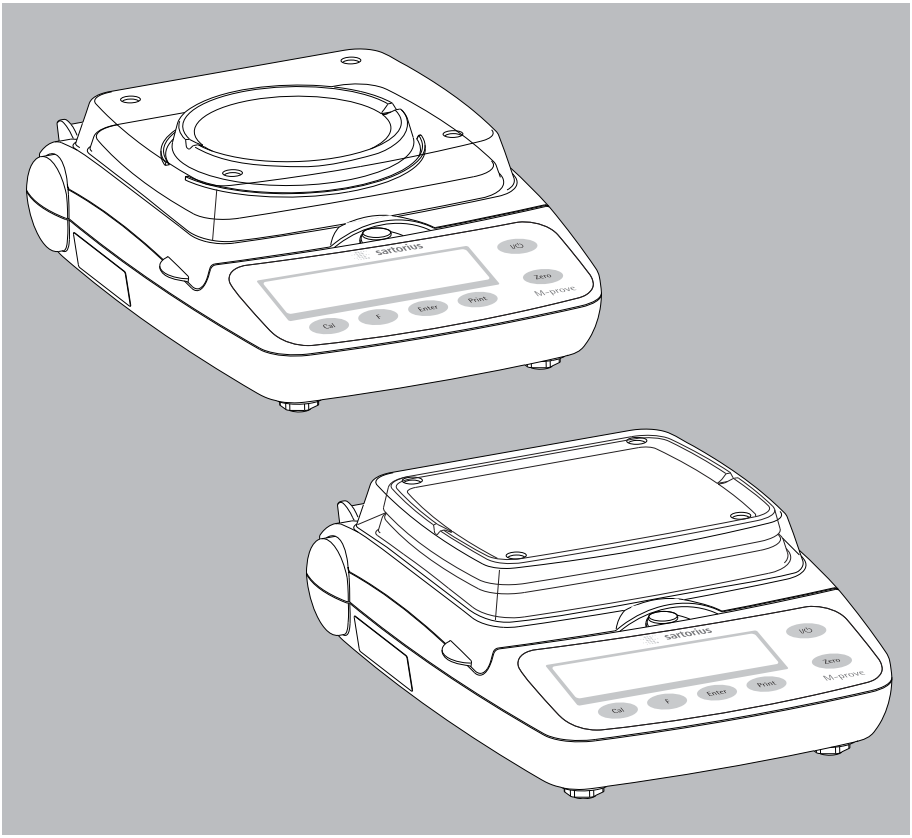
sartorius
mechatronics

Operating Instructions | Betriebsanleitung | Mode d'emploi | Istruzioni per l'uso | Manual de instrucciones

Sartorius M-prove

Electronic Precision Scales/Balances | Elektronische Präzisionswaagen | Balances électroniques de précision | Bilance elettroniche di precisione | Balanzas electrónicas de precisión



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Contents

Warnings and Safety Precautions

Safety Information

- To prevent damage to the equipment, please read these operating instructions carefully before using your balance.

⚠ Do not use this equipment in hazardous areas.

⚠ Make sure the voltage rating printed on the power supply is identical to your local line voltage.

⚠ Use only commercially available 9 V batteries. If desired, you can use a rechargeable battery (not included).

– The balance is energized at all times unless you disconnect the AC adapter and, if connected, the battery.

– Protect the AC adapter from contact with liquid

⚠ Exposure to excessive electromagnetic interference can cause the readout value to change. Once the disturbance has ceased, the instrument can be used again in accordance with its intended purpose.

Installation

– It is recommended to connect Sartorius accessories and options, as these are optimally designed for use with your balance.

– Do not open the balance housing as this may void the manufacturer’s warranty.

