321-78215A
May. 2017

Uni Bloc

SHIMADZU
Analytical Balance
Instruction Manual

AP W Series

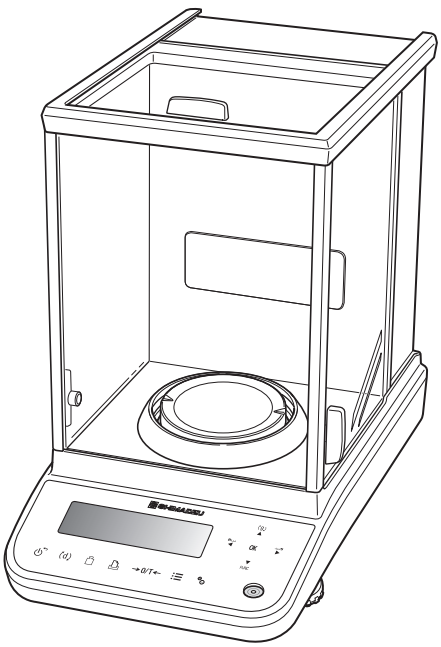
AP135W
AP225WD
AP125WD
AP324W
AP224W
AP124W

AP X Series

AP324X
AP224X
AP124X

AP Y Series

AP324Y
AP224Y
AP124Y



Read the instruction manual thoroughly before you use the product.
Keep this instruction manual for future reference.

SHIMADZU

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Foreword

Read the instruction manual thoroughly before using the product.

Thank you for purchasing the Shimadzu Analytical Balance AP Series.

This instruction manual provides details on how to use the balance and on the accessories and options, etc., that are related to it. Read the manual thoroughly and make sure it is used in accordance with the details listed herein. The following instruction manual is also supplied with this product.

Simple Sheet: Operation Guide 321-78192 Operation descriptions in a simple diagram format.

Store the instruction manuals together with the product in an easily-accessible location.

The instruction manuals (PDF format) can also be downloaded from the Shimadzu website (http://www.shimadzu.com/an/balance/index.html). Balances SEARCH Click

Notices

- If the balance is to be operated by a different user or transferred to a different location, make sure the instruction manuals are also provided to the subsequent users.
- Contact the Shimadzu sales office or agency in the event of the instruction manuals were lost or mislaid.
- Safety precautions are listed in the instruction manual to ensure safe usage. Read the section on [Safety Precautions] thoroughly prior to using the balance.
- You are requested to complete the user registration procedure to ensure that your balance can be used without anxiety. This is required when making claims against the product warranty, and you are requested to complete either of the following two user registration procedures.
  (1) Fill in the details on the rear of the [Product Warranty] card provided, and send it to us by facsimile.
  (2) Access our website and will in the details accordingly.
  (http://www.shimadzu.com/an/contact/index.html)

Once you have completed the user registration procedures, you will be given precedence with regard to receiving information on product warranty and Shimadzu products and services. (You are also requested to fill in the questionnaire.)

Notices

- The content of this manual is subject, without notice, to modifications for the sake of improvement.
- Every effort has been made to ensure that the content of this manual was correct at the time of creation. However, in the event that any mistakes or omissions are discovered, it may not be possible to correct them immediately.
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- Shimadzu does not guarantee the operations all USB memories, USB hubs or USB keyboards that can be connected to the USB port.

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Notation Conventions Used within the Instruction Manual

The instruction manual uses the following notation conventions in accordance with the degree of risk and damage to equipment.

Notation	Description
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injury or equipment damage.
Precautions	Provides additional information needed to properly use the balance.

Descriptions of the other pictograms used within the instruction manual are listed below.

Pictogram	Description
Prohibitions	Indicates an action that must NOT be performed
Instructions	Indicates an action that must be performed.
Hints	Provides information on useful techniques for using the balance.
☞ References	Indicates the location of information that can be used as reference material.

The functions available for use and the selectable items differ in accordance with the model with the AP Series. Read the sections concerning the model in use.
All items that are weighed with the use of the balance are referred to collectively as “samples” within the instruction manual.

Menu Operations: Menu operations are listed in a simplified format:
☞ [Measurement Keys + Application Function Operation Keys] (P.24)
☞ [How to use Menus] (P.28)

Terminology: Lists the terminology used within the instruction manual.

Display: AP W series displays are used in the instruction manual for explanatory purposes.
☞ [Display Panel] (P.23)

Precautions on Use

To be strictly observed

To ensure that you use the balance safely and correctly, read the following precautions carefully. The details listed below provide important information on safety, and must be observed at all times.

■ Precautions Related to Usage

⚠ CAUTION

Prohibitions

Cannot be used as proof of transactions.

The balance is not permitted by law to be used as proof of transaction for drug formulation, etc.

■ Precautions Related to Place of Installation

⚠ CAUTION

Prohibitions

Do not use the balance outdoors or anywhere where it will be exposed to water.

You could sustain an electric shock or the product could operate abnormally.

Prohibitions

Avoid locations where the balance will be exposed to volatile gas, flammable gas or corrosive gas.

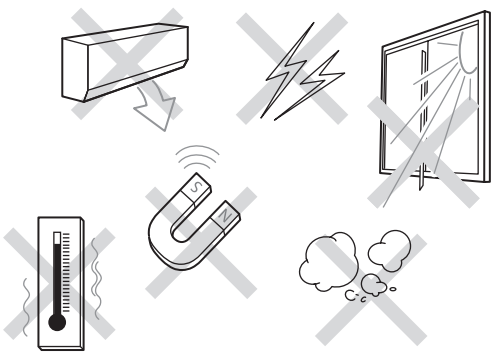
Failure to observe this may result in the outbreak of fire and accidents.

Prohibitions

Avoid locations where the balance will be exposed to any of the following.

You may not be able to obtain correct weight readings.

- Air flow from an air conditioner, ventilator, door or window
- Extreme temperature changes
- Vibration
- Direct sunlight
- Dust, fine particles, electromagnetic waves or a magnetic field
- Condensation



Instructions

Install the balance on a strong and stable flat table or floor.

Placing the balance in an unstable site could lead to injury or trouble with the balance.
When selecting the installation site, take into account the combined weight of the balance and the item to be weighed.

■ Precautions Related to Installation Work

⚠ CAUTION

Prohibitions **Do not connect anything other than peripheral devices specified by Shimadzu to the balance's connector.**

If you do, the balance may stop working normally.
In order to avoid trouble, always connect peripheral devices in accordance with the directions in this manual.

Instructions **Use the correct power supply and voltage with the AC adapter supplied.**

Using the balance with an incorrect power supply or voltage may result in the outbreak of fire or malfunctions. Note also that if the power supply or voltage is unstable or if the power supply capacity is insufficient, it will not be possible to obtain satisfactory performance from the balance.

Instructions **Install measures to prevent the balance from toppling over in the event of earthquakes, etc.**

If the balance topples over as a direct result of vibrations, it may result in injury.

Instructions **Plug the AC adapter into an easily accessible power outlet.**

During emergencies, it is necessary to unplug the AC adaptor from the power outlet.

Instructions **Beware of the gaps between equipment during installation.**

Failure to observe this may result in fingers getting caught, leading to injury.
Place fingers on the indentations on the sides of the unit and grip it firmly with both hands during installation.

■ Precautions Related to Work/Operations

⚠ CAUTION

Prohibitions **Do not operate the ionizer when measuring items that are explosive or inflammable.**

Failure to observe this may result in ignition and the outbreak of fire.

Instructions **Use the correct weighing units.**

Using incorrect weighing units can lead to accidents as a result of weighing errors. Check that the weighing units are correct before starting weighing.

Instructions **Treat the balance with care and respect.**

The balance is a precision instrument. Subjecting it to impact may result in malfunctions. When moving the balance, remove the pan, the pan supporter the shield plate, fix the glass draft shield, the Draft shield inner plate, the Power pack, the Stage, the Shield case and the Multi-stand, etc in place, and grasp it firmly with both hands when carrying it. If the balance is to be stored for long periods of time, place it in the packaging box which was used for delivery and store it in a safe location with few temperature fluctuations.

■ Risks Involved in Repairs/Dismantling/Modifications

⚠ CAUTION

Prohibitions **Never disassemble, modify or attempt to repair this product or any accessory.**

You could sustain an electric shock or the product could operate abnormally. If you believe that the balance has failed, contact your Shimadzu representative.

■ Precautions Related to Inspections/Maintenance

⚠ CAUTION

Prohibitions **The design standard period of usage for this product is ten years. Using the product for more than the design standard period may result in it being impossible to maintain performance or malfunctions, etc.**

- A fee is charged for safety inspections. Direct all requests to our sales offices, dealers or the service agencies specified by the company.
- The design standard period is the standard period during which the product can be used safely without malfunctions, and it does not represent the valid period of product warranty.
- See [Chapter 11. Maintenance] for details on daily maintenance inspections and replacement parts.

Prohibitions **Make sure the balance cover is not unintentionally removed other than when replacing the ionizer.**

Failure to observe this may result in injury and malfunctions. It is not necessary to remove the balance cover for normal inspections and maintenance work. Contact the service representatives specified by Shimadzu and request repairs that require the cover to be removed.

Instructions **Unplug the power cord from the AC adapter during inspections, maintenance and when replacing parts.**

Failure to observe this may result in accidents caused by electric shocks or short-circuits.

Instructions **Always use the parts specified in the instruction manual when replacing parts.**

The use of non-specified parts may result in them becoming damaged and unusable.

■ Measures to be Observed during Emergencies

⚠ CAUTION

Instructions **If you detect anything abnormal (e.g. a burning smell), immediately disconnect the AC adapter from the power outlet.**

Continuing to use the balance with an abnormality could lead to fire or an electric shock.

■ Measures to be Observed during Power Outages

⚠ CAUTION

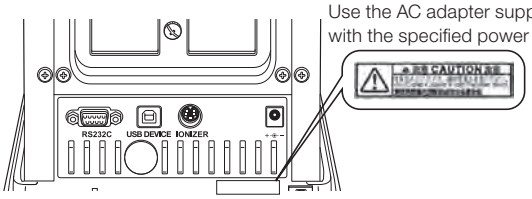
Instructions **After a power outage, turn the power back ON.**

When a power outage occurs, the power is shut off automatically. Therefore, begin operation from “Turning on the Power” (☞ P.19) again.

■ Caution Labels

Cautions labels are placed in necessary locations on the balance to ensure that it is used correctly. In the event of these labels being mislaid or damaged, contact a Shimadzu sales office or service agency to request new labels, and then make sure they are situated in the correct locations.

[AP224X example]

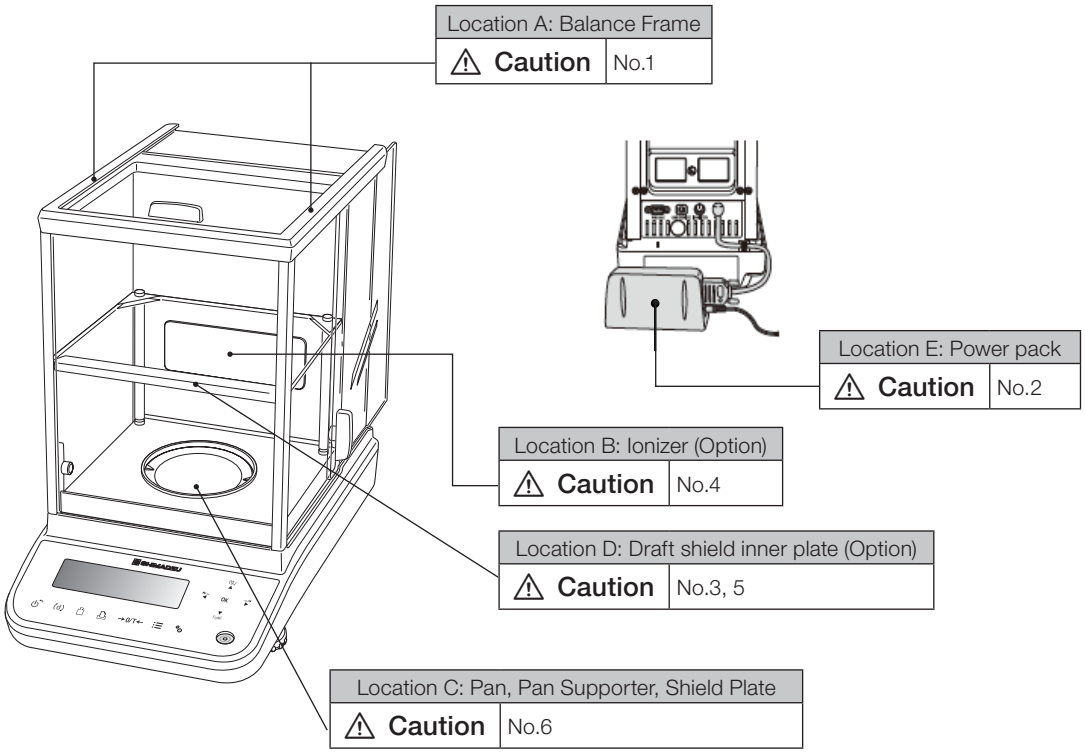


■ Residual Risk Information

Residual risk refers to the risks that could not be removed or reduced during the design and manufacturing stages.
Check the [Residual Risk Maps] for each area with inherent risks and implement protective measures while referring to the [List of Residual Risks].

■Residual Risk Maps

The [Equipment Location] and [No.] shown below match up with the [List of Residual Risks].
Refer to the [List of Residual Risks] for further details.



■List of Residual Risks

The [No.] and [Equipment Location] shown below match up with the [Residual Risk Maps].
Check the [Residual List Maps] for further retains on the relevant [Equipment Location].
Read and fully comprehend the details listed in [Refer To] and implement protective measures without fail.

Measurement Preparations

No.	Equipment Location	Risk	Protective Measures Implemented by Users	—	—
1	A	⚠ Caution The frame and front glass may become detached when the top frame is picked up and moved.	When moving the balance, do not hold it by the top frame, but grip the bottom of the main unit firmly with both hands to pick it up.	Refer To	P.15
				Task	Moving the Balance
				Qualifications & Training	Recipients of Work Training
2	E	⚠ Caution If semi-micro models are carried while still connected to the power supply box and the power supply unit falls down, the load on the cable could damage it.	When moving the balance, always disconnect the cable to the power supply unit before transporting it.	Refer To	P.15
				Task	Moving the Balance
				Qualifications & Training	Recipients of Work Training
3	D	⚠ Caution When installing the Draft shield inner plate (option), applying a load to the plate glass can damage it.	When installing the Draft shield inner plate (option), avoid applying any load onto the plate glass.	Refer To	P.14
				Task	Draft shield inner plate (option) installation
				Qualifications & Training	Recipients of Work Training

Measurements

No.	Equipment Location	Risk	Protective Measures Implemented by Users	—	—
4	B	⚠ Caution Measuring items that are explosive, inflammable and ignitable may catch fire, resulting in the outbreak of fire.	Do not operate the ionizer when measuring items that are explosive, inflammable or ignitable.	Refer To	P.108
				Task	Measuring items that are explosive, inflammable or ignitable
				Qualifications & Training	Recipients of Work Training

Maintenance

No.	Equipment Location	Risk	Protective Measures Implemented by Users	—	—
5	C	⚠ Caution Transporting the balance with the Draft shield inner plate (option) installed can damage the draft shield glass or plate glass.	When transporting the balance for repair, always remove the Draft shield inner plate (option).	Refer To	P.14
				Task	Transporting during repairs
				Qualifications & Training	Recipients of Work Training
6	D	⚠ Caution Transporting the unit with the pan, pan supporter and shield plate installed may result in damage to the draft shield glass.	Remove the pan, pan supporter and shield plate without fail when transporting the balance during repairs.	Refer To	P.138
				Task	Transporting during repairs
				Qualifications & Training	Recipients of Work Training

Product Warranty

Shimadzu provides warranty with regard to the following as a basic principle. See the [Product Warranty] supplied for further details.

1. Period of Warranty

Valid for one year from the date of purchase. (Restricted to Japan).

2. Items Covered by the Warranty

Malfunctions attributable to Shimadzu occurring within the period of warranty will be repaired or parts replaced free of charge. (The warranty is only valid within Japan).

3. Limitation of Liability

1) Shimadzu cannot be held responsible for the users' loss of profit, indirect damages or secondary damages under any circumstances. The company can also not be held responsible for damages relating to damage compensation caused to users by third parties.
2) The liability for compensatory damages attributable to Shimadzu is limited to a sum equivalent to the cost of the product in all cases.

4. Warranty Exemption

The warranty is not valid for malfunctions attributable to the following, even during the period of warranty.

1) Malfunctions occurring as a result of misuse.
2) When the product is repaired or modified, etc., by any company or person other than Shimadzu Corporation.
3) Malfunctions attributable to causes other than the product itself.
4) When used in harsh environments, such as high-temperature and high-humidity environments, environments subject to corrosive gases, and environments subject to vibrations, etc.
5) Malfunctions caused by fire, earthquakes or other natural disasters, by contamination caused by radioactivity or toxic substances, or by unavoidable situations, such as war, civil unrest and crime.
6) When moved or transported elsewhere after having been installed.
7) Consumable parts and parts conforming to this designation.

Aftercare Services and Part Supply Period

1. Aftercare Service

In the event of the product not operating normally, carry out inspections and resolve the problem in accordance with the instructions providing in [10.Errors and Recovery] (☞ P.136). If the problem persists or other problems that are thought to be malfunctions not covered by the instructions provided arise, contact the numbers provided on the back cover.

2. Part Supply Period

The period during which replacement parts will be supply for the product is up until seven years after the termination of manufacture.

Note that there are cases in which it will not be possible to supply replacement parts once this supply period has elapsed. However, the supply periods stipulated separately by the manufacturers will be applied for parts not manufactured by Shimadzu.

Inspections and Maintenance

Daily inspections, Periodic inspections and regular calibrations are required to ensure that the performance of the balance is maintained for long periods of time so that correct measurement data can be acquired.

- See [Chapter 11: Maintenance/Inspections] for details on daily inspections and part replacement.
- Contact a Shimadzu sales office or service agency, or one of Shimadzu's service companies to request Periodic inspections and regular calibrations.

Product Disposal

When disposing of the product, dismantle and dispose of the parts separately in accordance with their composition in order in consideration of environmental conservation.

Direct all inquiries to the contact numbers provided on the back cover.

Table of Contents

AP Series

The AP series comprises of electromagnetic equilibrium analytical balances mounted with aluminum UniBloc sensors. This instruction manual provides details on operating the AP series models listed below. The functions available differ in accordance with the model, so check the product label located on the front or back of the balance and read the sections concerning the model in use.

About the model name

Example. AP225WD (Model name)

- Capacity
  - 12: 120 g
  - 13: 135 g
  - 22: 220 g
  - 32: 320 g
- Minimum display
  - 4 : 0.1 mg
  - 5 : 0.00001 g (Semi-micro model only)
- Dual range (0.0001g/0.00001g)
- Series name
  - W : W series
  - X : X series
  - Y : Y series

AP Lineup

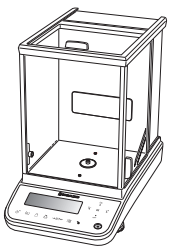
AP W Series	AP135W (Semi-micro)
	AP225WD (Semi-micro)
	AP125WD (Semi-micro)
	AP324W
	AP224W
	AP124W

AP X Series	AP324X
	AP224X
	AP124X
AP Y Series	AP324Y
	AP224Y
	AP124Y

Inspecting the Contents of the Package

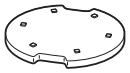
Check to ascertain that the following parts are included in the package, and that none of them are damaged. The figure in parenthesis ([ ]) represents the quantity. Contact a Shimadzu sales office of representative agency if any abnormalities are found.

☐ Main balance unit [1]

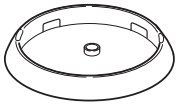


☐ Pan [1]

☐ Pan supporter [1]

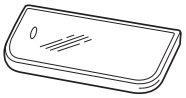


☐ Shield plate [1]



* Excluding semi-micro models

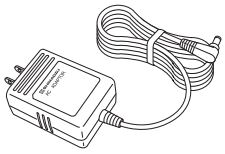
☐ Protection Cover [1]



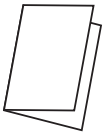
☐ Adapter cable holder [1]

* Excluding semi-micro models

☐ AC adapter [1]



☐ Insert card [1]

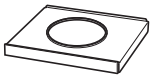


☑ Instruction manual [1]

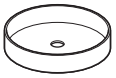
◆ Only semi-micro models

☐ Power pack [1]

☐ Stage [1]

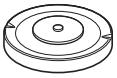


☐ Shield Case [1]



☐ Multi stand [1]

☐ Pan for fixing the multi-stand [1]

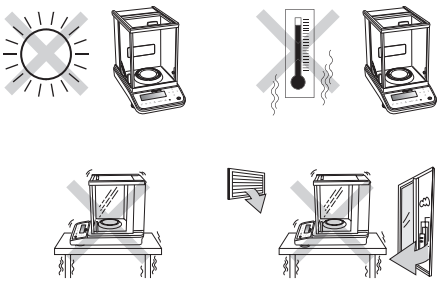


Deciding on an Installation Environment

The environment in which the balance is installed has an enormous effect on its performance.
It is therefore necessary to avoid the following environments and chose an appropriate environment in order to ensure accurate and reliable measurement results. Install the balance on a flat surface in a location with minimal vibrations.

* Avoid the following installation environments (see the illustrations below).
  - Environments with vibrations.
  - Environments with direct sunlight.
  - Environments with air currents from air-conditioners, ventilators, open doors and windows, etc.
  - Environments with extreme temperature changes,or high/low temperature, or high/low humidity.

Observe the instructions listed in [Safety Precautions] (P.5) to ensure safe measurements.



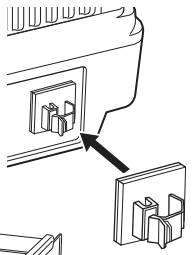
Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.

Attaching the Parts

(except Semi-micro models)
*Installation method to semi-micro models : next page

1. Attach the adapter cable holder

Peel the protective sheet of adhesive off the adapter cable holder, and stick it on the back of the balance as shown in the figure.



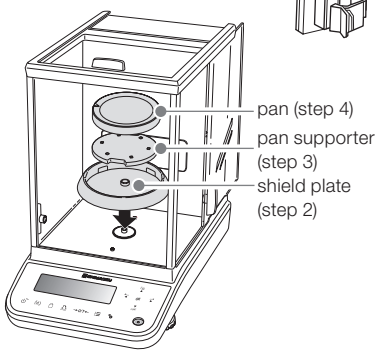
2. Attach the shield plate

3. Put the pan supporter in place

Gently attach the pan supporter on the center axis of the weighing chamber with hollow (two places) of it.

4. Put the pan on the pan supporters

Align the two pan notches with the left and right on the balance main body.



5. Set the protective cover

If the balance is used in an environment where it gets dirty easily, use the protective cover available.
(1) Peel the double-side tape from the protection cover (five locations).
(2) Place the protection cover over the balance's operation keys and display.
(3) With the protection cover in place on the operation keys/display panel, press down firmly on the double-side tape until it lodges in place.

⚠ CAUTION

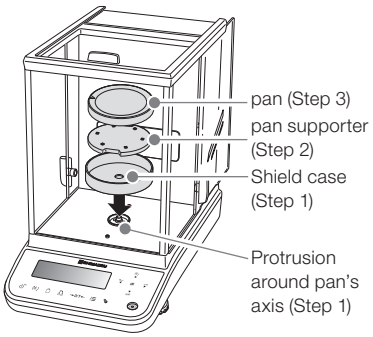
Remove the pan, pan supporter, shield plate and inner draft shield plate without fail when repairing or moving the balance. Failure to observe this may result in damage.

Using a verified balance as a legal measuring instrument in the EU:
Legal regulations require a verified balance be sealed. This control seal is a self-destructive adhesive label. This seal is irreparably damaged invalidating the verification, if you attempt to remove it. The balance must then be re-verified before it is used for legal measurements.

Attaching the Parts (When Using Semi-Micro Models)

1. Attach the shield case

Align the center hole on the shield case with the protrusion positioned at the pan's center axis, as shown in the figure on the right, and set it carefully in place.



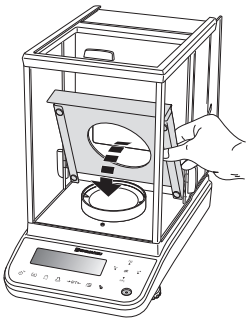
2. Put the pan supporter in place

Use the notches (two places) to carefully set the pan supporter in place on the axis so that it is centered in the weighing chamber as shown in the figure on the right.

3. Put the pan on the pan supporters

4. Attach the stage

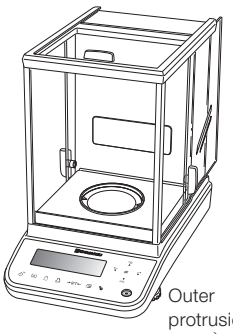
Follow the figure on the right, and position the stage so the skirt is against the back, and open both pan doors. Then, tilt the front of the stage upward at an angle and bring it down slowly to attach.

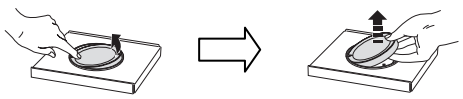


5. Attach the multi-stand when necessary

When using medical packaging paper that is bigger than the pan's diameter, when putting a package or a container such as a micro-tube on the pan, or when weighing a long, cylindrical sample, replace the pan with the multi-stand or with the special pan used for fixing the multi-stand. To remove the pan, press down on one side of the pan to lift up the pan. Then, grab the opposite side to remove.

[How to remove pan]





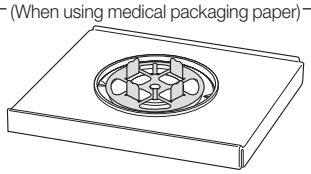
Press down to lift up the pan

Grab the opposite side that lifts up and remove

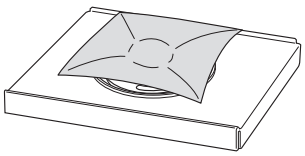
Pan for fixing the multi-stand

Use the multi-stand according to the application and refer to the illustrations below for attachment directions.

(When using medical packaging paper)

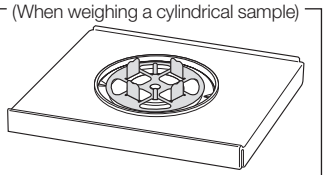


Align the hole at the center of the multi-stand with the protrusion at the center of the fixing plate, as shown in the illustration, and attach.

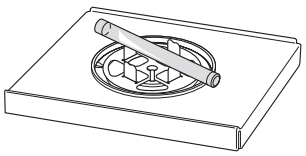


Make folds on the medical packaging paper and place onto the stand.

(When weighing a cylindrical sample)

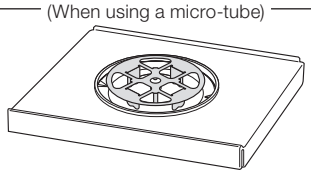


Align the hole at the center of the multi-stand with the protrusion at the center of the fixing plate, as shown in the illustration, and attach.

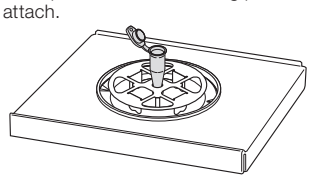


Use the notches on the stand, as shown in the illustration, and place the long sample onto the stand.

(When using a micro-tube)



Turn over the multi-stand as shown in the illustration, and align with the outer protrusion on the fixing pan and attach.



Insert the micro-tube into the hole at the center of the stand.

6. Attach the protection cover

Attach the protection cover as necessary, for example, when using the equipment in an environment that is prone to getting dirty.

(1) Peel off the paper to expose the adhesive on the double-sided tape (5 places) for the protection cover.

(2) Place the protection cover over the operation keys and display on the balance.

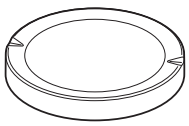
(3) Once the protection cover is fitted over the operation keys and display, press firmly onto the double-sided tape to ensure it adheres.

⚠ CAUTION

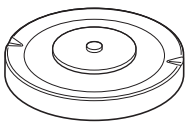
When repairing or moving the balance, the balance is delicate and can get damaged. Therefore, always remove the pan, the pan supporter, the draft shield inner plate (option), the power supply unit, the stage, the shield case and the multi-stand.

In case of the exchange pan, press [CAL] button.

Pan



Pan for Multi-stand



Using a verified balance as a legal measuring instrument in the EU:
In case of the exchange pan, reconnect AC adapter.

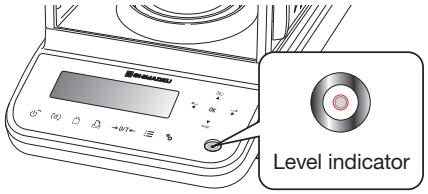
Adjusting the Horizontal Level of the Balance

Level Screw Operations
Turning the level screws in a clockwise direction when seen from above extends the legs to tilt the balance. Turning them in a counterclockwise direction shortens the legs to tilt the balance in the opposite direction.

Level the balance by following the procedure below.

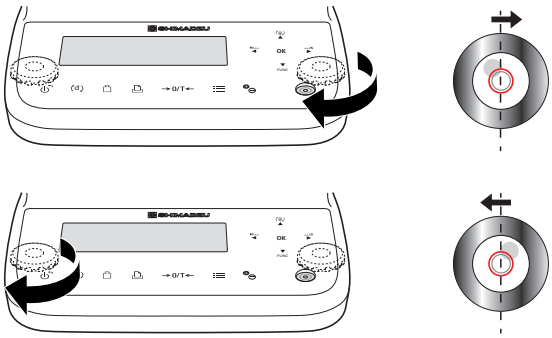
1. Turn all the level screws (total two at front) counterclockwise as viewed from above until they come to a gentle stop.

The balance will be tilted toward the front.



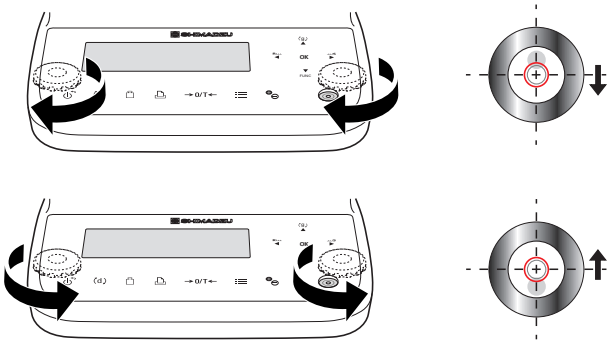
2. Adjust the two level screws at the front so that the air bubble in the level becomes centered in the left/right direction.

At this stage it doesn't matter if the air bubble isn't centered in the front/rear direction.



3. Turn both the level screws at the front in the same direction for the same amount to center the air bubble in the level in the front/back direction.

Adjust them to bring the air bubble into the center of the circle.



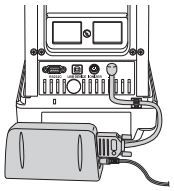
Turning on the Power

1. Insert the plug of the AC adapter into the DC IN connector on the back of the balance.

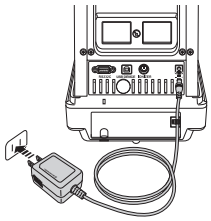
Semi-micro models

(1) Connect the cable (provided in the accessories) to the power supply unit.
 * Insert the connector of the cable in the power supply unit correctly, and fix the connector with the fixed screws.

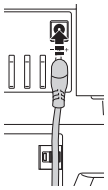
(2) Connect the plug for the AC adapter.



Other models

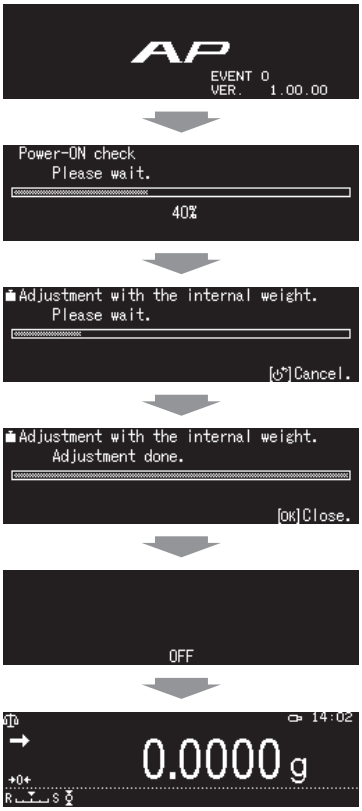


Cable holder is attached to the AC adaptor.
Fix the cable of the AC adaptor with cable holder to appropriate position on the back of the balance so it does not interfere with the glass draft shield when it is opened or closed.



2. Connect the AC adapter to the power outlet.

The following screen will be displayed.



A function for automatically adjusting sensitivity Perfect Self Calibration (PSC) with the use of internal weights. (W/X series only)
Calibration will be carried out automatically with the use of the weights incorporated into the balance when the AP series is started up in the default mode. The sound of a small motor will be heard during this. Press the [POWER] button during Perfect Self Calibration to halt the procedure.
[Adjustment and Tests with Internal Weights (W/X series only)] (P.36)

The Y Series is not equipped with a function for automatically adjusting sensitivity Perfect Self Calibration (PSC) with the use of internal weights, so PSC procedure is skilled and OFF displayed.

Press the [POWER] button when OFF is displayed.

* When using the log-in function, select the user by pressing the [UP] and [DOWN] keys to log in. The screen shown on the left will be displayed.
[Log-in Function] (P.63)

When you use a verified balance as a legal measuring instrument in the EU.
When you press the [POWER] button in the state of unstable, "---g" may be displayed.

⚠ CAUTION

Instructions

Use the correct power supply and voltage with the AC adapter supplied.

Using the balance with an incorrect power supply or voltage may result in the outbreak of fire or malfunctions. Note also that if the power supply or voltage is unstable or if the power supply capacity is insufficient, it will not be possible to obtain satisfactory performance from the balance.

Warming Up

Warming-up is performed to ensure that the balance is as stable as possible during adjustment and precise measurements. Leaving the balance with the power on in the weight measurement status or in the stand-by mode (☞ P.27) for several hours will stabilize the internal temperature of the balance. This procedure is known as warming-up.
Warming up requires the power to be left switched on for at least one hour.
The time required for warming up varies depending on the model.
Semi-micro models: At least 4 hours
Other models: At least 1 hour

Log-in Function ☞ [Log-in Function] (P.63)

The balance can be used with the Log-in Function.
The weight measurement screen will be displayed when the Log-in Function is not used.

3. Date/Time Confirmation

Refer to the following for details on adjusting the clock:
☞ [Date/Time Settings] (P.70)

4. Carrying Out Simple Measurements

Press the key on the control panel to perform simple measurements.

→0/T← [Zero Setting/Taring]

Place the measurement container on the pan and carry out taring (zero setting). Or, press the key to return the display to zero.
After the [Weighing] zero display:
Place the sample to be weighed on the pan, and the value displayed when the ⊂⊃ stability mark is shown is the result of the measurement.

