



**EJ-123/EJ-303
EJ-1202/EJ-3002
EJ-54D2
Compact Precision Balance**

INSTRUCTION MANUAL



This Manual and Marks

All safety messages are identified by the following, "WARNING" or "CAUTION", of ANSI Z535.4 (American National Standard Institute: Product Safety Signs and Labels). The meanings are as follows:

 WARNING	A potentially hazardous situation, which if not avoided, could result in death or serious injury.
 CAUTION	A potentially hazardous situation, which if not avoided, may result in minor or moderate injury.



This is a hazard alert mark.

Note This manual is subject to change without notice at any time to improve the product. No part of this manual may be photocopied, reproduced, or translated into another language without the prior written consent of the A&D Company.

Product specifications are subject to change without any obligation on the part of the manufacturer.

Compliance with FCC rules

Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of Class A digital devices pursuant to Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area, it may cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference. (FCC = Federal Communications Commission in the U.S.A.)

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1. INTRODUCTION

This manual describes how the compact precision balances work and how to get the most out of them in terms of performance.

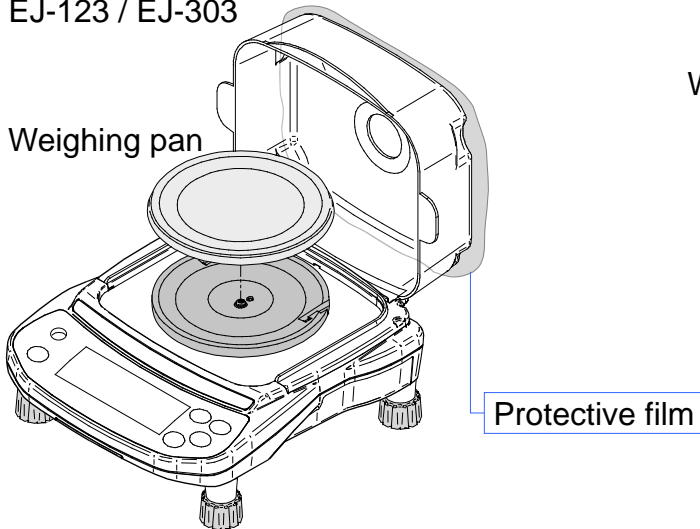
The EJ-123, EJ-303, EJ-1202, EJ-3002 and EJ-54D2 balances have the following features:

- The EJ-123, EJ-303, EJ-1202 and EJ-3002 are high-resolution type electronic balances having a display resolution of 1/120,000 to 1/300,000.
- The EJ-54D2 is a dual-range balance as shown below:
 - Gram mode Weighing capacity 22 g/Minimum display division 0.0002 g
 - Weighing capacity 52 g/Minimum display division 0.001 g
- The EJ-123, EJ-303 and EJ-54D2 are equipped with a breeze break which is provided as standard for more accurate weighing.
- The EJ-54D2 is equipped with a carat pan for weighing jewelry which is provided as standard.
- The balances have a counting function, a percent function, a hold function and an accumulation function.
- The LCD backlight will help with use in a dimly lighted place.
- The balances can be operated with an AC adapter, or 4 x size “AA” batteries for cordless operation.
- An optional USB interface is available for connecting the balance to a personal computer.
- An optional RS-232C serial interface is available for connecting the balance to a printer or personal computer and outputting Good Laboratory Practice (GLP) data.

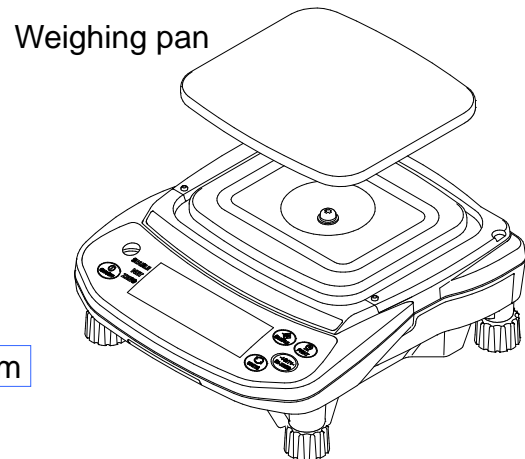
2. UNPACKING

When unpacking the balance, check whether all of the following items are included and remove the protective film for the breeze break and the weighing pan before use:

Main unit
EJ-123 / EJ-303



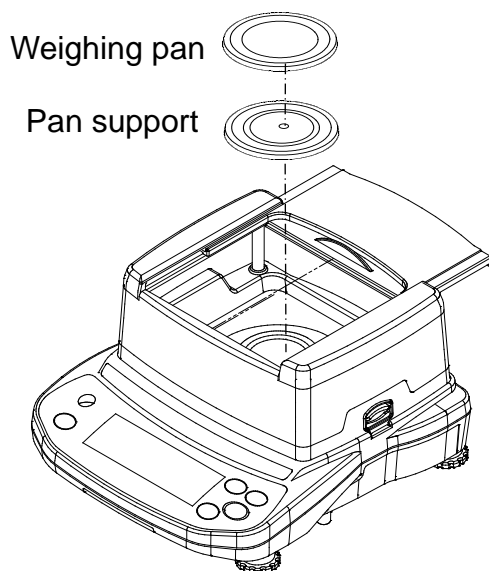
Main unit
EJ-1202 / EJ-3002



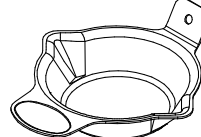
Wind shield cap
(EJ-123 / EJ-303 only)



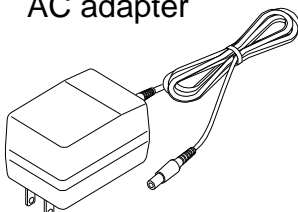
Main unit
EJ-54D2



Carat pan



AC adapter



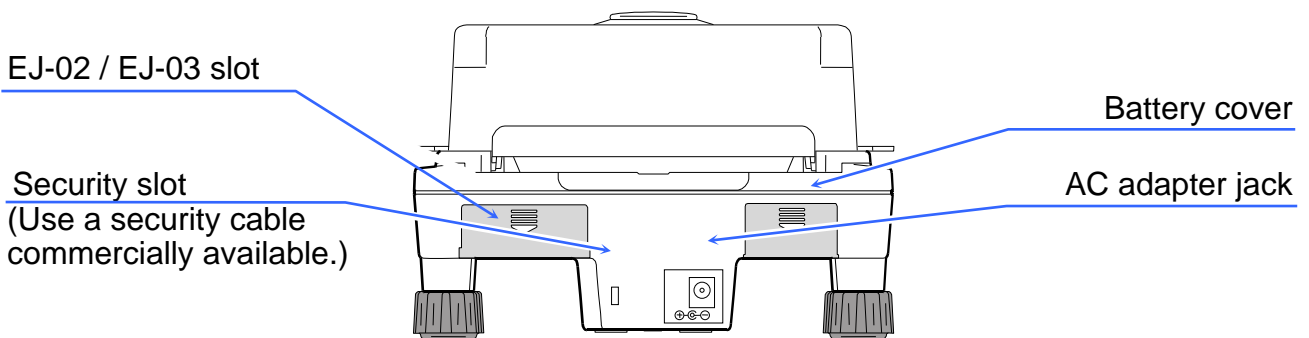
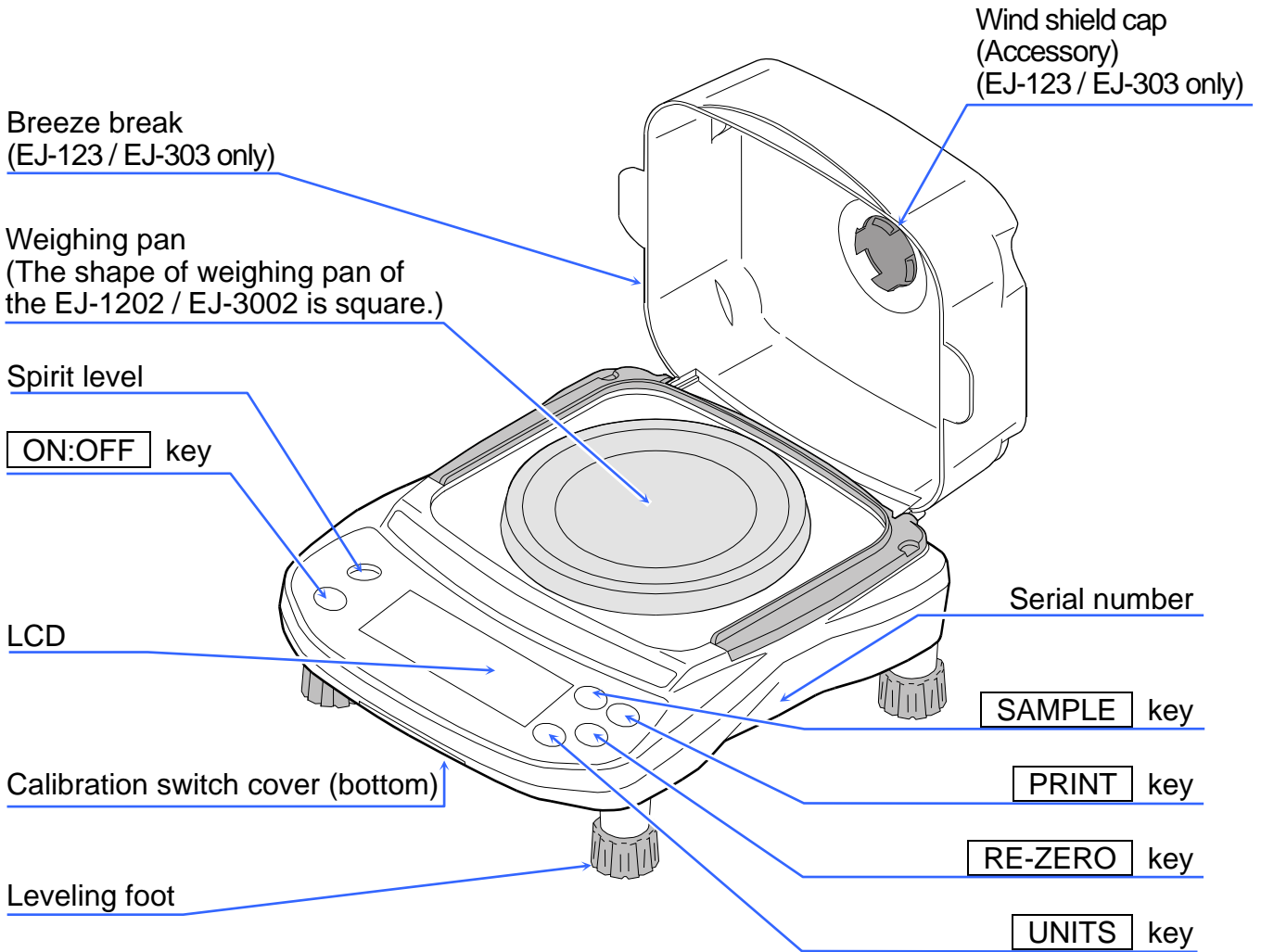
Please confirm that the AC adapter type is correct for your local voltage and receptacle type

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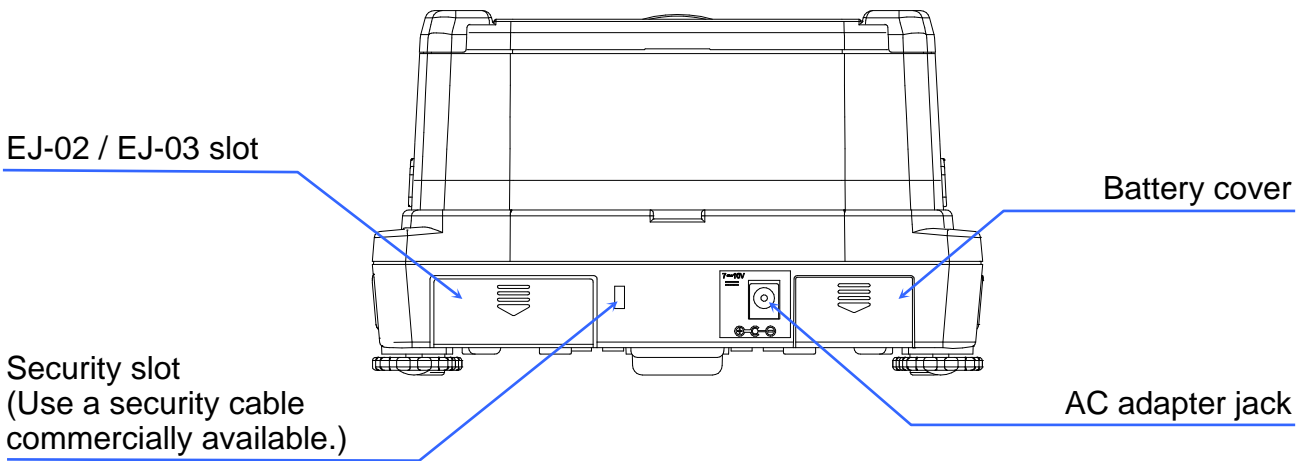
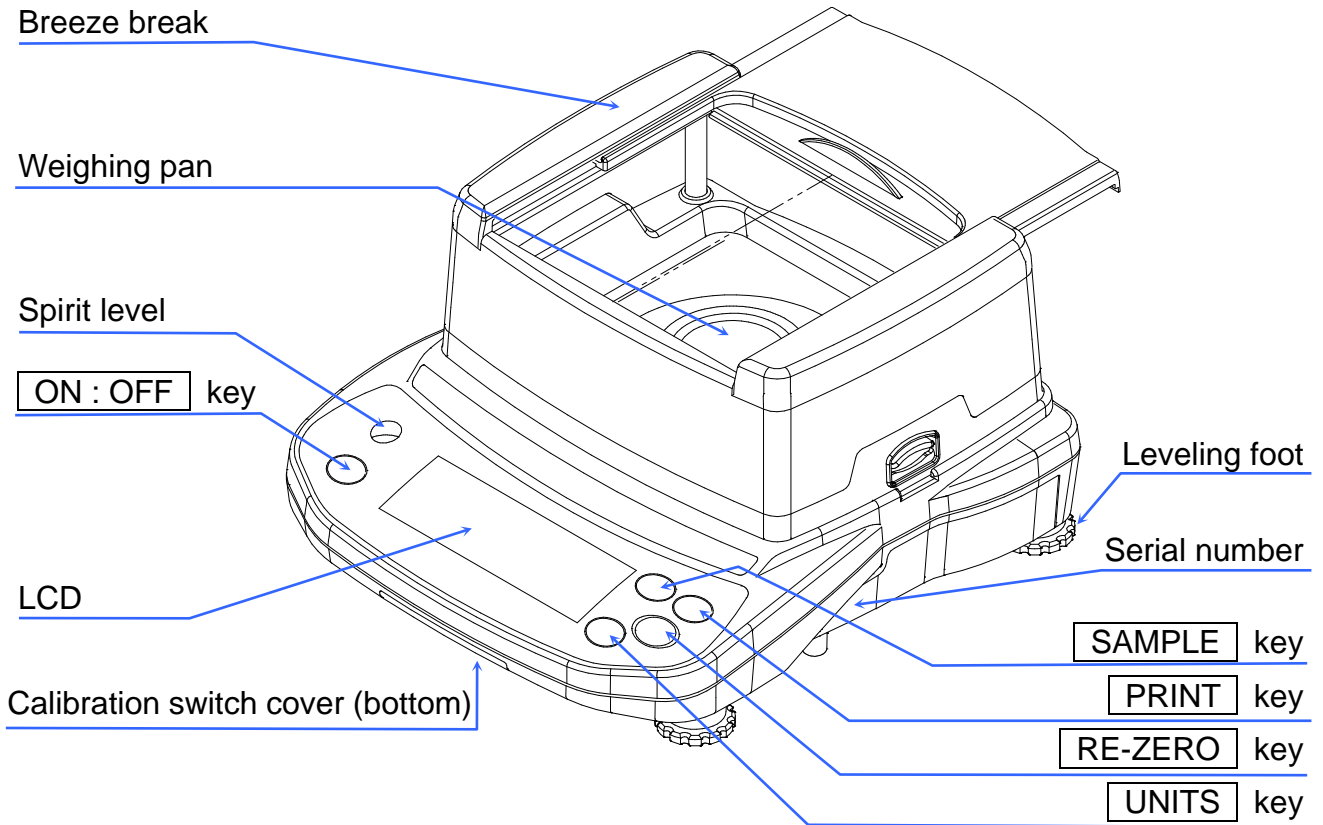


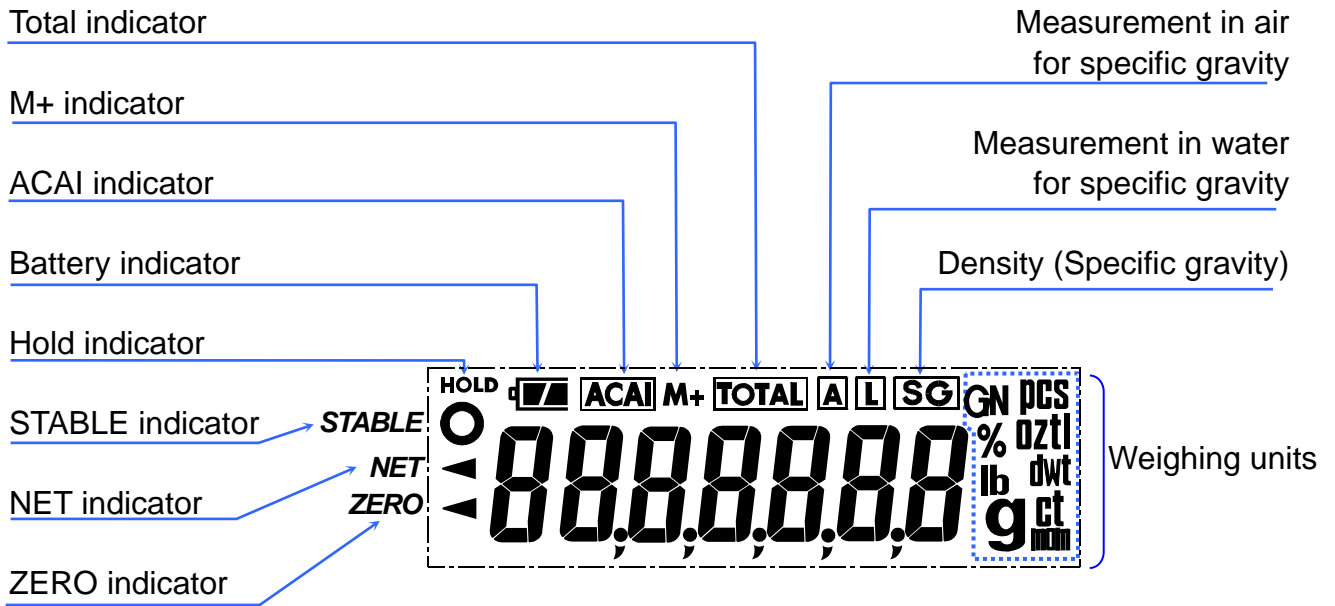
3. PART NAMES AND FUNCTIONS

EJ-123 / EJ-303 / EJ-1202 / EJ-3002



EJ-54D2



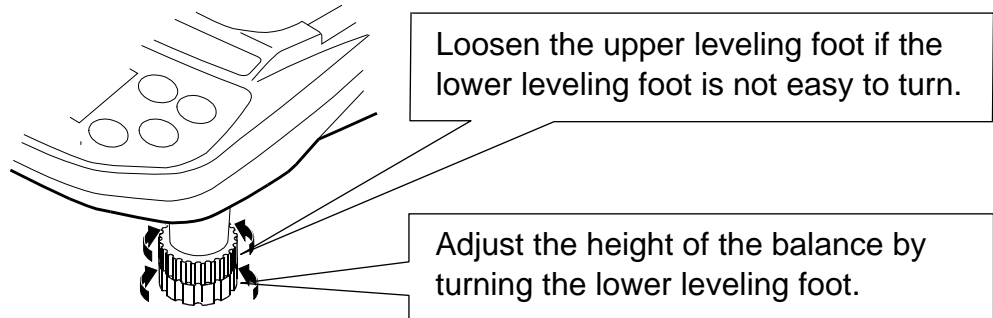


	Turns the power ON or OFF.
	Switches the weighing units and modes.
	Clears the display to zero (zero and tare).
	Weighing mode (EJ-54D2 only): Changes the weighing range (when "r n 0" is selected.) pcs mode: Enters the sample unit weight storing mode. % mode: Enters the 100% weight storing mode. Accumulation mode: Adds the weight value to total. Held down to enter the function setting mode.
	Outputs the weight value to a printer or personal computer. Stores a unit weight, 100% weight or other setting values to the balance.