Getting Started

Equipment Supplied

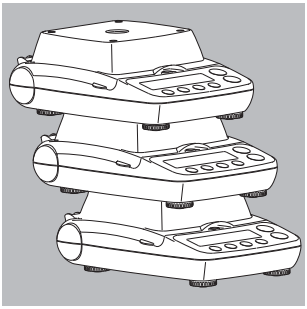
- Balance with protective flip-down cover
- Weighing pan
- Plug-in AC adapter

Additional equipment with models AY612, AY412, AY212, AY711, AY511:

- Calibration weight

Additional equipment with models AY303, AY123:

- Calibration weight
- Round glass draft shield
- Level indicator and adjustable feet



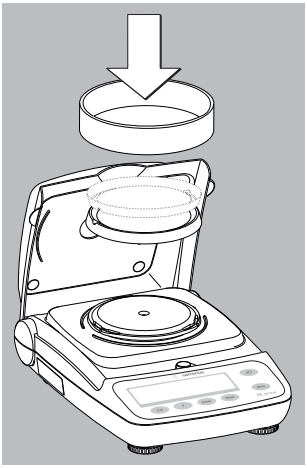
Storage

○ Do not stack more than 3 balances on top of one another at a time.

Installation

Choose a location that is not subject to the following negative influences:

- Heat (heater or direct sunlight)
- Drafts from open windows and doors
- Extreme vibrations during weighing
- Excessive moisture



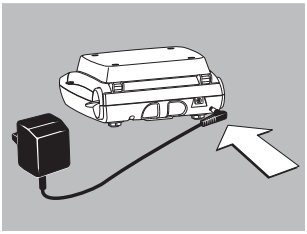
Setting Up the Balance

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

- Reversible round weighing pan

- Round glass draft shield on models AY303, AY123

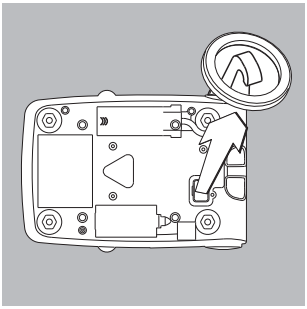
⚠ Do not use as an “in-use“ cover!



Connecting the Balance to AC Power

- ● It is recommended to use only the included AC adapter for optimal performance and safety.
- ● Insert plug into the jack (located on back of balance)
- ● Plug the AC adapter into an electrical outlet

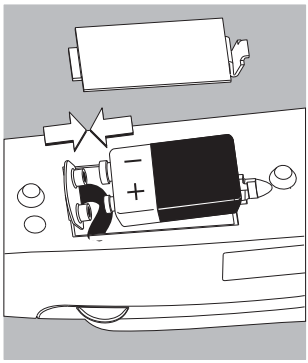
⚠ LISTED power supply 11 V – 21 V compliant with NEC Class 2 output.



Below-Balance Weighing

A port for a below-balance weighing hanger is located on the bottom of the balance.

- ● Open the cover plate on the bottom of the balance.
- ● Attach the sample (e.g., using a suspension wire) to the hanger.
- ○ Install a shield for protection against drafts if necessary.



Installing the Battery
(not for models AY303, AY123)

○ Batteries are not included with the equipment supplied

⚠ Use only commercially available 9 V batteries.

⚠ If you use a rechargeable battery, recharge it with an external battery charger.

● Lay the balance on its side

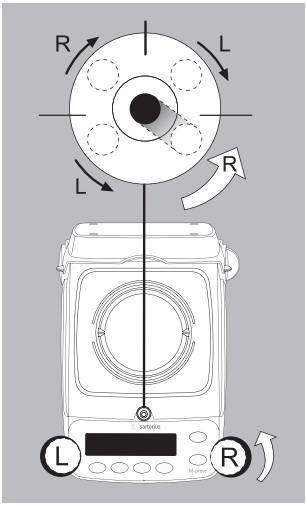
● Open the battery compartment:
remove the compartment cover

● Install the battery in the compartment

○ Make sure the polarity is correct.

⚠ Close the battery compartment:
slide the cover into position until it snaps into place

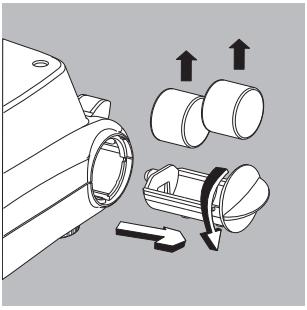
⚠ Do not throw away used batteries with normal household waste.
Rechargeable batteries contain toxic materials and must be disposed of in accordance with local waste disposal regulations.



Leveling the Balance
(only for models AY303, AY123)

- Always level the balance again any time after it has been moved to a different location.
  Example: moving bubble from R to L
- Turn the feet as shown in the diagram until the air bubble is centered within the circle of the level indicator.

> In most cases this will require several adjustment steps.



