg	5.6 kg
Weights for routine testing		
OIML CarePac	#11123001	#11123000
Weights	200 g F2, 10 g F1	200 g F2, 20 g F1
ASTM CarePac	#11123103	#11123100
Weights	200 g 1, 10 g 1	200 g 1, 20 g 1

	MS603TS	MS1003TS
Limit values		
Maximum capacity	620 g	1020 g
Readability	1 mg	1 mg
Repeatability (at nominal load)	1 mg	1 mg
Linearity deviation	2 mg	2 mg
Sensitivity temperature drift	3 ppm/°C	3 ppm/°C
Typical values		
Repeatability (at nominal load)	0.7 mg	0.7 mg
Linearity deviation	0.6 mg	0.6 mg
Minimum sample weight (acc. to USP)	1.4 g	1.4 g
Minimum sample weight (U=1 %, k=2)	0.14 g	0.14 g
Minimum sample weight OIML	0.02 g	0.02 g
Settling time	1.5 s	1.5 s
Adjustment	Int. Cal / FACT	Int. Cal / FACT
Balance dimensions (W x D x H)	204x347x283 mm	204x347x283 mm
Weighing pan dimensions	127x127 mm	127x127 mm
Usable height of draft shield	168 mm	168 mm
Weight of balance	5.6 kg	5.6 kg
Weights for routine testing		
OIML CarePac	#11123007	#11123008
Weights	500 g F2, 20 g F1	1000 g F2, 50 g F1
ASTM CarePac	#11123107	#11123108
Weights	500 g 1, 20 g 1	1000 g 1, 50 g 1

12.2.3 Balances with readability of 0.01 g, S platform

	MS1602TS	MS3002TS	MS4002TS
Limit values			
Maximum capacity	1620 g	3200 g	4200 g
Readability	0.01 g	0.01 g	0.01 g
Repeatability (at nominal load)	0.01 g	0.01 g	0.01 g
Linearity deviation	0.02 g	0.02 g	0.02 g
Sensitivity temperature drift	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.007 g	0.007 g	0.007 g
Linearity deviation	0.006 g	0.006 g	0.006 g
Minimum sample weight (acc. to USP)	14 g	14 g	14 g
Minimum sample weight (U=1 %, k=2)	1.4 g	1.4 g	1.4 g
Minimum sample weight OIML	0.5 g	0.5 g	0.5 g
Settling time	1.5 s	1.5 s	1.5 s
Adjustment	Int. Cal / FACT	Int. Cal / FACT	Int. Cal / FACT
Balance dimensions (W x D x H)	194x347x99 mm	194x347x99 mm	194x347x99 mm
Weighing pan dimensions	170x200 mm	170x200 mm	170x200 mm
Weight of balance	4.6 kg	4.6 kg	4.6 kg
Weights for routine testing			
OIML CarePac	#11123008	#11123009	#11123010
Weights	1000 g F2, 50 g F2	2000 g F2, 100 g F2	2000 g F2, 200 g F2
ASTM CarePac	#11123106	#11123109	#11123110
Weights	1000 g 1, 50 g 1	2000 g 1, 100 g 1	2000 g 4, 200 g 4

	MS4002TSDR	MS6002TS	MS6002TSDR
Limit values			
Maximum capacity	4200 g	6200 g	6200 g
Maximum capacity, fine range	820 g	–	1220 g
Readability	0.1 g	0.01 g	0.1 g
Readability, fine range	0.01 g	–	0.01 g
Repeatability (at nominal load)	0.1 g	0.01 g	0.01 g
Repeatability, at fine range (at nominal load)	0.01 g	–	0.01 g
Linearity deviation	0.2 g	0.02 g	0.2 g
Linearity deviation, fine range	0.02 g	–	0.02 g
Sensitivity temperature drift	3 ppm/°C	3 ppm/°C	3 ppm/°C
Typical values			
Repeatability (at nominal load)	0.05 g	0.007 g	0.05 g
Repeatability, at fine range (at nominal load)	0.007 g	–	0.007 g
Linearity deviation	0.02 g	0.006 g	0.02 g
Linearity deviation, at fine range	0.006 g	–	0.006 g
Minimum sample weight (acc. to USP)	14 g	14 g	14 g
Minimum sample weight (U=1 %, k=2)	1.4 g	1.4 g	1.4 g
Minimum sample weight OIML	0.5 g	0.5 g	0.5 g
Settling time	1.5 s	1.5 s	1.5 s
Adjustment	Int. Cal / FACT	Int. Cal / FACT	Int. Cal / FACT
Balance dimensions (W x D x H)	194x347x99 mm	194x347x99 mm	194x347x99 mm
Weighing pan dimensions	170x200 mm	170x200 mm	170x200 mm
Weight of balance	4.6 kg	5.1 kg	5.1 kg
Weights for routine testing			
OIML CarePac	#11123010	#11123011	#11123011
Weights	2000 g F2, 200 g F2	5000 g F2, 200 g F2	5000 g F2, 200 g F2
ASTM CarePac	#11123110	#11123111	#11123111
Weights	2000 g 4, 200 g 4	5000 g 4, 200 g 4	5000 g 4, 200 g 4

