sartorius
mechatronics

Operating Instructions

Sartorius Cubis Series

Electronic Precision and Analytical Balances
MSE Models

98648-017-17

Contents

The enclosed CD-ROM contains the Operating Instructions as a PDF file. To read and print the file, you require the program Acrobat Reader, which you can download for free from the Adobe website (www.adobe.com)

Software drivers for configuration of USB interfaces can also be downloaded from the internet:
http:||www.ftdichip.com|FTDrivers.htm
The installation guides for these drivers can be found here:
http:||www.ftdichip.com|Documents|InstallGuides.htm

Notes on Using this Manual

- ▶ Please read these entire instructions carefully before using the balance.
- ▶ Please ensure that you read the safety precautions carefully.
- ▶ These instructions are considered a part of the product. Keep these instructions in a safe and easily accessible location.
- ▶ If the instructions should be lost or misplaced, please contact Sartorius for a replacement or download the latest manual from our website: www.sartorius.com

Symbols and Signs

The following symbols and signs are used in these instructions:

	**Warning symbol for various types of dangers.** This symbol is explained in more detail in the section on safety precautions.
	This symbol indicates useful information and tips.
	This symbol indicates notes on use of the balance in legal metrology.

- ▶ Indicates a required action
- ▷ Describes the result of an action
1. If a procedure has multiple steps...
2. ... these steps are numbered consecutively.

– Indicates an item in a list

Technical Advice | Hotline:
Telephone: +49 551.308.4440
Fax: +49 551.308.4449

Safety Precautions

The balance has been constructed in accordance with the European Directives as well as international regulations and standards for operation of electrical equipment, electromagnetic compatibility and applicable safety requirements. Improper use or handling, however, can result in damage and|or injury.
This device should only be operated by trained personnel.
Personnel must have read the operating instructions, especially the safety instructions and have familiarized themselves with the equipment. The operator must supplement these warnings and safety precautions if necessary and brief operating personnel accordingly. The requirements pertaining to applicable installation regulations must be followed when using electrical equipment in systems and environmental conditions with increased safety requirements. Relevant laws, standards, regulations, guidelines and environmental protection laws valid in your country must be observed.
Always keep the equipment and balance freely accessible.
Any improper installation work or balance usage results in forfeiture of all claims under the manufacturer warranty.

Danger of Explosion!

Do not use this equipment in hazardous areas.

Danger of Electrical Shock!

Make sure that the voltage rating printed on the AC adapter is identical to your local line voltage. The wall outlet must have a protective grounding conductor! The operating instructions included with the AC adapter must be followed.

Do not switch on the equipment if the AC adapter or power cord are damaged. If the balance, the AC adapter or any of the cables are damaged, disconnect the equipment from the power supply and secure it so that it cannot be turned on.

Chemicals (e.g. gases or liquids) that can corrode and damage the inside or outside of the balance, AC adapter, power cable or peripherals must be kept away from the equipment.

Do not operate the balance unless the housing and the display are undamaged and the housing closed so that inadvertent contact with parts inside the equipment is not possible. Make sure that no liquids penetrate the balance.

Installation note:
The operator shall be responsible for any modifications to Sartorius equipment and for any connections of cables or equipment not supplied by Sartorius and must check and, if necessary, correct these modifications and connections.
Information on operational quality is available upon request from Sartorius.
You should only use accessories and options available from Sartorius.

You can only turn off power to the device by pulling the plug or disconnecting the mains connection line, or by unscrewing the four-pin plug at the DC supply cable for the balance.

Equipment may be damaged by objects with points or sharp edges (e. g. pens)!
The touch screen should only be operated using the finger tips.

Liquid penetration can damage the electrical components.

Only use a lightly-moistened cloth for cleaning. See “Care and Maintenance” for cleaning the device. Do not compromise the IP protection of the balance.

Do not open the balance housing. If the seal is broken, this will result in forfeiture of all claims under the manufacturer’s warranty. The device should only be opened by personnel trained by Sartorius.

Disconnect the balance from the wall outlet before moving it.

Avoid condensation damage to the device. When the balance is turned on, condensation build-up is not possible. If the device is moved from a cool environment to a warm environment, you must allow the device to acclimatize for approx. 2 hours before connecting to the power supply.

Good ventilation is required for devices with a built-in fan.
Heat build-up should be generally avoided. Maintain a min. distance of approx. 10 cm around the device.

Hazards at the Place of Installation and During Operation.

Avoid generating static electricity and establish potential equalization.
A 10 kiloohm ground is used when connecting the balance to the power supply. Disconnecting the ground conductor is not permitted.

Exercise caution to avoid glass breakage.
There is a danger of lacerations or cuts caused by sharp edges on glass or metal (contact springs), particularly when removing or replacing the glass draft shield panels, during cleaning, if a glass sample container breaks, or when modifying the balance hardware configuration.

Make sure all equipment operators have received proper instructions when working with hazardous or toxic materials. Failure to follow correct handling procedures can result in breakage of parts or spillage of liquids or other substances. Make sure the necessary protective clothing or equipment is worn, such as protective gloves, clothing, eyewear. All safety regulations applicable in the laboratory must be observed.

Exercise caution to avoid squeezing or crushing fingers when
- Operating the electronic draft shield
- Removing or installing the panels
- Adjusting the display

Do not expose the device to aggressive chemical vapors or to extreme temperatures, moisture, shocks, or vibration.

The device should be setup in areas away from equipment or devices that have strong magnetic properties. Extreme electromagnetic fields from electrical lines should also be avoided.

The setup location should be kept clean and free of dust.
Always keep the balance freely accessible.

Intended Use

Cubis models are high-resolution precision and analytical balances.
They were specially developed for exact determination of material mass in liquid, paste, powder or solid form.

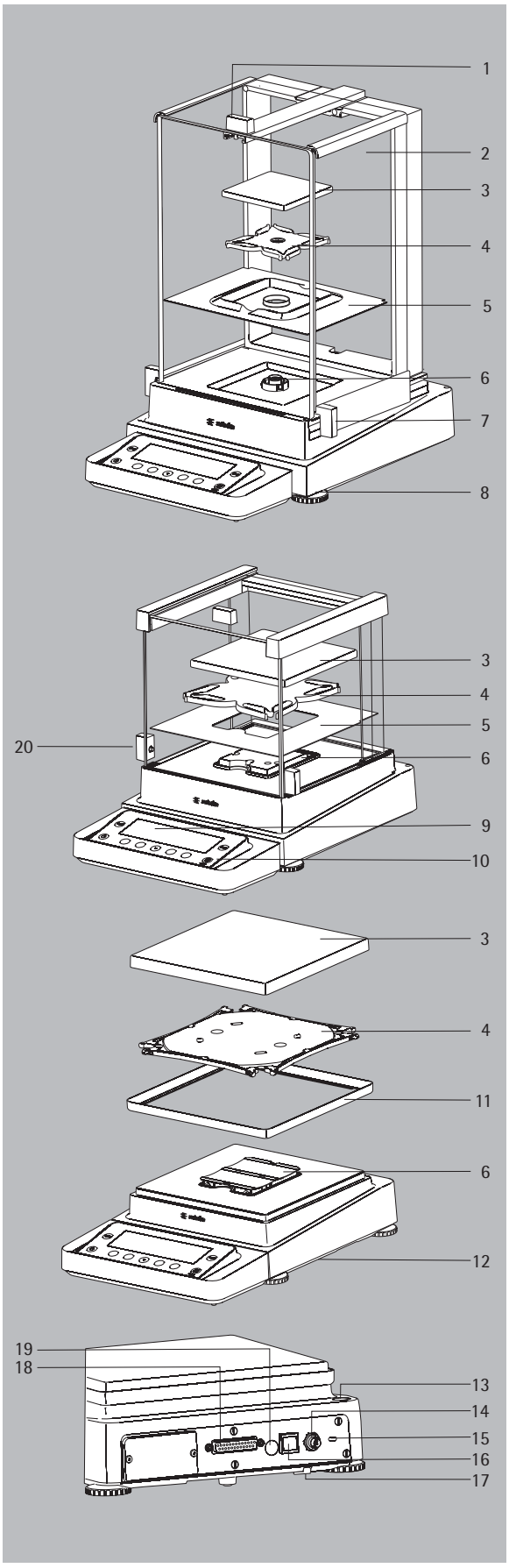
Appropriate containers must be used for each type of sample material.
Balance capacity depends on the Cubis model used. Capacities range from ± 0.01 mg (lowest mass determination) to 12.0 kg (highest mass determination).

Cubis models are designed specially for use in research,
education and day-to-day laboratory tasks in science and industry.

They are designed to be used exclusively indoors.

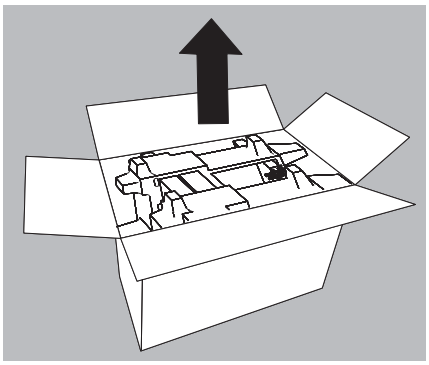
Cubis models can be operated standalone, connected to a PC, or in a network.

General View of the Equipment



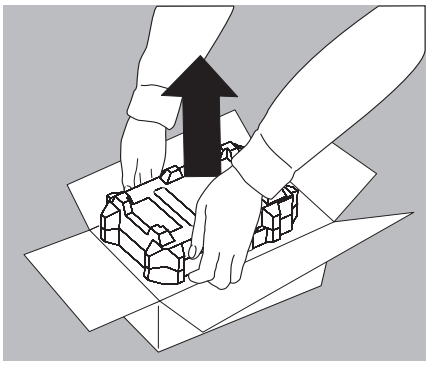
No.	Description	Order no. for replacement
1	Upper sliding draft shield panel|handle	
2	Back panel	69 ME0001
3	Weighing pan	
4	Pan support	69 ME0002
5	Shield plate	
6	Pan retainer	
7	Right sliding panel|handle	
8	Leveling foot	
9	Display	
10	Display and control unit	
11	Draft shield|shield disk (only for models with a readability of 10 mg)	
12	Under-balance weighing port (on the bottom of the balance)	
13	Level indicator	
14	Power socket	
15	Slot for attaching an anti-theft device	
16	USB interface for a PC connection	
17	Hook for under-balance weighing	
18	Communication interface (PERIPHERALS) for accessories	
19	Menu access switch	
20	Right sliding panel|handle	

Getting Started

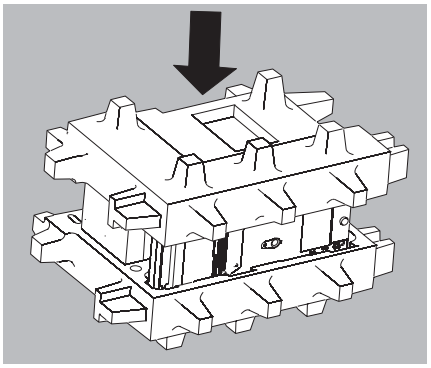


Unpacking the Equipment

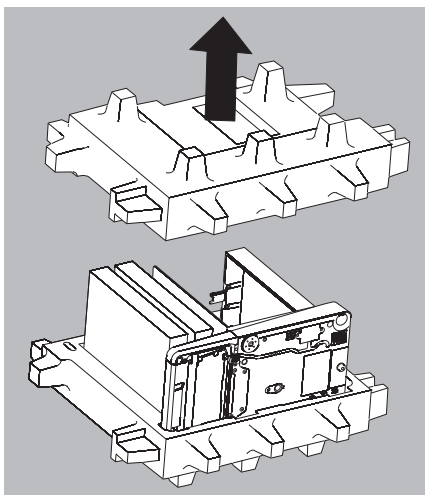
▶ Open the box.



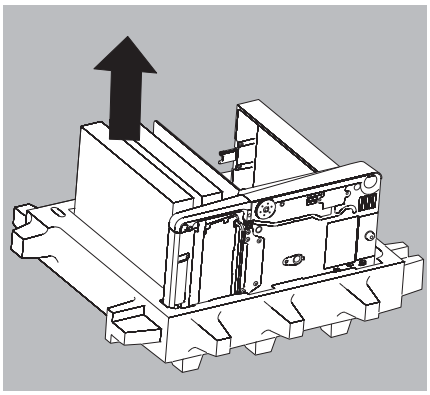
▶ Use both hands to lift the balance, with the packaging, out of the cardboard box.



▶ Place the packaging with the balance on the floor.

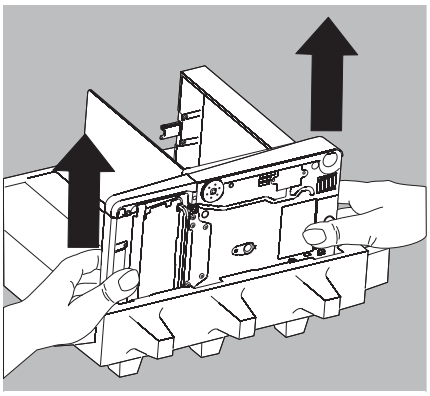


▶ Remove the top part of the packaging.



Balance with a Draft Shield

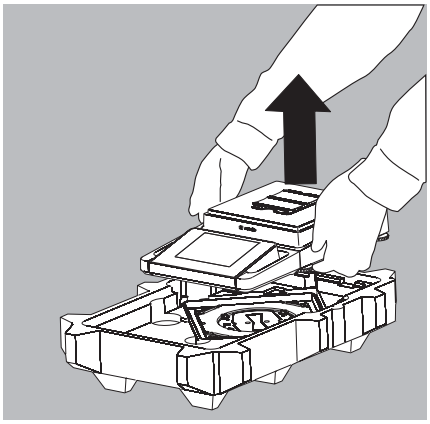
▶ Remove the packages (containing draft shield panels, weighing pan, pan support, AC adapter, etc.) from the lower packaging and place them to one side.



▶ Use both hands to lift the balance out of the packaging.

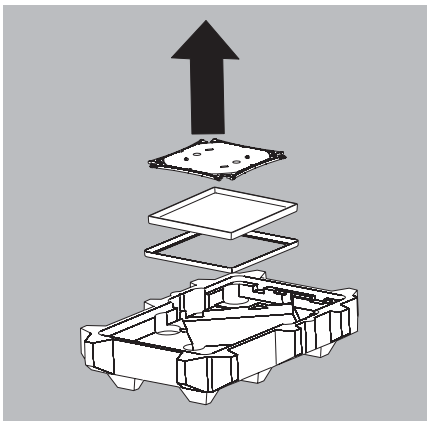
Exercise caution to avoid glass breakage.
Never lift the equipment by the draft shield panels to remove it from the packaging!

▶ Place the balance on an even surface.

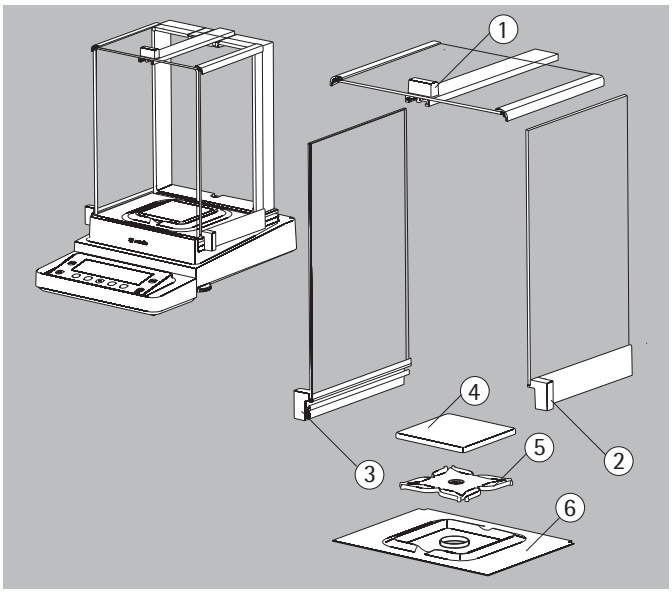


Balance with no Draft Shield

▶ Use both hands to lift the balance with no draft shield out of the packaging.



▶ Remove the AC adapter and the balance parts from the packaging.

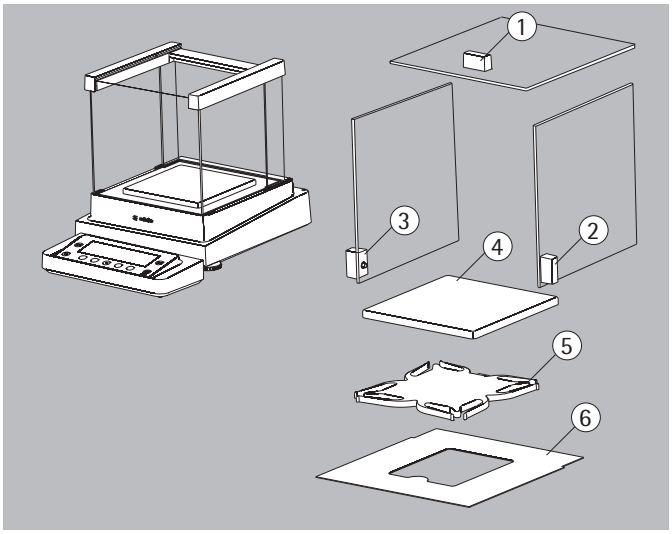


Equipment Supplied

- ▶ After unpacking the device and all parts, check them immediately for any visible damage as a result of rough handling during shipment.
  If you detect any damage, proceed as directed in the chapter entitled “Care and Maintenance” under “Safety Inspection.”
- ▶ Save the box and all parts of the packaging for any future transport.
  Unplug all connected cables before packing the equipment.

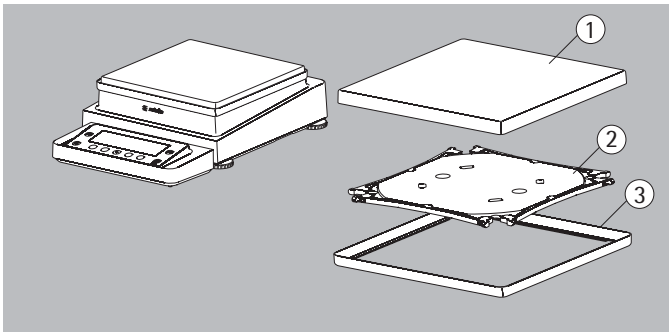
The model with the analytical draft shield comes with the following:
1) Sliding|upper draft shield panel
2) Right draft shield panel
3) Left draft shield panel
4) Weighing pan
5) Pan support
6) Shield plate

Not pictured:
- AC adapter
- Operating instructions
- USB cable



The model with the milligram draft shield comes with the following:
1) Sliding|upper draft shield panel
2) Right draft shield panel
3) Left draft shield panel
4) Weighing pan
5) Pan support
6) Shield plate

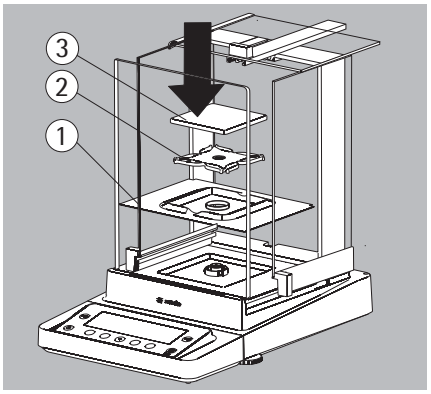
Not pictured:
- AC adapter
- Operating Instructions
- USB cable



The model without a draft shield comes with the following:
1) Weighing pan
2) Pan support
3) Shield plate
   (only for models with a readability of 10 mg)

Not pictured:
- AC adapter
- Operating Instructions
- USB cable

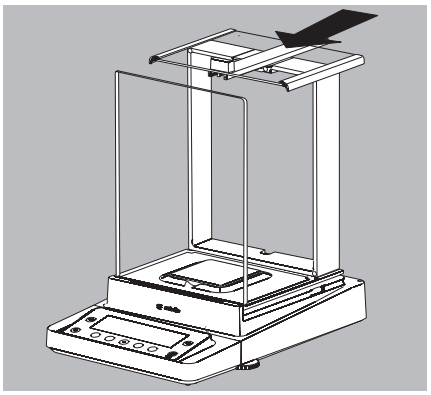
Assembly



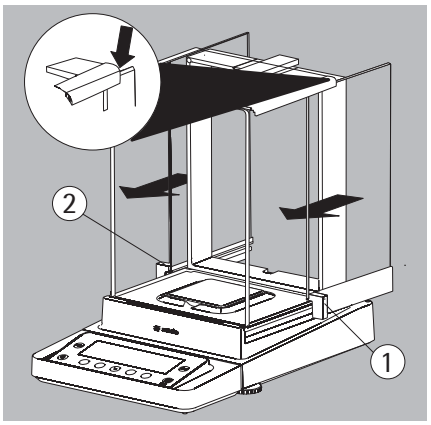
Installing the Analytical Draft Shield, Balance Assembly

▶ Place parts on the balance as shown in the picture.

1. Shield plate
2. Pan support
3. Weighing pan

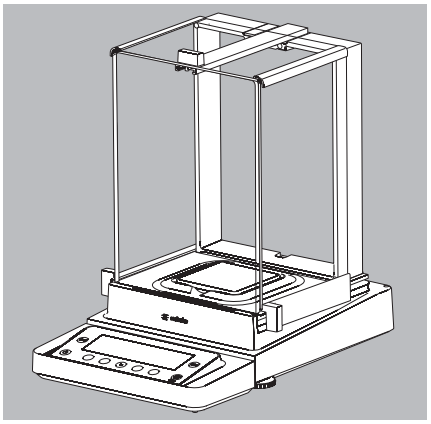


▶ Slide the upper draft shield panel into the guide rails from the rear.

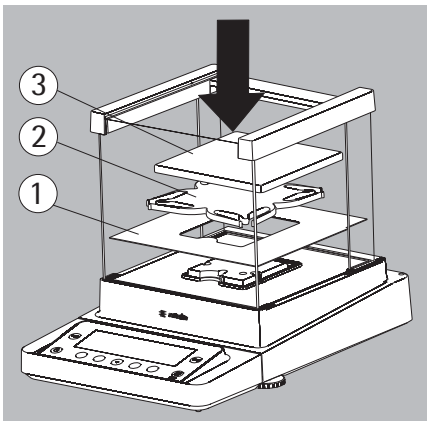


▶ Slide the side draft shield panel into the guide rails from the rear. Make sure the panels are within the upper and lower guide rails.
▶ Slide the panels in until they engage.

1. Right draft shield panel
2. Left draft shield panel



▷ This completes the balance assembly.

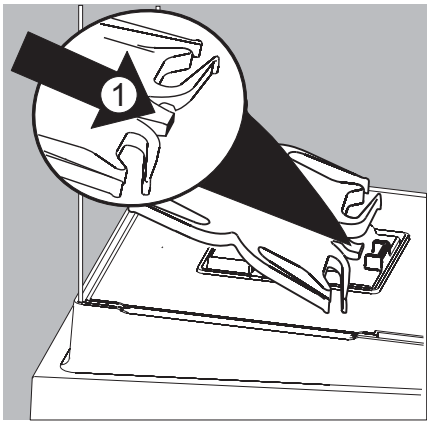


Installing the Draft Shield on Milligram Balances, Balance Assembly

▶ Place parts on the balance as shown in the picture.

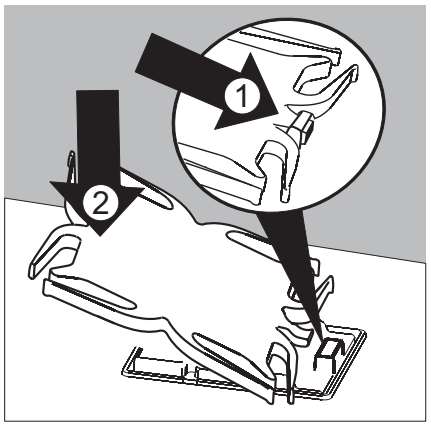
1. Shield plate
2. Pan support
3. Weighing pan

▶ First insert the shield plate.



▶ Make sure the pin on the pan support is facing toward the front, and slide it under the clip on the pan retainer.

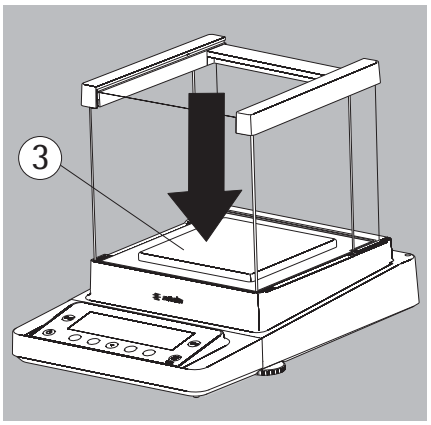
1. Insert the pan support



▶ After inserting the pan support, press it down against the shield plate so that it lies flat.

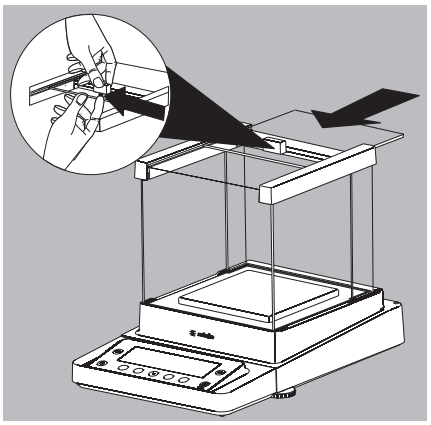
2. Press down on the pan support.