Removing Weights
for Calibration/Span Adjustment
(only for models AY612, AY412, AY212, AY711, AY511, AY303, AY123)

- Grasp the tab to turn and remove the weight compartment.

○ Follow instructions on page 16 for calibration/span adjustment.

Operation

Basic Weighing Function

Features

– Zeroing the balance
You can zero the balance within the entire weighing range, up to the maximum capacity.

Preparation

● Switch on the balance: press the (I/⏻) key

● If necessary, zero the balance: press the (Zero) key

○ If necessary, change the configuration settings:
see the chapter entitled “Configuration”

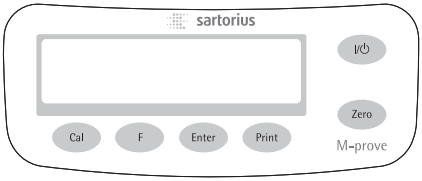
○ If desired, load the factory settings:
see the chapter entitled “Configuration,” menu item 9.– 1

Additional functions:

○ Switching off the balance: press the (I/⏻) key

○ Battery operation: automatic shut-off after 2,5 or 10 minutes; see chapter on configuration. Example: 2 minutes.
If the weight readout remains unchanged and no keys are pressed for at least two minutes, the battery symbol “ ▮ “ starts flashing. After another 2 seconds, the balance shuts off automatically, unless a key is pressed.

Description of the Keys



(I/⏻) switches the balance on and off or switches it to the standby mode. Battery operation: on; turns backlight on; off

(Zero) Zeros the balance; press and hold 2 seconds: opens the application menu

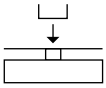
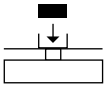
(Cal) Starts calibration/adjustment

(F) Starts an application program; Scrolling in application menu, configration menu and calibration menu

(Enter) Confirms the selected setting; Exits application, configuration & calibration menu if key is pressed and held for more than 2 seconds.

(Print) Generates a printout or data output

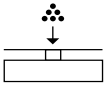
Example: Determine weight of sample

Step	Key (or instruction)	Display
1. Switch on the balance Self-test runs Display: Software version	I/⏻	8.8.8.8.8.8 r 31.01
2. Open the flip-down cover and leave open while weighing		
3. Place container on the balance (in this example, 52 g)		52.0 g
4. Zero the balance	(Zero)	0.0 g
5. Place sample in container on balance (in this example, 150,2 g).		150.2 g

Application Programs

Toggling between Weight Units
With this application program you can toggle the display of a weight value back and forth between two weight units (see table below).

Example: Toggle weight unit from pounds [lb] (application) to grams [g] (basic unit)

Step	Key (or instruction)	Display
1. Select application program	(Zero) > 2 sec	1.noAPP
2. Select Toggling between Weight Units	(F)	2.un It
3. Confirm unit	(Enter)	2.GrAMS
4. Select weight unit; in this example: "5. Pound" (see table below)	(F) repeatedly	5.Pound
5. Confirm weight unit (pounds)	(Enter)	0.0000 lb
6. Place sample on balance		0.2204 lb
7. Toggle weight unit	(F)	100.0 g

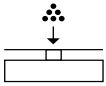
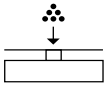
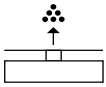
Menu code	Unit	Conversion factor	Display
1.uSEr*	Grams	1.00000000000	o
2.GrAMS (factory setting)	Grams	1.00000000000	g
4.CArAt	Carats	5.00000000000	o
5.Pound	Pounds	0.00220462260	lb
6.ounCE	Ounces	0.03527396200	oz
7.trYo	Troy ounces	0.03215074700	ozt
8.tL.Hon	Hong Kong taels	0.02671725000	tlk
9.tL.S in	Singapore taels	0.02645544638	tl
10.tL.tA	Taiwanese taels	0.02666666000	tl
11.GrA1	Grains	15.4323583500	GN
12.PEnY	Pennyweights	0.64301493100	dwt
15.tL.CH	Chinese taels	0.02645547175	tl
22.Pdo2	lb/oz	0.03527396200	lb:oz
23.nEWt	Newtons	0.00980665000	N

* User-defined conversion is customer selectable with RS-232 or USB program option.

Counting

Purpose
With the Counting program you can determine the number of parts or items.