MS12002S	
Limit values	
Maximum capacity	12200 g
Readability	0.01 g
Repeatability (at nominal load)	0.01 g
Linearity deviation	0.02 g
Sensitivity temperature drift	3 ppm/°C
Typical values	
Repeatability (at nominal load)	0.007 g
Linearity deviation	0.006 g
Minimum sample weight (acc. to USP)	14 g
Minimum sample weight (U=1 %, k=2)	1.4 g
Minimum sample weight OIML	0.5 g
Settling time	1.5 s
Adjustment	Int. Cal / FACT
Balance dimensions (W x D x H)	194x347x99 mm
Weighing pan dimensions	170x200 mm
Weight of balance	5.2 kg
Weights for routine testing	
OIML Weights	10000 g F2, 500 g F2
ASTM Weights	#11123110 10000 g 4, 500 g 4

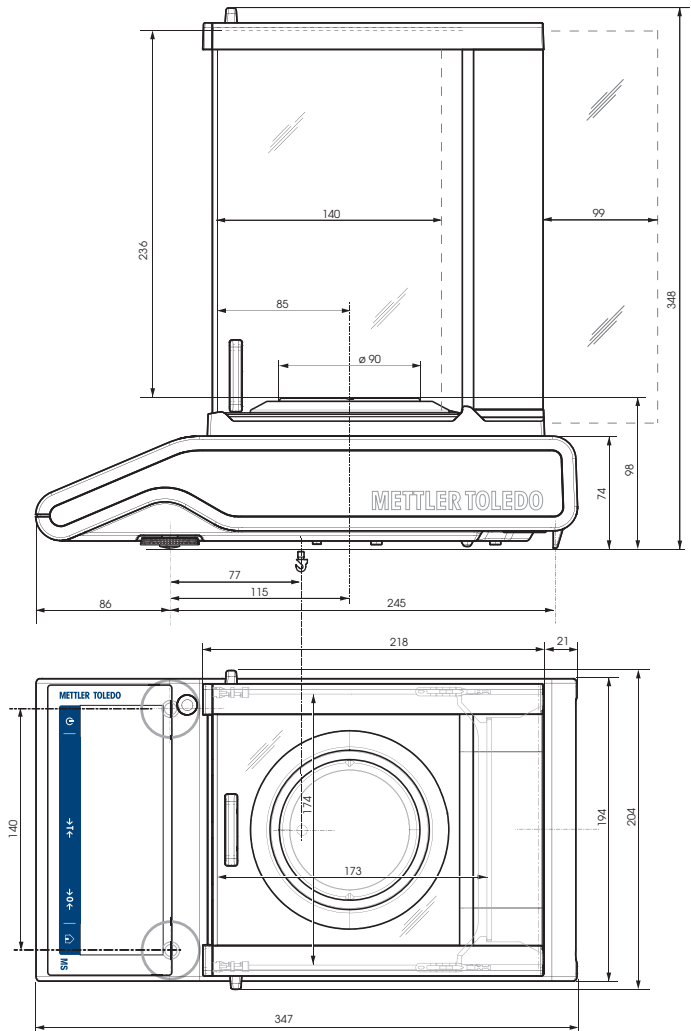
12.2.4 Balances with readability of 0.1 g to 1 g, S platform

		MS8001TS
Limit values		
Maximum capacity		8200 g
Readability		0.1 g
Repeatability (at nominal load)		0.1 g
Linearity deviation		0.2 g
Sensitivity temperature drift		3 ppm/°C
Typical values		
Repeatability (at nominal load)		0.07 g
Linearity deviation		0.06 g
Minimum sample weight (acc. to USP)		140 g
Minimum sample weight (U=1 %, k=2)		14 g
Minimum sample weight OIML		5 g
Settling time		1.5 s
Adjustment		Int. Cal / FACT
Balance dimensions (W x D x H)		194x347x99 mm
Weighing pan dimensions		170x200 mm
Weight of balance		4.6 kg
Weights for routine testing		
OIML CarePac		#11123011
	Weights	5000 g F2, 200 g F2
ASTM CarePac		#11123111
	Weights	5000 g 4, 200 g 4