⚠ Exercise caution to avoid squeezing or crushing fingers.

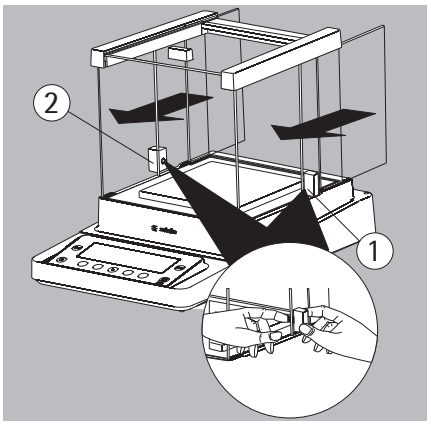


▶ Place the weighing pan on the pan support.

3. Weighing pan

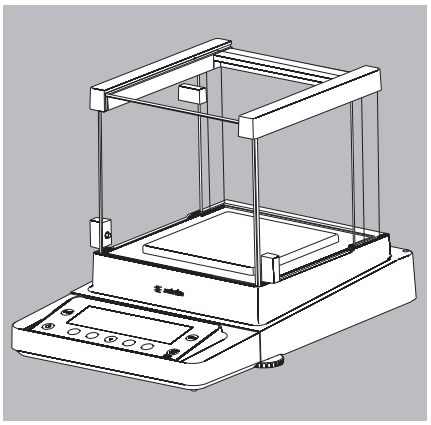


▶ Slide the upper draft shield panel into the guide rails from the rear while pressing the locking tab.

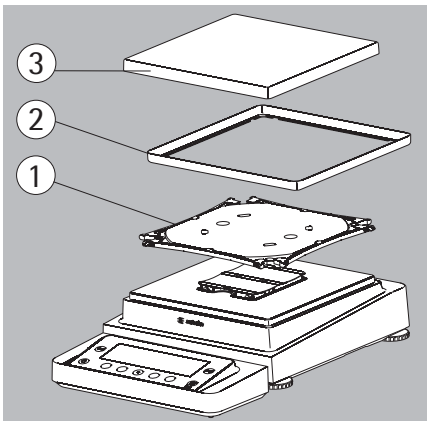


▶ Slide the side draft shield panel into the guide rails from the rear, while pressing the locking tab.

1. Right draft shield panel
2. Left draft shield panel



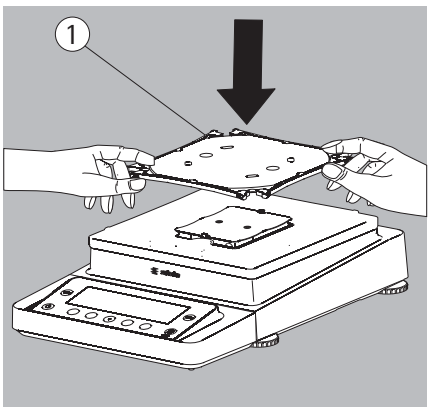
▷ This completes the balance assembly.



Assembly for Models Without a Draft Shield

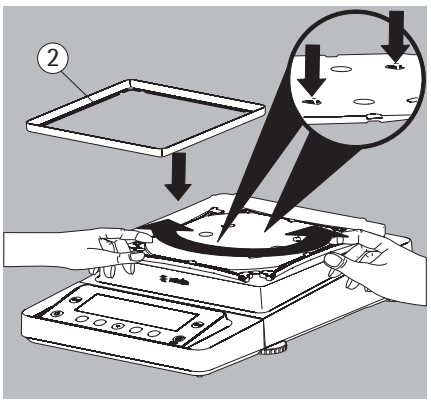
▶ Place parts on the balance as shown in the picture.

1. Pan support
2. Shield plate|draft shield
3. Weighing pan



▶ Place the pan support diagonally and press down lightly.

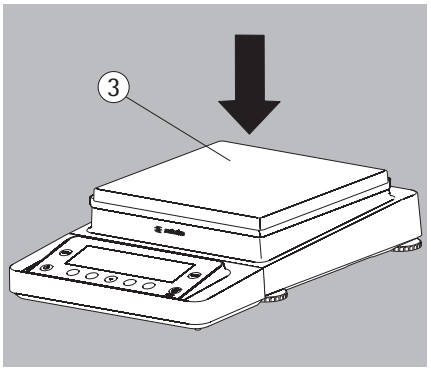
1. Pan support



▶ Carefully turn the pan support clockwise until the two buttons engage. The pan support is now attached.

▶ Insert the shield plate|draft shield.

2. Shield plate|draft shield



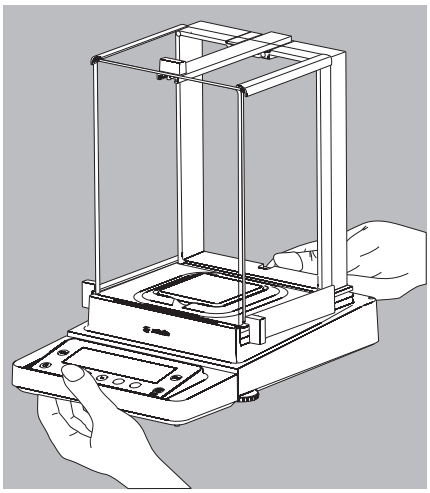
▶ Place the weighing pan on the pan support.

3. Weighing pan

▷ This completes the balance assembly.

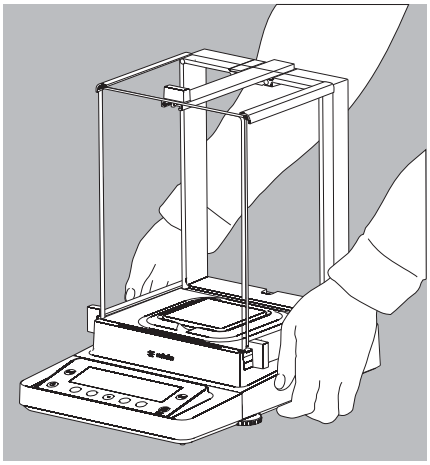
Transporting the Balance

Transporting the Device over Short Distances

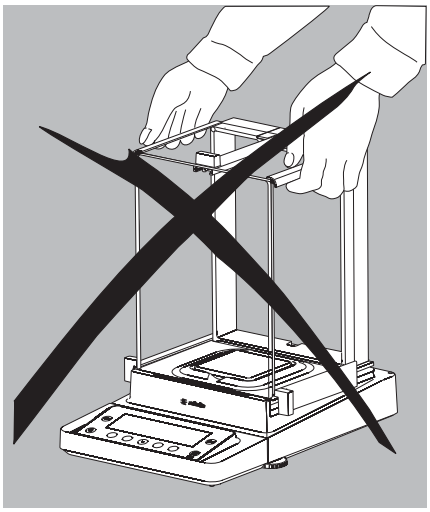


▶ As shown in this illustration

Or



▶ As shown in this illustration.



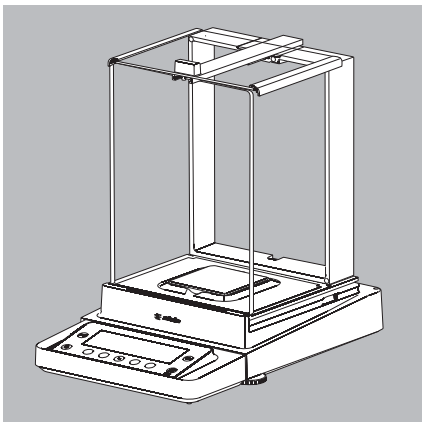
⚠ Exercise caution to avoid glass breakage.
Never lift and carry the balance by its draft shield!

Storage and Shipping Conditions

- Allowable storage and shipping temperature: –10 ...+60 °C
- Unpacked devices can lose their precision if subject to extreme vibrations.
- Excessive vibrations may compromise the safety of the equipment.

Save the packaging for any future storage or shipment of the balance.
Only the original packaging provides optimum protection for the equipment!

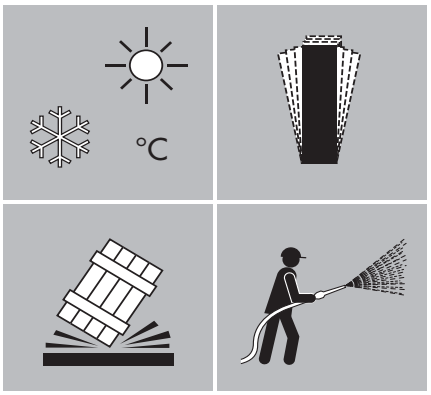
- Follow all warnings and safety precautions.
- Follow the instructions in the chapter “Transporting the Scale.”



Installation Instructions

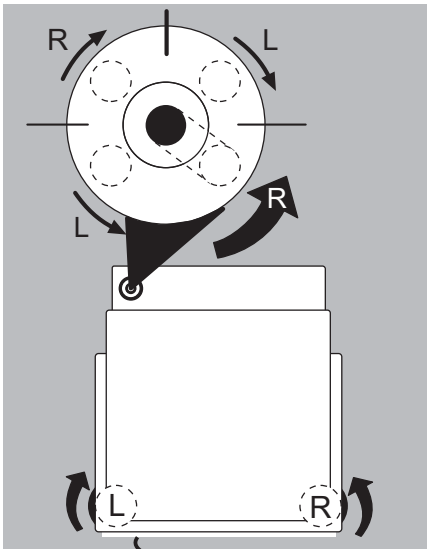
▶ Select the proper setup location:
– Set up device on a stable, even surface that is not exposed to vibrations (e.g., weighing stone).

– Ensure the device is located in a place where excessive heat cannot build up.
– Maintain free access to the device at all times.



Acclimatization

Condensation from humidity can form on the surfaces of a cold device when it is brought into a substantially warmer area.
You can prevent this by acclimatizing the device for about 2 hours at room temperature, leaving it unplugged from AC power.
Follow all warnings and safety precautions from the respective chapter.
Choose a location that is not subject to the following negative influences:
– Heat (heater or direct sunlight)
– Drafts from open windows, AC systems and doors
– Extreme vibrations during weighing
– Excessive moisture



Leveling the Balance, Setting the Level Indicator

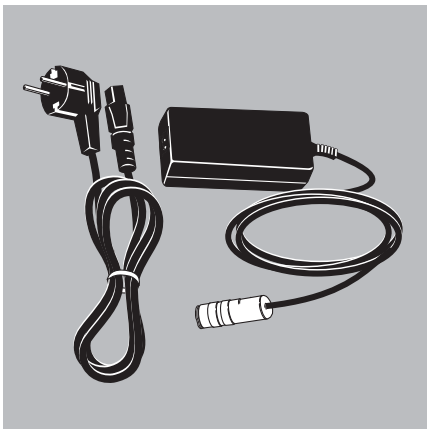
Leveling the balance compensates for slant or unevenness at the place of installation. The balance must be perfectly horizontal to ensure consistent, reproducible weighing results. All models are equipped with an electronic tilt angle detection feature.

▶ The scale is leveled using both front leveling feet.

▶ Screw in both back leveling feet (only for models with back leveling feet).

▶ Turn the 2 front feet as shown in the illustration until the air bubble is centered within the circle of the level indicator.
▷ Normally, several leveling steps are required.

▶ Turn both back leveling feet until they touch the setup surface (only for models with back leveling feet).



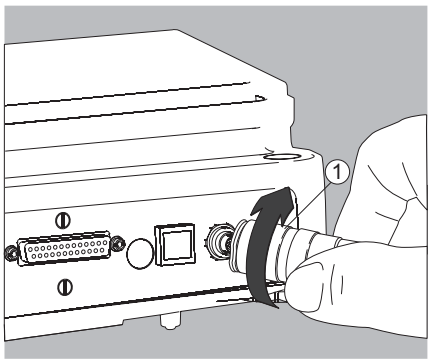
Power Connection

▶ Check the voltage rating and plug design!

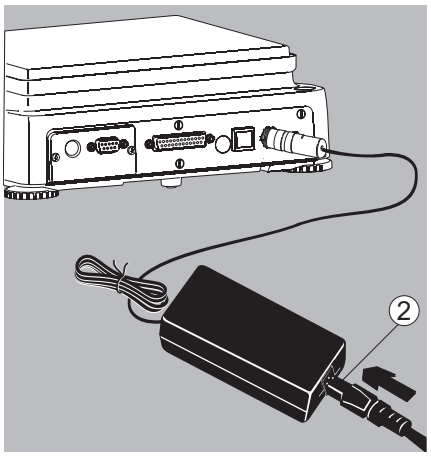
- The printed voltage rating (see type label) must match the voltage in the place of installation.
- If the stated supply voltage or the plug design of the power cord does not comply with your country's standard, please inform the nearest Sartorius representative or your dealer.
- The power connection must be made in accordance with the regulations applicable in your country.
- In order to connect the equipment to the power supply (protection class 1), use a correctly installed wall outlet with a protective grounding conductor (PE) and a fuse of a maximum 16 A.
- If a main feeder from the ceiling is required or if installation of a CEE plug is necessary, this must be carried out by a qualified electrician.
- Only use original Sartorius power cables!

Safety Precautions

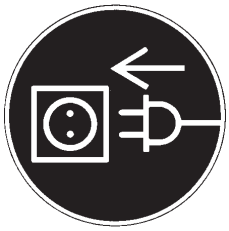
The output line of the power supply has a pole (GND) connected to the metal balance housing. The data interface is also galvanically linked to the balance housing (GND).



1. Plug the DC supply cable into the scale and tighten the threaded fitting.

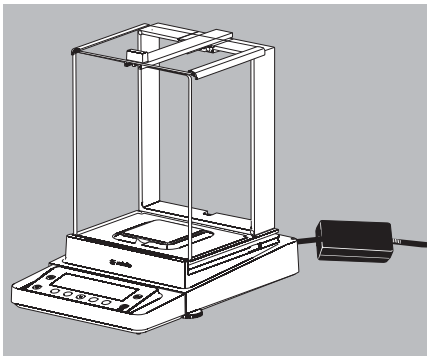


2. Plug the other end of the power cord into the AC adapter.

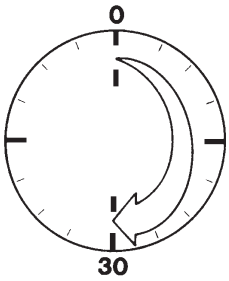


Connecting the Device to AC Power

▶ Insert the AC adapter plug into the wall outlet.



▷ The balance is now ready to use.



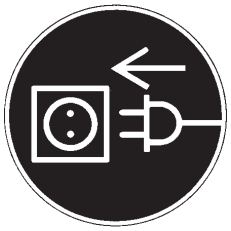
Warm-up Time

▷ To return precise results, the device must warm up for at least 30 minutes after initial connection to the power supply.
Only after this time will the device have reached the required operating temperature.

M The first time a verified balance used in legal metrology (legal-for-trade applications) is connected to the power, it must warm up for at least 24 hours before operation.
After having been disconnected and then connected again, it must warm up for 30 minutes.

Equipment Not in Use

- Place the equipment in standby mode when not in use for a short period of time by pressing the (⏻) key.

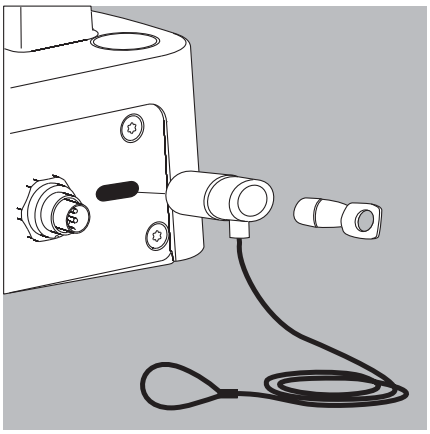


- For longer periods of non-use, the device should be disconnected from the power supply.

Connecting Electronic Devices (Peripherals)

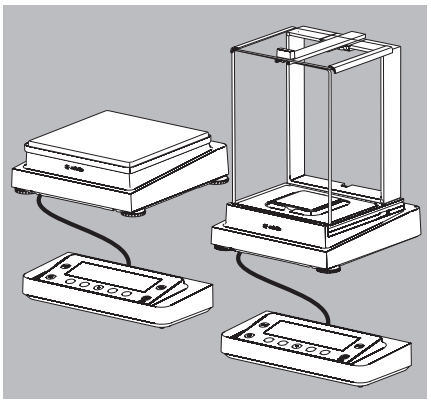
- Make absolutely sure that the device is unplugged from the power supply before connecting|disconnecting any peripheral device (printer, scanner, PC) to or from the data interface!

⚠ A device connected to the power supply should never be opened!



Anti-theft Locking Device (Accessory)

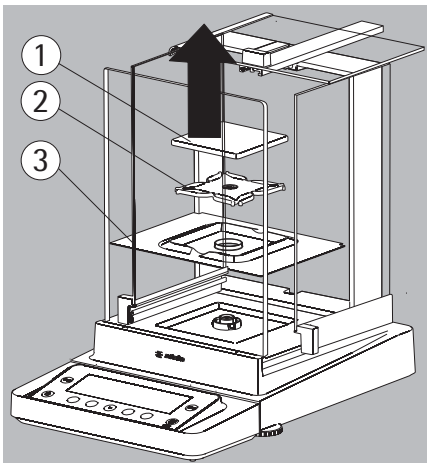
- An optional anti-theft locking device can be installed to the back of the balance.



Modifying the Balance

Setting up the Display and Control Unit at the Place of Use

The display and control unit can be removed for all models to enable the operator to customize the work space.



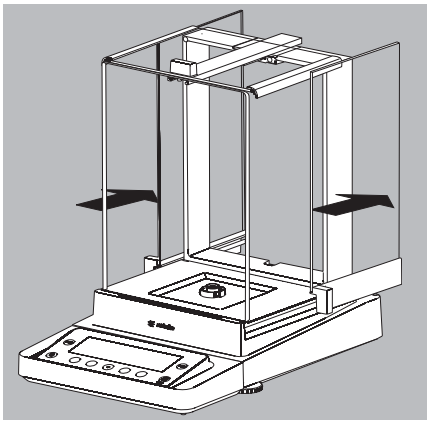
Removing the Retainer with the Display and Control Unit

▶ Remove all items (such as weights) from the draft shield.

▶ Carefully remove all parts as shown in the illustration.

1. Weighing pan
2. Pan support
3. Shield plate|draft shield

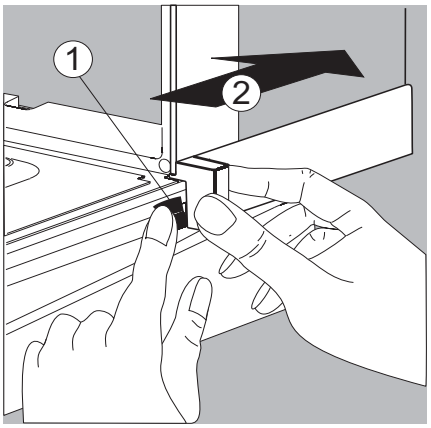
▶ Keep all parts in a safe place.

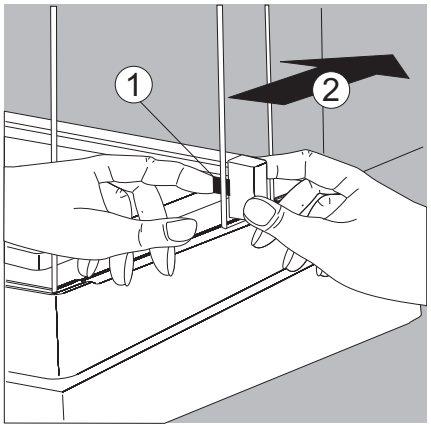


▶ Remove the panels (right and left).

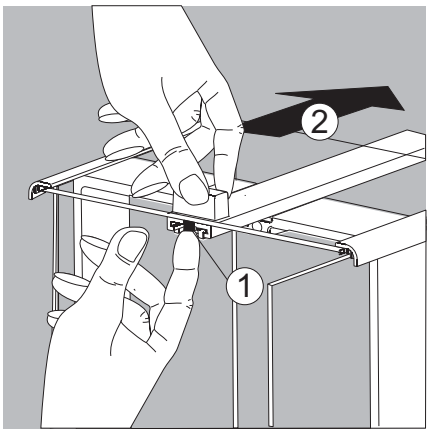
Models with the analytical draft shield
1. Press on the locking tab
2. Remove the panel

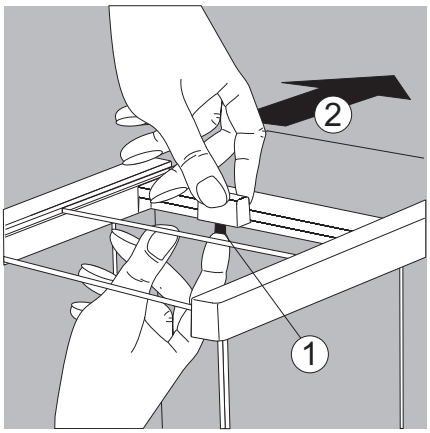
Models with the milligram draft shield
1. Press the locking tab
2. Remove the panel





▶ Keep all parts in a safe place!



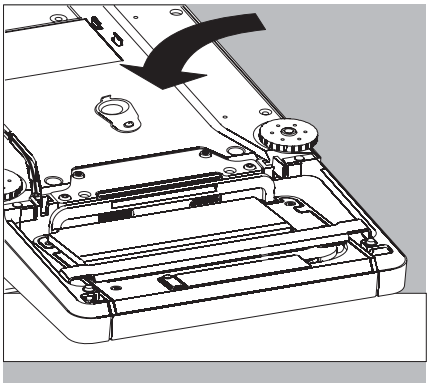


▶ Remove the upper draft shield panel.

Models with the analytical draft shield (left illustration).
1. Press the locking tab
2. Remove the panel

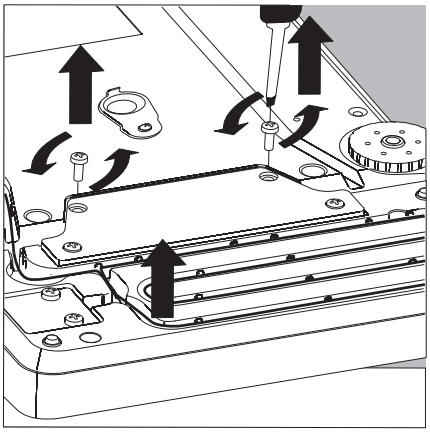
Models with the milligram draft shield (right illustration).
1. Press the locking tab
2. Remove the panel

▶ Keep all parts in a safe place!



▶ Turn over the scale and place on a soft surface.

⚠ Exercise caution to avoid glass breakage for models with a draft shield!

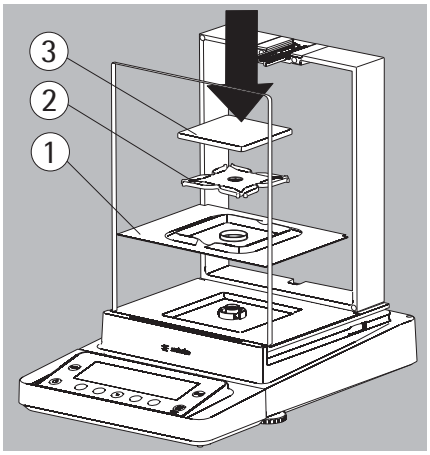


▶ Use a 2.5 mm Allen wrench to remove the two screws from the display and control unit retainer bracket.

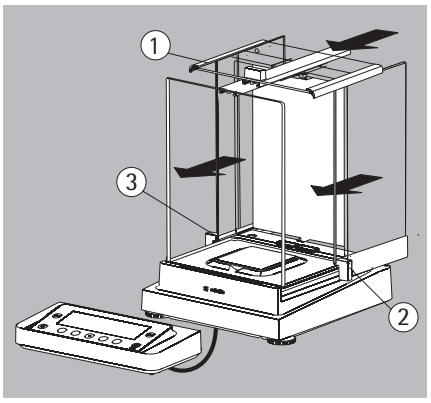
▶ Remove the display and re-insert both screws back into their holes.

▶ Lengthen the cable as desired and position the display and control unit as desired.

▶ Turn the balance over and place it on an even surface.

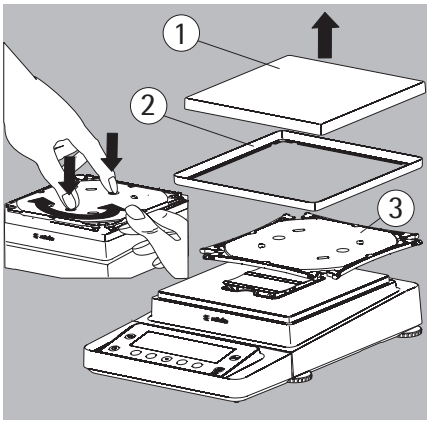


▶ Carefully place all parts on the balance:
1. Shield plate|draft shield
2. Pan support
3. Weighing pan



▶ Reinstall the upper and side shield panel:
1. Upper draft shield panel
2. Right draft shield panel
3. Left draft shield panel

▶ Level the balance (for procedure, see page 16).