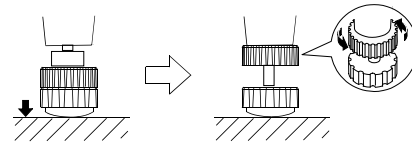
4. SETTING UP

4.1. Setting Up Your Balance

1. Place the weighing pan on the balance.
 2. Adjust the level of the balance using the leveling feet. Use the spirit level to confirm. The bubble should be in the center of the circle.
- For the EJ-123, EJ-303, EJ-1202 and EJ-3002 balances, the two leveling feet on the front side have a two-tier structure. To adjust the height of the balance, turn the lower leveling feet. Loosen the upper leveling feet if the lower leveling feet are not easy to turn.



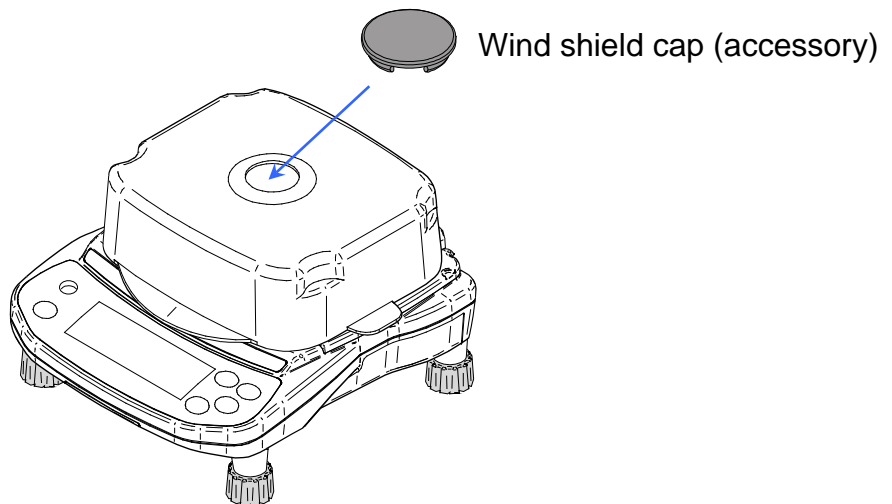
After adjusting the height of the balance, tighten the upper leveling feet if a rattling of the leveling feet occurs.



3. Calibrate your balance before use. (Refer to “[7. CALIBRATION](#)”)

About the wind shield cap (EJ-123 / EJ-303 only)

Should the displayed weight value be unstable due to a draft, attach the accessory wind shield cap to the hole located on the top of the breeze break. It is possible to reduce the entry of a draft into the breeze break to some extent. If attached, it may take time for the STABLE indicator to be displayed due to a variance in air pressure as a result of the closure of the breeze break.



Balance location

To measure correctly, to keep the balance in good condition, and to prevent hazards, observe the following:

- ❑ Do not install the balance in locations that are subject to excessive dust, breezes, vibration, large temperature fluctuations, condensation, or that may have magnetic fields.
- ❑ Install the balance on a solid surface and keep the balance level.
- ❑ Do not install the balance in direct sunlight.
- ❑ Do not install the balance near heaters or air conditioners.
- ❑ Use a stable AC power source.
- ❑ Do not install the balance in locations where combustible or corrosive gases may exist.
- ❑ Allow the balance to reach equilibrium with the ambient temperature before use.
- ❑ To ensure accurate weighing, turn the power ON at least half an hour before use, or have the AC adapter connected to the balance.
- ❑ When the balance is installed for the first time, or the balance has been moved, carry out calibration as described in “7. CALIBRATION”.

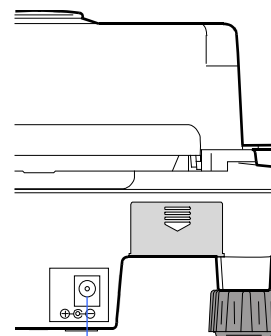
4.2. Power Source

For the power source, the AC adapter or 4 x size “AA” batteries can be used.

When Using the AC Adapter

Use a stable power source. To use the AC adapter, insert the AC adapter plug into the AC adapter jack on the rear side of the balance.

The balance is always connected to power internally (warming up status) while the AC adapter is connected to the balance even when nothing is shown on the display.



AC adapter jack

When Using the Batteries

Prepare 4 x size “AA” (LR6 / R6P) batteries. The batteries are not provided with the balance.




⚠ CAUTION

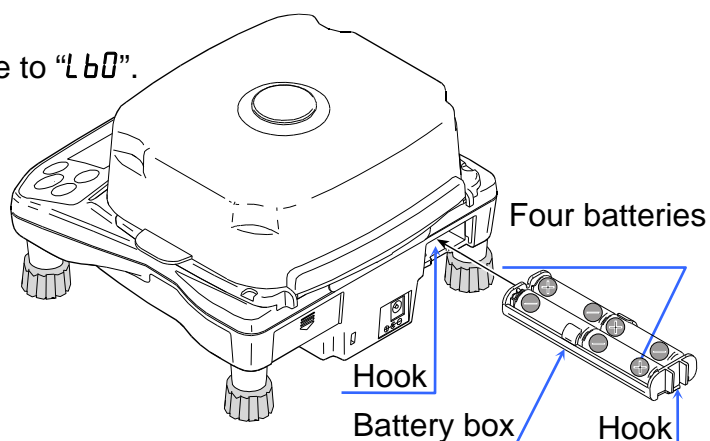
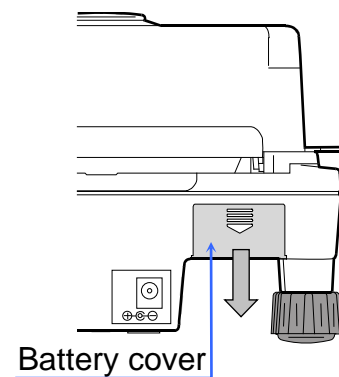
- ❑ Take great care with the polarity of the batteries. The polarity marks are shown in the battery box.
- ❑ Replace the used batteries with four new ones when “Lb0” is displayed.
- ❑ Do not mix used and new batteries. Do not mix battery types. It may cause damage to the batteries or the balance.
- ❑ The battery life depends on the ambient temperature, how used and so on.
- ❑ Remove batteries when the balance is not to be used for a long period of time. They may leak and cause damage to the balance.
- ❑ Damage due to battery leakage is not covered by the warranty.

Installing the Batteries

1. Turn the balance off and disconnect the AC adapter if used.
2. Slide the battery cover off.
3. Push the battery box up to unhook and pull it out.
4. Insert four new batteries (LR6 / R6P / AA) into the battery box, taking extreme care of the polarities.
5. Push the battery box into the balance as before.
6. Attach the battery cover.

- The battery indicator turns on when the balance is powered by the batteries. It will change as the battery voltage decreases.

New  →  →  Coming close to "L b0".



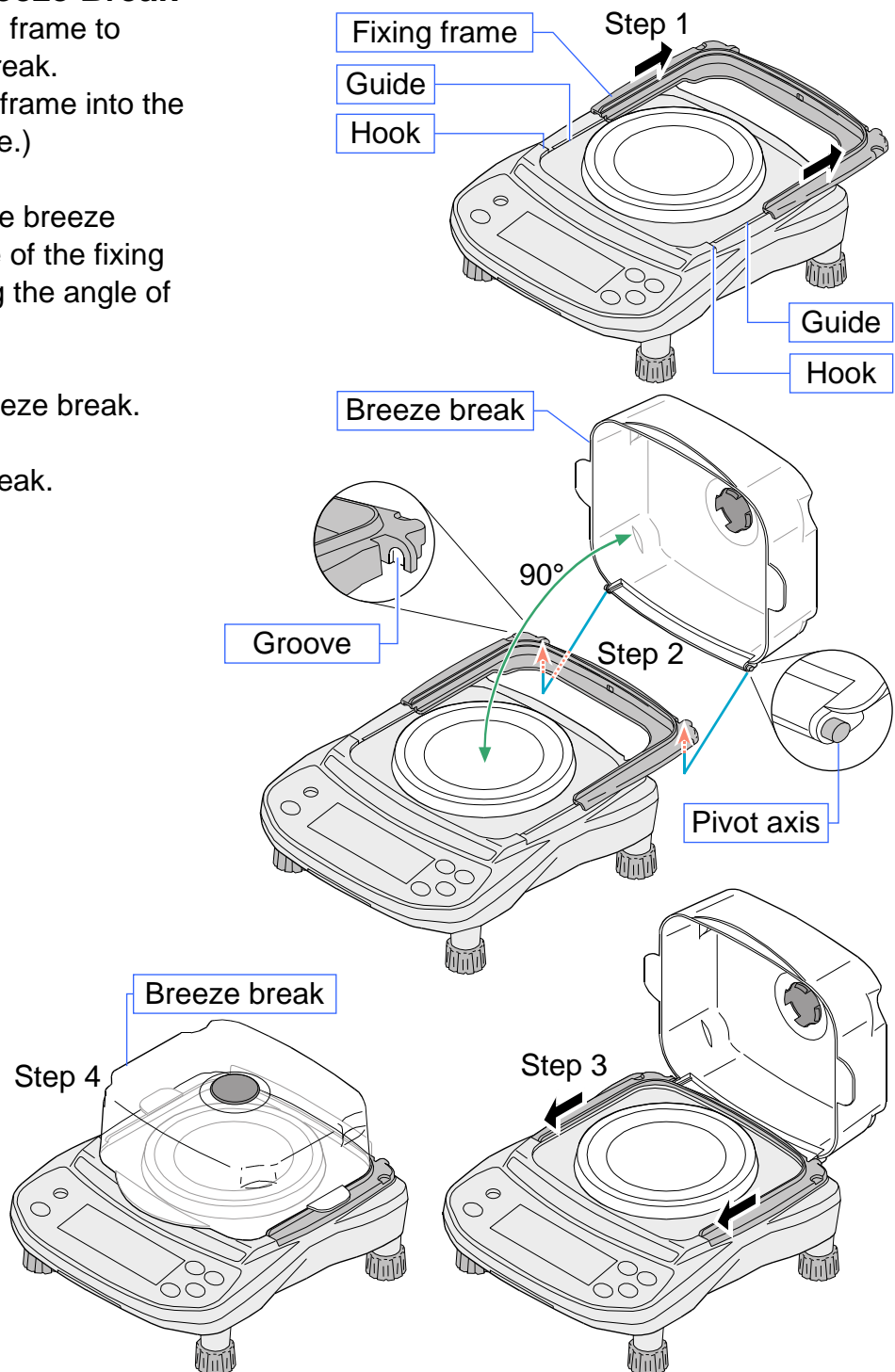
4.3. Breeze Break (For the EJ-123 / EJ-303)

The breeze break can prevent a measurement error due to a (disturbing) wind.

- The clear cover can be disconnected from the fixing frame easily when adding an excessive stress during operation. Assemble the breeze break with the following steps.

Assembling the Breeze Break

1. Slide back the fixing frame to attach the breeze break.
(Or install the fixing frame into the guide on the balance.)
2. Attach the axis of the breeze break on the groove of the fixing frame when keeping the angle of 90 degrees.
3. Slide and fix the breeze break.
4. Close the breeze break.

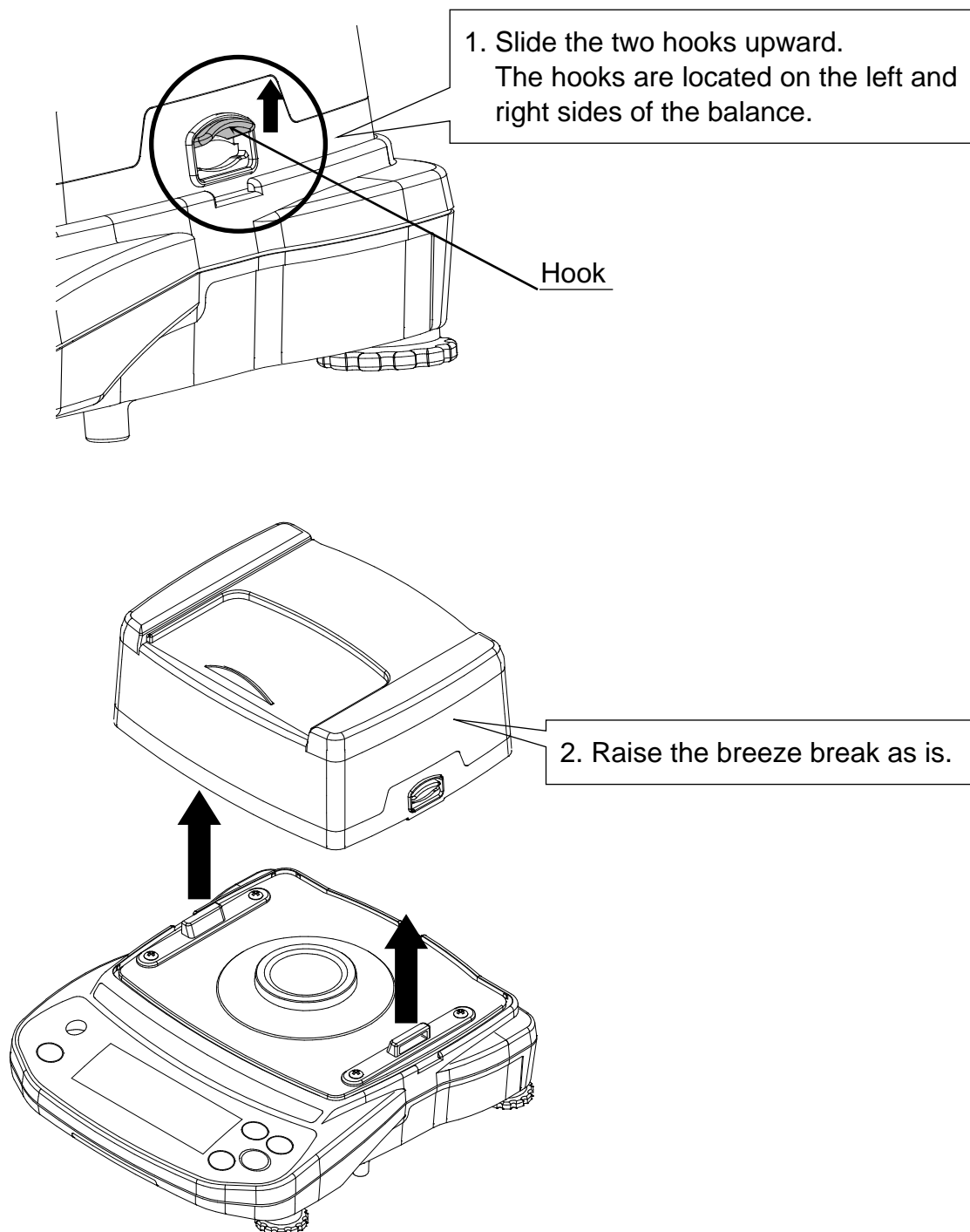


4.4. Breeze Break (For the EJ-54D2)

The breeze break can prevent a measurement error due to a (disturbing) wind.

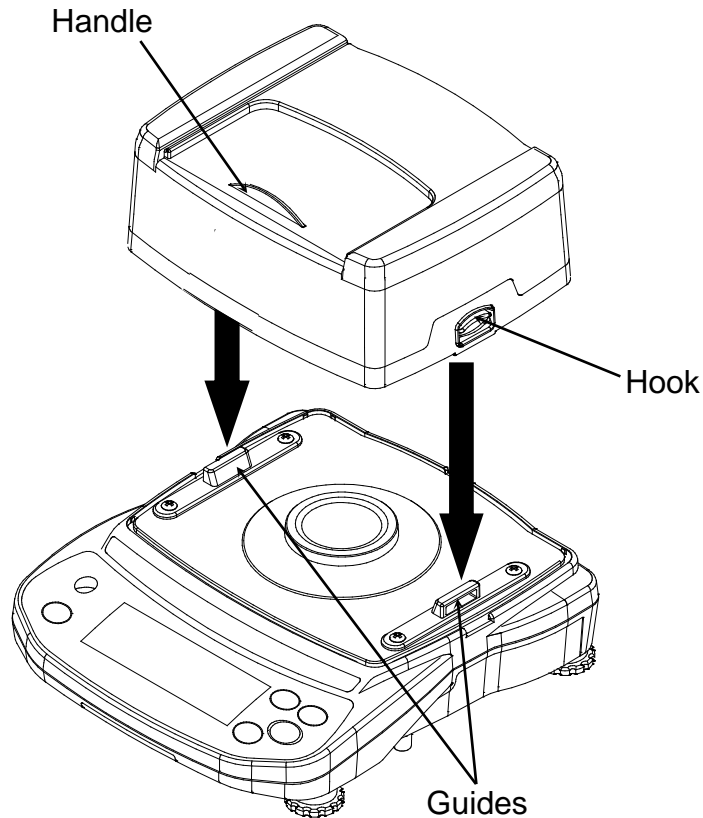
Detaching the Breeze Break

With the hooks located on the left and right sides of the balance held up, raise the breeze break.