12.3 Dimensions

12.3.1 Balances with readability of 0.1 mg and draft shield

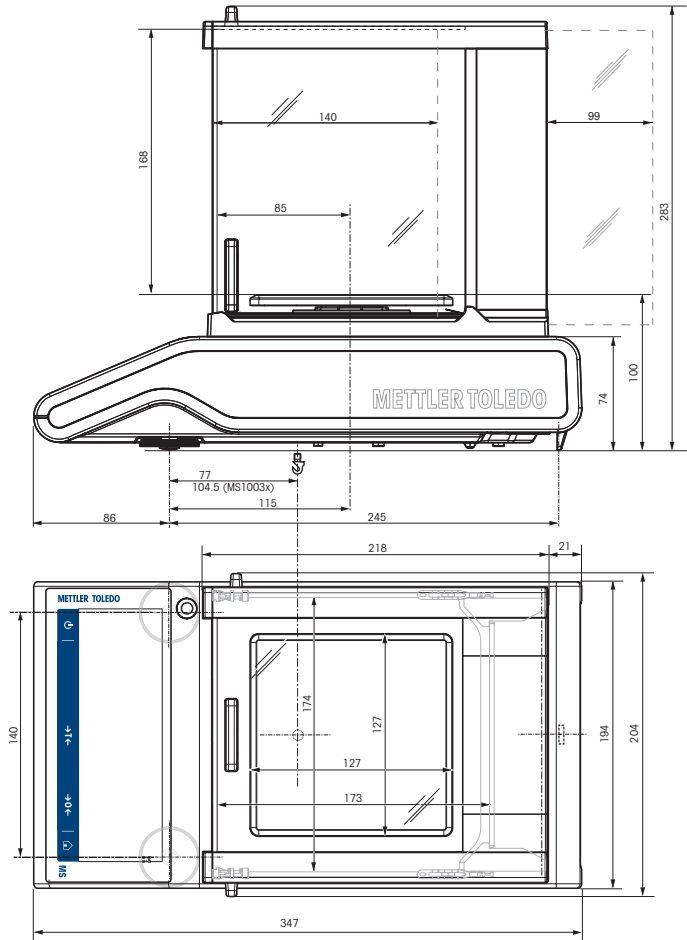
Models:
MS104TS
MS204TS
MS304TS



12.3.2 Balances with readability of 1 mg and draft shield

Models:

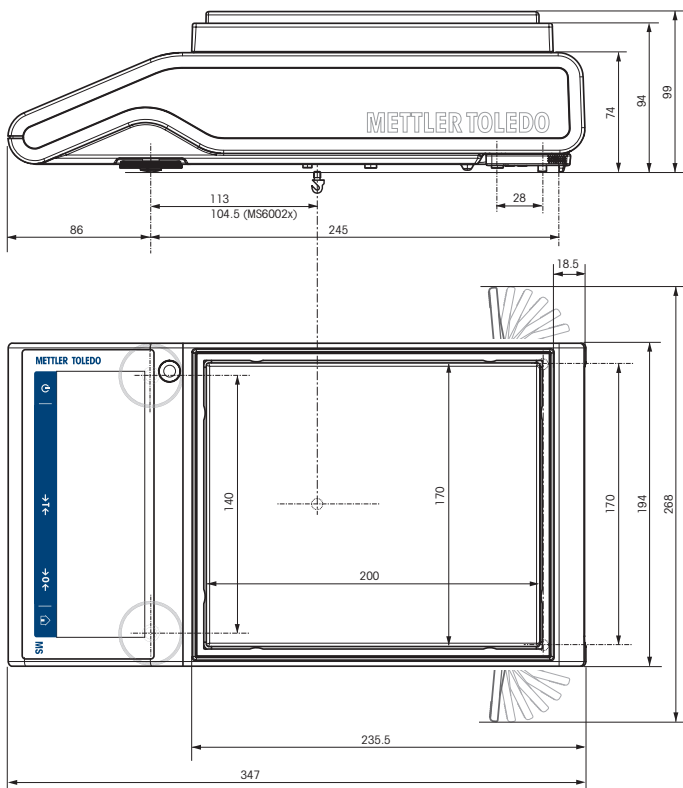
- MS303TS
- MS403TS
- MS603TS
- MS1003TS