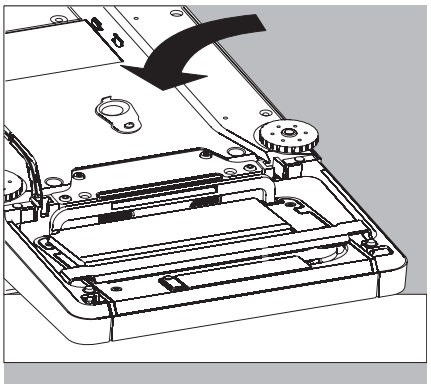


Removing the Display and Control Unit for Models Without a Draft Shield

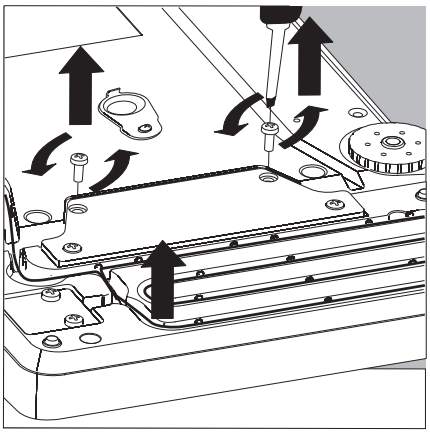
▶ Carefully remove all parts as shown in the illustration.

1. Weighing pan
2. Shield plate|draft shield
3. Pan support

▶ Keep all parts in a safe place.



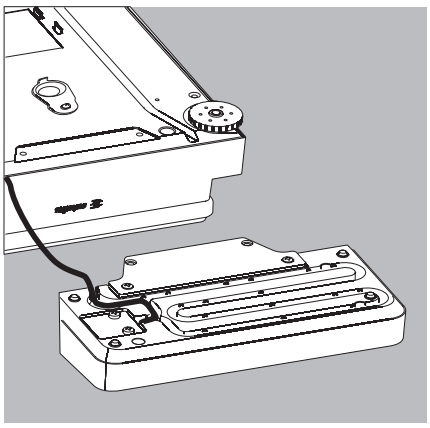
▶ Turn over the balance and place on a soft surface.



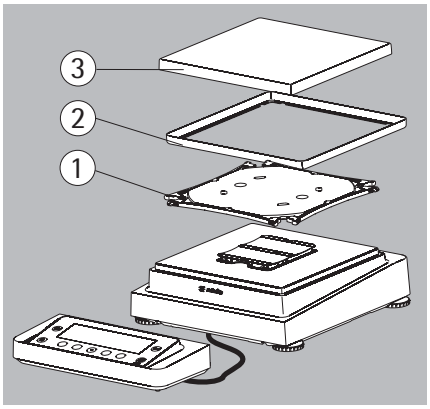
▶ Remove the two retaining screws.

▶ Remove the display and re-insert both screws back into their holes.

▶ Carefully pull the cable connected between the display and control unit from the retainer.



▶ Determine the required cable length.

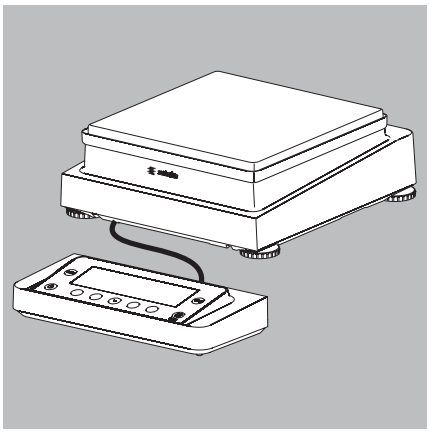


▶ Return the balance to an upright position and place the parts on the balance.

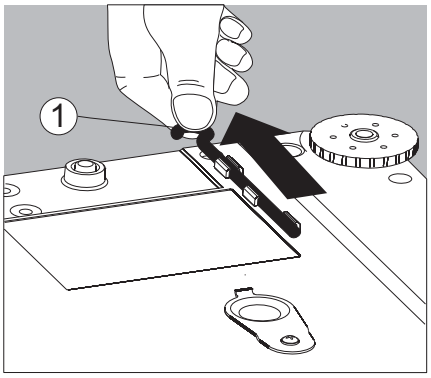
1. Attach the pan support.

2. Shield disk (only for models with a readability of 10 mg)

3. Weighing pan



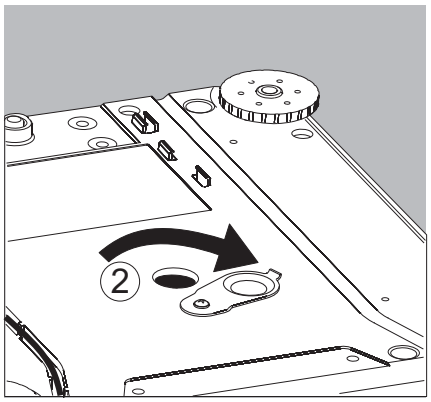
▶ Level the balance.



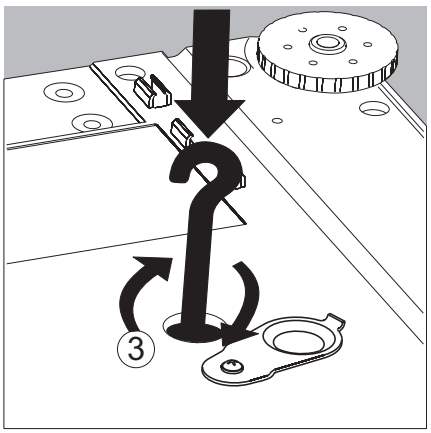
Under-Balance Weighing

A port for an under-balance weighing hanger is located on the bottom of the balance.

1. Remove the hook for under-balance weighing from the clip on the bottom of the balance.



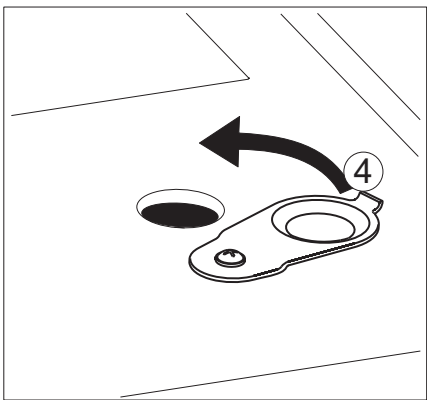
2. Push the cover of the under-balance weighing port to one side.



3. Carefully screw on the under-balance weighing hook.

⚠	Do not screw it in too tightly! This could damage the thread or the balance.
ⓘ	Install a draft protection shield.

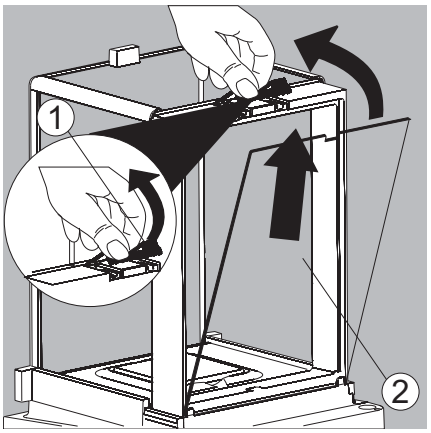
▶ Attach the sample (e.g., using a suspension wire) to the hanger.



4. When weighing has been completed, unscrew the hook and return it to the clip.

▶ Close the cover of the under-balance weighing port.

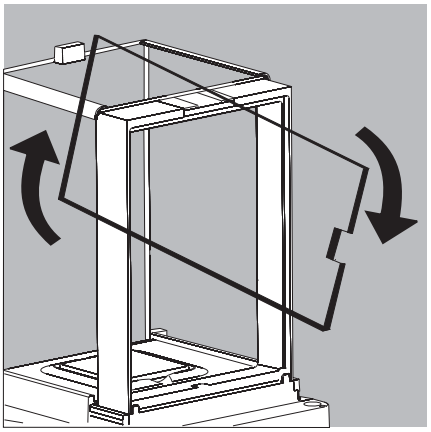
M	The under-balance weighing port may not be opened nor used on balances used for legal metrology!



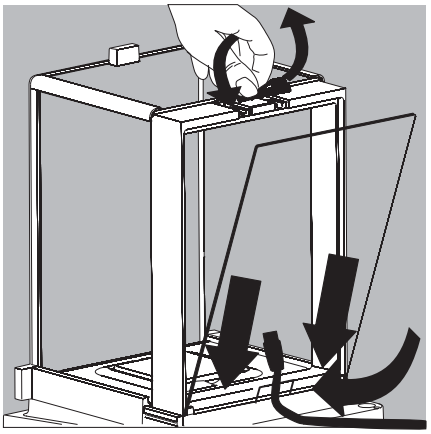
Using the Cable Opening in the Draft Shield

Models with an analytical draft shield have an opening for passing a cable (for example, for a temperature sensor) through to the interior of the weighing chamber.

1. Lift the locking tab on the rear panel of the analytical draft shield.
2. Lift the panel out of the draft shield.



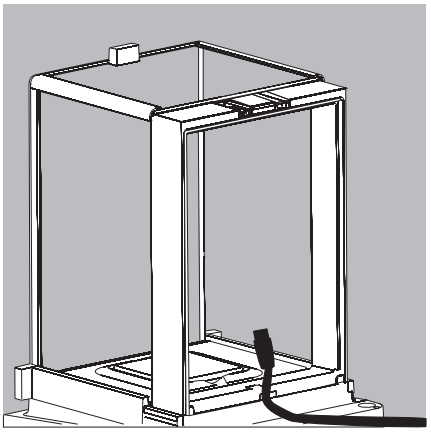
▶ Turn the panel clockwise 180° so that the opening is at the bottom.



▶ Install the desired sensor.

▶ Insert the panel in the guide rail.

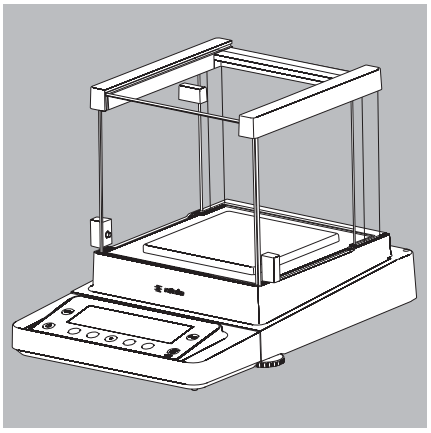
▶ Lift the locking tab and gently press the panel into position.



▶ Press the locking tab down and close it.

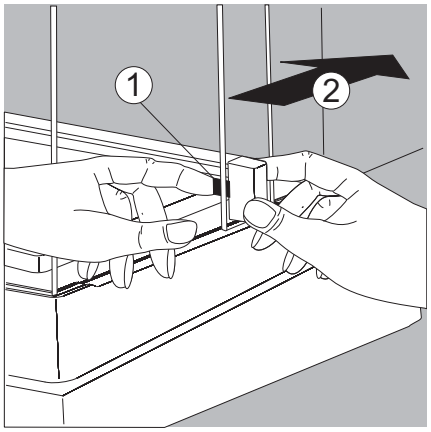
▶ You can now begin weighing.

Removing the Side Draft Shield Panels for Milligram Balances



The side draft shield panels on milligram balances can be removed and stored at the back of the analytical draft shield. This can be useful, for example, when performing continuous weighing or filling operations.

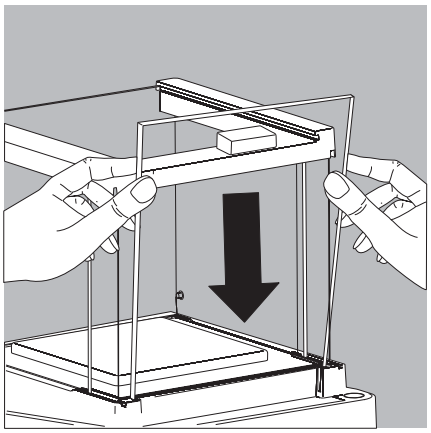
To work with an open draft shield, the ambient conditions must be extremely stable.



▶ Remove the panel:

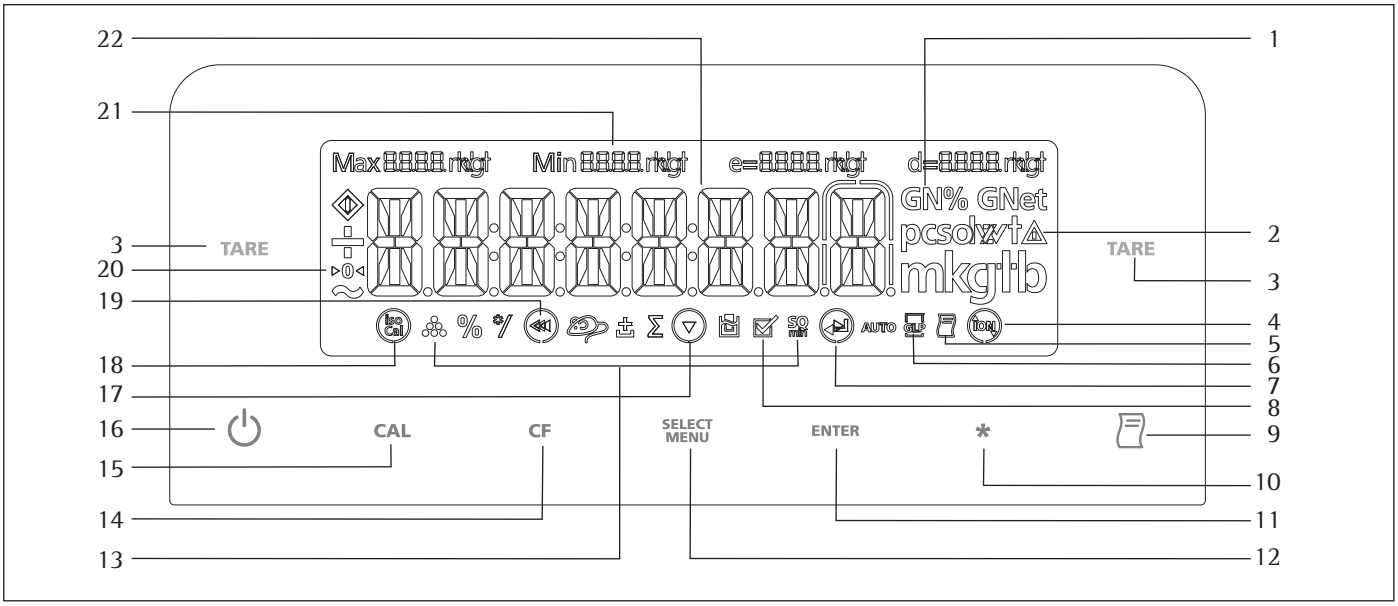
1. Press the locking tab

2. Remove the panel



▶ Place the panel in the storage slot at the back of the balance.

Operation



Overview of Display and Operating Elements

Position	Designation
1	Weight units
2	Calculated-value indicator: not a weight value
3	Taring
4	Symbol: “Ionizer active”
5	Symbol: “Printing mode active”
6	Symbol: “GLP printing mode active”
8	Symbol: “Application program active”
9	Data output: Press this key to send readout values to the built-in data interface.
10	Open or close draft shield | Turn on|off ionizer
11	Start an application program
12	Select an application program | Open the operating menu
13	Symbols for active application (, %, , ±, , ,)
14	Delete (Clear Function) This key is generally used to cancel functions: – Quit application program – Cancel calibration|adjustment routine | Exit the operating menu
15	Start calibration|adjustment routine
16	On|off
18	Symbol: “isoCAL”: Calibration|adjustment function
20	Symbols for zero range (verified models only)
21	Metrological data
22	Weight value displayed in selected weight unit
	Symbols:
19	◀◀ Save settings and exit the operating menu
19	◀ One menu level higher
17	▼ Select menu item
7	▶ Next item on current menu level
7	↲ Select a parameter setting

Basic Weighing Function

Features
- Taring the balance
- Printing weights

M **Using Verified Balances as Legal Measuring Instruments in the EU*:**
The type-approval certificate for verification applies only to non-automatic weighing instruments.
For automatic operation with or without auxiliary measuring devices, you must comply with the regulations applicable to the place of installation.

- ● Before using the balance as a legal measuring instrument, calibrate and adjust it at the place of use using the built-in motorized calibration weight: for details, see "Calibration|Adjustment" in this chapter.
- ○ The temperature range (°C) indicated on the verification label may not be exceeded during operation.

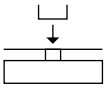
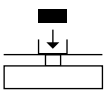
Example:
MSX
(II)
+10/+30 °C
+5°C/+40°C isoCAL

Preparation
- ● Switch on the balance: Press (⏻)
- ● Level the balance if required
- ● Tare the balance, if necessary: Press (TARE)

- ○ If necessary, change the configuration settings: See the chapter entitled "Configuration"
- ○ If desired, load the factory settings: See the chapter entitled "Configuration"

Additional functions
- ○ Switching off the balance: Press (⏻)

Example: Simple Weighing

	Step	Key (or Instruction)		Display|Printout
1.	Switch on the balance Self-test is performed, followed by automatic initial tare function.	(⏻)		0.0 g
2.	Place container on weighing pan (in this example: 11.5 g).		+	11.5 g
3.	Tare the balance	(TARE)		0.0 g
4.	Place sample in container (in this example: 132 g).		+	132.0 g
5.	Print weight.	(🖹)	N	+ 132.0 g

Level the balance with the inclination sensor

It is essential for exact weighing results that the balance is absolutely level. The front leveling feet can be used to level out small tilts of the floor. An integrated sensor detects the alignment of the balance and triggers a warning message when leveling is required.
When » ○ « appears on the display, you must level the balance.

	Step	Press key	Display
1.	○ flashes in the display:	○ flashes	
	Start leveling.	(*)	SCREW IN
2.	Fully screw in both back leveling feet (depends on the model) and confirm.	(*)	▼▲TURN▲▼
3.	Directional arrow on the right of TURN: Turn right leveling foot.		TURN▼▲
	Directional arrow on the left of TURN: Turn left leveling foot.		▲▼TURN
	Directional arrow ▲▼: Turn the respective leveling foot to the right until the directional arrow disappears. Directional arrow ▼▲: Turn the respective leveling foot to the left until the directional arrow disappears.		SCREW OUT
4.	Screw out both back leveling feet (depends on the model) until they touch the setup surface.	(*)	0.0g

Calibration and Adjustment

Purpose
Calibration is the determination of any difference between the measured value displayed and the true weight (mass) of a sample. Adjustment is the correction of this difference, or its reduction to an allowable level within maximum permissible error limits.

M Using Verified Balances as Legal Measuring Instruments in the EU:
Before using your balance as a legal measuring instrument, internal calibration must be performed at the place of installation.

Features
Calibration|adjustment can be performed only when:
- There is no load on the balance
- The balance is tared and
- The internal signal is stable.
- The sensitivity of the balance can be corrected by a max. of 2%.
- The balance can be adjusted using the Sartorius density determination kit YDK...

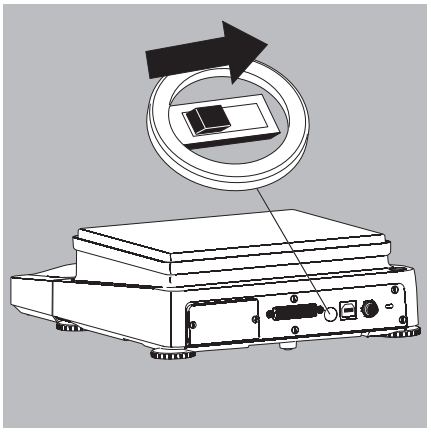
If these conditions are not met, an error message is displayed (ERR 02).

You can use any of the following weight units in calibration|adjustment:
CAL.UNIT - GRAMS, KILOGR (not for verified models)

- The automatic calibration and adjustment function (isoCAL) can be started, once the time or temperature values have been exceeded.

M **External Adjustment on Verified Balances**
- When the balance is used in legal metrology, external calibration is blocked as follows:
- The setting of the menu access switch is locked
- The cap over the menu access switch is sealed

To block calibration|adjustment:
- Select CAL.|ADJ. - BLOCKED
- Close the menu access switch on the back of the balance



For details on generating an ISO|GLP-compliant printout of calibration|adjustment results: System settings and report templates, see from page 59.

Following calibration|adjustment, the application parameters are cleared.

Internal Calibration|Adjustment
In the operating menu, select CAL.|ADJ. - CAL.INT..
The built-in motorized calibration weight is applied and removed automatically for internal calibration.
- ● Select Calibration|Adjustment: Press (CAL)
- > The built-in weight is applied automatically
- > The balance|scale is adjusted
- > The built-in calibration weight is removed

isoCAL*: Automatisch kalibrieren und justieren
In the operating menu, select ISOCAL-ON.
The balance will automatically display a flashing “isoCAL” character whenever the ambient temperature has changed since the last calibration|adjustment or a time interval has been exceeded.
The balance wants to perform an automatic adjustment.

The balance will indicate an automatic internal calibration and adjustment is necessary when the following requirements are met:
– Change in temperature or time interval is greater than stated in the table below
– No load change within the last 2 minutes
– The balance has not been used within the last 2 minutes
– The weight on placed on the balance may not exceed 2% of the maximum load.

The following display appears when the requirements are met:
1. The “isoCAL” symbol is flashing
2. The display indicates CAL.INT. in the measured value line

You can also specify in Setup that only the balance’s adjustment message is indicated, without any automatic calibration and adjustment taking place (menu item NOTE).

M **isoCAL is switched off on verified models:**
In that case, the balance can only be used for legal-for-trade applications within a limited temperature range.
– Balance of the accuracy class Ⓘ: +15°C to +25°C
– Balance of the accuracy class Ⓘ: +10°C to +30°C

The fully automatic adjustment function is triggered by the following criteria:

Model	When the temperature changes by	After time intervals of
MSE225, MSE225P, MSE125P, MSE324S, MSE224S, MSE324P, MSE124S, MSE3203P, MSE2203S, MSE2203P, MSE1203P	1.5 °C	4 h
MSE623S, MSE623P, MSE323S, MSE10202S, MSE8202S, MSE6202P, MSE4202S	2 °C	6 h
MSE2202S, MSE1202P	4 °C	12 h
MSA8201S, MSA5201S	4 °C	24 h

The criteria are also set on the corresponding verified models (Models MSE...-0CE).

Internal Calibration|Adjustment

Configuration:
SETUP - BAL.SCAL. - CAL.ADJ. - CAL.INT.

The built-in motorized calibration weight is applied and removed automatically for internal calibration.

- Select Calibration|Adjustment: Press (CAL)

> The built-in weight is applied automatically
> The balance is calibrated
> When the setup is configured to “Calibration and adjustment in one”, the balance will be adjusted automatically
> The built-in calibration weight is removed

Performing Calibration and Adjustment Routines
The following settings can be configured:
– Always perform calibration and adjustment in one routine (factory setting)
– After calibration, the user has the option to quit the routine without correction or to adjust the balance

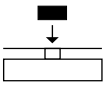
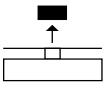
If no deviations are found during calibration, the calibration | adjustment routine can be exited after the calibration is completed. Two keys are now activated:

– The (CAL) key for initiating the adjustment routine
– The (CF) key for exiting the routine

	Step	Key (or instruction)	Display|Printout
1.	Tare the balance	(TARE)	0.0 g
2.	Starts the calibration	(CAL)	CAL.INT.
	The built-in weight is applied automatically		CAL.RUN.
3.	Calibration|adjustment executed		CAL.END
4.	The built-in calibration weight is removed		0.0 g

External Calibration

Configuration:
SETUP - BAL.SCAL. - CAL.ADJ. - CAL.EXT.
The required calibration weight is configured at the factory (see “Specifications”)

	Step	Key (or instruction)	Display|Printout
1.	Tare the balance	(TARE)	0.0 g
2.	Starts the calibration	(CAL)	CAL.EXT.
	Once you store the zero point, the required calibration weight is prompted (flashing display).		- 5000.0 g
3.	Apply the prompted calibration weight (in this example: 5000 g). Weight too low: a minus sign “–” is shown Weight too heavy: a plus sign “+” is shown The display stops flashing as soon as the weight value is within the defined limit.		5000.0 g
4.	Calibration|adjustment executed; then the calibration weight is displayed		CAL.END + 5000.0 g
5.	Remove the calibration weight		0.0 g

Configuration (Operating Menu)

You can configure the balance; i.e., adapt it to individual requirements.