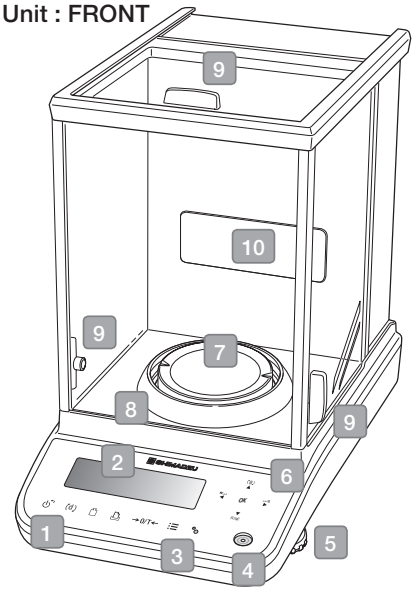
2 Component Names and Functions

This section explains the names and functions or components.

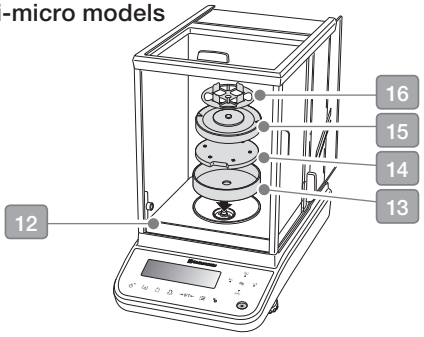
Main Unit

■ Main Unit Front, Top and Side Panels

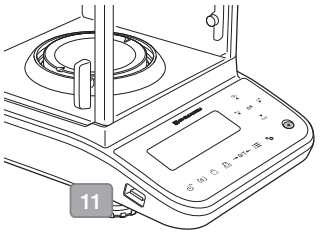
Main Unit : FRONT



for Semi-micro models

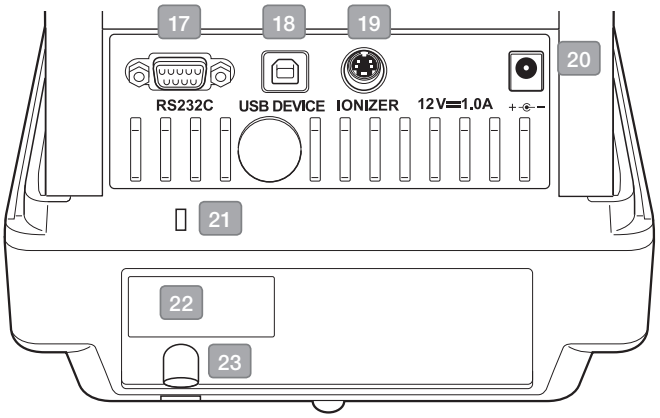


Main Unit : SIDE

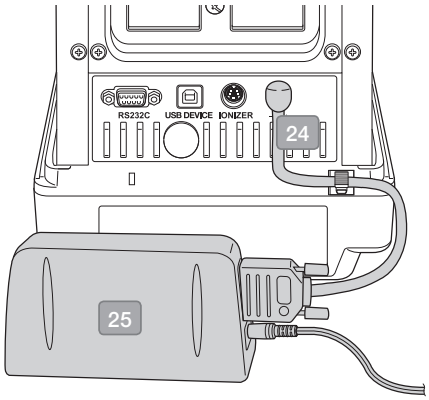


No.	Components Name	Function
1	Operation Keys	Issue the commands for performing taring, adjustment and printing, etc.
2	Display Panel	Displays various types of information, including measurement results, details on function settings, the function in use and errors.
3	Ionizer Indicator Light/Key	This function is suitable for the W and X Series. It displays the operation status of the ionizer when it is connected, and is used as a key to switch the ionizer ON and OFF.
4	Level indicator	This is used to adjust the horizontal level of the balance.
5	Level screws	Adjust the horizontal level of the balance.
6	Menu operation key	The key used for menu operations and parameter settings.
7	Pan	The articles to be measured are place on top of this
8	Draft Shield	Protects the balance from the effects of surrounding drafts.
9	Knob for glass draft shield	Used when opening and closing the draft shield door (3 locations).
10	Attaching portion for ionizer	The ionizer (optional) is attached here.
11	USB Host (W Series only)	Used when a USB memory, a USB keyboard or a barcode reader are to be connected. The USB host connector is fitted with a protective cap. Make sure the cap is used without fail when the connector is not in use.
12	Stage (for semi-micro models)	By preventing an updraft on the pan from an air current or air stream inside the weighing chamber, a more stable and consistent measurement value can be achieved.
13	Shield case (for semi-micro models)	This case prevents air currents from being generated.
14	Pan supporter	Place the pan onto this supporter.
15	Pan for fixing multi-stand (for semi-micro models)	This pan is for fixing the multi-stand in place.
16	Multi-stand (for semi-micro models)	This stand is convenient for using various types of samples, such as medical packaging paper, cylindrical samples or micro-tubes.

Main Unit Rear Panel



(for Semi-micro models)



No.	Components Name	Function
17	RS232C Serial Connector	This is used for connecting a printer (EP-100/110, etc.)
18	USB Device	This is used when the balance is connected to a personal computer.
19	connecter for ionizer (W/X Series only)	The connector for connecting the ionizer.
20	DC IN Connector	The AC connector is connected to this to supply power to the balance.
21	Security Slot	The slot for use with an anti-theft locking system.
22	Product Label	Lists the model name and serial number.
23	Anti-theft wire conduit	The anti-theft wire is passed through this conduit.
24	Power pack connecting cable (for semi-micro models)	This cable connects to the power supply unit (accessory) that is set up separately.
25	Power pack (for semi-micro models)	This power supply unit (accessory) is set up separately.

Display Panel

In addition to display the results of weight measurements, it is also possible to select called out menu items on the display panel. A flexible display will be shown depending on the function selected.

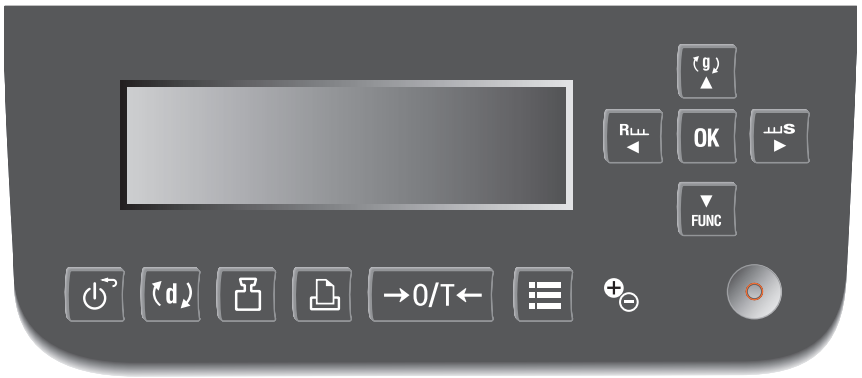
■ Display Examples when Measuring Weight

No.	Status	Descriptions		Refer To
(1)	Measurement mode display area	Displays the current function.		
(2)	Account/Time display area	The account name used to log-in and current time are displayed.		P.63
			Indicates that communications with externally-connected equipment is taking place.	P.112
			Indicates that a USB memory is connected.	P.132
			Menu lock	P.60
(3)	weighing value display area	Displays the results and units used in measuring mass and the measurement status.		
			Stability Mark: Displayed when the weighing value is stable.	P.54
		NET	NET: Indicates the sample weight.	P.32
		TARE	Displays the mass of taring (empty container).	P.32
		Gross	Gross: Indicates the sum of the tare and sample weight.	P.32
		HOLD	(HOLD) Displays the status of [HOLD], which fixes the measurement value display in place.	P.82
			(Auto zero) Displays whether the measurement value is within the zero range or not. *1	P.50
			Minus : Displayed when the weighing value is in the minus status.	—
		NET	NET: Indicates that the weighing value displayed when measuring formulas (formulation) is the net value minus the weight of the tare container. It also indicates that weighing is in progress.	P.92
			Comparator: Displays the analog bar and comparator mark that indicate Pass/Fail in accordance with preset conditions.	P.102
			(ANALOG BAR) Displays the current measurement value in the analog bar.	P.102
		[ ]	Bracket *2	
(4)	Status Area	The current setting is displayed in this area.		
		MW	Displays the minimum weighing value and unit.	P.106
		R S	Smart Setting Indicator: Indicates the level at which response and stability are currently being adjusted.	P.53
		Displays the status of the printer (option) connected.		
			Auto-print_Setting in progress	P.125
			Auto-print _ Operations in progress	P.125
			Interval_ Setting in progress	P.127
			Interval _ Operations in progress	P.127
		Measurement Status: Indicates the measurement status.		
			Filling	P.52
			Zero tracking	P.48
			Statistical calculation	P.101
		Error Status: Indicates the cause of error statuses.		
			Calibration required	P.40
			Insufficiency battery	P.19
			Insufficient USB memory	P.132

*1 **Using a verified balance as a legal measuring instrument in the EU:**
Indicates that the balance is set exactly to "Zero" with the zero-setting function (within ±0.25e: e = verification scale interval).

*2 **Using a verified balance as a legal measuring instrument in the EU:**
The figure(s) bordered by the bracket is(are) the auxiliary indicating device.

Measurement Keys + Application Function Operation Keys

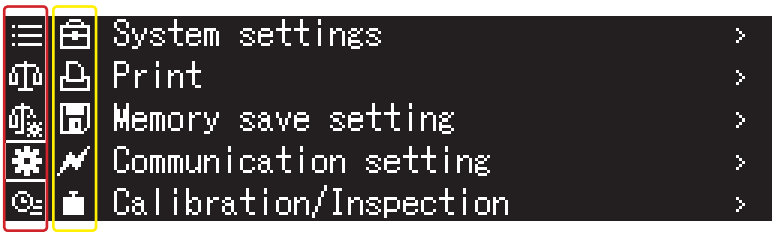


Key Name	During Measurement		During Menu Operations
	Short Press	Long Press (Approx. 3 or more seconds)	
[POWER]	Switches across to the Operation Mode/Stand-by mode.	—	Returns to the Weight Measurement Mode
[1d/10d]	Switches across to minimum display when in the Weight Measurement Mode. (0.01mg ⇔ 0.1mg/0.1mg ⇔ 1mg) *1	—	—
[CAL]	Executes calibration	Calls the setting Calibration menu in the System settings.	—
[PRINT] *2	Outputs weighing values to external equipment (printer, PC).	Calls the printer setup menu in the System settings.	—
→0/T← [0/T] *3	Executes taring (zero setting)	Calls the Zero/Taring menu.	—
[MENU]	Calls the menu when in the weight measurement mode. Calls the Statistical calculation menu when Statistical calculations are executed. Calls the menus for each application function when application functions are executed.	—	Returns to the weight measurement mode.
[ION]	Ionizer ON/OFF	Calls the ionizer setup menu.	—
OK [OK]	—	—	• Sets the menu. • Moves to the next operation with the wizard.
[UP] ▲	Switches between units when in the weight measurement mode. Displays the unit weight when in the Piece counting measurement mode. Displays the standard weight when in the Percent measurement mode.	Calls the unit registration menu when in the weight measurement mode. Switches between sample numbers when in the Piece counting measurement mode. Switches between percent standards when in the Percent measurement mode.	• Scrolls back through menu items. • Increases the number when numerals are being input.
FUNC [DOWN] ▼	Switches across to the application function mode when in the weighing mode.	Recalculates unit weights during Piece counting measurements	• Scrolls through menu items. • Decreases the number when numerals are being input.
[LEFT] ◀	Adjusts to gain increased response for the weight display.	—	Moves to the top menu item. Moves one digit to the left when numerals are being input.
[RIGHT] ▶	Adjusts to gain increased stability for the weight display.	—	Moves to the lower menu item. Moves one digit to the right when numerals are being input.

*1 Not applicable to a verified balance as a legal measuring instrument in the EU.
*2 Output is not made when the display is not stable with a verified balance as a legal measuring instrument in the EU.
*3 Using a verified balance as a legal measuring instrument in the EU:
Either "Taring" (at a weight exceeding 2.0% of the capacity) or "Zero-setting" (at a weight within 2.0% of the capacity) takes place.
Either "Taring" (at a weight exceeding 0.9g) or "Zero-setting" (at a weight within 0.9g) takes place with semi-micro model only.

■ Display Icons when Setting up Menus

The AP Series is equipped with many useful functions, one of which is the [Menu] function that enables users to efficiently select the optimal settings for each function in accordance with their requirements. Press the [MENU] key when the weight is displayed to move across to the menu screen. [Menu Settings] can be carried out in this mode.



The Menu Display when choosing system setting

Level 1 Level 2

The icons shown below will be displayed in the main menu items for Level 1 and Level 2. Descriptions of the icons are provided below

Icon	Description	Icons and Mode Selection
Level 1	**Measurement Mode Selection** Selecting one of the measurement modes for the various modes shown in the list on the left replaces the measurement mode icon shown in the second stage.	Standard measurement Piece counting measurement Percent measurement Averaging mode Solid specific gravity Liquid density Add-on mode Formulation mode Sample preparation (W Series only) Buffer solution preparation (W Series only) Sample preparation (W Series only)

The measurement mode icon selected will be displayed.

Icon	Description	Icons and Mode Selection
Level 2	One of the measurement modes selected and set above will be displayed.	The measurement mode menu set will be displayed in the following layer.
Level 1	Application Measurement	Filling Zero tracking
Level 1	System settings	System settings Print Save Memory Setting Communication setting Calibration Setting User Settings

Level 1	Menu History	The most recent ten menu histories will be displayed.

Measurements (Standard measurement Mode)

1. Check the Standard measurement mode

Standard measurement Mode
A function for measuring samples without using any special functions.

Perform the following operations in accordance with the status of the balance in order to activate the Standard measurement mode.

Balance Status	Activating the Weight Measurement Mode
OFF, STAND-BY display	Press [POWER]
Application Function Mode is activated	Press [DOWN].
	Press [MENU], press [LEFT], press [UP], select [Select Mode], press [OK], select [Standard measurement], and then press [OK].
Menu is displayed	Press [POWER].
Numeral input is activated	Press [POWER] until the weight measurement mode is activated.

If [OL (OVERLOAD)] or [-OL (OVERLOAD)], etc., is displayed during measurements
Indicates that a load exceeding the weighing capacity is being measured, or that the weighing pan is not properly in place.

2. Place the tare (container) on the pan

(1) Open the glass draft shield.
(2) Place the tare (container) on the pan, and then close the glass draft shield.

3. When the display stabilizes (when is displayed), press [→0/T← 0/T]

The display will show zero.

4. Place the sample in the tare container

(1) Open the glass draft shield.
(2) Place the sample on the pan, and then close the glass draft shield.

5. When the display stabilizes (when is displayed), read the result on the display

6. Remove the sample

(1) Open the glass draft shield.
(2) Remove the sample, and then close the glass draft shield.

Close the glass draft shield completely
When reading the results from the balance display, check to make sure that the glass draft shield is completely closed.

Reading stable weighing values
Troublesome currents of air caused by heat can make the display unstable. Avoid the following:
- Do not place your hand inside the glass draft shield.
- Do not touch the sample or tare (container) with bare hands.
- Do not weigh samples with different temperatures.

Use tweezers or gloves when handling the samples and tares (containers). When weighing samples with different temperatures, place the samples near the pan inside the glass draft shield and wait for the temperatures to stabilize before reading the weighing values.

Using a verified balance as a legal measuring instrument in the EU:
→0← Indicates that the balance is set exactly to "Zero" with the zero-setting function.

Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.

Ending Measurements

1. Press [POWER] when in the weight measurement mode

The stand-by mode will be activated.

Stand-by mode
A status in which the balance remains on stand-by while saving power so that it is ready to be used instantly. The term [Stand-by] will be displayed when [POWER] is pressed in the weight measurement mode, and the power-saving mode (stand-by mode) will be activated. Power continues to be supplied to the balance, even when in the eco mode, to maintain the stand-by mode in this case.

⚠ CAUTION

Prohibitions **Do not unplug the AC adapter under any circumstances when [Communicating] or any other message is displayed on the screen.**
Failure to observe this may result in the data stored within the balance being damaged.

Switching off the power
Although it is not necessary to switch off the power under normal circumstances when in the stand-by mode, if the balance is not to be used for a certain period of time, make sure the power is switched off.
(1) Activate the stand-by mode.
(2) Unplug the AC adapter from the power outlet.

How to use Menus

The AP Series is equipped with a wide variety of functions, which can be selected specifically for an application from the menus. This section explains the configuration and operation of the menu.

■ Menu Configurations

The menus are classified as shown in the following table in accordance with the parameters set. Functions are also available for calling out subsequent menus by pressing the keys for extended periods, and for easily returning to the weight display.
See the Menu Map for further details on each menu. [Menu Map] (P.149)

Menu	Outline	Calling Method
Measurement Mode Setup	Enables advanced parameters to be set for not only the standard weight mode, but also a wide range of other measurement modes (10 types).	Press  [MENU] key  [LEFT] key  [UP] key when in the weight measurement mode.
Main Menu	Displays and sets up the measurement mode menu for the above.	Press  [MENU] key when in the weight measurement mode.
Measurement setting menu	Displays and sets up the menus related to measurement modes.	Press  [MENU] key  [LEFT] key  [DOWN] key when in the weight measurement mode.
System setting menu	Displays and sets up the menus related to the system.	Press  [MENU] key  [LEFT] key  [DOWN] key ×2 when in the weight measurement mode.
Calibration Setting Menu	Sets the calibration details.	Press  [CAL] for 3 or more consecutive seconds when in the weight measurement mode.
Print Menu	Sets the output details for printers (optional) and other external devices.	Press  [PRINT] for 3 or more consecutive seconds when in the weight measurement mode.

■ Selecting Menus

Once the menu has been called out, select the desired function in the manner explained below to execute and setup the function.

◆ Selecting Functions

Press [UP] or [DOWN] to select the desired function.

◆ Deciding Upon Functions

Press [OK] to decide upon the selected function.
A lower level menu will be displayed if advanced settings are required for the selected function.

If additional selections are available for the selected function press [UP] or [DOWN], and then press [OK].

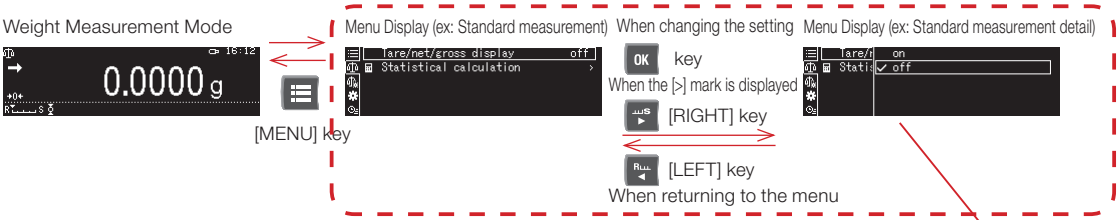
◆ Returning to the Previous Menu

Press [LEFT] to return to the previous menu.

Entering numerals and character
When numerals are characters need to be entered, press the relevant keys to enter them.
☞ [Entering Numerals and Characters] (P.33)

■ Screens When Setting up Menus

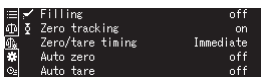
It is possible to move between the following displays when setting up the menus by pressing the ▼, ▲, ◀ and ▶ keys. The [OK] key can be used to set the parameters, and to display the list of items that can be selected.



[LEFT] key

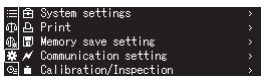
[DOWN] key

Menu display (measurement setup)



[DOWN] key

Menu display (system setup)



[DOWN] key

Displays Menu display the history menu

[DOWN] key

Return to the above [Menu Display (measurement mode)]

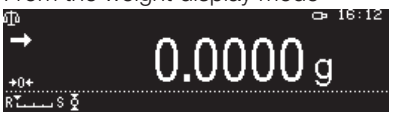
It is possible to immediately display the menu for the measurement mode set by the user by pressing the [MENU] key while the weight is being displayed. The menu items shown inside the dotted box can alternated in accordance with the measurement mode selected by the user. See P.30 for details on setting up and amending the measurement mode.

The definitions of the menu symbols are as follows:
1. When [>] is displayed on the right-hand edge of the menu, it means that a lower level menu is available if [RIGHT] is pressed.
2. When a scroll bar is displayed on the right-hand edge of the menu, it means that an additional parts of the menu can be displayed by pressing [UP] and [DOWN].
3. When the menu items are enclosed in boxes [ ], it means that the item in question has been selected.
4. When the menu items are enclosed in parenthesis ( ), it means that the item in question cannot be used.

■ Setting Up and Amending the Measurement Mode

[Measurement Selection Mode]

From the weight display mode



[MENU] Key

⇓

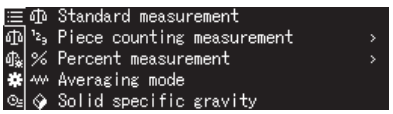
[LEFT] Key

⇓

[UP] Key

⇓

Menu Display (Measurement Selection Mode)



The measurement selection mode menu is displayed as shown on the left. This sets the way in which the user's balance is to be used. The items on the measurement selection mode menu are shown below.

To select the various measurement modes while in this status,
Press [RE/S] select [UP] [FUNC] and then set the [OK] key.

Measurement Selection Mode Menu Items

Icons	Mode Selection
	Standard measurement
	Piece counting measurement
	Percent measurement
	Averaging mode
	Solid specific gravity
	Liquid density

Icons	Mode Selection
	Add-on mode
	Formulation mode
	Sample preparation
	Buffer solution preparation
	Sample preparation

The selected measurement modes will be set in the second-stage menu, and can be alternated between the weight display and the selected menu screens.

Unavailable menus are not displayed

Switching between Displays

■ Switching between Minimum Number of Displayed Digits (1d/10d Display)

It is possible to erase one digit for a minimum display (displays 10d).

1d Display ←→ 10d Display

Press [(d) 1d/10d] when in the weight measurement mode

The minimum number of displayed digits will alternate.

When taking a measurement that exceeds the capacity of the small mass range on a dual range model, it cannot switch to 10d (0.001 g).

■ Switch measurement range (Only AP125WD and AP225WD)

When the power supply and the switch are turned ON, the minimum display is set to the “Small mass range” at 0.00001 g. To set the minimum display to the “Large mass range” at 0.0001 g, press [(d) 1d/10d] in the weight display to switch the measurement range.
If a sample is measured that exceeds the capacity (AP125WD: 52g and AP225WD: 102g) of the small mass range (while the small mass range is being used), the scale automatically changes to the large mass range. In this situation, if the [→0/T← O/T] is pressed in large mass range with the tare weight, this setting is calibrated for the large mass range. Even if the load on the pan is returned to the capacity of the small mass range, the display does not return back to the small mass range. Press the [→0/T← O/T] at this time to switch to small mass range.

(When using AP225WD)

Small mass range

Large mass range

■ Unit change

It is possible to switch between the pre-registered units.

Press [(g) UP] when in the weight measurement mode

The pre-registered units will alternate every time this is pressed.

Unit setting

Only [g] is registered as the default. When other units are required, it is necessary to register them in advance. [Unit setting] (P.56)

Unit Display after Rebooting

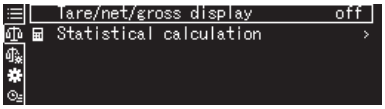
The unit that was used most recently will be displayed when the power is switched off and the balance rebooted.

■ Displaying Tare/Net/Gross

It is possible to switch between Tare/Net/Gross displays.

1. Press [MENU] when in the weight measurement mode

The main menu will be displayed.



2. Switch between Tare/Net/Gross displays.

(1) Select [TARE/Net/Gross Display] and then press [OK].
(2) Select either [On] or [Off], and then press [OK].

3. Return to the weight display mode

Press [POWER]

Cannot be used with the mol unit.

If the tare weight remains at zero without changing

If the [→0/T← O/T] key is pressed with the tare weight on the pan at approximately 2% or less of the capacity, the zero point will be re-set instead of the tare weight being displayed. In this event, the →0← zero point mark will be illuminated and the tare weight (net/gross) display will be zero.

■ Switching Between Decimal Points (.), Periods (.) and Commas (,)

It is possible to select [. (Period)] or [, (Comma)] for the decimal point display. If the Decimal point display is changed, the decimal point for all external data output to printers, etc., will also be changed.

1. Call [System settings]

(1) Press [MENU] when in the weight measurement mode, and then press [ ].
(2) Select [System settings], and then press [OK] or [▶].
(3) Select [System settings], and then press [OK] or [▶].

2. Select the decimal point

(1) Select the [Decimal point display], and then press [OK].
(2) Select either [Period] or [Comma], and then press [OK].

3. Return to the weight display mode

Press [POWER]

Entering Numerals and Characters

■ Input Conventions

It is necessary to enter numerals and characters when setting up weight values, conditional values needed to operate the function, the balance ID, the user ID and the password, etc., for menus.

◆ Operation Key Functions during Input

Operation Keys	Operations for Numeral Input	Operations for Character Input
[OK]	Sets the entered numeral.	Sets the entered character string.
[▲]	Increases the value of the numerical digit (0 – 9) entered (digits displayed sequentially in accordance with ▲▼).	Increases the value of the numeral or character (_, [blank], -, 0 – 9, A - Z) entered (digits displayed sequentially in accordance with ▲▼)
[▼]	Decreases the value of the numerical digit (0 – 9) entered (digits displayed sequentially in accordance with ▲▼).	Decreases the value of the numeral or character (_, [blank], -, 0 – 9, A - Z) entered (digits displayed sequentially in accordance with ▲▼)
[◀]	Moves the cursor from the entered digit (digits displayed sequentially in accordance with ▲▼) one character to the left.	
[▶]	Moves the cursor from the entered digit (digits displayed sequentially in accordance with ▲▼) one character to the right.	
[POWER]	Terminates input.	

When an USB keyboard is connected
Numerals and characters can be entered with the use of a USB keyboard when one is connected. ☞ [Operating the Balance with a USB Keyboard] (P.134)

■ Entering the Numerals and Characters Displayed

Key entry is explained below using the user ID as an example.

1. Enter a numeral or character

(1) Press [UP] or [DOWN] on the input screen.
The methods for entering numerals for unit weights, etc., and entering numerals and characters for the user ID, etc., are different.

(2) Press [LEFT] or [RIGHT].
This enables the cursor to be moved.

2. Repeat step 1 to enter all numerals and characters required

3. Set the numerals and characters entered

Press [OK].
The numerals and characters entered will be set.

5 Calibration

In order to perform accurate weight measurements, the balance must be calibrated after it has been moved and when there are large fluctuations in room temperature. Calibration means to adjust and confirm the balance's error of span with the use of the weights built into the balance (W/X series) or External Weights (Class E2 or equivalent) sold separately.

It is also recommended that calibration is performed on a daily basis (before being used every day, etc.).

The meanings of the terms [Adjustment], [Test] and [Calibration] in this instruction manual are explained below:

Adjustment: Adjusting the balance with the use of standard weights so that the span of balance is correct.

Test: Checking the condition of the balance's error of span with the use of standard weights.

Calibration: Covers both adjustment and tests.

Restrictions on Calibration Usage
Users who log on with guest IDs or user IDs without authority cannot perform adjustment and tests.

CAL key setting

The following functions are available for calibration. By registering which of the following methods is to be used in [CAL] enables registered operations to be started immediately just by pressing [CAL].

(1)	Internal Weight Calibration (W/X series)	Checks the balance's error of span and adjusts it correctly with the weights built into W/X series.	☞ [Adjustment and Tests with Internal Weights (W/X series only)] (P.36) ☞ [Time-Specified Adjustment (Timer CAL) Settings (W series only)] (P.42)
(2)	Internal Weight Checking (W/X series)	Checks the balance's error of span with the weights built into W/X series.	
(3)	External Weight Calibration	Checks the balance's error of span and adjusts it correctly with weights sold separately.	☞ [Adjustment and Tests with External Weights] (P.37)
(4)	External Weight Checking	Checks the balance's error of span with weights sold separately.	
(5)	Automatic Sensitivity Adjustment on Startup (W/X series)	Automatically checks the balance's error of span and adjusts it correctly with the weights built into the balance when W/X series are started up.	☞ [Turning on the Power] (P.19)
(6)	Internal Weight Adjustment (W/X series)	Checks the error of span for the internal weights and correctly adjusts the sensitivity.	☞ [Adjustment of internal weight (W/X series only)] (P.38)

Functions that cannot be registered in [CAL]
Items (5) and (6) listed above cannot be registered in [CAL]. It is recommended that internal weight adjustment explained in (6) is performed periodically.

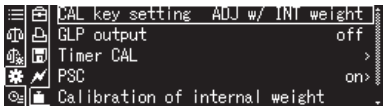
Functions registered as the default in [CAL]
[Internal Weight Adjustment] is registered in [CAL] as the default for W/X series, and [External Weight Adjustment] is registered in [CAL] as the default for Y series.

Glass Draft Shield
Details on opening and closing the glass draft shield when inserting and moving weights for calibration purposes have been omitted from this section. Make sure that the glass draft shield is closed without fail in order to obtain accurate measurements.
☞ [Measurements (Standard measurement Mode)] (P.26)

Perform the following procedures to register functions in [CAL].

1. Call out the calibration menu

Press [CAL] for three or more consecutive seconds.

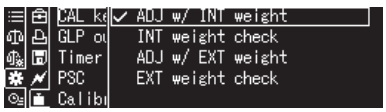


2. Assign a calibration method to the calibration key

* “Internal Weights calibration” [Internal Weight Check] can only be selected with W/X series.

(1) Select [Calibration Key Assignment], and then press [OK].

(2) Select the function to be assigned, and then press [OK].



3. Return to the weight measurement mode

Press [POWER]

[Adjustment and Tests with Internal Weights (W/X series only)] (P.36)
[Adjustment and Tests with External Weights] (P.37)

Using a verified balance as a legal measuring instrument in the EU:
Span calibration must be performed once the balance is installed and before using the balance as a legal measuring instrument in the EU. The balance must be connected to power and warmed up for at least one hour prior to span calibration and use as a legal measuring instrument.

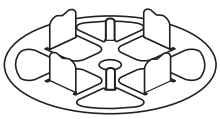
Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.

⚠ CAUTION

Instructions

In case of using the Multi-stand, remove the Multi-stand when you adjust and test your balance.

Multi-stand

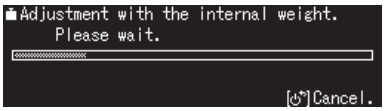


Adjustment and Tests with Internal Weights (W/X series only)

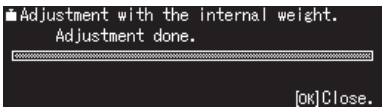
Correctly adjusts the span of balance with the use of internal weights.
First of all, register [Internal Weight Calibration] or [Internal Weight Test] in [CAL].
☞ [CAL key setting] (P.34)
([Internal Weight Calibration] is registered as the default.)

1. Start adjustment or test

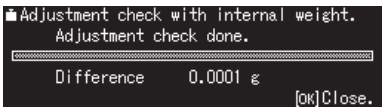
Press [CAL].
The display will switch to an execution in program screen when this is pressed, and adjustment or tests with the use of internal weights will be started.



When performing adjustment with internal weights



When performing tests with internal weights (reads the error of span)



When Canceling Calibration...
Do not cancel calibration with the keys or weighing tasks when [Please wait a moment] is displayed.

The screen will return to the weight measurement mode when adjustment and test are complete.

Test Results
Perform the adjustment procedure if the results of the test indicate a large error of span.

⚠ CAUTION

Instructions

Do not leave or move the balance if adjustment or tests have not been completed or ended normally

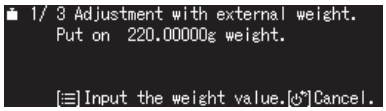
The internal weights are not maintained, so moving the balance may result in malfunctions. Make sure that the power is switched off and on once so that the balance can be started up normally (with the internal weights maintained).

Adjustment and Tests with External Weights

Correctly adjusts the span of balance with the use of external weights.
First of all, register [External Weight Calibration] or [External Weight Test] in [CAL].
☞ [CAL key setting] (P.34)
☞ [Reading stable weighing values] (P.27)

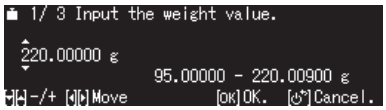
1. Start calibration or test

Press [CAL].



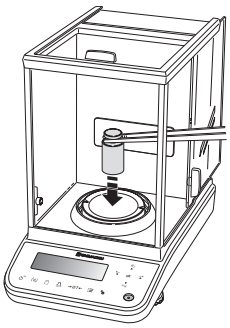
2. Amend the weight value

· Proceed to Step 3 if the weight value is not amended.
(1) Press [MENU].
(2) Enter the weight value, and then press [OK].
* See the specification table for details on the weight value entry range.



3. Place a weight with the weight displayed on the pan

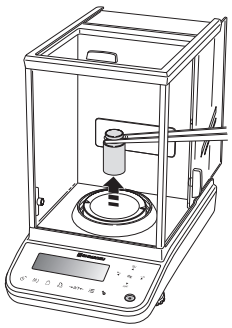
(1) Check to make sure nothing is on the pan.
(2) Place a weight with the weight displayed on the pan.
(3) Wait for the pan to stabilize and then for the message to change.

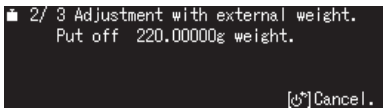


Message Screen
Messages stating either [Do not place the weight on the pan once 1/3 is displayed] or [Do not remove the weight from the pan once 2/3 is displayed] will be displayed if the pan is left untouched for approximately one minute. Recalibrate in accordance with the directions.

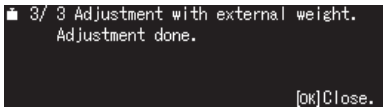
4. Remove the weight from the pan

(1) Remove the weight from the pan and wait for calibration to end.
(2) Check the results of adjustment or tests, and then press [OK].

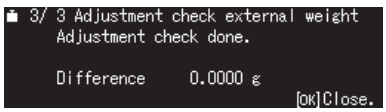




When performing calibration with external weights



When performing tests with external weights (reads the error of span)



The screen will return to the weight measurement mode when adjustment and test are complete.

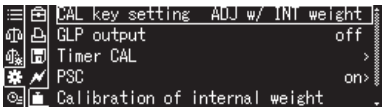
When Canceling Calibration...
Do not cancel calibration with the keys or weighing tasks when [Please wait a moment] is displayed.

Adjustment of internal weight (W/X series only)

The W/X series models are equipped with built-in adjustment weights. Adjustment is performed with the default settings of the internal weights, but Adjustment can be re-performed with the use of external weights.

1. Call out the calibration menu

Press [CAL] for three or more consecutive seconds.



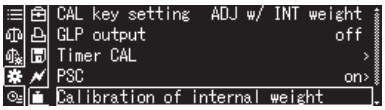
2. Start adjustment with the internal weights

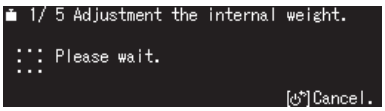
(1) Select [ADJ w/ INT Weight], and then press [OK].