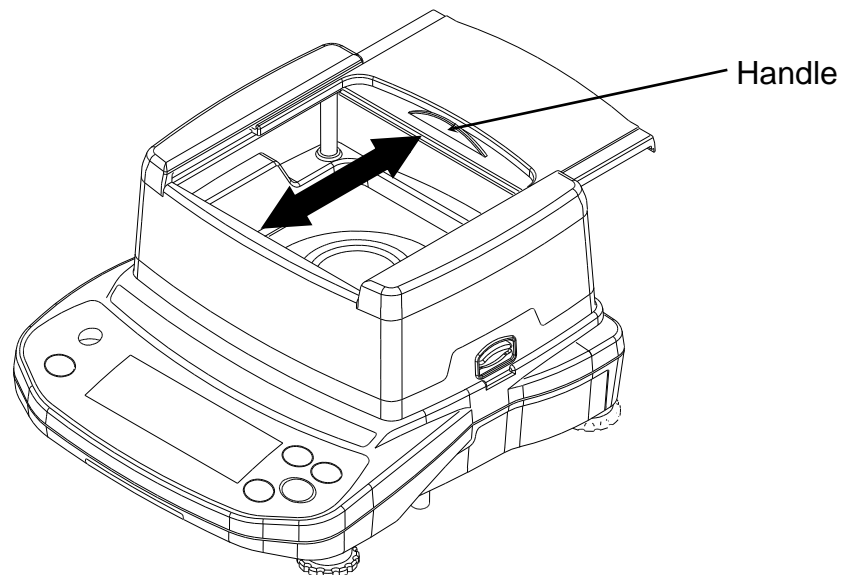
Attaching the Breeze Break

1. Align the breeze break with the balance.
 - ❑ Place the breeze break so that the handle of the sliding door will face forward.
2. Engage the hooks to the guides on the balance to secure the breeze break.
 - ❑ Confirm that the two hooks are securely engaged.
 - ❑ If the position of the breeze break is not correct, it will not be secured to the balance.



Using the Breeze Break

Slide the handle of the sliding door forward or backward to close or open the door.



5. OPERATION

5.1. Turn the Power ON and OFF

1. Press the ON:OFF key to turn the power ON.



All of the symbols are displayed as shown above.

(About units: Only the available units will be displayed.)

- Only when operated using the batteries, the balance subsequently performs a countdown using the underscore on the display.

The display turns off except for a weighing unit and the decimal point.

The balance waits for the weight value to become stable, and then, zero will be displayed along with the ZERO indicator (power-on zero).

The range for power-on zero is within $\pm 50\%$ of the weighing capacity around the calibrated zero point.

If the power is turned ON while there is a load beyond this range, the balance will be tared to zero and the NET and ZERO indicators turn on.

- For the EJ-54D2, only when operated using the batteries, the weight value flashes for a certain period of time after power-on zero. While the weight value is flashing, weighing is possible. But the balance may not be stable enough depending on the prior status of power to the balance. So, for more accurate weighing, wait for the weight value to stop flashing before weighing.

2. Press the ON:OFF key again to turn the power OFF.

- **Auto power-off function**

It is possible to have the power automatically turned OFF, if the zero band display (band width: $\pm 4d$ from the zero point, d =readability (scale interval or “division”)) continues for approximately 5 minutes. Refer to “8.5. Function List” and set the function to “P_{OFF}”.

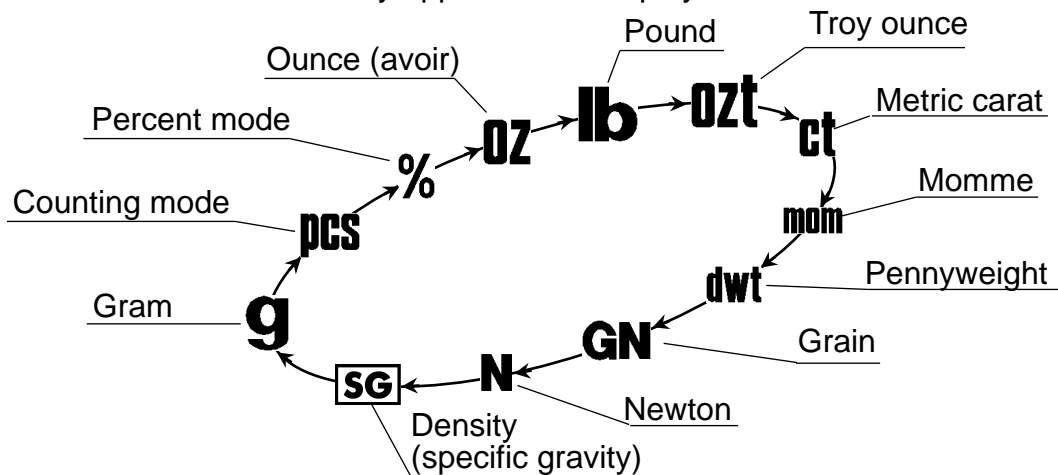
5.2. LCD Backlight

The LCD backlight will turn on when the weight value changes more than 4d (4 x readability (scale interval or “division”)) or any key operation is performed. When the weight value becomes and stays stable for a certain period of time, the backlight will automatically turn off. There is also a setting that the backlight is always on or off. For details, refer to the item “L_{LEUP}” of “8.5. Function List”.

5.3. Units

The most common unit of weight used around the world is the gram, but there is often a need to shift to alternative units specific to the country where the balance is used or to select modes such as counting or percent.

The units and the order they appear in the display are as follows:



Among the units, those available for the user have been set at the factory before shipping. The unit can be selected in the function setting mode. The order of the units available is the same as above, while skipping the units that are not available.

The unit “lb” is not available for the EJ-123, EJ-303 and EJ-54D2 models.

The unit “SG” is not available for the EJ-1202, EJ-3002 and EJ-54D2 models.

For details, refer to “[12. SPECIFICATIONS](#)”.

□ **Note**

It is possible to store only the units that will be actually used from the units available. It is also possible to specify the unit that will be shown first when the power is turned ON. For details, refer to “[8.4. Storing Weighing Units](#)”.

Conversion table

Units	Name	Conversion to gram
oz	Ounce (avoir)	28.349523125 g
lb	Pound (UK)	453.59237 g
ozt	Troy ounce	31.1034768 g
ct	Metric carat	0.2 g
mom	Momme	3.75 g
dwt	Pennyweight	1.55517384 g
GN	Grain (UK)	0.06479891 g
t	tola	11.6638038 g
tl	tael (Hong Kong general, Singapore)	37.7994 g
tl	tael (Hong Kong jewelry)	37.4290 g
tl	tael (Taiwan)	37.5 g

- “Newton” is the value calculated by “(weight in grams) x (9.80665 m/s²) / 1000”.
- The unit “t (tola)” and three kinds of “tl (tael)” are for special versions only. One of them can be selected and installed at the factory.

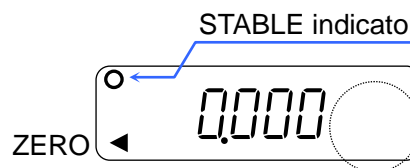
5.4. Selecting a Weighing Unit

Press the **UNITS** key to select a unit.

The following sections are a description of the three common units: g (gram mode), pcs (counting mode), and % (percent mode).



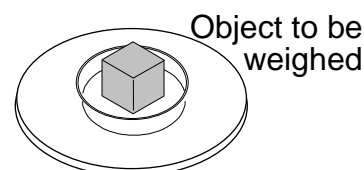
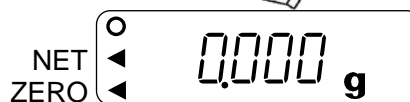
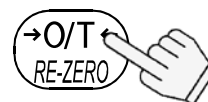
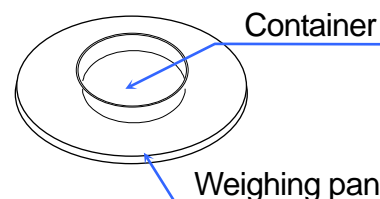
Each pressing switches the units available in the order described on the previous page.



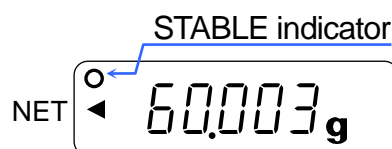
5.5. Basic Operation (Gram Mode)

For the EJ-54D2, when the carat pan provided with the balance is used, remove the weighing pan and place the carat pan directly on the pan support.

1. Select a weighing unit.
2. When the display does not show zero, press the **RE-ZERO** key to set the display to zero.
3. When using a tare (container), place the container on the weighing pan, and press the **RE-ZERO** key to subtract the tare weight.
4. Place the object to be weighed on the pan or in the container.
Wait for the STABLE indicator to turn on and read the value.



5. Remove the object from the pan.
 - **The **RE-ZERO** key will zero the balance if the weight is within $\pm 2\%$ of the weighing capacity around the power-on zero point. The ZERO indicator ◀ turns on. When the weight exceeds $+2\%$ of the weighing capacity, the balance is tared to zero. In this case the NET and ZERO indicators turn on.**



⚠ Precautions during operation

- Make sure that the STABLE indicator is on whenever reading or storing a value.
- Do not press the keys with a sharp object such as a pencil.
- Do not apply a shock or a load to the pan that is beyond the weighing capacity.
- Keep the balance free from foreign objects such as dust or liquid.
- Calibrate the balance periodically to maintain weighing accuracy. (Refer to “7. CALIBRATION”.)

5.6. Weighing Range (EJ-54D2 only)

- The EJ-54D2 has two weighing ranges available as follows:
Range 1 (low range)···22 g×0.0002 g
Range 2 (high range)···52 g×0.001 g
- Function settings available to select how the weighing range changes:
automatic range (r n G 1) or manual range (r n G 0).

Operation

Function setting	Description
r n G 1 (factory setting)	<p>Automatic range</p> <ul style="list-style-type: none"> □ When the weight value exceeds the maximum value in the low range, the weighing range automatically changes to the high range. □ When there is nothing on the weighing pan and the display shows zero along with the ZERO indicator and the balance becomes stable enough, the weighing range automatically changes from the high to the low range. When the ZERO indicator is not turned on or the taring operation is being performed, the weighing range does not change. Press the RE-ZERO key. □ When the RE-ZERO key is pressed and if the object on the weighing pan exceeds 2% of the weighing capacity, the balance is tared to zero, but the weighing range does not change. If the object is 2% of or less than the weighing capacity, the balance displays zero and clears the tare value. When the balance becomes stable enough, the weighing range automatically changes to the low range.
r n G 0	<p>Manual range</p> <ul style="list-style-type: none"> □ Press the SAMPLE key when the display shows a weight value (neither counting nor % display). The weighing range changes to the high range at any load. □ To change from the high to the low range, press the SAMPLE key when there is nothing on the weighing pan and the display shows zero along with the ZERO indicator. When the ZERO indicator is not turned on or the taring operation is being performed, the weighing range does not change. Press the RE-ZERO key and then press the SAMPLE key. If the balance is stable enough when the SAMPLE key is pressed, the weighing range changes to the low range. □ When the RE-ZERO key is pressed and if the object on the weighing pan exceeds 2% of the weighing capacity, the balance is tared to zero. If the object is 2% of or less than the weighing capacity, the balance displays zero and clears the tare value. In either case above, the weighing range does not change.

5.7. Display Hold Function

In stable measurements, this function can hold the weight value to read it easily. The function holds the value except in the zero band (band width: $\pm 4d$ from the zero point, d =readability (scale interval or "division")). The function releases the value when the weight value changes more than the value set in the function mode. Also, when the **RE-ZERO** key is pressed, the display hold is canceled and display becomes zero. Refer to the item "Hold" of ["8.5. Function List"](#).

5.8. Counting Mode (pcs)

The balance weighs the sample pieces and calculates the unit weight.

Using the sample unit weight, the balance counts the number of items in the sample.

- As for the minimum unit weight acceptable, refer to the item “Unit” of “8.5. Function List”.

Selecting the Counting Mode

- Press the **UNITS** key to select **pcs**. (**pcs**: pieces)

Storing the Sample Unit Weight

- Press the **SAMPLE** key to enter the sample unit weight storing mode.

- To select the number of samples, press the **SAMPLE** key. It may be set to 5, 10, 25, 50, or 100.

- Place a tare container on the weighing pan, and press the **RE-ZERO** key. Confirm that the right side of the number of samples shows zero.

- Place the number of samples specified on the pan. In this example, 25 pieces.

- Press the **PRINT** key to calculate and store the unit weight. Remove the sample. The balance is set to count objects with the unit weight.

- When the unit weight is too light to store, the display shows **Lo** for the moment and returns to the former display. When the sample weight is light and the counting error could become large, the balance will request you to use a larger number of samples. Place the displayed number of samples on the pan and press the **PRINT** key to calculate and store the unit weight. Refer to “Sample quantity error” and “Unit weight error” in “11.2. Error Codes”.

Counting the Objects

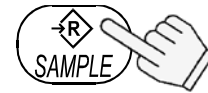
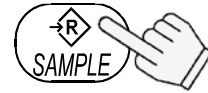
- Place the objects to be counted on the pan.

Counting Mode Using the ACAI Function

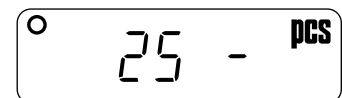
ACAI™ (Automatic Counting Accuracy Improvement) is a function that improves the accuracy of the unit weight by increasing the number of samples as the counting process proceeds.

- After storing the unit weight at step 6, add a few more samples on the pan. Then, the ACAI indicator turns on. (Add more than three pieces. The ACAI indicator will not turn on for the number of samples beyond the ACAI range.)

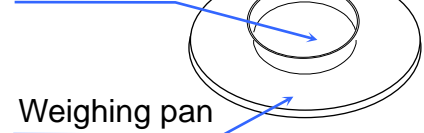
- The ACAI indicator will flash and the balance re-calculates the unit weight. Do not touch the balance or samples on the pan until the ACAI indicator turns off.



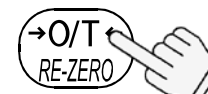
Switches the number of samples



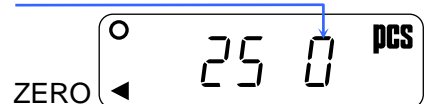
Container



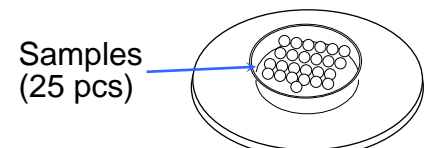
Weighing pan



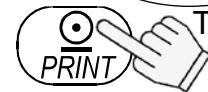
Confirm the display



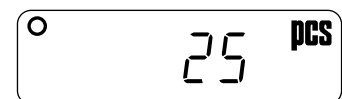
ZERO



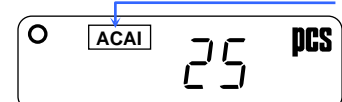
Samples
(25 pcs)



To store



ACAI indicator



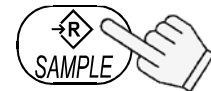
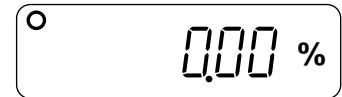
10. Counting accuracy is improved when the ACAI indicator turns off. Each time the above operation is performed, a more accurate unit weight will be obtained. There is no definite upper limit of ACAI range for the number of samples exceeding 100. Try to add a similar number of samples as that displayed.

5.9. Percent Mode (%)

The balance displays the weight value in percentage compared to a reference (100%) weight.

Selecting the Percent Mode

1. Press the **UNITS** key to select %. (%:percent)

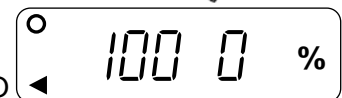


Storing the Reference (100%) Weight

2. Press the **SAMPLE** key to enter the reference weight storing mode.



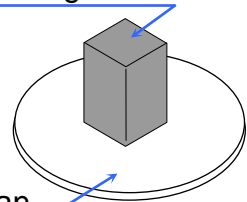
3. Press the **RE-ZERO** key to display 100 0%.



ZERO

Sample corresponding to the 100% weight

4. Place the sample to be set as the reference weight on the pan.



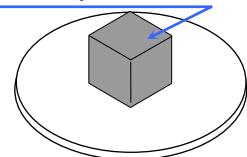
Weighing pan

5. Press the **PRINT** key to store the reference weight. Remove the sample.

- When the reference weight is too light to store, the display shows **L_o** for the moment and returns to the former display.

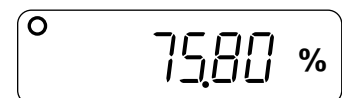


Object to be compared



Reading the Percentage

6. Place the object to be compared to the reference weight on the pan. The displayed percentage is based on 100% of the reference weight.



6. ACCUMULATION FUNCTION

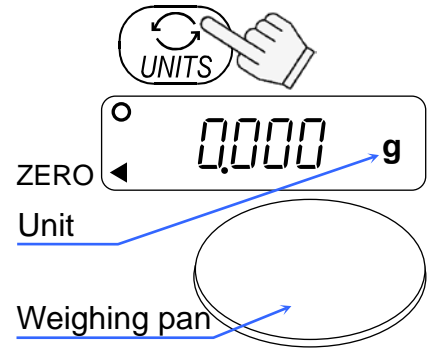
- This function counts the number of times objects are weighed, calculates the total mass value and displays the number (accumulated count) and accumulated mass value.
- Preset the item “*t o t l*” of the function list to use the accumulation function.
For the EJ-54D2, please note that the accumulation function is only available within the range of Range 1 (low range) when the weighing range is set to the manual range “*r n l*” in the function setting mode.
- The accumulated count and accumulated mass value are stored in memory even if the power to the balance is turned OFF.