Functions of the Keys During Configuration:

Display symbol	Key	Function
▼	(SELECT MENU)	Scroll through menu items
▶	(ENTER)	Next item on current menu level (use right cursor to scroll through up to 4 menu levels)
↲	(ENTER)	Confirm menu item
	(CF) (Press and hold)	Save settings and exit menu from any position
◀◀	(CF)	Save settings and exit menu
◀	(CF)	One menu level higher
2. 3. 1. 1		Indicates menu level

Menu Navigation
Example: Setting the Language

	Step	Key (or Instruction)	Display|Printout
1.	**Starting the Menu:** In Weighing mode, display the 1st menu item	(SELECT MENU) hold	APPLIC.
2.	Scroll up within a menu level; after scrolling through the last menu item, the first menu item is displayed again.	Repeatedly (SELECT MENU)	INPUT ... LANGUAG.
3.	Select next menu levels (scroll to the right)	Repeatedly (ENTER)	ENGLISH o
5.	**Change setting:** Select the menu item by scrolling up	(SELECT MENU)	ENGLISH
6.	**Confirm setting:** »o« indicates the menu item you have set	(ENTER)	ENGLISH o
7.	Go back to the previous menu level (from menu level 4)	(CF)	LANGUAG.
○	Set more menu items if required	(SELECT MENU), (ENTER)	
8.	**Save setting**	Repeatedly: (CF)	
	or		
○	Exit parameter setting without saving	(⏻)	
>	Restart your application		0.0 g

Parameter Settings: Menu

Level 1	Level 2	Level 3	Inform. on menu level
1) SETUP	BAL.SCAL. Balance parameters	AMBIENT conditions	1. 1. 1.
		APP.FILT. Application filter	1. 1. 2.
		STAB.RNG. Stability range	1. 1. 3.
		TARE [1])	1. 1. 5.
		AUT.ZERO Auto zero	1. 1. 6.
		WT.UNIT Basic weight unit	1. 1. 7.
		DISP.DIG. Display accuracy [1])	1. 1. 8.
		CAL.ADJ. Function of the (CAL) key	1. 1. 9.
		CAL.SEQ. Cal. sequence	1. 1. 10.
		ZERORNGE	1. 1. 11.
		WIT.ZERO Zero at Power On	1. 1. 12.
		ON TARE Tare|zero at Power	1. 1. 13.
		CYC.RATE Output rate	1. 1. 14.
		ISOCAL Autom. calibration|adjustment	1. 1. 15.
		EXT.CAL. External adjustment	1. 1. 16.
		CAL.UNIT Weight unit for calibration [1])	1. 1. 17.
	GEN.SERV. General Service	MEN.RESET Factory settings	1. 9. 1.
2) DEVICE	EXTRAS (Additional functions)	MENU Menu read only|can edit	2. 1. 1.
		SIGNAL Acoustic signal (beep)	2. 1. 2.
		KEYS Keypad	2. 1. 3.
		EXT.KEY External switch function	2. 1. 4.
		ON MODE Power-on mode	2. 1. 6.
		DR.SHIELD Automatic	2. 1. 9.
		RES.DR.SH Resolution, Draft Shield open	2. 1. 10.
		IONIZER	2. 1. 11
		LEVEL-	2. 1. 12
		LEVELING	2. 1. 13
	PERIPHER. (25-pin “Peripherals” interface)	DAT.REC. Communication mode	2. 2. 1. | 2. 3. 1.
		BAUD rate	2. 2. 2. | 2. 3. 2.
		PARITY Parity	2. 2. 3. | 2. 3. 3.
	PC-USB USB port (PC)	STOPBIT Number of stop bits	2. 2. 4. | 2. 3. 4.
		HANDSHK. Handshake mode	2. 2. 5. | 2. 3. 5.
		DATABIT Number of data bits	2. 2. 6. | 2. 3. 6.
3) DATA OUT	COM.SBI (PC Communication)	RESOLUT.ion (manual|automatic)	3. 1. 1.
		STOPAUT. Stop automatic printing	3. 1. 2.
		AUT.CYCL. Time-dependent autom. printing	3. 1. 3.
		FORMAT Line format for printout	3. 1. 4.
		AUTO TARE Autom. taring after printing	3. 1. 5.
	PRNT.PARA. for printing	RES. olution (manual)	3. 2. 1.
		FORMAT Line format for printout	3. 2. 2.
		PRT.INIT. Printout of appl. parameters	3. 2. 3.
		GLP ISO|GLP-compliant printout	3. 2. 4.
		TAR.PRT. Tare bal. after ind. print	3. 2. 5.
		TIME: 12h|24h	3. 2. 6.
		DATE: Format	3. 2. 7.
4) APPLIC.ation programs	WEIGH		4. 1.
	TOGGLE wt. unit	DISP.DIG. Display accuracy [1])	4. 2. 2.
	COUNT	RESOLUT.ion	4. 3. 1.
		REF.UPDT. Autom. ref. sample updating.	4. 3. 2.
	PERCENT Weighing in percent	DEC.PLCS Decimal places	4. 4. 1.
	NET-TOTL. Net-total Formulation	COMP.PRT. Printout of components	4. 5. 1.
	TOTAL Totalizing	COMP.PRT. Printout of components	4. 6. 1.
	ANIMALW. Animal weighing	ACTIVTY. Animal activity	4. 7. 1.
		START	4. 7. 2.
	CALC. Calculation	METHOD Operator	4. 8. 1.
		DEC.PLCS Decimal places	4. 8. 2.
	DENSITY Density determination	DEC.PLCS Decimal places	4. 9. 1.
5) INPUT Input	ID NO. ID input; max. 7 characters		5. 1.
	DATE Set a date		5. 2.
	TIME Set a time		5. 3.
6) INFO Information	VERSION, SER.NR., MODEL	Display software ver., serial no., model	6. 1.|.2.|.3.
7) LANGUAGE (LANGUAG.)	ENGLISH (Factory setting)		7. 1.
	DEUTSCH (German)		7. 2.
	FRANC.çais (French)		7. 3.
	ITAL.iano (Italian)		7. 4.
	ESPANOL (Spanish)		7. 5.
	РУССКИЙ (Russian)		7. 6.
	POLSKI (Polish)		7. 7.
8) OPT.MOD. (optional interface)		Displays software vers., serial no., model	8. 1./.2.

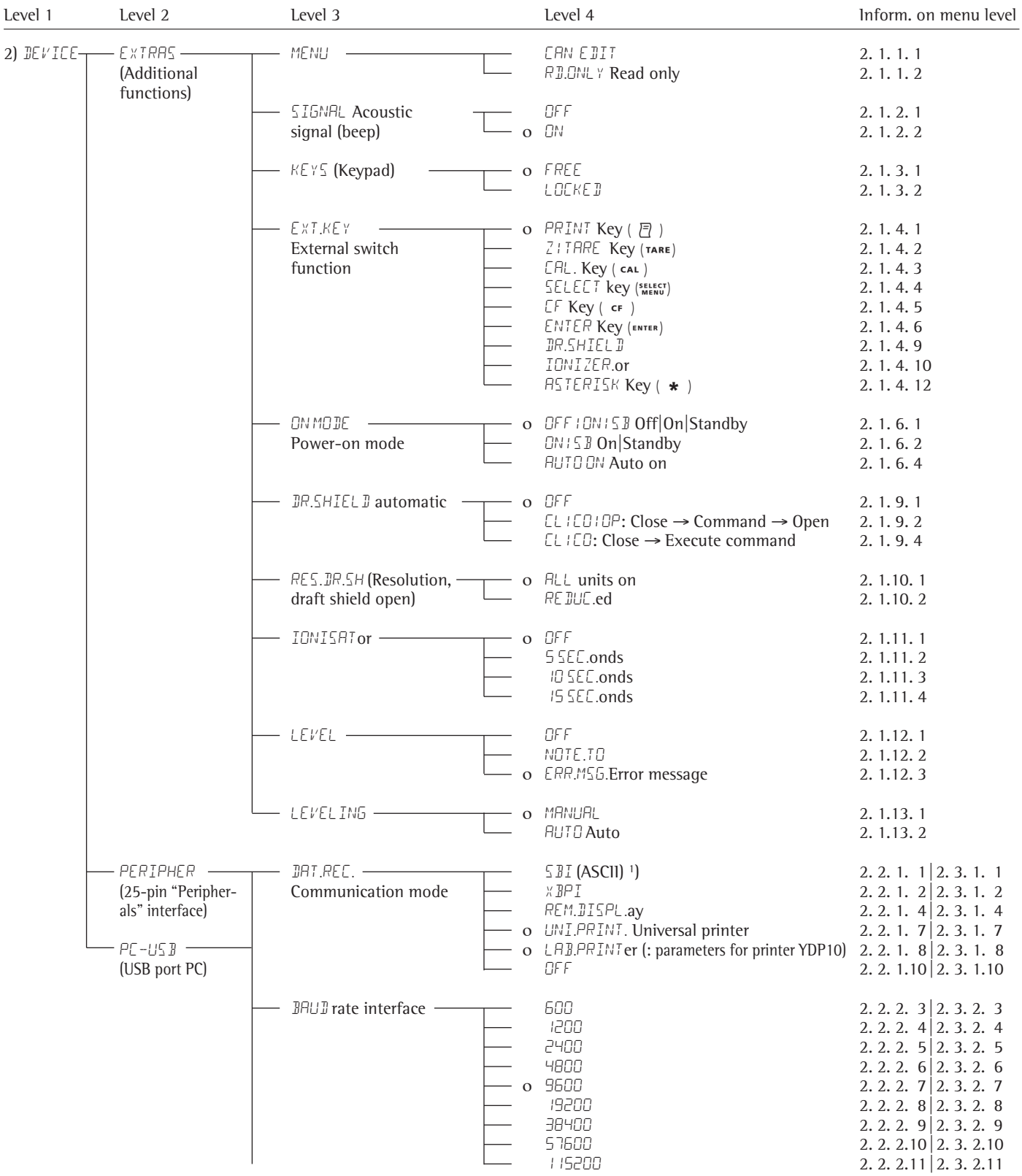
[1]) Setting cannot be changed on verified balances

Parameter settings: Overview

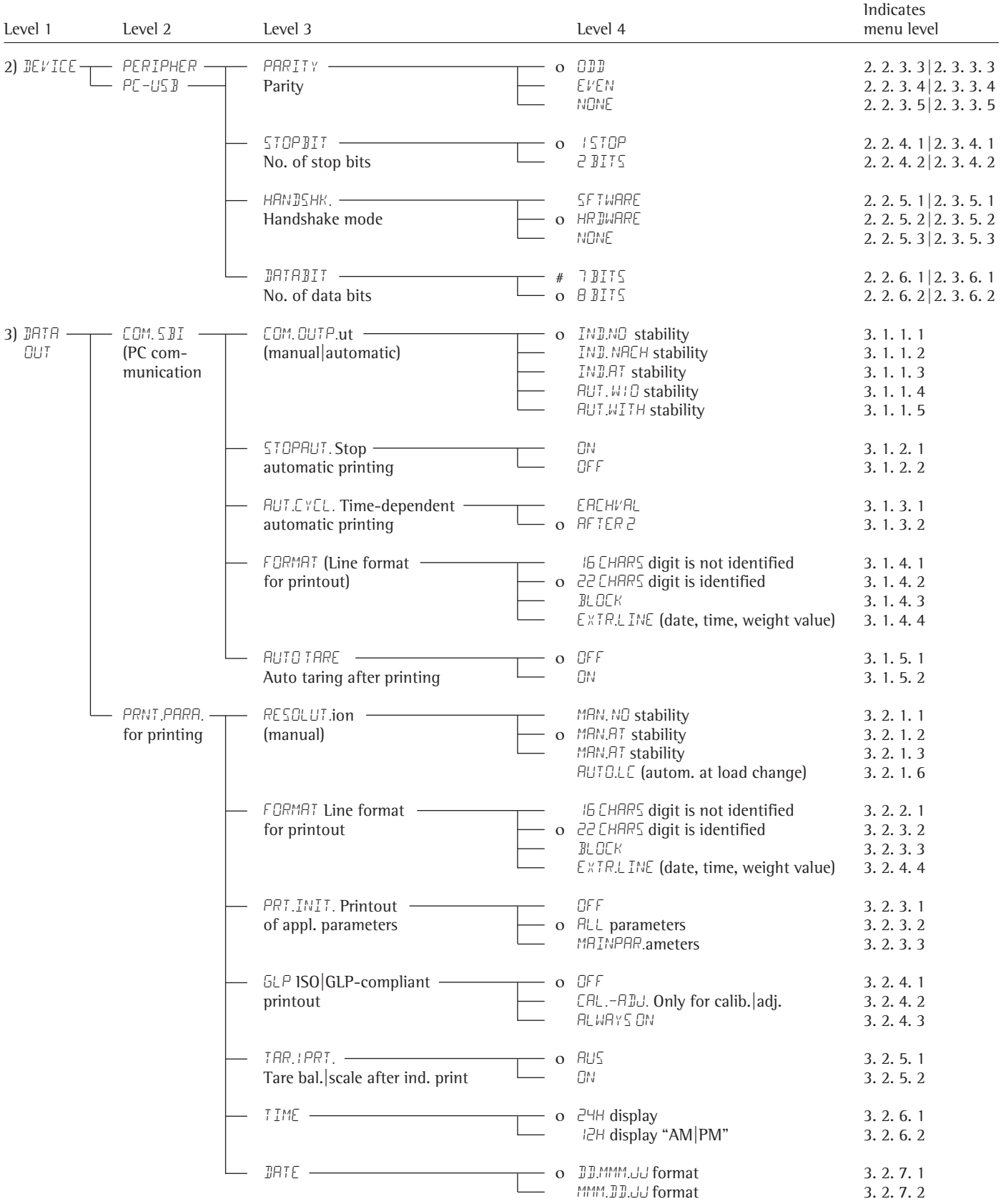
o = Factory setting; √ = User-defined setting

Level 1	Level 2	Level 3		Level 4	Inform. on menu level
1) SETUP	BAL.SCAL. Balance parameters	AMBIENT conditions Adapt filter		V.STABLE Very stable	1. 1. 1. 1
			o	STABLE	1. 1. 1. 2
				UNSTABL	1. 1. 1. 3
				V.UNSTBL. Very unstable	1. 1. 1. 4
		APP.FILT. Application filter	o	FINAL.RD. Final readout mode	1. 1. 2. 1
				FILLING Filling mode	1. 1. 2. 2
				REDUC. Reduced	1. 1. 2. 3
				OFF	1. 1. 2. 4
		STAB.RNG. Stability range		MAx ACC. Maximum accuracy	1. 1. 3. 1
				V.ACC.	1. 1. 3. 2
			o	ACC.	1. 1. 3. 3
				FAST	1. 1. 3. 4
				V.FAST	1. 1. 3. 5
				MAx FAST [1])	1. 1. 3. 6
		ST. DEL. Delay		NO	1. 1. 4. 1
			o	SHORT	1. 1. 4. 2
				AVERAG.	1. 1. 4. 3
				LONG	1. 1. 4. 4
		TARE [1])		WIOSTB. W|o stability	1. 1. 5. 1
			o	WI STAB. After stability	1. 1. 5. 2
				AT STAB. At stability	1. 1. 5. 3
		AUT.ZERO Auto zero		OFF	1. 1. 6. 1
			o	ON	1. 1. 6. 2
		WT.UNIT Basic weight unit		For list of units, see "Toggling Between Weight Units"	1. 1. 7. 1 to 1. 1. 7.24
		DISP.DIG. [1]) Display accuracy	o	ALL	1. 1. 8. 1
				LP.ON.OFF Last stability after load change	1. 1. 8. 2
				DIV. 1 1 Interval	1. 1. 8. 6
				MINUS 1 Subtract one Interval	1. 1. 8. 7
		CAL.ADJST. Function of the keys (CAL)		CAL.EXT. External cal.|adj. [1])	1. 1. 9. 1
				E.CAL.USR. External calibration with user weight[1])	1. 1. 9. 3
			o	CAL.INT. Internal Calibration|Adjustment	1. 1. 9. 4
				INT.LIN. Internal linearization (on analytical balances only)	1. 1. 9. 5
				SET.PREL. Set preload	1. 1. 9. 8
				DEL.PREL. Delete preload	1. 1. 9. 9
				BLOCKED (CAL) Blocked	1. 1. 9.10
				SET.EXT.W. Determine ext. calibration weight for E.CAL.USR.	1. 1. 9.17
		CAL.SEQ.uence		ADJ.ustment	1. 1.10. 1
				CAL.-ADJ.ustment as needed	1. 1.10. 2
		ZERORNGE		1 PERC.ent	1. 1.11. 1
			o	2 PERC.ent	1. 1.11. 2
		INIT.ZERO Zero at Power On	o	DEFAULT Factory set	1. 1.12. 1
				2 PERC.ent	1. 1.12. 2
		ON TARE Toggle tare|zero	o	On	1. 1.13. 1
				Off	1. 1.13. 2
		CYC.RATE Output rate	o	NORMAL	1. 1.14. 1
				HIGHVAR.	1. 1.14. 2
				SLOW	1. 1.14. 3
				MEDIUM	1. 1.14. 4
				FAST	1. 1.14. 5
				VERYFAST	1. 1.14. 6
				MAxIMUM	1. 1.14. 7
		ISOCAL Auto. calibration| adjustment		OFF	1. 1.15. 1
				NOTE	1. 1.15. 2
			o	ON	1. 1.15. 3
				TO.W.LINearize	1. 1.15. 4
		EXT.CAL. External calibration[1])	o	FREE	1. 1.16. 1
				LOCKED (blocked)	1. 1.16. 2
		CAL.UNIT Weight unit for calibration [1]) for calibration weight	o	GRAM	1. 1.17. 1
				KILOGR.am	1. 1.17. 2
				USERDEF. (Factory setting: pound)	1. 1.17. 4
	GEN.SERV. General Servicing	MEN.RESET Menu reset Restore fcty. settings		YES	1. 9. 1. 1
			o	NO Do not restore settings	1. 9. 1. 2
				Standard [1])	1. 9. 1. 3
				Calibrate [1])	1. 9. 1. 4

[1]) Setting cannot be changed on verified balances



[1]) Using Verified Balances as Legal Measuring Instruments in the EU*: In the setting "SBI", the non-verified display digit is not automatically identified. Please take the corresponding measures or adjust the settings on the peripheral device. (See also section entitled "Interfaces").


Level 1
Level 2
Level 3
Level 4
Indicates menu level
2) DEVICE
PERIPHER
PC-USB
PARITY
Parity
o ODD 2. 2. 3. 3 | 2. 3. 3. 3
EVEN 2. 2. 3. 4 | 2. 3. 3. 4
NONE 2. 2. 3. 5 | 2. 3. 3. 5
STOPBIT
No. of stop bits
o 1STOP 2. 2. 4. 1 | 2. 3. 4. 1
2 BITS 2. 2. 4. 2 | 2. 3. 4. 2
HANDSHK.
Handshake mode
SFTWARE 2. 2. 5. 1 | 2. 3. 5. 1
o HRDWARE 2. 2. 5. 2 | 2. 3. 5. 2
NONE 2. 2. 5. 3 | 2. 3. 5. 3
DATABIT
No. of data bits
7 BITS 2. 2. 6. 1 | 2. 3. 6. 1
o 8 BITS 2. 2. 6. 2 | 2. 3. 6. 2
3) DATA OUT
COM.SBI
(PC communication
COM.OUTP.ut
(manual|automatic)
o IND.NO stability 3. 1. 1. 1
IND.NACH stability 3. 1. 1. 2
IND.AT stability 3. 1. 1. 3
AUT.WIO stability 3. 1. 1. 4
AUT.WITH stability 3. 1. 1. 5
STOPAUT. Stop
automatic printing
ON 3. 1. 2. 1
OFF 3. 1. 2. 2
AUT.CYCL. Time-dependent
automatic printing
EACHVAL 3. 1. 3. 1
o AFTER 2 3. 1. 3. 2
FORMAT (Line format
for printout)
16 CHARS digit is not identified 3. 1. 4. 1
o 22 CHARS digit is identified 3. 1. 4. 2
BLOCK 3. 1. 4. 3
EXTR.LINE (date, time, weight value) 3. 1. 4. 4
AUTO TARE
Auto taring after printing
o OFF 3. 1. 5. 1
ON 3. 1. 5. 2
PRNT.PARA.
for printing
RESOLUT.ion
(manual)
MAN.NO stability 3. 2. 1. 1
o MAN.AT stability 3. 2. 1. 2
MAN.AT stability 3. 2. 1. 3
AUTO.LC (autom. at load change) 3. 2. 1. 6
FORMAT Line format
for printout
16 CHARS digit is not identified 3. 2. 2. 1
o 22 CHARS digit is identified 3. 2. 3. 2
BLOCK 3. 2. 3. 3
EXTR.LINE (date, time, weight value) 3. 2. 4. 4
PRT.INIT. Printout
of appl. parameters
OFF 3. 2. 3. 1
o ALL parameters 3. 2. 3. 2
MAINPAR.ameters 3. 2. 3. 3
GLP ISO|GLP-compliant
printout
o OFF 3. 2. 4. 1
CAL.-ADJ. Only for calib.|adj. 3. 2. 4. 2
ALWAYS ON 3. 2. 4. 3
TAR.!PRT.
Tare bal.|scale after ind. print
o AUS 3. 2. 5. 1
ON 3. 2. 5. 2
TIME
o 24H display 3. 2. 6. 1
12H display “AM|PM” 3. 2. 6. 2
DATE
o DD.MMM.JJ format 3. 2. 7. 1
MMM.DD.JJ format 3. 2. 7. 2

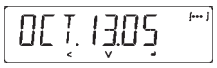
Level 1	Level 2	Level 3	Level 4	Indicates menu level
APPLIC. Appli-cation programs	WEIGH			4. 1.
	WT.UNIT Toggle wt. unit	DISP.DIG. [1] Display accuracy	o ALL	4. 2. 2. 1
			LP.ON.OFF (Last stability after load change)	4. 2. 2. 2
			DIV. 1 1 Interval	4. 2. 2. 6
			MINUS 1 Subtract one interval	4. 2. 2. 7
	COUNT	RESOLUT.ion	o DISP.ACC. Display accuracy	4. 3. 1. 1
			10 FOLD 10 times > disp.	4. 3. 1. 2
			100 FOLD 100 times > disp.	4. 3. 1. 3
		REF.UPDT. auto Reference sample updating	o OFF	4. 3. 2. 1
			AUTOmatic	4. 3. 2. 2
	PERCENT Weighing in percent	DEC.PLCS Number of decimal places	NONE No decimal places	4. 4. 1. 1
			o 1 DEC. PL. 1 decimal place	4. 4. 1. 2
			2 DEC.PL. 2 decimal places	4. 4. 1. 3
			3 DEC.PL. 3 decimal places	4. 4. 1. 4
	NET-TOTL. Net-total formulation	COMP.PRT. Printout of components	OFF	4. 5. 1. 1
			o ON	4. 5. 1. 2
	TOTAL Total	COMP.PRT. Printout of components	OFF	4. 6. 1. 1
			o ON	4. 6. 1. 2
	ANIMALW. Animal weighing	ACTIVTY. Animal activity	CALM (fluct.: 2% of test obj.)	4. 7. 1. 1
			o ACTIVE (fluct.: 5% of test obj.)	4. 7. 1. 2
			V.ACTIVE (fluct.: 20% of test obj.)	4. 7. 1. 3
		START	MANUAL	4. 7. 2. 1
			o AUTOmatic	4. 7. 2. 2
	CALC. Calculation	METHOD (operator)	o MUL. Multiplier	4. 8. 1. 1
			DIV. Divisor	4. 8. 1. 2
		DEC.PLCS Number of decimal places	NONE No decimal places	4. 8. 2. 1
			o 1 DEC. PL. 1 decimal place	4. 8. 2. 2
			2 DEC.PL. 2 decimal places	4. 8. 2. 3
			3 DEC.PL. 3 decimal places	4. 8. 2. 4
	DENSITY Density determination	DEC.PLCS Number of decimal places	NONE No decimal places	4. 9. 1. 1
			o 1 DEC. PL. 1 decimal place	4. 9. 1. 2
			2 DEC.PL. 2 decimal places	4. 9. 1. 3
			3 DEC.PL. 3 decimal places	4. 9. 1. 4

[1]) Setting cannot be changed on verified balances

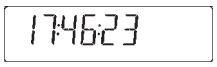
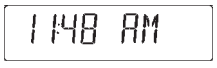
Input: ID., Date and Time

Level 1	Level 2	Level 3	Indicates menu level
INPUT Input	ID.	Input ID., max. 7 characters Possible characters: 0 to 9; A to Z; dash|hyphen; space	5. 1.
	DATE	Set date	5. 2.
	TIME	Set time	5. 3.

Depending on how the menu item “Print PRNT.PARA.meters DATE” is set, the date will be displayed in the following format:

Format	Symbol: Date
DD.MM.YYYY	
MMM.DD.YY	

Depending on how the menu item “Print PRNT.PARA.meters TIME” is set, the time will be displayed in the following format:

Time	Symbol: Time
24h mode	
12h mode	

Example: Set ID., date and time

Step	Key (or Instruction)	Display
1. Open the menu: first menu item is shown	(SELECT MENU) hold	APPLIC.
2. Select Setup menu	(SELECT MENU)	INPUT
ID no.		
3. Select input for ID	2× (ENTER)	ID.
4. Entering or changing ID numbers key: Press and hold to repeat	(SELECT MENU) (SELECT MENU) hold	3-------
5. Moving within the 7-digit ID number	(ENTER) or (CF)	3-ABC 12
6. Save settings at the last position of the ID number	(ENTER)	ID.
Date:		
7. Select “Date” and confirm	(SELECT MENU), (ENTER)	08.FEB.09
8. Change setting – key: Press and hold to repeat	(SELECT MENU) (SELECT MENU) hold	10.FEB.09
9. Go to next position Day|Month|Year	(ENTER) or	10.FEB.09
10. Store setting for position “Year”	(ENTER)	DATE
Time:		
11. Select “Time”	(SELECT MENU), (ENTER)	10.46.23
12. Change setting – key: Press and hold to repeat	(SELECT MENU) (SELECT MENU) hold	11.46.23
13. Toggle position between hour|minute|second	(ENTER) or	11.46.32
14. Set seconds to “0”	(SELECT MENU)	11.47.00
15. Store setting for position “Second”	(ENTER)	TIME
16. Save settings and exit menu	Repeatedly (CF)	
> Restart application		0.0 g

Device Information

Level 1	Level 2	Level 3	Indicates menu level	
INFO rmation	VERSION	Show software version	REL.32.05	6. 1.
	SER.NO.	Show serial number (To toggle focus between upper and lower display sections, press (SELECT MENU))	1080 1234	6. 2.
	MODEL	Show model designation (to change focus from upper to middle to lower display section and back, press (SELECT MENU))	MSE820 IS	6. 3.