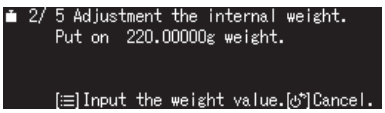
(2) Enter the administrator's password, and then press [OK].

[Entering Numerals and Characters] (P.33)
[Changing Passwords] (P.64)

Adjustment with the internal weights will start once the password has been authorized.







Default Password

The default password is set at [9999] when the balance is shipped from the factory.

About the setting procedure of the weights

The setting procedure of the weight maybe change by your balance model.

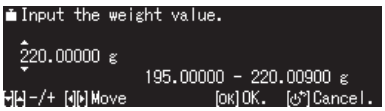
3. Amend the weight value

Proceed to Step 4 if the weight value is not amended.

(1) Press [MENU].

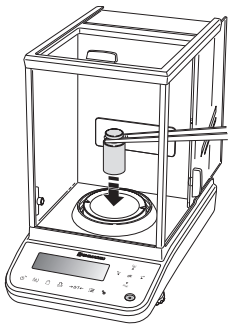
(2) Enter the weight value, and then press [OK].

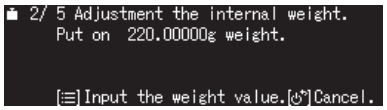
* See the specification table for details on the weight value entry range.



4. Place a weight with the weight displayed on the pan

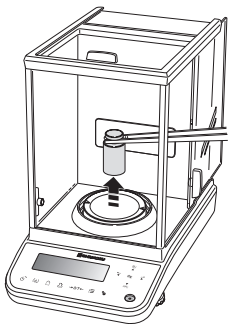
(1) Make sure that nothing is on the pan.
(2) Place a weight with the weight displayed on the pan.

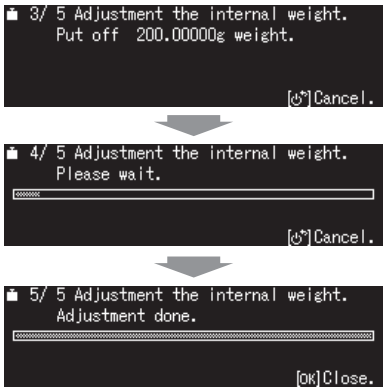




5. Remove the weight from the pan

Remove the weight from the pan.
The screen will return to the weight measurement mode when adjustment is complete.





5

⚠ CAUTION

Instructions

Do not leave or move the balance if adjustment or tests have not been completed or ended normally

The internal weights are not maintained, so moving the balance may result in malfunctions. Make sure that the power is switched off and on once so that the balance can be started up normally (with the internal weights maintained).

Not applicable to a verified balance as a legal measuring instrument in the EU.

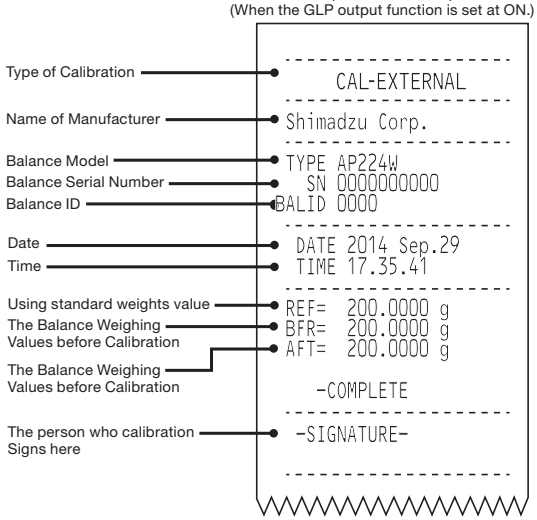
Saving Records of Calibration

It is possible to save records of calibration execution, and to assign each balance an ID so that multiple balances can be managed.

■ Record of Calibration Printing Samples

The record of calibration shown below is a sample. The details to be output can be set by the user.
☞ [GLP output Function] (P.129)

Example of Printer Output
(When the GLP output function is set at ON.)



Printing Sensitivity Calibration Records
The GLP output function can be set at ON or OFF when printing sensitivity calibration records.
☞ [GLP output Function] (P.129)

Perfect Self Calibration (PSC) Settings (W/X series only)

The sensitivity temperature coefficient for the AP Series has been adjusted within a range of ±2ppm/°C. When a 100g sample is being measured, there is a possibility that a change in sensitivity up to a maximum of ±0.2mg will occur for 100g if the temperature inside the balance fluctuations by 1°C. This means that a 300g sample will experience a change of up to a maximum of ±0.6mg, which will greatly affect measurement accuracy.
The W/X Series is equipped with an automatic sensitivity adjustment (PSC: Perfect Self Calibration) function that adjusts sensitivity completely automatically when it detects fluctuations in temperatures to ensure that measurements are carried out correctly.

The Perfect Self Calibration function can be switched off and the settings amended in accordance. There are two different sets of conditions required for operating the Perfect Self Calibration function. The condition that acquires the greater levels of accuracy is given priority out of these two sets of conditions.

(1) Directly setting the parameters to the amount of temperature change when temperature change is detected. This function maintains compatibility with Shimadzu's conventional models. This function is to be used when accuracy management is to be performed in accordance with temperature.

(2) Setting the parameters at permissible accuracy levels required for weighing large numbers of samples under normal weight conditions.
It is recommended that temperature fluctuation is initially set at 1.0°C if it is not known what temperature to set in order to satisfy the specifications (within +/-2ppm/Deg.C). The required level of permissible accuracy must also be entered. PSC weighing performance will be adversely affected if temperature fluctuation is set lower than necessary and if the precision setting is frequently raised, so check work efficiency levels and set the parameters appropriately.

* Permissible accuracy is defined as the upper limit for fluctuations when sensitivity changes due to temperature fluctuations that affect operations inside the balance.

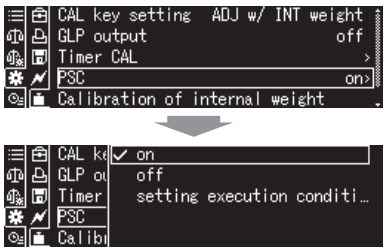
* In addition to the above two conditions, PCS will also be carried out forcibly after four hours have elapsed since the previous sensitivity calibration. This is to prevent the sensitivity from changing owing to the passage of time.

1. Call out the calibration menu

Press [CAL] for three or more consecutive seconds.

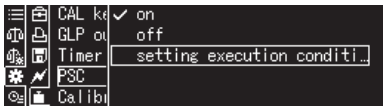
2. Set PSC (Perfect Self Calibration) ON/OFF when in the operation mode

(1) Select [PSC], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 3 if [on] was selected.
· Proceed to Step 6 if [off] was selected.



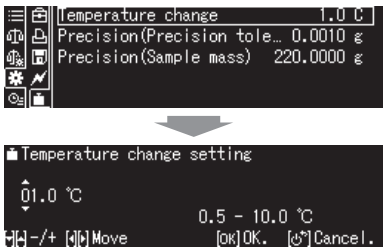
3. Start the enforcement condition settings

Select [setting execution condition], and then press [OK].



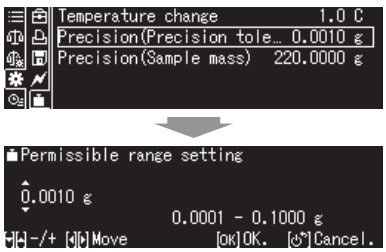
4. Set the temperature fluctuation value for the enforcement condition

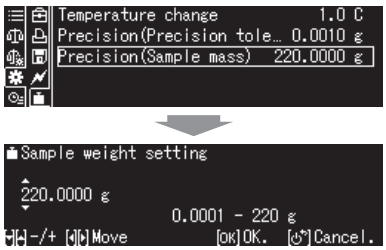
Set the level of fluctuation within the surrounding temperature for carrying out automatic adjustments.
(1) Select [Temperature change], and then press [OK].
(2) Enter the temperature within a range of 0.5 to 10 degrees Celsius as the enforcement condition, and then press [OK].



5. Set the Precision Allowed parameter for the enforcement Condition

· Set the level of accuracy permissible for automatic sensitivity adjustment. The lower this value is set, the more frequently adjustment will be carried out.
(1) Select [Precision Allowed], and then press [OK].
(2) Enter the precision allowed parameter within a range of 0.0001 to 0.1000g as the enforcement condition, and then press [OK].
· Setting for the most commonly sample weighed.
(1) Select [Sample mass], and then press [OK].
(2) Enter the sample weight that is most commonly weighed within a range of 1g to the weighing capacity, and then press [OK].





6. Return to the weight measurement mode

Press [POWER]

If the weight mark continues to blink
It means that sensitivity calibration has not started for some reason.
See [Troubleshooting] in [Chapter 10 Errors and Recovery] (P.136).

Using a verified balance as a legal measuring instrument in the EU:
The balance must be used within the temperature range indicated on the verification label.

In case of using the Multi-stand.
Remove the Multi-stand from pan, or set off the PSC function.

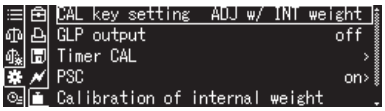
Time-Specified Adjustment (Timer CAL) Settings (W/X series only)

It is possible to set the timer and perform PSC (Perfect Self Calibration) and test at a predetermined time with the built-in weight in W series models. Three different times can be registered. This function is useful when calibration records are required for regular sensitivity adjustment, and when it is necessary to adjust sensitivity during break periods, etc., so as not to interfere with measuring work. The weight mark will start blinking approximately two minutes prior to sensitivity adjustment to notify the user.

Time-specified adjustment outside of weight display modes
Time-specified adjustment are deactivated outside of the stand-by mode, the menu display mode, the input mode and other Weight display modes.

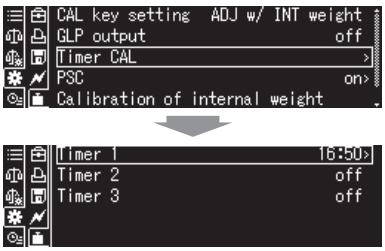
1. Call out the calibration menu

Press [CAL] for three or more consecutive seconds.



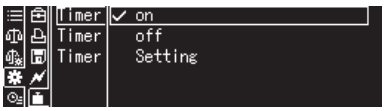
2. Select the timer to set

(1) Select [Timer CAL], and then press [OK].
(2) Either any of the timers from 1 to 3, and then press [OK].



3. Set the timer ON/OFF

Select [on] or [off], and then press [OK].
· Proceed to Step 4 if [on] was selected.
· Proceed to Step 5 if [off] was selected.



4. Set the time

(1) Select [Time setting], and then press [OK].
(2) Enter the time for the timer, and then press [OK].
[Entering Numerals and Characters] (P.33)

5. Return to the weight measurement mode

Press [POWER]

In case of using the Multi-stand
Remove the Multi-stand from pan, or set off the timer-CAL function.

Periodic inspections (W/X series only)

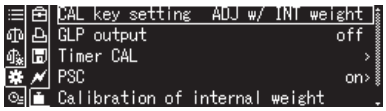
The Periodic inspection function enables the user to easily carry out regular inspections. Contact our service company when considering more stringent periodical inspections.

■ Periodic inspection Settings

It is possible to change the Periodic inspection settings.

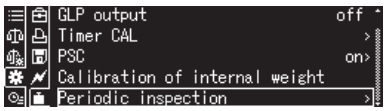
1. Call out the calibration menu

Press [CAL] for three or more consecutive seconds.



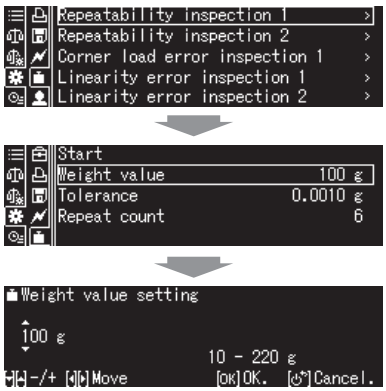
2. Start the Periodic inspection settings

Select [Periodic inspection], and then press [OK].



3. Set the repeatability Inspection settings

(1) Select any of the [Repeatability Inspections 1,2], and then press [OK].
(2) Select either [Start], [Weight Value], [Tolerance] or [Repeat Count], and then press [OK].
(3) Enter the numeral, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)



[Weight Values] are…
The value of weights used for inspecting repeatability.

[Tolerance] are…
Calculates the width of the zero point (maximum value – minimum value) and width of the weighted value (maximum value - minimum value) for repeatability, and sets the permissible values for these.

[Repeat Counts] are…
The number of times inspections are carried out on repeatability.

4. Return to the Periodic inspections menu

Press [LEFT] twice.

5. Set the corner load error inspections

(1) Select [Corner load error inspection 1], and then press [OK OK].
(2) Select [Setting], either [Weight Value] or [Tolerance], and then press [OK OK].
(3) Enter the numeral, and then press [OK OK].
[Entering Numerals and Characters] (P.33)

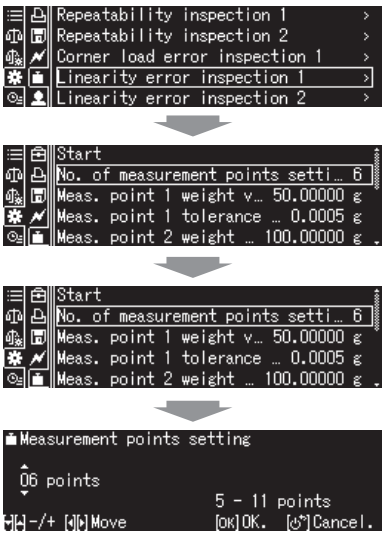
[Tolerance] are…
[Tolerance] during corner load errors are the maximum values of the difference when the value of each location is subtracted from the central placement value (standard).

6. Return to the Periodic inspections menu

Press [LEFT] twice.

7. Set the linearity error inspection

(1) Select [Linearity error inspection 1,2], and then press [OK OK].
(2) Set the number of measurement points. Select [Number of Measurement Points], and then press [OK OK].
(3) Enter the number of measurement points, and then press [OK OK].
(4) Set the measurement points between steps (6) and (8) for the following [Weight Value] and [Tolerance] settings.
(5) Select [Measurement Point n : Weight Value], and then press [OK OK].
(6) Enter the weight value, and then press [OK OK].
(7) Select [Measurement Point n : Tolerance], and then press [OK OK].
(8) Enter the Tolerance value, and then press [OK OK].
[Entering Numerals and Characters] (P.33)



[Linearity error inspection 1,2] are...
[Linearity error inspection] during instrumental error inspections are the maximum values of the difference when the value of each measurement point is subtracted from each weight value (standard).

An [Linearity error inspection 2] may not display depending on the model being used.

8. Return to the weight measurement mode

Press [POWER]

■ Performing Periodic inspections

It is recommended that repeatability inspections, corner load error inspections and instrumental error inspections (performance inspections) are carried out periodically. Although these inspections may be carried out independently, they can also be carried out in series, as explained below.

Precautions

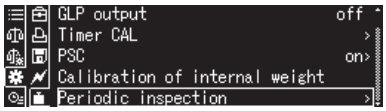
- These performance inspections may be considered to be a yardstick for determining if the balance is operating normally.
- Carry out the performance inspections in a location free from sudden changes in room temperature.
- Place the weights inside the weighing chamber in advance to make sure the inspections are carried out without any differences in temperature between the weighing chamber and the weights.
- Use elongated pincers to place and remove the weights, and do not put hands inside the weighing chamber.

1. Call out the Periodic inspections

Press [CAL] for three or more consecutive seconds.

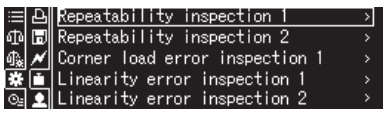
2. Start the Periodic inspections

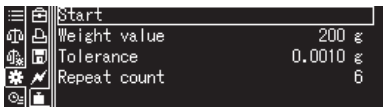
Select [Periodic inspection], and then press [OK].



3. Perform the repeatability inspection

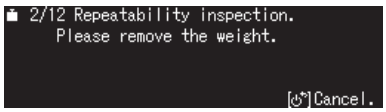
(1) Select [Repeatability Inspection], and then press [OK].
(2) Select [Start] to commence the repeatability inspection.
(3) Place the designated weight on the pan and wait for the display to change.



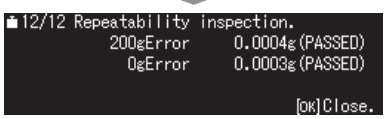


Timing for Display Change

The balance will automatically change the display when the weight is placed or removed from the pan. It takes the stable time for about 30 seconds for automatic data output.
(The stable time differ from the model.)
The width of stability detection is set at ±1 count (default setting when shipped from the factory).



(4) Remove the weight from the pan as the direction.
(5) Repeat Steps 3 and 4 in accordance with the on-screen directions.
The repeat count is set at 6 (default setting when shipped from the factory).
(6) Check the results of the inspection, which will be displayed when the inspection is complete.
(7) Press [OK].
The width of stability detection is set at ±1 count (default setting when shipped from the factory).

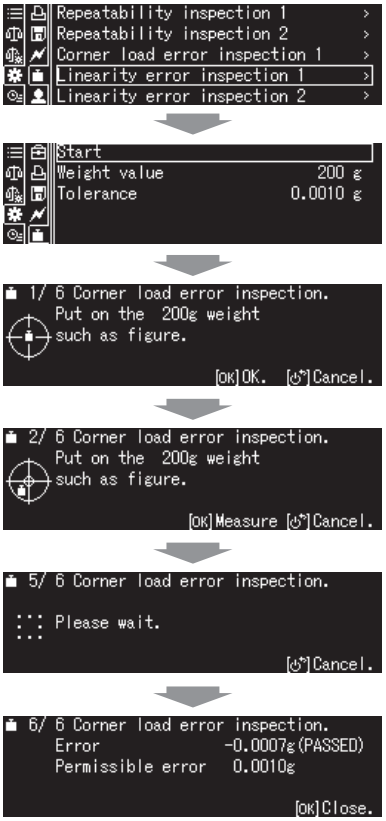


When [Incompatible] is displayed...

Check to ascertain that the set environment is compatible and that there are no abnormalities with the balance, and then run the inspection once more.
Judges whether or not the results of the inspection are within the permissible range of error for the measurement values (maximum value - minimum value).

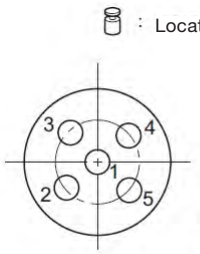
4. Perform the corner load error inspection

(1) Select [Corner load error inspection 1], and then press [OK OK].
(2) Press [Start], and then press [OK OK].
(3) Place the specified weight in the position indicated (center of the pan), and then press [OK OK].
A message stating [Measuring in progress] will be displayed. Proceed to the following when measuring is complete.
(4) Place the specified weight in the position indicated (left-hand side of the pan), and then press [OK OK].
(5) Place the weight on the back left-hand side of the pan, and then press [OK OK].
(6) Place the weight on the back right-hand side of the pan, and then press [OK OK].
(7) Place the weight on the front right-hand side of the pan, and then press [OK OK].
(8) Check the results of the inspection when [Completed] for (6) has been displayed.
(9) Remove the weight, and then press [OK OK].



Position for placing the weight

The position for placing the weight will be indicated on the display panel. Place the weight in the specified position.
In the case of round pan, place the weight on the position of 1/2 radius from the center.
Example:



Sequence

1. Center
2. Front left-hand side
3. Back left-hand side
4. Back right-hand side
5. Front right-hand side

5. Perform the linearity error inspection

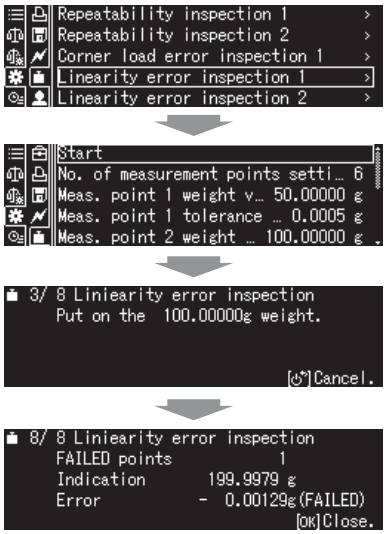
Instructions

Before performing the linearity error inspection

Adjust sensitivity without fail before performing the linearity error inspection.

☞[Sensitivity Adjustment with Internal Weights] (P.36)
[Sensitivity Adjustment with External Weights] (P.37)

(1) Select [Linearity error inspection 1,2] and then press [OK OK].
(2) Press [Start], and then press [OK OK].
(3) Place the specified weight on the pan, and then press [OK OK].
(4) Repeat Step 3 in accordance with the on-screen directions.
(5) Check the results of the inspection when [Completed] is displayed.
(6) Remove the weight, and then press [OK OK].



Timing for Display Change

The balance will automatically change the display when the weight is placed or removed from the pan. It takes the stable time for about 30 seconds for automatic data output.
(The stable time differ from the model.)
The width of stability detection is set at ±1 count (default setting when shipped from the factory).

Linearity Error Inspection Measurement Points

The measurement points mentioned here include the zero point (with nothing placed on the pan) and the maximum weighing capacity points.
For example, in the event of the AP224X, the general values are 0g (zero point) and 50g, 100g, 150, 200g and 220g (maximum weighing capacity points).

Precautions When Adding Measurement Points

The set weight value for added measurement points is [1.0000g], so the weight value for each measurement point must be reset without fail when added.
Reset the weight value for each measurement point.

[Tolerance] are...

[Tolerance] during instrumental error inspections are threshold values that determine if the weights are compatible from each weight setting.

An [Linearity error inspection 2] may not display depending on the model being used.

6. Return to the weight measurement mode

Press [POWER POWER]

Taring Settings

Equipped with the following functions relating to the zero point and taring. These functions are used in accordance with the measurement environment and the measurements to be taken.

Zero tracking Function
Corrects changes of the zero point that occur immediately after the power is switched on and when temperature fluctuations occur, etc., to maintain the zero point display.
☞ [Zero tracking Function] (this page)

Auto zero Function
Automatically corrects discrepancies in the zero point caused by residue left on the pan after measurements have been taken. ☞ [Auto zero Function] (P.50)

Auto tare Function
Automatically executes the taring function after weighing values have been output.
☞ [Auto tare Function] (P.51)

Zero/tare timing Function
Zero point setting and taring are executed after waiting for (stability mark) to be illuminated.
☞ [Amending the Zero and Tare Timing Function] (P.49)

What is taring?
A function that subtracts the weight of the container, etc., placed on the pan so that only the weight of the sample placed in the container is displayed.

What is the zero point? →0←
A status in which zero is displayed with nothing placed on the pan to indicate that measurements can be started.

To set the zero point accounting for the tare weight
press the [→0/T← O/T] key when the tare weight on the pan is approximately 2% or less of the capacity. The →0← zero point (not the tare weight) is reset and displayed.

Call out the Measurement Setting Menu.
Press [→0/T← O/T] for three or more consecutive seconds to call out the Measurement Setting Menu.

■ Zero tracking Function

Setting the Zero tracking function corrects changes to the zero point that occur immediately after the power is switched on and when temperature fluctuations occur, etc., when zero is displayed (including when taring is being executed) to maintain the zero point display.
(The default setting for the Zero tracking function is ON.)

1. Check the (Zero tracking mark) while in the weight measurement mode

The (Zero tracking mark) will be displayed when the Zero tracking function is set at ON.

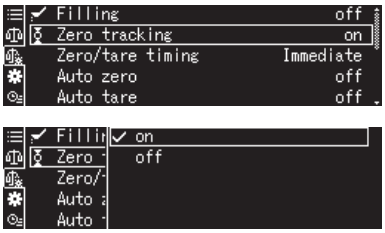
Check to see if the Zero tracking mark is displayed

2. Call out the Zero tracking function

(1) Press [MENU] when the weight is displayed, and then press [LEFT].
(2) Select [Measurement Setting] and then press [OK].

3. Set the Zero tracking function to ON or OFF

(1) Select [Zero tracking], and then press [OK].
(2) Select [on] or [off] for the function, and then press [OK].



4. Return to the weight measurement mode

Press [POWER].

■ Amending the Zero and Tare Timing Function

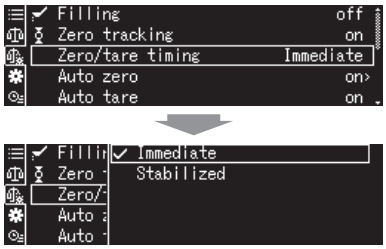
It is possible to select whether execute the zero/taring function without waiting for (stability mark) to be illuminated (immediately), or to execute it after (stability mark) has been illuminated (at stability) by pressing [→0/T← O/T] for Zero Point Setting/Taring with the zero/tare timing function.
The default is set at executing the function without waiting for (stability mark) to be illuminated.

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Settings], and then press [OK].

2. Set the zero/tare timing function

(1) Select [Zero/tare timing], and then press [OK].
(2) Select [Immediate] or [Stabilized], and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

■ Auto zero Function

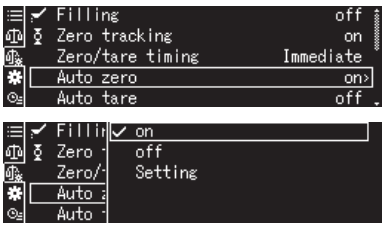
Setting the Auto zero function automatically corrects discrepancies in the zero point caused by residue left on the pan after measurements and the display will show zero.
This function cannot be used in combination with formula measurements (formulation).

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Settings], and then press [OK].

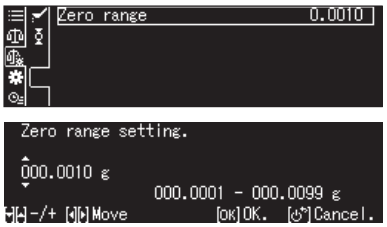
2. Set the Auto zero function to ON or OFF

(1) Select [Auto zero], and then press [OK].
(2) Select [on] or [off] for the function, and then press [OK].
· Proceed to Step 3 if [on] was selected.
· Proceed to Step 4 if [off] was selected.



3. Enter the range for automatic zero point correction (zero range)

(1) Select the [setting] for the Auto zero function, and then press [OK].
(2) Select [Zero Range] and then press [OK]. [Entering Numerals and Characters] (P.33)
(3) Enter the zero range value, and then press [OK].



Zero Range Value

The zero range value is only valid for the unit displayed at the time of input. When the unit is switched to a different unit, it is necessary to set (update) the zero range again from Step 1 when that unit is displayed. The upper limit for the zero range is 99d. 1d represents the minimum display for the unit displayed. For example, the following will be in effect when a minimum display of 0.0001g is set for the balance.

Ex:

Unit	Minimum Display	Upper Zero Range Limit	Setting area for zero range value
g	0.0001g	0.0099g	0.0001~0.0099g
g	0.00001g	0.00099g	0.00001~0.00099g
ct	0.001ct	0.099ct	0.001~0.099ct

4. Return to the weight measurement mode

Press [POWER].

■ Auto tare Function

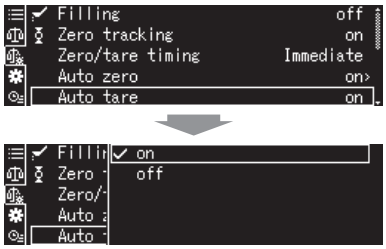
Setting the Auto tare function to ON automatically executes the taring function after weighing values have been output, and the display will be zero at that point.

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Settings], and then press [OK].

2. Set the Auto tare function to ON or OFF

(1) Select [Auto tare], and then press [OK].
(2) Select [on] or [off], and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

Adjusting Stability and Response

There are several methods available for adjusting balance stability and response in accordance with the installation environment (level of vibrations, etc.) and the article being measured (measuring solid articles or blocks, or measuring liquids and powers).
· Stability: To minimize fluctuations in the weighing value and acquire stability.
· Response: To swiftly respond to fluctuations in the weight placed on the pan.
Follow the procedures below to use the balance in its optimal condition.

■ Activating the Filling Function

The weighing mode suitable for weighing samples (powder and liquid, etc.) up until the targeted value is known as "Filling." The display swiftly keeps track of the weight, and it allows the final value to be read after stabilization.
The ✓ (Filling Mark) icon will be displayed when Filling is set at ON.

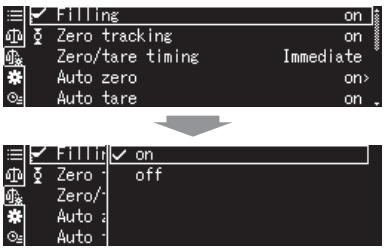
Filling mark displayed when Filling is set at ON.

1. Callout the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].

2. Set Filling to ON or OFF

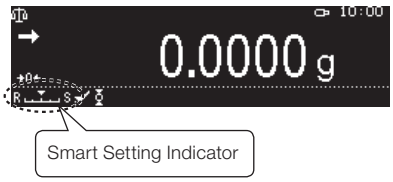
(1) Select [Filling], and then press [OK].
(2) Select [on] or [off], and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

■ Smart Stability and Response Settings



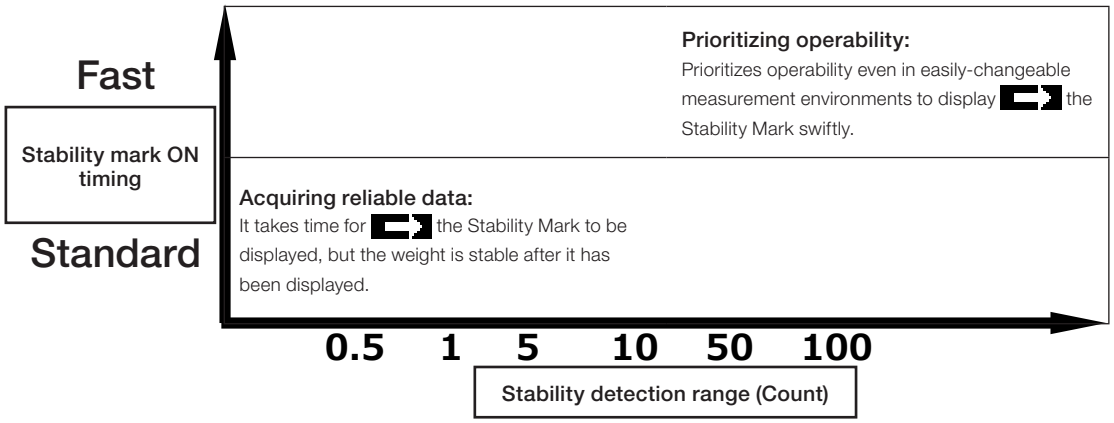
It is possible to adjust stability and response in stages for the weight measurement mode in the real-time during measurements in accordance with the installation environment and item being measured.
The AP series is equipped with superior stability and response, but as stability and response run contrary to each other under normal conditions, placing the priority on just one of them results in the characteristics of the other becoming slightly weaker.
The status of stability and response adjustments is displayed on the smart setting indicator.

Stability and response can be set as shown in the following table by pressing [LEFT] and [RIGHT] while in the weight measurement mode to move the cursor along the smart setting indicator's calibrations.

Priority on Response	⇔	**Priority on Stability**
← R▼▼▼▼S	Smart Setting Indicator	→ R▼▼▼▼S
When [LEFT] is pressed: The ▼ icon (level indicator) moves toward R for the number of times this is pressed to increase the response displayed in stages.	Operations	**When [RIGHT] is pressed:** The ▼ icon (level indicator) moves toward S for the number of times this is pressed to increase the stability displayed in stages.
• When swift weighing is required • When improved work efficiency is required • When fixed-volume filling and formulation is required with liquid or powder	Used in these situations	• When accurate weighing is required • When the display is unstable • When used in a place that is constantly subject to comparatively large vibrations • When constant air flow is present and the display frequently fluctuates.

■ Adjusting the Stability Mark

The stability mark is displayed when the weighing value stabilizes.
The following settings are available as the conditions for illuminating ⊂⊃ (Stability Mark),
· Stability detection range
· Stability mark ON timing
Although it is not necessary to change this setting under normal circumstances, it does need to be changed if the stability judgment conditions are to be weakened ⊂⊃ (stability mark) so that detection is easier when the balance is installed in an unstable environment, for example.
It is recommended that the [Stability detection range] and [Stability mark ON timing] parameters are adjusted in accordance with the way in which the balance is being used while referring to the following chart in order to set the appropriate stability detection level.



◆ Stability detection range Settings

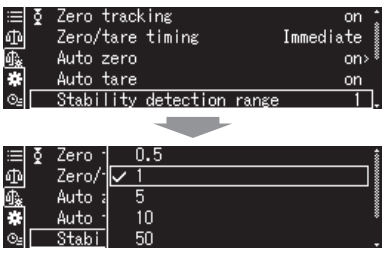
The Stability detection range determines whether the weighing value is stable or not by judging if the value is within the preset count for the minimal digit for a predetermined period of time.
(The default for the Stability detection range is set a 1 count (1d).)

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].

2. Set the Stability detection range

(1) Select [Stability detection range], and then press [OK].
(2) Select the value for the Stability detection range, and then press [OK].
Select either 0.5, 1, 5, 10, 50, 100 or 1000 for the Stability detection range in alignment with the use or objective of the measurement.



3. Return to the weight measurement mode

Press [POWER]

When data output is slow
The installation environment and the sample are the reasons for unstable displays. When the data output related to stability inspections is slow, increase the Stability detection range.

◆ Stability mark ON timing Settings

It is possible to set the timing for displaying (Stability Mark) in accordance with usage and required levels of precision.

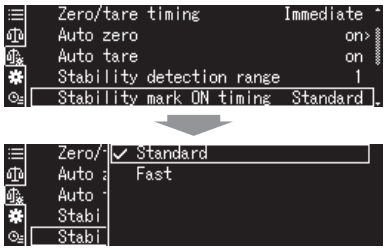
Fasten the timing of stability mark display	The (Stability Mark) is displayed when stability has been detected. The weighing value is easily subject to fluctuations once (Stability Mark) has been displayed, but it provides more efficient work time. (Improves measurement speed)
Setting the standard timing for stability mark display	The (Stability Mark) is displayed when stability has been detected and continues in the status for a predetermined period of time. This means that stricter judgment is carried out for (Stability Mark) display, but it provides more accurate weighing as the weighing value has stabilized once it is displayed. (Improved reliability)

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].

2. Set the timing for stability mark illumination

(1) Select [Stability mark ON timing], and then press [OK].
(2) Select either [Standard] or [Fast], and then press [OK].