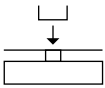
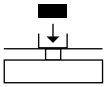
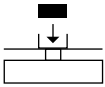
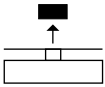
Example: Determine the number of uncounted parts; weigh in the selectable reference sample quantity (in this example: 20)

Step	Key (or instruction)	Display
1. Select application program	(Zero) > 2 sec	noAPP
2. Select Counting	(F) repeatedly	Count
3. Confirm setting Symbol "✱" on the display: application is active	(Enter)	0.0 g ✱
4. Place empty container on the balance		100.0 g ✱
5. Zero the balance	(Zero)	0.0 g ✱
6. Place reference sample quantity (20) on the balance		66.0 g ✱
7. Select reference sample quantity: in increments of 1 (1, 2, 3, ..., 99) or in increments of 10 (10, 20, 30, ...,100)	(F) repeatedly (briefly) or (F) > 2 sec.	
8. Confirm selected reference sample quantity	(Enter)	? 20
9. Place uncounted parts on balance		20 pcs ✱
10. Toggle display between mean piece weight, total weight, and quantity	(F) repeatedly	512 pcs ✱
11. Unload the balance		3.300 g ✱ ▲
12. Counting application: value clear the reference (Enter) > 2 sec		
13. Reactivate Counting (if no other application program has been selected)	(F)	
14. Repeat procedure starting from Step 5.		

Weighing in Percent

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

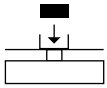
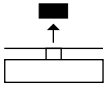
Example: Determine an unknown percentage; store the weight on the balance as the reference percentage (100%)

	Step	Key (or instruction)	Display
1.	Select application program	(Zero) > 2 sec	noAPP
2.	Select Weighing in Percent	(F) repeatedly	PErCt
3.	Confirm setting Symbol "✱" on the display: application is active	(Enter)	0.0 g ✱
4.	Place empty container on the balance		100.0 g ✱
5.	Tare the balance	(Zero)	0.0 g ✱
6.	Place the reference weight for 100% on the balance		222.5 g ✱
7.	If desired, change the number of decimal places displayed: 100.0%, 100.00% or 100% (factory setting)	(F) repeatedly	? 100.00
8.	Confirm selected no. of decimal places	(Enter)	100.00% ✱
9.	Place unknown weight on the balance		144.94% ✱
10.	Toggle display between weight and percentage	(F) repeatedly	322.5 g ✱
11.	Unload the balance		
12.	Weighing in Percent application: clear the reference percentage	(Enter) > 2 sec	
13.	Reactivate Weighing in Percent (if no other application program has been selected)	(F)	
14.	Repeat procedure starting from Step 5.		

"Hold" Display

Purpose
"Holds" the displayed value; also, the display will be locked for 5 seconds after removing the sample from the pan.

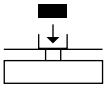
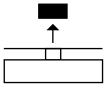
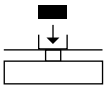
Example: Determine weight of oversized sample

	Step	Key (or instruction)	Display
1.	Select application program	(Zero) > 2 sec	InoAPP
2.	Select Hold Display	(F) repeatedly	SHLdon
3.	Confirm setting Symbol "✱" on the display: application is active	(Enter)	0.0 g ✱
4.	If necessary: zero the balance	(Zero)	
5.	Place oversized sample on balance		888.8 g ✱
6.	Start application program Symbol "⚠" flashes on the display: the weight value is locked	(F)	275.5 g ✱⚠
7.	Unload the balance: the weight value remains displayed for a further 5 seconds; or		
8.	Zero the balance	(Zero)	0.0 g ✱
9.	End the Display Hold application	(Enter) > 2 sec	
10.	Reactivate Display Hold (if no other application program has been selected)	(F)	
11.	Repeat procedure starting from Step 5.		

Totalizing

Purpose
With this application program you can add up successive weight values exerding capacity of balance.