Display of Menu Items: Language or Codes

LANGUAGE (LANGUAG.)	ENGLISH (factory setting)	7. 1.
	DEUTSCH (German)	7. 2.
	FRANC.ais (French)	7. 3.
	ITAL.iano (Italian)	7. 4.
	ESPANOL (Spanish)	7. 5.
	РУССКИЙ (Russian)	7. 6.
	POLSKI (Polish)	7. 7.

Application Programs

M Using Verified Balances as Legal Measuring Instruments in the EU*:
All application programs can be selected on balances|scales used as legal measuring instruments.
Calculated values are alternately indicated with the following symbols:

- Percent = %
- Piece count (counting) = pcs
- Computed value = o, ⚠

Counting

Display symbol: ⁂

Purpose
With the counting application, you can determine the number of parts which each have approximately equal weight. To do this, a known number of parts (the reference sample quantity) is weighed first, and the individual piece weight (reference weight) is calculated from this result. Then the number of parts subsequently placed on the balance|scale can be determined from their weight.

Changing the Reference Sample Quantity
Activate function:
Press the (SELECT MENU) key
Select the desired reference sample quantity (1 to 100):
In increments of 1: Press the (SELECT MENU) key briefly
In increments of 10:
Press and hold the (SELECT MENU) key.
The quantity is stored in battery-backed memory.

Reference Sample Updating
Automatic reference sample updating optimizes the counting accuracy.
You can activate or deactivate this function in the menu.

Automatic reference sample updating is performed when the requirements, including the specified stability criterion, have been met.

The abbreviation *OPT*, for “optimizing”, is displayed briefly with the new reference sample quantity.

Preparation
- Select the Counting application in the menu: see “Configuration.”
  See the chapter entitled “Configuration”

- Configure parameters:

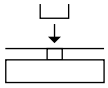
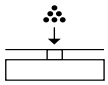
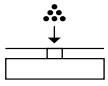
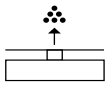
APPLIC.ation programs
- *COUNT*.
  - *RESOLUT*.ion
    - o *DISP.ACC*. Display accuracy
    - *10-FOLD* 10-fold higher
    - *100-FOLD* 100-fold higher
  - *REF.UPDT*. Autom. ref. sample updating
    - o *OFF* Switched off
    - *AUTOM*. Automatic

o = Factory Settings

Printout: Counting

nRef 10	: Reference sample quantity
wRef 21.14 g	: Reference weight for 1 unit
Qnt + 500 pcs	: Calculated quantity

Example: Counting parts of equal weight
Parameter settings: APPLIC. - COUNT.

Step	Key (or Instruction)	Display|Printout
1. Place empty container on the balance		+ 22.6 g
2. Tare the balance	(TARE)	0.0 g
3. Add reference sample quantity to container (in this example: 20 pcs)		
4. Changing the reference sample quantity	(SELECT MENU)	REF 10 pcs
5. Select reference sample quantity: In increments of 1 (1, 2, 3, ..., 100) In increments of 10 (10, 20, ..., 200)	Repeatedly press (SELECT MENU) briefly or hold the (SELECT MENU) key.	REF 20 pcs
6. Confirm selected reference sample quantity and start application. The current reference weight remains stored until a new reference is set.	(ENTER)	+ 20 pcs nRef 20 pcs wRef 1.07 g
7. Add desired number of pieces		+ 500 pcs
8. If desired, print result	( )	Qnt + 500 pcs
9. Toggle display between mean piece weight, weight, quantity	Repeatedly (SELECT MENU)	+ 1.07 g ⚠ + 535.0 g + 500 pcs
10. Unload the balance		– 2 pcs
11. Repeat as needed, starting from Step 7		
12. Delete reference value	(CF)	0.0 g

Weighing in Percent

Display symbol: %

Purpose
This application program allows you to obtain weight readouts in percent which are in proportion to a reference weight.

Changing the Reference Percentage
Activate function:
Press the (SELECT MENU) key
Select the desired reference sample quantity (1 to 100):
In increments of 1: Press the (SELECT MENU) key briefly
In increments of 10: Press and hold the (SELECT MENU) key.

The selected percentage is stored in battery-backed memory.

Preparation

- Select the “Weighing in percent” application in the menu.
  See the chapter entitled “Configuration”

- Configure parameters:

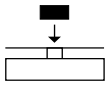
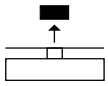
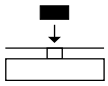
APPLIC. Application programs
└ PERCENT Weighing in percent
  └ DEC.PLCS. Number of decimal places
    ├ NO decimal places
    ├ o 1 DEC.PL. 1 decimal place
    ├ 2 DEC.PL. 2 decimal places
    └ 3 DEC.PL. 3 decimal places

o = Factory settings

Printout: Weighing in percent

pRef 100	: Reference percentage
Wxx% 111.6 g	: Reference weight net xx% for selected reference percentage
Prc + 94.9 %	: Calculated reference percentage

Example: Determining residual weight in percent
Parameter settings: APPLIC. - PERCENT
Reference percentage: REF 100%

Step	Key (or Instruction)	Display|Printout
1. Tare the balance	(TARE)	0.0 g
2. Information: Enter reference percentage (Changing the reference: see the previous page)	(SELECT MENU)	REF 100 %
3. Place sample equal to 100% on the balance (in this example: 111.6 g)		
4. Initialize the balance The current reference weight remains stored until a new reference is set.	(ENTER)	+ 100.0 % pRef 100 % Wxx% + 111.6 g
5. Remove sample (e.g., for drying)		
6. Place unknown weight on balance (in this example: 105.9 g)		+ 94.9 %
7. If desired, print percentage	( )	Prc + 94.9 %
8. Toggle display between weight and percentage	 Repeatedly (SELECT MENU)	+ 105.9 g + 94.9 %
9. Clear display of residual weight and reference percentage	(CF)	+ 105.9 g
10. If desired, print net residual weight	( )	N + 105.9 g

Calculation

Display symbol:

Purpose
With this application program you can calculate weight values using a multiplier or divisor.
This can be used, for example, to determine the weight per unit area, or “gsm” weight (grams per square meter), of paper

Setting the Factor or Divisor
Activate function:
Press the (SELECT MENU) key
Select a number of up to 8 digits and, if needed, one decimal point (0.0000001 – 99999999):
In increments of 1: Press the (SELECT MENU) key briefly
To increase the value without pressing repeatedly: Press and hold the (SELECT MENU) key.

The selected operator is stored in battery-backed memory.

Preparation
- Select the “Calculation” application in the menu.
  See the chapter entitled “Configuration”

- Configure parameters:

APPLIC. Application programs
- CALC. Calculation
  - METHOD (Operator)
    - o MUL. Multiplier
    - DIV. Divisor
  - DEC.PLCS. Number of decimal places
    - NONE No decimal places
    - o 1 DEC.PL. 1 decimal place
    - 2 DEC.PL. 2 decimal places
    - 3 DEC.PL. 3 decimal places

o = Factory settings

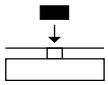
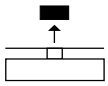
Printout: Calculation

```
Mul   +  1.2634
Div   +  0.6237
Res   +    79.7 o
```

: Multiplier
: Divisor
: Result

Example:
Calculating the weight per unit area of paper: An A4 sheet of paper is used in this example, with surface dimensions of 0.210 m × 0.297 m = 0.06237 m^2. To determine the weight per unit area, the total weight is divided by the surface.

Parameter settings:
APPLIC. - CALC. - METHOD - DIVIS.

Step		Key (or Instruction)	Display|Printout
1.	Tare the balance	(TARE)	0.00 g
2.	Activate divisor input	(SELECT MENU)	------ 1.0
3.	Set the divisor (in this example: 0.06237): Position the decimal point, Enter numerals in increments of 1 or:	(ENTER), 5× (SELECT MENU), 2× (ENTER), Repeatedly press (SELECT MENU) briefly or hold the (SELECT MENU) key	___.00000 ___.06000 ___.06237
4.	Store the divisor and initialize the balance. The current divisor remains stored in battery-backed memory until the setting is changed.	(ENTER)	+ 0.0 o Div 0.6237
5.	Weight per unit area: Place an A4 sheet of paper on the balance		+ 79.7 o
6.	If desired, print result	(🖹)	Res + 79.7 o
7.	Toggle display between weight and calculated value	Repeatedly (SELECT MENU)	+ 4.97 g + 79.7 o
8.	Unload the balance		+ 0.0 o
9.	Repeat as needed, starting from Step 5		

Averaging (Animal Weighing)

Display symbol:

Purpose
Use this program to determine the weights of unstable samples (e.g., live animals) or to determine weights under very unstable ambient conditions.
With this program, the balance calculates the weight as the average of a defined number of individual weighing operations (also referred to as “subweighing operations”).

Changing the Number of Subweighing Operations
Activate function: Press the (SELECT MENU) key
Select the desired number of measurements (1 to 100):
In increments of 1: Press the (SELECT MENU) key briefly
In increments of 10: Press and hold the (SELECT MENU) key.

The selected number of measurements is stored in battery-backed memory.

Preparation
- Select the animal weighing application in the menu:
  See the chapter entitled “Configuration”

- Configure parameters:

APPLIC. Application programs
- ANIMALW. Animal weighing
  - ANIMALW. Animal activity
    - CALM Stable readout
    - o ACTIVE Unstable
    - UNSTABLE Very unstable readout
  - START
    - MANUAL
    - o AUTOM. Automatic

o = Factory settings

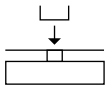
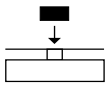
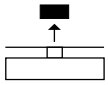
Printout: Averaging

```
mDef        20
x-Net +  410.1 g
```

: Defined number of subweighing operations
: Result of averaging

Example: Determining animal weight with automatic start and 20 subweighing operations (measurements)

Parameter settings: APPLIC. - ANIMALW.

Step		Key (or Instruction)	Display|Printout
1.	Place animal weighing bowl on the balance		22.6 g
2.	Tare the balance	(TARE)	0.0 g
3.	Change the number of subweighing operations	(SELECT MENU)	REF 30
4.	Set number of measurements: In increments of (1, 2, 3, ..., 100) In increments of 10 (10, 20, ..., 100)	Repeatedly press (SELECT MENU) briefly or hold the (SELECT MENU) key	REF 20
5.	Confirm number of measurements and start automatic animal weighing. The number of measurements remains stored in battery-backed memory until the setting is changed.	(ENTER)	+ 0.0 g *
6.	Place first animal in bowl. The balance delays the start of measurements until the difference between 2 measurements meets the criterion.		888 20 19 1
7.	Read off the result. The result is displayed with the "⚠" symbol (= calculated value) and remains displayed until the sample (animal) is removed from the load plate (bowl).		+ 410.1 g ⚠ mDef 20 x-Net + 410.1 g
8.	Unload the balance		+ 0.0 g
9.	Weigh next animal (if desired). The next weighing series begins automatically.		

Net-total Formulation

Display symbol: ⏃

Purpose
With this application program you can weigh in different components up to a defined total. You can print out both the total weight and the individual weights of the components.

Features
- Weigh up to 99 components from “0” to a defined total component weight.
- Store component weights (“Store xx comp.”), with
  – display zeroed automatically after value is stored, and
  – automatic printout
- Clear component memory following cancellation of the weighing sequence by pressing (CF) and printout the total weight.
- Toggle between component weight and total weight by pressing and holding (SELECT MENU).
- Printout the total of the individual component weights (**T–Comp**)

Preparation
- Select the Net-total application in the menu.
  See the chapter entitled “Configuration”
- Configure parameters:

APPLIC. Application programs
└ NET-TOTL Net-total formulation
  └ COMP.PRT. Printout of components
    ├ OFF
    └ o ON

o = Factory settings

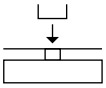
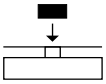
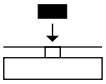
Printout: Net-total formulation

```
Comp 2+   278.1 g
T-Comp+ 2117.5 g
```

: Second component
: Sum of components

Example: Counting parts into a container

Parameter settings: APPLIC. - NET-TOTL.

Step	Key (or Instruction)	Display|Printout
1. Place empty container on the balance.		65.0 g
2. Tare	(TARE)	0.0 g
3. Add first component		+ 120.5 g
4. Store component data	(ENTER)	+ 0.0 g Net Comp 1+ 120.5 g
5. Add next component		+ 70.5 g Net
6. Store component data	(ENTER)	+ 0.0 g Net Comp 1+ 70.5 g
7. Weigh in further components as desired	Repeat steps 5 and 6	
8. Fill to desired final value (view the current total weight value)	(SELECT MENU)	+ 1911.0 g
9. Print total weight and clear the component memory g	(CF)	+ 2117.5 g T-Comp+ 2117.5

Totalizing

Display symbol: ∑

Purpose
With this application program you can add values from successive, mutually independent weight values to a total that exceeds the capacity of the balance.

Features
- Totalizing memory for up to 99 values
- Store component weights (“Store xx comp.”), with automatic printout
- Toggle display between the current individual weight value and the value in totalizing memory by pressing (SELECT MENU).
- Printout the total of the individual component weights (**S–Comp**)
- To close the application program and print the total weight: press (CF)

Preparation
- Select the Totalizing application in the menu. See the chapter entitled “Configuration”
- Configure parameters:

APPLIC. Application programs
└ TOTAL Totalizing
  └ COMP.PRT. Printout of components
    ├ OFF
    └ o ON

o = Factory settings

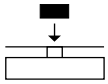
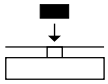
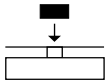
Printout: Totalizing

```
Comp 2+  278.1 g
S-Comp+ 2117.5 g
```

: Second component
: Totalizing memory

Example: Totalizing weight values

Parameter settings: APPLIC. - TOTAL : COMP.PRT: ON

Step		Key (or Instruction)	Display|Printout
1.	Tare	(TARE)	0.0 g
2.	Place sample on the balance (in this example: 380 g)		+ 380.0 g
3.	Store value in memory	(ENTER)	+ 380.0 g Comp 1+ 380.0 g
4.	Remove sample		+ 0.0 g
5.	Place the next sample on the balance (in this example: 575 g)		+ 575.0 g
6.	Store value in memory	(ENTER)	+ 955.0 g + 575.0 g Comp 2+ 575.0 g
7.	Remove sample		
8.	View the value in totalizing memory	(SELECT MENU)	+ 955.0 g ⚠
9.	Weigh in further components as desired	Repeat steps 5 and 6	
10.	Print total weight and clear the totalizing memory	(CF)	0.0 g S-Comp+ 2117.5 g

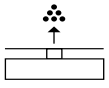
Mass Unit Conversion

Purpose
With this application program you can change the weight value displayed from the basic weight unit to any of 4 application weight units (see table on next page).

Features
- Set the basic unit and display accuracy in the Setup menu: see the chapter entitled “Configuration”.
- Set the application weight units and display accuracies in the Application menu.
- These settings are stored in battery-backed memory.
- The basic unit is active when the balance is powered up.

Example: Change display from the basic unit in this example, grams [g] to pounds [lb] and then to Troy ounces [ozt].

Configuration: APPLIC. - UNIT

Step	Key (or instruction)	Display|Printout	
Preparation:			
1.	Begin selection of an application weight unit	(SELECT MENU)	NO o
2.	Select an application unit; in this example, pounds (see table on next page)	Repeatedly (SELECT MENU)	POUNDS
3.	Confirm the weight unit (Troy ounces)	(ENTER)	POUNDS o
4.	Select the next application weight unit; (see table on next page)	(ENTER), Repeatedly (SELECT MENU)	NO o TROY.OZ.
5.	Confirm weight unit (Troy ounces)	(ENTER)	TROY.OZ. o
6.	Select other application units if desired (max. 4 total) (otherwise, confirm NO by pressing (ENTER))		
7.	Store selection	(CF)	0.00 g
	Conversion:		
8.	Place the sample on the balance		+ 100.00 g
9.	Toggle unit for weight value	Repeatedly (ENTER)	+ 0.22046 lb + 3.5275 ozt

The following weight units are available in your balance
(in legal metrology, only units permitted by national law are available):

Menu Item	Unit	Conversion Factor	Display Symbol
1) USERDEF.	Grams	1.00000000000	o
2) GRAMS (Factory setting)	Grams	1.00000000000	g
3) KILOGR.	Kilograms	0.00100000000	kg
4) CARATS	Carats	5.00000000000	o
5) POUNDS	Pounds	0.00220462260	lb
6) OUNCES	Ounces	0.03527396200	oz
7) TROY.OZ.	Troy ounces	0.03215074700	ozt
8) HKTAEL	Hong Kong taels	0.02671725000	tl
9) SNG.TAEL.	Singapore taels	0.02645544638	tl
10) TWN.TAEL	Taiwanese taels	0.02666666000	tl
11) GRAINS	Grains	15.4323583500	GN
12) PENY.WT.	Pennyweights	0.64301493100	dwt
13) MILLIGR.	Milligrams	1000.00000000	mg
14) PT.P.LB.	Parts per pound	1.12876677120	o
15) CHN.TAEL	Chinese taels	0.02645547175	tl
16) MOMMES	Mommes	0.26670000000	m
17) CARATS	Carats	5.00000000000	KT
18) TOLA	Tola	0.08573333810	o
19) BAHT	Baht	0.06578947436	b
20) MESGHAL	Mesghal	0.21700000000	o
21) TONS	Tons	0.00000100000	t
22) LB:OZ [1])	Pounds : Ounces (lb|oz)	0.03527396200	lb oz
23) NEWTON	Newton	0.00980665000	N
24) MICROGR. [2])	Micrograms	1000000.00000	o

[1]) = The format for display of pounds|ounces cannot be changed: xx:yy.yy x=lb, y=oz
[2]) = Unit not available on all models

⚠ Some weight units may be blocked from use in legal metrology, depending on national verification laws.

Density Determination

Display symbol:

Purpose
This application program lets you determine the density of solid substances using the buoyancy method.

Features
To enter the density of the buoyancy liquid (g|cm³) at the corresponding temperature, press (SELECT MENU). See the next page for a table of density values for water. The factory setting is 1 g|cm³.

The following formula is applied:

$$\text{Density of sample} = \frac{\text{Weight in air}}{\text{(Weight in air – weight in water)}} \cdot \text{density of liquid}$$

When you start the density determination routine, the density of the liquid is displayed briefly.
Positive and negative values can be stored for weight in air and weight in water. The weight in water must be less than the weight in air; otherwise, an error message is displayed.
You can have results displayed with one to three decimal places:
see “Configuration”. Note: the sample holder and suspension wire used in the example below are not included with the balance.

Preparation
- Select the “Density Determination” application in the menu:
  See the chapter entitled “Configuration”

- Configure parameters:

APPLIC. Application programs
└ DENSITY Density determination
  └ DEC.PLCS. Number of decimal places
    - NONE — No decimal places
    - o 1 DEC.PLCS. — 1 Decimal places
    - 2 DEC.PLCS. — 2 Decimal places
    - 3 DEC.PLCS. — 3 Decimal places

Note: When three decimal places are shown,
the third decimal place might be erroneous; for example, if corrections for air density and the particular density determination kit used are not considered.

o = Factory settings

Printout for Density Determination

```
RhoFl   0.99823 o
Wa    +   20.0 g
Wfl   +   15.0 g
RhoFl       4.0 o
```

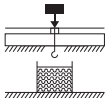
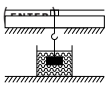
: Density of liquid (g|cm³)
: Weight in air
: Weight in liquid
: Result: density of the sample

Table:
Density of H_2O at Temperature T (in °C)

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

Parameter settings: APPLIC. - DENSITY - DEC.PLCS - 1 DEC.PL.

Example: Determining the density of a solid using water as the buoyancy liquid. The density of water at 20°C is 0.99823 g|cm³.

Step		Key (or Instruction)	Display|Printout
1.	Attach sample holder to suspension wire		
2.	Tare the balance	(TARE)	0.0 g
3.	Edit the stored density value	(SELECT MENU)	_ 1.00000
4.	Set the divisor (in this example: 0,99823): Enter numerals in increments of 1 or:	Repeatedly press (SELECT MENU) briefly or hold the key, (ENTER), etc.	_0.99823
5.	Save density value and start application The current density value remains stored in battery-backed memory until the setting is changed.	(ENTER)	
6.	Confirm "AIR" display	(ENTER)	AIR
7.	Determine the weight of the sample in air: place sample on the balance		+ 20.0 g
8.	Store value for weight in air		
9.	Remove sample from the balance		WATER
10.	Determine weight in liquid: place sample in holder.		
11.	Confirm "WATER" display	(ENTER)	0.0 g
12.	Immerse sample in liquid		+ 15.0 g
13.	Store value for weight in liquid, view result, and print	(ENTER)	+ 4.0 o RhoFl 0.99823 o Wa + 20.0 g Wfl + 15.0 g
14.	Delete result	(CF)	Rho 4.0 o
15.	Repeat as needed, starting from Step 5		

ISO|GLP-compliant Printout|Record

Features
You can have device information, ID texts and date and time printed before (GLP header) and after (GLP footer) the values of a weighing series. These parameters include:

GLP header:
- Date
- Time at beginning of measurement
- Balance manufacturer
- Balance model
- Balance serial number
- Software version number
- Identification number of the current sampling operation

GLP footer:
- Date
- Time at end of measurement
- Field for operator signature

Configuration
- Setting menu codes for the printout (see “Configuration”):
- ISO|GLP-compliant printout or record only for calibration|adjustment:
  PRNT - PRNT.PARA. -GLP - CAL.+ADJ.
  or
  ISO|GLP-compliant printout or record always on:
  PRNT - PRNT.PARA. - GLP -ALWAYS ON

- Line format for printout: include data ID codes (22 characters; factory setting): PRNT - PRNT.PARA. - FORMAT : 22 CHARS

- Formats for time:
  PRNT - PRNT.PARA. - TIME - 24H
  or
  PRNT - PRNT.PARA. - TIME - 12H
  with **A**hh:mm or **P**hh:mm

- Formats for date:
  PRNT - PRNT.PARA. - DATE - MMM.DD.YY
  or
  PRNT - PRNT.PARA. - DATE - MMM.DD.YY

⚠ No ISO|GLP-compliant record is output if any of the following settings are configured:
PRNT - PRNT.PARA. - FORMAT - 16 CHARS

Function Keys
Transfer header and first measured value:
Press (🖹)

> The header is included with the first printout|data record.

To output header and reference data automatically when an application program is active:
Press (ENTER)

Exit the application:
1) To send the GLP footer: press Press (CF)
2) Quit application program: Press (CF)

The ISO|GLP-compliant printout can contain the following lines:

`--------------------`	Dotted line
`17-Aug-2008  10:15`	Date|time (beginning of measurement)
`SARTORIUS`	Balance manufacturer
`Mod.  MSE8201S`	Model
`Ser. no.  10105355`	Balance serial number
`Ver. no.  00-39-02`	Software version
`ID  2690 923`	ID.
`--------------------`	Dotted line
`L ID`	Measurement series no.
`nRef  10 pcs`	Counting: Reference sample quantity
`wRef  21.14 g`	Counting: Reference weight
`Qnt +  567 pcs`	Counting result
`--------------------`	Dotted line
`17-Aug-2008  10:20`	Date|time (end of measurement)
`Name:`	Field for operator signature
	Empty line
`--------------------`	Dotted line

ISO|GLP-compliant printout for external calibration|adjustment:

`--------------------`	Dotted line
`17-Aug-2008 10:30:00 AM`	Date|time (beginning of measurement)
`SARTORIUS`	Balance manufacturer
`Mod.  MSE8201S`	Model
`Ser. no.  10105352`	Balance serial number
`Ver. no.  00-39-02`	Software version
`ID  2690 923`	ID.
`--------------------`	Dotted line
`Cal. Ext. Test`	Calibration|adjustment mode
`Set +  5000.0 g`	Calibration weight
`Diff. +  0.2 g`	Difference determined in calibration
`Cal. Ext. Complete`	Confirmation of completed calibration procedure
`Diff.  0.0 g`	Difference from target following adjustment
`--------------------`	Dotted line
`17-Aug-2008 10:32:00 AM`	Date|time (end of measurement)
`Name:`	Field for operator signature
	Empty line
`--------------------`	Dotted line

Interfaces

Purpose
The MSE models have two data interfaces used to output measurement values, calculated values and parameter settings to printers or PCs.

Merkmale of the Interfaces:
– USB interface for a PC connection (PC)
– 25-pin connector for Sartorius accessories (peripherals)

USB Port (PC)

Intended Use
Any PC equipped with a USB port can be connected to a Cubis balance.
A virtual serial interface (virtual COM port) is set up as a device type at the USB port. There is no difference for the application on the PC whether the serial interface in the PC is built-in or a virtual interface. The interface always functions the same.

The USB port was designed for the office environment and is not suitable for use in rough industrial environments.

System Requirements

– Computer (PC) running Windows 98SE®, Windows ME®, Windows 2000®, Windows XP® or Windows Vista®
– Free USB connection

Software Driver and Installation Guides
The enclosed CD contains the software driver.
This driver can be also be downloaded online at:
http:||www.ftdichip.com|FTDrivers.htm
The installation guides for the drivers can be found at:
http:||www.ftdichip.com|Documents|InstallGuides.htm
You can use this driver to install the virtual interface.