3. Return to the weight measurement mode

Press [POWER]

Unit Settings

It is possible to display weights in units other than the standard g (gram) unit by pressing [UP] with the weight displayed.
The required units need to be registered in advance.
The default unit is registered as g (grams).
☞ [Unit change] (P.31)

◆ Displayable Units and Conversion Factors

Weight Unit	g Conversion	Main Applications
g (grams)	1	
mg (milligrams)**	0.001	
ct (carats)*1	0.2	Diamonds
mom (mommes)*	3.75	Pearls
oz (ounce)*	28.349523	
ozt (troy ounce)*	31.1034768	Gold coins
dwt (pennyweight)*	1.5551738	
GN (grain)*	0.06479891	Gunpowder
HTl (Hong Kong tael)*	37.429	Precious metal
STl (Singapore tael)*	37.7993641666667	Precious metal
TTl (Taiwan tael)*	37.5	Precious metal
MTl (Malaysian tael)*	37.79289	Precious metal
m (mesghals)*	4.60832	Precious metal
o (part pound)*	0.88592	
B (bahts)*	15.16	Gold
S (SAWARAN)*	7.999	Precious metal
Ks (kyats)*	16.606	Precious metal
T (tolas)*	11.6638038	Precious metal
User*2	Can be set as required by the user (can also be set for the minimum display)	
Mol 0~9 (mols)*3	Mass Number (user-specified setting)	

*1: There are cases in which the minimum ct (carat) display unit differs even with the same models.
*2: The conversion factor can be set as required by the user for user-specified unit.
☞ [User-specified Unit Settings] (P.57)
*3: There are cases in which values are displayed in the mol units when the mass number is set.
* Depending on the legal restriction, these units are not always available.
Using a verified balance as a legal measuring instrument in the EU:
These units are not available for use.
** Using a verified balance as a legal measuring instrument in the EU:
This unit is not available for use.

■ Unit setting

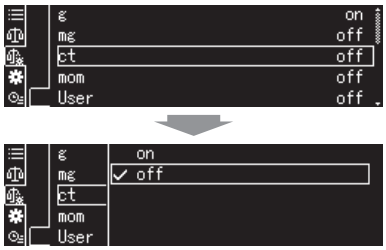
◆ Unit Settings

1. Press [UP] while in the weight measurement mode for three or more consecutive seconds.

Select [Unit setting], and then press [OK].

2. Set the unit

(1) Select the unit to be registered, and then press [OK].
(2) Select [on] or [off], and then press [OK].
(3) Repeat steps (1) and (2) to set all required units.



3. Return to the weight measurement mode

Press [POWER]

◆ User-Specified Unit (Conversion Factor) Settings

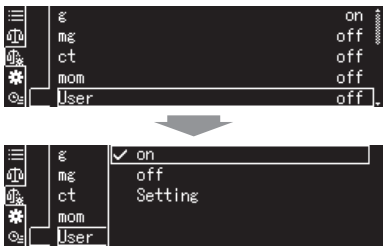
It is possible to set a user-specified value (multiplier) to be calculated against the weighing value (g).

1. Press [UP] for three or more consecutive seconds while in the weight measurement mode

Select [Unit setting], and then press [OK].

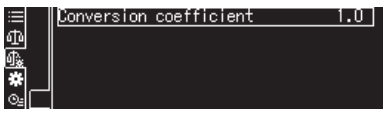
2. Set the user-specified unit to ON or OFF

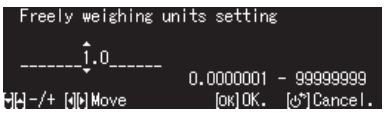
(1) Select [User], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 3 if [on] was selected.
· Proceed to Step 4 if [off] was selected.



3. Set the conversion coefficient

(1) Select [Setting] and then press [OK].
(2) Select [Conversion coefficient] and then press [OK].
Enter conversion coefficient within a maximum of 8 digits, and then press [OK].
[Entering Numerals and Characters] (P.33)





Conversion coefficient Equations

The following equation is achieved if the conversion coefficient is set at [k].
[k] x g unit = Balance weighing value (user-specified unit)

Accuracy When User Units are Set

There are cases in which a value that exceeds weighing capacity is displayed if the user enters 10 as the conversion coefficient for the user unit, for example, so note that the accuracy of these values cannot be guaranteed.

4. Return to the weight measurement mode

Press [POWER].

◆ mol Conversion (W/X series only)

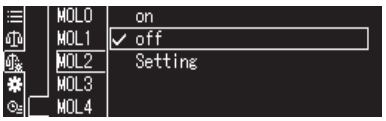
It is possible to register the sample name and weight value in advance to calculate the load value (g) / molecular value and display the result. The sample name can also be output on the screen of via a printer in alignment with the measurement result (mol unit).
A maximum of ten molecular value units between MOL 0 and MOL 9 can bet registered, and the names can be amended and entered at random so that they are easily understood.

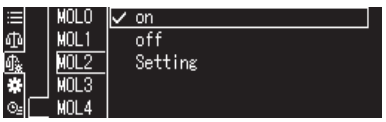
1. Press [UP] for three or more consecutive seconds while in the weight measurement mode.

The unit registration menu will be displayed.

2. Set the molecular weight unit to ON or OFF

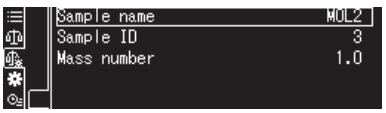
(1) Select any number between [MOL 0 - 9], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 3 if [on] was selected.
· Proceed to Step 7 if [off] was selected.

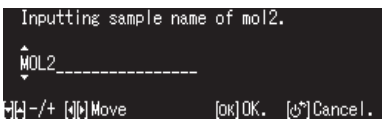




3. Enter the name of the unit

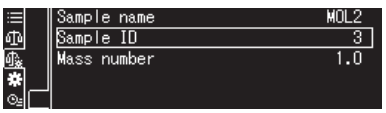
(1) Select [Setting], and then press [OK].
(2) Select [Sample Name], and then press [OK].
(3) Enter up to 20 alphanumerals, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)

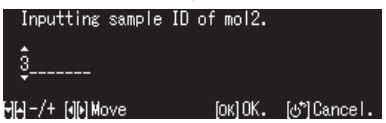




4. Enter the sample ID

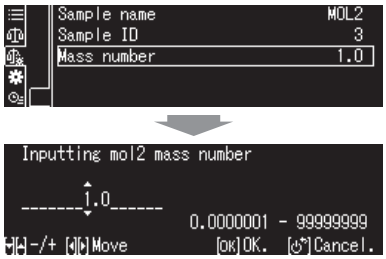
(1) Select the [Sample ID], and then press [OK].
(2) Enter up to 10 alphanumerals, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)





5. Enter the mass number

(1) Select [Mass number], and then press [OK].
(2) Enter the mass number within a maximum of eight digits, and then press [OK].



6. Return to the weight measurement mode

Press [POWER]

Menu Settings

■ Returning to the Default Settings (Menu reset)

Reset the menus when you lose track of the settings through excessive operations. This will return the settings to the default settings.
An asterisk (*) will be displayed on the [Menu Map] when the settings have been returned to the default settings. ☞ [Menu Map] (P.149)

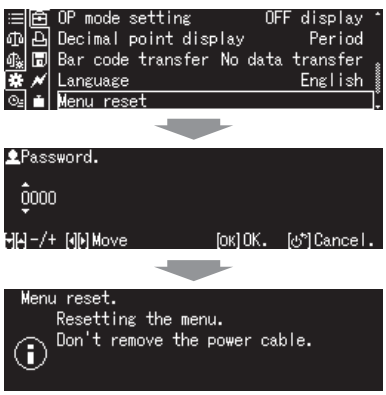
When the Log-in Function is Set at ON
Items without update authority will not be reset by logged in users. The items that will not be reset regardless of whether the log-in function is set at ON or OFF are as follows: [Certain standard weight input values], [Language setting].

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Menu reset

(1) Select [Menu reset (Password)], and then press [OK].
(2) Enter the password, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)
☞ [Password Changes] (P.64)



Password Types
The password of the logged in user is required when the log-in function is set at ON, and the password of the administrator is required when it is set at OFF.

When no Password has been Set
The [Menu reset] confirmation screen will be displayed. Press [ON] to reset the menu.

The menu settings will be returned to the default settings, and the screen will return to the weight measurement mode.

Default Password
The default password is set at [9999] when the balance is shipped from the factory.

■ Preventing Amendments to Menu Settings (Menu lock)

To prevent the menu settings from being accidently amended when the log-in function has been deactivated, the balance administrator can manage the passwords to forbid menu setting operations.

Operations when the Menu lock has been activated
It is possible to execute calibrations and change the weight values when the menu settings have been locked.

Setting the Menu lock for Each User
It is possible to apply the Menu lock setting for each individual user.

1. Call out the System settings (Level 2)

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK]

2. Set the Menu lock functions

(1) Select [Menu lock], and then press [OK].
(2) Select [on] or [off], and then press [OK].
(3) Enter the password, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)

(Menu lock mark) will be displayed when the password has been approved, and the menu settings will be locked.

Default Password
The default password is set at [9999] when the balance is shipped from the factory.

■ Printing the Menu Setting Status

It is possible to output the status of the menu settings.
The details that can be output are listed below.

Item	Details
Measurement Mode	Balance ID settings, minimum weighing value, weighing mode, mode (Standard measurement, Piece counting measurement, Percent measurement, Averaging mode, Solid specific gravity, liquid density, Add-on mode, Formulation mode, Sample preparation, Recipe preparation)
Setting Related	smart setting values, targeted settings, Pass/fail evaluation, Filling mode settings, weighing units (registered units), Stability detection range setting, stability mark illumination setting, zero/tare timing, Zero tracking, Auto tare, Auto zero
Calibration Related	Calibration (calibration types registered with the CAL key) (ICAL, ECAL, ITEST, ETEST)), PSC (Perfect Self Calibration) (ON/OFF, operation conditions (temperature Fluctuations, permissible errors)), time-specified adjustment settings, calibration log output, print functions
USB Memory Related	USB memory saving settings (weighing values, records of calibration), USB saved data format (printing format, CSV format)
Output Related	output function types registered in [PRINT] (one-time output, interval output, auto print), Output timing, date and time printing, minimum weighing value printing, sample ID printing, measurement No. printing
Communication setting Related	RS232C Communication settings (mode, baud rate, parity, stop bit, handshake, data format and delimiter selected with the standard 1 – 5), USB Communication setting s (mode, baud rate, parity, stop bit, handshake, data format and delimiter selected with the standard 1 – 5)
System Related	date format, brightness setting, buzzer sound, Ion irradiation time, barcode setting, OP mode settings (ON/OFF, set time), Decimal point display setting, display language,
Log-in Related	Administrator, log-in function, user information (information on user logged in and detail settings)

1. Connect a personal computer or printer (optional) to the balance

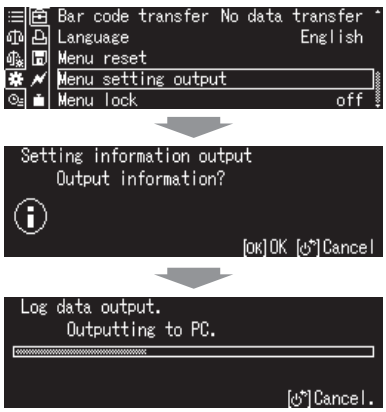
[9. Connecting and Communicating with Peripheral Devices] (P.112)

2. Call out the menu setting status output function

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

3. Output the menu setting status

(1) Select [Menu setting output], and then press [OK].
(2) Press [OK].
The menu setting status will be output.
The screen will return to the weight measurement mode when output has been completed.

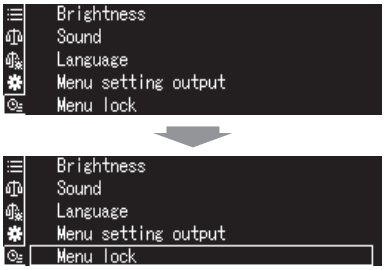


■ Calling Recently-Used Menus (Menu History)

It is possible to swiftly call out menus that have been recently used.

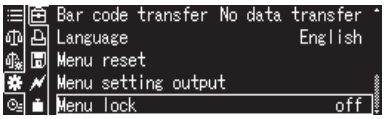
1. Call our the menu history

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Menu History], and then press [OK].
The menu history menu will be displayed.



2. Select a function from the menu history

Select a function from the menu history, and then press [OK].



Log-in Function

■ Log-in Function ON/OFF

This is a function for heightening security for the balance with the use of user IDs and passwords. Setting the log-in function to [ON] will enable the administrator to control who is using the balance and what they are using it for. Examples of using the log-in function's ON/OFF settings are shown in the following table.

Log-In Function: OFF	Log-In Function: ON	
All registered users are recognized as administrators. (Default setting)	Administrator User 01 Up to 10 users can be controlled User 10	Administrator authorization assigns the following to each user: • User ID, User Name, Password Registration • Authorizes or denies the use of [Amend Settings], [External Output of Measurement Values], [Use USB Memory], [Sensitivity Adjustment], [Sensitivity Test]

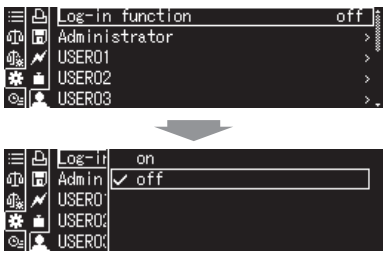
1. Call out the user settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [User Settings], and then press [OK].

2. Set the log-in function to ON or OFF

(1) Select [Log-in Function], and then press [OK].
(2) Select [on] or [off], and then press [OK].

Set this to [on] if the log-in function is in use, and then proceed onto Step 3.



3. Set the management information for each user.

This sets the management information for each user.
☞ [User Management (User Name Changes, Function Restrictions, etc.)] (P.64)

User Management (User Name Changes, Function Restrictions, etc.)

It is possible for the administrator to manage the balance when the log-in function is set at ON by setting up to a maximum of ten users and then assigning authority to each of the functions they can use. Only an administrator with an administrator's password can use the user management function.

1. Call out the user settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [User Settings], and then press [OK].

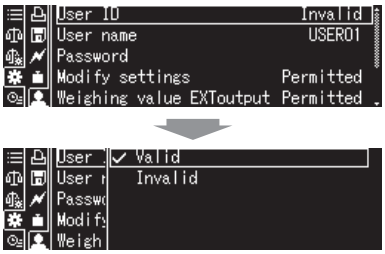
2. Select the user to set

Select [USER 01 - 10] (or the user name), and then press [OK].

Changing the Administrator Name and Password
To change the administrator's user name and password, select [Administrator] and then perform Steps 4 and 5.

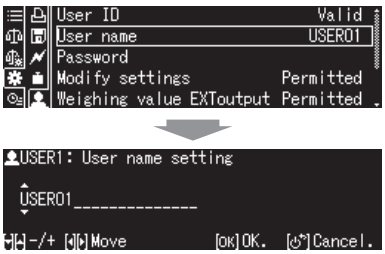
3. Validate or invalidate a user ID

(1) Select [User ID], and then press [OK].
(2) Select [Valid] or [Invalid], and then press [OK].
· Proceed to Step 4 if [Validate] was selected.
· Proceed to Step 7 if [Invalidate] was selected.



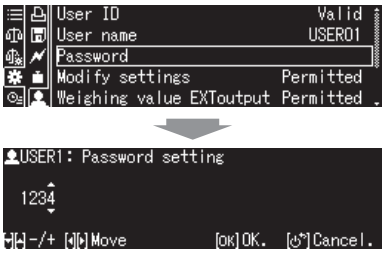
4. Change the user name

(1) Select [User Name], and then press [OK].
(2) Enter the user name, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)



5. Change the password

(1) Select [Password], and then press [OK OK].
(2) Enter the new password, and then press [OK OK].



Password Types

There are two types of passwords available: the administrator's password and the user's password. The functions that require password entry are shown in the following chart.

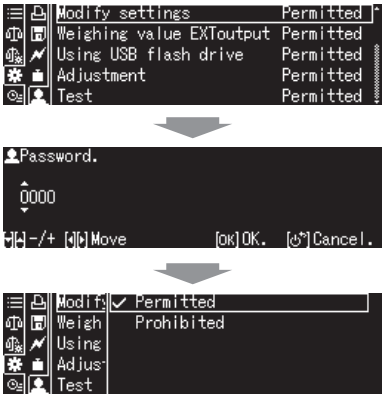
Type	Administrator's Password	User's Password
Default Password	9999	0000
Functions Requiring Password Entry	- Log-in with administrator's ID - Amending user management information - Internal weight calibration - Minimum weight setting - Canceling Menu lock - Deleting internal memory - Setting the date format - Changing the date/time - Resetting all user menus	- Log-in with user's ID * Password entry not required if set at [0000]. - Resetting menus for individual users

Authority for Changing Passwords

All user passwords can be changed if logged in as an administrator.

6. Set authority of each users

(1) Select either [Modify settings], [Weighing value EXT output], [Using USB flash drive], [Adjustment] or [Test], and then press [OK OK].
(2) Enter the password, and then press [OK OK].
(3) Select [Permitted] or [Prohibited], and then [OK OK].



Modify settings	Authorizes or denies the authority to change the settings made with the use of the menus.
Weighing Value External Output	Authorizes or denies the authority to output weighing values to USB or personal computers.
Using USB flash drive	Authorizes or denies the authority to use USB memories.
Adjustment	Authorizes or denies the authority to adjust sensitivity.
Test	Authorizes or denies the authority to perform tests.

7. Return to the weight measurement mode

Press [POWER].

■ Logging in at Start Up

Log in by following the procedure shown below if the log-in function is set at [ON].

1. Call out the user list.

Press [POWER] on the OFF screen or STAND-BY screen to display the user list.

2. Select the user.

Press [UP] or [DOWN], select the user and then press [OK].

Logging In with a Guest ID

Press [POWER] with the user list displayed to enable log-in with a guest ID.

☞ [Guest IDs] (this page)

3. Enter the password.

Enter the password (i.e. 1234) and press [OK] to display the weight display screen.

☞ [Entering Numerals and Characters] (P.33)

User Passwords

Password entry is not required if the user password is set at [0000].

Guest IDs

It is possible for people other than the administrator and users authorized by the administrator to log in without entering a password and carry out weighing tasks. The ID used for this is known as the Guest ID.

The word [GUEST] will be displayed in the [User Name/Time] area at the top right-hand side of the weight display screen. However, only weighing procedures can be carried out, and the other functions are restricted.

■ Changing User Passwords

Each user must set their own user ID password (a password is required when logging in). The default password when the balance is shipped from the factory is [0000].

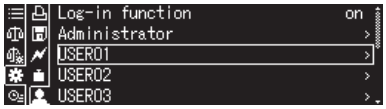
It is not necessary to enter a password during log-in if [0000] is set as the password.
Once the password has been set at anything other than [0000], this password must be entered during log-in. Observe the following procedure to log-in with personal user IDs.

1. Call out the user settings.

(1) Press [MENU] with the weight displayed, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [User Settings], and then press [OK].

2. Select the user that is to be set up.

Select the personal user ID (or user name), and then press [OK].



3. Change the password.

(1) Select [Password], and then press [OK].

(2) Enter the current password, and then press [OK]. The default password when the balance is shipped from the factory is [0000].

(3) Enter the new password, and then press [OK]. The illustration on the left shows an example of the new password as [1234].

☞ [Entering Numerals and Characters] (P.33)

4. Return to the weight display.

Press [POWER].

Balance Settings

■ Screen saver Function

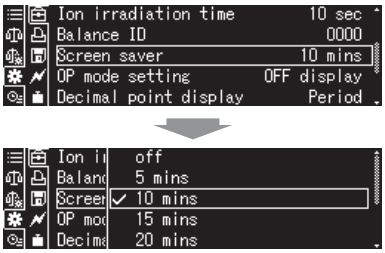
When the Screen saver function is activated, it turns to standby mode automatically when weighing and key operations have not been used for a preset period of time.

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the period of time until Screen saver

(1) Select [Screen saver], and then press [OK].
(2) Select [off] or the period of time until OP mode setting, and then press [OK].



Screen saver Settings
Select either OFF, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 30 minutes.

3. Return to the weight measurement mode

Press [POWER].

■ Display Settings in the Operation Mode

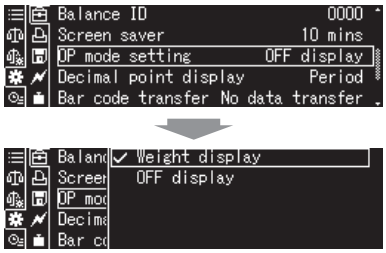
It is possible to set the display settings for the balance operation mode.

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the display settings for the operation mode

(1) Select [OP Mode Setting] and then press [OK OK].
(2) Select either [Weight display], [OFF display], and then press [OK OK].



Operation Mode Settings

The parameters set will be displayed when in the balance operation mode.
Weight Display: Displays either the log-in screen or the weight display screen.
This is used when the balance in incorporated into the measurement system in order to acquire data from the moment of startup.
OFF Display: Displayed as OFF. Press [POWER] to display the log-in screen or the weight display screen.

3. Return to the weight measurement mode

Press [POWER].

■ Balance ID Settings

It is possible to set a 16-digit management number (ID) and record logs of all calibrations together when multiple balances are being managed.
Setting which balance to use for acquiring measurement data is useful for the balance administrator to identify the calibrations.

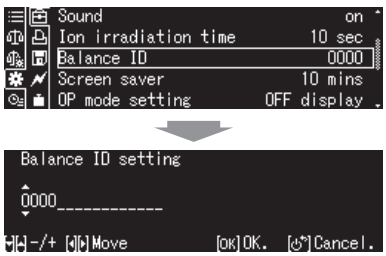
1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK OK].
(3) Select [System settings], and then press [OK OK].

2. Set the balance IDs

(1) Select [Balance ID], and then press [OK OK].
(2) Enter the ID, and then press [OK OK] (maximum of 16 characters).

[Entering Numerals and Characters] (P.33)



3. Return to the weight measurement mode

Press [POWER].

■ Date/Time Settings

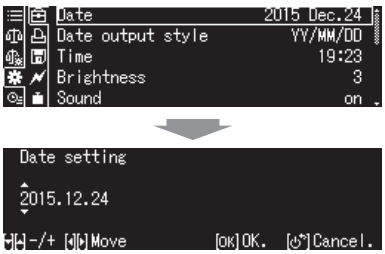
Sets the date and time for the balance.

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings] (Level 2), and then press [OK].

2. Set the date and time

(1) Select [Date] or [Time], and then press [OK].
(2) Enter the date or time, and then press [OK].
[Entering Numerals and Characters] (P.33)



Date and Time Settings
There are cases in which the administrator's password is required when amending date and time settings to prevent tampering. Change the date and time settings after the administrator has been approved (password entered).

3. Return to the weight measurement mode

Press [POWER].

■ Output Style Settings

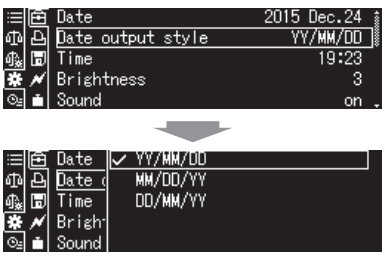
Sets the date format for output to printer, etc.

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the output style for the date

(1) Select [Date Output Style], and then press [OK].
(2) Select either [YY/MM/DD], [MM/DD/YY] or [DD/MM/YY], and then press [OK].



Date Style Setting
The administrator's password may be required to change the setting for date output style in order to prevent tampering. Change the date style setting after the administrator has been approved (password entered).

3. Return to the weight measurement mode

Press [POWER].

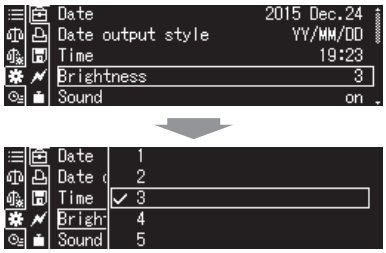
■ Brightness Settings

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the brightness

(1) Select [Brightness], and then press [OK].
(2) Select [1 – 5] as the brightness setting, and then press [OK].
The higher the value, the higher the luminance, which makes the display brighter.



3. Return to the weight measurement mode

Press [POWER].

■ Sound Settings

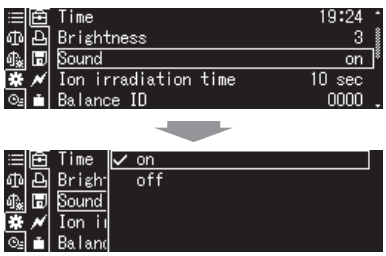
A buzzer will let the user know the status of the balance when an operation key is pressed and when the stability mark is displayed if this function is activated. The buzzer is set to ON or OFF.

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the sound

(1) Select [Sound], and then press [OK].
(2) Select either [ON] or [OFF], and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

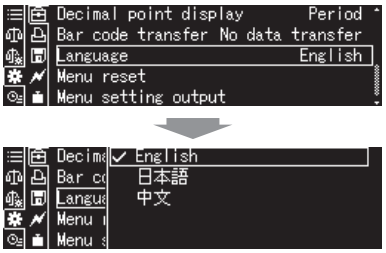
■ Language Settings

1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Select the setting, and then press [OK]

Select either [English], [Japanese] or [Chinese], and then press [OK].
(1) Select [Language], and then press [OK].
(2) Select either [English], [日本語(Japanese)] or [中文(Chinese)], and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

Balance Built-in Memory Contents

The weighing values obtained from the balance and the records of calibration are stored on the built-in memory.
When the built-in memory runs out of space, it automatically deletes the oldest records.

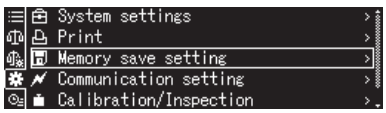
Outputting Data to External Devices
It is possible to output the records stored on the built-in memory to external devices that are connected. (W Series only)
☞ [Built-in Memory Output] (P.133)

■ Viewing Weighing Values and Records of Calibration

It is possible to view the weighing values and records of calibration stored on the balance.

1. Call out the Save memory Settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Memory save settings], and then press [OK].



2. View the weighing values and records of calibration

(1) Select [Browse measurement records] or [Browse CAL/Inspection records], and then press [OK].
(2) Select the date, and then press [OK].
The weighing value or record of calibration will be displayed.

When it is not possible to save, output or view sensitivity calibrations:
Note that it is not possible to save, output or view sensitivity calibrations unless the GLP output setting has been validated (set at ON).
☞ [GLP output Function] (P.129)

■ Deleting the Contents of the Built-in Memory

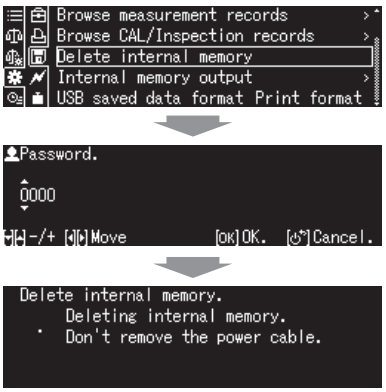
It is possible to delete all weighing values and records of calibration stored on the balance. Once they have been deleted, they cannot be recovered.

1. Call out the Save memory Settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Save memory Settings], and then press [OK].

Delete the records stored in the built-in memory

(1) Select [Delete internal memory], and then press [OK].
(2) Enter the password, and then press [OK].
A message stating that the built-in memory will be erased, and the screen will return to the selection screen once this task has been completed.



Default Password
The default password is set at [9999] when the balance is shipped from the factory.

Prohibitions

Precaution when deleting the internal memory

Do not switch off the power supply when [Please wait] is displayed. Failure to observe this will result in the data in the memory not being deleted correctly, and will lead to malfunctions.

7 Applications

The AP Series applications include the application function mode, the comparator function mode, and the minimum weight value setting mode. Statistical calculation, the comparator function and minimum weight value (MW) setting can also be used in combination when in the application measurement mode. The application function is a mode for changing the settings and measurement methods for the purpose of weighing samples in accordance with the sample type and environment. ☞ [Application Function Mode] (this page)

Statistical calculation calculates the statistic for measurement values to produce average values, standard deviation values, maximum values and minimum values, etc.
☞ [Performing Statistical calculation (Statistical calculation)] (P.101)

The comparator function is a function that finds a difference between the weighing values and the reference values or target values.
☞ [Comparator Function] (P.102)

Minimum weight (MW) setting is a function for evaluating [Minimum Weight Values] in order to inform the user of the range that measurements can be safely carried out.
☞ [Minimum Weighing Value Mode] (P.106)

Application Function Mode

■ Application Function Mode

The regular measurement mode is known as the Standard measurement mode, There is also an application function mode that is useful to match the sample type and environment or conditions. The application function mode contains the modes listed below. It is possible to select one of these modes to use in accordance with the method of application.

Switching between the Standard measurement Mode and the Application Weighing Mode
It is possible to switch across to the general measurement mode when measuring weight by pressing [FUNC DOWN].
However, it is not possible to switch modes when using the Statistical calculation, comparator or minimum weight value (MW) setting functions.

List of application measurement mode functions

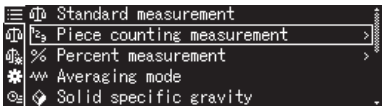
Icon	Function	Details	Functions that can be used together		
			Statistics	Comparator	Minimum Weight
	Piece counting measurement	Enables the unit weight of the sample to be set so that the set number can be weighed. ☞ [Measuring Part Quantities (Piece counting measurement)] (P.76)	○	○	○
	Percent measurement	Enables the percentage in relation to the standard weight to be weighed. ☞ [Measuring Percentages (Percent measurement)] (P.79)	○	○	○
	Averaging mode	Enables fluctuations in the weighing value to be restrained when weighing moving samples such as small animals or in bad conditions with strong vibrations, etc. ☞ [Measuring Averages (Averaging mode)] (P.82)	○	○	○
	Solid specific gravity	By weighing samples in air and in water, their specific gravity will be calculated. ☞ [Measuring the Specific Gravity of Solids (Solid specific gravity)] (P.84)	○	○	○
	Liquid density	By weighing samples in air and in water, their density will be calculated. ☞ [Measuring Liquid Density (Liquid density)] (P.87)	○	○	○
	Add-on mode	Enables multiple samples to be weighed and the data for each sample to be output, and creating records and adding the results at the same time. This mode is used when formulating multiple samples. ☞ [Measuring Large Quantities of Fine Samples (Add-on mode)] (P.90)	×	×	○
	Formulation mode	This is used to formulate multiple different samples. ☞ [Measuring Formulas (Formulation mode)] (P.92)	×	×	○
	Recipe preparation	Enables pre-registered recipes to be called out and samples prepared in accordance with that recipe. This is useful for compounding medicine. ☞ [Preparing Samples in Accordance with Recipes (Recipe preparation) (W Series only)] (P.95)	×	×	○
	Buffer solution preparation	A function for adjusting the buffer solution that has been registered for use with liquid chromatographs or other analysis equipment in accordance with recipes. ☞ [Buffer solution preparation (Preparing Buffer Solutions) (W Series only)] (P.98)	×	×	○
	Sample preparation	A function for supporting sample acquisition when preparing samples to be analyzed with liquid chromatographs or other analysis equipment. ☞ [Sample preparation for Analysis (Sample preparation) (W Series only)] (P.99)	×	×	○

■ Measuring Part Quantities (Piece counting measurement)

◆ Preparing for Piece counting measurement (Sample Registration)

1. Set the Piece counting measurement mode

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Piece counting measurement], and then press [OK].



2. Select the sample

Select the number (or name) of the sample to set, and then press [OK].
The display varies when data (unit weight value) has already been entered for the selected sample.

When unit weight values have not been set:
Proceed to step 3.

When unit weight values have already been set:
· To update the unit weight value, change the sample setting to update the value.
[Changing the Piece counting measurement Sample Settings] (P.78)
· No further operations are required if the unit weight value does not need to be updated. It is no possible to perform Piece counting measurement.
[Measuring Part Quantities] (P.77)

3. Set the unit weight

(1) Enter the sample name.
(2) Enter the quantity for the setting.
(3) The weight measurement screen will be displayed for sample measurement purposes. Measure the set quantity, and then press [OK].
(4) The unit weight value will be registered, and the registered details will be displayed.

Registering unit weight values:
When registering the unit weight values of different samples, select different sample numbers.
Also, press [DOWN] for three or more consecutive sections on the piece counting measurement screen if the unit weight value is to be updated for the same samples.
This will recalculate the unit weight values with the use of the weight value for the number of samples involved.

◆ Manual entry of unit weight values:

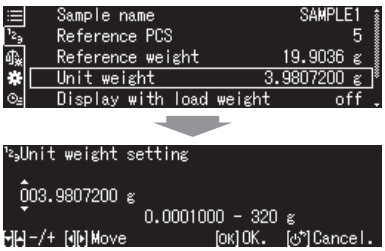
It is possible to set the unit weight values manually with the actual weight.

1. Enter the unit weight value.

Press [MENU].

(1) Select [Unit Weight] and then press [OK].

(2) The calculated unit weight value will be displayed separately, so enter the unit weight value.



Entering the Unit Weight Value Manually:

It is possible to enter the unit weight value manually if it has been determined in advance without the need to weigh it.

In this event, the [Set Count] and [Set Weight] values will be displayed as zero.

◆ Set the simultaneous display for the load weight value

1. Set the simultaneous display for the load weight value

Press [MENU].

(1) Select [Load Weight Value Simultaneous Display], and then press [OK].

(2) Select [on] or [off], and then press [OK].

◆ Measuring Part Quantities

1. Set the Piece counting measurement mode

Returning to the Standard measurement Mode

Press [DOWN]. If the balance still does not return to the Piece counting measurement mode, press [MENU], select [Select Mode], press [OK], Select [Piece counting measurement], and then press [OK].

2. Select the sample number

(1) Select the preset sample number, and then press [OK].

(2) Check the contents of the registration.

3. Perform taring

Place a container on the pan, and then press [→0/T← 0/T].

4. Place the sample in the container

(1) Place the sample in the container, and then weigh it.
(2) Read the quantity of the sample.

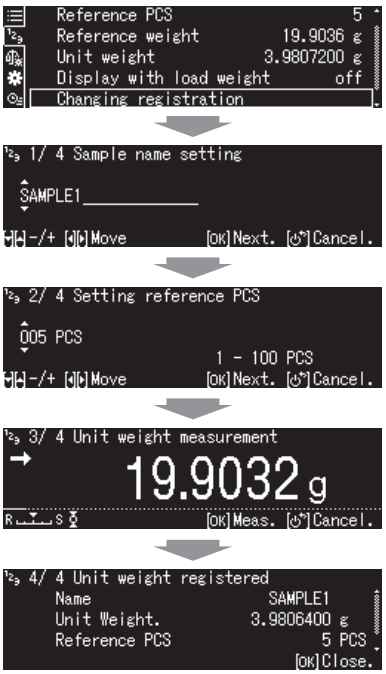
◆Changing the Piece counting measurement Sample Settings

1. Start Piece counting measurement mode setting

Press [MENU].

2. Set the unit weight

(1) Select [Changing Registration] and then press [OK].
(2) Enter the sample name.
(3) Enter the quantity for the setting.
(4) The weight measurement screen will be displayed for sample measurement purposes. Measure the set quantity, and then press [OK].
(5) The unit weight value will be amended, and the registered details will be displayed.



3. Return to the weight measurement mode

Press [POWER].