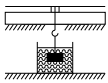
Example: Totalizing weight values

Step	Key (or instruction)	Display
1. Select application program	(Zero) > 2 sec	
2. Select Totalizing	(F) repeatedly	
3. Confirm setting Symbol "✱" on the display: application is active	(Enter)	
4. If necessary: zero the balance	(Zero)	
5. Place sample on balance (in this example, 380 g)		
6. Store value in memory. Total weight is displayed steadily; Σ symbol flashes.	(Enter)	
7. Remove sample from balance		
8. Place the next sample on the balance (in this example, 575 g)		
9. Store value in memory. Totalized stored weight is displayed; symbol Σ flashes. Note: Σ symbol remains on indicating stored value in memory until cleared	(Enter)	
10. To view the current weight for 2 seconds (if a printer is connected, a printout is generated)	(F)	
11. Clear totalizing memory (if a printer is connected, total is printed)	(F) > 2 sec	
12. End Totalizing	(Enter) > 2 sec	
13. Reactivate Totalizing (if no other application program has been selected) (if a printer is connected, total is printed).	(F)	
14. Repeat procedure starting from Step 6.		

Specific Gravity

Purpose
Use this application program to determine the specific gravity of a sample. The result is displayed with one decimal place. Beaker and wire not included with balance.

Example: Determine the specific gravity of a solid.

	Step	Key (or instruction)	Display
1.	Select application program	(Zero) > 2 sec	noAPP
2.	Select Specific Gravity	(F) repeatedly	SPECGr
3.	Confirm setting Symbol "✱" on the display: application is active	(Enter)	0.0 g ✱
4.	If necessary, zero the balance	(Zero)	
5.	Start application program	(F)	AIrUAL
6.	Confirm the display, "AIrUAL"	(Enter)	20.0 g ✱
7.	Determine weight of the sample in air: place sample on the balance		
8.	Store weight-in-air value	(Enter)	WAtEr
9.	Remove sample from balance		
10.	Determine weight of sample in liquid: connect wire and set up beaker		
11.	Confirm the display "WAtEr"	(Enter)	15.0 g ✱
12.	Place sample in liquid		
13.	Store the weight-in-liquid value and view the result	(Enter)	4.0 s ✱
14.	Clear the display	(Zero)	
15.	Exit the Specific Gravity application	(Enter) > 2 sec	
16.	Reactivate Specific Gravity (if no other application program has been selected)	(F)	0.0 g ✱
17.	Repeat procedure starting from Step 5.		

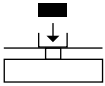
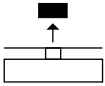
Calibration/Span Adjustment

Calibration is recommended after initial installation and each time the balance is moved.

Features
Calibration/adjustment can be performed only when:
- there is no load on the balance,
- the balance is zeroed, and
- the internal signal is stable.

If these conditions are not met, an error message is displayed.
The weight required for calibration/adjustment is displayed.
Standard calibration weights for selected models: to remove, see instructions on page 4.
Press (F) to select a different weight value.
To cancel the procedure: press and hold the (Enter) key (> 2 sec.).

Example: Calibrate/adjust span of the balance (here: model AY5101)

Step	Key (or instruction)	Display
1. Switch on the balance	I/⏻	
2. Zero the balance	(Zero)	
3. Start calibration The preset calibration weight is displayed without the weight unit (in this example, 5000 g)	(Cal)	
4. To select a different calibration weight value	(F) repeatedly	 
5. Confirm calibration weight value and start calibration/span adjustment After the zero point is stored, the required calibration weight flashes on the display.	(Enter)	 
6. Place the required calibration weight on the balance The readout stops flashing if the weight is applied within the defined time limit and tolerance. If the weight value is accepted, the display stops flashing and the stability symbol ⚖ appears on the display.		
7. Remove the calibration weight		
8. Calibration has been completed		

Configuration (Setup Menu)

To configure the balance; i.e., adapt the balance to individual requirements.