Installation
▶ Disconnect the balance from the AC power:
unplug the power cord from the wall outlet (mains).

▶ Insert the connection cable into the balance and the PC's USB port.

▶ Then reconnect the balance to the power and turn it on (ON).

▷ Windows detects the connected USB cable.
The installation wizard is activated the first time the USB cable is connected.

Initial Connection

Driver software installation for the USB interface:

1. Start the installation wizard for the driver software downloaded from the Internet.

2. The installation procedure for the driver differs slightly depending on your Windows® version. However, the installation wizard guides you through the driver selection for all versions.

3. When you click on the “Finish” button, your virtual interface should be ready to use.

For Windows®, the virtual interface is normally added as an additional output to the COM ports that already exist.

Example:
For a PC with up to 4 COM ports, the virtual interface would then be COM5 (see Device Manager).

Installation Instructions for Microsoft XP® and Vista®

Changing the Port No.
If the USB interface needs to be used with programs for which the number of COM ports is limited (e.g. only COM1, 2, 3, 4), you may be required to assign the new virtual interface to one of these numbers.

▶ This setting is carried out in Windows:
- Select: START → Settings → Control Panel
- Select: System
- Select: Hardware → Device Manager
- Open: Connections
- Double click: USB Serial Port
- Select: Port Settings → Advanced

Change Latency Time

▶ For faster communication, set “Latency Timer” to 1 msec:
See same dialog as in “Change port no.” section.

Plug & Play Mode in Autoprint (SBI)

▶ Turn off “Plug & Play Mode” here:
See same dialog as in “Change port no.” section.

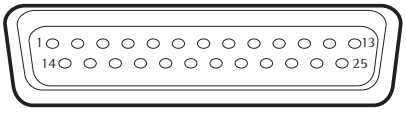
Connecting to Different PC USB Ports
Connect the cable to a different USB port:
Carry out new driver installation.
If possible, always use the same USB port.

▶ **Uninstalling the Driver**
- Select: START → Settings → Control Panel
- Select: Software
- Select: Select FTDIUSB Serial Converter Driver
- Press: The “Remove” button

> The software is uninstalled.

“Peripherals” Interface (25-pin)

Female Interface Connector:



Pin assignment 25-pin socket, RS-232:
Pin 1: Signal ground
Pin 2: Data output (TxD)
Pin 3: Data input (RxD)
Pin 4: Internal ground (GND)
Pin 5: Clear to Send (CTS)
Pin 6: Not used
Pin 7: Internal ground (GND)
Pin 8: Internal ground (GND)
Pin 9: Not used
Pin 10: Not used
Pin 11: + 12 V output
Pin 12: Reset _ Out*)
Pin 13: + 5 V output
Pin 14: Internal ground (GND)
Pin 15: Universal switch
Pin 16: Not used
Pin 17: Not used
Pin 18: Not used
Pin 19: Not used
Pin 20: Data Terminal Ready (DTR)
Pin 21: Not used
Pin 22: Not used
Pin 23: Not used
Pin 24: Not used
Pin 25: + 5 V output

Connection port for control switch

*) = Hardware restart

Preparation
You can set these parameters for other devices in the Setup menu:
see “Configuration”.

You will also find a detailed description of the available data interface commands in the file “Data Interface Descriptions for Cubis Series, MSE Models”, which you can download from the Sartorius website:
(www.sartorius.com “Download Center”).

The many and versatile properties of these balances can be fully utilized for printing out records of the results when you connect your balance to a Sartorius data printer.
The recording capability for printouts makes it easy for you to work in compliance with ISO|GLP.

Troubleshooting Guide

Error codes are shown on the main display for approx. 2 seconds. The program then returns automatically to the previous status.

Display	Cause	Remedy
No segments appear on the display	No power present	Check power supply
	The power cord is not plugged in	Plug in power cord
HIGH	Weighing capacity exceeded	Unload the weighing pan
LOW or ERR 54	Something is touching the weighing pan	Move the object that is touching the weighing pan
APP.ERR.	Cannot store data: Load on weighing pan too light or no sample on pan while application is active	Increase load
DIS.ERR.	Data output not compatible with output format	Change the configuration in the operating menu
PRT.ERR.	Interface port for printer output is blocked	Reset the menu factory settings, or Contact your local Sartorius Service Center
ERR 02	Calibration|adjustment condition not met, e.g., – Tare with the key (TARE) – Load on weighing pan	Calibrate only when zero is displayed Unload the balance
ERR 10	The (TARE) key is blocked when there is data in the second tare memory (net-total); only 1 tare function can be used at a time	Press (CF) to clear the tare there is data in the second tare memory and release the tare key (TARE)
ERR 11	Tare memory not allowed	Press (TARE)
LEVEL.ERR.	You should level the balance	Level the balance
○ is flashing	The balance is not leveled	Level the balance using the leveling feet
The weight readout changes constantly	Unstable ambient conditions (too much vibration, or the scale is exposed to a draft) A foreign object is caught between weighing pan and balance housing	Set up the balance in another area Change in setup menu Remove the foreign object
The weight readout is obviously wrong	The balance was not calibrated|adjusted Balance not tared before weighing	Calibrate|adjust the balance Tare

If any other errors occur, contact your local Sartorius Service Center.
Contact information: Please point your Internet browser to: http:||www.sartorius.com

Care and Maintenance

Service
Regular servicing by a Sartorius technician will extend the service life of your balance and ensure its continued weighing accuracy. Sartorius offers its customers service contracts with regular maintenance intervals ranging from 1 month to 2 years.
The frequency of the maintenance intervals depends on the operating conditions and the user's tolerance requirements.

Repairs

Repair work must only be performed by trained service technicians. Any attempt by untrained persons to perform repairs may result in considerable hazards for the user.

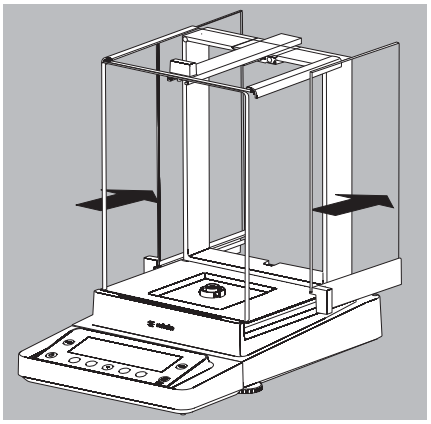
⚠ The device should be unplugged during repair work.
Unplug the power cord from the outlet.
Repair work must only be performed by Sartorius-trained service technicians.
If required, please contact your Sartorius dealer.

Cleaning the Balance

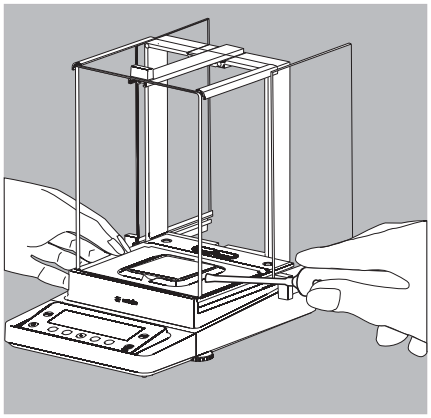
⚠ Ensure that no dust or liquid enters the balance weighing system.

Do not use aggressive cleaning agents (solvents or similar).

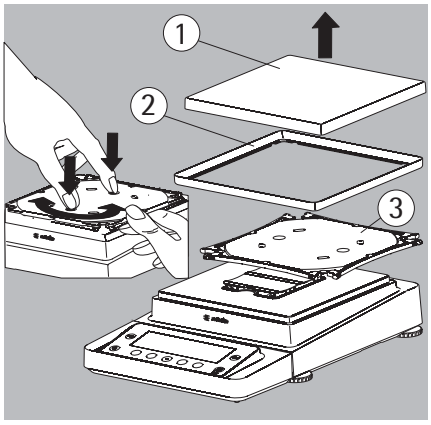
Isolate from supply voltage: Unplug the power cord from the wall outlet and unplug any data cables connected to the balance.



- ▶ Open the panels of the analytical draft shield completely.
- ▶ Clean the housing and interior of the balance with a cloth lightly moistened with a soap solution.
- ▶ Dry all parts with a soft, dry cloth or use blotting paper to absorb dampness. Then replace all dried parts.
- ▶ Remove panels from the analytical draft shield and clean them with commercially available glass cleaner. Wipe the panels dry.
Then reinstall them to the balance.



▶ Carefully remove any sample residue|spilled powder using a brush or hand-held vacuum.

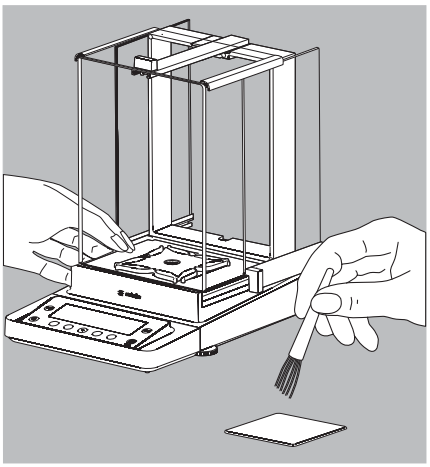


▶ If necessary, remove the weighing pan, shield plate and pan support.

1. Weighing pan

2. Shield plate|draft shield

3. Pan support



▶ Clean parts with a cloth or brush.
Then reinstall them to the balance.

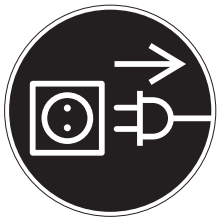
Cleaning Stainless Steel Surfaces

All stainless steel parts should be cleaned at regular intervals.

Use a damp cloth or sponge to clean stainless steel parts on the balance.
Only use conventional household cleaning agents which are suitable for stainless steel (e.g., Stahlfix). After this, let the device dry.
For additional protection, protective oil may be applied.

Remove the stainless steel weighing pan and thoroughly clean it separately.
Only use solvents for cleaning stainless steel parts.
The stainless steel weighing pan should be cleaned simply by rubbing.
After this, rinse the equipment thoroughly until all residue is removed.
No protective oil should be applied to the stainless steel weighing pan.

Safety Inspection



If there is any indication that safe operation of the balance is no longer warranted:

▶ Disconnect from the supply voltage: Unplug the power cord from the outlet.

▶ Secure the AC adapter and cord so that they cannot be used.

Safe operation of the balance with the AC adapter is no longer ensured when:

- The AC adapter or the mains connecting lead shows visible damage.
- The AC adapter no longer functions properly.
- Following extended storage in adverse conditions.
  In this case notify your nearest Sartorius Service Center.

Maintenance and repair work may only be carried out by service technicians who have access to the required maintenance manuals and have attended appropriate service training courses.

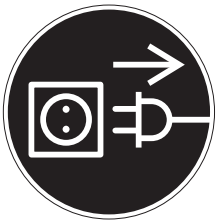
We recommend that the device be inspected by a qualified Sartorius service technician in regard to the following:

- Leakage current: < 0.05mA measured with a properly calibrated multimeter.
- Insulating resistance: >7megaohms measured with a constant voltage of at least 500 V at a 500 kohm load.

The duration and number of checks should be determined by a qualified Sartorius service technician on-site based on specific ambient and operating conditions (once a year as a minimum).

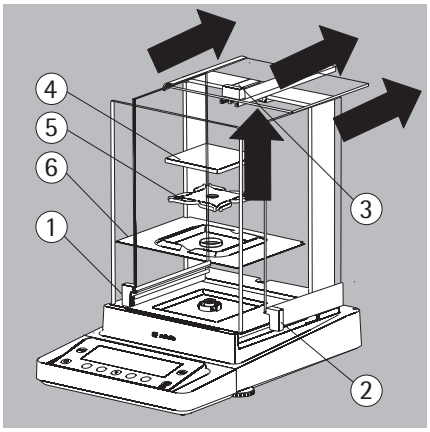
Transporting the Balance

If repairs are required, use the original packaging to transport the balance. To ensure adequate protection for safe shipment, Sartorius products have been packaged to the extent necessary using environmentally friendly materials. Only the original packaging provides optimum protection for the equipment!



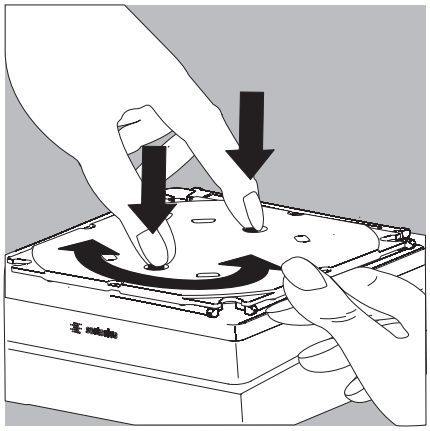
▶ Disconnect the device from the power supply.

▶ Disconnect the device from the power supply.



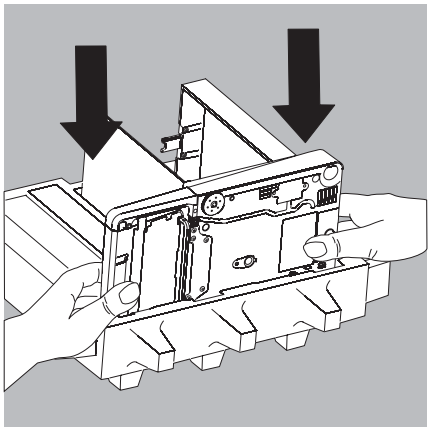
▶ Remove all items (such as weights, sensors, etc.) from the weighing chamber.

1. Remove the side panel
2. Remove the side panel
3. Remove the upper draft shield panel
4. Remove the weighing pan
5. Remove the pan support
6. Remove the shield plate|draft shield

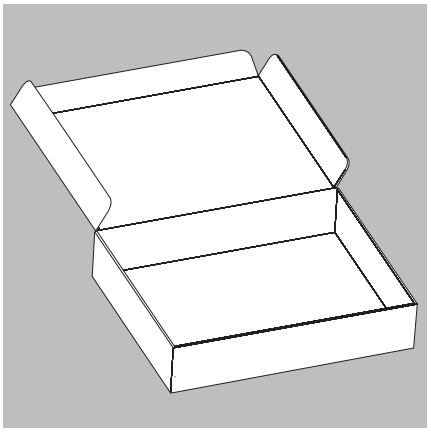


▶ On models without a draft shield: press down on the two pan support fasteners.

▶ Rotate and remove the pan support.

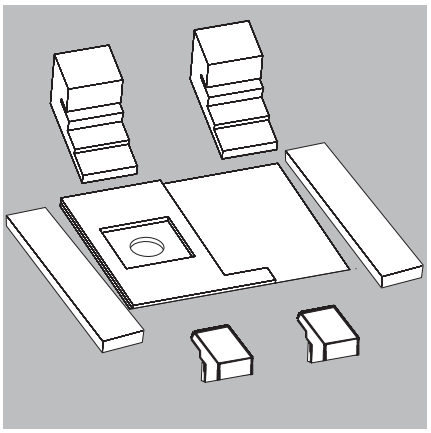


▶ Place the balance in the lower part of the packaging.

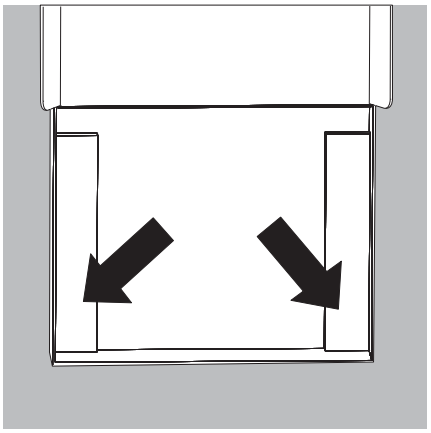


Transporting the Parts (Large Analytical Draft Shield)

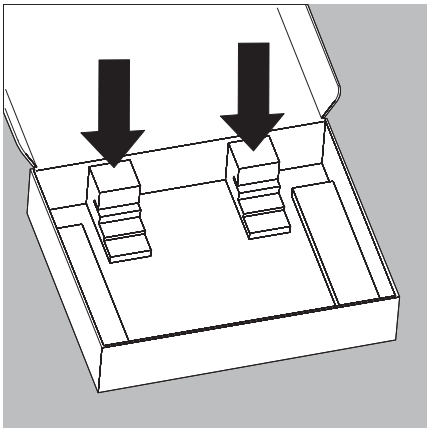
▶ Get the box ready for the individual parts of the balance.



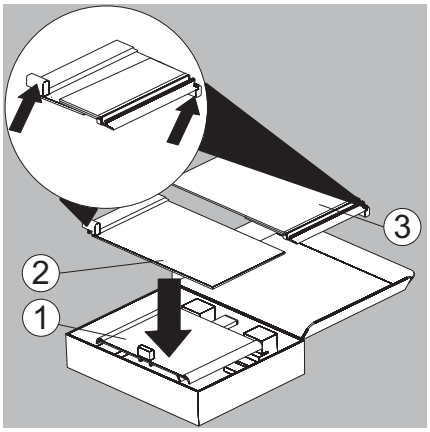
▶ Get the foam and cardboard inserts ready.



▶ Place the flat foam pieces in the box.



▶ Place the other foam pieces in the box.

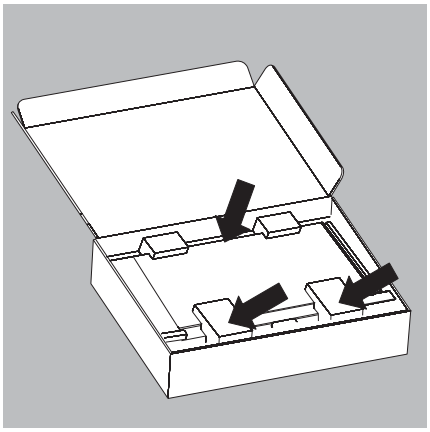


▶ Place the panels in the packaging.

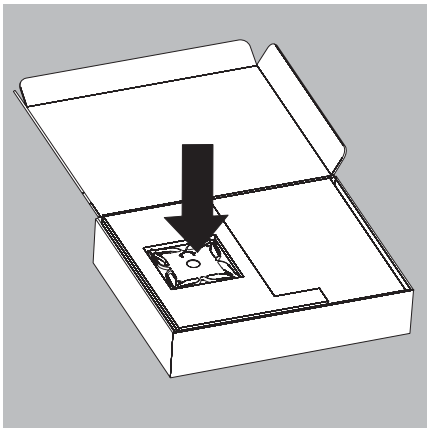
1. Place the upper draft shield panel into the packaging (handle upwards).

2. Place the side panel into the packaging (handle upwards)

3. Place the other side panel into the packaging (handle downwards).

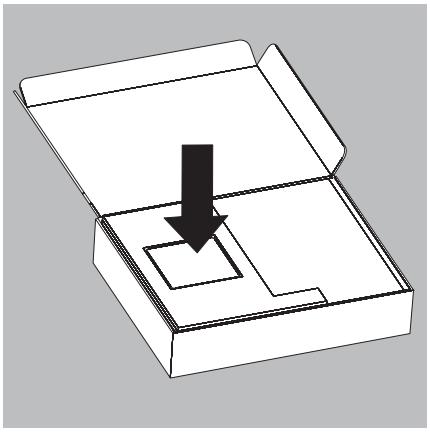


▶ Insert the front foam pieces into the box, wedging the panels into the back foam pieces.

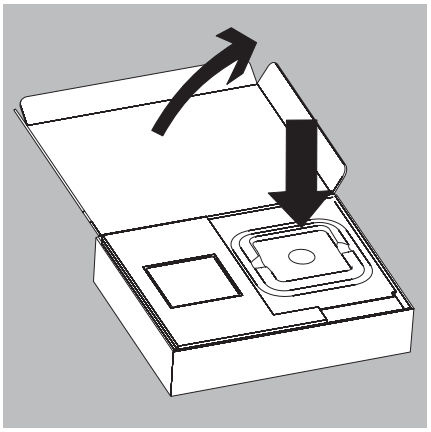


▶ Place the cardboard insert into the box.

▶ Place the pan support into the opening.



▶ Place the weighing pan on the pan support.

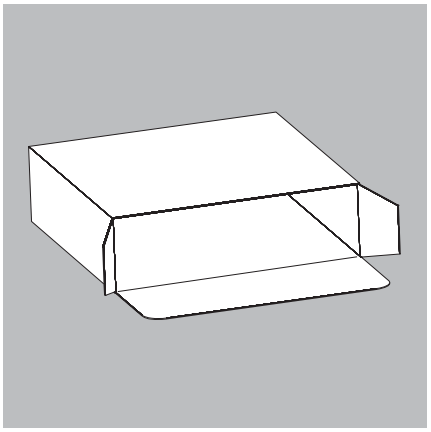


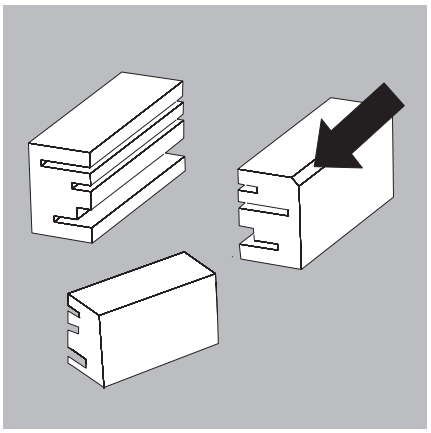
▶ Place the shield plate|draft shield into the opening.

▶ Close the box.

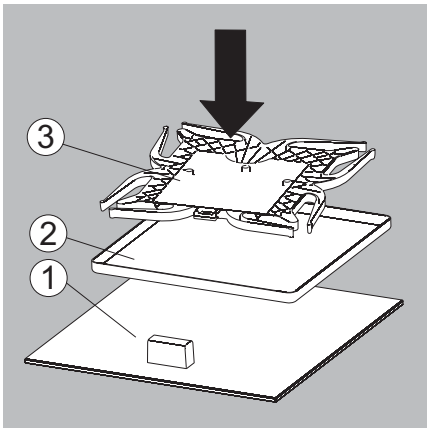
Transporting the Parts (Small Analytical Draft Shield)

▶ Get the box ready for the individual parts of the balance.



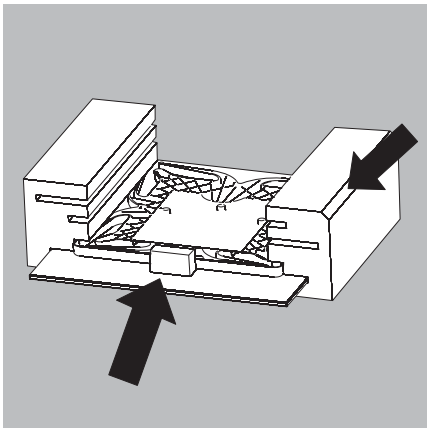


▶ Get the foam pieces ready.

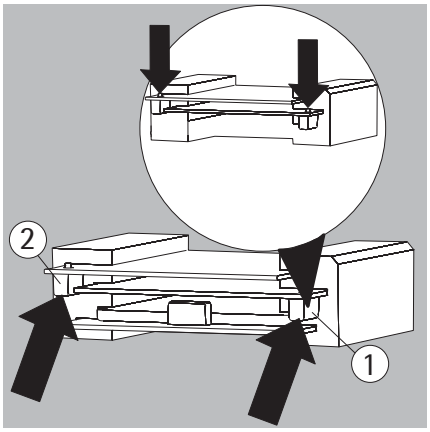


▶ Place the balance parts on top of each other

1. Upper draft shield panel
2. Shield plate|draft shield
3. Pan support



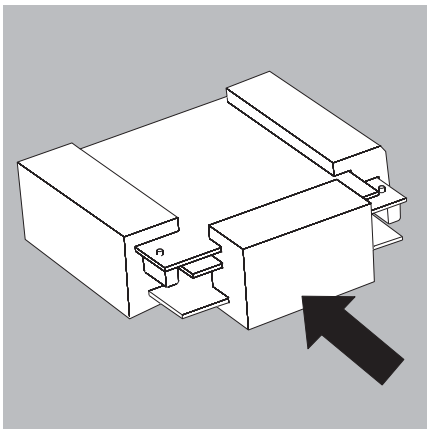
▶ Slide the parts into the foam.



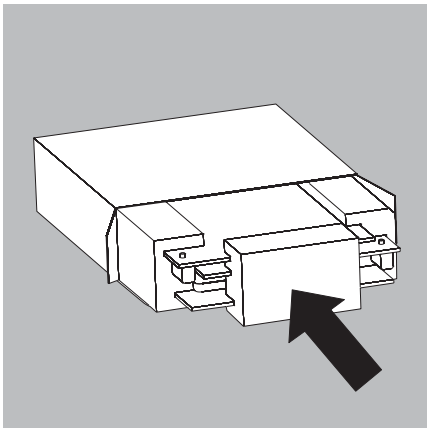
▶ Place the panels in the packaging.