■ Measuring Percentages (Percent measurement)

◆ Preparing for Percent measurements

1. Set the Percent measurement mode

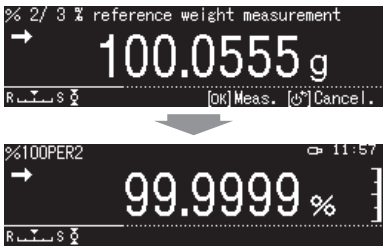
(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Percent measurement], and then press [OK].
(4) Select either [100PER1~3(100% standard1~3)] or [ANYPER1,2(user-specified % standard1,2)] (or Sample Name), and then press [OK].
The display varies when data (unit weight value) has already been set for the reference value.

When a percent reference value has not been set
Proceed to Step 2.

When a percent reference value has been set
· To update the percent reference value, change the sample setting to update the value.
☞ [Changing the Percent measurement Sample Settings] (P.81)
· The following operations are not necessary if the percent standard is not updated. Percent measurement can be performed without any further operations.
☞ [Measuring Percentages] (P.80)

2. Set the standard weight

In the case of the 100% standard
(1) Enter the sample name.
(2) Place the container on the pan, and then press [→0/T← O/T].
(3) Place the sample in the container.
(4) Weigh the sample, and press [OK] when the [Stability Mark] is displayed.
(5) The standard weight will be registered and the registered details will be displayed.
(6) Press [OK] to display the percentage calculated at 100%.



In the case of the user-specified % standard
(1) Enter the sample name.
(2) Enter the user-specified percentage.
(3) Place the container on the pan, and then press [→0/T← O/T].
(4) Place the sample in the container.
(5) Weigh the sample, and press [OK] when the [Stability Mark] is displayed.
(6) The standard weight will be registered and the registered details will be displayed.
(7) Press [OK] to display the percentage calculated at the user-specified percentage.

Standard Weight Settings
It is not possible to set weights that are equivalent to 100% so that they are less than 100 times the weight of the balances minimum display. Also, the number of digits after the decimal point displayed will differ in accordance with the size of the standard weight.

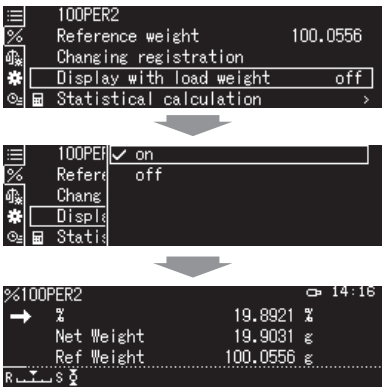
◆ Set the simultaneous display for the load weight value

1. Set the simultaneous display for the load weight value

Press [MENU].

(1) Select [Display with load weight], and then press [OK].

(2) Select [on] or [off], and then press [OK].



2. Return to the weight measurement mode

Press [POWER].

◆ Measuring Percentages

Measures the percentage value of the sample with the preset reference value.

[Preparing for Percent measurements] (P.79)

1. Set the Percent measurement mode

Returning to the Standard measurement Mode

Press [DOWN]. If the balance still does not return to the Percent measurement mode, press [MENU], select [Select Mode], press [OK], Select [Percent measurement], press [OK], select standard weight, and then press [OK].

2. Measure the sample

(1) Place a container on the pan, and then press [→0/T← 0/T].

(2) Place the sample in the container.
A percentage value calculated with the preset standard percentage will be displayed.

◆ Changing the Percent measurement Sample Settings

1. Start Percent measurement mode setting

Press [MENU].

2. Set the standard weight and reference value

(1) Select [Changing registration], and then press [OK].
(2) Enter the sample name.
(3) Place the container on the pan, and then press [O/T].
(4) Place the sample in the container.
(5) Weigh the sample, and press [OK] when the [Stability Mark] is displayed.
(6) The standard sample will be registered and the registered details will be displayed.
(7) Press [OK] to display the percentage calculated at the calculated percentage.

■ Measuring Averages (Averaging mode)

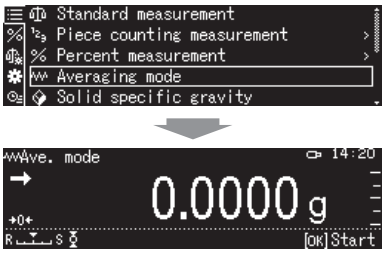
Makes it possible to restrain fluctuations of the weighing value when weighing moving samples such as small animals and when weighing in bad conditions with strong vibrations, etc. The hold function can also be used for measuring averages. This enables the average value of the measurements to be calculated for a predetermined period of time when it has been set at ON. Averaging mode is performed in the real-time when the hold function is set at OFF.

◆ Preparing for Averaging modes

Perform the preparations required for carrying out Averaging mode. Set the hold function to ON or OFF.

1. Set the Averaging mode

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Averaging mode], and then press [OK].
(4) The measurement screen will be displayed.

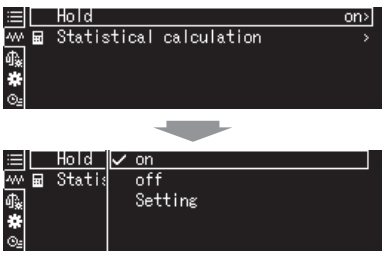


2. Start the Averaging mode settings

Press [MENU].

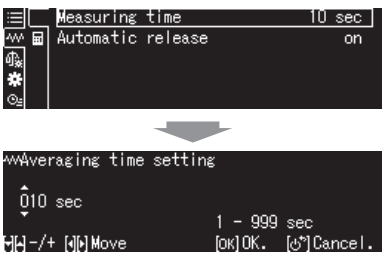
3. Set the hold function ON or OFF

(1) Select [Hold], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 4 if [on] was selected.
· Commence Averaging modes if [off] was selected.



4. Set the measurement time

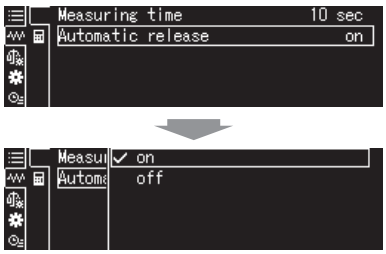
(1) Select [Setting] and then press [OK].
(2) Select [Measuring time], and then press [OK].
(3) Enter the measurement time between 1 and 999 seconds, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)



What is measurement time?
This is the period of time required for measurements after the sample has been placed on the pan and the [OK] button pressed. The weight will be measured and the average value calculated during this period.

5. Set Automatic release

(1) Select [Automatic release], and then press [OK].
(2) Select [on] or [off], and then press [OK].



What is Automatic release?
Automatic release is a function for automatically canceling the hold display. The hold display is canceled when the load weight value is less than half of the display and less than 50 times of the zero range.

6. Return to the weight measurement mode

Press [POWER].

◆ Measuring Averages

1. Set the Averaging mode

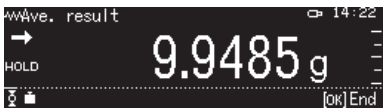
Returning to the Standard measurement Mode
Press [DOWN]. If the balance still does not return to the Averaging mode, press [MENU], select [Select Mode], press [OK], Select [Averaging mode], and then press [OK].

2. Measure the sample in the Averaging mode

Place the sample on the pan, and then weigh it.
Pres [OK] to start the averging measurement mode.

The time count screen shown on the right will not be displayed if the hold function is set at [OFF], and the average value will be displayed in the real time.

3. Cancel the hold function



· The hold display will be cancelled automatically if auto cancel has been set at ON when the item being weighed reaches the removal conditions (hold display at half of the weight value and the zero range multiplied by 50 or less).
· If auto cancel has been set at OFF, remove the sample and then press [OK].

■ Measuring the Specific Gravity of Solids (Solid specific gravity)

This function measures the weight of the samples (solids) in air and in liquids which is for known density (or specific gravity), and then calculates the density (or specific gravity) of the samples.
The procedures explained below are for when the user has prepared a suspension pan and water tank. Measuring specific gravity can also be carried out more easily with the use of the optional simplified specific gravity measurement kit SMK- 601. See the instruction manual supplied with the kit for details on using it.

◆ Preparing for Solid specific gravitys

1. Make the preparations for measuring solids in air and in liquid

Make sure the AC adapter has been disconnected from the balance before attempting installation.
☞ [Ending Measurements] (P.27)
[Using the simplified specific gravity measurement kit]
Install the simplified specific gravity measurement kit inside the draft shield while referring to the [SMK-601 Simplified Specific Gravity Measurement Kit Instruction Manual].
[Using the balance's suspension pan hook]
Suspend a suspension pan (provided separately) on the suspension pan hook, and then submerge the pan in the water tank liquid.
When the installation is complete, turn ON the power supply for the balance and set to the weight display.
☞ [Turning on the Power] (P.19)

2. Set the Solid specific gravity mode

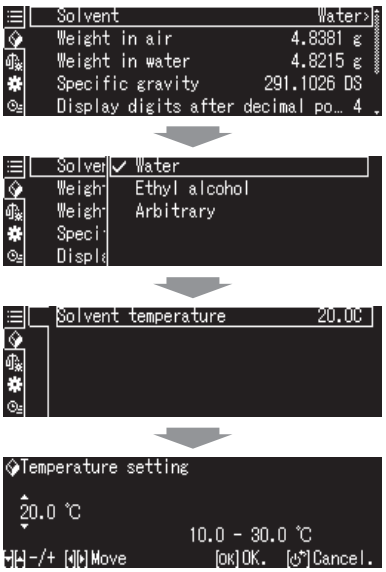
(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Solid specific gravity], and then press [OK].

3. Start the Solid specific gravity settings

Press [MENU].

4. Set the Solvent

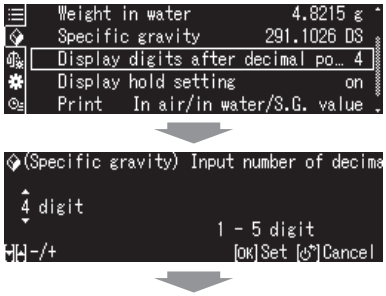
(1) Select [Solvent], and then press [OK].
(2) Select either [Water], [Ethyl alcohol] or [Arbitrary] as the liquid medium, and then press [OK].
(3) Set the [Solvent temperature], and then press [OK].
(4) Enter the temperature of the solvent between a range of 10.0 to 30.0°C, and then press [OK].
(5) Press [LEFT].



Selecting [User-specified] as the Solvent
If [User-specified] has been Selected in Step (2), select [solvent Density], press [OK], enter the density of the liquid medium within a range of 0.0001 and 999.9999, and then press [OK].

5. Set the number of digits to be displayed after the decimal point for the solid specificity gravity value in accordance

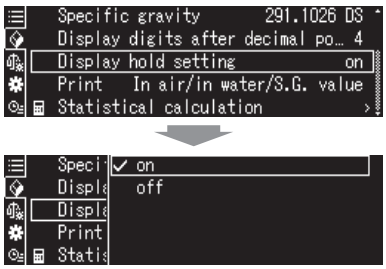
(1) Select [Number of Digits to be Displayed after the Decimal Point], and then press [OK OK].
(2) Enter the number of digits to be displayed after the decimal point within a range of 1 to 5, and then press [OK OK].



6. Set display hold at ON or OFF in accordance

(1) Select [Display hold setting], and then press [OK OK].
(2) Select [on] or [off], and then press [OK OK].

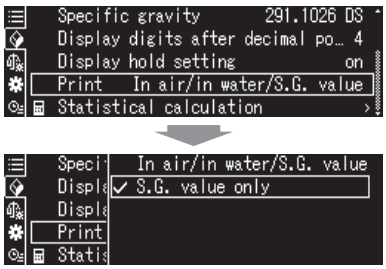
The solid specific gravity value will be held once it has been determined if the display hold setting has been set at [ON], and it will continued to be displayed until [ON] is pressed.



7. Set the details to be printed in accordance

(1) Select [Print], and then press [OK OK].
(2) Select [In Air/In water/S.G] or [S.G value only], and then press [OK OK].

When used in combination with statistics calculation:
Only the specific gravity value will be output as the result.



8. Return to the weight measurement mode

Press [⏻ POWER].

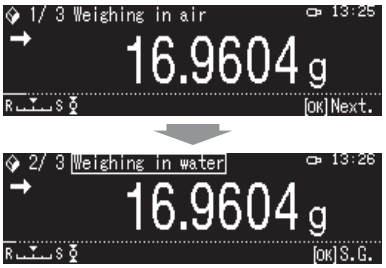
◆ Measuring the Specific Gravity of Solids

1. Set the Solid specific gravity mode

Returning to the Standard measurement Mode
Press [FUNC DOWN]. If the balance still does not return to the Solid specific gravity mode, press [MENU], select [Select Mode], press [OK], Select [Solid specific gravity], and then press [OK].

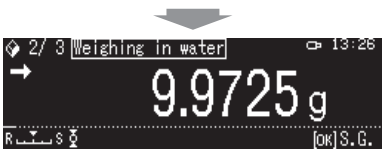
2. Measure the sample in air

(1) Perform taring and place the sample in air on the pan.
(2) Weigh the sample.
(3) Press [OK] when (Stability Mark) has been displayed.



3. Measure the sample in water

(1) Place the sample in water on the pan and then take the measurement.
(2) Press [OK] when (Stability Mark) has been displayed.



4. Reading solid specific gravity values

Read the calculated solid specific gravity value.
The results of the specific gravity value will be output when [OK] is pressed, and the screen will return to Step 2. [1/3 Specific Gravity Measurement in Air].
The data will also be saved (updated).

To return to the previous step...
It is possible to return to the previous step by pressing [POWER].

■ Measuring Liquid Density (Liquid density)

This function measures the weight of sinkers (solids) which its weight is already known in air and in the targeted liquid, and then calculates their liquid density.
The procedures explained below are for when the user has prepared a suspension pan and water tank.
Measuring specific gravity can also be carried out more easily with the use of the optional simplified specific gravity measurement kit SMK-601. See the instruction manual supplied with the kit for details.

◆ Preparing to Measure Liquid density

1. Make the preparations for measuring in air and in liquid

Make sure the AC adapter has been disconnected from the balance before attempting installation.

☞ [Ending Measurements] (P.27)

[Using the simplified specific gravity measurement kit]

Install the simplified specific gravity measurement kit inside the draft shield while referring to the [SMK-601 Simplified Specific Gravity Measurement Kit Instruction Manual].

[Using the balance's Below - weight hook]

Suspend a suspension pan (provided separately) on the Below - weight hook, and then submerge the pan in the water tank liquid.

When the installation is complete, turn ON the power supply for the balance and set to the weight display.

☞ [Turning on the Power] (P.19)

2. Set the Liquid density mode

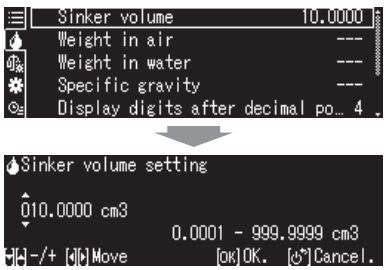
(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Liquid Density], and then press [OK].

3. Start the Liquid density settings

Press [MENU].

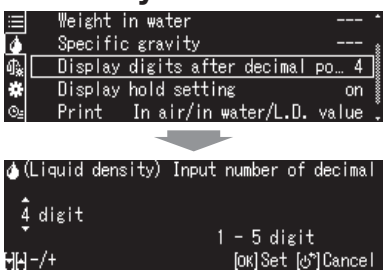
4. Set the cubic volume of the sinker

(1) Select [Sinker volume], and then press [OK].
(2) Enter the cubic volume of the sinker within a range of 0.0001 and 999.9999cm³, and then press [OK].



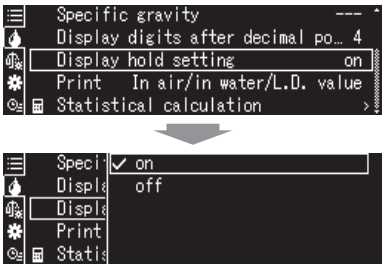
5. Set the number of digits to be displayed after the decimal point for liquid density in accordance

(1) Select [Number of Digits to be Displayed after the Decimal Point], and then press [OK].
(2) Enter the number of digits to be displayed after the decimal point within a range of 1 to 5, and then press [OK].



6. Set display hold at ON or OFF in accordance

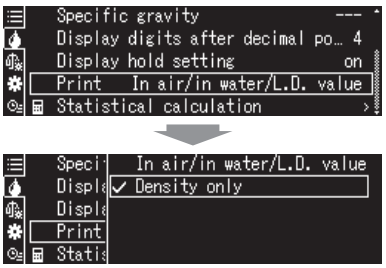
(1) Select [Display hold setting], and then press [OK OK].
(2) Select [on] or [off], and then press [OK OK].



The liquid density will be held once it has been determined if the display hold setting has been set at [ON], and it will continued to be displayed until [OK OK] is pressed.

7. Set the details to be printed in accordance

(1) Select [Print], and then press [OK OK].
(2) Select [In Air/In water/L.D. value] or [Density Only], and then press [OK OK].



8. Return to the weight measurement mode

Press [POWER].

◆ Measuring Liquid Density

1. Set the liquid density mode

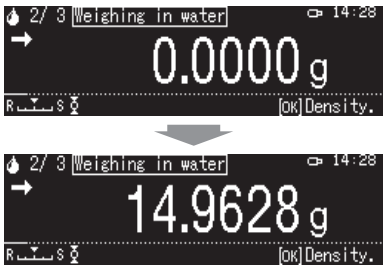
Returning to the Standard measurement Mode
Press [FUNC DOWN]. If the balance still does not return to the liquid density mode, press [MENU], select [Select Mode], press [OK], select [Liquid Density], and then press [OK].

2. Measure the sinker in air

(1) Hang the sinker on the pan frame and weigh it.
(2) Press [OK] when (Stability Mark) has been displayed.

3. Measure the sinker in liquid

(1) Place the water tank containing the sample liquid on the water tank pan, suspend the sinker in it so that it is submerged, and then weigh it.
(2) Press [OK] when (Stability Mark) has been displayed.



4. Read the liquid density

Read the calculated liquid density.
The results of the density will be output when [OK] is pressed, and the screen will return to Step 2. [1/3 Specific Gravity Measurement in Air].

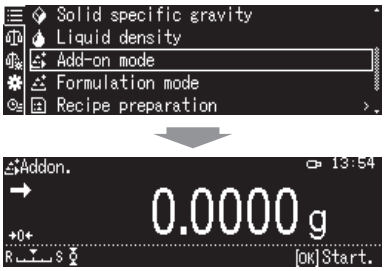
To return to the previous step...
It is possible to return to the previous step by pressing [POWER].

■ Measuring Large Quantities of Fine Samples (Add-on mode)

A useful function for formulating large quantities of fine samples. This function is used with a printer or personal computer connected.
The weight of each sample will be measured, output and added together, and the total sum will be output when formulation has been completed.

◆ Measuring with the Add-on mode

1. Set the Add-on mode



(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Add-on mode], and then press [OK].
Set the element number output and total sum output.
☞ [Element Number Output (Add-on mode)] (P.91)
☞ [Total Sum Output (Add-on mode)] (P.91)
(4) Place the container on the pan, and press [→0/T← O/T] when the stabilization mark is displayed.
Taring will be performed.
(5) Press [OK].
The [Add-on mode Ready] status will be activated.

2. Measure the sample

(1) Place the sample in the container.
The weighing value of the sample (element) will be output when the load has stabilized, recorded and taring will be carried out automatically.

3. Repeat Step 2 for the required number of samples

4. Press [PRINT] when formulation is complete

The total sum of the weighing values measured will be displayed and output. Press [OK] to return the display to the [Add-on mode Ready] status.

◆ Element Number Output (Add-on mode)

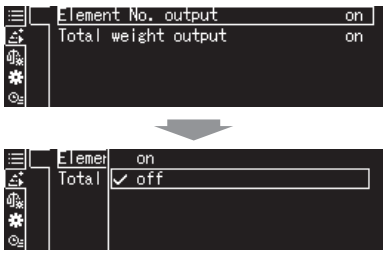
A function that can set the numbers to each sample automatically to the output results.

1. Call out the Add-on mode setting function

(1) Press [MENU] with the Add-on mode in the measurement ready status.
(2) Select [Print], and then press [OK].

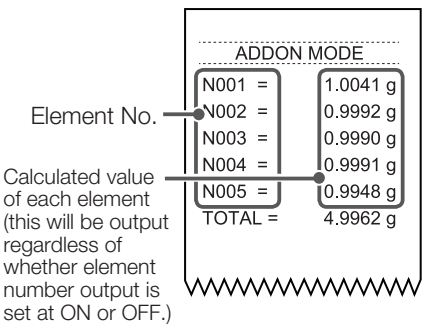
2. Set element number output at ON or OFF

(1) Select [Element No. output], and then press [OK].
(2) Select [on] or [off], and then press [OK].



3. Return to the Add-on mode's weight measurement mode

Press [POWER].



◆ Total Weight Output (Add-on mode)

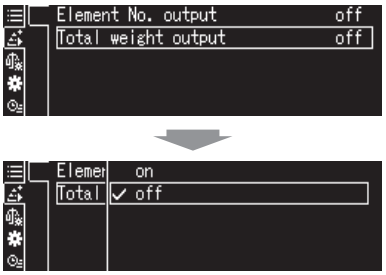
A function to output the total weight at the same time as the display. The total weight will be output together with the term [TOTAL =].

1. Call out the Add-on mode setting function

(1) Press [MENU] when the Add-on mode is in the measurement ready status.
(2) Select [Print], and then press [OK].

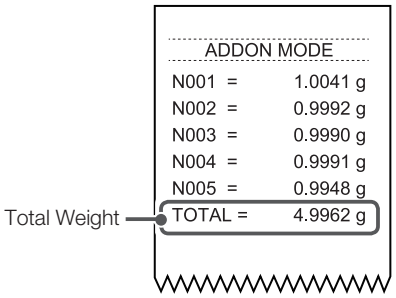
2. Set element number output at ON or OFF

(1) Select [Total Weight Output], and then press [OK OK].
(2) Select [on] or [off], and then press [OK OK].



3. Return to the Add-on mode's weight measurement mode

Press [POWER].



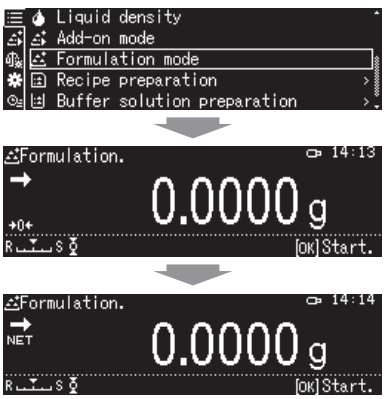
■ Measuring Formulas (Formulation mode)

◆ Measuring Formulas (Formulation)

This function is useful when formulating multiple samples. It is used with a printer or personal computer connected.

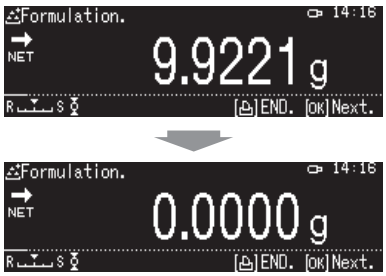
1. Set the Formulation mode

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Formulation mode], and then press [OK].
Set element number output and total weight output.
☞ [Element Number Output (Formulation)] (P.93)
☞ [Total Weight Output (Formulation)] (P.94)
(4) Place the container on the pan, and then press [→0/T← 0/T].
Taring will be performed.
(5) Press [OK].
The Formulation mode will enter the measurement ready status.



2. Measure the sample

(1) Place the sample in the container.
(2) Press [OK].
The weighing value for the sample (element) will be output and recorded, and taring will be automatically executed.



3. Repeat Step 2 for the required number of samples

4. Press [PRINT] when formulation has been completed

The total weight of the weighing values measured up until now will be displayed. Check this, and then press [OK].
The Formulation mode will enter the measurement ready status

◆ Element Number Output (Formulation)

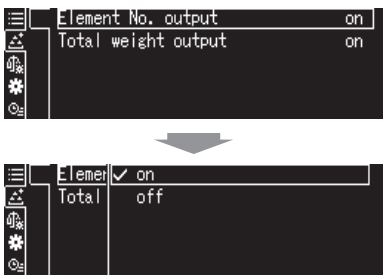
A function that enables the number of each sample is automatically assigned to the output results.

1. Call out the Formulation mode setting function

(1) Press [MENU] with the Formulation mode in the measurement ready status.
(2) Select [Print], and then press [OK].

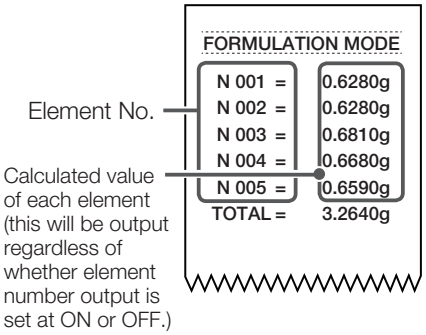
2. Set element number output to ON or OFF

(1) Select [Element No. output], and then press [OK].
(2) Select [on] or [off], and then press [OK].



3. Return to the Formulation mode's measurement ready status

Press [POWER].



◆ Total Weight Output (Formulation)

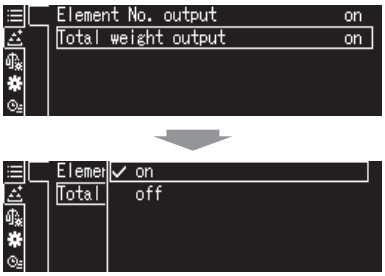
A function to output the total weight output at the same time as the display. The total weight will be output together with the term [TOTAL =].

1. Call out the Formulation mode setting function

(1) Press [MENU] with the Formulation mode in the measurement ready status.
(2) Select [Print], and then press [OK].

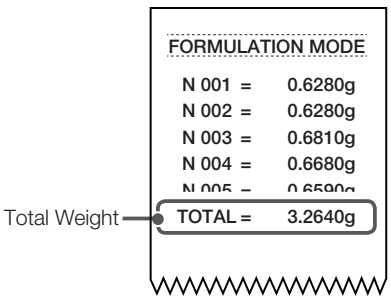
2. Set element number output at ON or OFF

(1) Select [Total Weight Output], and then press [OK].
(2) Select [on] or [off], and then press [OK].



3. Return to the Formulation mode's measurement ready status

Press [POWER].



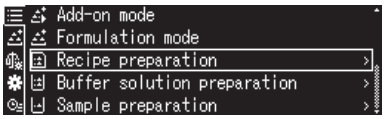
■ Preparing Samples in Accordance with Recipes (Recipe preparation) (W Series only)

It is possible to call out pre-registered recipes in order to prepare samples in accordance with the recipe with the W series. This is very useful for compounding medicines.

◆ Preparing for Recipe preparation

1. Set the Recipe preparation

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Select Mode], and then press [OK].
(3) Select [Recipe preparation], and then press [OK].

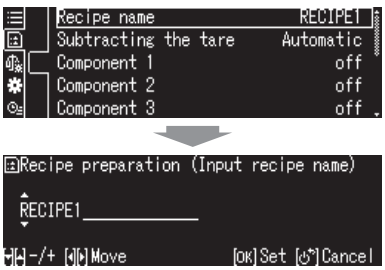


2. Select the recipe

Select any of the recipes from [RECIPE1-5] (or the recipe name), and then press [OK].

3. Set the Recipe name

(1) Select [Recipe name], and then press [OK].
(2) Enter the recipe name, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)

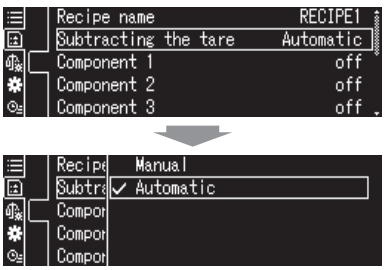


4. Set taring

(1) Select [Taring], and then press [OK].
(2) Select [Auto] or [Manual], and then press [OK].

Taring Setting

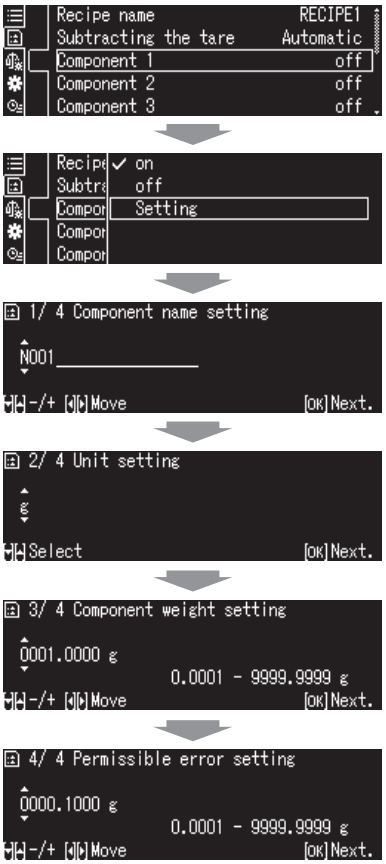
If [Automatic] is selected, taring will be carried out automatically when the next sample is placed in the pan after the recipe preparation when sample weighing has been completed. If [Manual] is selected, taring needs to be carried out manually for each sample preparation.



5. Register the ingredients

(1) Select any of the ingredients from [Component 1-10] (or ingredient name), and then press [OK OK], and select [Setting] then press [OK OK].
(2) Enter the ingredient name within 20 characters, and then press [OK OK].
(3) Select the unit, and then press [OK OK].
(4) Enter the weight, and then press [OK OK].
(5) Enter the permissible error value, and then press [OK OK].

[Entering Numerals and Characters] (P.33)



Preparing for unit registration
Pre-Unit setting enables them to be selected in Step 3.

[Unit Settings] (P.56)

If the unit of each component is not unified.
Units of the total value is “g (gram)”.

[Permissible Error Value] is...
The [Permissible Error Value] entered in Step 5 represents the value for which an OK judgment is permitted with regard to the range of ingredient weight for each ingredient.

6. Repeat Step 5 for the required number of samples

7. Return to the weight measurement mode

Press [POWER].

◆ Preparing Samples

1. Set the Sample preparation mode

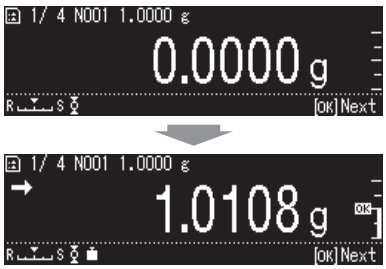
Returning to the Standard measurement Mode
Press [FUNC DOWN]. If the balance still does not return to the Sample preparation mode, press [MENU], select [Select Mode], press [OK], select [Preparing Samples], and then press [OK].

2. Select the recipe

Select any of the recipes from [RECIPE1-5] (or the recipe name), and then press [OK].

3. Measure the first sample

(1) Place the container on the pan.
(2) Press [→0/T← 0/T].
(3) Weigh the sample in accordance with the ingredient name, weight and permissible error value displayed on the screen.
(4) Press [OK] when (Stability Mark) is displayed.



4. Formulate the sample

(1) Press [→0/T← 0/T].
(2) Weigh the sample in accordance with the ingredient name, weight and permissible error value displayed on the screen.
(3) Press [OK] when (Stability Mark) is displayed.

Taring Setting
It is not necessary to press [→0/T← 0/T] as instructed in (1) if [Taring] has been set at [First Time Only].

5. Repeat Step 4 for the required number of samples

6. End Sample preparation

The total weight will be displayed when Sample preparations for all ingredients have been completed. Read the display, and then press [OK].

Recipe preparation data output
Once a recipe has been prepared, the output process will always be started and [Printing] will be displayed to make sure that the weight record of the prepared sample is saved.

7. Cancel the hold function

Press [OK].

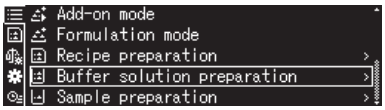
■ Buffer solution preparation (Preparing Buffer Solutions) (W Series only)

It is possible to prepare buffer solutions in accordance with pre-registered recipes.

◆ Buffer solution preparation (Preparing Buffer Solutions)

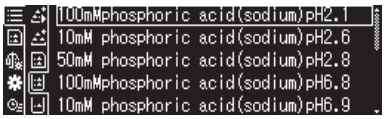
1. Set the Buffer solution preparation mode

(1) Press [MENU] and then [LEFT] on the weight display.
(2) Select [Mode Selection] and then press [OK].
(3) Select [Buffer solution preparation] and then press [OK].



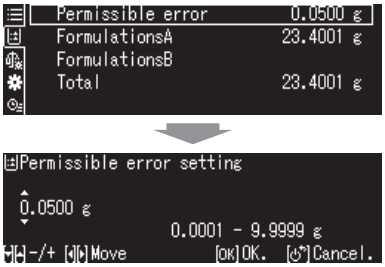
2. Select the registered buffer solution (recipe)

(1) Select the required buffer solution from the list of registered buffer solutions (recipes) displayed, and then press [OK]. [Press [OK] to move across to [4. Enter Formation Volumes] screen.



3. Set the permissible error range

(1) Press [MENU] on the formulation setting screen to display the permissible weighing error screen.
(2) Press [OK] to display the permissible error setting screen, and then enter the values between a range of 0.0001g and 9.9999g.
(3) Press [OK] to return to the permissible weighing error screen.
(4) Press [MENU] to return to the formulation setting screen.



The pre-registered buffer solution (recipe) list contains the thirteen types listed below.

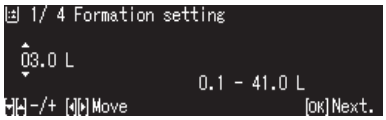
No.	Buffer Solution List
1	100mM phosphoric acid (sodium) buffer solution pH2.1
2	10mM phosphoric acid (sodium) buffer solution pH2.6
3	50mM phosphoric acid (sodium) buffer solution pH2.8
4	100mM phosphoric acid (sodium) buffer solution pH6.8
5	10mM phosphoric acid (sodium) buffer solution pH6.9
6	20mM sodium citrate buffer solution pH3.1
7	20mM sodium citrate buffer solution pH4.6
8	10mM sodium tartrate buffer solution pH2.9
9	10mM sodium tartrate buffer solution pH4.2
10	20mM acetic acid ethanolamine buffer solution pH9.6
11	100mM sodium acetate buffer solution pH4.7
12	100mM potassium borate buffer solution pH9.1
13	100mM sodium borate buffer solution pH9.1

4. Enter the formation volumes

The ingredient name, weight and permissible error range will be displayed on the formation setting screen, and the sample will be measures so that it is within the permissible range.

The weight and permissible error range will be compared against the formation and determined accordingly.

(1) Enter the formation and then press [OK OK].



If the display unit for the ingredient weight is [mL] instead of [g], the display for the load placed on the pan is for reference purposes only. The balance is not able to weigh the specified capacity (mL) of the solution, so it must be inserted accurately with the use of the pipette.

The measured permissible error will be displayed on the entry screen if [MENU] is pressed during operations to enable the progress of the measurement to be checked midway through.

(2) Weigh the specified ingredients and press [OK] when the stability mark is displayed.