12.3.3 Balances with readability of 0.01 g

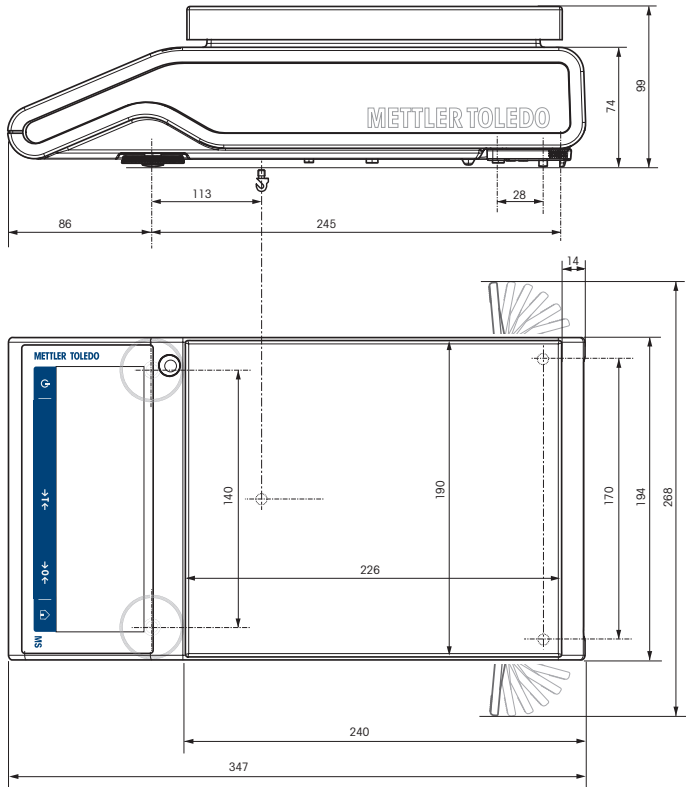
Models:

- MS1602TS
- MS3002TS
- MS4002TS
- MS4002TSDR
- MS6002TS
- MS6002TSDR



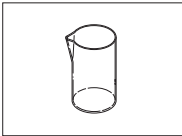
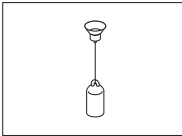
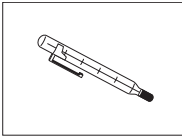
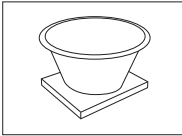
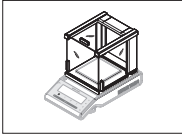
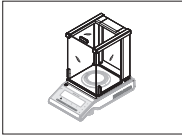
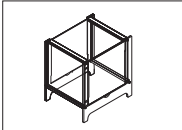
12.3.4 Balances with readability of 0.1 g to 1 g

Models:
MS8001TS

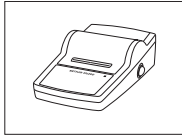


13 Accessories and Spare Parts

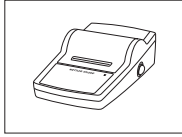
13.1 Accessories

	Description	Part No.
Density determination		
	Glass beaker, height 100 mm, Ø 60 mm	00238167
	Sinker for density of liquids in conjunction with density kit Calibrated (sinkers + certificate) Recalibrated (new certificate)	00210260 00210672 00210674
	Calibrated thermometer with certificate	11132685
Weighing pans		
	Dynamic weighing pan MS-DWP-21 with 4 litre bowl (for balances with readability of 0.01 g and 0.1 g)	30006471
Draft shields		
	Draft shield with sliding doors "mg" (usable height 168 mm)	12122405
	Draft shield with sliding doors "0.1 mg" (usable height 236 mm)	12122404
	Draft shield MS-DS-21 for models with readability of 0.1 g up to 0.01 g.	12121014

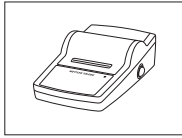
Printers



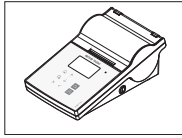
RS-P25 printer with RS232C connection to instrument	11124300
Paper roll, set of 5 pcs	00072456
Paper roll, self-adhesive, set of 3 pcs	11600388
Ribbon cartridge, black, set of 2 pcs	00065975



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



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

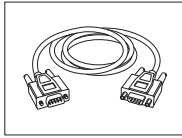


P-56RUE thermal printer with RS232C, USB and ethernet connections, simple printouts, date and time, label printing (limited).	30094673
Paper roll, white, set of 10 pcs	30094723
Paper roll, white, self-adhesive, set of 10 pcs	30094724
Paper roll, white, self-adhesive labels, set of 6 pcs	30094725