6.1. Indicators and Keys

- The **M+** indicator turns on when the accumulation data is stored.
- The **M+** indicator and **TOTAL** turn on when the accumulated count or accumulated mass value is displayed.
- Operation keys are as follows:
 - The **UNITS** key
 - When the accumulation data is stored, pressing the **UNITS** key displays the weight value, accumulated count and accumulated mass value sequentially.
 - When the accumulation data is not stored, pressing the **UNITS** key switches the preset units sequentially.
 - The **RE-ZERO** key
 - When the weight value is displayed, pressing the **RE-ZERO** key clears the display to zero.
 - When the accumulated count or accumulated mass value is displayed, pressing the **RE-ZERO** key resets the accumulation data to zero.
 - The **SAMPLE** key
Pressing the **SAMPLE** key adds the weight value to total under the following conditions:
 - The weight value is stable and +5d above the zero band.
 - The accumulated count is less than 10000.
 - The accumulated mass value is less than 9999999.
- The unit weight of the counting mode and the reference (100%) weight of the percent mode cannot be stored when the accumulation function is used.

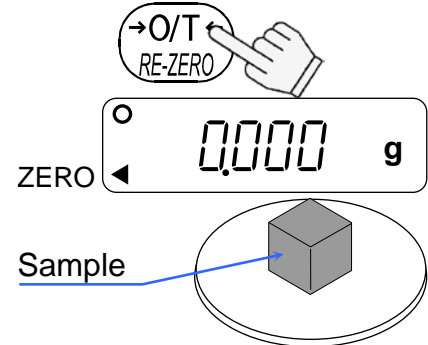
6.2. Selecting a Weighing Unit

1. Press the **UNITS** key to select a unit to be used in the accumulation function.
- The unit cannot be changed after the accumulation data is stored. To change the unit, reset the accumulation data and then press the **UNITS** key.
Note that multiple units cannot be used in the accumulation function.



6.3. Adding the Accumulation Data

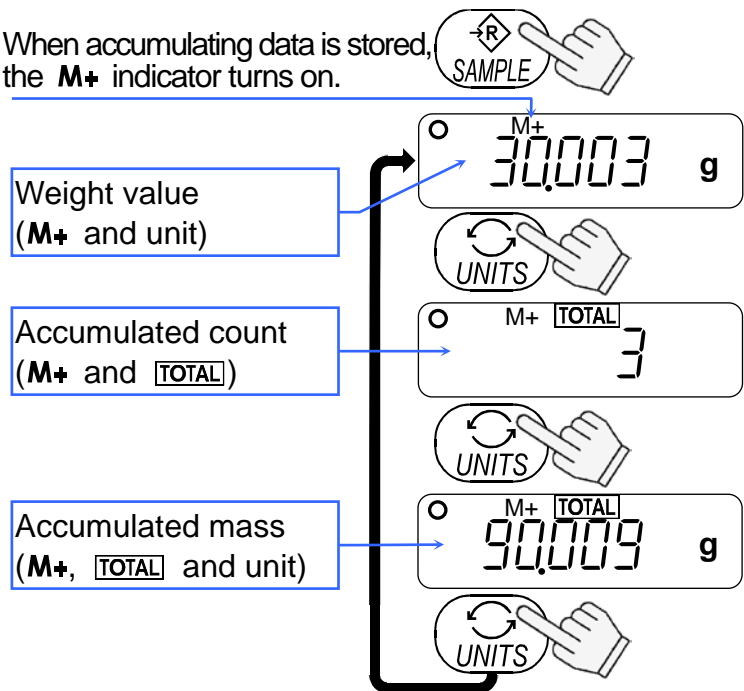
2. Press the **RE-ZERO** key to set the display to zero.
3. Place the sample on the pan.
4. Wait for the STABLE indicator to turn on. Press the **SAMPLE** key to accumulate the weight value. The **M+** indicator turns on.
5. Repeat steps 2 to 4 to weigh other samples.
The **M+** indicator flashes once for each sample.



When accumulating data is stored, the **M+** indicator turns on.

6.4. Displaying the Accumulation Data

6. When the **UNITS** key is pressed, the weight value, accumulated count and accumulated mass value are displayed sequentially. The **M+** indicator and **TOTAL** turn on when the accumulated count or accumulated mass value is displayed.



6.5. Deleting the Accumulation Data

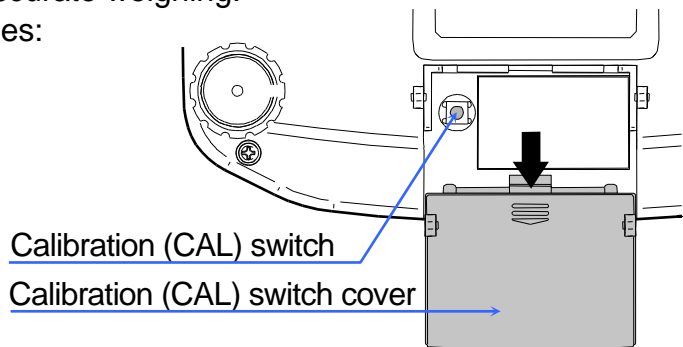
1. Display the accumulated count or accumulated mass value.
2. Press the **RE-ZERO** key to reset the accumulated count and accumulated mass value to zero. The **M+** indicator and **TOTAL** turn off and the state of the balance returns to step 1 on this page.
- When the item "Unit" of the function list is changed, the accumulation data is reset to zero.

7. CALIBRATION

This function adjusts the balance for accurate weighing.

Perform calibration in the following cases:

- ❑ When the balance is first used.
- ❑ When the balance has been moved.
- ❑ For regular calibration.



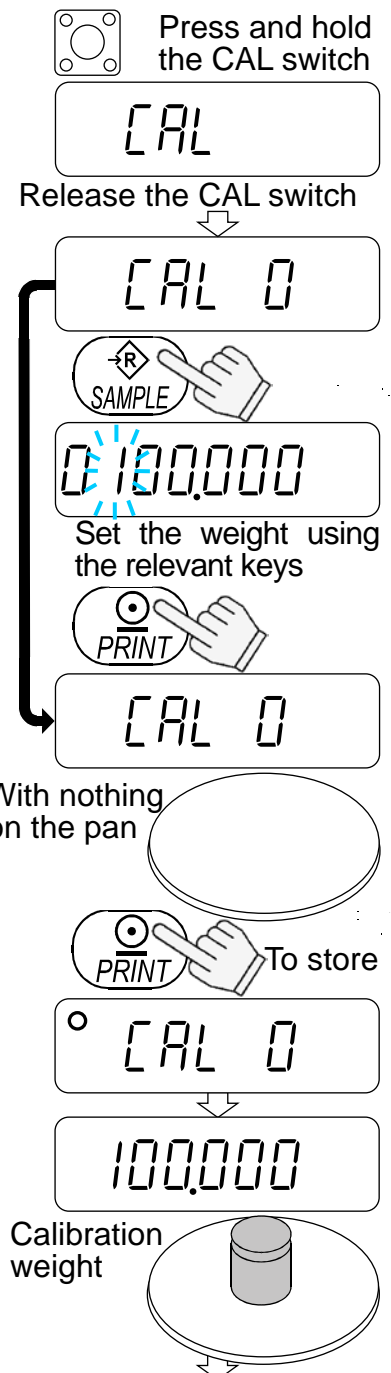
7.1. Calibration Using a Weight

- ❑ Prepare a calibration weight (sold separately) in advance.

1. Warm up the balance for at least half an hour with nothing on the pan.
2. Press and hold the calibration (CAL) switch until CAL appears, and release the switch.
3. The balance displays CAL 0.
To change the calibration weight value, proceed to step 4.
To use the calibration weight value in the balance memory, proceed to step 5.

4. Press the SAMPLE key. The display shows the calibration weight value in “grams” that is stored in the balance. Use the following keys to change the value.
 - SAMPLE keyTo select the digit to be changed (flashing).
 - RE-ZERO keyTo set the value of the digit selected.
 - PRINT key.....To store the value and return to step 3.
 - UNITS key.....To cancel the value and return to step 3.

- ❑ Use a calibration weight more than 2/3 of the capacity.
5. At step 3, press the PRINT key to weigh the zero-point value. Do not touch the pan during weighing. When the zero calibration is completed, the display will show the calibration weight value.
 - ❑ To perform the zero calibration only and finish the procedure, press the UNITS key. After displaying End , the balance turns off.
 6. Place a calibration weight with the same value as displayed on the pan.
Press the PRINT key to weigh it. Do not touch the pan during weighing.



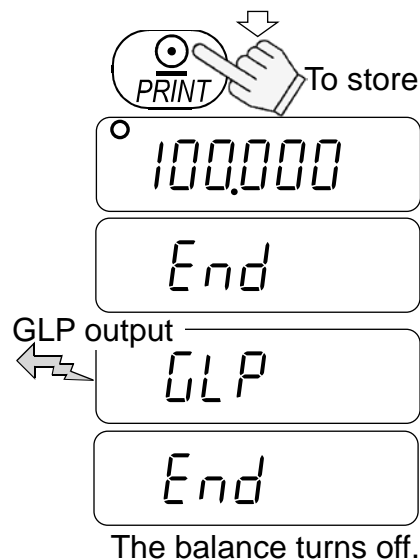
7. End appears.
Remove the weight from the pan.

When the GLP output (function setting “*info 1*” or “*info 2*”) is selected, GLP appears. The calibration report is output and End appears again. Then the balance turns off.

□ **Note**

The value set in step 4 is stored in memory even if the power is turned OFF.

If the balance is to be moved to other places, set the gravity acceleration value of the area where the calibration using a weight is to be performed, and calibrate the balance according to the procedure above. Refer to the next section to set the gravity acceleration value.



7.2. Gravity Acceleration Correction

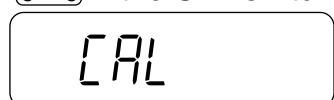
When the balance is first used or has been moved to a different place, it should be calibrated using a calibration weight. But if a calibration weight is not available, the gravity acceleration correction will compensate the balance. Change the gravity acceleration value of the balance to the value of the area where the balance will be used. Refer to the gravity acceleration map appended to the end of this manual.

□ **Note**

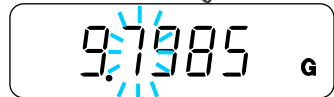
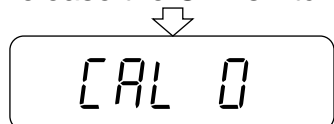
Gravity acceleration correction is not required when the balance is calibrated using a calibration weight at the place where the balance is to be used.

1. Press and hold the calibration (CAL) switch until CAL appears, and release the switch.
2. The balance displays CAL 0.
3. Press the RE-ZERO key. The display shows the gravity acceleration value stored in the balance. Use the following keys to change the value.
SAMPLE keyTo select the digit to be changed (flashing).
RE-ZERO keyTo set the value of the digit selected.
PRINT key.....To store the value and return to step 2.
UNITS key.....To cancel the value and return to step 2.
4. After setting the value, press the PRINT key.
CAL 0 appears after End.
5. If it is necessary to calibrate the balance using a calibration weight, go to step 4 of “7.1. Calibration Using a Weight”. To finish the setting, press the UNITS key.
6. The balance turns off.

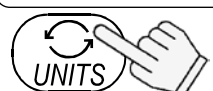
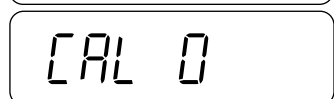
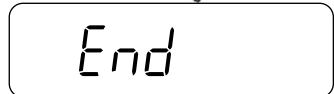
Press and hold the CAL switch



Release the CAL switch



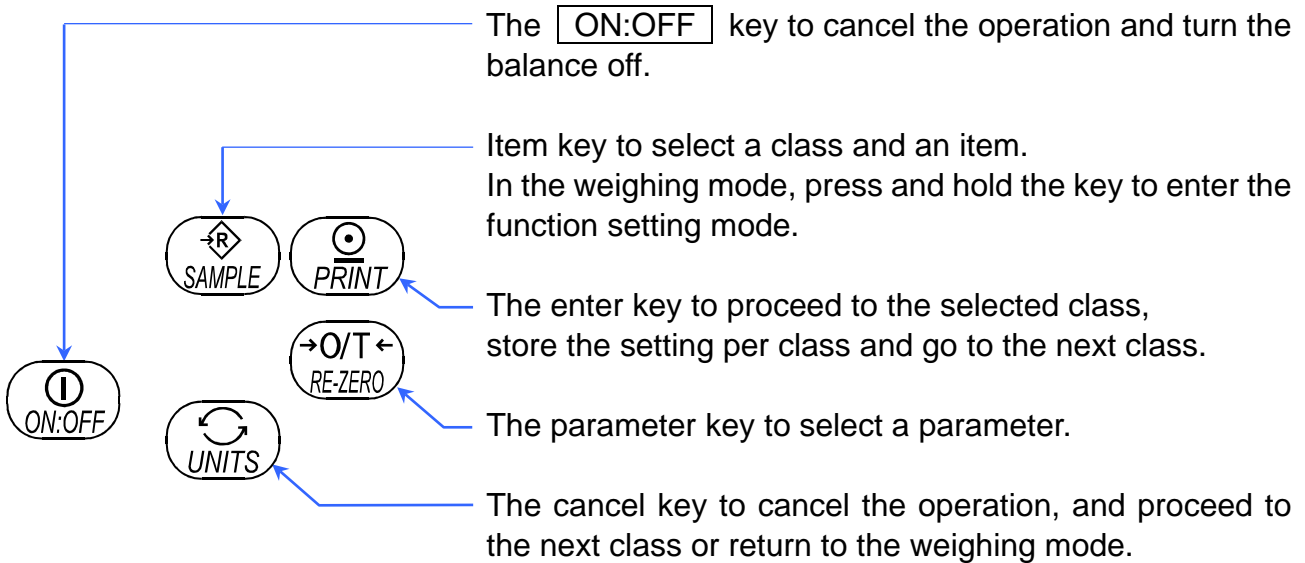
Set the value using the relevant keys



The balance turns off.

8. FUNCTIONS

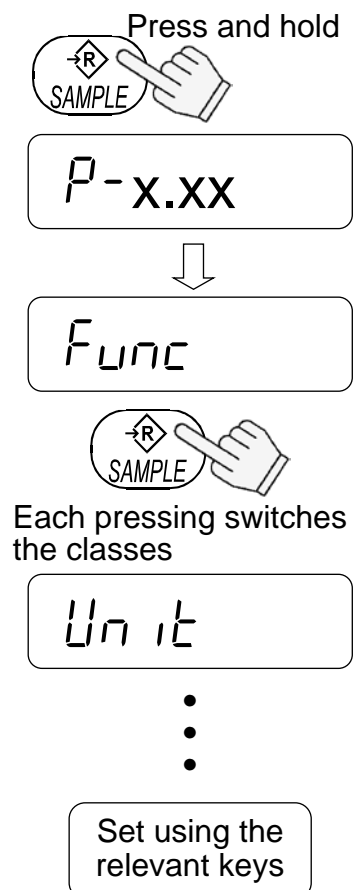
8.1. Key Operation



8.2. Entering the Function Setting Mode

In the weighing mode, press and hold the **SAMPLE** key. After displaying the software version **P-x.xx**, the balance enters the function setting mode and displays **Func**. Each time the **SAMPLE** key is pressed, the class appears one after another.

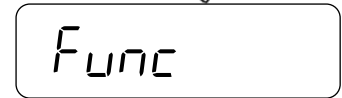
Once a class is selected, the items are available for selection. (Refer to “8.5. Function List”.)



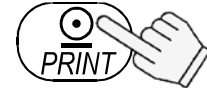
8.3. Setting Example

To set auto power-off function to “Enabled”, and the ACAI function to “Disabled”.

1. Press and hold the **SAMPLE** key to display **Func**.



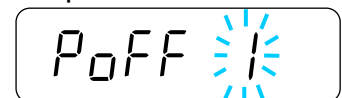
2. Press the **PRINT** key to display **PoFF 0**.



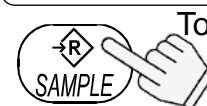
3. Press the **RE-ZERO** key to display **PoFF 1**.



Each pressing switches the parameter

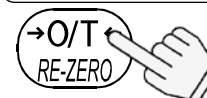


4. Press the **SAMPLE** key several times to display **ACA, 1**.



To confirm

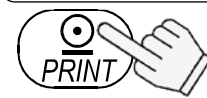
5. Press the **RE-ZERO** key to select **ACA, 0**.



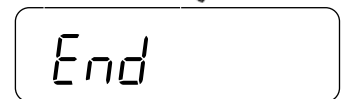
Each pressing switches the parameter



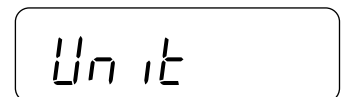
6. Press the **PRINT** key to store the parameters. **Unit** appears after **End**.



To store



7. Press the **UNITS** key to turn the balance off.



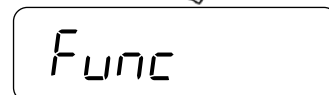
The balance turns off.

8.4. Storing Weighing Units

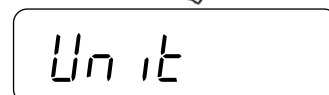
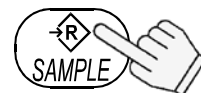
It is possible to store the weighing units that will actually be used from the units available. For the units available, refer to “5.3. Units”.

Select and store the weighing units as described below:

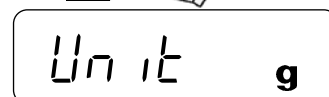
1. Press and hold the **SAMPLE** key to display **Func**.



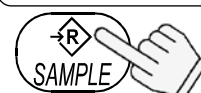
2. Press the **SAMPLE** key to display **Unit**.



3. Press the **PRINT** key.

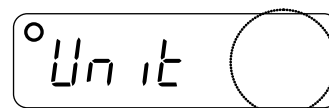


4. Press the **SAMPLE** key to display a weighing unit to be stored.



Each pressing switches the units available in the order described in “5.3.Units”.

5. Press the **RE-ZERO** key to select the weighing unit. The selected weighing unit is shown with the STABLE indicator.



- At this stage, the weighing unit is not stored in memory.



6. Repeat steps 4. and 5. to select all weighing units to be used.



7. Press the **PRINT** key to store the selected weighing units in memory. **id** appears after **End**.



8. Press the **UNITS** key to turn the balance off.



Note

When the balance is turned ON, it starts with the unit that was selected first in step 5.



The balance turns off.