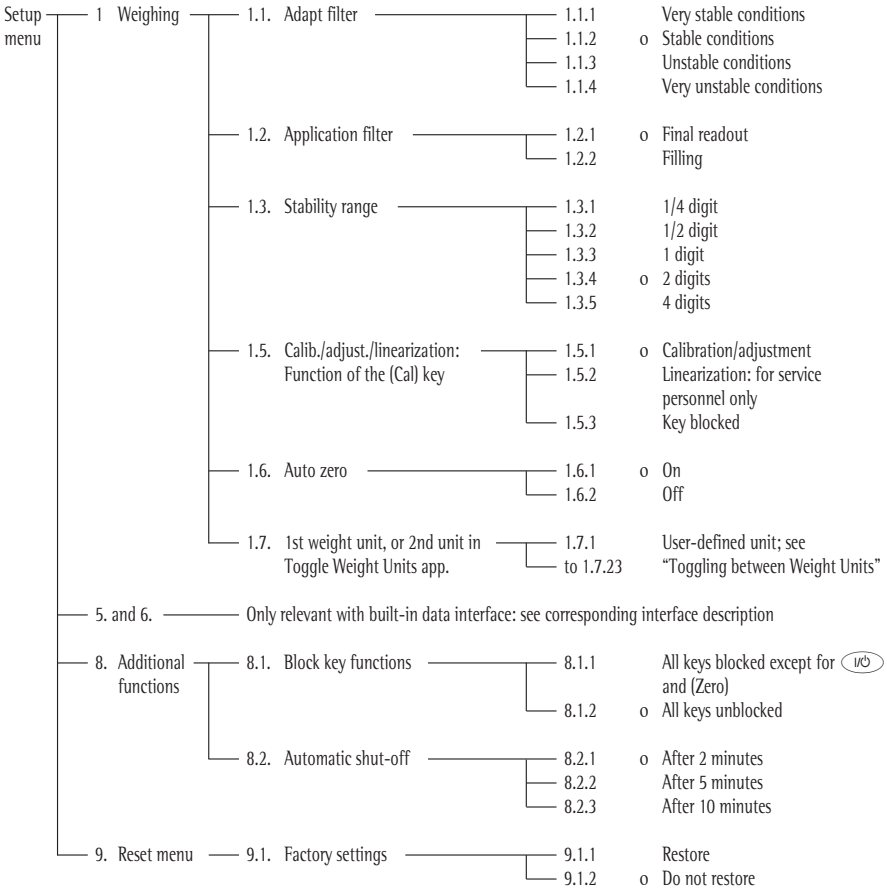
Step	Key (or instruction)	Display
1. Switch off the balance	I/⏻	
2. Switch on the balance and	I/⏻	
while all segments are displayed	(Zero) briefly	

Navigation in the Setup Menu

Key	Press briefly	Press and hold
(Enter)	Menu level: move to the right (cyclical)	Confirm setting
(F)	Menu item: Scrolling	–
(Zero)	Menu level: Move to the left	Save settings and exit Setup

Parameter Settings (Overview)

o Factory setting √ User-defined setting



Error Codes

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

Display/Problem	Cause	Solution
No segments appear on the display	No power available	Check the power supply
	The AC adapter is not plugged in	Plug in the AC adapter
	Battery is drained	Replace battery; recharge battery using external charger
oL	The load exceeds the balance capacity	Unload the balance
uL	Weighing pan not in place	Place the weighing pan on the balance
	Something is touching the weighing pan	Move the object that is touching the weighing pan
d iSErr	Display overflow: Value cannot be shown on the display	Reduce load on the balance
CALErr	Calibration parameter not met; e.g.: – Balance not zeroed – Balance is loaded	Calibrate only when zero is displayed Press (Zero) to tare the balance Unload the balance
APPErr	Weight is too light or there is no sample on the balance with application in use	Increase the weight on the balance
PrtErr	Data interface for printing is blocked	Contact the Sartorius customer service center
bAL.Err	Balance loaded or defecteive when power was turned on	Unload balance before switching on or contact Sartorius custumer service
SYS.Err	Balance defective	Contact Sartorius custumer service
Max. weighing capacity is less than indicated under “Specifications”	The balance was switched on without the weighing pan in place	Place the weighing pan on the balance and press (I/⏻)
The weight readout is obviously wrong	The balance was not calibrated/ adjusted before weighing Balance not zeroed	Calibrate/adjust the balance Zero the balance

If any other errors occur, contact your local Sartorius customer service center.

Recycling

Information and Instructions on Disposal and Repairs Packaging that is no longer required must be disposed of at the local waste disposal facility. The packaging is made of environmentally friendly materials that can be used as secondary raw materials.

The equipment, including accessories and batteries, does not belong in your regular household waste. The EU legislation requires its Member States to collect electrical and electronic equipment and disposed of it separately from other unsorted municipal waste with the aim of recycling it.

For disposal in Germany and in the other Member States of the European Economic Area (EEA), please contact our service technicians on location or your Sartorius dealer.