1. Place the side panel into the packaging (handle downwards)

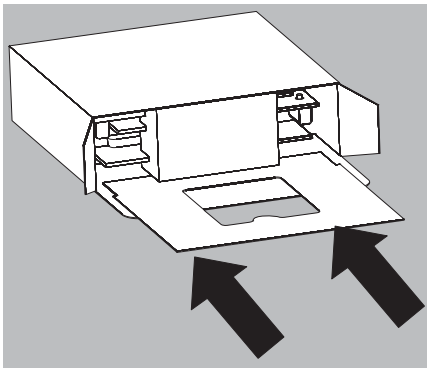
2. Place the other side panel into the packaging (handle downwards)



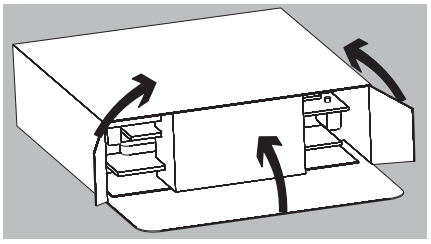
▶ Place the foam piece in front of the parts.



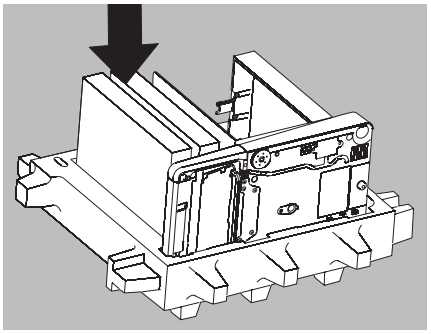
▶ Place the package into the box.



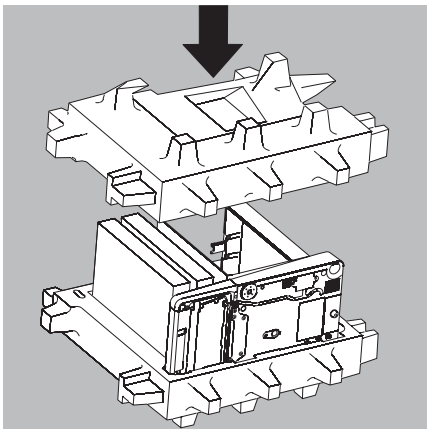
▶ Slide the shield plate into the packaging.



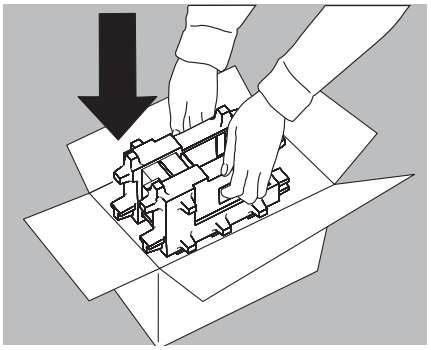
▶ Close the box.



▶ Place the box into the packaging.



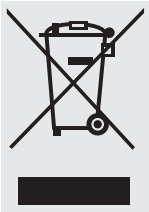
▶ Place the top part on to the packaging.



▶ Insert the balance into the box with cushioning.

▶ Send the packaged balance.

Disposal



The packaging is to be taken to a local waste disposal site if no longer required. The packaging comprises environmentally-friendly-friendly materials that can be used as secondary raw materials. The device, including accessories and batteries, is not to be thrown into the household waste. EU legislation in Member States requires electrical and electronic equipment to be collected separately from unsorted municipal waste so that it may be recycled. In Germany and several other countries, Sartorius AG itself assumes responsibility for the return and conformant disposal of its electronic and electrical products. These products may not be placed with household waste or brought to collection centers run by local public disposal operations not even by small commercial operators. For disposal in Germany and in the other member nations of the European Economic Area (EEA), please contact our local service technicians or our Service Center in Goettingen, Germany:

Sartorius AG Service Center
Weender Landstrasse 94–108
37075 Goettingen

In countries that are not members of the European Economic Area (EEA) or where no Sartorius subsidiaries or dealerships are located, please contact your local authorities or a commercial disposal operator. Remove the batteries and hand them in to a collection point prior to disposal|scrapping of the device. Sartorius AG, its affiliates, subsidiaries, dealers and distributors will not take back equipment contaminated with hazardous materials (ABC contamination) – either for repair or disposal.

Please refer to our web site (www.sartorius.com) or contact the Sartorius Service Department for more detailed information regarding repair service addresses or the disposal of your device.

Specifications

General Data

Sartorius power supply 6971987	
Primary	100 – 240 V~, -15%|+10%, 50-60 Hz, 1.0 A
Secondary	15 V, ± 5%, 2.66A (max.), protected electronically against short circuit
Power supply connection cable	Two-sided plug with a 3-pin country-specific power plug and 3-pin socket (IEC|EN60320-1|C14) for connection to the power supply
Other data	See label on the power supply

Balance	
Power supply	Only via Sartorius power supply 6971987
Input voltage	15 Vdc, ± 5%
Power consumption	7 W (max.)

Ambient conditions	
Environment	Use indoors only
Ambient temperature: Storage and shipping	–10 °C ... +60 °C
Ambient temperature: Operation	+5 °C ... +40 °C
Elevation:	2000 m above sea level
Highest relative humidity:	80% for temperatures up to 31°C, decreasing linearly up to 50% relative humidity for 40 °C

Safety of electrical equipment	According to EN 61010-1:2001 Safety requirements for equipment for measurement, control, and laboratory use - Part 1: General Requirements
Electromagnetic compatibility	According to EN 61326-1:2006 Electrical equipment for measuring technology, control technology and laboratory use EMC requirements - Part 1: General requirements
Interference resistance:	Suitable for use in industrial areas
Interference emissions:	Class B (suitable for use in residential areas and areas that are connected to a low voltage network that also supplies residential buildings).

Standard equipment	
Customization to operating and setup conditions	4 optimized filter stages
Available weight units	Gram, Kilogram, Carat, Pound, Ounce, Troy Ounce, Tael Hong Kong, Tael Singapore, Tael Taiwan, Grain, Pennyweight, Milligram, Parts per Pound, Tael China, Mommes, Austrian carat, Tola, Baht and Mesghal
Available application programs	Changing unit, counting, weighing in percent, calculation, averaging (animal weighing), density determination, totalizing, net-total formulation, SQmin

Model-specific Data

Semi-microbalances 0.01

Model		MSE225S	MSE225P	MSE125P
Readability	mg	0.01	0.01|0.02|0.05	0.01|0.1
Weighing capacity	g	220	60|120|220	60|120
Tare range (subtractive)	g	– 220	– 220	– 120
Repeatability	≤±mg	0...60g: 0.015 60...220g: 0.025	0...60g: 0.015 60..0.220g: 0.04	0...60g: 0.015 60..0.120g: 0.06
Linearity	≤±mg	0.1	0.15	0.15
Corner load (test load [g])	mg	0.15 (100)	0.2 (100)	0.15 (50)
Min. initial weight*	mg	20	20	20
Sensitivity drift between +10...+30°C	±ppm|K	1	1	1
Typical stabilization time	s	≤ 2	≤ 2	≤ 2
Typical measurement time	s	≤ 6	≤ 6	≤ 6
External standard calibration value (with an accuracy of at least ...)	g	200 (E2)	200 (E2)	100 (E2)
Display result (depending on the set filter level)		0.2 – 0.4		
Weighing pan dimensions (W × D)	mm	85 × 85		
Weighing chamber height (draft shield DU)		mm	261	
Protection		Protected against dust and water		

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Analytical balances 0.1 mg

Model		MSE324S	MSE224S	MSE324P	MSE124S
Readability	mg	0.1	0.1	0.1|0.2|0.5	0.1
Weighing capacity	g	320	220	80|160|320	120
Tare range (subtractive)	g	– 320	– 220	– 320	– 120
Repeatability	≤±mg	0.1	0.07	0.1|0.2|0.4	0.1
Linearity	≤±mg	0.3	0.2	0.5	0.2
Corner load (test load [g])	mg	0.3 (200)	0.2 (100)	0.4 (200)	0.2 (50)
Min. initial weight*	mg	120	120	120	120
Sensitivity drift between +10...+30°C	±ppm|K	1	1	1	1
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1
Typical measurement time	s	≤ 3	≤ 3	≤ 3	≤ 3
External standard calibration value (of at least accuracy class ...)	g	200 +100 (E2)	200 (E2)	200 +100 (E2)	100 (E2)
Display result (depending on the set filter level)		0.1 – 0.4			
Weighing pan dimensions (W × D)	mm	85 × 85			
Weighing chamber height (draft shield DU)	mm	261			
Protection		Protected against dust and water			

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Model-specific Data

Precision balances

Models		MSE3203P	MSE2203S	MSE2203P	MSE1203S
Readability	mg	1|10	1	1|10	1
Weighing capacity	g	1,010|3,200	2,200	1,010|2,200	1,200
Tare range (subtractive)	g	– 3,200	– 2,200	– 2,200	– 1,200
Repeatability	≤±mg	1|6	1	1|6	0.7
Linearity	≤±mg	5	3	5	2
Corner load (test load [g])	mg	2 (1,000)	2 (1,000)	3 (1,000)	2 (500)
Min. initial weight*	g	1.5	1.5	1.5	1.5
Sensitivity drift between +10...+30°C	±ppm|K	1	1	1	1.5
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1
Typical measurement time	s	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
External standard calibration value (of at least accuracy class ...)	g	2000 (E2)	2000 (E2)	1000 (E2)	1000 (E2)
Display result (depending on the set filter level)		0.1 – 0.4			
Weighing pan dimensions (W × D)	mm	140 × 140			
Weighing chamber height (draft shield DU)	mm	172			
Protection		Protected against dust and water			

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Precision balances

Models		MSE623S	MSE623P	MSE323S
Readability	mg	1	1|2|5	1
Weighing capacity	g	620	150|300|620	320
Tare range (subtractive)	g	– 620	– 620	– 320
Repeatability	≤±mg	0.7	1|2|4	0.7
Linearity	≤±mg	2	5	2
Corner load (test load [g])	mg	2 (200)	4 (200)	2 (200)
Min. initial weight*	g	1.5	1.5	1.5
Sensitivity drift between +10...+30°C	±ppm|K	2	2	2
Typical stabilization time	s	≤ 0.8	≤ 0.8	≤ 0.8
Typical measurement time	s	≤ 1	≤ 1	≤ 1
External standard calibration value (of at least accuracy class ...)	g	500 (E2)	500 (F1)	200 (E2)
Display result (depending on the set filter level)		0.1 – 0.4		
Weighing pan dimensions (W × D)	mm	140 × 140		
Weighing chamber height (draft shield DU)	mm	172		
Protection		Protected against dust and water		

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Model-specific Data

Precision balances

Models		MSE10202S	MSE8202S	MSE6202S	MSE6202P	MSE4202S
Readability	mg	10	10	10	10|20|50	10
Weighing capacity	g	10,200	8,200	6,200	1,500|3,000|6,200	4,200
Tare range (subtractive)	g	– 10,200	– 8,200	– 6,200	– 6,200	– 4,200
Repeatability	≤±mg	7	7	7	7|20|40	7
Linearity	≤±mg	20	20	20	50	20
Corner load (test load [g])	mg	20 (5,000)	20 (5,000)	20 (2,000)	50 (2,000)	30 (2,000)
Min. initial weight*	g	12	12	12	12	12
Sensitivity drift between +10...+30°C	±ppm|K	2	2	2	2	2
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1	≤ 0.8
Typical measurement time	s	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1
External standard calibration value (of at least accuracy class ...)	kg	10 (E2)	5 (E2)	5 (E2)	5 (F1)	2 (E2)
Display result (depending on the set filter level)		0.1 – 0.4				
Weighing pan dimensions (W × D)	mm	206 × 206				
Protection		Protected against dust and water				

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Models		MSE2202S	MSE1202S	MSE12201S	MSE8201S	MSE5201S
Readability	mg	10	10	100	100	100
Weighing capacity	g	2,200	1,200	12,200	8,200	5,200
Tare range (subtractive)	g	– 2,200	– 1,200	– 12,200	– 8,200	– 5,200
Repeatability	≤±mg	7	7	50	50	50
Linearity	≤±mg	20	20	100	100	100
Corner load (test load [g])	mg	20 (1,000)	20 (500)	200 (5,000)	200 (5,000)	200 (2,000)
Min. initial weight*	g	12	12	100	100	100
Sensitivity drift between +10...+30°C	±ppm|K	2	2	4	4	4
Typical stabilization time	s	≤ 0.8	≤ 0.8	≤ 0.8	≤ 0.8	≤ 0.8
Typical measurement time	s	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
External standard calibration value (of at least accuracy class ...)	kg	2 (F1)	1 (F1)	10 (F1)	5 (F2)	5 (F2)
Display result (depending on the set filter level)		0.1 – 0.4				
Weighing pan dimensions (W × D)	mm	206 × 206				
Protection		Protected against dust and water				

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Model-specific Data

Verified models with EC Type Approval: Semimicrobalances 0.01 mg

Model		MSE225S-0CE	MSE225P-0CE	MSE125P-0CE
Type, approval number		MSX, D09-09-015		
Accuracy class*	mg	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	mg	0.01	0.01|0.02|0.05	0.01|0.1
Weighing capacity max*	g	220	60|120|220	60|120
Calibration value e*	mg	1	1	1
Min. load min*	mg	1	1	1
Tare range (subtractive)		≤ 100% from max. weighing capacity		
Application range according to DIR*	g	0.001 – 220	0.001 – 220	0.001 – 120
Min. initial weight**	mg	20	20	20
Typical stabilization time	s	≤ 2	≤ 2	≤ 2
Typical measurement time	s	≤ 6	≤ 6	≤ 6
External standard calibration value (of at least accuracy class ...)	g	200 (E2)	200 (E2)	100 (E2)
Application range (temperature)		With “isoCAL” function: +5...+40 °C | without “isoCAL” function: +15...+25 °C		
Customization to operating and setup conditions		4 optimized filter stages		
Display result (depending on the set filter level)		0.2 – 0.4		
Weighing pan dimensions (W × D)	mm	85 × 85		
Weighing chamber height (draft shield DU)	mm	261		
Protection		Protected against dust and water		

* = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Verified models with EC Type Approval: Analytical balances 0.1 mg

Model		MSE324S-0CE	MSE224S-0CE	MSE324P-0CE	MSE124S-0CE
Type, approval number		MSX, D09-09-015			
Accuracy class*		Ⓘ	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	mg	0.1	0.1	0.1|0.2|0.5	0.1
Weighing capacity max*	g	320	220	80|160|320	120
Calibration value e *	mg	1	1	1	1
Min. load min*	mg	10	10	10	10
Tare equalization range (subtractive)	g	≤ 100% from max. weighing capacity			
Application range according to DIR*	g	0.01 – 320	0.01 – 220	0.01 – 320	0.01 – 120
Min. initial weight**	mg	120	120	120	120
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1
Typical measurement time	s	≤ 3	≤ 3	≤ 3	≤ 3
External standard calibration value (of at least accuracy class ...)	g	200 +100 (E2)	200 (E2)	200 +100 (E2)	100 (E2)
Application range (temperature)		With “isoCAL” function: +5...+40 °C | without “isoCAL” function: +15...+25 °C			
Display result (depending on the set filter level)		0.1 – 0.4			
Weighing pan dimensions (W × D)	mm	85 × 85			
Weighing chamber height (draft shield DU)	mm	261			
Protection		Protected against dust and water			

* DIR = Directive 90\|384\|EEC on non-automatic weighing instruments used within the European Economic Area
** = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Model-specific Data

Verified models with EC Type Approval: Precision Balances

Models		MSE3203P-0CE	MSE2203S-0CE	MSE2203P-0CE	MSE1203S-0CE
Type, approval number		MSX, D09-09-015			
Accuracy class*		Ⓘ	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	mg	1|10	1	1|10	1
Weighing capacity max*	g	1,010|3,200	2,200	1,010|2,200	1,200
Calibration value e*	mg	10	10	10	10
Min. load min*	mg	100	100	100	100
Tare equalization range (subtractive)	g	≤ 100% from max. weighing capacity			
Application range according to DIR*	g	0.1 – 3,200	0.1 – 2,200	0.1 – 2,200	0.1 – 1,200
Min. initial weight**	g	1.5	1.5	1.5	1.5
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1
Typical measurement time	s	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
External standard calibration value (of at least accuracy class ...)	g	2000 (E2)	2000 (E2)	1000 (E2)	1000 (E2)
Application range (temperature)		With “isoCAL” function: +5 ... +40°C | Without “isoCAL” function: +15...+25°C			
Display result (depending on the set filter level)		0.1 – 0.4			
Weighing pan dimensions (W × D)	mm	140 × 140			
Weighing chamber height (draft shield DE)	mm	172			
Protection		Protected against dust and water			

Verified models with EC Type Approval: Precision Balances

Models		MSE623S-0CE	MSE623P-0CE	MSE323S-0CE
Type, approval number		MSX, D09-09-015		
Accuracy class*	mg	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	mg	1	1|2|5	1
Weighing capacity max*	g	620	150|300|620	320
Calibration value e *	mg	10	10	10
Min. load min*	mg	20	20	20
Tare equalization range (subtractive)		≤ 100% from max. weighing capacity		
Application range according to DIR*	g	0.02 – 620	0.02 – 620	0.02 – 320
Min. initial weight*	g	1.5	1.5	1.5
Typical stabilization time	s	≤ 0.8	≤ 0.8	≤ 0.8
Typical measurement time	s	≤ 1	≤ 1	≤ 1
Application range (temperature)		With “isoCAL” function: +5...+40°C | Without “isoCAL” function: +10...+30°C		
Display result (depending on the set filter level)		0.1 – 0.4		
Weighing pan dimensions (W × D)	mm	140 × 140		
Weighing chamber height (draft shield DE)	mm	172		
Protection		Protected against dust and water		

* DIR = Directive 90\|384\|EEC on non-automatic weighing instruments used within the European Economic Area
** = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

Verified models with EC Type Approval: Precision Balances

Models		**MSE10202S-0CE**	**MSE8202S-0CE**	**MSE6202S-0CE**	**MSE6202P-0CE**	**MSE4202S-0CE**
Type, approval number		MSX, D09-09-015				
Accuracy class*		Ⓘ	Ⓘ	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	g	0.01	0.01	0.01	0.01|0.02|0.05	0.01
Weighing capacity max*	g	10,200	8,200	6,200	1,500|3,000|6,200	4,200
Calibration value e*	g	0.1	0.1	0.1	0.1	0.1
Min. load min*	g	1	0.5	0.5	0.5	0.5
Tare equalization range (subtractive)		≤ 100% from max. weighing capacity				
Application range according to DIR*	g	1 – 10,200	0.5 – 8,200	0.5 – 6,200	0.5 – 6,200	0.5 – 4,200
Min. initial weight**	g	12	12	12	12	12
Typical stabilization time	s	≤ 1	≤ 1	≤ 1	≤ 1	≤ 0.8
Typical measurement time	s	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1
Application range (temperature): With “isoCAL” function: Without “isoCAL” function:		 +5...+40°C +15...+25°C	 +5...+40°C +10...+30°C	 +5...+40°C +10...+30°C	 +5...+40°C +10...+30°C	 +5...+40°C +10...+30°C
Display result (depending on the set filter level)		0.1 – 0.4				
Weighing pan dimensions (W × D)	mm	206 × 206				
Protection		Protected against dust and water				

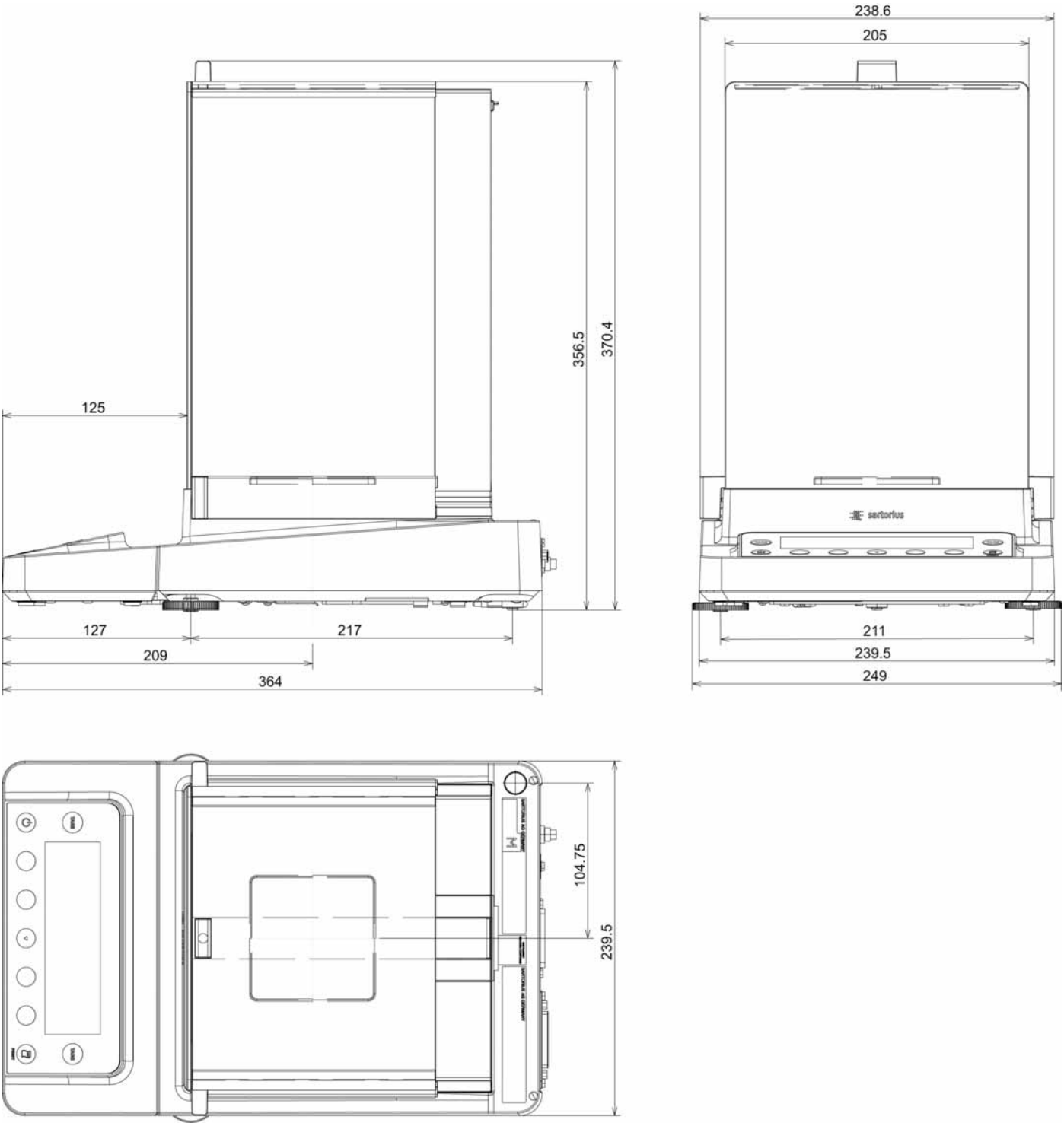
Verified models with EC Type Approval: Precision Balances

Models		**MSE2202S-0CE**	**MSE10202S-0CE**	**MSE12201S-0CE**	**MSE8201S-0CE**	**MSE5201S-0CE**
Type, approval number		MSX, D09-09-015				
Accuracy class*		Ⓘ	Ⓘ	Ⓘ	Ⓘ	Ⓘ
Scale interval d*	mg	10	10	100	100	100
Weighing capacity max*	g	2,200	1,200	12,200	8,200	5,200
Calibration value e *	g	0.1	0.1	1	1	1
Min. load min*	g	0.5	0.5	5	5	5
Tare equalization range (subtractive)		≤ 100% from max. weighing capacity				
Application range according to DIR*	g	0.5 – 10,200	0.5 – 8,200	0.5 – 6,200	0.5 – 6,200	0.5 – 4,200
Min. initial weight**	g	12	12	100	100	100
Typical stabilization time	s	≤ 0.8	≤ 0.8	≤ 0.8	≤ 0.8	≤ 0.8
Typical measurement time	s	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
External standard calibration value (of at least accuracy class ...)	kg	2 (F1)	1 (F1)	10 (F1)	5 (F2)	5 (F2)
Application range (temperature)		With “isoCAL” function: +5...+40 °C | without “isoCAL” function: +10...+30 °C				
Display result (depending on the set filter level)	0.1 – 0.4					
Weighing pan dimensions (W + D)	mm	206 × 206				
Protection		Protected against dust and water				

* DIR = Directive 90|384|EEC on non-automatic weighing instruments used within the European Economic Area
** = Typical min. initial weighing according to USP (Unites States Pharmacopeia), USP31-NF26