8.5. Function List

Class	Item	Parameter	Description	
Func	P _{OFF} Auto power-off	◆ 0	Auto power-off disabled	Automatically power OFF
		1	Auto power-off enabled	
	r _{NG} Weighing range	0	Manual range	Function to change the weighing range (EJ-54D2 only)
		◆ 1	Automatic range	
	L _{ond} Response	0	Fast / sensitive	Software filtering
		◆ 1		
		2	Slow / stable	
	St-b Stability band width	0	Judge precisely (±0.5d)	The STABLE indicator turns on when the fluctuation interval of the weighing display is less than the reference value.
		◆ 1	 (±1d)	
		2	Judge moderately (±2d)	
	t _{rc} Zero tracking	0	Disabled	Function to keep the display value at zero by tracking the zero point
		◆ 1	Enabled	
	P _{nt} Decimal point	◆ 0	Point (.)	Decimal separator
		1	Comma (,)	
	P _{rt} Data output mode	0	Command and stream modes	Auto-print A: + data Auto-print B: +/- data
		◆ 1	Command mode and PRINT key	
		2	Command mode, PRINT key and auto-print A	
		3	Command mode, PRINT key and auto-print B	
	P _{USE} Data output pause	◆ 0	No pause (general equipment)	Interval between continuous data
		1	1.6 seconds (for AD-8121B)	
	i _{nfo} GLP output	◆ 0	No output	GLP output format
		1	AD-8127/AD-8121B format (*)	
		2	General format	
	b _{PS} Baud rate	◆ 0	2400 bps	
		1	4800 bps	
		2	9600 bps	
		3	1200 bps	
	b _{tPr} Data and parity	◆ 0	7 bits, even parity	
		1	7 bits, odd parity	
		2	8 bits, non parity	
	A _{CAI} ACAI function	0	ACAI disabled	When "0" is set, no additional samples required.
		◆ 1	ACAI enabled	
	U _{n in} Minimum unit weight	◆ 0	1d	d = readability (scale interval or "division")
		1	1/10d	
		2	Total sample weight ≥5d (**)	
	S _{nPL} Number of samples	◆ 0	10 pcs	The number of samples shown first when entered into the unit weight storing mode
		1	25 pcs	
		2	50 pcs	
		3	100 pcs	
		4	5 pcs	

◆ : Factory setting

Class	Item	Parameter	Description		
Func	Hold Display hold function	◆ 0	Disabled	d = readability (scale interval or "division") Hold: Holds stable weight values except in the zero band. When the value changes more than the limit, the display hold is canceled.	
		1	Hold. Limit : ±10d		
		2	Hold. Limit : ±50d		
		3	Hold. Limit : ±100d		
		4	Hold. Limit : ±200d		
	totl Accumulation function	◆ 0	Disabled		
		1	Enabled		
	LLUP LCD backlight control	0	Always off	To control how the LCD backlight turns off after the STABLE indicator turns on.	
		1	Turns off after 5 seconds		
		2	Turns off after 10 seconds	Weight changes or key operation will turn the backlight on.	
		◆ 3	Turns off after 30 seconds		
		4	Turns off after 60 seconds		
		5	Always on		
	Unit	Weighing units to be displayed	Sets to display units	Refer to "8.4. Storing Weighing Units".	
id	ID number for GLP output	Sets the ID number	Refer to "10. ID NUMBER AND GLP".		

◆ : Factory setting

* : When the AD-8127/AD-8121B format is selected, the interval between continuous data is 1.6 seconds regardless of the setting "PULSE".

** : Even if the weight display is "5d", the sample weight may not be accepted. This is because the weight display data is rounded off internally.

9. OPTIONS

The following options are available for the EJ-123, EJ-303, EJ-1202, EJ-3002 and EJ-54D2 balances:

- EJ-02 USB interface
- EJ-03 RS-232C serial interface
- EJ-13 Density determination kit for EJ-123 / EJ-303

□ **Note**

The EJ-123, EJ-303, EJ-1202, EJ-3002 and EJ-54D2 balances have only one option slot for a communications interface. Either the EJ-02 USB interface or the EJ-03 RS-232C serial interface can be installed at one time.

9.1. EJ-02 USB Interface

The EJ-02 allows an EJ-123, EJ-303, EJ-1202, EJ-3002 or EJ-54D2 balance to be connected to a personal computer with the USB interface.

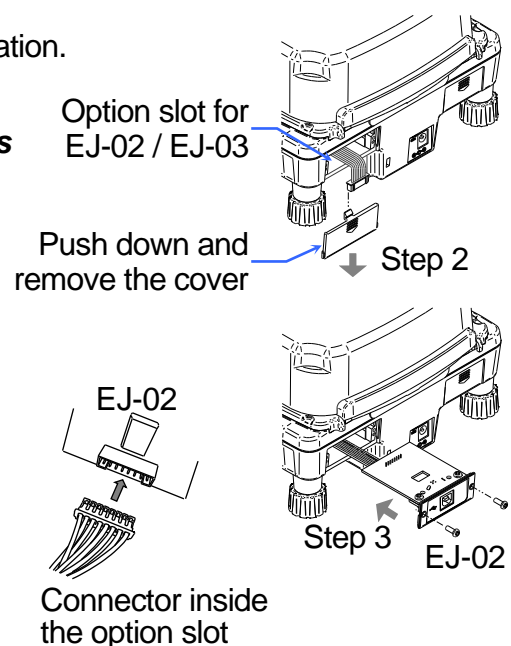
- The EJ-02 can transmit the weight value (numerical value only) unidirectionally to a personal computer via USB.
- The EJ-02 can transmit the weight value (numerical value only) directly to application software such as Microsoft Excel, Word and Notepad.
- A special USB software driver is not necessary.
- The EJ-02 cannot be used for bidirectional communication.

□ **Note**

A commercially available type A-B USB cable is required.

Installing the EJ-02

1. Turn the balance off and disconnect the AC adapter if used.
2. Remove the cover of the option slot on the rear by pressing and lowering it down.
3. Connect the connector in the slot to the EJ-02 unit and insert it into the slot.
4. Secure the EJ-02 with the screws supplied with the option.



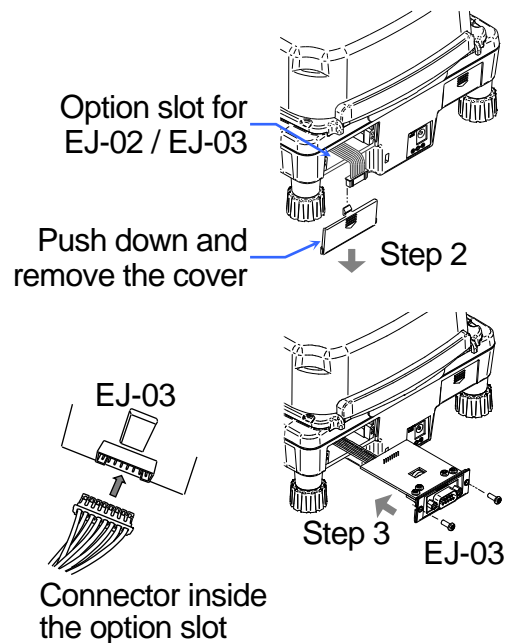
9.2. EJ-03 RS-232C Serial Interface

The EJ-03 allows an EJ-123, EJ-303, EJ-1202, EJ-3002 or EJ-54D2 balance to be connected to a printer or a personal computer using the RS-232C serial interface.

- The RS-232C serial interface has the following four modes:
 - Stream mode.....Outputs data continuously.
 - Key mode.....Outputs data when the PRINT key is pressed.
 - Auto-print modeOutputs data which meets the conditions of auto-print.
 - Command mode.....Controls the balance using commands from a personal computer.
- Set the parameters of the data format (b^P5 and b^tP_r) and data output mode (P_r^t), as necessary.
- Use a D-Sub 9-pin cable (straight type) to connect the balance to a personal computer.
Optional cable: AX-KO2466-200 D-Sub 9-pin - D-Sub 9-pin cable (2 m)

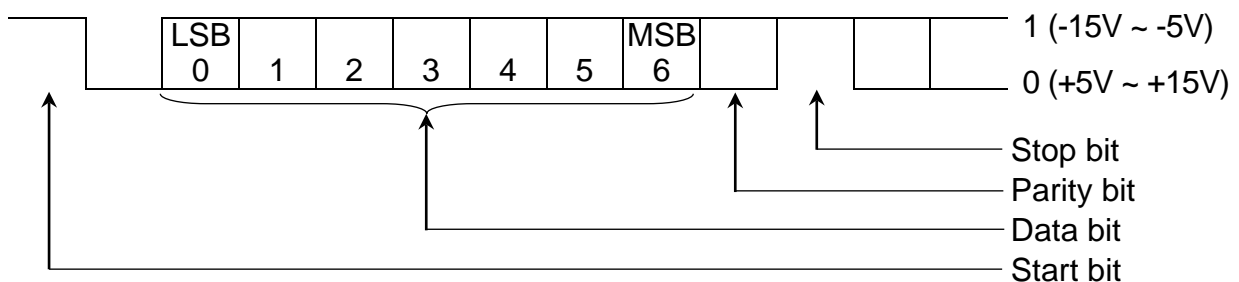
Installing the EJ-03

1. Turn the balance off and disconnect the AC adapter if used.
2. Remove the cover of the option slot on the rear by pressing and lowering it down.
3. Connect the connector in the slot to the EJ-03 unit and insert it into the slot.
4. Secure the EJ-03 with the screws supplied with the option.

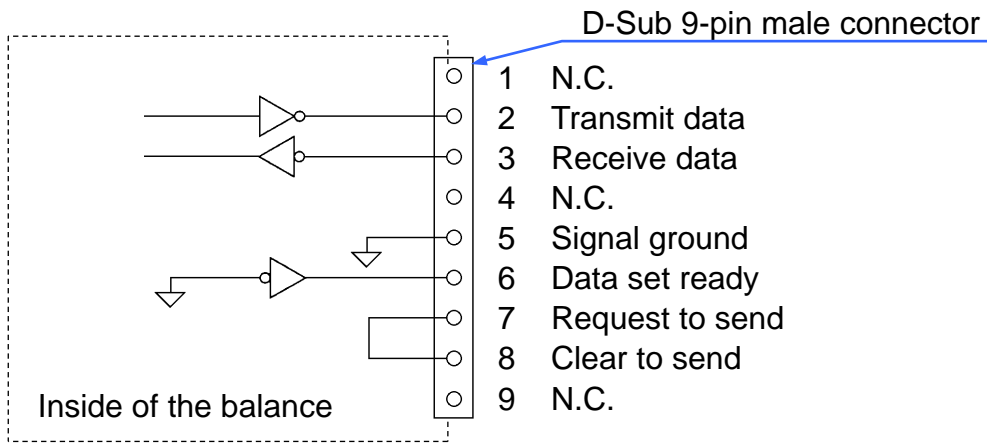


Interface Specifications (Connector type:D-Sub 9-pin[male])

Transmission system	EIA RS-232C
Transmission form	Asynchronous, bidirectional, half-duplex
Data format	Baud rate: 1200, 2400, 4800, 9600 bps
	Data: 7 bits + parity 1bit (even or odd) or 8 bits (non-parity)
	Start bit: 1 bit
	Stop bit: 1 bit
	Code: ASCII
	Terminator: C _R L _F (C _R : 0Dh, L _F : 0Ah)

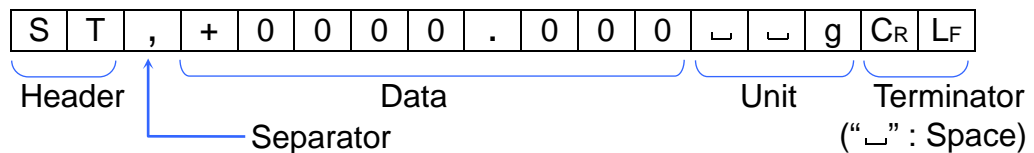


Pin Connections



The interface is designated as DCE (Data Communication Equipment).

9.3. Data Format



- There are four types of headers:
 - ST : Stable weighing data (including % data)
 - QT : Stable counting data
 - US : Unstable weighing data (including counting and % data)
 - OL : Out of weighing range (Over)
- The data is normally 9 digits including a decimal point and a sign.
- There are 14 types of units:
 - g : Weighing data “g”
 - P C : Counting data “pcs”
 - % : Percentage data “%”
 - o z : Weighing data “decimal ounce”
 - l b : Weighing data “decimal pound”
 - o z t : Weighing data “troy ounce”
 - c t : Weighing data “carat”
 - mom : Weighing data “momme”
 - d w t : Weighing data “penny weight”
 - GN : Weighing data “grain”
 - N : Force data “Newton”
 - t l : Weighing data “tael”
 - t : Weighing data “tola”
 - D S : Calculated density (specific gravity) value
- The terminator is always CRLF.

- Example of output data:

Weighing data “gram”	S	T	,	+	0	0	1	2	.	3	4	5	└	└	g	C _R	L _F
Counting data	Q	T	,	+	0	0	0	1	2	3	4	5	└	P	C	C _R	L _F
Percentage data	S	T	,	+	0	0	0	1	2	.	3	4	└	└	%	C _R	L _F
Out of range “gram” (+)	O	L	,	+	9	9	9	9	.	9	9	9	└	└	g	C _R	L _F
Out of range “pcs” (-)	O	L	,	-	9	9	9	9	9	9	9	9	└	P	C	C _R	L _F

Data Output Mode

- Stream mode
 - Set the function to “Prt 0”.
 - The balance outputs the current display data. The data update rate is approximately 10 times per second. This rate is the same as the display update.
 - The balance does not output data while it is in the setting mode.
- Key mode
 - Set the function to “Prt 1, 2 or 3”.
 - When the **PRINT** key is pressed while the weight value is stable (the STABLE indicator is on), the balance outputs the data. When the data is output, the display will flash once.
- Auto-print mode A
 - Set the function to “Prt 2”.
 - The balance outputs the weight value when the display is stable (the STABLE indicator is on) and the data is greater than +4d.
 - The next output can be obtained after the display returns below +4d.
- Auto-print mode B
 - Set the function to “Prt 3”.
 - The balance outputs the weight value when the display is stable (the STABLE indicator is on) and the data is greater than +4d or less than -4d.
 - The next output can be obtained after the display returns between -4d and +4d.

Command Mode

In the command mode, the balance is controlled by commands that come from a personal computer.

Command List

- Command to request the current weighing data.

Command	Q	C _R	L _F														
Reply	S	T	,	+	0	0	1	2	.	3	4	5	└	└	g	C _R	L _F
- Command to zero or tare the balance (same as the **RE-ZERO** key).

Command	Z	C _R	L _F
Reply	Z	C _R	L _F
- Command to change the weighing units (same as the **UNITS** key).

Command	U	C _R	L _F
Reply	U	C _R	L _F

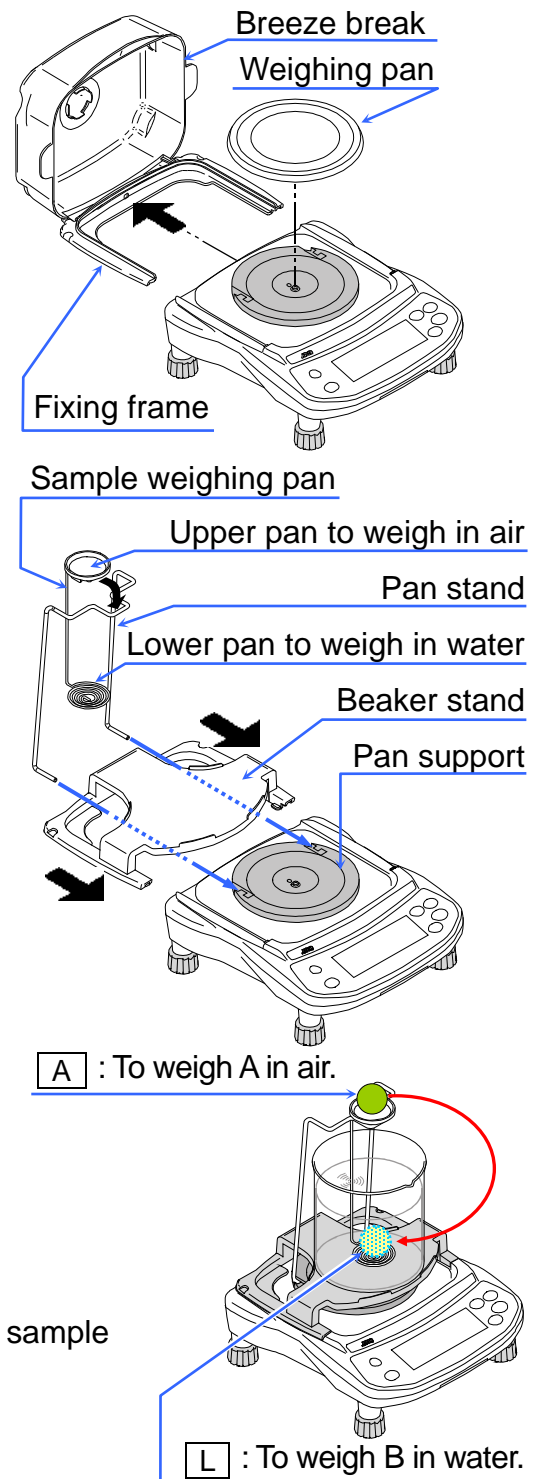
9.4. EJ-13 Density Determination Kit

Using this option and calculation program, the balance can determine the density (specific gravity) of a sample.

- EJ-13 is for use with the EJ-123 / EJ-303.

EJ-13 Installation

- Remove the weighing pan and the fixing frame.
- Install the beaker stand on the balance and attach the pan support to the pan support of the balance.
- Remove the breeze break that can not be used while using the density determination kit.
- Place a beaker filled with water on the beaker stand and place the sample weighing pan on top of the pan support.



Density (Specific Gravity) Measurement

- The density for a liquid can be set two ways. One is to set the water temperature and the other is to set the density value directly.
- The factory setting for density of a liquid is 25 °C as water temperature (the density value, $\rho = 0.99704 \text{ (g/cm}^3\text{)}$, is used for calculation).
- The result is shown with three decimal places.
- The density (specific gravity) is calculated by the following formula.

$$S = \frac{A}{A - B} \times \rho$$

S: Density (specific gravity) of a sample
A: Weight in air
B: Weight in liquid
 ρ : Density of liquid (water)

Change the Function Table

Selecting a way to set the density of a liquid

Select the liquid density input method from the function table below.