In countries that are not members of the European Economic Area (EEA) or where no Sartorius dealers are located, please contact your local authorities or a commercial disposal operator.

Prior to disposal and/or scrapping of the equipment, any batteries should be removed and disposed of in local collection boxes.

Equipment contaminated with hazardous materials (ABC contamination) will not be taken back; neither for repair or disposal.

Accessories (Options)

Product	Order No.
Data interface, mounting kit	
– RS-232 interface with cable	**YADAP-RS**
– USB interface with cable	**YADAP-USB**
Data printer	**YDP20-0CE**
Lock-down capability (for anti-theft locking device)	**LC-1**
Calibration weights	
– for AY5101 (5 kg; F2)	**YCW6548-00**
– for AY3101 (2 kg; F2)	**YCW6248-00**
– for AY1501 (1 kg; M1)	**YCW615-00**
– for AY10000 (5 kg; M1)	**YCW655-00**
– for AY6000 (5 kg; M2)	**YCW656-00**
– for AY4000 (2 kg; M2)	**YCW626-00**
– for weight compartment, (right side), (100 g; F1)	**69V00006**
In-use cover:	
– for models without glass draft shield	**69V00030**
– for models with glass draft shield	**69V00029**
Round glas draft shield (25 mm high)	**69V00003**
Weighing pan: – Round	**69V00031**
– Rectangular	**69V00032**
Leveling feet (set of one adjustable foot and one fixed foot)	**69V00007**
Covers: (set of small parts)	**69V00008**
– Battery compartment	
– Interface port	
– Weight compartment	

Overview

Specifications

Model		AY303	AY123	AY612	AY412	AY212
Weighing capacity	g	300	120	610	410	210
Readability	g	0.001	0.001	0.01	0.01	0.01
Tare range (subtractive)	g	300	120	610	410	210
Linearity	≤±g	0.003	0.002	0.01	0.01	0.2
Operating temperature range		10°C to 30°C (273°K to 303°K; 50°F to 86°F)				
Stabilization time (average)	s	2.5	2.5	2	2	2
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.1–0.8 (depends on filter level selected)				
Calibration weight	g	200 (F1)	100 (F1)	200 (F2)	200 (F2)	200 (M1)
Net weight, approx.	kg	1.3	1.2	1.35	1.35	1.2
Pan size	mm	97 ∅	97 ∅	145×130	145×130	97 ∅
Power source/voltage/frequency		AC adapter, 230 V or 115 V, +15% to – 20%, 48–60 Hz				
Power consumption (average)	W	1	1	0.75	0.75	0.75
Hours of operation w/ 9 V battery:						
– Alkaline (approx.)	h	–	–	11	11	14
– Rechargeable, fully ch., (NiMH), avg.	h	–	–	2.5	2.5	4

Model		AY5101	AY3101	AY1501	AY711	AY511	AY10000	AY6000	AY4000
Weighing capacity	g	5100	3100	1500	710	510	10100	6100	4100
Readability	g	0.1	0.1	0.1	0.1	0.1	1	1	1
Tare range (subtractive)	g	5100	3100	1500	710	510	10100	6100	4100
Linearity	≤±g	0.1	0.1	0.1	0.1	0.1	1	1	1
Operating temperature range		10°C to 30°C (273°K to 303°K; 50°F to 86°F)							
Stabilization time (average)	s	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Adaptation to ambient conditions		By selection of 1 of 4 optimized filter levels; display update: 0.1–0.8 (depends on filter level selected)							
Calibration weight	kg	5 (F2)	2 (F2)	1 (M1)	0,2 (M2)	0,2 (M2)	5 (M1)	5 (M2)	2 (M2)
Net weight, approx.	kg	1.1	1.1	1.1	1.25	1.25	1.1	1.1	1.1
Pan size	mm	145×130							
Power source/voltage/frequency		AC adapter, 230 V or 115 V, +15% to – 20%, 48–60 Hz							
Power consumption (average)	W	1	1	0.75	0.75	0.75	0.75	0.75	0.75
Hours of operation w/ 9 V battery:									
– Alkaline (approx.)	h	11	11	14	14	14	14	14	14
– Rechargeable, fully ch., (NiMH), avg.	h	2.5	2.5	4	4	4	4	4	4