(3) Save the results of the measurement and then start taring.

(4) The total weight will be displayed once all ingredients have been measured.

Buffer solution preparation data output

Once the buffer solution has been prepared, the output process will always be started and [Printing] will be displayed to make sure that the weight record of the prepared ingredients is saved.

(5) The screen will return to the formation entry screen when [OK] is pressed, and it will then be possible to commence the preparation of the buffer solution.

■ Sample preparation for Analysis (Sample preparation) (W Series only)

This function supports sample collection when preparing samples for analysis.
Entering the required property weight, molecular weight and hydrate weight, etc., enables targets to be calculated. The function also supports Sample preparation measurement operations by displaying on one screen the required property weight that is included while carrying out measurements.

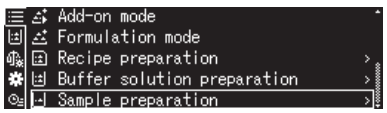
◆ Sample preparation for Analysis (Sample preparation)

1. Set the Sample preparation mode.

(1) Press [MENU] when the weight is displayed, and then Press [LEFT].

(2) Select [Mode Selection], and then press [OK].

(3) Select [Sample preparation], and then press [OK].



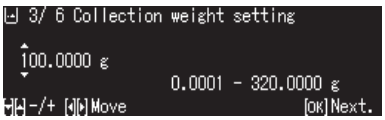
2. Measure the Sample

(1) Select the sample name, and then press [OK OK].

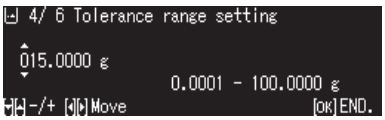
(2) Enter the sample name, and then press [OK OK].

(3) Select the sample type, and then press [OK OK].
The sample types available are as follows:
[Hydrate], [Purity], [Molecular], [Salt]

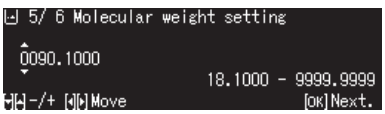
(4) Confirm and enter the sample collection weight (required weight including during measurement), and then press [OK OK].



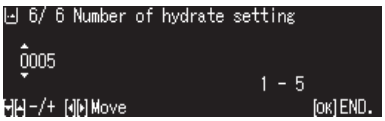
(5) Enter the tolerance range for the collection weight, and then press [OK OK].



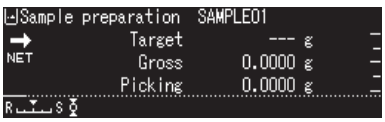
(6) Press [OK OK] for the molecular weight of the sample (compound).



(7) Enter the weight of the selected sample, and then press [OK OK]. (Screen shows hydrate weight.)



(8) The values for Sample preparation will be displayed.
Target Value: Total weight for acquiring the standard weight of the required property.
Gross Weight: Measurement weight.
Picking Weight: Required property weight included during measurement.



3. Return to the weight display

Press [FUNC DOWN].

Performing Statistical calculation (Statistical calculation)

This function can be used for Standard measurement mode, measuring part quantities, measuring percentages, measuring averages, measuring specific gravity, measuring the specific gravity of solids and measuring liquid density. The Statistical calculation function cannot be used during continual output.

1. Select the application function for which Statistical calculation is to be performed

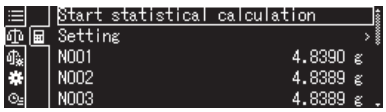
(1) Press [MENU], and then press [LEFT].
(2) Select [Select Mode], and then press [OK].

Functions with which Statistical calculation cannot be used

The Statistical calculation function cannot be used in combination with the following application function modes:

- Add-on mode
- Formulation mode
- Sample preparation

2. Start Statistical calculation

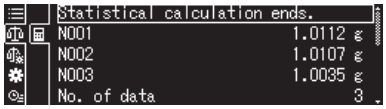


(1) Press [MENU].
(2) Select [Statistical calculation], and then press [OK].
(3) Select [Start Statistical calculation], and then press [OK]. Statistical calculation will be started.
(4) Place the sample of the pan and press [PRINT] to commence calculation for all items of data.

Checking Statistical calculation Midway Through

Press [MENU] during Statistical calculation. Press [MENU] once more to return to Statistical calculation.

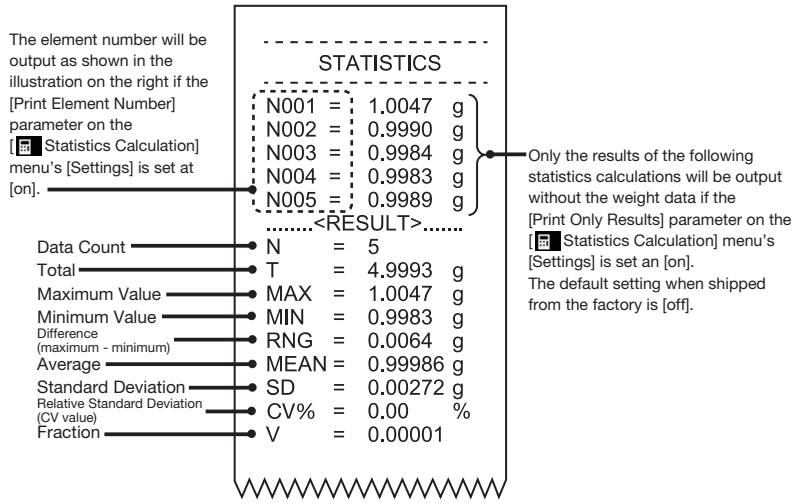
3. End Statistical calculation



(1) Press [MENU].
(2) Select [Statistical calculation ends.], and then press [OK].
The results of Statistical calculation will be output from the printer.

Calculation results

When the result values are too large (exceed the number of displayed digits), [---] is output.



Comparator Function

■ Comparator Function

The comparator function finds a difference between the reference value / target value and the weighing value, and then displays that status.
The comparator function consists of the two modes listed below. Select one of these modes in alignment with the environment to be used and the purpose of its use.

Target measurement Mode
Excesses and deficiencies with regard to the target value are judged and displayed by analog bar and the comparator marks (LO OK HI) when a target value and a permissible range for the target value has been set. ☞ [Target measurement Mode] (this page)

Pass/fail evaluation Mode
The sample weight is judged for “pass” or “fail” on the analog bar and with the comparator marks (LO OK HI) when the upper pass limit for and lower pass limit thresholds have been set.
☞ [Pass/fail evaluation Mode] (P.104)

Before Setting the Comparator Function
The comparator function can be used in combination with the application function mode.
☞ [Application Function Mode] (P.75)
The comparator function setting will be saved after the power has been switched off.

■ Target measurement Mode

Excesses and deficiencies with regard to the target value are judged and displayed by analog bar and the comparator marks when a target value and a permissible range for the target value has been set.

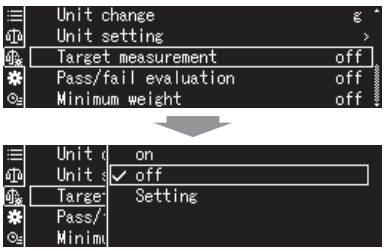
◆ Target measurement Mode Settings

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].

2. Set the Target measurement mode at ON or OFF

(1) Select [Target measurement], and then press [OK].
(2) Select [on] or [off], and then press [OK].
- Proceed to Step 3 if [on] has been selected.
- Proceed to Step 6 if [off] has been selected.

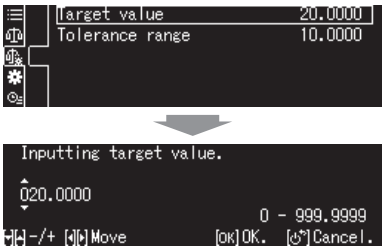


3. Start setting the Target measurement mode

Select [Setting], and then press [OK].

4. Set the target value

(1) Select [Target value], and then press [OK OK].
(2) Enter the target value, and then press [OK OK].
☞ [Entering Numerals and Characters] (P.33)



Enter the target value
The target value entered here will be displayed in the display count.

5. Set the tolerance range

(1) Select [Tolerance range], and then press [OK OK].
(2) Enter the tolerance range, and then press [OK OK].
☞ [Entering Numerals and Characters] (P.33)

Amending the unit…
If the unit it amended, the specified target value and permissible error range will not be calculated in accordance with this unit, so there will be cases in which the judgment is different. If the unit is amended, reset the target value and the permissible error range.

6. Return to the weight measurement mode

Press [POWER].

◆ Measuring with the Target measurement Mode

1. Set the Target measurement mode

[Target measurement Mode Settings] (P.102)

2. Take measurements in the Target measurement mode

(1) Place the container on the pan, and then press [→0/T← 0/T].
(2) Weigh the sample.

Excesses and deficiencies are judged in accordance with the following conditions.

Condition	Judgment	Target Value and Range Indications		
		Height of Analog Bar	Blinking of Comparator Marks	Target value 100g Permissible error range 0.0010g (Examples)
Exceeds Target Value Range	Large deviation from the target value		Blinks slowly (1.5- 2 second cycle)	150g or less
	Small deviation within 25% of the target value		Blinks fast (0.5 - 1 second cycle)	125g or less
Within Target Value Range (Target Value ± Permissible Range)	No excess or deficiency		OK illuminated (Will not blink)	99.9990 to 100.0010g
Less than Target Value Range	Small deviation within 25% of the target value		Blinks fast (0.5 - 1 second cycle)	75g or more
	Large deviation from the target value		Blinks slowly (1.5 - 2 second cycle)	50g or more

■ Pass/fail evaluation Mode

The sample weight is judged by “pass” or “fail” on the analog bar and the comparator marks when the upper pass limit for and lower pass limit thresholds have been set.

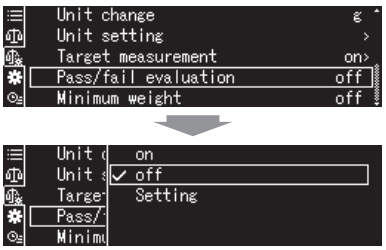
◆ Pass/fail evaluation Mode Settings

1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].

2. Set the Pass/fail evaluation mode at ON or OFF

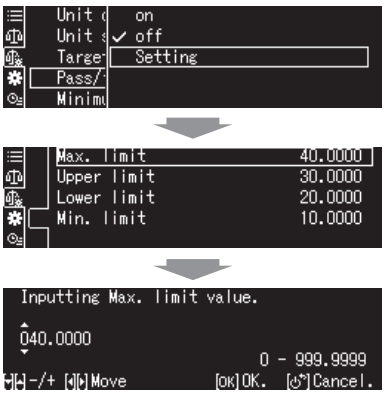
(1) Select [Pass/Fail evaluation], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 3 if [on] has been selected.
· Proceed to Step 4 if [off] has been selected.



3. Set the maximum limit, the upper limit, the lower limit and the minimum limit values

(1) Select [Setting], and then press [OK].
(2) Select either [Max. limit], [Upper limit], [Lower limit] or [Min. limit], and then press [OK].
(3) Enter the values for each setting, and then press [OK].

☞ [Entering Numerals and Characters] (P.33)



Entering maximum limit, upper limit, lower limit and minimum limit values

The maximum limit, upper limit, lower limit and minimum limit values entered here will be displayed in the display count.

What are maximum limit and minimum limit values?

The maximum limit and minimum limit values are set as the range for which judgment is possible.

Double-Check all Values without Fail

If the value entered does not match up with the logic, such as when an upper limit that is smaller than the lower limit has been entered, the balance will automatically correct it for a different value and set this value accordingly. Special care must be taken when previously set values are changed (updated) for new values.

Amending the unit…

It is not possible to set units for the maximum limit, upper limit, lower limit and minimum limit values, and there will be cases in which the judgment is different. If the unit is amended, reset the each value.

4. Return to the weight measurement mode

Press [POWER].

◆ Measuring with the Pass/fail evaluation Mode

1. Set the Pass/fail evaluation mode

[Pass/fail evaluation Mode Settings] (P.104)

2. Take measurements in the Pass/fail evaluation mode

(1) Place the container on the pan, and then press [→0/T← 0/T].

(2) Weigh the sample.

Pass or fail will be judged in accordance with the following conditions.

Conditions					Pass/fail evaluation	Analog Bar and Comparator Marks
Upper limit of specified range	<	Display			Invalid	
Upper limit of pass range	<	Display	≤	Upper limit of pass range	HI	
Lower limit of judgment range	≤	Display	≤	Upper limit of judgment range	OK	
Lower limit of pass range	≤	Display	<	Lower limit of judgment range	LO	
		Display	<	Lower limit of pass range	Invalid	

Minimum Weighing Value Mode

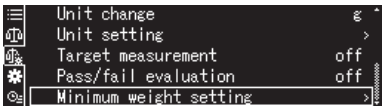
The balance needs to know the level of reliability involved in the measurement data. When measuring miniscule samples, the balance performance and the installation environment affects the measurement and can decrease the measurement accuracy. The AP Series evaluates the level of data reliability to output as measurement values with the use of the minimum weighing value, and the user is altered to measurements that fall below this value by the measurement display blinking so that the user can confirm the range in which measurements are possible with peace of mind. There are two methods available for setting the minimum weighing value calculating the minimum weighing value during actual measurement, and setting a random value for the minimum weighing value. Explanations on these two methods are provided below.

■ Calculating the minimum weighing value during actual measurement

Observe the following procedure if the minimum weighing value acquired separately is to be set in the balance. This method cannot be used by anyone other than the administrator. The administrator must also enter a password before the procedure can be carried out.

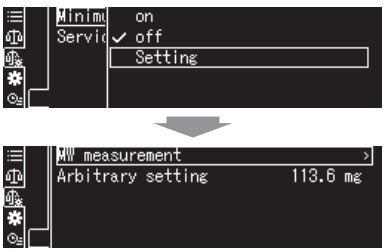
1. Call out the measurement setting menu

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [Measurement Setting], and then press [OK].
(3) Select [Minimum weight], and then press [OK].



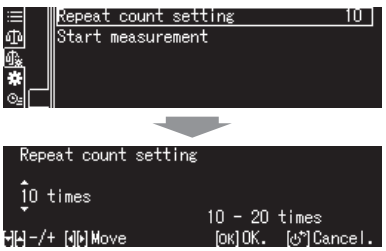
2. Start measuring the minimum weighing value

(1) Select [MW Judgment], and then press [OK].
(2) Select [Setting], and then press [OK].
(3) Enter the password, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)
It is possible to change the minimum weighing value mode settings once the password has been authorized.
The random setting will be displayed as [----] as the default setting if the minimum weighing value has not been measured.
(4) Select [MW Judgment], and then press [OK].



3. Set the repeat count

(1) Select [Repeat count setting], and then press [OK].
(2) Enter any value between 10 and 20 for the repeat count, and then press [OK].
☞ [Entering Numerals and Characters] (P.33)



4. Measure the minimum weighing value

(1) Select [Start Measurement], and then press [OK].
(2) Place the container on the pan, and then press [→0/T← 0/T].
(3) Place the weight in the container in accordance with the screen instructions, and then press [OK].

Changing the Weight of the Weight

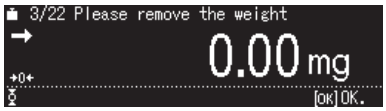
Press [MENU], enter the weight of the weight and then press [OK] to change the weight value.

(4) Remove the weight in accordance with the screen instructions, and then press [OK].

(5) Press [→0/T← 0/T].

(6) Repeat procedures from (3) to (5) in accordance with the screen instructions.

(7) Read the Pass/fail evaluation once minimum weighing value measurement has been completed.



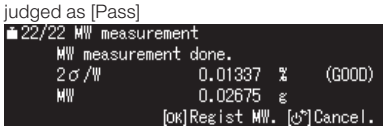
Minimum weighing value setting

If the minimum weighing value has been actually measured and has been judged as [Pass]:

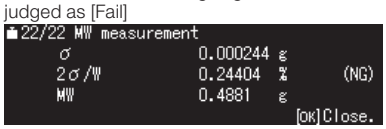
Press [OK]: Updates the minimum weighing value setting.

Press [POWER]: The minimum weighing value is not updated. If the value has been judged as [Fail], check the suitability of the balance's installation environment, and then increase the weight and measure it again.

When the minimum weighing value has been judged as [Pass]



When the minimum weighing value has been judged as [Fail]



The displayed value maybe changed by your balance model.

5. Return to the weight measurement mode

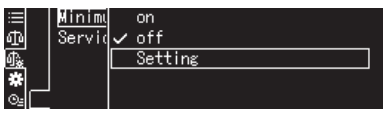
Press [POWER].

Minimum weighing value output

Note that it is not possible to print or output a value that is lower than the minimum weighing value when in the minimum weighing value mode.

■ Setting a random value for the minimum weighing value

Observe the following procedure if the minimum weighing value has been measured and a value larger that this is to be reset in the balance. However, this function cannot be used unless the minimum weighing value has been actually measured and calculated.



1. Setting the minimum weighing value

(1) Select [Arbitrary setting], and then press [OK].

(2) Enter a random minimum weighing value, and then press [OK].

☞ [Entering Numerals and Characters] (P.33)

2. Set an arbitrary minimum weighing value.

(1) Select [Arbitrary Setting], and then press [OK].

(2) Enter the arbitrary minimum weighing value, and then press [OK].

☞ [Entering Numerals and Characters] (P.33)

3. Return to the weight display.

Press [POWER].

Setting minimum weighing values for USP (United States Pharmacopeia)

The minimum weighing value is not set when the balance in shipped from the factory. It is not possible to set a value that is 820-times lower than the minimum weighing value listed in the USP (United States Pharmacopeia). It is also not possible to set a minimum weighing value that is lower than the value acquired through actual measurement.

Service setting

The [Service Setting] shown in the above-mentioned [MW Judgment] menu is used by representatives from the SHIMADZU service company who visits the user's premises to set the minimum weighing value. This menu cannot be operated by users. Contact the SHIMADZU service company for further details on the value set.

8 Ionizer (STABLO-AP Option: W/X)

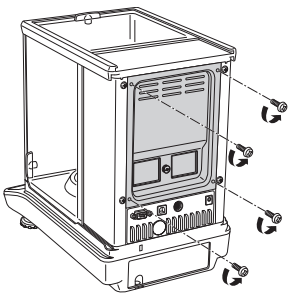
It is possible to connect an ionizer that irradiates ion in order to eradicate static electricity in the sample and draft shield. The ionizer is optional and needs to be purchased separately, and it has to be connected to the balance.

Connecting the Ionizer

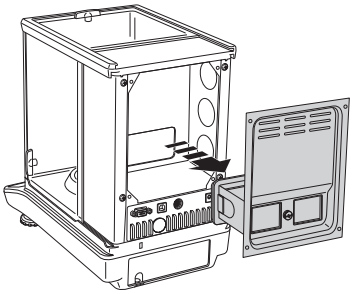
The ionizer is connected to the inside of the balance. A screwdriver(+ #2) is required for this procedure.

1. Switch off the power to the balance, and unplug the AC adapter from the DC IN connector

2. Remove the screws (inside in four locations) on the backplate



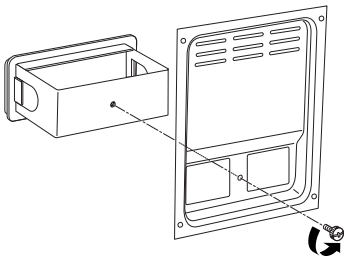
3. Remove the backplate from the main balance unit



⚠ CAUTION

Take care to avoid cutting your fingers on the edge of the backplate.

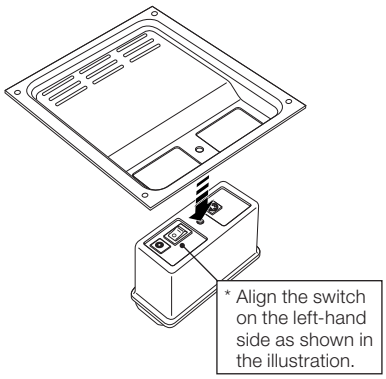
4. Turn the knob on the backplate in a counterclockwise direction to remove the accessory parts



Removing the Accessory Parts

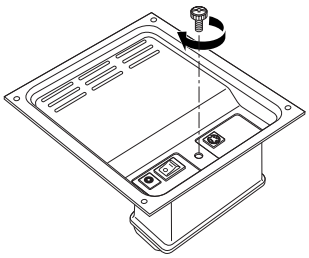
There is a chance that the accessory parts may be needed again after installing the ionizer, so store them in a safe place.

5. Align the ionizer with the backplate with the switch facing upward and located on the left-hand side.

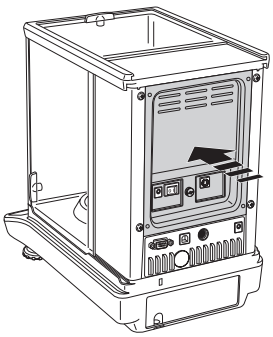


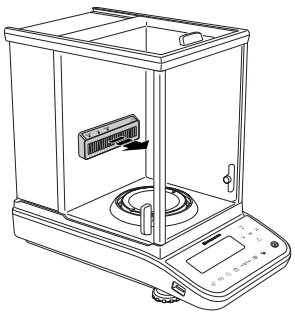
Aligning the Backplate
Align the ionizer so that the switch and connector protrude from the hole in the backplate.

6. Attach the ionizer by turning the knob removed in Step 4 in a clockwise direction through the center hole

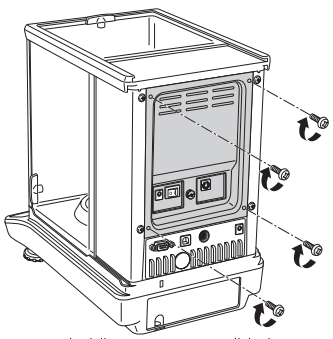


7. Align the backplate with the rear of the balance, and then push the ionizer into place while making sure that the ion emitter is located inside the weighing capacity chamber

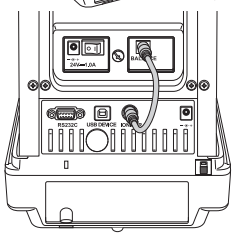




8. Replace the screws removed in Step 1 (four locations)



9. Connect the cable supplied with the ionizer

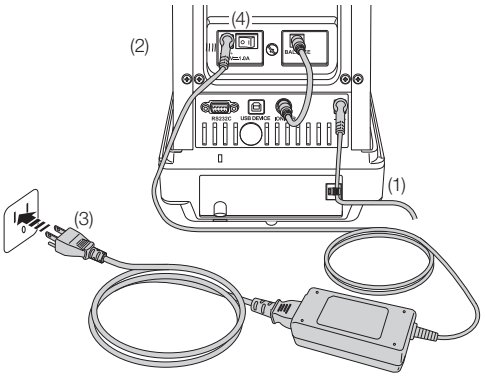


Turning on the Power to the Ionizer

1. Switch on the power to the balance

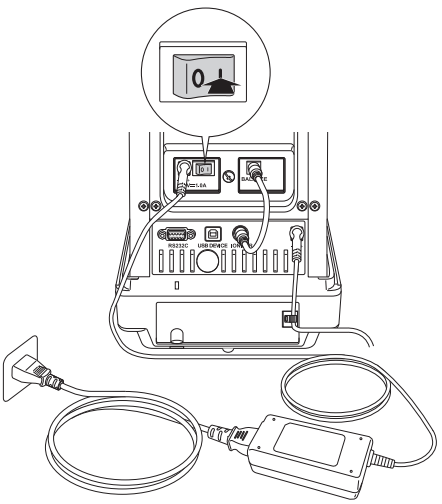
[Turning on the Power] (P.19)

2. Plug the AC adapter supplied with the ionizer into the DC IN connector on the ionizer



3. Plug the AC adapter connected to the ionizer into a power outlet

4. Turn the power supply switch on the ionizer to [ON]



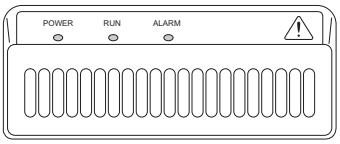
Make sure that the [ION] key on the balance's operation key panel and the [POWER] lamp on the ionizer indicator inside the draft shield are lit up

Using the Ionizer

Read the instruction manual provided with the ionizer for further details on installation and usage.

Removing Static Electricity

1. Check to make sure that the [POWER] indicator light for the ionizer is illuminated



2. Close the glass draft shield

3. Press [ION]

The [RUN] lamp on the ionizer's indicators will be illuminated, and ion emission will commence. The time of ion emission is set at 10 seconds (default setting when shipped from the factory). Ion emissions will stop automatically after the time set for ion emissions has elapsed.

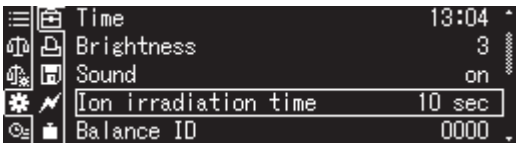
Halting ion emissions

Press [ION] during ion emission to halt emissions.

Changing Ion irradiation time

1. Call out System settings

(1) Press [MENU], and then .press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

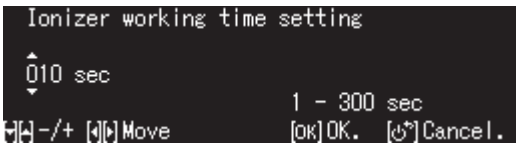


Simplified method of calling out the setting menu

It is possible to call out the setting menu in a simplified manner by pressing [ION] for an extended period.

2. Set the time for ion emissions

(1) Select [Ion irradiation time], and then press [OK].
(2) Set the Ion irradiation time between 1 - 300 seconds, and then press [OK].



3. Return to the weight measurement mode

Press [POWER].

Connecting External Equipment

It is possible to output weight values, setting details and other data from printers, sequencers (PLCs) and other serial communication equipment, and to personal computers. This section explains useful functions for connecting and outputting data to these types of external equipment. The rear of the balance is equipped with various types of connectors that are compatible with the external equipment that is to be connected.

■ Connecting Printers

It is possible to connect the special EP-100/EP-110 printers for printing weight values, setting statuses and other data. Connect the printer to the balance in accordance with the following procedures.

EP-100/EP-110 Printer

Special cable is provided

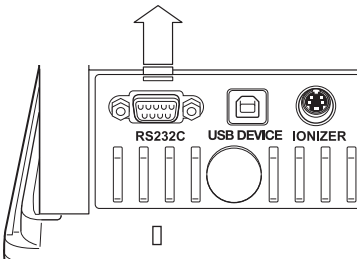
1. Switch off the power to the balance and the printer

2. Firmly connect the cable (supplied with the printer) from the RS232C serial connector on the balance to the connector on the printer

3. Switch on the power to the balance

4. Switch on the power to the printer

5. Press [PRINT] on the balance, and then check operations to make sure the measurement values are printed normally.



Rear of the balance

Points to Note

Switch off the power to the printer before switching off the balance. Refer to the printer's instruction manual for details on the printer.

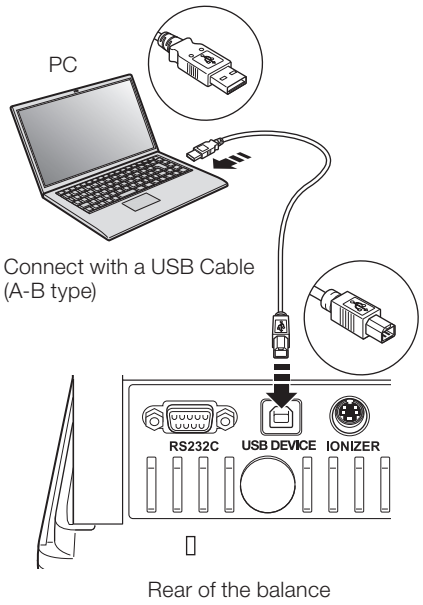
GLP output Function and the Printer's Statistical calculation Function

The printer's Statistical calculation function cannot be used when the GLP output function has been set at ON.

☞ [GLP output Function] (P.129)

■ Connecting Personal Computers

It is possible to output weight values, setting statuses and other data to personal computers in the same way as with printers with the use of USB cables. USB cables are available as options (P/N:S321-71730-41 USB cable set). Connect personal computers to the balance in accordance with the following procedures.



1. Switch off the power to the balance.

2. Connect the USB cable between the USB connector on the PC and the [USB DEVICE] connector on the rear of the balance.

3. Switch on the power to the balance.

4. The USB driver will be automatically installed on the PC.

If the USB driver does not install correctly

There are cases in which the USB driver will not be installed correctly if the personal computer concerned is not connected to the Internet (not connected to a LAN).
In this event, download the following instruction manual and USB driver from the Internet, and perform the installation procedure once again.

USB Interface Driver and Installation Manual Download Page
http://www.shimadzu.com/an/balance/moisture/moc63u3.html

5. Download the [Balance Keys] software for collecting data

(1) Log into a personal computer equipped with Internet access with administrator authority.
(2) Start up the browser, and access the following site.
http://www.shimadzu.com/an/balance/index.html
(3) Click on [Download] on the [Balance Keys Data Collection Software] page, and then download the file in accordance with the on-screen instructions.

[Balance Keys] data collection software

It is the [Balance Keys] software that enables numerals entered from keyboards with the use of the balance's serial communication function to be easily transferred to the position where the PC cursor lies. Data can be directly loaded as long as key input is possible, regardless of the application.

Points to Note

- If communications are to be performed with communication software installed onto the personal computer, make sure the settings are made in accordance with the instructions for that software. ☞ [User Settings] (P.122)
- Programing that uses command codes is necessary to control the balance from a personal computer. ☞ [List of Commands] (P.117)

6. Decompress the downloaded [Balance Keys] file

Right-click on the file downloaded in Step 5, and then click on [Open All] or [Decompress].

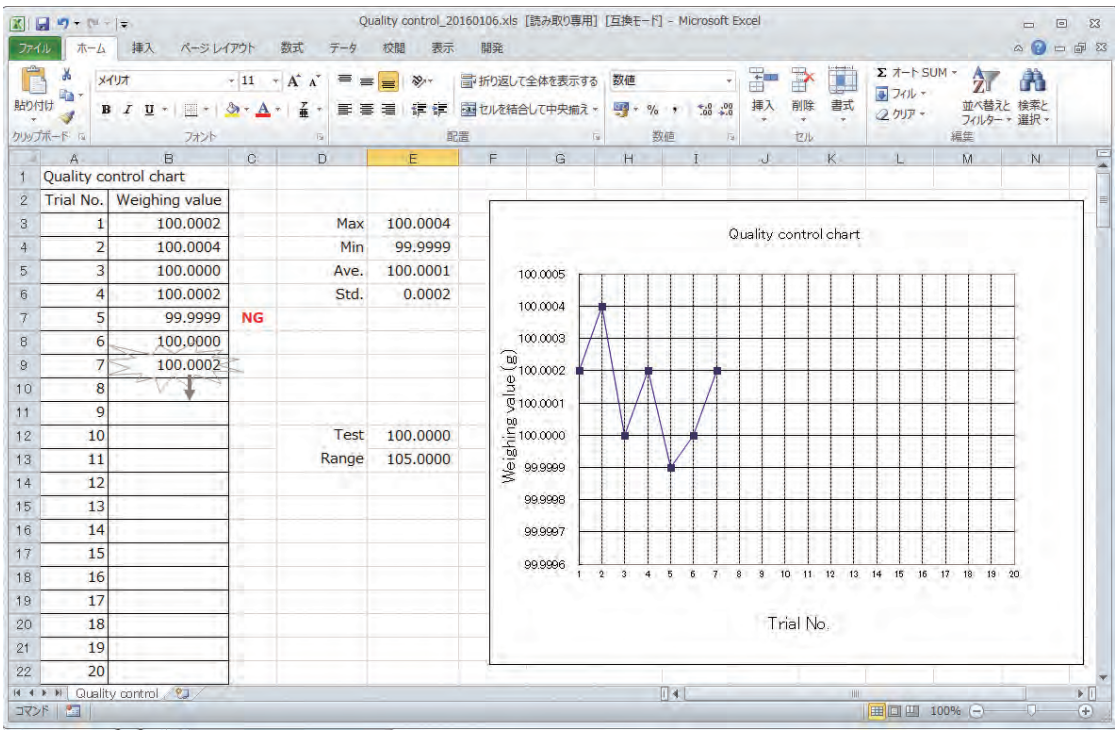
7. Set up [Balance Keys]

See the instruction manual for the [Balance Keys Data Collection Software] decompressed in Step 6 for details on set-up, start up the setup file (Setup.exe), follow the instructions displayed to set it up, and then set the [Balance Keys] parameters.

8. Confirming operations

Run an operation test while setting the parameters by pressing [PRINT] on the balance and checking that the measurement values displayed are correct. If everything is normal, press the [TEST OK] button.

Next, start up [Excel] (or [Notepad] or a similar application) on the personal computer Key input will be enabled, and the cursor will be displayed at a location where input is possible. Press [PRINT] on Balance, The values displayed on the balance will be transferred to the cursor position.



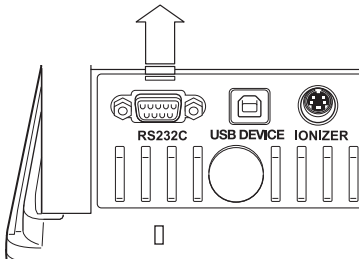
Example of balance data loaded onto an Excel worksheet

■ Connecting Sequencers(PLCs) and Other Serial Communications Equipment

It is possible to connect sequencers (PLCs) and other serial communication equipment to output weight values, perform taring and calibration with special commands, and read and write setting values. Connect the equipment to the balance in accordance with the following procedures in this event.

Sequencers (PLCs) and other serial communication equipment

Cables to be prepared by the user



Rear of the balance

1. Switch off the power to the balance and other equipment.

2. Firmly connect the [RS232C] connector on the rear of the balance to the communication connector on the equipment with the use of a special cable prepared by the user.

* See [Cable Connections (RS232C)] (P.116).

3. Switch on the power to the balance.

4. Switch on the power to the equipment.

5. Align the Communication settings on the balance to the settings on the equipment.

Procedures for confirming operations for the serial communications equipment connected

There are many different types of communications specifications for serial communications equipment depending on the manufacturer and the equipment concerned. Read the instruction manual for the relevant equipment first of all, and then check operations in accordance with the following procedures.

(1) Check the cable connection, (2) Check that the communication conditions are in alignment, (3) Establish communications procedures, (4) Check operations.

6. Either press [PRINT] on the balance or send and receive a command from the equipment to check whether the weight value has been correctly input and output.

■ Cable Connections (RS232C)

Advanced equipment (D-sub9 pin) (Cross connection)

Advanced Equipment **Specifications differ in accordance with the equipment**			**Balance** **D-sub9P plug (female)** **Connect to the RS232C connector**	
RXD	2	———	3	TXD
TXD	3	———	2	RXD
DTR	4	———	6	DSR
SG	5	———	5	SG
DSR	6	———	4	DTR
RTS	7	⌋ ⌊	7	RTS
CTS	8		8	CTS

■ Data Formats

Details on the data format when [Standard] SHIMADZU (Standard) is selected with the communications setting (☞ P.121) are provided below.