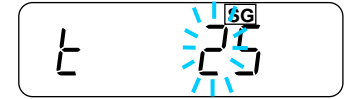
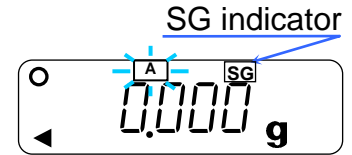
The function table is available only when the density measurement mode is selected.

Class	Item	Parameter	Description
Func	Ld in Liquid density input	◆ □	Water temperature
			Liquid density

◆ : Factory setting

Entering the density of a liquid ($Ld_{in} = 0$)

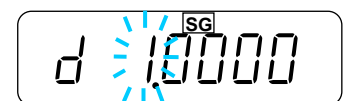
1. Press the **UNITS** key to select **SG**.
 2. Press and hold the **UNITS** key to display the liquid density input mode. The display will show the water temperature currently set (factory setting: 25 °C).
 3. Using the **RE-ZERO** (to increment the value) and **SAMPLE** keys (to shift the selected digit), set the value and press the **PRINT** key to store.
- To cancel the setting procedure and return to the density measuring mode, press the **UNITS** key. The input value is not stored.
 - The relation between the water temperature and density is shown below.



°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0	0.99984	0.99990	0.99994	0.99996	0.99997	0.99996	0.99994	0.99990	0.99985	0.99978
10	0.99970	0.99961	0.99949	0.99938	0.99924	0.99910	0.99894	0.99877	0.99860	0.99841
20	0.99820	0.99799	0.99777	0.99754	0.99730	0.99704	0.99678	0.99651	0.99623	0.99594
30	0.99565	0.99534	0.99503	0.99470	0.99437	0.99403	0.99368	0.99333	0.99297	0.99259
40	0.99222	0.99183	0.99144	0.99104	0.99063	0.99021	0.98979	0.98936	0.98893	0.98849
50	0.98804	0.98758	0.98712	0.98665	0.98618	0.98570	0.98521	0.98471	0.98422	0.98371
60	0.98320	0.98268	0.98216	0.98163	0.98110	0.98055	0.98001	0.97946	0.97890	0.97834
70	0.97777	0.97720	0.97662	0.97603	0.97544	0.97485	0.97425	0.97364	0.97303	0.97242
80	0.97180	0.97117	0.97054	0.96991	0.96927	0.96862	0.96797	0.96731	0.96665	0.96600
90	0.96532	0.96465	0.96397	0.96328	0.96259	0.96190	0.96120	0.96050	0.95979	0.95906

Entering the density of a liquid directly ($Ld_{in} = 1$)

1. Press the **UNITS** key to select **SG**.
 2. Press and hold the **UNITS** key to display the liquid density input mode. The display will show the liquid density currently set (factory setting: 1.0000 g/cm³).
 3. Using the **RE-ZERO** (to increment the value) and **SAMPLE** keys (to shift the selected digit), set the value and press the **PRINT** key to store.
- To cancel the setting procedure and return to the density measuring mode, press the **UNITS** key. The input value is not stored.

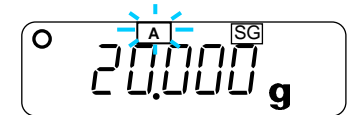
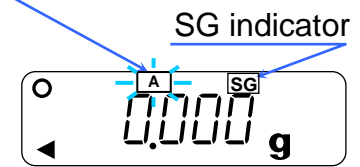


Example of Density Measurement

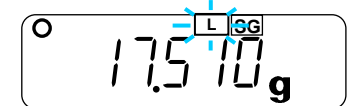
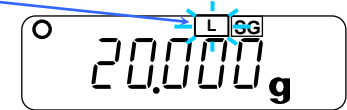
Selecting the density measurement mode

1. Press the **UNITS** key to select **SG** .
 - The weighing unit is “g”.
 - The display shows that **A** blinks and the balance is measuring the weight in air.
 - When the display does not show zero, press the **RE-ZERO** key to set the display to zero.
2. Place a sample on the upper pan.
3. Wait for the **STABLE** indicator to be displayed and press the **SAMPLE** key to store the weight in air.
4. The display shows that **L** blinks and the balance starts to measure the weight in water.
5. Place the sample on the lower pan in water.
 - Adjust the amount of water so that the sample is about 10 mm below the water surface.
6. Wait for the **STABLE** indicator to be displayed and press the **SAMPLE** key. Then the balance reads the weight in water and shows the density (specific gravity) of the sample.
7. To continue the density measurement, press the **SAMPLE** key again. To exit this measurement, press the **UNITS** key.

Measuring weight in air.

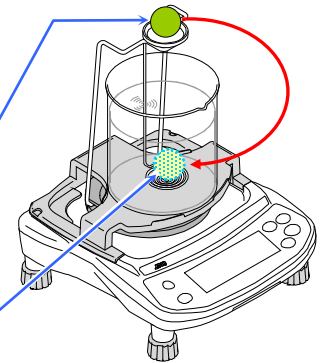


Measuring weight in water.



A : To weigh the sample in air.

L : To weigh the sample in water.

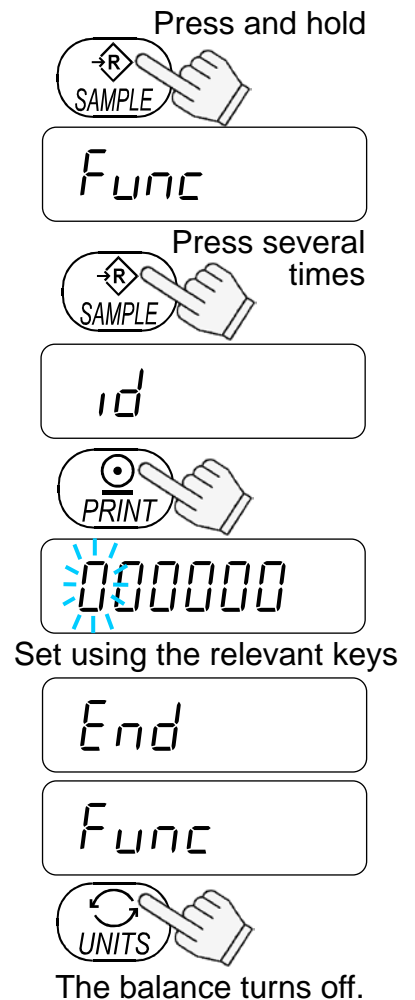


10. ID NUMBER AND GLP

- The ID number is used to identify the balance when Good Laboratory Practice (GLP) is used.
- The ID number is stored in memory even if the power to the balance is turned OFF.
- The following GLP data is transmitted to a printer or a personal computer using the optional RS-232C serial interface.
 - The result of calibration (“Calibration report”)
 - The result of calibration test (“Calibration test report”)
 - The “Title block” and “End block” for GLP data
- The GLP output format includes the balance manufacturer name, model number, serial number, ID number and space for a signature.
- By using the AD-8127/AD-8121B, printing out dates and times is possible (GLP output format $inF0 = I$).

10.1. Setting the ID Number

1. Press and hold the **SAMPLE** key to display **Func**.
2. Press the **SAMPLE** key several times to display **id**.
3. Press the **PRINT** key. Enter the ID number using the following keys.
 - SAMPLE** key To select the digit to be changed (flashing).
 - RE-ZERO** key To set the character of the digit selected. Refer to the table below for the “Display Character Set”.
 - PRINT** key To store the value and proceed to the next step.
 - UNITS** key To cancel the value and proceed to the next step.
4. When the above operation has been completed, **Func** appears after **End**.
5. Press the **UNITS** key to turn the balance off.



Display Character Set

0	1	2	3	4	5	6	7	8	9	-	_	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	-	_	A	B	C	d	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

“_” : Space

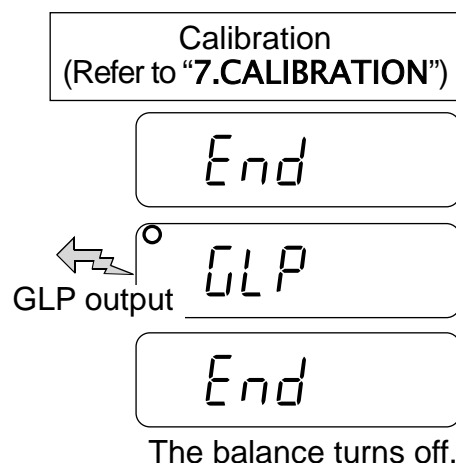
10.2. GLP Report

- To output the GLP report to the AD-8127 printer, set the function to “*inF0 1*” and set the printing mode of the printer to DUMP.
- To output the GLP report to the AD-8121B printer, set the function to “*inF0 1*” and set the printer to MODE 3.
- To output the GLP report to a personal computer, set the function to “*inF0 2*” and “*PUSE 0*”.

Calibration Report

Perform calibration using a weight. Then the balance will output a calibration report.

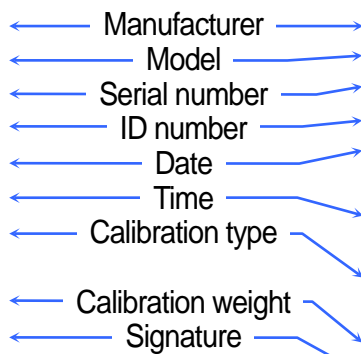
1. Perform calibration according to “7.1. Calibration Using a Weight”.
2. `End` appears when the calibration has been completed.
3. `GLP` appears and the calibration report is output.
4. `End` appears again. Remove the weight. The balance turns off.



AD-8127/AD-8121B format “*inF0 1*”

```

      A & D
MODEL   EJ-123
S/N     Q12345678
ID      ABCDEF
DATE    2013/11/14
TIME    02:53:21
CALIBRATED(EXT.)
CAL.WEIGHT
      +100.000 g
SIGNATURE
-----
    
```



General format “*inF0 2*”

```

.....A&_D<CRLF>
MODEL.....EJ-123<CRLF>
S/N.....Q12345678<CRLF>
ID.....ABCDEF<CRLF>
DATE<CRLF>
<CRLF>
TIME<CRLF>
<CRLF>
CALIBRATED(EXT.)<CRLF>
CAL.WEIGHT<CRLF>
.....+100.000..g<CRLF>
SIGNATURE<CRLF>
<CRLF>
<CRLF>
-----<CRLF>
<CRLF>
<CRLF>
    
```

- ␣ : Space, ASCII 20h
- CR : Carriage return, ASCII 0Dh
- LF : Line feed, ASCII 04Ah

Calibration Test Report

- ❑ The calibration test mode is used to compare a calibration test weight with the calibration test data weighed by the balance.
- ❑ This test does not perform calibration and this mode is available even after sealing the calibration (CAL) switch.

1. Press and hold the **SAMPLE** and **PRINT** keys until **[[** appears, and release both keys.

❑ Pressing and holding the calibration (CAL) switch will also display **[[** after **CAL**. Immediately release the CAL switch while **[[** is displayed.

2. **[[0** appears.

3. If necessary, change the value of the calibration test weight according to step 4 of “7.1. Calibration Using a Weight”.

4. With nothing on the pan, press the **PRINT** key. The zero point is measured and the weight value is displayed for a few seconds. Then, the display shows the value of the calibration test weight.

5. Place a weight of the same value as displayed on the pan and press the **PRINT** key to weigh it. The weight value is displayed for a few seconds.

6. **End** appears.

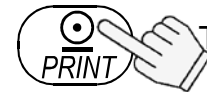
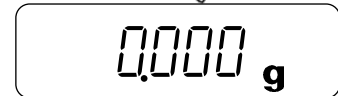
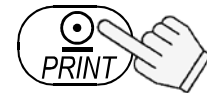
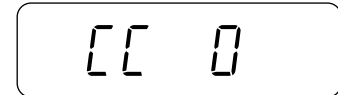
7. **GLP** appears and the calibration test report is output.

8. **End** appears again. Remove the weight. The balance turns off.

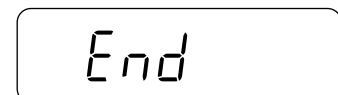
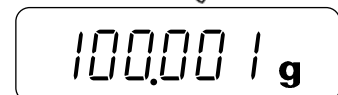
Press and hold both keys.



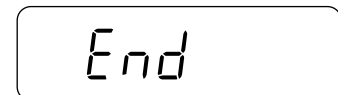
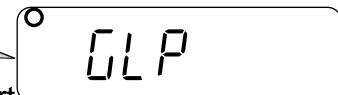
Release both keys.



To weigh



To output calibration test report



The balance turns off.

AD-8127/AD-8121B format “info 1”

```

      A & D
MODEL  EJ-123
S/N    012345678
ID     ABCDEF
DATE   2013/11/14
TIME   02:53:21
CAL.TEST(EXT.)
ACTUAL
      0.000 g
      +100.001 g
TARGET
      +100.000 g
SIGNATURE
-----
  
```

← Manufacturer →
 ← Model →
 ← Serial number →
 ← ID number →
 ← Date →
 ← Time →
 ← Calibration test type →
 ← Zero value →
 ← Target weight value →
 ← Target weight →
 ← Signature →

_ : Space, ASCII 20h
 CR : Carriage return, ASCII 0Dh
 LF : Line feed, ASCII 04Ah

General format “info 2”

```

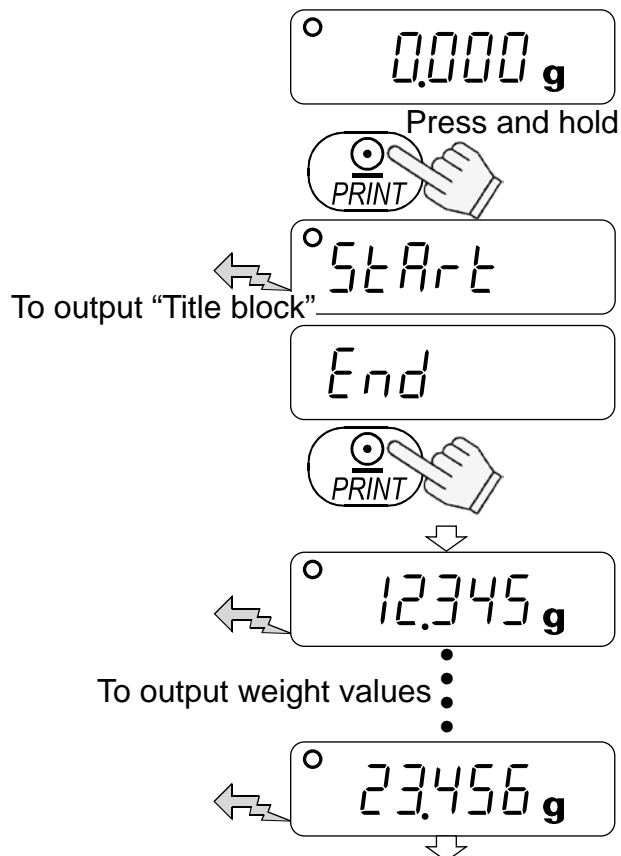
_____A_&_D<CRLF>
MODEL_____EJ-123<CRLF>
S/N_____Q12345678<CRLF>
ID_____ABCDEF<CRLF>
DATE<CRLF>
<CRLF>
TIME<CRLF>
<CRLF>
CAL.TEST(EXT.)<CRLF>
ACTUAL<CRLF>
_____0.000__g<CRLF>
_____+100.001__g<CRLF>
TARGET<CRLF>
_____+100.000__g<CRLF>
SIGNATURE<CRLF>
<CRLF>
<CRLF>
-----<CRLF>
<CRLF>
<CRLF>
  
```

Outputting the “Title block” and “End block”

- When weight values are recorded as the GLP report, the “Title block” and “End block” are added at the beginning and at the end of a group of weight values.

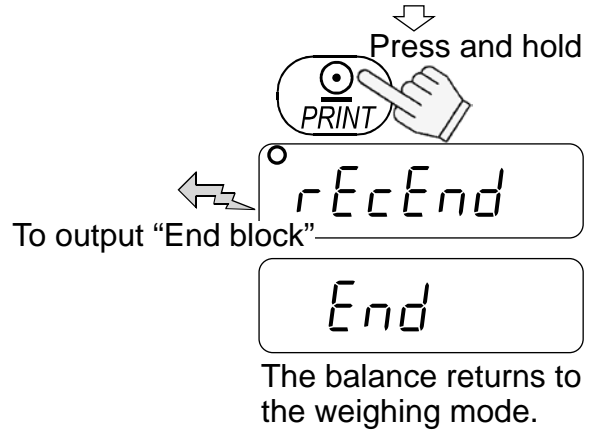
“Title block”

- Press and hold the **PRINT** key. Release the **PRINT** key when **Start** is displayed. The balance outputs the “Title block”.
- Press the **PRINT** key or select the auto-print mode to output the weight values.



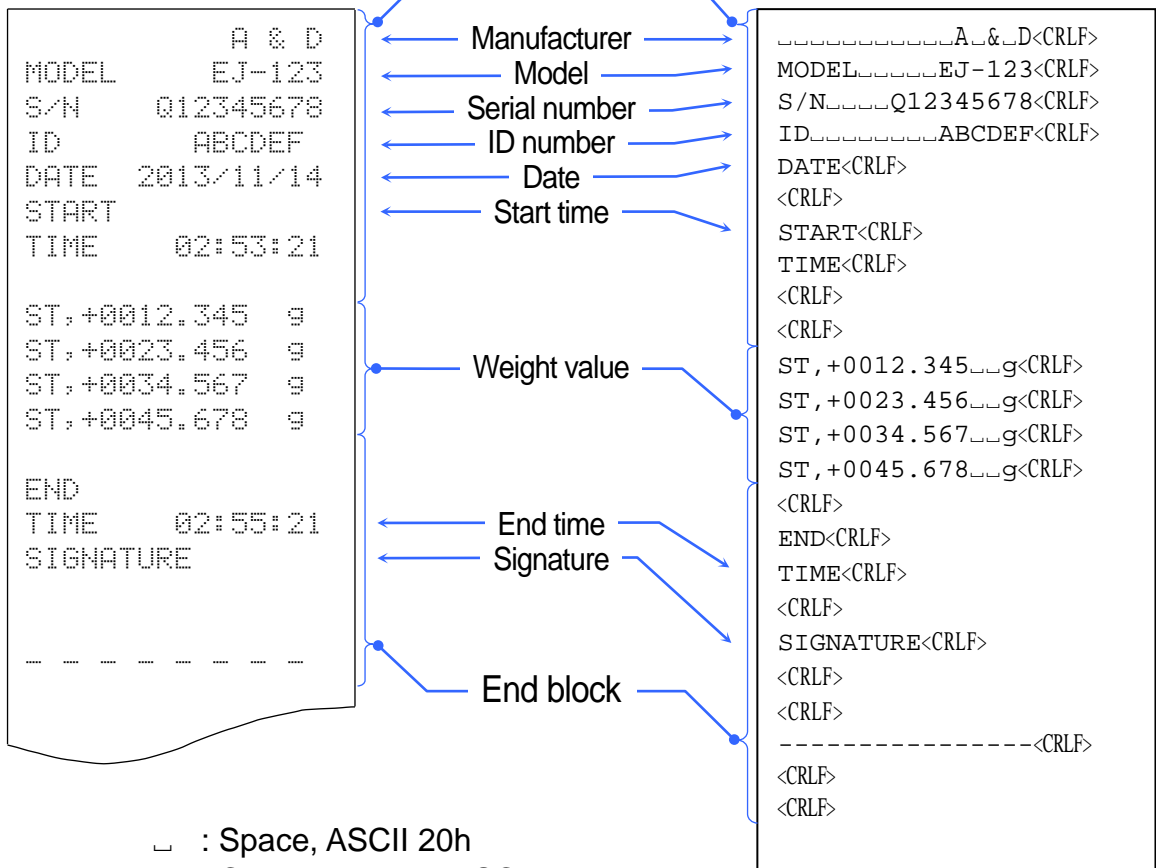
“End block”

- Press and hold the **PRINT** key. Release the **PRINT** key when `rEcEnd` is displayed. The balance outputs the “End block”.
- `End` appears. The balance returns to the weighing mode.