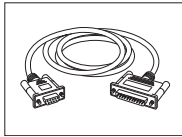


P-58RUE Thermal printer with RS232C, USB and ethernet connections, simple printouts, date and time, label printing, balance applications: statistics, formulation, totaling.	30094674
Paper roll, white, set of 10 pcs	30094723
Paper roll, white, self-adhesive, set of 10 pcs	30094724
Paper roll, white, self-adhesive labels, set of 6 pcs	30094725

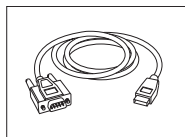
Cables for RS232C interface



RS9 – RS9 (m/f): connection cable for PC, length = 1 m	11101051
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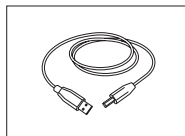
RS9 – RS25 (m/f): connection cable for PC, length = 2 m	11101052
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RS232 - USB converter cable – Cable with converter to connect a balance (RS232) to a USB port

64088427

Cables for USB interface

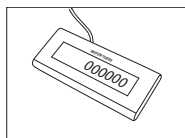


USB (A –B) connection cable for connection to PC, length = 1 m

12130716

Cable replacement (wireless)

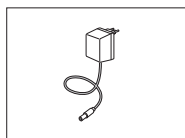
Auxiliary displays



RS232 auxiliary display AD-RS-M7

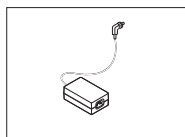
12122381

Power supplies



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

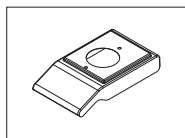
11120270



AC/DC adapter (without power cable) 100–240 V AC, 0.8 A, 50/60 Hz, 12 V DC 2.5 A

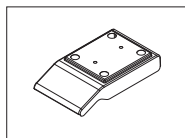
11107909

Protective covers



Protective cover for balances with draft shield

12121850



Protective cover for balances without draft shield

12121851

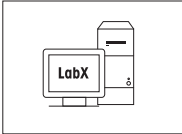
Anti-theft devices



Steel cable

11600361

Software

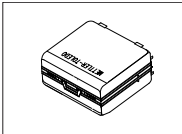


LabX direct balance (simple data transfer)

11120340

Weighing below the balance

Transport cases



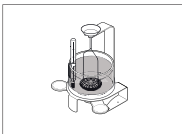
Transport case

11124245

Adjustment weights



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



Density kit MS-DNY-43 for MS-TS balances
($d = 0.1 \text{ mg/1 mg}$)

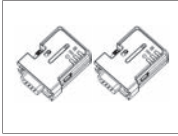
11142143



Bluetooth RS232 serial adapter ADP-BT-S for wireless connection between **printer** and balance* or between **balance** and PC*. Fits printers P-56 / P-58 and the following balance models (SW V3.20 or higher required): MS-TS.
* Bluetooth interface required

30086494

- 1 Bluetooth RS232 serial adapter (slave)
- 1 MT-DB9 male to female connector
- 1 MT-DB9 male to male connector



Bluetooth RS232 serial adapter set ADP-BT-P for wireless connection between printer and balance. Fits printers P-56 / P-58 and the following balance models (SW V3.20 or higher required): MS-TS.

30086495

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

13.2 Spare parts

Draft shield

Drawing	Pos	Description	Part No.	
	5	Draft shield lock	12122013	
	6	Bottom plate	12122019	
	Draft shield "168 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 low with handle	12121883	
	7	Front glass low	12122014	
	Draft shield "236 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	
	7	Front glass high	12122011	

Weighing pans / draft shield elements / support

Drawing	Pos	Description	Part no.
	1	0.1 mg Weighing pan Ø 90 mm	12122010
	2	0.1 mg Pan support Ø 90 mm	11124249
	3	0.1 mg Draft shield element	12122008
	4	1 mg Weighing pan 127x127 mm	12122009
	5	1 mg Pan support 127x127 mm for models up to 999 g	12122017
	5	1 mg Pan support 127x127 mm for models from 1000 g	12122016
	6	0.01 g Draft shield element 170x200 mm	12122018
	7	0.01 g Weighing pan 170x200 mm	11124247
	8	0.01 g Pan support 170x200 mm	12121064
	7	0.1 g Weighing pan 190x226 mm	11124248
8	0.1 g Pan support 190x226 mm	12121066	
9	from 0.01 g	Pan support caps	11131029
10	Leveling foot		11106323

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GWP®

Good Weighing Practice™

GWP® is the global weighing standard, ensuring consistent accuracy of weighing processes, applicable to all equipment from any manufacturer. It helps to:

- Choose the appropriate balance or scale
- Calibrate and operate your weighing equipment with security
- Comply with quality and compliance standards in laboratory and manufacturing

► www.mt.com/GWP

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Subject to technical changes.

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