◆ Standard Format

The data format when negative values (i.e. -123.4567 g) are output is shown below. The delimiter is C/R. The data length differs in accordance with the attributed information, the number of characters that express the unit, and the delimiter.
The data length in this example is 13 bytes.

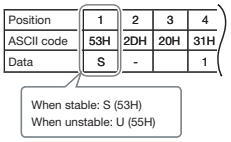
	❶	❷									❸		❹
Position	1	2	3	4	5	6	7	8	9	10	11	12	13
ASCII Code	2DH	31H	32H	33H	2EH	34H	35H	36H	37H	20H	67H	20H	0DH
Data	-	1	2	3	.	4	5	6	7		g		C/R

No.	Position	Description
❶	Position 1 (Positive/Negative)	A space [ ] will be inserted for positive values, and a minus mark [-] will be inserted for negative values.
❷	Positions 2 - 10 (Absolute Values)	When all of the eight positions are not used by numerals, codes expressing a space will be inserted in the vacant positions as shown in the example.
❸	Positions 11, 12 (Unit)	When the unit consists of a single character, the code expressing a space will be inserted in position 12. When the unit consists of three characters, all thirteen characters will be transmitted. When the unit consists of four characters, 14 characters will be transmitted.
❹	Position 13 (Delimiter)	The code expressing the delimiter.

◆ When Data Length Exceeds the Standard Format

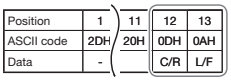
When data including stability information is output

Codes expressing S or U will be added to the head of the data. The data length will therefore become one byte longer.



When "C/R+L/F" has been selected as the delimiter

Two bytes are required for delimiter information.
One byte will be added after the standard position 13. The data length will therefore become one byte longer.



Verified balance as a legal measuring instrument

The brackets "[ ]" bordering auxiliary indicating device of legal measuring instrument are also outputted. In this case, "[" and "]" are inserted to border the part of auxiliary indicating device in the format. Consequently, the data becomes 2 bytes longer.

◆ When [OL (Overload)] or [-OL (Overload)] is Output

The data format is as follows when [OL (Overload)] is output.

The data length in this example is 13 bytes.

Position	1	2	3	4	5	6	7	8	9	10	11	12	13
ASCII Code	20H	20H	20H	20H	20H	4FH	4CH	20H	20H	20H	20H	20H	0DH
Data						O	L						C/R

A minus mark [-] (ASCII code: 2DH) will replace the space in position 1 when [-OL (Overload)] (negative overload) is output.

■ List of Commands

Limitations on Balance Type and Status

The commands that can be used are restricted by the status and type of the balance.

◆ Data Output

Command	Function	Remarks
D01*2	Continual output	Synchronized with the display update cycle (approximately 100msec) and continually transmits weight data up until the D09 (cancel output) command is received.
D02	Continual output when stable	
D03	Continual output with stability information	
D04*1	One-time enforced output	Unconditionally performs one-time enforced output when the command is received. ☞ [Setting the Output timing] (P.128)
D05*2	One-time output	Equivalent to the output key.
D06	Auto print setting	Sets the auto print settings.
D07*1	One-time output with stability information	Unconditionally performs one-time output when stability information is contained in the header and the command is received.
D08*2	One-time output when stable	Performs one-time output when the stability mark is illuminated after the command has been received even when the output timing has been set at [Immediately]. ☞ [Setting the Output timing] (P.128)
D09	Cancel output	Cancels continual output and the auto print settings.

*1 Not applicable to a verified balance as a legal measurement instrument in the EU.
*2 Output is not made when the display is not stable with a verified balance as a legal measuring instrument in the EU.

◆ Key Operations

Command	Function	Description
POWER	[POWER]	Press [POWER] key
DIGIT	[1d/10d]	Press [1d/10d] key
PRINT	[PRINT]	Press [PRINT] key
TARE	[0/T]	Press [→0/T← 0/T] key, Taring zero display
CAL	[CAL]	Press [CAL] key, Calibration CAL execution
MENU	[MENU]	Press [MENU] key
ION	[ION]	Press [ION] key
ENTER	[OK]	Press [OK] key
UP	[▲ UNIT]	Press [UP] key
DOWN	[▼ FUNC]	Press [DOWN] key
LEFT	[◀ LEFT]	Press [LEFT] key
RIGHT	[▶ RIGHT]	Press [RIGHT] key

◆ Mode Setup

Command	Function	Description
Application Standard measurement Mode (Overall)		
R	Cancel Application Standard measurement Mode settings	
Piece counting measurement		
PCS ?	Unit (PCS) mode setting	?: Numerals 1 – 5 (number specification for destination sample)
UW?=XX.XXXX	Unit weight setting	?: Numerals 1 – 5, XX.XXXX: Set value (g)
UW?	Unit weight loading	?: Numerals 1 – 5
UB?=XXXXX	Standard unit setting	?: Numerals 1 – 5, XXXXX: Set value (1 - 10000)
UB?	Standard unit loading	?: Numerals 1 – 5
RECALC	Unit weight re-calculation	The unit weight is recalculated using the result of the weight value (UNIT count) calculated with the weight value (g) at that point.
Percent measurement		
G	%⇔g switch units	
%?	% mode setting	?: Numerals 1 – 3 (number specification for destination sample) or none. In the event of none, it will move to the Percent measurement mode recently moved to, and the load currently on the pan will be recorded as 100%.
% W ? = X X. XXXX	Standard weight value setting	?: Numerals 1 – 3 XX.XXXX: Set value (g)
% W?	Standard weight value loading	?: Numerals 1 – 3
Formulation		
M	Formulation mode Setting	
Add-on		
+	Add-on mode setting	
Solid specific gravity		
SD	Solid specific gravity mode setting	
Liquid Density		
LD	Liquid density mode setting	

◆ Comparator Function

Command	Function	Description
Targeted measurement mode		
TRGT	Targeted measurement setting	
TARGET=XX.XXXX	Target value setting	Less that the weighing capacity
LIMIT=XX.XXXX	Permissible pass range setting	More than the minimum display
Pass/fail evaluation Mode		
CHKW	Pass/fail evaluation setting	
OVR.RNG=XX.XXXX	Maximum judgment limit setting	Upper limit at which judgment is possible Judgment not possible above this value. Less than the weighing capacity.
HI.LIM=XX.XXXX	Upper pass limit setting	Upper Pass/Fail threshold Lower pass limit < Upper pass limit < Upper judgment limit
LO.LIM=XX.XXXX	Lower pass limit setting	Lower Pass/Fail threshold Lower judgment limit < Lower pass limit < Upper pass limit
UND.RNG=XX.XXXX	minimum judgment limit setting	Lower limit at which judgment is possible Judgment not possible below this value.
Comparator Pass/Fail Output		
GO	Pass/Fail output (Above excessive weight)	HL
	Pass/Fail output (Excessive weight)	HI
	Pass/Fail output (Suitable weight)	OK
	Pass/Fail output (Insufficient)	LO
	Pass/Fail output (Below insufficient)	LL

◆ Sensitivity and Unit Registration

Command	Function	Description
Calibration		
ICAL	Sensitivity (Internal)	
ECAL	Sensitivity (External)	
ECAL.W=XXX.XXXX	Calibration standard weight value setting (External)	XXX.XXXX: Set value (g)
Unit Registration		
g	g unit setting	Switches between ON / OFF.
mg	mg unit setting	Switches between ON / OFF.
ct	Carat unit setting	Switches between ON / OFF.
mom *1	Momme unit setting	Switches between ON / OFF.

*1 Not applicable to a verified balance as a legal measurement instrument in the EU.

◆ System Setting

Command	Function	Description
Balance Software		
ID=XXXX	Balance ID setting	Default setting [0 0 0 0]
ID	Balance ID loading	XXXX: Alphanumerals (4 characters)
STATE	Setting status output	Outputs the status for all function settings
TIME	Date/Time loading	DATE_2015_Dec.11 TIME_12.34.56 Loads the date and time from the built-in clock
User Management		
LOGIN=XXXX: YYYY	Logs in by specifying the user name (XXXX) and password (YYYY) Possible to log-in with a command from the PC.	XXXX : User ID (maximum of 20 alphanumerals) YYYY : Password 4 numeric
LOGOUT	Log-out	[STAND-BY] displayed upon log-in.
UID	Acquires the ID for the user currently logged in	IDXX XX: 01 ~ 10 Log-IN ID Displays USER 01 – 10 on the display menu.

◆ Miscellaneous

Command	Function	Description
TYPE	Model	TYPE_AP224W
VER	Version	VER_X.XX.XX 5-digit numeral 1.00.11
SN	Serial Number	SN_XXXXXXXXXX Serial No. 10 digits, Maximum 12 digits ex D447400101
MAX	Maximum weighing capacity	MAX_XXX X: Maximum weighing capacity
MIN	Minimum display value	MIN_X.XXXXX X: Minimum display value
{ ??...	{ ??...	??...Echo-back ??: alphanumeral string (maximum 32 characters)
“_ (Space) “	Clears the receiving buffer stored within the balance	

Communication settings

The Communication settings menu is used to set the communication specifications when a personal computer or printer, etc., are connected.
The default setting is [Standard].
Four other [Standard Settings] are also available that are the most frequently used Communication setting combinations.

Selecting one of the combinations from [Standard Setting 1] through [Standard Setting 5] enables all of the baud rate (communication speed), parity (bit length), stop bit, handshake, and data format and delimiter parameters to be set with a single operation.
☞ [Standard Settings] (this page)

Each item can be set as required by the user.
☞ [User Settings] (P.122)

[Communication setting Table]

	Standard	Expansion	Type M	Type S	Type A	User Settings
Supporting Manufacturers, etc.	Shimadzu (Standard)	Shimadzu* (With response)	Mettler	Sartorius	A&D	—
Baud Rate (Communication Speed)	1200	1200	2400	1200	2400	User-specified
Parity (Bit length)	None (8)	None (8)	Even (7)	Odd (7)	Even (7)	User-specified
Stop Bit	1	1	2	2	2	User-specified
Handshake	Hard	Hard	OFF	Hard	OFF	User-specified
Data Format	Shimadzu Standard	Shimadzu Standard	Mettler Standard	Sartorius Standard	A&D Standard	User-specified
Delimiter	C/R	C/R	C/R+L/F	C/R+L/F	C/R+L/F	User-specified

* It is possible to respond to commands received from a personal computer. OK (C/R) is returned when received normally, and NG (C/R) is returned when an abnormality occurs.

■ Standard Settings

The standard settings can be selected from the pre-set Communication settings available.

1. Start Communication setting

(1) Press [PRINT] while in the weight measurement mode for three or more consecutive seconds.
(2) Select [Communication settings], and then press [OK].

2. Select the Communication settings from the standard settings

(1) Select either [RS232C] or [USB] as the connector terminal for which Communication settings are to be made, and then press [OK].
(2) Select either [Standard], [Expanded], [M Format], [S Format], [A Format] or [User Settings], and then press [OK].

3. Return to the weight measurement mode

Press [POWER].

■ User Settings

All of the Communication setting can be set at user-specified.

1. Start user-specified setting the Communication settings

(1) Press [PRINT] in the weight measurement mode for three or more consecutive seconds.
(2) Select [Communication settings], and then press [OK].
(3) Select [RS232C] or [USB], and then press [OK].
(4) Select [User Settings], and then press [OK].

2. Set the communication speed in accordance

(1) Select [Communication Speed], and then press [OK].
(2) Select either [300bps], [600bps], [1200bps], [2400bps], [4800bps], [9600bps], [19.2kbps] or [38.4kbps], and then press [OK].

3. Set the parity in accordance

(1) Select [Parity], and then press [OK].
(2) Select either [None], [Odd] or [Even], and then press [OK].

None	No parity, 8-bit length
Odd	Odd parity, 7-bit length
Even	Even parity, 7-bit length

4. Set the stop bit in accordance

(1) Select [Stop Bit], and then press [OK].
(2) Select [1] or [2], and then press [OK].

5. Set the handshake in accordance

(1) Select [Handshake], and then press [OK].
(2) Select the type of handshake required, and then press [OK].

OFF	No handshake
HARD	Hardware handshake
SOFT	Software handshake
TIMER	Timer handshake

6. Set the data format in accordance

(1) Select [Data Format], and then press [OK].
(2) Select the type of format required, and then press [OK].

Format 1	The Shimadzu standard format. Set this format under normal circumstances.
Format 2	Format 1 with extended functions. Returns a response to the command received from the PC.
Format 3	The same format as Mettler balances.
Format 4	The same format as Sartorius balances.
FREE	A format with which the first byte and the amount of data transmitted can be set freely. Can be set at 1 – 99 for the first byte, and 1 – 99 for the transmission data count.

7. Set the delimiter in accordance

(1) Select [Delimiter], and then press [OK OK].
(2) Select the type of delimiter required, and then press [OK OK].

CR	Carriage return (ASCII code ODH)
LF	Carriage return line feed (ASCII code OAH)
CR+LF	Carriage return & carriage return
Comma	"," (ASCII code 2CH)
Tab (Unit Attached)	Unit symbol attached when there is a direct Windows connection compatible with AU
Tab (No unit)	Numbers only when there is a direct Windows connection compatible with AU
Enter (Unit Attached)	Unit symbol attached when there is a direct Windows connection compatible with AU
Enter (No unit)	Numbers only when there is a direct Windows connection compatible with AU

What is a Delimiter?
The symbol to separate each item of data and each command.

8. Return to the weight measurement mode

Press [POWER].

■ Serial Communication Function Troubleshooting

Check the following if the serial communication function does not operate normally.
Contact our service company if the problem cannot be solved.

Problem	Cause	Recovery
I set up the serial communication function, but nothing happens.	Are you using the correct communication cable?	Check the type and connection of the connected communication cable.
I am using an USB serial converter, but the serial communication function doesn't work.	Has the correct COM number been set?	Check the setting for the COM number is correct in the Windows settings. For details on checking and changing the COM number, refer to the Shimadzu website (http://www.shimadzu.com/an/balance/index.html).
	Is the driver that is supplied with the USB serial converting starting up normally?	There is a chance that the driver provided with the USB serial converter was not set up properly. For details on the setup method, refer to the Shimadzu website (http://www.shimadzu.com/an/balance/index.html).
The serial communication function does not work when the PC is rebooted.	Have you started up the Balance Keys software?	The serial communication function cannot be used if Balance Keys has not been started up. For details on Balance Keys, refer to the Shimadzu website (http://www.shimadzu.com/an/balance/index.html).
Garbled text is loaded onto the PC.	Are the serial communication function settings correct?	The settings for the serial communication function on the balance or PC are incorrect. Reset the settings. ☞ [Communication settings] (P.121)
The cells are not transferred when I enter the data on Excel.	Has Excel been set so that the cell does not move when the [Enter] key is pressed?	Click on the [File] tab on Excel, and then click on [Options].Click on [Advanced Settings], and add a tick to [Move cell after pressing the [Enter] key].
	Has the Japanese conversion function on Windows been set at ON?	Set the Japanese conversion function on Windows at OFF.
The operations sometimes seem strange.	Has the communication speed been correctly set on [Balance Keys]?	There are cases in which operations malfunction if the speed of communications is set too slow, depending on the processing performance of the PC. Set this in alignment with the communication speed. There are also cases in which malfunctions occur if the interval set for transmitting data from the balance is set too short. Set this so that subsequent items of data are transmitted after they have been displayed on the screen. Also, avoid using the continuous output function in this event.
	Is anything touching the PC input device?	Make sure nothing is touching the PC keyboard or mouse when data is being transmitted from the balance.

Useful Output Functions

■ Automatic Printing/Output (Auto-Print)

It is possible to output the weighing values displayed automatically without pressing the [PRINT] key for each measurement.
When the auto print function is set at ON, (auto print mark) will be displayed at the bottom of the screen.

Auto Print Mark
The auto print mark will be reverse displayed during output

Cannot be Used in Combination with the Interval Timer Function
The auto print function cannot be used in combination with the interval timer function.

1. Call out the auto print function

(1) Press [PRINT] for three or more consecutive seconds.
(2) Select [Print], press [OK], and then Select [Auto Print] and then press [OK].

Calling Out the Auto Print Function from [MENU]
Press [MENU], select [System settings], press [OK], select [Print], press [OK], select [Auto Print], and then press [OK]. This will perform the same operations.

2. Set auto print to ON or OFF

Select [on] or [off], and then press [OK].
· Proceed to Step if [on] has been selected.
· End operations if [off] has been selected.

3. Select the Output timing conditions

(1) Select [Setting], and then press [OK].
(2) Select either [Stabilize at Positive Value], [Stabilize at Negative Value], [Stabilize at Zero] or [Pass for Pass/fail evaluation], and then press [OK].
(3) Select [on] or [off], and then press [OK].
[Output timing List]

Timing	Details	
Stabilize at Positive Value	Automatically output once when a sample has been placed on the pan with a stable status close to zero and stability detected at a positive value. If the sample is then removed or [O/T] pressed, it is not possible to output the next value unless a return to zero has been determined.	
Stabilize at Negative Value	Automatically output once when a sample has been placed on the pan, [O/T] pressed, stability detection carried out with zero, the sample removed, and stability detected at a negative value. If the sample is then removed or [O/T] pressed, it is not possible to output the next value unless stability detection with zero has been carried out.	
Stabilize at Zero	Automatically output once when a sample has been placed on the pan and stability detection carried out, and stability detected at zero.	
Pass for Pass/fail evaluation	Automatically output once when stability is detected with the pass mark at [OK] in the Pass/fail evaluation mode.	
Return to zero determined See Step 4 below	[Zero]	Return to zero determined once the value has stabilized close to zero. Use this setting if the priority is to be placed on weight accuracy.
	[50% of Previous Output]	Return to zero determined if a weight value that is 50% of the previous output is detected. Use this setting if the priority is to be placed on work efficiency (speed).

4. Set the zero return requirement in accordance

(1) Select [Zero Return Requirement], and then press [OK OK].
(2) Select [Zero] or [50% of Previous Output], and then press [OK OK].

What is the Zero Return Requirement?

Depending on the zero range setting, the word “zero” in zero return judgment means that if the weighing value was less than the zero return requirement value when the previous sample was removed, it will not be possible to place the next sample on the pan and automatically output it until the display becomes stable. This function prevents more than two outputs for the same sample. Select either [Zero] or [50% of Previous Output] for the zero return requirement value. The 50% setting enables time to be saved by allowing the next sample output as soon as the display stabilizes without completely returning to zero.

5. Return to the weight measurement mode

Press [POWER].

6. Check the auto print function

(1) Place the container on the pan, and then press [→0/T← 0/T].
(2) Place the sample in the container.
(3) Output will be confirmed automatically when (Stability Mark) is displayed.
(4) Remove the sample from the pan.

■ Intermittent Printing/Output (Interval Timer Function)

The displayed weight values are automatically output at preset intervals without having to press [PRINT] for each measurement. When the interval timer is set at ON, (interval timer mark) will be displayed at the bottom of the screen.

The interval timer mark changes to a reverse display during output

Cannot be Used in Combination with the Auto Print Function

The interval timer function cannot be used in combination with the auto print function.

1. Call out the interval timer function

(1) Press [PRINT] for three or more consecutive seconds, and then press [OK] to display the print setup menu.
(2) Select [Interval Timer], and then press [OK].
(3) Select [on] or [off], and then press [OK].
· Proceed to Step 2 if [on] has been selected.
· End operations if [off] has been selected.

Calling Out the Continuous Output Function from [MENU]

Press [MENU], select [System settings], press [OK], select [Print], press [OK], select [Interval Timer], and then press [OK]. This will perform the same operations.

2. Set whether to output a value that has not been averaged as the output value

(1) Select [Set], and then press [OK].
(2) Select [Averaging], and then press [OK].
(3) Select [on] or [off], and then press [OK].

3. Set the output interval

(1) Select [Output Interval], and then press [OK].
(2) Enter the output interval within a range of 00:00 to 99:59 minutes/seconds, and then press [OK]. The set value is 00:01 seconds when shipped from the factory.

When 00:00 has been Set

Continual output will be performed at an interval of approximately 100msec.

Loading weight fluctuations in the real time

Setting [Averaging] to [off]and [Output Interval] to [00:00] will enable the data to be loaded in the real time while monitoring the volatility of the liquid.

After the interval timer has been set

Setting [Interval Timer] to [Set] will automatically set this function to valid (on).

4. Return to the weight measurement mode

Press [POWER].

5. Check the interval timer function

(1) Place the container on the pan, and then press [→0/T← 0/T].
(2) Press [PRINT].
(3) Place the sample in the container.
(4) The weighing value displayed will be automatically output at the preset output intervals.
(5) Remove the sample from the pan.

Pausing and Restarting interval Output
Press [PRINT] to pause continual output. Press [PRINT] to restart output.

Communication Mark Operations
There are cases when the communication mark will appear to be illuminated continually during continuous printing. Also, if the baud rate for data output is too slow, the display will become unstable and the balance's response will become slower. In this even, increase the speed of the baud rate or set the handshake function at OFF.

When Connected to a Printer
Depending on the performance of the printer, there are cases in which the data output interval is longer than 100msec.
Also, the output interval will output the data in alignment with either [RS232C] or [USB DEVICE], whichever has the slowest output rate. In the event of output not being performed in accordance with the output interval setting, increase the communication speed of the device not being used and set the handshake function to [Off].

■ Output timing Settings

It is possible to set the Output timing in accordance with the stability of the display when [PRINT] is pressed.

1. Set the Output timing

(1) Press [PRINT] for three or more consecutive seconds, and then press [OK] to display the print setup menu.
(2) Select [Output timing Setting], and then press [OK].
(3) Select [Immediate] or [At Stability], and then press [OK].

Immediate	Output regardless of the stability/instability of the display.
At Stability	Waits for the display to become stable (stability mark illuminated) before outputting the data.

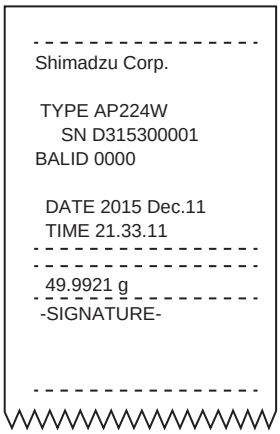
2. Return to the weight measurement mode

Press [POWER].

■ GLP output Function

It is possible to add the balance ID, user name and other information as the header when outputting records of calibration on weighing values by setting the GLP output Function at ON.
The header is not output even when the GLP function is set at ON if the interval timer function is being used.

Printer Example (with the GLP output function set at ON)



1. Call out the calibration menu

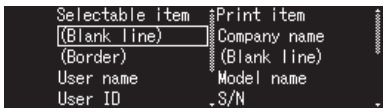
Press [CAL] for three or more consecutive seconds.
The calibration menu will be displayed.

2. Set GLP output at ON or OFF

(1) Select [GLP output], and then press [OK].
(2) Select [on] or [off], and then press [OK].
· Proceed to Step 3 if [on] has been selected.
· Proceed to Step 4 if [off] has been selected.

3. Set the output details

(1) Select [Set], and then press [OK].
(2) Select the items that need to be output with [Select Details] and then press [OK] to add the selected item to the end of the print items listed on the right.



(3) Repeat (2) to set all details that need to be output. To remove this setting from the print items, press [RIGHT], select the relevant print item and then press [OK].
(4) When all items have been selected, press [LEFT].

The details that can be output are listed below:
· Date
· Time
· User name (Logged in user name)*1
· User ID (Logged in user ID)*1
· Company name
· Model name
· S/N (Serial Number)
· Software version
· Balance ID
· MW (Minimum weighing value)
· Blank line
· Ruled line (----------)

Output settings when shipped from the factory:
· Company name
· (Blank line)
· Model name
· S/N
· Balance ID
· (Blank line)
· Date
· Time
· (Ruled line)

*1: Output is not possible unless logged as a specific user
*2: When the minimum weighing value mode is unavailable, output is not possible even if it is set.

4. Return to the weight measurement mode

Press [POWER].

■ Setting the Details to Print

Sets whether to print the date, time, barcode ID or sample ID together with the weight value.

1. Call out the Print menu

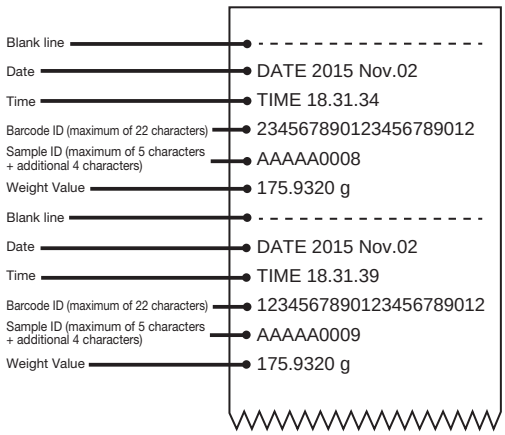
Press [PRINT] for three or more consecutive seconds without releasing it.
Press [OK] to display the Print menu.

Call it out by pressing [MENU].
Press [MENU], select [System settings], press [OK], select [Print], and then press [OK]. This will perform the same operations.

2. Set the details to be output

(1) Select either [Print Date/Time], [Print Sample ID], or [Barcode ID], and then press [OK].
(2) Select [on] or [off], and then press [OK].

Print example when all of the [Print Date/Time], [Print Barcode ID] and [Print Sample ID] parameters have been set at [ON].



The barcode ID does not display on models that are not compatible.

Barcode ID input
It is possible to input the barcode ID (maximum of 22 characters) with the use of a barcode reader.
Make sure the reading of the ID has been completed with the barcode reader before output.
Alternatively, it is also possible to pre-input the barcode ID in advance from a keyboard by entering it in [Input Character String] and pressing the [ENTER] key.

3. Return to the weight measurement mode

Press [POWER].

Connecting USB Devices (W Series only)

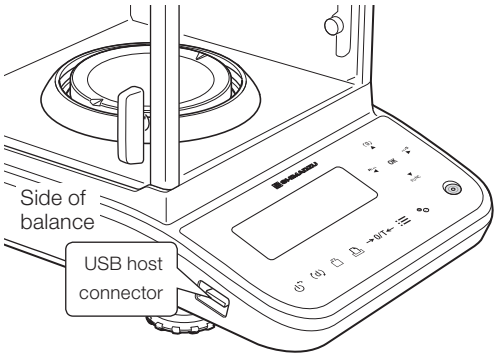
It is possible to transfer calibration values record and measurement values to a USB memory by connecting a USB memory, and to transmit commands to the balance by connecting a USB keyboard or USB barcode reader, etc..

Connection Method

1. Switch off the power to the balance and the printer

2. Connect the USB I/O equipment to the [USB Host] connector on the right side of the balance.

3. Switch on the power to the balance



USB equipment that can be connected, and their applications

Equipment Name	USB memory	USB keyboard	USB barcode reader	USB hub
External				
Application	For saving weight value and sensitivity calibration records	For operating menus with keyboard data entry	Bulk data input	USB equipment multi-connector
Reference Page	P.132	P.134	P.135	---

Precautions when connecting USB memories

· Check to make sure that the mark indicating that a USB memory has been connected is displayed at the top of the balance's screen when USB memories are connected.
If not displayed, it could mean that the memory has not been connected correctly.

· Make sure that USB memories equipped with an access LED lamp that have been formatted in the FAT32 format are used, and never remove them from the connector during access (when the LED lamp is blinking).

Make sure USB equipment is connected correctly

Connect and disconnect the cable carefully. Check the direction and shape of the connector before plugging it in, and make sure that it is straight when plugged in. Exerting excessive force may result in the terminal being damaged.
Pulling on the cable may result in the cable or connector being damaged.
Make sure that protective cap supplied is replaced when the connector is not in use.

■ Saving Weighing Values, Calibration Records and Weighing Screens on USB Memories (W Series only)

◆ Preparing the USB Memory Saving Settings

It is possible to set the format for saving data on the USB memory to either the printing format (txt format) or the CSV format.

1. Call out the Save memory setting

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Save memory setting], and then press [OK].

2. Set the data to be stored on the USB memory

(1) Select [Save Weighing Values on USB Memory] or [Save Records of Calibration on USB Memory], and then press [OK].
(2) Select [on] or [off], and then press [OK].

File name for saving data on USB memories
Files are output with the names [XXXYYYYMMDDhhmmss(_?).file extension].
Files will be saved under the [XXXYYYYMMDDhhmmss(?).file extension] name.
XXX: CAP = Weighing screen, YYYY: Year, MM: Month, DD: Date, hh: hour, mm: minute, ss: second.
(?): (? in the file name: There are cases in which additional numbers are added.)
File extension: txt or CSV

◆ Saving the weighing values and sensitivity calibration records on the memory.

Sets whether the weighing values and sensitivity calibration records are to be saved on the memory or not.

1. Call out the Save memory Settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Save memory Settings], and then press [OK].

2. Set the format for saving data on the USB memory

(1) Select [USB Memory Storage Format], and then press [OK].
(2) Select the storage format from [Print Format] or [CSV Format], and then press [OK].

◆ Saving the Weight Values onto the USB Memory (Screen capture Function)

It is possible to save images (BMP format) of the weight screen and save them onto USB memories.

1. Call out the Print

(1) Press [MENU] on the weight display, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Print], and then press [OK].

2. Set up the screen capture function

(1) Select [Screen capture], and then press [OK].
(2) Select either [on] or [off], and then press [OK]. Setting this to [ON] enables images of the weight screen to be saved onto USB memories.

3. Save the weight screen

Press [PRINT] with the weight value that is to be saved displayed. This is a useful function as it enables the information displayed on the screen to be saved so that measurement records can be checked later.

◆ Outputting Data Saved on the Built-in Memory to USB Memories

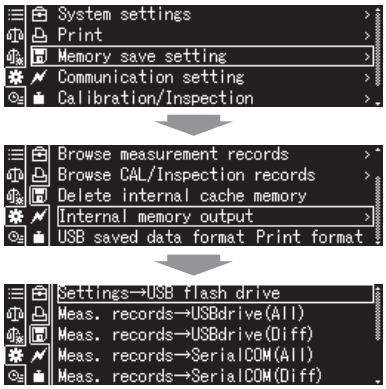
Timing for Outputting Data to the Built-in Memory
Data is output to the built-in memory on a constant basis, but to the USB memory only when the setting has specified.

1. Call out the Save memory Settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [Memory save setting], and then press [OK].

2. Set built-in memory output

(1) Select [Internal memory output], and then press [OK].
(2) Select any of the output methods, and then press [OK]



When the data saved on the internal memory is to be deleted
Select the [Memory Saving Setup] menu, select the [Delete Internal Memory (Password) (Deletes All Data)], and then press [OK]. A prompt requiring the administrator authorization (password) will be displayed. Enter the administrator's password and then press [OK] to delete all of the data stored on the internal memory.
☞ [Deleting the Contents of the Built-in Memory] (P.74)

Output Method	Output Details	Output Destination
Setting Data →USB Memory	Setting Data	USB Memory
Weighing value →USB Memory (All)	All weighing values	USB Memory
Weighing Value →USB Memory (Deviations Only)	Deviating weighing values	USB Memory
Weighing Value →Serial Communication (All)	All weighing values	Serial Communications
Weighing Value →Serial Communication (Deviations Only)	Deviating weighing values	Serial Communications
Record of Calibration →USB Memory (All)	All records of calibration	USB Memory
Record of Calibration →USB Memory (Deviations Only)	Deviating records of calibration	USB Memory
Record of Calibration →Serial Communication (All)	All records of calibration	Serial Communications
Record of Calibration →Serial Communication (Deviations Only)	Deviating records of calibration	Serial Communications

What does [Deviation] mean?
The deviation functions enables the previous data to be recorded so that only the new measurement data is output.

3. Return to the weight measurement mode

Press [POWER].

File Names Output to the USB Memory
Files are output with the names [XXXYYYYMMDDhhmmss(_?).file extension].
XXX: WEI = Weighing value, CAL = Record of Calibration, SET = Setting information, CAP = Weight Screen
YYYY: Year
MM: Month
DD: Date
File extension: txt or CSV

Operating the Balance with a USB Keyboard

◆ Key Entry Using USB Keyboards

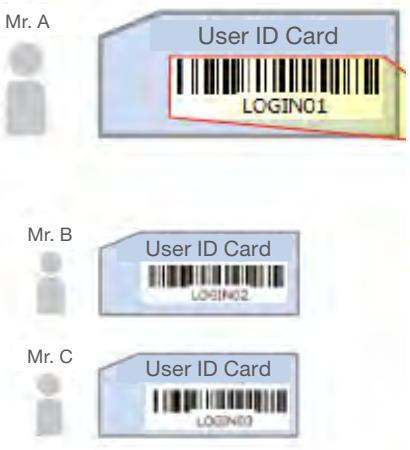
The USB keyboard keys that correspond to the balance keys are listed below.
USB keyboards are effective when numerals and characters need to be entered. This simplifies key operations for the balance, and enables both data input and menu operations.

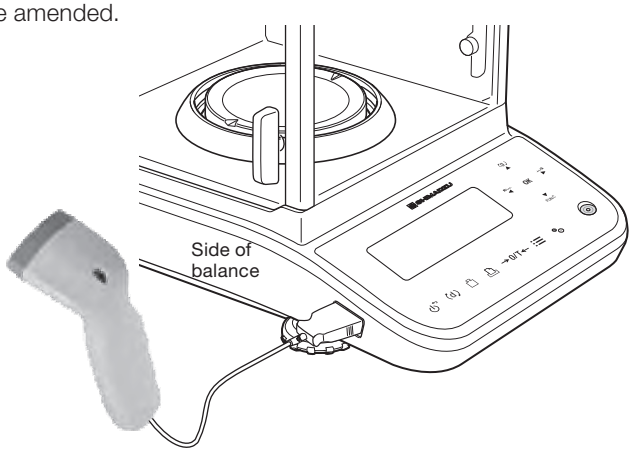
USB Keyboard Keys	Corresponding Balance Keys
0 - 9	Values selected with [▲] and [▼], and set with [OK]
Alphabet, SPACE, symbols, etc.	* Used for entering character data.
Enter	[OK]
Backspace	[◀]
Delete	[▶]
Arrow Keys	[▲] [▶] [◀] [▼]
ESC	[POWER]

Transferring Data to the Balance with the Use of USB Barcode Readers

It is possible to transfer data entered with a keyboard to the balance with the use of USB barcode readers. Simply reading the barcode enables units to be amended and applied measurements to be automatically converted.
It is also possible to manage sample IDs with barcodes.
* Only the g, mg, ct and mom units can be amended.

Example of the User Log-in Function

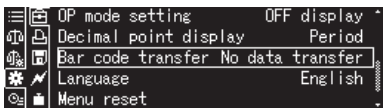




It is necessary for all users to enter passwords when using the log-in function.
The use of a barcode reader enables the barcodes used for managing all users to be read so that log-in is possible without entering passwords.

◆ Set up barcode transfer

It is possible to recognize data received from a barcode reader connected to the balance with a USB cable as balance commands. The method of transferring data that is loaded from the barcode reader needs to be set in advance.