AD-8127/AD-8121B format “*info 1*”

General format “*info 2*”



- ␣ : Space, ASCII 20h
- CR : Carriage return, ASCII 0Dh
- LF : Line feed, ASCII 04Ah

11. MAINTENANCE

11.1. Notes on Maintenance

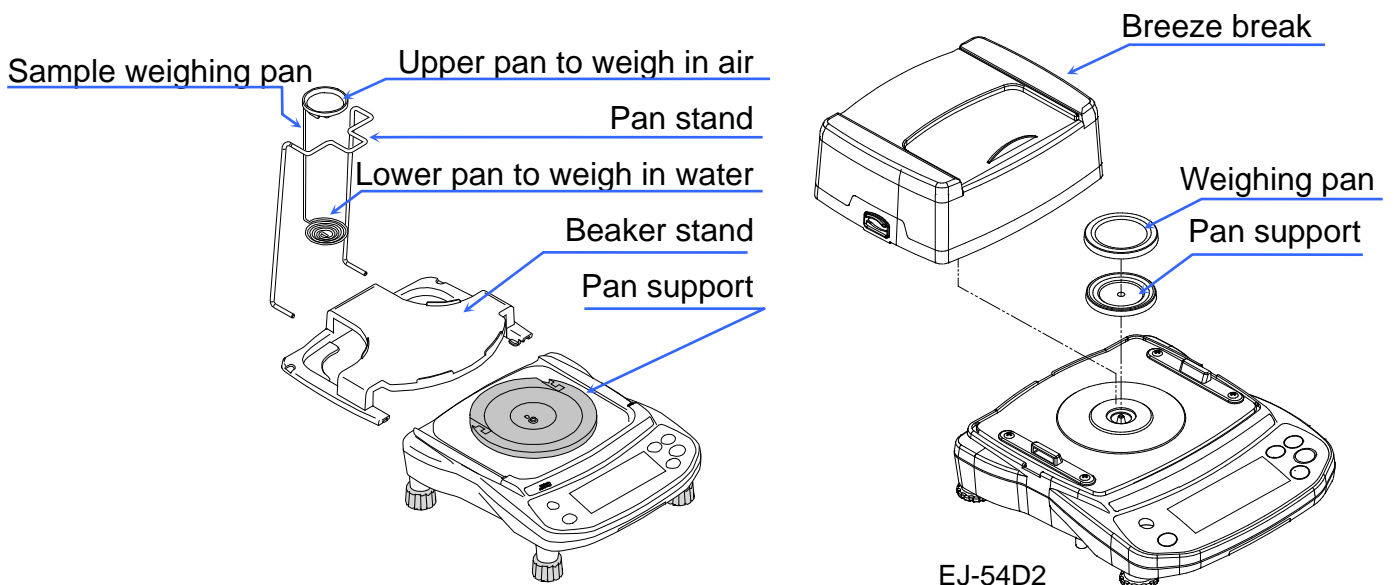
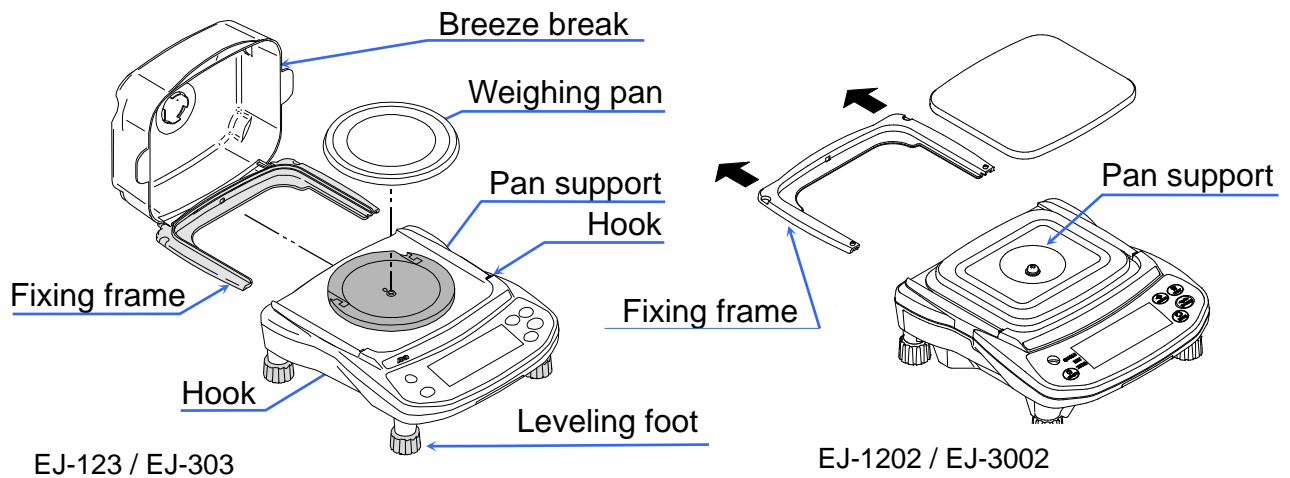
- Avoid mechanical shock to the balance.
- Do not disassemble the balance.
- Use the original package for transportation.
- Avoid dust and water so that the balance weighs correctly. Protect the internal parts from liquid spills and excessive dust.

Cleaning the Balance

Do not use organic solvents or chemical cloth to clean the balance.

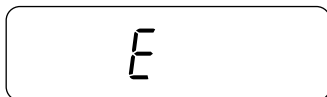
Balance main unit	To clean the balance main unit, use a lint free soft cloth moistened with a neutral detergent.
Breeze break	The parts of the breeze break have an antistatic coating. Clean the breeze break with a dry lint free soft cloth. Cleaning it repeatedly with a cloth moistened with a neutral detergent or water, or washing it with water may reduce the antistatic effect of the coating.

To clean the area around the pan support, refer to the illustration below.



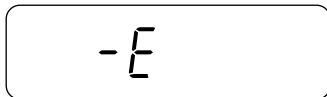
11.2. Error Codes

Overload error



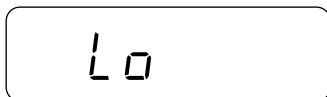
Warning to indicate that an object beyond the balance capacity has been placed on the pan.
Remove the object from the pan.

Range exceeding error



Warning to indicate that the balance has detected an excessive upward force.
Check if there is anything trapped under the edge of the weighing pan. There is a possibility that the weight sensor itself may have a failure.

Unit / 100% weight error



The sample weight is too light to be used as the unit weight in the counting mode or 100% reference weight in the % mode.

Sample quantity error



When the sample weight is light and the counting error could become large, the balance will request you to use larger number of samples.

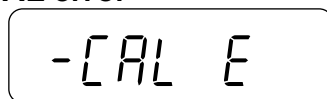
Place the displayed number of samples on the pan and press the **PRINT** key to store the unit weight.

Note: Pressing the **PRINT** key without adding samples is possible, but that may reduce the counting accuracy.

When starting from the 100 samples, **100 -** may be displayed if the sample weight is light. In this case, press the **PRINT** key without adding any samples.

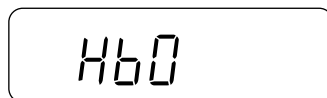
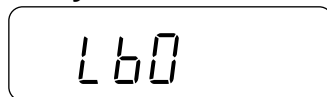
When “**ACAI, 0**” (ACAI disabled) or “**U \bar{n} in 2**” is selected, this error will not appear.

CAL error



Warning to indicate that calibration has been canceled because the calibration weight is too light.
Check the weighing pan and the calibration weight.

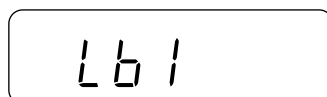
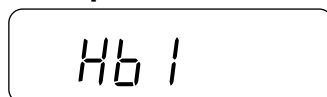
Battery error



Warning to show that the batteries are exhausted.
Replace the batteries with new ones or use the AC adapter.

Warning to show that the battery voltage is too high.
Check the batteries.

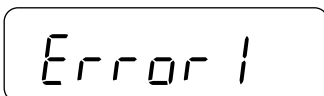
AC adapter error




Warning to show that the output voltage of an AC adapter is too high. Check if the AC adapter is the correct type.

Warning to show that the output voltage of an AC adapter is too low. Check if the AC adapter is the correct type.

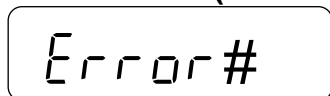
Stability error

A rectangular box with rounded corners containing the text "Error 1" in a monospaced, digital-style font.

Warning to indicate that the weight value is not stable and the balance cannot display it.

Prevent vibration and drafts. Press the  key to return to the weighing mode.

Internal errors (# is a number except 1.)

A rectangular box with rounded corners containing the text "Error #" in a monospaced, digital-style font.

The balance detects an error state in internal processing. With nothing on the weighing pan, turn the power OFF and ON again. If the error persists, request service.

- Error 3: EEPROM (non-volatile memory) failure
- Error 5: Mass sensor failure
- Error 6: Temperature sensor failure
- Error 7: Voltage detection unit failure

If you cannot resolve an error or other errors occur, request service from the store where you purchased the balance or from your local A&D dealer.

12. SPECIFICATIONS

12.1. Generals

MODEL	EJ-123	EJ-303
Weight capacity	120 g	310 g
Readability	0.001 g	0.001 g
Repeatability (Standard deviation)	0.003 g	0.003 g
Linearity	±0.003 g	±0.003 g
Sensitivity drift	±20 ppm / °C (10 °C to 30 °C / 50 °F to 86 °F)	
Number of samples	5, 10, 25, 50 or 100 pieces	
Max. count *	120,000 pcs	310,000 pcs
Min. unit weight *	0.001 g	
% readability	0.01 %	
Min. 100 % weight	0.1 g	
Display	7-segment LCD with backlight (Character height 16 mm)	
Display update	10 times per second	
Operating temperature and humidity range	10 °C to 30 °C / 50 °F to 86 °F, 85 %R.H. or less (non-condensing)	
Power supply	AC adapter or 4 x size "AA" batteries	
Battery operation	Approximately 80 hours (backlight off, alkaline batteries)	
Weighing pan size	110 mm φ	
Weight	Approximately 1160 g	
Calibration weight (factory setting)	100 g	300 g

* : In case of "0.001 g" (factory setting)

MODEL	EJ-1202	EJ-3002
Weight capacity	1200 g	3100 g
Readability	0.01 g	0.01 g
Repeatability (Standard deviation)	0.03 g	0.03 g
Linearity	±0.03 g	±0.03 g
Sensitivity drift	±20 ppm / °C (10 °C to 30 °C / 50 °F to 86 °F)	
Number of samples	5, 10, 25, 50 or 100 pieces	
Max. count *	120,000 pcs	310,000 pcs
Min. unit weight *	0.01 g	
% readability	0.01 %	
Min. 100 % weight	1 g	
Display	7 segment LCD with backlight (Character height 16 mm)	
Display update	10 times per second	
Operating temperature and humidity range	10 °C to 30 °C / 50 °F to 86 °F, 85 %R.H. or less (non-condensing)	
Power supply	AC adapter or 4 x size "AA" batteries	
Battery operation	Approximately 80 hours (backlight off, alkaline batteries)	
Weighing pan size	127 mm x 140 mm	
Weight	Approximately 1490 g	
Calibration weight (factory setting)	1000 g	3000 g

* : In case of "0.01 g" (factory setting)

MODEL	EJ-54D2	
Weighing capacity	22 g	52 g
Readability	0.0002 g	0.001 g
Repeatability (standard deviation)	0.0004 g	0.001 g
Linearity	±0.0006 g	±0.001 g
Sensitivity drift	±20 ppm / °C (10 °C to 30 °C / 50 °F to 86 °F)	
Number of samples	5, 10, 25, 50 or 100 pieces	
Max. count *	260,000 pcs	
Min. unit weight *	0.0002 g	
% readability	0.01%	
Min. 100% weight	0.02 g	
Display	7-segment LCD with backlight (Character height 16 mm)	
Display update	10 times per second	
Operating temperature and humidity range	10 °C to 30 °C / 50 °F to 86 °F, 85%R.H. or less (non-condensing)	
Power supply	AC adapter or 4 x size "AA" batteries	
Battery operation	Approximately 70 hours (backlight off, alkaline batteries)	
Weighing pan size	50 mm φ	
Weight	Approximately 1020 g	
Calibration weight (factory setting)	50 g	

* : In case of "0.01 g" (factory setting)

12.2. Other Weighing Units

MODEL		EJ-123	EJ-303	EJ-1202	EJ-3002	EJ-54D2	
oz	Capacity	4.23290	10.93495	42.3290	109.3495	0.77603	1.83425
	Min. display	0.00005	0.00005	0.0005	0.0005	0.00001	0.00005
lb	Capacity	-----	-----	2.64555	6.83435	-----	-----
	Min. display	-----	-----	0.00005	0.00005	-----	-----
ozt	Capacity	3.85810	9.96675	38.5810	99.6675	0.70732	1.67185
	Min. display	0.00005	0.00005	0.0005	0.0005	0.00001	0.00005
ct	Capacity	600.000	1550.000	6000.00	15500.00	110.000	260.000
	Min. display	0.005	0.005	0.05	0.05	0.001	0.005
mom	Capacity	32.0000	82.6665	320.000	826.665	5.8667	13.8665
	Min. display	0.0005	0.0005	0.005	0.005	0.0001	0.0005
dwt	Capacity	77.162	199.335	771.62	1993.35	14.1464	33.437
	Min. display	0.001	0.001	0.01	0.01	0.0002	0.001
GN	Capacity	1851.88	4784.04	18518.8	47840.4	339.510	802.48
	Min. display	0.02	0.02	0.2	0.2	0.005	0.02
tola	Capacity	10.2882	26.5780	102.882	265.780	1.88618	4.4582
	Min. display	0.0001	0.0001	0.001	0.001	0.00002	0.0001
tl (HG)**	Capacity	3.17465	8.20120	31.7465	82.0120	0.58202	1.37570
	Min. display	0.00005	0.00005	0.0005	0.0005	0.00001	0.00005
tl (HJ)**	Capacity	3.20605	8.28235	32.0605	82.8235	0.58778	1.38930
	Min. display	0.00005	0.00005	0.0005	0.0005	0.00001	0.00005
tl (T)**	Capacity	3.20000	8.26665	32.0000	82.6665	0.58667	1.38665
	Min. display	0.00005	0.00005	0.0005	0.0005	0.00001	0.00005

****The unit “t (tola)” and three kinds of “tl (tael)” are for special versions only and one of them will be available.**