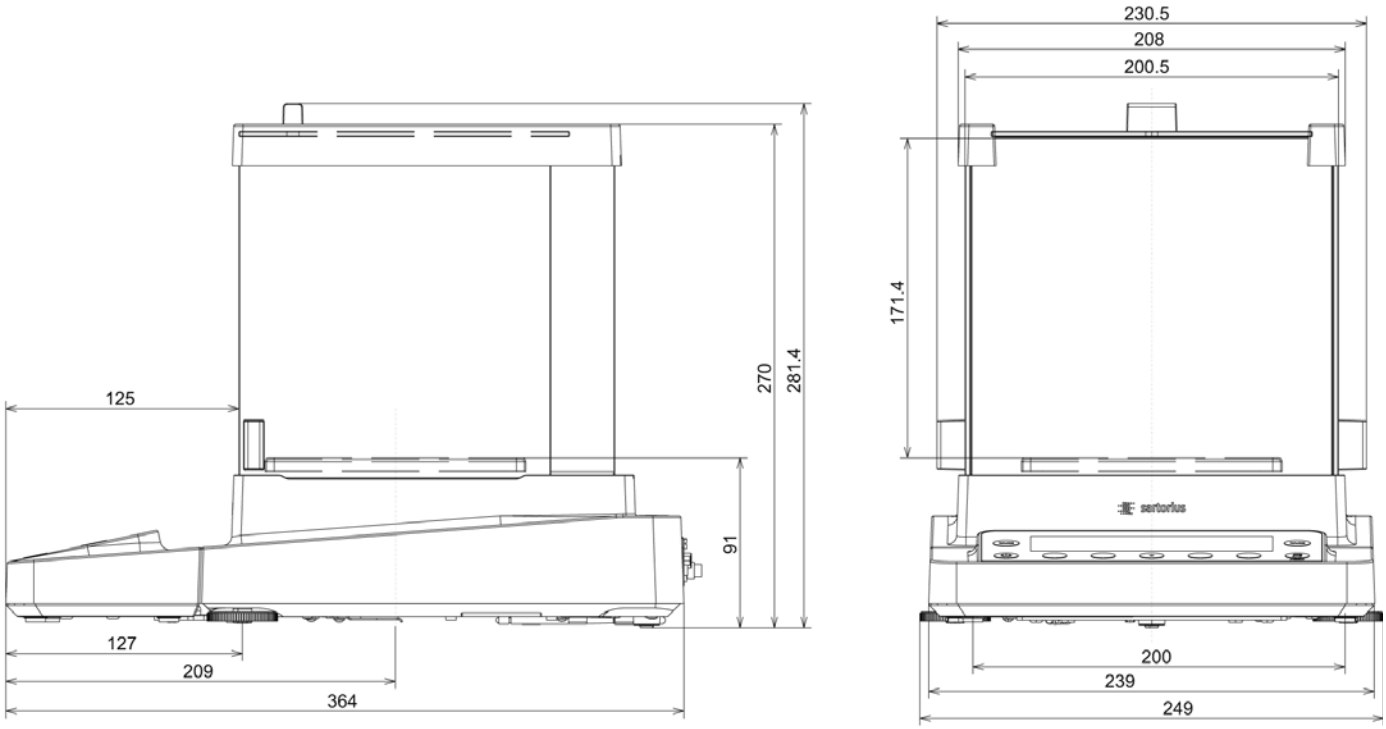
Dimensions (Scale Drawings)

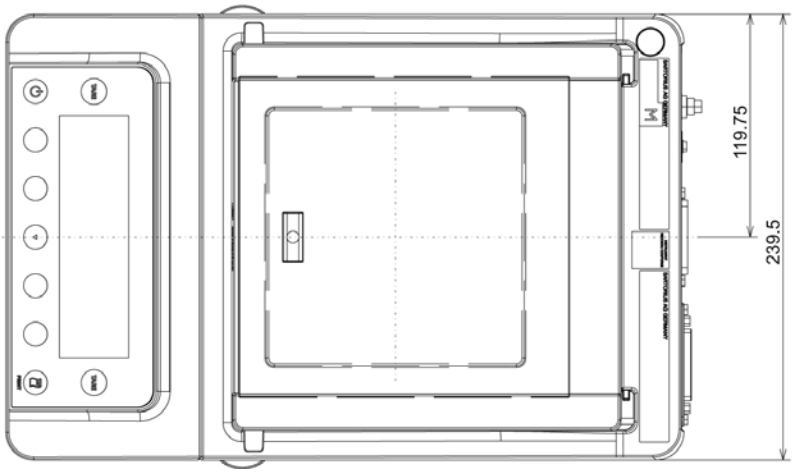
Semimicro and analytical balances with manual DU draft shield



All dimensions are given in millimeters

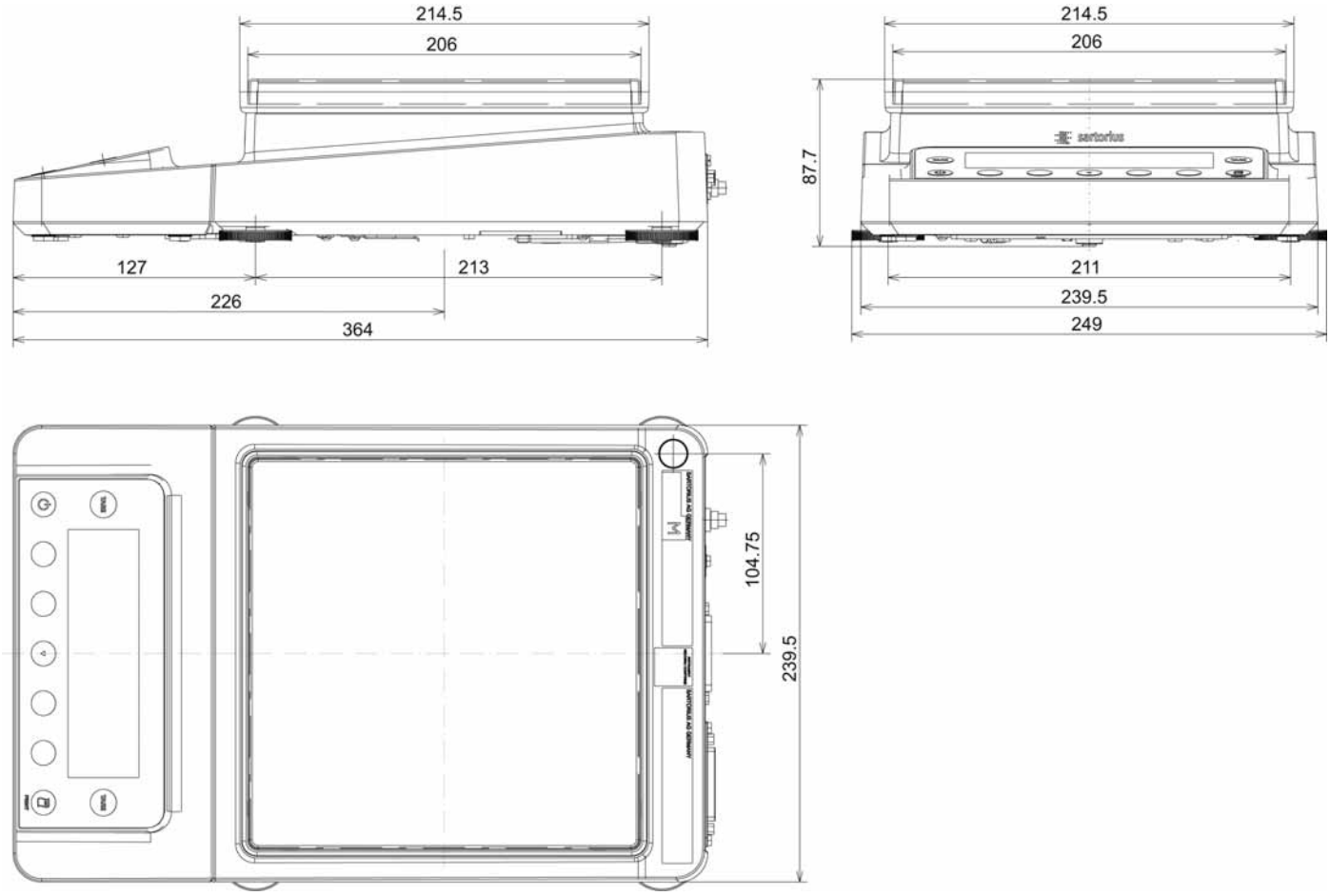
Precision balances with a readability of 1 mg and manual DE draft shield





All dimensions are given in millimeters

Semimicro and analytical balances with manual DU draft shield



All dimensions are given in millimeters

Accessories (Options)

Verifiable data printer for connection to RS232, 25-pin. Accessory interface	YDP10-0CE
Paper rolls for printer YDP10-0CE; 5 rolls 50 m each	6906937
Color ribbon for YDP10-0CE	6906918
Additional display, LCD, figure size 13 mm, backlit	YRD03Z
RS-232C connection cable to connect PC with 9-pin COM interface, length 1.5 m	7357314
Standard operating procedure (SOP)	YSL07D
Infrared sensor for touchless function triggering (e.g., draft shield control)	YHS01MS
Hand switch for printing, taring, or to use function keys, selection via menu, incl. T connector	YHS02
Foot switch for printing, taring, or to use function keys, selection via menu, incl. T connector	YFS01
Foot switch for the functions draft shield on|off (only in combination with DA and DI draft shield), tare and print	YPE01RC
Density determination kit for solids and liquids for weighing modules with a readability of < 1 mg	YDK01MS
3-segment control display, red – green – red, for plus|minus measurements, incl. T connector	YRD11Z
Barcode reader with connection cable, 120 mm reading range	YBR03PS2
Pipette calibration kit for models with 0.01 mg and 0.1 mg readability; hardware and software	upon request
Software for pipette calibration	upon request
Antistatic weighing pan, diameter 130 mm, for weighing modules with a readability of 0.1 mg or 0.01 mg	YWP01MS
Antistatic weighing pan, diameter 150 mm, for weighing modules with a readability of 1 mg	YWP02MS
Support arm for 10|100 mg precision weighing modules for raising the operating unit	YDH01MS
Weighing table made from synthetic stone, with vibration dampening	YWT03
Wall console	YWT04
Weighing table made from wood with synthetic stone for precise, reliable measurements	YWT09
Display and control unit with backlit LC display and tactile keys	YAC01MSE
Display and control unit with backlit b|w graphic display and tactile navigation keys	YAC01MSU
Display and control unit with color TFT graphic display and touch screen	YAC01MSA
Display cable 3 m, for separated setup of display and balance unit	upon request
SartoCollect software for data communication between balance and PC	YSC02
Sartorius OPC server for connecting all Sartorius Cubis balances Requires 32-bit Microsoft Windows 2000 or XP with the current service packs. (Free download of a 30-day test version from the Sartorius website)	
– Initial license	6289OPC
– Each additional license within an order	6289OPC-L

Declarations of Conformity

Weighing Instruments for Use in Legal Metrology:Council Directive 90/384/EEC "Non-automatic weighing instruments"
This Directive regulates the determination of mass in legal metrology.

For the respective Declaration of Type Conformity for weighing instruments that have been verified by Sartorius for use as legal measuring instruments and that have an EC Type-Approval Certificate, see the page after next.

This Directive also regulates the performance of the EC verification by the manufacturer, provided that an EC Type-Approval Certificate has been issued and the manufacturer has been accredited by an officer of a Notified Body registered at the Commission of the European Community for performing such verification.

Sartorius complies with EC Directive No. 90/384/EEC for non-automatic weighing instruments, which has been in effect since January 1, 1993, within the Single European Market, as well as the accreditation of the Quality Management System of Sartorius AG by Lower Saxony's Regional Administrative Department of Legal Metrology (Niedersächsisches Landesverwaltungsamt – Eichwesen) from February 15, 1993.

"EC Verification" – A Service Offered by Sartorius
Our service technicians authorized to perform the verification* of your weighing instruments that are acceptable for legal metrological verification can inspect and verify the metrological specifications at the place of installation within the Member States of the European Union and the Signatories of the Agreement on the European Economic Area.

Subsequent Verifications within the European Countries
The validity of the verification will become void in accordance with the national regulations of the country in which the weighing instrument is used. For information on verification and legal regulations currently applicable in your country, and to obtain the names of the persons to contact, please contact your local Sartorius office, dealer or service center.

For more information on the verification of weighing instruments for use in legal metrology, contact the Sartorius Service Center.

* = in accordance with the accreditation certificate received by Sartorius AG

sartorius
mechatronics

CE

EG-Konformitätserklärung
EC Declaration of Conformity

Sartorius AG
37070 Göttingen
Germany

erklärt, dass das Betriebsmittel
declares that the equipment

Gerät: *Apparatus:*	**Elektronische Halbmikro-, Analysen- und Präzisionswaage** ***Electronic Semi-micro, Analytical and Precision Balance***
Baureihe / *Batch:*	**MSA, MSE, MSU**
Typbezeichnung: *Type:*	Siehe Anhang 1 *See Annex 1*

mit den grundlegenden Anforderungen der folgenden Europäischen Richtlinien übereinstimmt:
complies with the basic requirements of the following European Directives:

Richtlinie 2004/108/EG *Directive 2004/108/EC*	Elektromagnetische Verträglichkeit *Electromagnetic compatibility*
Richtlinie 2006/95/EG *Directive 2006/95/EC*	Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen *Electrical equipment designed for use within certain voltage limits*

Das Gerät erfüllt die anwendbaren Anforderungen der in Anhang 2 aufgeführten harmonisierten Europäischen Normen.
The apparatus meets the applicable requirements of the harmonized European Standards listed in Annex 2.

Sartorius Mechatronics
Göttingen, 2008-11-07

C. Oldendorf
Prokurist, Leitung
Technologie & Innovation
Sparte Mechatronik
Vice President, R&D
Technological Operations & Innovations
Mechatronics Division

Dr. D. Klausgrete
Leitung
International Certification Management
Sparte Mechatronik
Head of
International Certification Management
Mechatronics Division

SAG08CE007 34785-790-58 SOP-3.RD-045-fo2

CE Declaration of Type Conformity to Directive No. 90/384/EEC

This declaration is valid for non-automatic electromechanical weighing instruments for use in legal metrology. These weighing instruments accepted for legal metrological verification have an EC Type-Approval Certificate. The model(s) concerned is (are) listed below along with the respective type, accuracy class, and EC Type-Approval Certificate number:

Model	Weighing instrument type	Accuracy class	EC type-approval certificate no.
MS...-.CE	MSX	(I)	D09-09-015
MS...-.CE	MSX	(II)	D09-09-015

SARTORIUS AG declares that its weighing instrument types comply with the requirements of the Council Directive on non-automatic weighing instruments, no. 90/384/EEC of 20 June 1990; the associated European Standard "Metrological aspects of non-automatic weighing instruments," No. EN 45501; the most recently amended versions of the national laws and decrees concerning legal metrology and verification in the Member States of the European Union, the EU, and the Signatories of the Agreement on the European Economic Area, which have adopted this Council Directive into their national laws; and with the requirements stipulated on the Type-Approval Certificate for verification. This Declaration of Type Conformity is valid only if the ID label on the weighing instrument has the CE mark of conformity and the green metrology sticker with the letter "M" stamped on it (the two-digit number in large print stands for the year in which the mark was affixed):

Example (date/year and number of the notified body may vary):

If these marks are not on the ID label, this Declaration of Type Conformity is not valid. Validity can be obtained, for example, by submitting the weighing instrument for final processing by an authorized representative of SARTORIUS AG. The period of validity of this Declaration of Type Conformity shall expire upon any tampering with, repair or modification of this weighing instrument or, in some Member States, on the date of expiration. This declaration applies only to the weighing instrument without peripheral devices.
The operator of this weighing instrument shall be responsible for obtaining an authorized renewal of the verification, such as subsequent or periodic verification, of the weighing instrument for use as a legal measuring instrument.

Sartorius AG
37070 Goettingen, Germany
Signed in Goettingen on 20 June 2009

Dr. G. Maaz
(President of the Mechatronics Division)

J. Rehwald
(Head of the Production Department
Mechatronics / Weighing Technology Division)

LOP-3.225_an2e_2005.06.09.doc
P106ep00.doc

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

EG-Bauartzulassung

EC type-approval certificate

Zulassungsinhaber: *Issued to:*	Sartorius AG Weender Landstr. 94-108 37075 Göttingen
Rechtsbezug: *In accordance with:*	§ 13 des Gesetzes über das Mess- und Eichwesen *(verification act)* vom*/dated* 23. März 1992 (BGBl. I S. 711), zuletzt geändert am *(last amended on)* 03.07.2008 (BGBl. I S. 1185), in Verbindung mit Richtlinie *(in connection with council directive)* 2009/23/EC , geändert durch *(amended by)* ----------
Bauart: *In respect of:*	Nichtselbsttätige elektromechanische Präzisionswaage *Non-automatic electromechanical high accuracy weighing instrument*
Typ */ Type:*	MSX (I) Max 10200 g, e = 1...200 mg, n ≤ 102000 (II) Max 12200 g, e = 0,01...2 g, n ≤ 82000 Option: Mehrteilungswaage *multi-interval instrument* Mehrbereichwaage *multi-range instrument*
Zulassungsnummer: *Approval number:*	D09-09-015
Gültig bis: *Valid until:*	18.06.2019
Anzahl der Seiten: *Number of pages:*	17
Geschäftszeichen: *Reference No.:*	PTB-1.12-4041250
Benannte Stelle: *Notified Body:*	0102
Ort, Ausstellungsdatum: *Date of issue:*	Braunschweig, 19.06.2009

Zertifizierer: *Certifier:*
Im Auftrag *By order*

Dipl.-Ing. K. Schulz

Siegel *Seal*

Bewerter: *Evaluator:*
Im Auftrag *By order*

Dipl.-Ing. M. Link

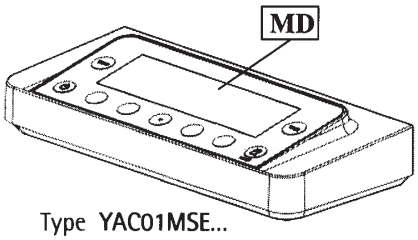
R3-0022

Die Hauptmerkmale, Zulassungsbedingungen und Auflagen sind in der Anlage enthalten, die Bestandteil der EG-Bauartzulassung ist. Hinweise und eine Rechtsbehelfsbelehrung befinden sich auf der ersten Seite der Anlage

The principal characteristics, approval conditions and special conditions, if any, are set out in the Annex which forms an integral part of the EC type-approval certificate. For notes and information on legal remedies, see first page of the Annex.

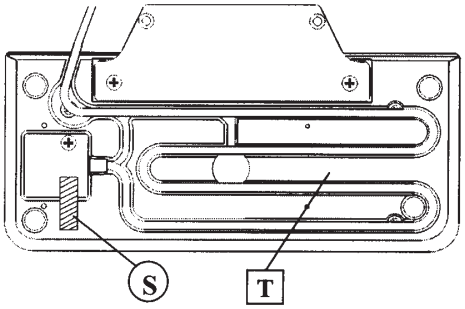
Plates and Markings

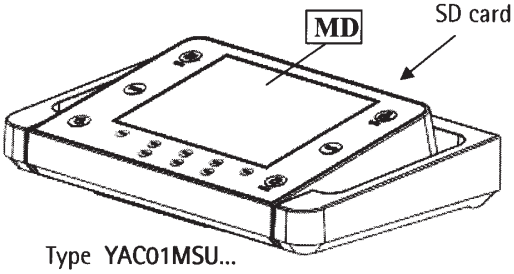
Indicating and operator terminals



Type YAC01MSE...

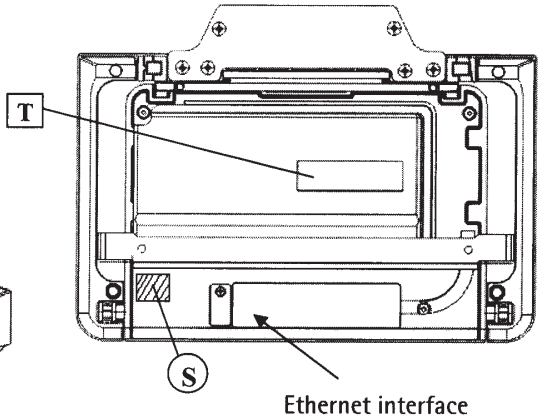
Type YAC01MSE
Bottom view

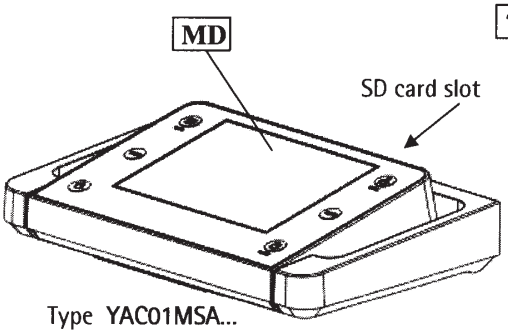




Type YAC01MSU...

Type YAC01MSU and YAC01MSA
Bottom view





Type YAC01MSA...

T Plate with model designation (terminal)

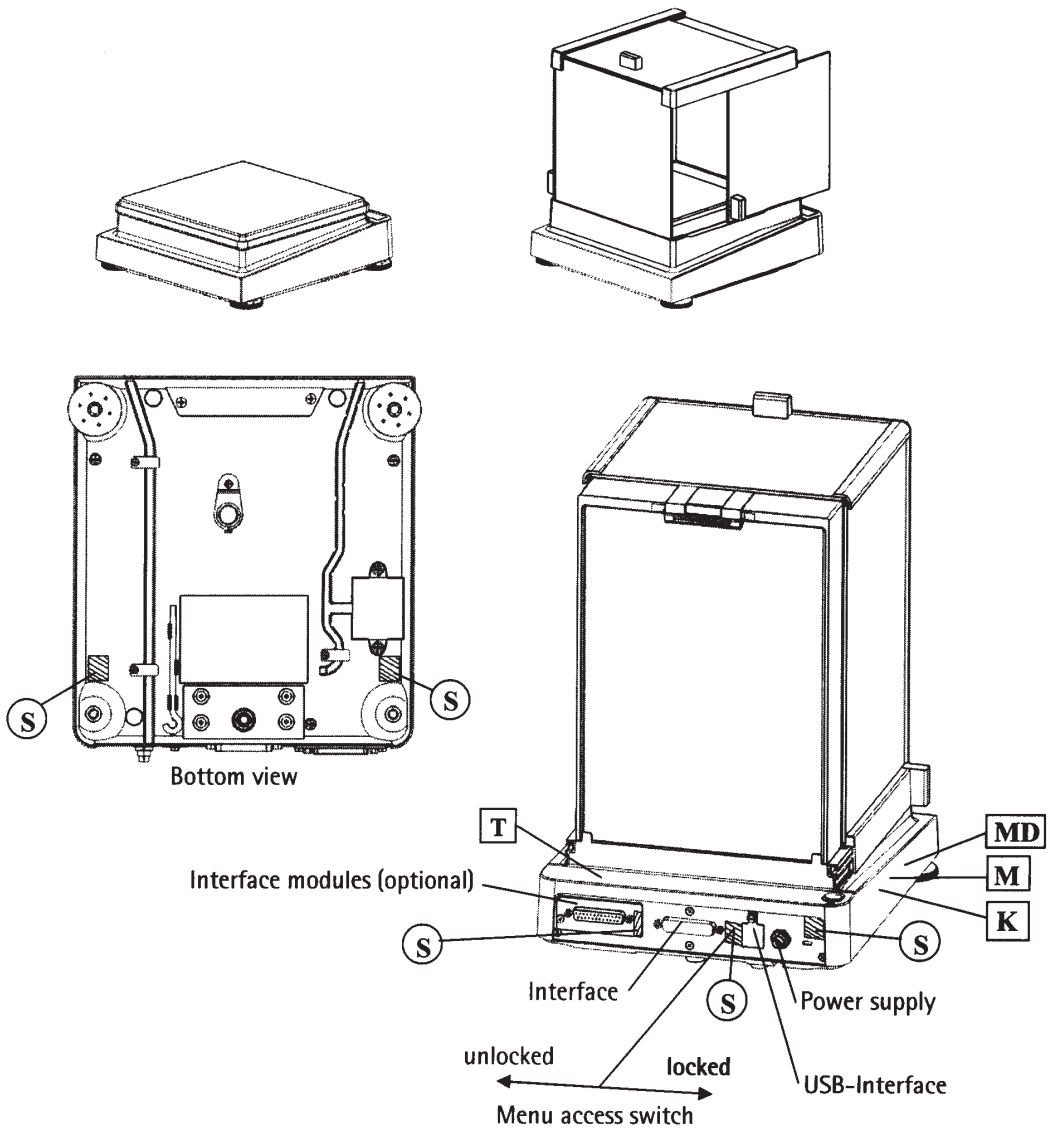
S Protective mark (self-adhesive mark or seal)

MD Metrological data Max, Min, e and if existent d of the active weighing range

PPCU100609e

Type weighing instrument: MSX
EC type-approval certificate: D09-09-015

Weighing modules



K Descriptive plate with CE-sign

M Mark for EC verification (green metrology sticker)

S Protective mark (self-adhesive mark or seal)

MD Metrological data Max, Min, e and if existent d

T Plate with model designation (weighing module)

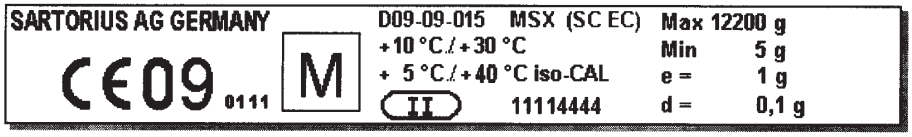
PPCU100609e

Type weighing instrument: MSX
EC type-approval certificate: D09-09-015

Type MSX

Indicating and operator terminals: YAC01MSE, YAC01MSA, YAC01MSU
Weighing modules: SA EA, SB EA, SB EB, SC EA, SC EB, SC EC

Example of descriptive plate on a weighing instrument already verified [K]



Example of plate with model designation (weighing module) [T]

Example of plate with model designation (terminal) [T]

PPCU100609e

Type weighing instrument: MSX
EC type-approval certificate: D09-09-015

Sartorius AG
Weender Landstrasse 94–108
37075 Goettingen, Germany

Phone +49.551.308.0
Fax +49.551.308.3289
www.sartorius-mechatronics.com

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