1. Call out the System settings

(1) Press [MENU] while in the weight measurement mode, and then press [LEFT].
(2) Select [System settings], and then press [OK].
(3) Select [System settings], and then press [OK].

2. Set the method of transferring barcode data

(1) Select [Bar code transfer] and then press [OK].
(2) Select either [Transfer All], [Transfer All Except Commands] or [No data transfer], and then press [OK].

Transfer All	Outputs the data to a personal computer via the USB device or RS-232C without the balance processing it.
Transfer All Except Commands	The data is recognized as commands for the balance. Data that cannot be recognized as commands is output to the personal computer.
No Transfer	The data is recognized as commands for the balance. Data that cannot be recognized as commands is ignored.

3. Return to the weight measurement mode

Press [POWER].

Serial Communication Function Errors
See [Serial Communication Function Troubleshooting] (P.124) for details on serial communication function errors.

Troubleshooting

Problem	Cause	Recovery	Remarks
Nothing is displayed on the screen	• Is the power cord unplugged? • Is the main power breaker switched off? • Does the voltage match?	Check the power supply and voltage, and make sure the connections are correct.	P.19
The display stays the same even when a sample is placed on the pan	Is the pan positioned correctly?	Make sure the pan is positioned correctly.	P.15
The display flickers, and [redacted] (Stability Mark) is not displayed	Has the balance been installed in an unstable location?	Remove the effects of vibrations and air flows. Install the balance on a firm base.	P.15
	Is the sample overlapping the edge of the pan?	Make sure the sample does not overlap the edge of the pan.	—
	Is something other than the sample coming into contact with the pan?	Make sure that nothing other than the sample comes into contact with the pan.	—
	Are the glass draft shields open?	Close all glass draft shields and read the display again.	—
The measurement results are incorrect	Has adjustment been performed?	Perform adjustment.	P.34
The weight mark continues to blink	There is a chance that changes in the installation environment have drastically misaligned the zero point. Or, a weighing sample has been placed on the pan.	Sensitivity calibration won't start. Check to make sure that nothing has been placed on the pan, and then perform sensitivity calibration manually by pressing [CAL]. Or, press [POWER] and unplug the AC adapter with [STAND-BY] displayed, and then plug in the adapter and press [POWER] again. Sensitivity calibration will be performed automatically.	P.41

Error Messages

Error Display Timing	Message Display	Cause	Recovery	Remarks
When an Ionizers is in Use	Ionizer Error • Ionizer communications cable is disconnected Check the above • Ionizer AC adapter is disconnected • Ionizer power switch is off	Ionizer connections cannot be confirmed	Connect the ionizer's AC adapter correctly. Switch on the power to the ionizer. Connect the ionizer correctly to the balance.	P.108
	Ionizer Error Internal malfunction. Switch off the power and cease using the ionizer. Contact your nearest service agency.	The Ionizer might be broken.	Press [POWER] and return to the weighing mode display. Switch off the power to the ionizer and contact your nearest service agency.	—
When the balance is in use	Internal Error Internal malfunction. Switch off the power and cease using the balance. Contact your nearest service agency.	The Balance might be broken.	Cease using the balance and contact your nearest service agency.	—
When Calibration is being performed with the Internal Weight	If something has been placed on the pan, remove. In addition, unplug the AC adapter and then plug it in again.	The weighing value may be not zero value during calibration.	Remove whatever has been placed on the pan, and make sure the pan is in the correct position. If the message still displays, unplug the AC adapter from the balance. Then, plug it in again and press [POWER]. In the case displayed message, contact your nearest service agency.	P.36
	Calibration error with the Internal weight.	In the semi-micro models, the connect cable is not fixed correctly with the power supply unit.	Insert the connector of the cable in the power supply unit correctly, and fix the connector with the fixed screws.	P.19
	Check the following and try again. • Do not touch the balance during calibration. • Avoid the following installation environments with vibrations, with airflow, with extreme temperature changes.	The balance cannot be calibrated by unstable weighing value.	Set the stage, the shield case in the semi-micro balance. Confirm the balance's location, and use the balance after the warming-up.	P.5 P.16 P.20
	Check the following and try again. • Remove whatever has been placed on the pan. • Unplug the AC adapter, and then plug it in again.	The zero point is misaligned during the previous calibration.	In order to cancel the error message, Press [POWER] to display [STAND-BY], and then remove the sample from the pan. Then unplug the balance's AC adapter and plug it in again, and press [POWER].	P.36
	Check the following and try again. • Do not touch the balance during calibration. • Unplug the AC adapter, and then plug it in again.	The weight span is misaligned with the zero point during the previous calibration.	In order to cancel the error message, press [POWER] to display [STAND-BY], unplug the balance's AC adapter and plug it in again. Press [POWER]. When performing sensitivity calibration the next time, avoid touching the balance.	—
	Could be a malfunction with the internal equipment. Contact your nearest service agency.	There is a chance that a malfunction has occurred with the internal weight.	Cease use of the balance, and contact your nearest service agency.	—

* In the case a message not to correspond to as above or an error occurs, contact your service agency.

Maintaining the Balance

⚠ CAUTION

Instructions **Prior to commencing maintenance, press [POWER] to display [STAND-BY] and unplug the balance's AC adapter.**

If you carry out maintenance with the AC adapter left plugged into the power outlet, you may sustain an electric shock.

Instructions **Do not touch the pan support shaft**

Failure to observe this may result in damage to the balance.

Instructions **Make sure dust or dirt does not enter the hole on the pan support shaft**

Make sure dust or dirt does not enter the hole in the pan supporter when cleaning it. Failure to observe this may result in malfunctions.

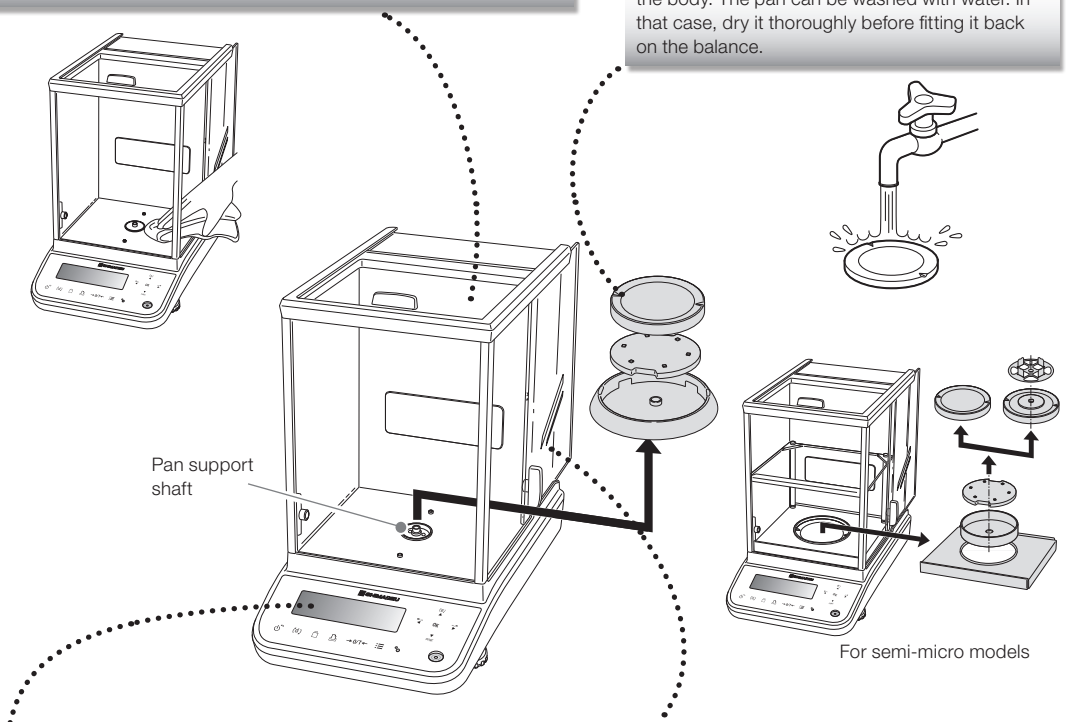
Main Balance Unit

Soak a soft cloth with a neutral detergent, wring the cloth out thoroughly, and then wipe the balance.

When cleaning the inside of the weighing chamber, always remove the pan, the pan supporter, the shield plate, the inner draft shield plate (option), the stage, the shield case and the multi-stand.

Pan

When cleaning the pan, be sure remove it from the body. The pan can be washed with water. In that case, dry it thoroughly before fitting it back on the balance.



Display / Operation Keys

Do not use organic solvent and pharmaceutical detergents or chemical cloths. Failure to observe this may result in damage to the coating or display panel. Use a protection cover if using the balance in an environment where it will be readily subject to soiling.

Glass Draft Shield

Remove the glass draft shield to clean the door rails and replace the shield.

[Removing the Glass Draft Shield] (P.139)

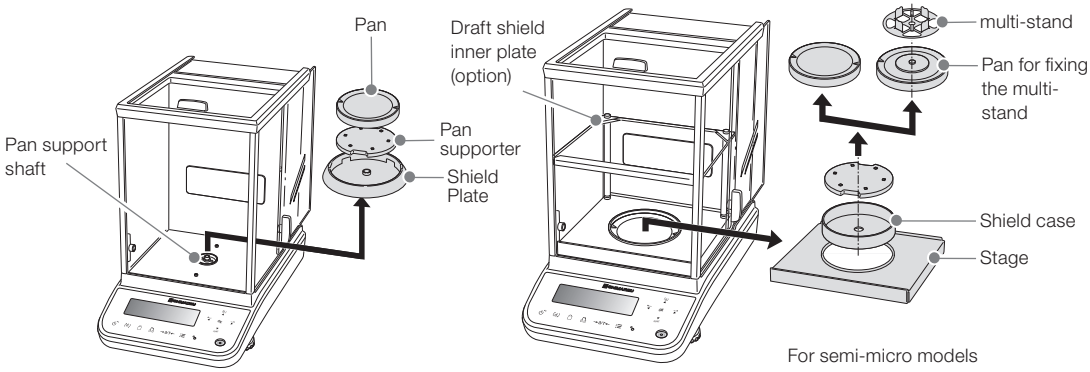
■ Removing the Glass Draft Shield

It is possible to remove the glass draft shield to clean the door rails.

⚠ CAUTION

Handle the glass door with due care.
- Take care when handling the glass door so as not to crack it.
- Take care not to injure your hands on the door rail.
- Exercise due care when handling broken glass

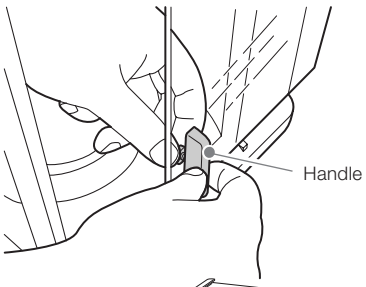
1. Remove the pan, the pan supporter, the shield plate, the inner draft shield plate (option), the stage, the shield case and the multi-stand.



2. Turn the knob on the inner side of the handle to remove the handle

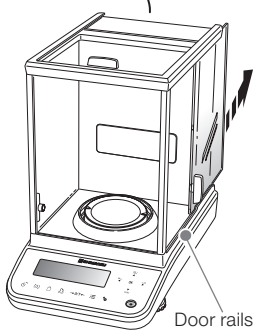
⚠ Prohibit

Do not touch the pan support shaft.
This could damage the balance.



3. Pull the glass door out from the rear

Replacing the door rails
It is possible to replace the door rails on the left and right of the glass draft shield in the event of them wearing down or it being impossible to remove soiling. The door rails are easily removed by lifting them upwards from the bottom.



4. Install the glass door following the steps in reverse order when it is removed

⚠ CAUTION

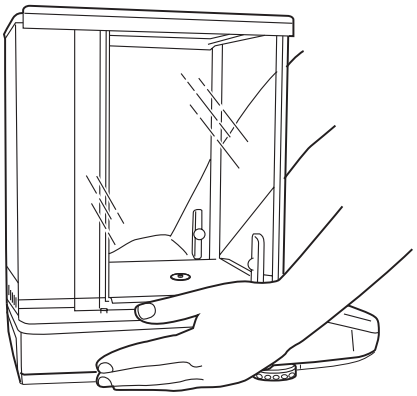
When fitting the glass door, be sure to fit the knob.
If you forget to attach the knob, the glass door could fall off.

■ Moving the Balance to Other Locations

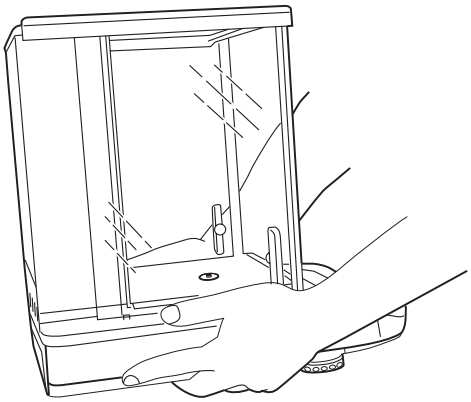
Carrying by Hand: First, be sure to remove the pan, the pan supporter the shield plate, the inner draft shield plate (option), the stage, the shield case and the multi-stand from the inside of the weighing chamber. Next, hold the balance firmly with both hands and then move it.

Carrying Using other Methods: Use the packaging that it was delivered in.

1. Grip the balance with both hands as shown in the illustration.



2. Place your fingers underneath it, and lift it gently.



⚠ CAUTION

The balance is a precision instrument. Handle it with care and protect it from impact.

Inspection

Since the balance may develop error due to its application and environment of use, it must undergo both daily and Periodic inspections in order to properly maintain its required performance and functions.
However, since the management standards governing the content of these inspections (methods, judgment criteria, etc.) will differ depending on the purpose of use, management goals, they must be determined by the customer.
If the content of the inspections is made too lax, the risk that you will continue to use the balance without discovering an abnormality increases, but if it is excessively strict it may reduce working efficiency, so you should take the care to devise balanced inspection content, considering the risks, the performance that is required in the work to be done.
This section indicates the guidelines for daily inspections and Periodic inspections.
Please use these guidelines for reference when deciding the practical details of your own inspections.

■ Daily Inspections

The person who actually uses (manages) the balance must carry out inspections on a daily basis (prior to use).
The points inspected in daily inspections can, if you like, be reduced to the minimum necessary.
Here are some examples for your reference.

	Daily Inspection [Reference Example 1]	Daily Inspection [Reference Example 2]
Frequency of inspection	Once per day	Once to several times per day (as required)
Inspection timing	Before the start of work	Before the start of work and when performing important weighing operations
Method of inspection	Observe the instrumental error at a single point. Set the "observation point" as a point a little above the upper limit value of the range in which the balance is actually used to weigh.	Observe the instrumental error at a single point. As the point to be observed before the start of work, set a point a little above the upper limit value of the range in which it is possible that actual measurements will be made.
Criterion of judgment	To be accurate to within ±5 at one decimal place to the right of the digit where accuracy is required when actually weighing with the balance.	To be accurate to within ±5 at one decimal place to the right of the digit where accuracy is required when actually weighing with the balance.

What is instrumental error?
This is the amount of the discrepancy between the value indicated by the balance and the correct value. It is assessed as the difference between the weight reading when a weight that corresponds to the observation point is weighed on the balance and the actual weight value of that weight. ☞ [About Weights] (P.143)

■ Periodic inspections

Perform regular inspections (once per year, etc.). It is necessary for regular inspections to be carried out stringently for all elements, including performance and functions. It is also possible for a calibration certificate containing the JCSS logo to be issued for areas of uncertainty. It is recommended that you request a Shimadzu service agent to carry out the actual inspections. See the Shimadzu website (http://www.shimadzu.com/an/balance/index.html) for further details.
An overview is given below.

	Overview of Periodic inspection [Reference Example]
Frequency of inspection	Once a year
Inspection timing	Any day during the established month
Method of inspection	Check for abnormalities in the following functions and external appearance. • Display panel • Menu operation keys / operation keys • Pan • Level Check the following aspects of performance. • Repeatability: Weigh a weight that corresponds to approximately half of the weighing capacity of the balance five to ten times and assess the dispersion in the weight readings obtained. • Eccentric error: Assess the difference in the weight readings obtained when a weight corresponding to one third to half of the weighing capacity of the balance is placed in the center of the pan and at a position shifted from the center by a specified distance. • Instrumental error: Decide on four or more observation points and assess the difference between the values obtained when weights corresponding to these points are weighed on the balance and the actual weight values of the weights.
Criterion of judgment	Users are required to determine the criterion of judgment as a basic principle in accordance with the installation environment and required level of accuracy. For example, the general judgment criterion is the value actually measured with the balance with the required level of accuracy set within +/-5 of the final digit.

Equipped with a menu to support the Periodic inspections listed above.
☞ [Performing Periodic inspections] (P.45)

About Weights

In order to establish and maintain balance performance, it is necessary to accurately align the balance sensitivity with the weight in use, and to check that this has been done.
Uses weights for some of the calibrations and Periodic inspections that are performed in the location where the balance is actually used. These weights must be prepared in advanced and carefully managed.
☞ [Adjustment and Tests with External Weights] (P.37)
☞ [Periodic inspections (W/X series only)] (P.43)

■ Types of Weight and Their Selection

There are many types of weights. Select the appropriate weights for the specifications of your balance by referring to the following table.

◆ Selecting Weight Classes

It is common for the various types of main weights to be classified into difference classes in accordance with their level of accuracy. Class E2 weights are to be used with the AP Series.
Class E2 Weights Minimum Display: Less than 1mg, Resolution*: Approximately 1/1,000,000 or more,
Generic Name: Analytical Balance
* Resolution refers to (Minimum Display) ÷ (Weighing Capacity).

◆ Selecting How Many Grams to Use for Weights

It is recommended that weights that are close to the weighing capacity of the balance are chosen when selecting the weights to use for balance calibration. The recommended weights with regard to the weighing capacity of the balance are listed below.

Balance Weighing Capacity	Recommended Weights for Calibration
52g	50g
102g	100g
120g	100g
135g	100g
220g	200g
320g	300g

For information on the range of weights that can be used to calibrate balances (i.e. values that can be entered as the weight value) see "Adjustment range with weights" in [Specifications]. ☞ [12. Specifications] (P.144)
It is also possible to calibrate a balance with a weight that is not close to the weighing capacity of the balance.
However, if you do this, when weighing in the range that exceeds the weight value that was used for calibration, the performance may deteriorate proportionately (the instrumental error may become larger).

■ JCSS Weight Calibrations

The weights must be correctly managed in order to ensure the correct management of the balance. Shimadzu recommends that weights that have received JSCC calibrations are used to guarantee correctly managed weights. It is also necessary to perform (update) JCSS Calibration periodically. Only authorized offices are permitted to perform JCSS Calibrations, and Shimadzu is an authorized office. Contact our sales offices, retail outlets or service agents for further details.
A detailed explanation is also provided on the Shimadzu website (http://www.shimadzu.com/an/balance/index.html) and is available for access.

12 Specifications

Series Name	W Series					
Model	AP135W	AP125WD	AP225WD	AP124W	AP224W	AP324W
P/N	S321-74000-10	S321-74000-11	S321-74000-12	S321-74000-01	S321-74000-02	S321-74000-03
Weighing Capacity	135g	120g/52g	220g/102g	120g	220g	320g
Minimum Display	0.01mg	0.1mg/0.01mg	0.1mg/0.01mg	0.1mg	0.1mg	0.1mg
Calibration Weight	Built-in					
Range of External Weights for Calibration Purposes (Recommended weight)	45~135.0009g (100g)	45~120.0090g (100g)	95~220.0090g (200g)	45~120.009g (100g)	95~220.009g (200g)	95~320.009g (300g)
Repeatability (Standard Deviation)	0.05mg	0.1mg/0.02mg	0.1mg/0.05mg	0.1mg	0.1mg	0.15mg
Minimum weighing value (*1)	30mg			200mg		
Linearity	±0.1mg	±0.2mg/ ±0.05mg	±0.2mg/ ±0.1mg	±0.2mg		±0.3mg
Response Time (*2)	Approx. 8 sec.	Approx. 2 sec. / Approx. 8 sec.		Approx. 2 sec.		
Temperature/ Humidity Range During Use	5~40°C, 20~85% (*3)					
Sensitivity Temperature Coefficient	±2ppm/°C (10~30°C)					
Pan Size	Approximately 91DIA. mm (*4)					
Main Unit Dimensions	Approximately 212(W) × 411(D) × 345(H)mm			Approximately 212(W) × 367(D) × 345(H)mm		
Weight	Approximately 7.9 kg			Approximately 7.0 kg		
Display	Organic EL Display (Dot Matrix)					
Rated Power Supply	DC 12V , 1.0A					
Degree of Soiling	2					
Overvoltage Category	II					
Altitude	Maximum 2,000m					
Installation Environment	Limited to Indoor Use					
Input Power Supply (AC Adapter)	Either of following (*5) AC100-240V, 300mA 50/60Hz AC100-240V, 400mA 50/60Hz AC100-240V, 600mA 50/60Hz					
I/O Terminals	RS232C(D-sub9P Plug) , USB host (Type A) , USB device (Type B), Ionizer					

*1 USP 41 compliant. The values were taken from testing at Shimadzu factories using weights that were approximately 5% of the balance capacity. The minimum weighing value must be measured in the environment where the balance will actually be used because the installation environment and conditions impact that minimum value

*2 The response time is a representative value.

*3 No condensation.

*4 The size of the pan is the diameter of outer diameter.
The term “dimensions” refer to the side of the flat surface of the pan. As the pan is tapered, the other size is slightly longer.

*5 Depending on the attached AC adapter.

* The model names and specifications, etc., listed herein are subject to alteration without prior notice.
Access the Shimadzu website (http://www.shimadzu.com/an/balance/index.html) for the latest information.

Series Name	X Series			Y Series		
Model	AP124X	AP224X	AP324X	AP124Y	AP224Y	AP324Y
P/N	S321-74000-04	S321-74000-05	S321-74000-06	S321-74000-07	S321-74000-08	S321-74000-09
Weighing Capacity	120g	220g	320g	120g	220g	320g
Minimum Display	0.1mg					
Calibration Weight	Built-in			None		
Range of External Weights for Calibration Purposes (Recommended weight)	45~100.009g (100g)	95~220.009g (200g)	95~320.009g (300g)	45~120.009g (100g)	95~220.009g (200g)	95~320.009g (300g)
Repeatability (Standard Deviation)	0.1mg		0.15mg	0.1mg		0.15mg
Minimum weighing value (*1)	200mg					
Linearity	±0.2mg		±0.3mg	±0.2mg		±0.3mg
Response Time (*2)	Approximately 2 seconds					
Temperature/ Humidity Range During Use	5 ~ 40°C, 20 ~ 85%(*3)					
Sensitivity Temperature Coefficient	± 2ppm/°C (10 ~ 30°C)					
Pan Size	Approximately 91DIA. mm (*4)					
Main Unit Dimensions	Approximately 212(W)×367(D)×345(H)mm					
Weight	Approximately 7.0 kg			Approximately 6.5 kg		
Display	Organic EL Display (Dot Matrix)					
Rated Power Supply	DC 12V , 1.0A					
Degree of Soiling	2					
Overvoltage Category	II					
Altitude	Maximum 2,000m					
Installation Environment	Limited to Indoor Use					
Input Power Supply (AC Adapter)	Either of following (*5) AC100-240V, 300mA 50/60Hz AC100-240V, 400mA 50/60Hz AC100-240V, 600mA 50/60Hz					
I/O Terminals	RS232C (D-sub9P Plug), USB device (Type B), Ionizer			RS232C (D-sub9P Plug), USB device (Type B)		

*1 USP 41 compliant. The values were taken from testing at Shimadzu factories using weights that were approximately 5% of the balance capacity. The minimum weighing value must be measured in the environment where the balance will actually be used because the installation environment and conditions impact that minimum value

*2 The response time is a representative value.

*3 No condensation.

*4 The size of the pan is the diameter of outer diameter.
The term “dimensions” refer to the side of the flat surface of the pan. As the pan is tapered, the other size is slightly longer.

*5 Depending on the attached AC adapter.

* The model names and specifications, etc., listed herein are subject to alteration without prior notice.
Access the Shimadzu website (http://www.shimadzu.com/an/balance/index.html) for the latest information.

Maintenance Parts

■ List of Maintenance Parts

Part	Parts No.	Remarks
Pan	S321-71052	
Pan Supporter	S321-74011-01	Including rubber
Shield Plate	S321-74027-01	Excluding semi-micro models
AC Adapter	S321-73901	
Level Screws	S321-71069-01	
Right Glass Draft Shield ASSY	S321-71043-22	Including handle and Knob
Left Glass Draft Shield ASSY	S321-71043-21	Including handle and Knob
Top Glass Draft Shield ASSY	S321-71041-21	Including handle and Knob
Front Glass ASSY	S321-62931-02	
Right Door Rails	S321-73614-02	
Left Door Rails	S321-73614-01	
Set of 5 Protection Covers	S321-73668-01	
Set of 4 Rubber Fittings for the Pan Supporter	S321-62984-03	
Set of 3 Knobs for the Glass Draft Shield	S321-62985-21	
Adapter Cable Holder	S072-60330-02	Excluding semi-micro models
Cable Holder	S072-60639-02	Only on semi-micro models, for fixing the cable to the power pack.
Instruction Manual	S321-78214	This manual
Stage	S321-74063-01	Semi-micro models only
Shield Case	S321-74062-01	Semi-micro models only
Multi Stand	S321-74057-01	Semi-micro models only
Pan for fixing multi-stand	S321-74064-01	Semi-micro models only
Power pack	S321-74033-01	Semi-micro models only

■ List of Special Accessories (Options)

Part	Part No.	Remarks
Electronic Printer EP-100	S321- 73900-11	With Statistical calculation function, normal paper, can be used in combination with the serial communication function. Date and time output.
Electronic Printer EP-110	S321- 73900-12	With Statistical calculation function, normal paper, can be used in combination with the serial communication function, date and time. Organic EL display, time modification prevention, customized printing.
Specific Gravity measurement Kit SMK-601	S321-60550-03	
STABLO®-AP Ionizer	S321-73700-02	Supplied with a one-touch ionizer attachment/detachment stand
Draft shield inner plate	S321-74150-01	
RSIO Conversion Cable	S321-75705-41	For connecting printer EP-80, EP-90 (Specially-designed for AP)
USB Cable set	S321-71730-41	USB Cable (A-B Type)

Electronic Balance Inspection Methods

■ Classes and Tolerance

1. Decide upon the class and inspection tolerance (permissible error range).

Check Table 1 and Table 2 for combinations of the balance's minimum d display and capacity to decide upon the class, and then set the inspection tolerance in accordance with the class.

Table 1

Minimum d Display	Largest Maximum d Display = Capacity / d			
	≤5,000	≤50,000	≤500,000	>500,000
1g	4	3	2	1
0.1g	4	3	2	1
0.01g	3	3	2	1
0.001g	2	2	2	1
0.0001g	2	2	2	1
0.00001g	AA	AA	AA	AA

Table 2

Class	Load Indicated with the Largest Maximum d Display = Load Value / Minimum d Display								
	≤500	≤2,000	≤5,000	≤20,000	≤50,000	≤200,000	≤500,000	≤2,000,000	>2,000,000
4	±5d	±10d	±15d						
3	±5d			±10d	±15d				
2	±5d					±10d	±15d		
1	±5d							±10d	±15d
AA	±10d							±20d	±30d

2. Repeatability inspection procedure

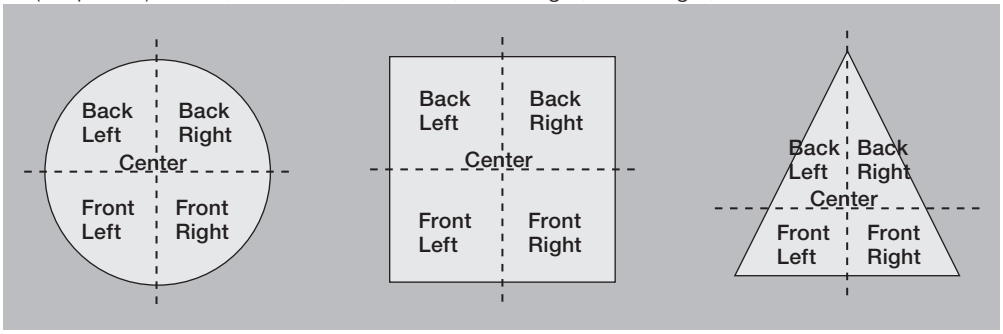
Models with internal weights for calibration purposes are calibrated with those weights.

(1) Weights close to half of the capacity or a single weight with a capacity that exceeds that are to be placed on and removed from the pan five or more times, and records taken of the zero point and the measurement value during the load. (A maximum of two weights may be used if this is impossible.)
Instead of the recording the zero point measurement value, it is acceptable to only record the value during the load if the weight is placed on the pan after it has been set at zero for each display.

(2) Calculate the width (maximum value – minimum value) for each value at the zero point and during load (only the value during load if the zero point was not measured), and if the result is within inspection tolerance, it will be given a pass mark.

3. Corner Load Error Inspection Procedures

(1) Place a single weight between 1/3 to 1/2 of the capacity in sequence on the pan at the positions shown in the illustration below, and then record the measurement values.
(Sequence) Center, Front Left, Back Left, Back Right, Front Right, Center



Place the weight in the center of the pan, and then divide the plan into four and place the weight in the center of each division.
For example, in the event of a circular pan, place the weight half way between the center and edge of the pan.

(2) If the average value of two values with the weight placed in the center of the pan and the difference (corner load error) when the weight is placed anywhere other than the center is within all inspection tolerance values listed in Table 2, they will be given a pass mark. Instead of using the average value of two values with the weight placed in the center of the pan, it is acceptable to calculate the corner load error from the difference between the first time the weight is placed in the center.

4. Instrumental Error Inspection Procedure

(1) Four or more measurement points, including the one close to the capacity, are set. Set these values while referring to the following.
A) A value divided into the average capacity range, or close to it.
B) A point that replaces the inspection tolerance.
C) The load area considered important by the person requesting the inspection.

(2) Place the weights at locations that correspond with the preset measurement points in the following sequence, and record the measurement values. Instead of the recording the zero point measurement value, it is acceptable to only record the measurement value during the load if the weight is placed on the pan after it has been set at zero for each display.

Zero point
First (minimum) measurement point
Second measurement point
Third measurement point
. . . .
Maximum measurement point (close to capacity)
Zero point

(3) Subtract the average value of the first and last zero point values from the measurement values of each measurement point. (Not necessary if the zero point was not measured.)

(4) Calculate the values obtained in the previous step and the difference (instrumental error) between the rated weight of the weight placed on the pan, and if all values are within inspection tolerance, they will be given a pass mark.

Menu Map

The menu map is a diagram that shows the entire system of menu items in an easy-to-understand style.
This is useful for swiftly accessing the menu required.
See ☞ [How to use Menus] (P.28) for details on the menu setting mechanisms and menu operation methods.

■ Using the Menu Map

Menu Map Symbols	Operation Explanations
[UP], [DOWN]	Select the required menu.
[RIGHT], [OK]	Set the selection or move across to the lower level menu.
[LEFT]	Move to the upper level menu.
☞	Refers to the relevant page in the instruction manual.
*	Default settings (when the menus are reset).

Menu Configuration

		Default settings	Items Set for Each User	relevant page in the instruction manual
Mode Selection	Standard measurement	Standard measurement	○ (*1)	☞ P.26
	Piece counting measurement			☞ P.76
	Percent measurement			☞ P.79
	Averaging mode *3			☞ P.82
	Solid specific gravity *3			☞ P.84
	Liquid density *3			☞ P.87
	Add-on mode			☞ P.90
	Formulation mode			☞ P.92
	Recipe preparation (W Series only)			☞ P.95
	Buffer solution preparation (W Series only)			☞ P.98
	Sample preparation (W Series only)			☞ P.99
Menu for Each Applied Measurement	Menus that correspond with the applied measurement in use will be displayed.			☞ P.75
	Statistical calculation			☞ P.101
Measurement setting	Filling	off	○	☞ P.52
	Zero tracking	on	○	☞ P.48
	Zero/tare timing *3	immediate	○	☞ P.49
	Auto zero *3	off	○ (*2)	☞ P.50
	Auto tare	off	○	☞ P.51
	Stability detection range (0.5, 1, 5, 10 count)	1	○	☞ P.54
	Stability mark ON timing *3	Standard	○	☞ P.55
	Unit change	g	○	☞ P.56
	Unit setting *3 (a part of the unit)	g		☞ P.56
	Target measurement	off	○ (*2)	☞ P.102
	Pass/fail evaluation	off	○ (*2)	☞ P.104
	Minimum weight setting	off	○ (*2)	☞ P.106

*1 Only mode selection can be set for each user. The values set for each mode (unit weights for individual measurements, recipe formation, etc.) shared by all users.
*2 Only ON/OFF can be set for each user. Other set values (zero range, target values, etc.) are shared by all users.
*3 Not applicable to a verified balance as a legal measuring instrument in the EU.

System setting	System settings	Date			P.70
		Date output style	YY/MM/DD		P.70
		Time			P.70
		Brightness	3	○	P.71
		Sound	on	○	P.71
		Ion irradiation time (W/X-series only)	10 sec.		P.111
		Balance ID	0000_____		P.69
		Screen saver	10 mins.		P.68
		OP mode setting	OFF display		P.68
		Decimal point display	Period		P.32
		Bar code transfer (W Series only)	No data transfer		P.135
		Language	English		P.72
		Menu reset (Password)			P.59
		Menu setting output			P.61
		Menu lock (Password)	off	○	P.60
	Print	Screen capture	off		P.132
		Interval timer (Averaging output interval)	off		P.127
		Auto print	off		P.125
		Date/time printed	off		P.130
		Bar code ID printed (W Series only)	off		P.130
		Sample ID printed	off		P.130
		Output timing *3	immediate		P.125
	Memory save setting	Save measurement records to USB (W Series only)	on		P.132
		Save calibration records to USB (W Series only)	on		P.132
		Browse weight values *3			P.73
		Browse CAL/Inspection records *3			P.73
		Delete internal memory (Password) (Delete all data) *3			P.74
		Internal memory output *3 (Possible only configuration information output)			P.133
		USB saved data format (W Series only)	Print format		P.132
	Communication setting	RS232C	Standard		P.121
		USB	Standard		P.121
	Calibration/Inspection	CAL key setting	W/X:Internal weight Calibration Y:External weight Calibration *4		P.34
		GLP output			P.129
		Timer CAL (W/X-series only)	off		P.42
		PSC (W/X-series only) *3	off		P.40
		Adjustment of internal weight (W/X-series only) *3	on		P.38
		Periodic inspection (W/X-series only)			P.43
	User setting	Log-in function	off		P.63
		Administrator			P.64
		USER01-10			P.64
Menu history					P.62

*3 Not applicable to a verified balance as a legal measuring instrument in the EU.
*4 Not applicable to verified balance as a legal measuring in Brazil and India.

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