tl (HG): Hong Kong General / Singapore tael

tl (HJ): Hong Kong Jewelry tael

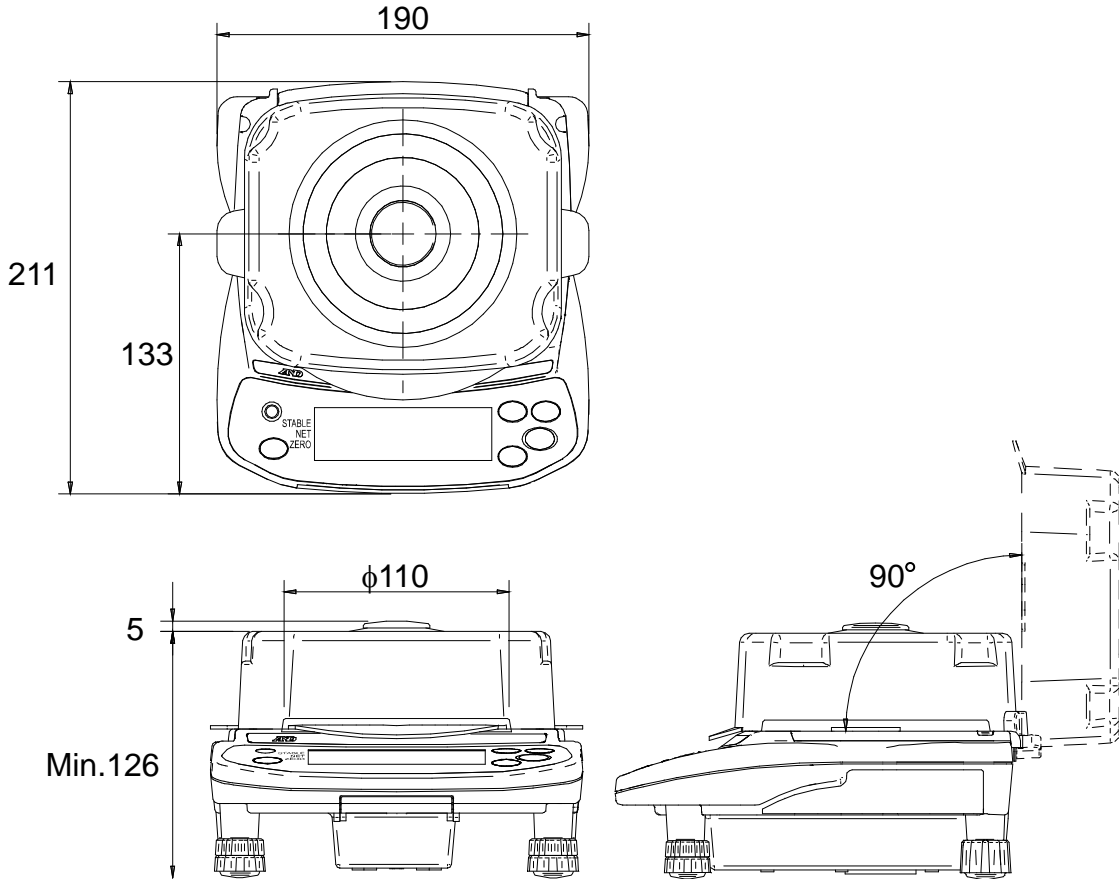
tl (T): Taiwan tael

12.3. Options

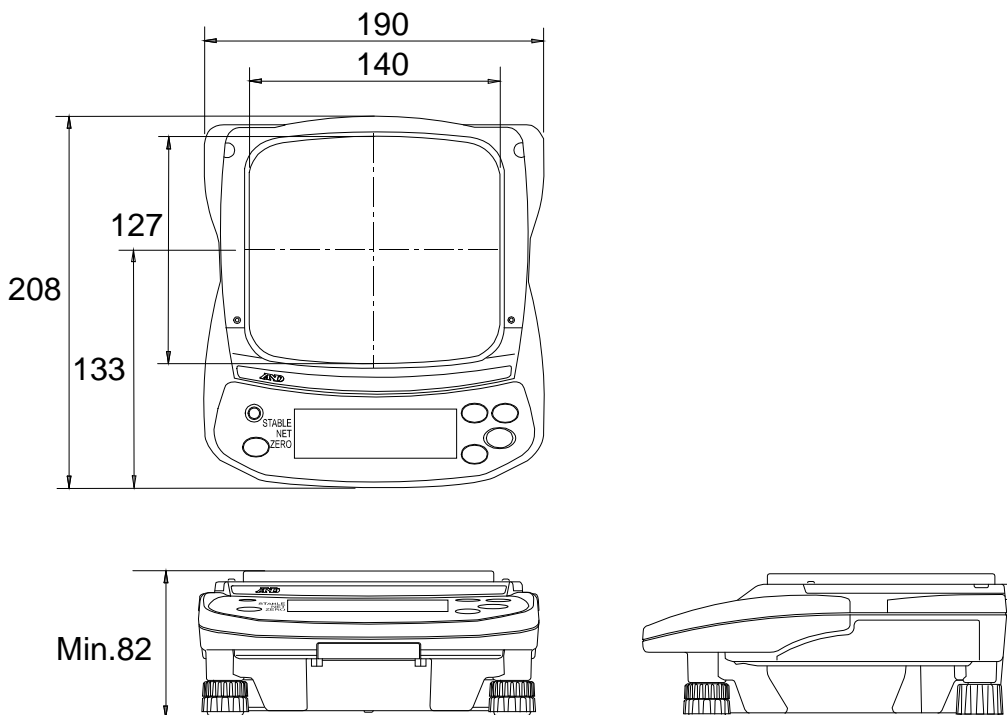
- EJ-02 USB interface
- EJ-03 RS-232C serial interface
- EJ-13 Density determination kit for EJ-123 / EJ-303

12.4. Dimensions

EJ-123 / EJ-303

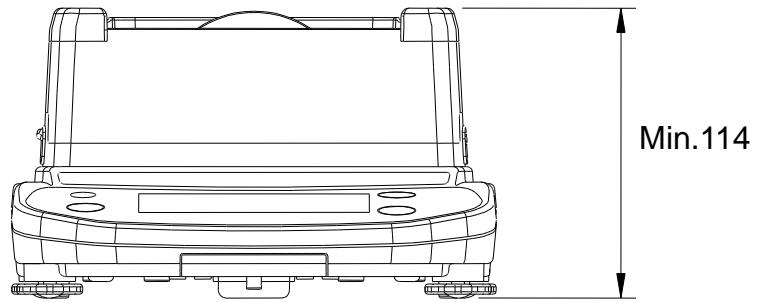
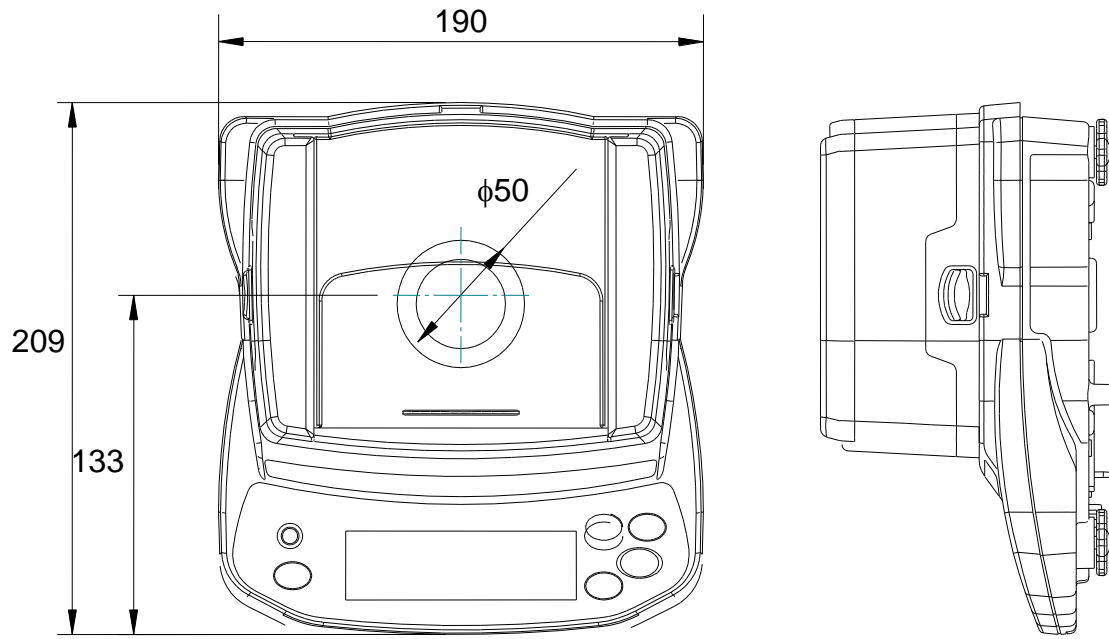


EJ-1202 / EJ-3002

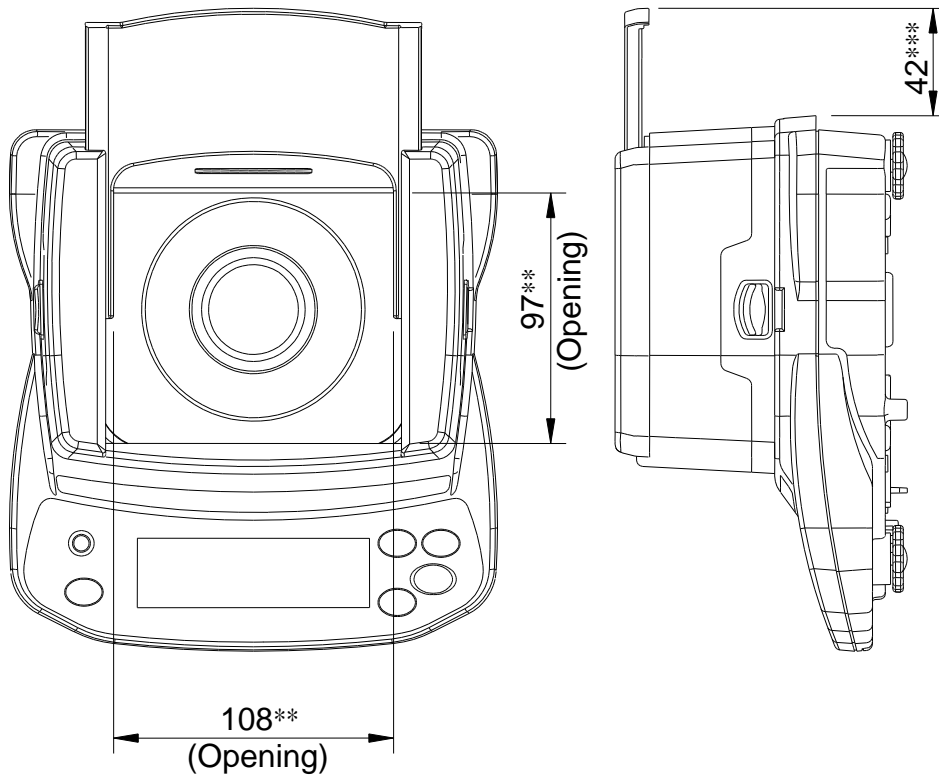
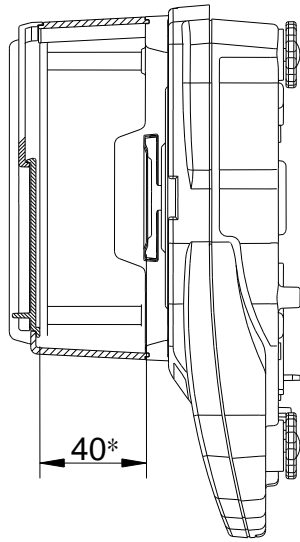


Unit: mm

EJ-54D2



Unit: mm



Unit: mm

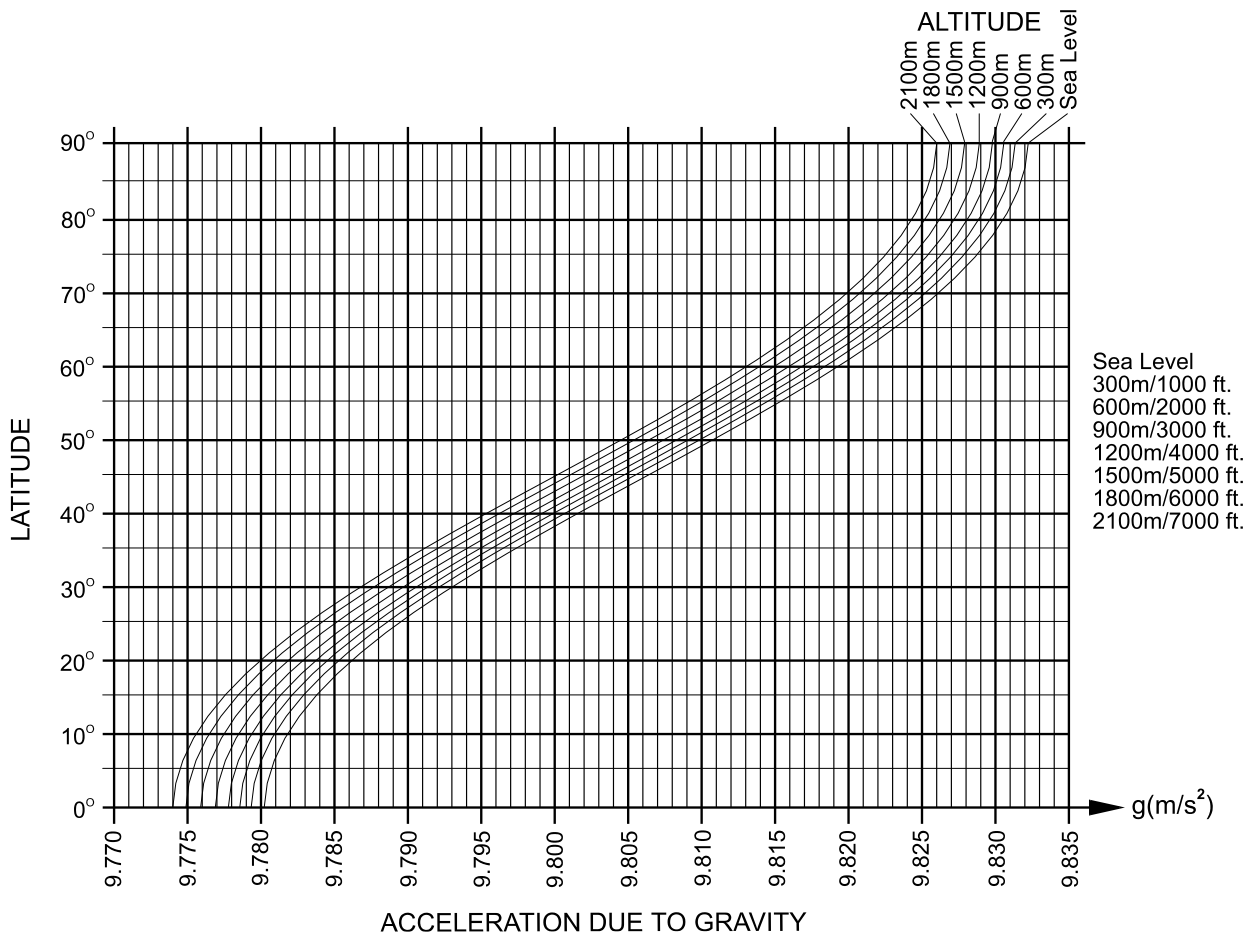
- * : Inside size from the center of the weighing pan to the sliding door
- ** : Size of the breeze break opening
- *** : Size of the sliding door protruding from the rear of the balance when opened

13. GRAVITY ACCELERATION MAP

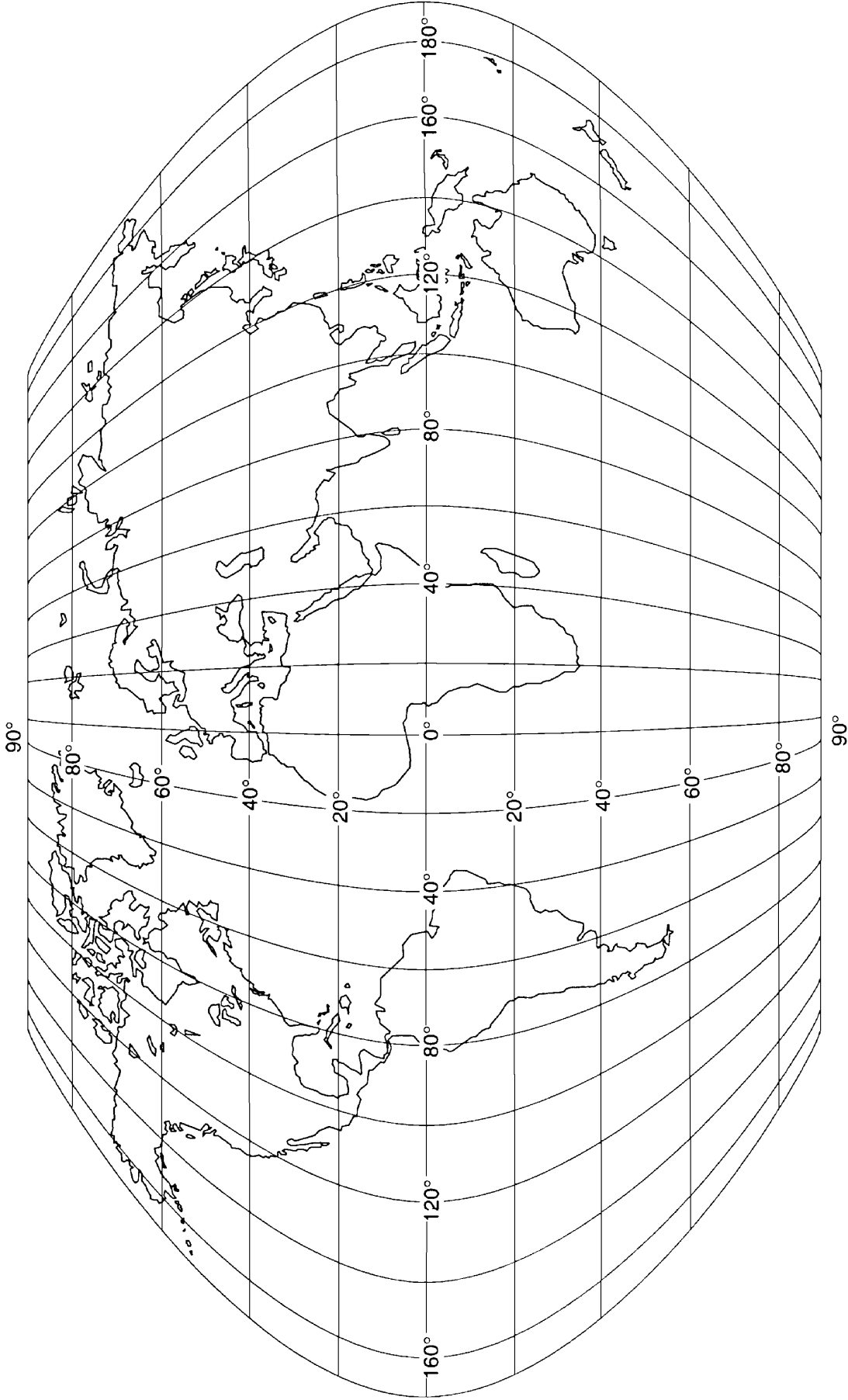
Values of Gravity at Various Locations

Amsterdam	9.813 m/s ²
Athens	9.807 m/s ²
Auckland NZ	9.799 m/s ²
Bangkok	9.783 m/s ²
Birmingham	9.813 m/s ²
Brussels	9.811 m/s ²
Buenos Aires	9.797 m/s ²
Calcutta	9.788 m/s ²
Cape Town	9.796 m/s ²
Chicago	9.803 m/s ²
Copenhagen	9.815 m/s ²
Cyprus	9.797 m/s ²
Djakarta	9.781 m/s ²
Frankfurt	9.810 m/s ²
Glasgow	9.816 m/s ²
Havana	9.788 m/s ²
Helsinki	9.819 m/s ²
Kuwait	9.793 m/s ²
Lisbon	9.801 m/s ²
London (Greenwich)	9.812 m/s ²
Los Angeles	9.796 m/s ²
Madrid	9.800 m/s ²

Manila	9.784 m/s ²
Melbourne	9.800 m/s ²
Mexico City	9.779 m/s ²
Milan	9.806 m/s ²
New York	9.802 m/s ²
Oslo	9.819 m/s ²
Ottawa	9.806 m/s ²
Paris	9.809 m/s ²
Rio de Janeiro	9.788 m/s ²
Rome	9.803 m/s ²
San Francisco	9.800 m/s ²
Singapore	9.781 m/s ²
Stockholm	9.818 m/s ²
Sydney	9.797 m/s ²
Taichung	9.789 m/s ²
Tainan	9.788 m/s ²
Taipei	9.790 m/s ²
Tokyo	9.798 m/s ²
Vancouver, BC	9.809 m/s ²
Washington DC	9.801 m/s ²
Wellington NZ	9.803 m/s ²
Zurich	9.807 m/s ²



World Map



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